NUREG-1767, Vol. 1

Environmental Impact Statement on the Construction and Operation of a Proposed Mixed Oxide Fuel Fabrication Facility at the Savannah River Site, South Carolina

Chapters 1 through 8 and Appendices A through E

Final Report

U.S. Nuclear Regulatory Commission
Office of Nuclear Material Safety and Safeguards
Washington, DC 20555-0001

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Division of Waste Management and Environmental Protection
Office of Nuclear Material Safety and Safeguards
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ABSTRACT

The U.S. Department of Energy (DOE) has contracted with Duke Cogema Stone & Webster (DCS) to design, construct, and operate a proposed Mixed Oxide (MOX) Fuel Fabrication Facility that would convert depleted uranium and weapons-grade plutonium into MOX fuel. The proposed MOX facility would be located on the DOE's Savannah River Site in South Carolina. Use of the proposed facility to produce MOX fuel would be part of the DOE's surplus plutonium disposition program. The purpose of the DOE program is to ensure that plutonium produced for nuclear weapons and declared excess to national security is converted to proliferation-resistant forms.

This final environmental impact statement (FEIS) was prepared in compliance with the National Environmental Policy Act (NEPA), the U.S. Nuclear Regulatory Commission's (NRC's) regulations for implementing NEPA, and the guidance provided by the Council on Environmental Quality regulations implementing the procedural provisions of NEPA. This FEIS evaluates the potential environmental impacts of the proposed action. The document discusses the purpose and need for the proposed action, describes the proposed action and its reasonable alternatives, describes the environment potentially affected by the proposal, presents and compares the potential environmental impacts resulting from the proposed action and its alternatives, and identifies mitigation measures that could eliminate or lessen the potential environmental impacts. The document also includes comments received on the draft environmental impact statement and NRC's responses.

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EXECUTIVE SUMMARY

The consortium of Duke Project Services Group, Inc., COGEMA, Inc., and Stone & Webster, Inc., has formed a Limited Liability Company called Duke Cogema Stone & Webster (DCS). DCS has been hired by the U.S. Department of Energy (DOE) to design, construct, and operate a facility (the proposed MOX facility) that would convert depleted uranium and surplus weapons-grade plutonium into mixed oxide (MOX) fuel. The DOE is responsible for the surplus plutonium disposition program for the United States. Within this program, the U.S. Nuclear Regulatory Commission (NRC) has the independent responsibility of determining whether the proposed MOX facility can be built and operated in a safe and environmentally acceptable manner. The proposed action requiring the February 2003 draft environmental impact statement (DEIS) and this NRC final environmental impact statement (FEIS) involves a decision by the NRC whether to authorize DCS to construct and later operate the proposed MOX facility at DOE's Savannah River Site (SRS) in South Carolina. DCS has submitted to the NRC, among other documents, a revised Construction Authorization Request (CAR) and a revised environmental report (ER), in seeking authority to begin constructing the proposed MOX facility.

This FEIS was prepared by the staff of the NRC and its contractor, Argonne National Laboratory, and complies with the National Environmental Policy Act (NEPA), NRC regulations for implementing NEPA (Title 10, Part 51 of the *Code of Federal Regulations* [10 CFR Part 51]), and the applicable Council on Environmental Quality (CEQ) regulations.

The proposed MOX facility would convert 34 metric tons (MT) (37.5 tons) of surplus weapons-grade plutonium into MOX fuel. This facility would be built on 16.6 ha (41 acres) of land in the F-Area of the SRS. If the NRC approves the CAR, DCS plans to request a 10 CFR Part 70 license to possess and use special nuclear material at the proposed MOX facility. Such a license would allow DCS to operate the proposed MOX facility for 20 years. The facility would be designed for a maximum annual throughput of 3.5 MT (3.9 tons) of plutonium.

Feedstock (surplus plutonium dioxide and depleted uranium dioxide) would be required to be transported to the SRS to make the MOX fuel. The surplus plutonium is currently stored at seven DOE facilities at various locations in the United States. Additionally, depleted uranium hexafluoride would need to be transported from a DOE site (assumed to be the gaseous diffusion uranium enrichment facility in Portsmouth, Ohio) to a commercial fuel fabrication facility (assumed to be the Global Nuclear Fuel Americas, LLC, in Wilmington, North Carolina), where it would be converted to depleted uranium dioxide, which would then be transported to the SRS. Once manufactured, the MOX fuel would be transported to mission reactors, where it would be irradiated. For purposes of complying with NEPA's requirements, it is assumed that one or more reactors will later be authorized by the NRC to use MOX fuel, and the FEIS includes a generic evaluation of using MOX fuel in a reactor. In order for a specific commercial reactor to use MOX fuel, an amendment to its 10 CFR Part 50 NRC license would be required. The NRC would analyze the site-specific environmental impacts related to such an amendment if and when such a request was made to the NRC. Following irradiation and storage at reactor sites, the spent MOX fuel would be transported to a geologic repository (assuming one is later licensed by the NRC to operate) for final disposal, and the FEIS includes a discussion of spent MOX fuel transportation impacts.

In addition to presenting the potential environmental impacts of the proposed MOX facility and the related fuel cycle impacts, this FEIS discusses two proposed DOE facilities — the Pit Disassembly and Conversion Facility (PDCF) and the Waste Solidification Building (WSB) — which would also be located at the SRS, that would be required to support operation of the proposed MOX facility. The PDCF would be required to convert approximately 25.6 MT (28.2 tons) of surplus plutonium from a metallic form to plutonium dioxide powder. The remaining quantity of surplus plutonium, called "alternate feedstock," would be in a form that would be suitable to go directly to the proposed MOX facility. The proposed MOX facility would remove impurities from the plutonium dioxide and mix it with depleted uranium dioxide to make MOX fuel.

The WSB would process liquid waste streams from the PDCF and proposed MOX facility. The WSB may also be used for temporary storage and processing of other waste forms generated at the proposed MOX facility and the PDCF before such wastes are transferred to the SRS waste management system or shipped off-site for disposition. In addition, infrastructure upgrades would be needed to support the proposed MOX facility. These upgrades would include constructing waste transfer pipelines, realigning electric utility lines, and adding access roads.

A brief summary of FEIS Chapters 1-6 follows. Chapter 1 of the FEIS discusses the purpose and need for this action and its relationship to the DOE's surplus plutonium disposition program. The fundamental purpose of this DOE program is to ensure that surplus weapons-grade plutonium is converted to proliferation-resistant forms. The DOE's program is intended to lay the foundation for parallel disposition of excess Russian plutonium, thereby protecting against proliferation of materials capable of making weapons of mass destruction.

Chapter 2 of this FEIS describes the proposed action and alternatives to the proposed action, including the no-action alternative. The no-action alternative consists of the continued storage of surplus plutonium at various locations throughout the DOE complex, in the event the NRC does not approve the proposed MOX facility. This alternative is evaluated in detail in Chapter 4. Other alternatives to the proposed action discussed in Chapter 2 include alternate locations for the proposed MOX facility in the F-Area, alternate technology and design options, immobilizing surplus plutonium instead of producing MOX fuel, deliberately making off-specification MOX fuel, the "MIX MOX" alternative, and the Parallex Project (which involves irradiating the MOX fuel in Canadian deuterium uranium reactors).

Chapter 3 describes the environment that would be affected by the proposed action and includes discussions on soils, hydrology, air quality, local ecology, waste management, risks to human health, and socioeconomic issues.

Chapter 4 evaluates and compares the environmental effects of the proposed action and the no-action alternative. Significant or more important potential impacts are discussed in Chapter 4, which includes the following topics: (1) human health, (2) air quality, (3) hydrology,

(4) waste management, (5) accident impacts, (6) decommissioning, and (7) environmental justice. Indirect impacts of transportation of radioactive materials, conversion of depleted uranium, and reactor use are discussed in Chapter 4. The following potential impacts for the no-action alternative and proposed action are considered to be less significant and are discussed in Appendixes G and H: (1) geology, seismology, and soils; (2) noise; (3) ecology; (4) land use; (5) cultural and paleontological resources; (6) infrastructure; and (7) socioeconomics. A summary of the significant or more important potential impacts discussed in Chapter 4 is presented below.

The annual collective dose to members of the public (i.e., those living and working within 80 km [50 mi] of the SRS) produced by routine operation of the proposed MOX facility, the PDCF, and the WSB would be expected to result in a latent cancer fatality (LCF) rate of approximately 0.0009/yr or less. Routine operation of the proposed MOX facility, the PDCF, and the WSB is expected to produce small air quality impacts and would not cause exceedance of any ambient air quality standard level for criteria pollutants at the SRS.

Construction and routine operation of the proposed facilities would not be expected to cause any disproportionately high and adverse impacts to low-income or minority populations in the SRS vicinity. Of the accidents evaluated, a hypothetical PDCF tritium release accident had the highest estimated short-term impacts, approximately 3 LCFs among members of the off-site public. Such an accident also had the highest estimated 1-year exposure impact, including the ingestion dose, of up to 100 LCFs among members of the off-site public. However, it is regarded as highly unlikely that such an accident would occur, and the risk to any population, including low-income and minority communities, is considered to be low. Nevertheless, the communities most likely to be affected by a significant accident would be minority or low-income, given the demographics and prevailing wind direction. The extent to which low-income or minority population groups would be affected would depend on the amount of material released and the direction and speed of the wind.

Transportation of uranium and plutonium feedstock materials, transuranic waste, fresh MOX fuel, and spent MOX fuel would result in approximately 3,300,000 to 8,200,000 km (2,050,000 to 5,100,000 mi) traveled by 1,497 to 3,512 truck shipments over the operations period of the proposed MOX facility. Up to 1 LCF might be expected from the radioactive nature of the cargo. (Estimated LCFs for members of the public and the transportation crews were 0.2 to 0.4 and 0.1 to 0.3, respectively.) One to two latent fatalities from vehicle emissions were estimated, and no fatalities (0.078 to 0.20 fatality) from the physical trauma of potential vehicle accidents were estimated.

Chapter 4 of the FEIS also evaluates the use of MOX fuel in a generic reactor using a 40% MOX fuel core. For both normal operations and design-basis accidents, the impacts of using MOX fuel in a reactor would not be significantly different from the impacts of a reactor using 100% low-enriched uranium fuel. For highly unlikely beyond-design-basis accidents, the impacts for a reactor using a 40% MOX fuel core could be up to 14% greater than for a reactor using 100% low-enriched uranium fuel. Since no reactor licensee has yet sought the authority to use MOX fuel, the transportation of fresh MOX fuel is also evaluated on a generic basis, using a surrogate reactor located in the Midwest.

Chapter 4 also presents the costs and benefits of the proposed action. The primary benefit of operating the proposed MOX facility would be the resulting reduction in the supply of weapons-grade plutonium available for unauthorized use. Converting surplus plutonium in this manner is viewed as being a safer use/disposition strategy than the DOE's continued storage of surplus plutonium, as would occur under the no-action alternative, because it would reduce the number of locations where the various forms of plutonium are stored. Further, converting weapons-grade plutonium into MOX fuel in the United States — as opposed to immobilizing a portion of it as the DOE had previously planned to do — lays the foundation for parallel disposition of weapons-grade plutonium in Russia, which distrusts immobilization because of its failure to degrade the plutonium's isotopic composition. Converting surplus plutonium into MOX fuel is thus viewed as a better way of ensuring that weapons-usable material will not be obtained by rogue states and terrorist groups. Implementing the proposed action is expected to promote the above nonproliferation objectives.

In addition to the above primary benefits, there would be secondary economic benefits of the proposed action. Impacts of construction on the regional economic area (REA) and region of influence (ROI) would be beneficial with respect to jobs and income. During operations, the proposed MOX facility, PDCF, and WSB would be expected to generate 490 direct and 780 indirect jobs, producing a total income of $64 million a year in the REA. The economic cost benefit analysis for the proposed action shows an overall net benefit to the ROI and REA of $1,940 million. National economic costs for the proposed MOX facility, PDCF, and WSB are estimated to be $4,064 million (in 2003 dollars). The national economic benefits would include adding employment and income in various sectors of the economy through the purchase of goods and services required during construction and operation.

Chapter 5 of the FEIS identifies mitigation measures that could eliminate or lessen the potential environmental impacts of the proposed action. The NRC evaluated proposed mitigation measures identified by DCS and identified additional measures that could reduce or eliminate adverse environmental impacts of the proposed action. On the basis of its independent review, the NRC is making a preliminary conclusion that the potential significant impacts of the proposed action can be mitigated. However, any possession and use license issued to DCS should be conditioned on the commitments made by DCS and the various proposed NRC mitigation requirements discussed in Chapter 5.

Chapter 6 presents the many federal, state, and local environmental requirements that would be applicable to the proposed MOX facility.

After weighing the costs and benefits of the proposed action, comparing alternatives, and considering the comments received on the DEIS (see FEIS Appendix J), the NRC staff, in accordance with 10 CFR 51.91(d), includes in this FEIS its final NEPA recommendation regarding the proposed action. As discussed further in Chapter 2, the NRC staff continues to recommend that, unless safety issues mandate otherwise, the action called for is the issuance of the proposed license to DCS, with conditions to protect environmental values. As stated in Chapter 2, the NRC staff concludes that (1) the applicable environmental requirements presented in FEIS Chapter 6 and (2) the proposed mitigation measures discussed in FEIS

Chapter 5 would eliminate or substantially lessen any potential adverse environmental impacts associated with the proposed action.

Appendix J includes a summary of the comments and responses received on the DEIS. Ninety-four commenters submitted about 750 comments on the DEIS. Appendix J also identifies changes in the FEIS text based on the comments and revised accident analyses from new design information for the WSB provided by DCS since publication of the DEIS.

ACRONYMS AND ABBREVIATIONS

The following is a list of the acronyms, initialisms, abbreviations, and units of measure used in this document. Some acronyms and abbreviations used only in tables, figures, equations, or as reference callouts are defined in the respective tables, figures, equations, and reference lists.

Acronyms, Initialisms, and Abbreviations

7Q10	7-day low flow, 10-year recurrence flow
AADT	average annual daily traffic
ADU	ammonium diuranate
AEA	Atomic Energy Act
Ag	silver
$AgNO_3$	silver nitrate
ALARA	as low as reasonably achievable
ALI	annual limit on intake
ALOHA	Areal Locations of Hazardous Atmospheres (computer code)
Am	americium
ANL-W	Argonne National Laboratory-West
ANSI	American National Standards Institute
APA	aqueous polishing area
APSF	Actinide Packaging and Storage Facility
AQCR	Air Quality Control Region
BPIP	Building Profile Input Program
BRP	Reagents Processing Building
CAA	Clean Air Act
CANDU	Canadian Deuterium Uranium (reactor)
CAR	Construction Authorization Request
CAS	Chemical Abstract Services
CEDE	committed effective dose equivalent
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	*Code of Federal Regulations*
CH-TRU	contact-handled transuranic (waste)
CIESIN	Center for International Earth Science Information Network
CIF	Consolidated Incineration Facility
CO	carbon monoxide
CO_2	carbon dioxide
CPT	cone-penetration test
CSWTF	Central Sanitary Wastewater Treatment Facility
CWA	Clean Water Act

D&D	deactivation and decommissioning
DCP	dry conversion process
DCS	Duke Cogema Stone & Webster
DDE	deep dose equivalent
DEIS	draft environmental impact statement
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
DWPF	Defense Waste Processing Facility
EA	environmental assessment
EBR-II	Experimental Breeder Reactor-II
EDE	effective dose equivalent
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
ER	Environmental Report
ERPG	Emergency Response Planning Guideline
ETF	Effluent Treatment Facility
FEIS	final environmental impact statement
FGR	Federal Guidance Report
FOF	F-Area Outside Facility
FONSI	Finding of No Significant Impact
FR	*Federal Register*
FSER	final safety evaluation report
FTE	full-time equivalent
FY	fiscal year
Ga	gallium
GE	General Electric
GENII	Generation II (computer code)
GRP	gross regional product
$H_2C_2O_4$	oxalic acid
HEPA	high-efficiency particulate air (filter)
HEU	highly enriched uranium
HF	hydrogen fluoride
HI	hazard index
HLW	high-level (radioactive) waste
HQ	hazard quotient
HRCQ	highway route controlled quantity
HSWA	Hazardous and Solid Waste Amendments
HVAC	heating, ventilation, and air conditioning
HYDOX	hydride-oxidation
ICRP	International Commission on Radiological Protection
IMPLAN	Intelligent Multi-Resource Planning (computer code)

INEEL	Idaho National Engineering and Environmental Laboratory
ISA	integrated safety analysis
ISCST3	Industrial Source Complex Short-Term (version 3) model
ISFSI	interim spent fuel storage installation
ITP	in-tank precipitation
KAMS	K-Area Material Storage (SRS)
LANL	Los Alamos National Laboratory
LCF	latent cancer fatality
L_{dn}	day-night average sound level
L_{eq}	equivalent sound pressure level
LEU	low-enriched uranium
LLC	Limited Liability Company
LLNL	Lawrence Livermore National Laboratory
LLW	low-level (radioactive) waste
LSA	low specific activity
LTA	lead test assembly
MAR	material at risk
MBTA	Migratory Bird Treaty Act
MC&A	material control and accounting
MEI	maximally exposed individual
MMI	Modified Mercalli Intensity (earthquake intensity scale)
MOX	mixed oxide (plutonium dioxide and uranium dioxide)
MPQAP	MOX Project Quality Assurance Plan
MSL	mean sea level
MWMF	Mixed Waste Management Facility
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NERP	National Environmental Research Park
NESHAPs	National Emission Standards for Hazardous Air Pollutants
NMSS	Office of Nuclear Material Safety and Safeguards (NRC)
NNSA	National Nuclear Security Administration
NO_2	nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NO_x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NRC	U.S. Nuclear Regulatory Commission
NRHP	*National Register of Historic Places*
NSC	National Safety Council
NSPS	New Source Performance Standards

O_3	ozone
OAQPS	Office of Air Quality Planning and Standards (EPA)
OFASB	Old F-Area Seepage Basin
OHER	Office of Health and Environmental Research (DOE)
OML	oxalic mother liquor
ORR	Oak Ridge Reservation
OSHA	Occupational Health and Safety Administration
PAG	protective action guide
PAH	polycyclic aromatic hydrocarbon
Pb	lead
PDCF	Pit Disassembly and Conversion Facility
PEIS	programmatic environmental impact statement
PM	particulate matter
PM_{10}	particulate matter with a diameter less than or equal to 10 micrometers
$PM_{2.5}$	particulate matter with a diameter less than or equal to 2.5 micrometers
PMF	probable maximum flood
PSD	Prevention of Significant Deterioration
PSSCs	principal structures, systems, and components
Pu	plutonium
Pu (IV)	tetravalent plutonium
Pu (III)	trivalent plutonium
PuO_2	plutonium oxide
QA	quality assurance
RCRA	Resource Conservation and Recovery Act
REA	regional economic area
REG	mitigation measures instituted to ensure compliance with regulations, permits, and guidelines
RFETS	Rocky Flats Environmental Technology Site
ROD	Record of Decision
ROI	region of influence
S&D PEIS	Storage and Disposition Programmatic Environmental Impact Statement
SA	Supplement Analysis
SAAQS	State Ambient Air Quality Standard
SC	South Carolina; state route
SCAPA	Subcommittee on Consequence Assessment and Protective Action (DOE)
SCDHEC	South Carolina Department of Health and Environmental Control
SCDNR	South Carolina Department of Natural Resources
SCSHPO	South Carolina State Historic Preservation Officer
SER	safety evaluation report
SGT	Safeguards Transporter
SHPO	State Historic Preservation Office
SIP	state implementation plan

SNF	spent nuclear fuel
SNM	special nuclear material
SO_2	sulfur dioxide
SO_x	sulfur oxides
SPCC	spill prevention control and countermeasures
SPD	surplus plutonium disposition
SPD EIS	Surplus Plutonium Disposition Environmental Impact Statement
SPL	sound pressure level
SR	State Route
SRARP	Savannah River Archaeological Research Program
SREL	Savannah River Ecology Laboratory
SRS	Savannah River Site
SWB	standard waste box
TAP	toxic air pollutant
TCDD	tetrachlorodibenzo-para-dioxin
TEDE	total effective dose equivalent
TEEL	temporary emergency exposure limit
TI	transport index
TIGR	thermally induced gallium removal
TRAGIS	Transportation Routing Analysis Geographic Information System
TRU	transuranic (radioactive waste)
TRUPACT	transuranic package transporter
TSCA	Toxic Substances Control Act
TSD	Transportation Safeguards Division (DOE Albuquerque Operations Office)
TSP	total suspended particulates
U	uranium
UF_6	uranium hexafluoride
UO_2	uranium dioxide
U.S.C.	*United States Code*
VOC	volatile organic compound
VRM	visual resource management
WAC	waste acceptance criteria
WIPP	Waste Isolation Pilot Plant
WM PEIS	*Final Waste Management Programmatic Environmental Impact Statement for Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Waste*
WMA	Wildlife Management Area
WSB	Waste Solidification Building

Units of Measure

Bq	becquerel(s)	km^2	square kilometer(s)
Btu	British thermal unit(s)	kV	kilovolt(s)
Ci	curie(s)	L	liter(s)
μCi	microcurie(s)	lb	pound(s)
cm	centimeter(s)	m	meter(s)
d	day(s)	m^2	square meter(s)
dB	decibel(s)	m^3	cubic meter(s)
dBA	A-weighted decibel(s)	μm	micrometer(s)
dps	disintegration(s) per second	mg	milligram(s)
°C	degree(s) Celsius	mi	mile(s)
°F	degree(s) Fahrenheit	mi^2	square mile(s)
ft	foot (feet)	min	minutes
ft^2	square foot (feet)	mm	millimeter(s)
ft^3	cubic foot (feet)	mo	month(s)
g	gram(s) or gravitational acceleration	mph	mile(s) per hour
		mrem	millirem(s)
μg	microgram(s)	mSv	millisievert(s)
gal	gallon(s)	MT	metric ton(s)
gpm	gallon(s) per minute	MWh	megawatt-hour(s)
h	hour(s)	nCi	nanocurie(s)
ha	hectare(s)	Pa	Pascal(s)
hg	mercury	ppb	part(s) per billion
Hz	hertz	ppm	part(s) per million
in.	inch(es)	s	second(s)
K	kelvin degrees (temperature)	Sv	sievert(s)
kg	kilogram(s)	yd^3	cubic yard(s)
km	kilometer(s)	yr	year(s)

1 PURPOSE OF AND NEED FOR ACTION

1.1 Introduction

In 1992, at the end of the Cold War, the President commissioned the National Academy of Sciences to study management and disposition options for surplus weapons-usable plutonium. Several agreements were subsequently reached with Russia on the mutual reduction of plutonium stockpiles. The U.S. Department of Energy (DOE) is responsible for the surplus plutonium disposition program for the United States. Within this program, the U.S. Nuclear Regulatory Commission (NRC) has the independent responsibility of reviewing a proposal to design, construct, and operate a facility in the United States that would convert depleted uranium dioxide and weapons-grade plutonium dioxide into mixed oxide (MOX) fuel. A 1998 amendment to the Energy Reorganization Act of 1974 gave the NRC licensing and related regulatory authority over the proposed facility. In accordance with the National Environmental Policy Act (NEPA), 42 *United States Code* (U.S.C.) 4321 *et seq.*, the proposal to build and operate such a facility is being reviewed by the NRC in this final environmental impact statement (FEIS), to evaluate the potential environmental impacts that would result if the proposed action is taken.

The surplus plutonium disposition program is discussed in Section 1.1.1. The proposed action is described in Section 1.2, and the purpose and need for the proposed action are discussed in Section 1.3. Section 1.4 describes the process used by the NRC to determine the scope of this environmental impact statement (EIS), which identified the issues to be studied in detail and the issues that do not require detailed study.

1.1.1 Surplus Plutonium Disposition Program

Following the end of the Cold War, the United States and Russia took steps to mutually reduce their respective stockpiles of weapons-grade plutonium by declaring some of this plutonium excess to national security needs. The surplus plutonium disposition program involves making sure that this surplus plutonium cannot be used again to make nuclear weapons. The DOE evaluated a number of strategies to disposition the U.S. stockpile of surplus plutonium and has published two related EISs, a record of decision (ROD), and an amended ROD (DOE 1996, 1999, 2000, 2002). As part of this program, in 1999, the DOE selected a contractor, Duke Cogema Stone & Webster (DCS), to design, construct, and operate a facility that would convert uranium and weapons-grade plutonium into MOX fuel, as discussed further in Section 1.1.2.

To implement DOE's surplus plutonium disposition program, the DOE ROD in January 2000 set forth a "hybrid" approach, which involved immobilizing a portion of the surplus plutonium and converting the remaining portion into nuclear reactor fuel. Three new facilities were proposed for the DOE's Savannah River Site (SRS) in South Carolina to implement the hybrid approach. A Pit Disassembly and Conversion Facility (PDCF) would convert metallic weapons material, called pits, to plutonium dioxide powder. The proposed PDCF would be built and operated under the DOE's jurisdiction and authority. A plutonium immobilization plant was proposed to convert some of the plutonium dioxide powder from the PDCF and plutonium from other sources into ceramic cylinders to be encapsulated in vitrified high-level waste. The Mixed Oxide Fuel Fabrication Facility (hereafter referred to as "the proposed MOX facility") would convert the balance of the plutonium dioxide powder from the PDCF into MOX fuel for subsequent irradiation in U.S. commercial reactors authorized by the NRC to use such fuel.

Under its January 2000 ROD, the DOE planned to convert 33 metric tons (MT)[1] (36.4 tons) of surplus plutonium into MOX fuel and to immobilize 17 MT (19 tons) in the plutonium immobilization plant. Among the plutonium disposition program's purposes is to reduce over time the number of locations in the United States where the various forms of plutonium are stored, to better ensure that weapons-usable material does not fall into the hands of rogue states or terrorist groups. Irradiated MOX fuel would be highly radioactive, making it inaccessible for reuse as nuclear weapons material. In September 2000, Russia and the United States agreed to disposition 34 MT (37.5 tons) of surplus weapons-grade plutonium from their respective stockpiles (White House 2000). Under this agreement, disposition may be accomplished either by immobilization or by MOX fuel fabrication and subsequent irradiation.

However in April 2002, the DOE issued an amended ROD (DOE 2002), in which it decided not to pursue its hybrid approach due to budgetary constraints. The DOE determined that in order to make progress with available funds, only one approach could be supported. Russia does not consider immobilization alone to be an acceptable approach because immobilization, unlike the irradiation of MOX fuel, fails to degrade the isotopic composition of the plutonium. Russia further contends that the United States could easily retrieve plutonium from the immobilized waste at a later date and reuse that plutonium in nuclear weapons (DOE 2002). Because an immobilization-only approach would jeopardize Russia's continued involvement in the joint effort to reduce supplies of weapons-grade plutonium, the DOE decided that if only one disposition approach is to be pursued, the MOX fuel approach is the preferred one. The DOE concluded that implementation of the MOX-only approach is the key to successfully completing the September 2000 agreement between Russia and the United States (DOE 2002). Accordingly, the DOE decided to pursue a MOX-only approach, under which all 34 MT (37.5 tons) of surplus weapons-grade plutonium would be converted into MOX fuel, and the DOE canceled the plutonium immobilization plant. The DOE had earlier identified Duke Power Company's four reactors at the Catawba and McGuire stations (two at each station) as potential candidates to irradiate MOX fuel. The potential candidate reactors can accommodate up to 25.5 MT (28.2 tons) of surplus plutonium in MOX fuel. The DOE has not yet identified the additional candidate reactors necessary to accommodate the additional MOX fuel (8.5 MT [9.4 tons]) to be irradiated under the amended ROD.

The DOE also issued a supplemental NEPA analysis on April 24, 2003 (DOE 2003). The Supplement Analysis (SA) addressed the above-referenced changes in DOE's surplus plutonium disposition program, to determine whether the Surplus Plutonium Disposition Final Environmental Impact Statement (SPD EIS) (DOE 1999) should be supplemented. The SA

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1 A metric ton (MT) equals 1,000 kilograms (kg) and is equivalent to 1.1 tons, or approximately 2,200 pounds (lb).

discussed how adoption of the MOX-only approach required additional aqueous processing steps at the proposed MOX facility to remove impurities — mainly chlorides — from the alternate feedstock material. Additional equipment at the proposed MOX facility to remove the chlorides includes two dissolution lines, an enlarged annular tank, and a chlorine gas wash column. The SA noted that the transuranic (TRU) waste generated by operation of the proposed MOX facility would, after processing at the Waste Solidification Building (WSB), be shipped from the SRS to the DOE's Waste Isolation Pilot Plant (WIPP). The DOE stated in its SA that prior to obtaining the necessary clearances for shipping TRU waste to WIPP, the amounts of such waste would be well within existing SRS storage capacity. The DOE further found that TRU waste generated by operation of the proposed MOX facility would meet the WIPP waste acceptance criteria, and that the impacts of packaging, transporting, and disposing of such waste would be bounded by prior DOE environmental analyses. The SA concluded that "the activities and potential environmental impacts associated with the proposed processing of 6.5 MT of surplus plutonium originally intended for immobilization and the increase in the total amount of surplus plutonium to be fabricated into MOX fuel from 33 MT to 34 MT are not different in kind, and only slightly in degree, from those described in the SPD EIS." Accordingly, the DOE found no requirements for supplementing the SPD EIS.

1.1.2 MOX Fuel Fabrication Facility

As referenced above, the DOE selected DCS to design, construct, and operate the proposed MOX facility. Because Congress gave the NRC licensing and related regulatory authority over the proposed MOX facility, its construction and operation will require NRC approvals, issued pursuant to the *Code of Federal Regulations*, Title 10, Part 70 (10 CFR Part 70), "Domestic Licensing of Special Nuclear Material." As part of its licensing review, the NRC has prepared this FEIS in accordance with the NRC's 10 CFR Part 51 regulations implementing NEPA and the generally applicable Council on Environmental Quality (CEQ) regulations in 40 CFR Part 1500. This FEIS addresses the direct, indirect, and cumulative impacts related to building, operating, and decommissioning the proposed MOX facility. Although the DOE has prepared previous EISs that cover impacts of the proposed MOX facility on a programmatic level, the NRC has prepared this EIS to incorporate additional site-specific information and design details in order to meet its NEPA requirements as stated in 10 CFR Part 51.

To obtain approval to construct the facility, DCS submitted a MOX Project Quality Assurance Plan (MPQAP) on June 22, 2000, an Environmental Report (ER) on December 19, 2000 (DCS 2000), a revised MPQAP on January 29, 2001, and a Construction Authorization Request (CAR) on February 28, 2001 (DCS 2001). The NRC then published its Notice of Intent to prepare an EIS for the proposed MOX

Categories of Impacts

Impacts of the proposed and connected actions include:

- Direct effects — caused by the proposed action and occur at the same time and place,
- Indirect effects — occur later in time or are farther removed in distance but are reasonably foreseeable, and
- Cumulative impacts — potential impacts when the proposed action is added to other past, present, and reasonably foreseeable future actions.

facility (NRC 2001a). Because of design changes in the proposed MOX facility resulting from DOE's amended ROD, DCS submitted Revision 2 of the ER on July 12, 2002 (DCS 2002a), and an amended CAR on October 31, 2002 (DCS 2002b). DCS submitted Revision 3 of the ER on June 20, 2003 (DCS 2003a), which updated Revision 2 to incorporate responses to requests by the NRC for additional information and revised impacts from the WSB to include preliminary design details provided by the DOE. DCS submitted Revision 4 of the ER on August 14, 2003 (DCS 2003b), which updated impacts from the WSB based on recent revisions by the DOE. On June 10, 2004, DCS submitted Revision 5 to the ER (DCS 2004a). This revision incorporated changes in the facility design affecting waste volumes. In particular, the silver recovery process was removed from the design. Other changes included movement of the controlled area boundary to be colocated with the SRS site boundary, design refinements to the WSB, and the decision to route the liquid low-level waste (LLW) streams from the proposed MOX facility and the PDCF to the WSB rather than the Effluent Treatment Facility at the SRS. On the same date, DCS also submitted revisions to its CAR (DCS 2004b). If the amended CAR is approved, DCS plans to submit its application for a 10 CFR Part 70 operating license. The date for DCS filing such an application is not known at this time.

The NRC's decision-making process for the proposed MOX facility includes an environmental review and a safety review (see text box on the MOX licensing process). In addition to this EIS, which documents NRC's environmental review, the NRC will prepare two final safety evaluation reports (FSERs). The first FSER will evaluate the CAR and will address whether construction of the proposed MOX facility may be authorized pursuant to 10 CFR Part 70 and the Atomic Energy Act. In this regard, 10 CFR 70.23(b) states that the NRC will approve construction of a plutonium processing and fuel fabrication facility if it finds that the design bases of the principal structures, systems, and components (PSSCs) and the quality assurance (QA) program provide reasonable assurance of protection against natural phenomena and the consequences of potential accidents. The 10 CFR 70.23(b) safety findings on the CAR will be documented in the first FSER, now scheduled to be issued in February 2005. The NRC will use the safety findings in the first FSER and the environmental review in this EIS to decide whether or not to authorize construction of the proposed MOX facility.

If construction is authorized, a second FSER would address whether the proposed MOX facility, as built, may be authorized to operate under a 10 CFR Part 70 license. The second FSER would evaluate a DCS application for a license to possess and use special nuclear material (SNM) at the proposed MOX facility. DCS plans to submit such an application if the amended CAR is approved. The safety findings in the second FSER and the environmental review in this EIS would be used by the NRC to decide whether or not to issue an SNM possession and use license to DCS, which would authorize operation of the proposed MOX facility.

Under NEPA, the scope of this EIS is broader than that of the FSERs. This EIS addresses the environmental impacts of constructing, operating, and decommissioning the proposed MOX facility and the environmental impacts of the alternatives considered. This EIS does not address safety issues that are not considered to have potential environmental impacts. For example, the effects of a postulated criticality accident are presented here because such an accident could produce environmental impacts. However, the question of whether the criticality

MOX Licensing Process

DCS has chosen to request authorization to build and operate a mixed oxide (MOX) fuel fabrication facility in two steps. Step 1 was the Construction Authorization Request (CAR) initially filed by DCS in February 2001. The NRC staff is performing a safety review of the CAR and plans to issue a final safety evaluation report (FSER) on the CAR in February 2005. As reflected in this environmental impact statement (EIS), the NRC staff has also performed an environmental review evaluating the impacts of both the construction and operation of the proposed MOX fuel fabrication facility.

If the NRC staff grants the CAR, DCS plans as Step 2 of the process to apply for a license to possess and use special nuclear material (SNM) at the MOX fuel fabrication facility. If such an application is filed and accepted for docketing, the NRC staff would publish a notice of opportunity for hearing in the *Federal Register*. This notice would give individuals and organizations the opportunity to request the NRC to conduct an adjudicatory hearing regarding any DCS request for an SNM license. NRC hearings are governed by the requirements in 10 CFR Part 2. Regardless of whether or not an adjudicatory hearing is held, the NRC staff would perform a safety review of any DCS request for an SNM license, prepare a second FSER, and either issue DCS an operating license or deny the application. The MOX licensing process is further summarized in the chart below.

SAFETY REVIEWS

Construction Authorization

- In a CAR, the applicant must identify principal structures, systems, and components (PSSCs) that reduce the risk of accidents and natural phenomena hazards.
- The applicant must also address baseline design criteria and quality assurance (QA) requirements. These include issues such as fire protection, criticality control, and quality standards and records.
- The NRC staff issues a construction-related FSER that documents its findings on the CAR and QA program description.

License to Possess and Use SNM

- DCS must also submit a license application for authorization to possess and use SNM.
- The NRC staff would issue a second FSER that documents its findings relative to the license application.

ENVIRONMENTAL REVIEW

Environmental Impact Statement

- Pursuant to the *Code of Federal Regulations*, Title 10, Part 51 (10 CFR Part 51) implementing regulations for the National Environmental Policy Act (NEPA), the NRC staff prepares a single EIS.
- The NRC EIS includes impacts from both construction and operation of the proposed action and alternatives.

ADJUDICATION

Adjudication Hearing

- An adjudicatory hearing regarding the CAR is now being held.

safety controls proposed by DCS would adequately prevent such an accident is part of the NRC's safety review and is not discussed in this EIS.

1.2 Description of the Proposed Action and Connected Actions

As described further in Section 1.2.1, the proposed action involves a decision by NRC whether or not to authorize DCS to construct and later operate the proposed MOX facility at the SRS to convert 34 MT (37.5 tons) of surplus weapons-grade plutonium to MOX fuel. Section 1.2.2 describes actions that are connected to the proposed action. Connected actions fall within the scope of the actions evaluated in an EIS (40 CFR 1508.25). More detailed technical information about the proposed action and connected actions is presented in Section 2.2.

1.2.1 Proposed Action

The proposed MOX facility would be built on 16.6 ha (41 acres) of land in the F-Area of the SRS (see Figures 1.1 and 1.2). DCS is expected to request a license for 20 years. The facility would be designed for maximum annual throughput of 3.5 MT (3.9 tons) of plutonium. Impacts in the ER are based on the maximum annual design capacity. This FEIS is based on a total of 34 MT (37.5 tons) of surplus plutonium. The rate at which DCS actually processes the plutonium would likely be less than the facility's design capacity. Therefore, actual annual impacts should be less than those presented in the ER. The period of operation would likely be less than the 20-year license period. The actual period of operation would vary depending on the annual throughput over time. The 20-year licensing period would allow deactivation and decommissioning to occur prior to license termination. For purposes of this FEIS, a period of operation of 10 years is assumed to bound impacts. If the actual period of operation is longer than 10 years as a result of an actual throughput less than the maximum design capacity, the annual impacts would be less, even though they would occur over a longer period of time.

Proposed Action

- The proposed federal action is for the U.S. Nuclear Regulatory Commission to authorize Duke Cogema Stone & Webster (DCS) to build and operate a facility to fabricate mixed oxide (MOX) fuel.
- NEPA requires preparation of an EIS for major federal actions that could significantly affect the human environment.
- To operate the MOX facility, DCS would need an NRC license to possess and use special nuclear material (surplus plutonium from the U.S. nuclear weapons program).
- Under contract with the DOE, DCS would build and operate a facility to manufacture nuclear fuel using surplus plutonium.
- The NRC-licensed facility for fabricating nuclear fuel would be located on the DOE's Savannah River Site.

Direct effects of the proposed action include effects resulting from construction, operation, and decommissioning of the proposed MOX facility to convert 34 MT (37.5 tons) of surplus plutonium into MOX fuel. Plutonium dioxide powder would be processed at the proposed MOX

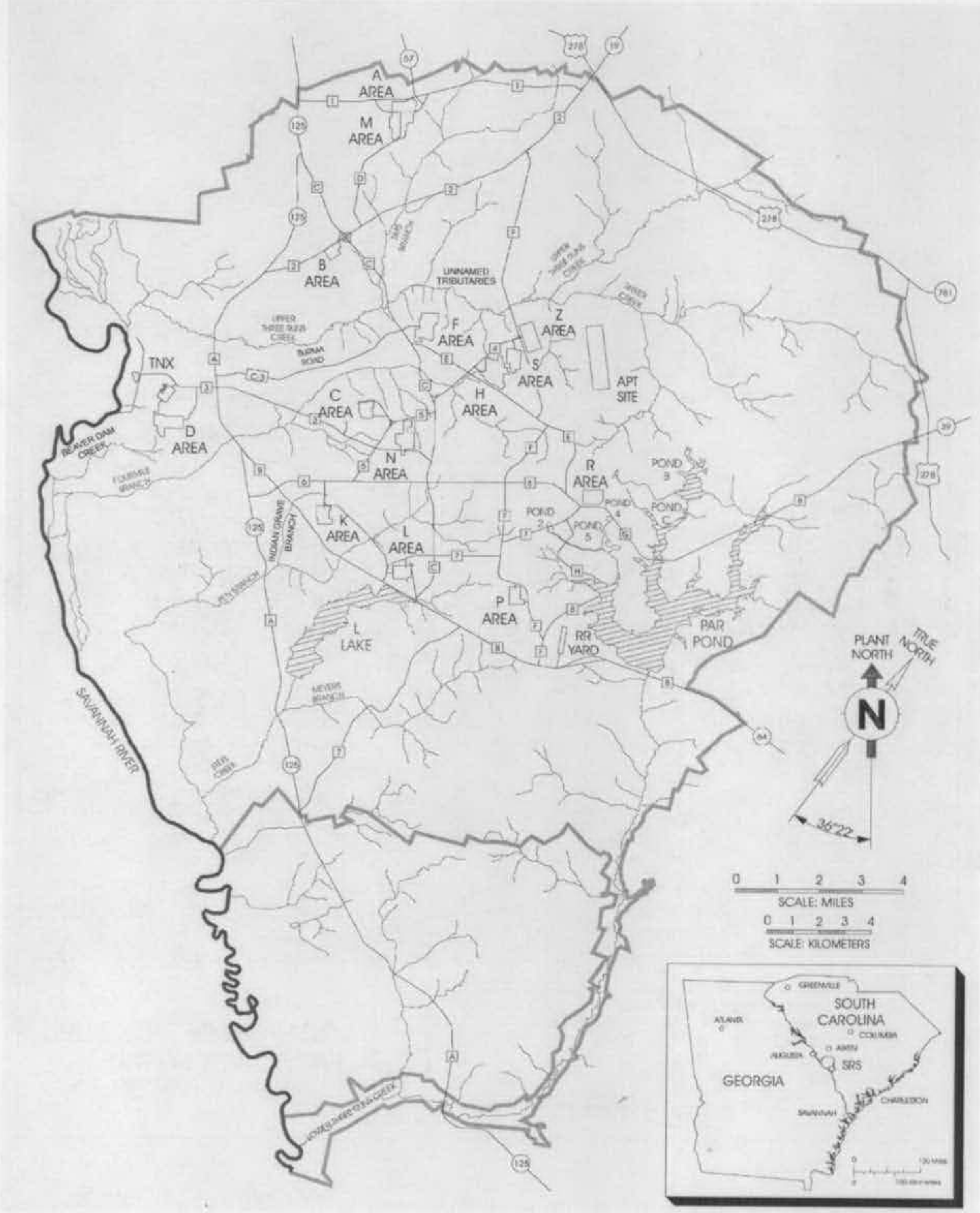

Figure 1.1. Location of the Savannah River Site and the F-Area (*Source*: DCS 2001).

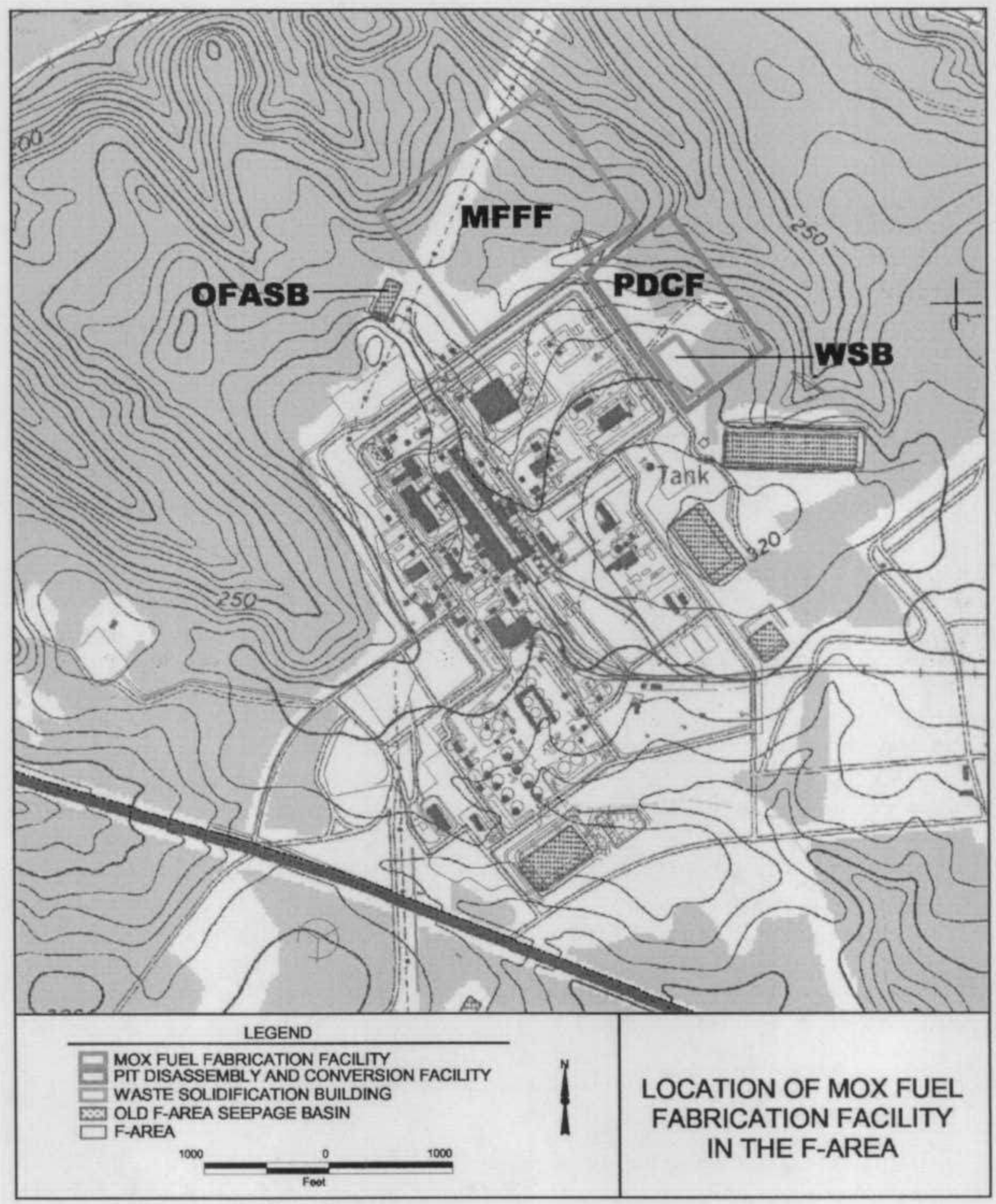

Figure 1.2. Locations of the proposed MOX facility, the PDCF, and the WSB in the F-Area on the SRS complex (*Source*: DCS 2002a).

facility to remove impurities, such as americium and gallium, and would be mixed with the depleted uranium dioxide to form the MOX fuel. The final blend for MOX fuel would have a required plutonium content of 2.3% to 4.8% (percent by weight). The facility would be capable of producing MOX fuel with a plutonium content of up to 6% (DCS 2001).

1.2.2 Connected Actions

> **Connected Actions**
>
> Actions closely related to the proposed action that:
>
> - Automatically trigger other actions which may require environmental impact statements,
> - Cannot or will not proceed unless other actions are taken previously or simultaneously, or
> - Are interdependent parts of a larger action and depend on the larger action for their justification.

In order for the proposed MOX facility to fulfill its function, other "connected actions" would also occur. For example, the PDCF would be the source of some of the plutonium dioxide needed to make MOX fuel. Therefore, the PDCF must be constructed and authorized by the DOE to operate so that the proposed MOX facility would have the required material with which to make MOX fuel.

Feedstock (surplus plutonium dioxide and depleted uranium dioxide) would be required to be transported to the SRS to make the MOX fuel. Because the surplus plutonium is currently stored at seven DOE facilities (see Figure 1.3 and Table 1.1), it would need to be transported to the SRS (DOE 2000). The depleted uranium hexafluoride would first be transported from a DOE site (assumed to be the gaseous diffusion uranium enrichment facility in Portsmouth, Ohio) to an existing commercial fuel fabrication facility (assumed to be the Global Nuclear Fuel-Americas, LLC, facility in Wilmington, North Carolina), where it would be converted to depleted uranium dioxide, which would then be transported to the SRS.

Two new DOE facilities (the PDCF and the WSB) are needed to support the proposed MOX facility. The PDCF would be required to convert approximately 25.6 MT (28.2 tons) of surplus plutonium metal to plutonium dioxide. The remaining quantity of surplus plutonium, called "alternate feedstock," would be in a form that would be suitable to go directly to the proposed MOX facility. The WSB would process liquid waste streams from the PDCF and the proposed MOX facility. Since the PDCF and WSB would not be under NRC's Atomic Energy Act jurisdiction, the safety issues pertaining to the PDCF and WSB will not be addressed by the NRC in the FSERs.

As discussed in Section 4.3.4, the wastes generated at the proposed MOX facility and the PDCF would be managed at the WSB, sent to the SRS waste management system, or sent to approved facilities off the SRS property for disposition. In addition, infrastructure upgrades would be needed to support the proposed MOX facility. These upgrades include waste transfer pipelines, electric utility line realignment, and addition of access roads.

The FEIS also evaluates transporting the fresh (unirradiated) MOX fuel made by the proposed MOX facility (assuming it is built and is authorized to operate) to mission reactors for irradiation.

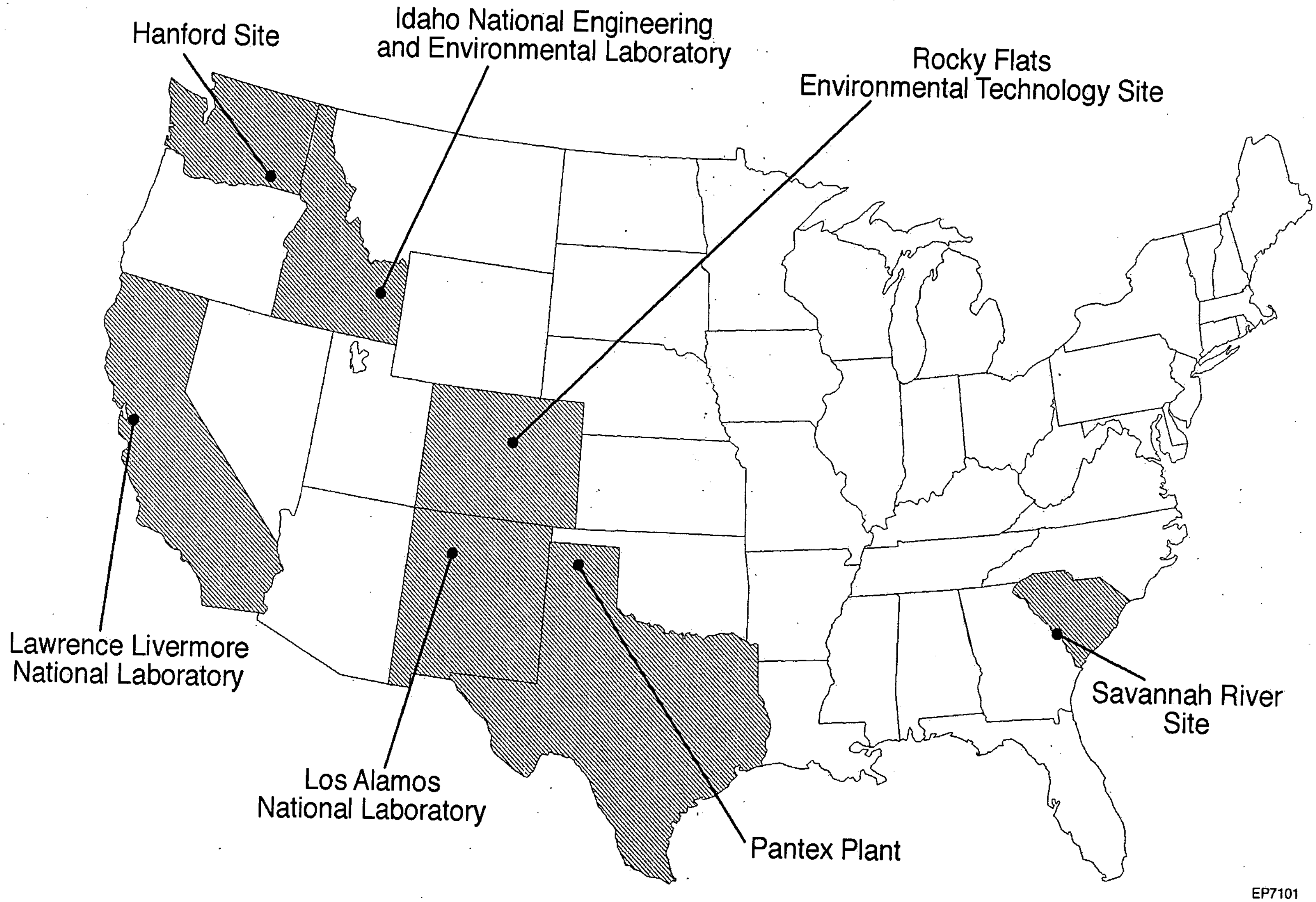

Figure 1.3. Locations of DOE facilities containing surplus plutonium (*Source*: Adapted from DOE 1999).

This page is being withheld pursuant to 10 CFR 2.390(a).

to proliferation-resistant forms (DOE 1999). The purpose and need discussion establishes a range of reasonable alternatives to the proposed action that can satisfy this underlying purpose and need.

Following the subsequent September 2000 surplus plutonium disposition agreement between Russia and the United States (White House 2000), the DOE determined that a MOX-only approach best ensures the joint reduction of existing plutonium stockpiles held by the two nations, and concluded in its amended ROD that reliance on this approach is the key to successfully completing the agreement (DOE 2002). The result of this action would be to reduce over time the number of locations where the various forms of plutonium are stored and to ensure that this weapons-usable material does not fall into the hands of rogue states or terrorist groups.

1.4 Scope of the EIS

Proposed Action Elements

- Construction, operation, and decommissioning of proposed MOX facility, PDCF, and the WSB;
- Infrastructure upgrades;
- Shipment of surplus plutonium from the DOE sites to the SRS;
- Transport of depleted uranium hexafluoride from the DOE facility at Portsmouth, Ohio, to the commercial fuel fabrication facility in Wilmington, North Carolina;
- Transport of depleted uranium oxide from the Wilmington facility to the SRS;
- Transport of MOX fuel and fuel irradiation in surrogate reactors; and
- Spent MOX fuel transport to a geologic repository.

1.4.1 Scoping Process

On March 7, 2001, the NRC issued a Notice of Intent (NOI) in the *Federal Register* (66 FR 13794) to prepare an EIS for construction and operation of the proposed MOX facility at the SRS near Aiken, South Carolina. In the NOI, NRC announced plans for two scoping meetings: one in North Augusta, South Carolina, on April 17, 2001, and another in Savannah, Georgia, on April 18, 2001. In a second *Federal Register* notice on April 11, 2001 (66 FR 18223), the NRC announced that a third scoping meeting would be held in Charlotte, North Carolina, on May 8, 2001.

The three scoping meetings were held as planned. At each meeting, the NRC staff distributed background materials on the MOX fuel program and NRC's plans for conducting licensing and environmental reviews for the facility. An open house held before each meeting provided attendees an opportunity to view informational materials and talk informally with NRC staff. During the meeting, the NRC staff presented an overview of the NRC's role in the facility licensing process and described the NRC's approach to meeting its obligations under NEPA. The presentations were followed by a question and answer period in which the NRC staff responded to questions from attendees. The majority of time at the meetings was devoted to allowing individuals to express their views on the scope of the EIS.

A total of about 300 individuals attended the three scoping meetings, and about 80 of them asked questions or provided oral comments at the meetings. In addition, approximately 60 individuals or organizations submitted written comments to the NRC by regular mail, fax transmittal, e-mail, or in person at the meetings. Some of the individuals who provided written comments also spoke at the meetings. Some individuals attended and offered comments at more than one meeting. Although issues raised during the scoping period were considered in the preparation of the draft environmental impact statement (DEIS), some of those issues were either analyzed in less detail or were not analyzed at all, depending on their relevance to the proposed action and the anticipated impacts. The full scoping summary report (NRC 2001b) is included as Appendix I.

The scoping process helped to determine the scope of the EIS and identify significant issues to be analyzed in depth. For instance, two technology options for the proposed action were identified during the scoping process. The first option is to substitute sand filters for the proposed high-efficiency particulate air (HEPA) filters to control air emissions from the facility. The second option is to substitute a dry process for the proposed wet process to remove impurities from plutonium dioxide powder. Cumulative impacts of the proposed action, in addition to other contaminant sources, were also identified as a relevant issue.

The no-action alternative, if NRC does not authorize construction or operation of the proposed MOX facility, was also refined through the scoping process. In addition to the no-action alternative of continued storage of all of the surplus weapons-grade plutonium at the present DOE sites in an unaltered form, the public suggested considering immobilizing all of the surplus weapons-grade plutonium at the SRS as a no-action alternative.

The scoping process identified several relevant areas of concern to the public.[2] Concerns were expressed about the existing groundwater contamination at the SRS and the potential for the proposed facility and waste disposal to further deteriorate groundwater quality. Existing deep boreholes at the SRS were identified as a possible conduit for contaminant migration. Concerns were also expressed about the existing contamination of the Savannah River and the potential for the proposed facility to affect surface water quality. The impacts of facility-induced surface water quality changes on the downstream fishing and marine economy and on the downstream tidal wetlands were also concerns raised at the scoping meetings. Similarly, concerns were expressed regarding air quality impacts from both chemical and radiological materials.

The potential for human health impacts to the public and workers was also a concern. This included workers at the proposed facility, at the SRS, at the proposed reactors, and at disposal facilities. It was also suggested that the impacts to groups other than the "Standard Man" be assessed, such as unborn fetuses, children, and elderly populations. Impacts from possible accidents at the proposed facility during transport of radioactive materials and at the proposed reactors also were a significant concern. It was suggested that the worst-case accidents should be evaluated, including natural disasters and terrorist acts.

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[2] The Scoping Summary Report (Appendix I) contains a complete summary of all comments received.

Some issues identified during the scoping process were considered to be beyond the scope of the EIS. In general, these issues are not directly related to the assessment of potential impacts from the proposed action now under consideration. The lack of in-depth discussion in the EIS, however, does not imply that an issue or concern lacks value.

A number of commenters requested that the SPD EIS prepared by the DOE be supplemented and many of the decisions already made by the DOE be revisited. Because the scope of the EIS was limited to the action now under review by the NRC, issues pertaining to decisions already made by the DOE and not affected by new information were addressed by referencing the appropriate DOE analysis.

Comments that seek to alter international treaties or affect national, state, or local laws, statutes, or regulations (e.g., comments that asked to alter Price-Anderson Act[3] limits) were not addressed because they do not pertain to reasonably foreseeable impacts arising from the construction and operation of the proposed MOX facility.

Comments on the scope of assessing reactor use impacts in the EIS for the proposed MOX facility were varied. Considering that the environmental impact of reactor use of MOX fuel was a significant issue with many commenters, it is appropriate to consider those impacts in the EIS. However, the currently available information does not lend itself to performing new analyses. The DOE's SPD EIS (DOE 1999) analyzed impacts of MOX fuel use at the McGuire, Catawba, and North Anna reactors. Therefore, the FEIS refers to the SPD EIS, but does not reanalyze generic reactor use impacts of MOX fuel. The specific environmental impacts resulting from the use of 40% MOX fuel cores in any particular reactor would be addressed by the NRC in reviewing the requisite 10 CFR Part 50 license amendment application. Duke Energy has submitted a license amendment request to the NRC to place lead test assemblies in its reactors. As discussed in Section 4.4.3, impacts associated with the lead test assemblies are considered to be outside the scope of this EIS because these activities would occur regardless of any decision by the NRC on the proposed MOX facility.

A number of commenters requested that the EIS analyze the impacts of having to upgrade the emergency response equipment and retrain emergency responders in the communities around the SRS, at the reactors, and along transportation routes. Other commenters requested that the EIS identify capabilities of local, regional, and national medical facilities to manage the casualties resulting from potential accidental releases and assess the readiness of communities to evacuate certain areas along the transportation routes in case of an accident. These issues are discussed in the EIS to the extent that they are required as mitigation measures presented in Chapter 5.

Many commenters raised a number of different issues concerning terrorism. The Scoping Summary Report stated that the EIS would not address the impacts of terrorism because these impacts are not considered to be reasonably foreseeable as a result of the proposed action. However, following the events of September 11, 2001, the Commission decided to consider the

[3] The Price-Anderson Act limits the liability of the nuclear industry in the event of a nuclear accident in the United States.

question of whether NEPA requires the evaluation of such impacts. By order dated December 18, 2002 (CLI-02-24), the Commission ruled that NRC has no obligation under NEPA to consider intentional malevolent acts in conjunction with the licensing of the proposed MOX facility.

In response to the cancellation of the plutonium immobilization facility (DOE 2002), the NRC delayed the issuance of the DEIS. The NRC held three public meetings in North Augusta, South Carolina; Savannah, Georgia; and Charlotte, North Carolina, and solicited additional written comments on how the immobilization of surplus plutonium as a no-action alternative should be discussed (NRC 2002). The NRC also solicited views on other alternatives that should be considered in the DEIS. In response, most commenters said they still wanted immobilization considered as an alternative in the DEIS, while some urged the NRC to instead focus on the proposed action. As discussed further in Section 2.3, the NRC has determined that immobilization of plutonium did not require an in-depth evaluation in the DEIS, because it was not a reasonable alternative to the proposed action. In response to the NRC's solicitation on other alternatives that should be considered, the alternative of deliberately producing off-specification MOX fuel was identified. This alternative is discussed in Section 2.3.

With respect to the proposed PDCF, the DOE's change from a "hybrid" to a MOX-only approach resulted in a change in the scope of the DEIS from that described in the NRC's March 7, 2001, NOI. The NRC stated there that the PDCF would not be part of the NRC's NEPA review of the proposed MOX facility (NRC 2001a). Initially, the PDCF had independent utility apart from the MOX facility, since the DOE planned to build and operate the PDCF along with the plutonium immobilization plant regardless of whether MOX fuel was also produced (DOE 2000). Now, because of the DOE's subsequent decision in its amended ROD to cancel the plutonium immobilization plant and implement a MOX-only approach (DOE 2002), the PDCF no longer has independent utility apart from the proposed MOX facility. Thus, for NEPA purposes, the PDCF must be evaluated in the EIS to avoid an improper segmentation of the potential impacts discussion.

1.4.2 Issues Studied in Detail

As discussed in the Scoping Summary Report (Appendix I), the goal of this EIS is to set forth the impact analyses in a manner that is readily understandable by the public. Significant or more important impacts are discussed in Chapter 4 of this FEIS. On the basis of the NRC's analyses and consideration of comments received during the scoping process, the following topics are discussed in detail in Sections 4.2 and 4.3 for the no-action alternative and the proposed action, respectively: (1) human health, (2) air quality, (3) hydrology, (4) waste management, (5) accident impacts, (6) decommissioning, and (7) environmental justice. Transportation of radioactive materials, conversion of depleted uranium, and use of MOX fuel in reactors are discussed in Section 4.4. Cumulative impacts are discussed in Section 4.5. The cost-benefit analysis for the no-action and proposed action alternatives, which builds on the comparison of alternatives in Section 2.4, is provided in Section 4.6. Mitigation actions to address the potential impacts are discussed in Chapter 5.

1.4.3 Issues Eliminated from Detailed Study

Impacts found to be less significant are discussed in FEIS Appendixes G and H. These impacts include those pertaining to geology, seismology, soils, noise, ecology, land use, cultural and paleontological resources, infrastructure, socioeconomics, and aesthetics.

1.4.4 Preparation of the Final Environmental Impact Statement

The NRC made the DEIS available for public review and comment in February 2003 in accordance with 10 CFR 51.73, 10 CFR 51.74, and 40 CFR 1503.1. The NRC provided a 75-day public comment period (which ended May 14, 2003) on the DEIS. The length of the comment period exceeded the minimum of 45 days specified in 10 CFR 51.73.

During that period, the NRC held three public meetings to receive oral comments regarding the contents of the DEIS. These public meetings were held on March 25, 2003, in Savannah, Georgia; March 26, 2003, in North Augusta, South Carolina; and March 27, 2003, in Charlotte, North Carolina. The NRC published notice of these meetings in the *Federal Register* (68 FR 97208, February 28, 2003), on its Web site, and in local newspapers.

Approximately 45 people provided oral comments at the public meetings. A certified court reporter recorded the oral comments and prepared written transcripts. The transcripts of the public meetings are part of the public record for the proposed project and were used in developing the comment summaries contained in Appendix J. In addition to oral comments received at the public meetings, the NRC received written comments, letters, facsimile transmittals, and e-mails regarding the DEIS and associated issues. A summary of the comments and responses are included in Appendix J. The written comments and transcripts are reproduced in Appendix L.

The NRC has reviewed each comment letter and all transcripts of the public meetings and has grouped comments relating to similar issues and topics, as permitted by the Council on Environmental Quality's NEPA regulations and the NRC regulations at 10 CFR 51.91 and 40 CFR 1503.4(b). Because the comments were voluminous, Appendix J provides summaries of all substantive comments received on the DEIS. The NRC then prepared responses to each of the comments or summaries of comments. Commenters are identified in each summary with a commenter number. Appendix K contains an index of commenter names and commenter numbers.

1.4.5 Other National Environmental Policy Act Documents Related to This Action

In preparing the EIS, the following other NEPA documents were considered:

Storage and Disposition of Weapons-Usable Fissile Materials Final Programmatic Environmental Impact Statement, DOE/EIS-0229, U.S. Department of Energy, Office of Fissile Materials Disposition, Washington, D.C., December 1996.

Surplus Plutonium Disposition Final Environmental Impact Statement, DOE/EIS-0283, U.S. Department of Energy, Office of Fissile Materials Disposition, Washington, D.C., November 1999.

Record of Decision for the Surplus Plutonium Disposition Final Environmental Impact Statement, U.S. Department of Energy, Washington, D.C., January 11, 2000 (*65 Federal Register* [FR] 1608).

Final Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada, DOE/EIS-0250, U.S. Department of Energy, Office of Civilian Radioactive Waste Management, Feb. 2002.

1.5 Cooperating Agencies

No cooperating agencies have been involved in preparation of the EIS.

1.6 Other State and Federal Agencies

Several federal, Native American, state, and local agencies and organizations were contacted to gather relevant information for this EIS. The scope of the analysis necessitated obtaining information from state agencies in both South Carolina and Georgia. The following is a list of all agencies contacted during early stages of the DEIS preparation:

Federal Agencies

U.S. Department of Energy, Savannah River Operations Office
U.S. Department of Energy, Office of Fissile Material Disposition
U.S. Fish and Wildlife Service

Native American Organizations

Catawba Indian Nation
Pee Dee Indian Association
Ma Chis Lower Alabama Creek Indian Tribe
Muscogee (Creek) Nation
Indian People's Muskogee Tribal Town Confederacy
Yuchi Tribal Organization, Inc.
United Keetowah Band of Cherokee Indians

State Agencies

South Carolina State Historic Preservation Office, Department of Archives and History
South Carolina Department of Natural Resources, Wildlife and Freshwater Fisheries Division

South Carolina Department of Health and Environmental Control, Bureau of Air Quality
South Carolina Department of Transportation
Georgia Department of Natural Resources, Wildlife Resources Division
Georgia Department of Natural Resources, Environmental Protection Division, Air Protection Branch

Towns, Cities, and Counties

Columbia County, Georgia
Town of Grovetown, Georgia
Town of Harlem, Georgia
City of Augusta/Richmond County, Georgia
City of Blythe, Georgia
City of Hephzibah, Georgia
Aiken County, South Carolina
City of Aiken, South Carolina
Town of Jackson, South Carolina
Town of New Ellenton, South Carolina
City of North Augusta, South Carolina
Town of Wagener, South Carolina
Barnwell County, South Carolina
City of Barnwell, South Carolina
Town of Blackville, South Carolina
Town of Williston, South Carolina

School Districts

Columbia County Board of Education, Georgia
Richmond County Board of Education, Georgia
Aiken County Board of Education, South Carolina
Williston School District #19, South Carolina
Williston School District #29, South Carolina
Williston School District #45, South Carolina

1.7 References for Chapter 1

DCS (Duke Cogema Stone & Webster) 2000. *Mixed Oxide Fuel Fabrication Facility Environmental Report*. Docket Number 070-03098. Charlotte, NC. Dec.

DCS 2001. *Mixed Oxide Fuel Fabrication Facility Construction Authorization Request*. Docket Number 070-03098. Charlotte, NC. Feb.

DCS 2002a. *Mixed Oxide Fuel Fabrication Facility Environmental Report, Revision 1 & 2*. Docket Number 070-03098. Charlotte, NC.

DCS 2002b. *Amended Mixed Oxide Fuel Fabrication Facility Construction Authorization Request*. Docket Number 070-03098. Charlotte, NC.

DCS 2003a. *Mixed Oxide Fuel Fabrication Facility Environmental Report, Revision 3*. Docket Number 070-03098. Charlotte, NC. June.

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2 ALTERNATIVES, INCLUDING THE PROPOSED ACTION

This chapter presents details of the alternatives considered in this environmental impact statement (EIS). The no-action alternative, which is discussed in Section 2.1, considers the continued storage of surplus plutonium in various locations throughout the U.S. Department of Energy (DOE) complex in the event the U.S. Nuclear Regulatory Commission (NRC) either denies Duke Cogema Stone & Webster's (DCS's) construction authorization request for the Mixed Oxide Fuel Fabrication Facility (the proposed MOX facility) or, later, denies DCS's subsequent request for a Title 10, Part 70 of the *Code of Federal Regulations* (10 CFR Part 70) license to possess and use special nuclear material. Section 2.2 presents the technical details of the proposed action and the connected actions.

Section 2.3 considers several alternatives to the proposed action and explains why they are not analyzed further in Chapter 4. These alternatives include alternate locations for the proposed MOX facility in the F-Area, alternative technology and design options, immobilization of surplus plutonium, deliberately making off-specification MOX fuel, the MIX MOX alternative, and the Parallex Project.

The NRC recognizes that under the provisions of 10 CFR 70, the Commission may approve construction of the proposed MOX facility and subsequently deny the DCS application for a 10 CFR Part 70 license to possess and use special nuclear material. Although this is a possible outcome relative to the proposed action, the NRC is not considering construction alone as a separate alternative because the NRC would not knowingly select an alternative involving construction of a facility that cannot be used for its intended purpose.

Section 2.4 compares the potential impacts related to the proposed action with those of the no-action alternative. Section 2.5 presents the NRC staff's final environmental recommendation on the action to be taken.

2.1 No-Action Alternative — Continued Storage of Surplus Plutonium

The no-action alternative would be a decision by the NRC not to approve the proposed MOX facility. It is reasonable to assume that if the NRC does not approve the proposed MOX facility, the DOE's surplus plutonium would remain in storage at DOE facilities. The surplus plutonium inventory is now stored at seven DOE sites. If this storage were to continue, it is possible that limited new construction would be required at one or more of these sites to upgrade storage conditions. However, the impacts of such construction, if required, would be addressed under a separate site-specific environmental review by DOE. For purposes of this EIS, the impacts of continued storage of surplus plutonium are assumed to be essentially the same as those analyzed by DOE in the Surplus Plutonium Disposition Environmental Impact Statement (SPD EIS) (DOE 1999a). However, the analysis in this EIS also considers the DOE's action to consolidate the storage of 6 MT (6.6 tons) of non-pit surplus plutonium from the Rocky Flats Environmental Technology Site to the Savannah River Site's K-Area Material Storage (KAMS) facility (DOE 2002b). The impacts of the no-action alternative are presented in Section 4.2 and Appendix G.

2.2 Proposed Action — Description of Mixed Oxide Fuel Fabrication Facilities and Connected Actions[1]

2.2.1 Introduction

The proposed MOX facility is designed to convert surplus weapons-grade plutonium and depleted uranium dioxide (UO_2) into MOX fuel that could be used at commercial nuclear power plants authorized to use such fuel. If the construction authorization for the proposed MOX facility is granted, the facility would be built on the north-northwest side of the F-Area at the SRS (see Figure 1.2 in Section 1.2). The Pit Disassembly and Conversion Facility (PDCF) would be built by DOE on the north-northeast side of the F-Area. The PDCF would be used to recover the plutonium metal from the pits[2] of disassembled weapons and would convert the weapons-grade plutonium to plutonium dioxide powder, which would subsequently be transferred to the proposed MOX facility as feedstock.

Within the boundaries of the PDCF, the DOE would also construct the Waste Solidification Building (WSB) (see Figure 1.2). The WSB would be used to process several liquid waste streams from the proposed MOX facility and the PDCF and convert them to solid transuranic (TRU) waste or low-level waste (LLW). This section describes the general layout of the proposed MOX facility, the processes to be used to manufacture MOX fuel, and the systems that would be used to handle the waste streams from the facility. As discussed in Section 1.2.2, since the PDCF and WSB are connected actions, these proposed DOE facilities are also discussed in Sections 2.2.2 and 2.2.4, respectively. Other elements of the proposed action as described in Section 1.2 that are not discussed in Chapter 2 are discussed in Chapter 4. Direct and indirect impacts of the proposed action and connected actions are presented in Sections 4.3 and 4.4, and Appendix H.

As discussed in Section 1.4.1, the technology option of substituting a sand filter for the proposed high-efficiency particulate air (HEPA) filters to control air emissions from the proposed MOX facility was identified during the scoping process. This technology option is described in Section 2.2.5 and is analyzed in Section 4.3.8.

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1 Except as noted, the descriptions provided in this section are based on information from DCS (2000, 2001, 2002, and 2004) and DOE (1999a).

2 Pits are weapon components with a spherical metal core made of plutonium metal and several outer layers.

2.2.2 Pit Disassembly and Conversion Facility

2.2.2.1 Description of the Pit Disassembly and Conversion Facility

The PDCF would be built by the DOE and would not be subject to NRC licensing. The facility would be used to recover plutonium metal from weapon components, and convert it to an unclassified (i.e., no longer exhibiting any characteristics that are protected for reasons of national security) plutonium dioxide. The plutonium dioxide would be transferred to the proposed MOX facility. In addition to excess weapon components, the PDCF would be able to receive excess plutonium metal in other forms and be capable of converting it to plutonium dioxide.

The PDCF would be designed to process up to 3.5 MT (3.9 tons) of plutonium metal into plutonium dioxide annually. Facility operations would require a staff of about 400 personnel. The facility would be built in a hardened space of thick-walled concrete that meets all applicable standards for processing special nuclear material. One or possibly both levels of the two-story building would be below grade. Areas of the facility in which plutonium would be processed or stored would be designed to survive natural phenomena such as earthquakes, floods, and tornadoes, as well as potential accidents associated with fissile and radioactive materials. Ancillary buildings would be required for support activities.

Activities involving radioactive materials or externally contaminated containers of radioactive materials would be conducted in gloveboxes. The gloveboxes would be interconnected by a contained conveyor system to move materials from one process step to the next. Gloveboxes would remain completely sealed and operate independently, except during material transfer operations. Built-in safety features would limit the temperature and pressure inside the gloveboxes and ensure that operations remain within criticality safety limits. When dictated by process needs or safety concerns, an inert atmosphere would be maintained in gloveboxes. The exhaust from the gloveboxes would be continuously monitored for radioactive contamination. The atmosphere in the gloveboxes would be kept at a lower pressure than that of the surrounding areas so that any leaks of gaseous or suspended particulate matter would be contained and filtered appropriately. The building ventilation system would include HEPA filters and would be designed to maintain confinement, thus precluding the spread of airborne radioactive particulates or hazardous chemicals within the facility or to the outside environment. Both intake and exhaust air would be filtered, and exhaust gases would be monitored for radioactivity.

Beryllium may be a constituent of some of the pits that would be disassembled in the PDCF. Because inhalation of beryllium dust and particles has been proven to cause a chronic and sometimes fatal lung disease, beryllium is of special interest from a health effects perspective. However, the process operations in the PDCF are expected to generate only larger, nonrespirable turnings and pieces of the metal, and all work would be performed in gloveboxes. No grinding would be done that could cause small pieces of beryllium to become airborne.

The PDCF would accommodate the following surplus plutonium-processing activities: pit receipt, storage, and preparation; pit disassembly; plutonium conversion; oxide blending and sampling; nondestructive assay; product canning; product storage; product inspection and sampling for international inspection; product shipping; declassification of parts not made from special nuclear materials; highly enriched uranium (HEU) decontamination, packaging, storage, and shipping; tritium capture, packaging, and storage; and waste packaging, sampling, and certification. Additional areas for support activities would be needed, including office space, change rooms, a central control room, a laboratory, mechanical equipment rooms, mechanical shops, an emergency generator to supply power to critical safety systems in the event of a power outage, a warehouse, shipping and receiving areas, waste storage, guard stations, entry portals, and parking.

2.2.2.2 Processes Occurring in the PDCF

At the PDCF, the storage containers in which the plutonium is received would be removed from their overpacks (outer shipping containers), the contents verified, and the information regarding the material entered into the PDCF's material accountability system. Pits and plutonium metal would be placed in a short-term receiving vault, checked for radiological contamination, and transferred to the pit storage vault until processing. Before being processed in the pit disassembly line, the pits would be segregated on the basis of the potential presence of tritium.[3] Pits without tritium would go into the pit bisector glovebox, and those containing tritium would start in the Special Recovery Line glovebox.

In the pit bisector glovebox, external structures would be cut away from the pit, and the pit would be cut in half. Nonbonded pits (pits whose components separate easily) would be separated into plutonium metal, HEU, classified metal shapes, and classified nuclear material parts. The plutonium parts would be assayed as part of the material accountability program. HEU would be sent to the HEU-processing station for material accountability, electrolytic decontamination, and packaging; the classified metal shapes and metal shavings would go to the declassification furnaces; the nuclear material parts to the storage at the pit conversion facility; and the plutonium to the hydride-oxidation (HYDOX) station for the next step of the process. Bonded pits, which cannot be separated prior to processing, would be sent to the HYDOX station intact. For these pits, HEU, classified metal shapes, and classified nuclear material parts would be separated from the plutonium metal during the HYDOX process, then sent to the HEU-processing station, declassification furnaces, and storage at the pit conversion facility, respectively. Recovered HEU would be stored in a vault at the pit conversion facility until shipped to the Y-12 Facility at the Oak Ridge Reservation (ORR) for declassification, storage, and eventual disposition. The HEU would meet Y-12 acceptance criteria prior to shipment to the ORR.

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[3] Tritium can be used as a boosting fuel in high-energy atomic weapons. Although the operators of the pit conversion facility would know which pits contain tritium, the pit types and the number of surplus pits that contain tritium are classified.

Pits with tritium would also be bisected, and the HEU, classified metal shapes, and classified nuclear material parts would be separated from the plutonium; this would occur in the Special Recovery Line glovebox. Under normal circumstances, all of the tritium associated with a given pit would be captured and recovered during the tritium removal process in the Special Recovery Line. It is expected that the tritium in a small number of pits will have absorbed into the plutonium. For these pits, an additional step would occur in the Special Recovery Line glovebox: the plutonium would be heated in a vacuum furnace to drive off the tritium as a gas. The tritium would then be captured on a catalyst bed and packaged as LLW for treatment and disposal. HEU and classified metal shapes would be decontaminated and sent to the HEU-processing station and declassification furnaces, respectively; classified nuclear material parts would be placed in storage at the pit conversion facility. After confirmation that the plutonium metal was free of tritium, the plutonium would be assayed as part of the special nuclear material accountability program and transferred to the HYDOX station. Recovered HEU would be stored in a vault at the pit conversion facility until shipped to the ORR for declassification, storage, and eventual disposition. The HEU would meet Y-12 acceptance criteria prior to shipment to the ORR.

In the HYDOX module, plutonium metal would react with hydrogen, nitrogen, and oxygen at controlled temperatures and pressures in a pressure vessel to produce plutonium dioxide. The plutonium metal would first be reacted with hydrogen gas to form a hydride. Then the vessel would be purged of the hydrogen and the hydride reacted with nitrogen gas to form a nitride. The nitrogen would then be purged and replaced with oxygen for the final reaction forming plutonium dioxide. The plutonium dioxide product would be collected and assayed for the material accountability program to confirm that all of the plutonium metal entering the HYDOX process left as an oxide.

In the primary canning module, the cans of plutonium dioxide would be placed into a primary storage can made of stainless steel. This can would then be welded shut and leak tested to ensure that the weld was sound. If the can were to fail the leak test, it would be reopened and rewelded. After passing the leak test, the primary can would be sent to the electrolytic decontamination module. After decontamination, each can would be rinsed, dried, and surveyed to verify decontamination, then sent to the secondary canning module.

In the secondary canning module, primary cans would be placed into secondary stainless steel storage cans meeting the DOE's long-term storage requirements. Also in this module, secondary storage cans would be welded shut and leak tested. After leak testing, each can would be marked with a laser to identify the can and its contents, and passed to the nondestructive assay module.

In the nondestructive assay module, each can would be assayed to confirm its contents. Following assay, the cans would be moved into the main storage vault and would be available for international inspection. After inspection, the cans would be transferred to another vault that would also be subject to international inspection. The cans would subsequently be transferred to the proposed MOX facility.

2.2.2.3 Radioactive Effluents and Wastes at the PDCF

Potential effluents and wastes from the PDCF are described in a Los Alamos National Laboratory report (LANL 1998) and the SPD EIS (DOE 1999a). The facility would be designed to minimize the quantities of both the effluents and wastes. Preliminary estimates indicate that small quantities of various plutonium isotopes and americium-241 and tritium gas would be emitted to the air from the facility. No releases to surface water would be expected directly from the PDCF. The facility would be expected to generate small quantities of TRU waste, LLW, mixed waste, and nonradioactive hazardous waste. All liquid radioactive wastes generated in the PDCF would be sent to the WSB for treatment. The treated waste would either be sent to an approved disposal facility or discharged to a permitted outfall on the SRS. Radioactive solid wastes generated at the facility would be packaged in accordance with the acceptance criteria of the receiving disposal site and sent to the WSB for temporary storage and final processing before being shipped to an approved disposal facility. Mixed waste and hazardous waste generated at the facility would be sent to the SRS waste management system or to an off-site permitted facility for disposition. Nonradioactive/nonhazardous solid waste would be sent to an approved landfill. An evaluation of waste management impacts for this EIS is presented in Section 4.3.4.

2.2.3 MOX Fuel Fabrication Facility

2.2.3.1 Description of the MOX Fuel Fabrication Facility

As designed, the project site would occupy an area of about 16.6 ha (41 acres). Approximately 6.9 ha (17 acres) of the site would be developed with buildings, other facilities, and paving. The remaining 9.7 ha (24 acres) would be landscaped with either grass or gravel.

No highways, railroads, or waterways traverse the proposed MOX facility site, and material and personnel would be moved to and from the site on existing SRS roads. The proposed MOX facility would consist of the following buildings:

- MOX Fuel Fabrication Building
- Emergency Diesel Generator Building
- Standby Diesel Generator Building
- Secured Warehouse Building
- Administration Building
- Technical Support Building
- Reagents Processing Building
- Receiving Warehouse Building

All of these buildings except the Administration Building and the Receiving Warehouse Building would be enclosed within a double fence perimeter intrusion detection and assessment system. The area within this system would total about 5.7 ha (14 acres) and would be designated as the "Protected Area" (10 CFR Part 73).

The Technical Support Building, located between the Administration Building and the MOX Fuel Fabrication Building, would house the main support facilities for MOX Fuel Fabrication Building personnel and would contain the access facilities for the Protected Area and the MOX Fuel Fabrication Building. The building would not be directly involved in the principal processing functions of the facility. Supporting activities and facilities located in this building would include health physics, an electronics maintenance laboratory, a mechanical maintenance shop, personnel locker rooms, and a first aid station.

The MOX Fuel Fabrication Building would have three major functional areas: the MOX Processing Area, the Aqueous Polishing Area, and the Shipping and Receiving Area. The MOX Processing Area would include the blending and milling area, pelletizing area, sintering area, grinding area, fuel rod fabrication area, fuel bundle assembly area, a laboratory area, and storage areas for feed material, pellets, and fuel assemblies. Space would also be provided in the MOX Fuel Fabrication Building for support equipment, such as temporary waste storage; heating, ventilation, and air conditioning (HVAC) equipment; HEPA filter plenums; inverters; switchgear; and pumps. The Aqueous Polishing Area would be used to remove impurities from the feed plutonium coming from the PDCF as well as from the plutonium in the alternate feedstock for use in the MOX Processing Area. The aqueous polishing process would extract impurities from the weapons-grade plutonium dioxide. The Shipping and Receiving Area would contain the equipment and facilities used to handle incoming and outgoing materials to and from the MOX Processing Area and Aqueous Polishing Area.

The Emergency Diesel Generator Building would contain the emergency diesel generator to provide the emergency on-site electrical power supply for safety related structures, systems, or components. The Standby Diesel Generator Building would contain the diesel generators that would provide the on-site electrical power source in the event of loss of off-site power. The Secured Warehouse Building would include the Material Receipt Area, the Storage Area, the MOX Fresh Fuel Package Storage Area, the Parts Washing Facility, the Vehicle Access Portal, and the Vehicle Gatehouse. The Material Receipt Area would serve as the receiving facility for most of the materials (including depleted uranium dioxide), supplies, and equipment necessary for facility operations. The Administration Building, located outside of the Protected Area of the complex, would provide administrative support to the facility and its operations. Space would be provided in the building for facility management, facility operations, finance and administration, health and safety, quality assurance, and management personnel.

The Reagents Processing Building, located adjacent to the Aqueous Polishing Area of the MOX Fuel Fabrication Building, would provide storage for pure reagent-grade chemicals and facilities for preparation of chemical solutions used in the Aqueous Polishing Area. The Reagents Processing Building would consist of several separate rooms or areas for the various chemicals. Concrete curbs around the chemical storage areas would provide for spill containment. Chemicals would be transferred to the Aqueous Polishing Area from the Reagents Processing Building via piping located in a below-grade concrete trench between the two buildings.

The Receiving Warehouse Building would be a single-story, pre-engineered metal building located outside of the perimeter intrusion detection and assessment system. The building would consist of the Unloading Dock, the Materials Receiving Area, the Inspected Warehouse Holding Area, the Material Transfer Dock, offices, vestibule, and the Inspection Guard Station.

2.2.3.2 Processes Occurring in the Proposed MOX Facility

The proposed MOX facility is being designed to convert plutonium dioxide and depleted uranium dioxide to MOX fuel. Operations at the facility would begin with the receipt of the plutonium dioxide and depleted uranium dioxide feed materials. The plutonium dioxide would then be purified in the aqueous polishing process before being blended with the depleted uranium dioxide. The blended material would then be formed into pellets, the pellets incorporated into fuel rods, the fuel rods placed in fuel assemblies, and the assemblies loaded into transport casks for shipment to the nuclear power plants authorized to use MOX fuel. The technology used in the fuel fabrication process includes recycling of waste and scrap streams. The major steps in the aqueous polishing and fuel fabrication processes are shown in Figures 2.1 and 2.2, respectively.

2.2.3.2.1 Feed Materials

The plutonium dioxide feed material from the PDCF, transported in approved shipping containers, would be received in the shipping and receiving area of the MOX Fuel Fabrication Building. The feed material would be offloaded, the packaging would then be removed, and control would be transferred to the responsible facility manager. Material control and accounting (MC&A) and radiation protection functions would then be performed, and the feed material would be moved to the MOX Processing Area.

Alternate feedstock (feed material not coming from the PDCF) would be received as plutonium dioxide. Some of this material might contain higher than normal salt contaminants, some would contain chloride contaminants, and some would contain trace amounts of enriched uranium. All alternate feedstock would be milled to a uniform particle size to facilitate dissolution. The alternative feedstock would be analyzed for contaminants.

If chloride contaminant concentrations were found to be above feedstock specifications, they would be removed by conversion to chlorine gas. The chlorine gas would be passed through a scrubber to convert the chlorine to a sodium chloride solution. If the chloride contaminants were within feedstock specifications, the feedstock would be processed as described in Section 2.2.3.2.2.

For uranium-rich alternate feedstock, an additional scrubbing column would be used to remove uranium to levels that meet the specification for purified plutonium.

Depleted uranium dioxide feed material, packaged in drums and shipped by truck, would be received at the Material Receipt Area of the Secured Warehouse Building. Conventional materials and supplies would be received at the Secured Warehouse Building. The materials

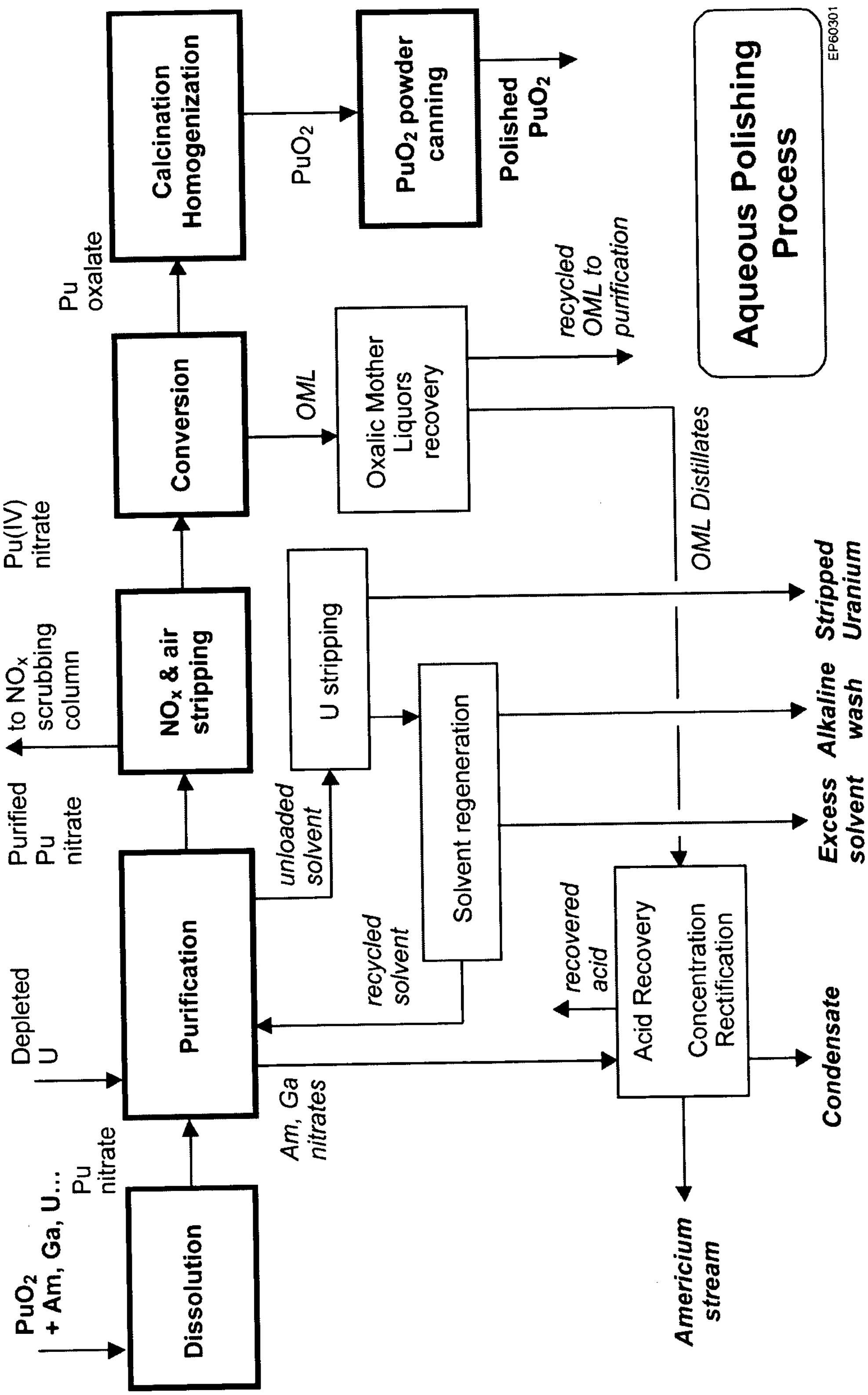

Figure 2.1. Principal steps in the aqueous polishing process (*Source:* DCS 2004).

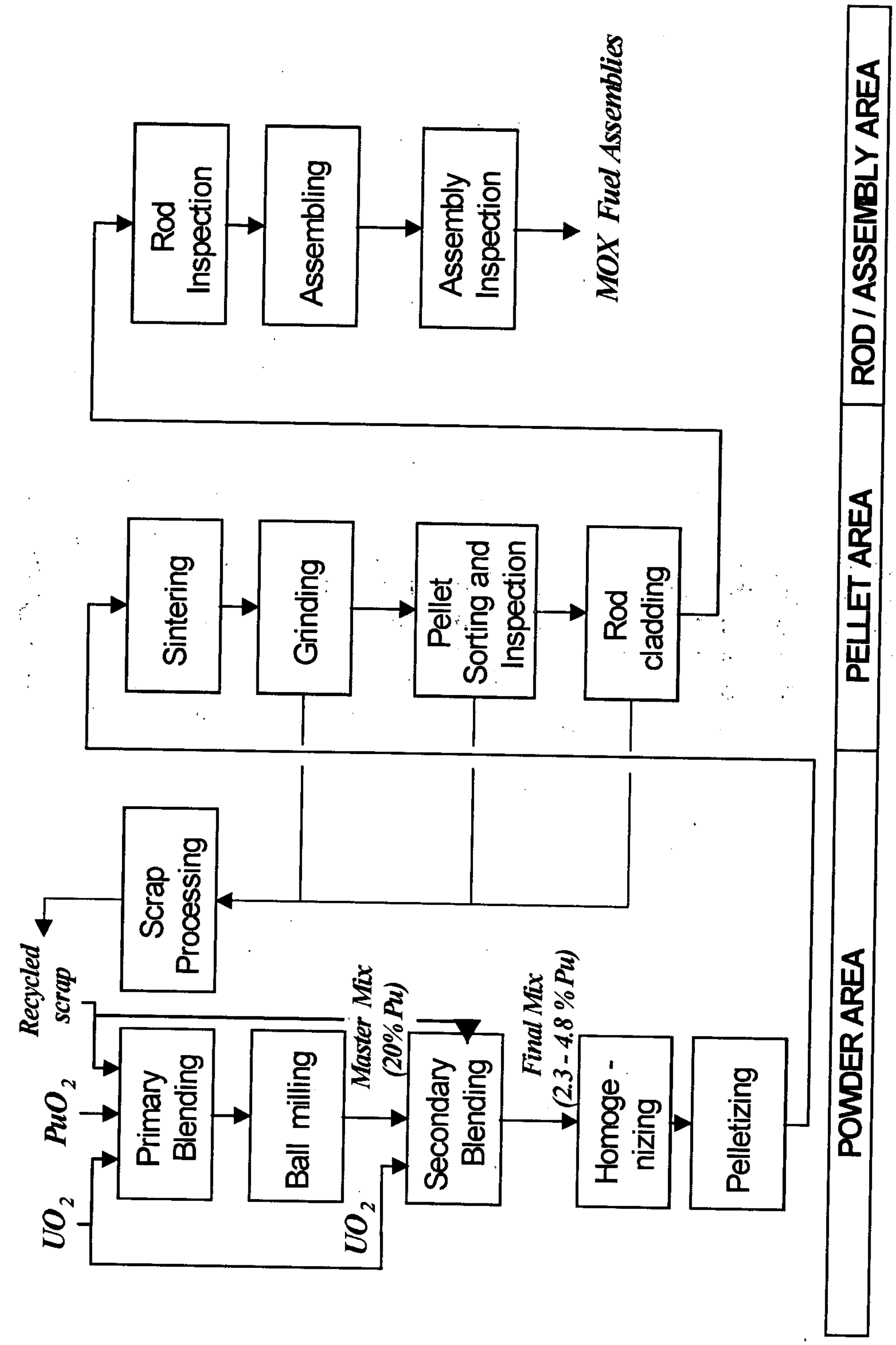

Figure 2.2. Principal steps in the fuel fabrication process (*Source:* DCS 2002).

would be inventoried, sorted, and removed to storage in the Secured Warehouse Building or delivered via on-site vehicles to the proper processing area.

2.2.3.2.2 Aqueous Polishing Process

The plutonium dioxide received at the facility would contain small amounts of impurities, mainly gallium, americium, highly enriched uranium, and, in the case of alternate feedstock, additional impurities. These impurities would have to be removed before the plutonium could be used in reactor fuel. The chloride contaminants would be removed from alternate feedstock before further aqueous polishing (see Section 2.2.3.2.1). The aqueous polishing process would remove remaining impurities in three major steps: dissolution, purification, and conversion.

The *dissolution step* would involve dissolving the plutonium dioxide powder in a water-based (aqueous) solution of silver (Ag^{2+}) and nitric acid at nearly room temperature. An electrical current would be passed through the solution to help dissolve the powder.

In the *purification step*, the plutonium in the aqueous solution would be separated from uranium, americium, gallium, and other impurities by solvent extraction. In this process, the aqueous solution and an organic solvent solution are mixed. The organic solvent does not readily mix with or dissolve in water, and the two solutions will separate if they are allowed to settle. However, by forcibly mixing the two solutions and adjusting chemical parameters in the aqueous solution, individual metals like plutonium can be selectively extracted from the aqueous solution into the organic solvent. In the process proposed by DCS, the solvent extraction process would involve mixing the aqueous solution with an organic solvent composed of 30% tri-butyl phosphate in dodecane. The mixing would occur in the middle of tall and narrow process vessels called columns. During mixing, the solvent would selectively extract the plutonium and uranium from the aqueous solution. The less dense solvent containing uranium and plutonium would then separate from the aqueous solution at the top of the columns. The impurities would remain in the denser aqueous solution and would be removed at the bottom of the column.

The solvent solution containing the uranium and plutonium would be washed with a nitric acid solution. This wash solution would be returned to the acid recovery unit for recycling of the acid. The plutonium and uranium in the organic solvent would then be mixed with an aqueous solution containing hydroxylamine nitrate. This process would reduce the tetravalent plutonium [Pu(IV)] to trivalent plutonium [Pu(III)], which would allow the plutonium to be removed from the organic solvent in an aqueous solution of nitric acid, hydrazine nitrate, and hydroxylamine nitrate. The organic solvent, which would then contain only high-enriched uranium and residual amounts of plutonium, would be mixed with another aqueous "wash" solution to remove the residual plutonium. The washed solvent would be routed to the uranium stripping process. High-enriched uranium would be stripped from the solvent by mixing the solvent with dilute nitric acid in another separation column. The stripped uranium solution would be diluted with depleted uranium before being transferred to the WSB for further treatment. The solvent, which would no longer contain significant amounts of uranium, plutonium, or impurities, would be routed to the solvent recovery mixer-settlers to be recycled.

The Pu(III) solution would be converted back to a solution of Pu(IV) by driving nitrous fumes (dinitrogen tetroxide [N_2O_4] and nitrogen dioxide [NO_2]) through the plutonium solution in a packed column. The offgas would be routed through an offgas treatment system before being discharged to the atmosphere.

The conversion step would be a continuous oxalate conversion process. The oxidized Pu (IV) would be reacted with excess oxalic acid ($H_2C_2O_4$) to precipitate plutonium oxalate. Plutonium oxalate would be collected on a filter, then dried in a screw calciner to produce purified plutonium dioxide powder. The purified plutonium dioxide powder would be blended and stored in cans.

Offgas from the screw calciner would be routed through the process offgas treatment unit and HEPA filters prior to discharge to the atmosphere through the exhaust stack. The filtered oxalic mother liquors would be concentrated, reacted with manganese to destroy the oxalic acid, and recycled to the beginning of the extraction cycle, to minimize losses of plutonium to waste.

A liquid americium waste stream would be generated by the aqueous polishing process described above. DCS estimates that approximately 24.5 kg (54.0 lb) of americium-241 would annually become part of this waste stream, an amount that would contain 84,000 Ci of radioactivity (DCS 2002). This liquid waste stream — together with an excess acid stream, and an alkaline wash stream — would be combined into the high-alpha activity waste to be piped from the proposed MOX facility to the WSB, where it would be solidified through the use of the WSB's planned evaporation, neutralization, and cementation methods. (The WSB is discussed further in EIS Section 2.2.4). The maximum annual volume of these streams from the proposed MOX facility is estimated to be 44,200 L (11,700 gal) (DCS 2004).

2.2.3.2.3 MOX Fuel Fabrication Process

The MOX fuel fabrication process would consist of four major steps: (1) powder master blend and final blend production, (2) pellet production, (3) rod production, and (4) fuel rod assembly.

The first operation would be the production of the powder master blend. The purified plutonium dioxide from the aqueous polishing process would be mixed with depleted uranium dioxide and recycled scraps to produce an initial mixture that would be approximately 20% plutonium. This mixture would be ground in a ball mill and mixed with additional depleted uranium dioxide and recycled scraps to produce a final blend with the required plutonium content (typically from 2.3 to 4.8%). This final blend would be further homogenized to meet stringent plutonium distribution requirements. During the final homogenizing, lubricants and pore-formers would be added to control the density of the final mixture.

The final homogenized powder blend would be pressed to form green pellets. The green fuel pellets would be sintered to obtain the required ceramic qualities. Sintering is the process of heating the green pellets in a furnace at temperatures of up to 1,700°C (3,100°F). The sintering step would remove organic products dispersed in the pellets and remove the pore-formers that were added during powder homogenization. The sintered pellets would be ground to a specified diameter and sorted. Recovered powder from grinding and discarded pellets would be recycled through a ball mill and reused in the powder processing.

Fuel rods would be loaded to an adjusted pellet length column, welded, pressurized with helium, and then decontaminated in gloveboxes. The decontaminated rods would be removed from the gloveboxes and placed on racks for inspection and assembly. Fuel rods would be inserted into the fuel assembly frame, and the fuel assembly construction would be completed. The fuel assembly would be subjected to a final inspection before shipment to reactors.

2.2.3.3 Radioactive Effluents and Wastes at the Proposed MOX Facility

2.2.3.3.1 Airborne

DCS has proposed to treat exhausts from the Fuel Fabrication Building and remove airborne radioactive materials with (at a minimum) a two-stage HEPA filter system before exhaust air is discharged to the environment. The exhaust streams would include those from building ventilation; gloveboxes; the process vents of tanks, vessels, and other equipment in the Aqueous Polishing Area; and the sintering furnaces in the Processing Area.

The filtered exhausts would be discharged through a common stack (MOX vent stack) on the roof of the Fuel Fabrication Building. Stack effluents would be continuously monitored. The stack would be 37 m (120 ft) above grade.

2.2.3.3.2 Liquids

After sampling and characterization, liquid waste streams containing radioactive materials would be transferred to the WSB for processing and treatment. Thus, no radioactive liquids would be released directly from the facility to the environment. Within the Aqueous Polishing Area, recycling would be used extensively to reduce liquid waste volumes and impurities before transfer to the WSB.

The liquid waste streams from the Aqueous Polishing Area would include the following:

- Chloride removal waste
- Liquid americium stream
- Excess acid stream
- Excess low-level radioactive solvent waste
- Stripped uranium stream
- Rinsing water
- Contaminated drains

2.2.3.3.3 Solids

Solid radioactive wastes would be placed in appropriate containers (typically 55-gal drums), assayed, and transferred to the WSB for processing and disposal. Whenever practical, the solid wastes would be compacted to reduce volume and disposal costs.

The solid radioactive wastes generated in the Fuel Fabrication Building would include TRU solid wastes and LLW (which would include uranium and/or plutonium contamination). Other potentially radioactive, mixed, or nonradioactive hazardous wastes that might be generated by the facility would be transferred to the WSB, SRS waste management system, or an off-site permitted facility for disposition. Impacts associated with management of wastes from the proposed MOX facility are presented in Section 4.3.4.

2.2.4 Waste Solidification Building

2.2.4.1 Description of the Waste Solidification Building

The WSB, which is not subject to NRC licensing, would be constructed by the DOE on the PDCF site south of the PDCF to process the following liquid waste streams from the PDCF and the proposed MOX facility:

- MOX facility high-alpha-activity waste stream
- MOX facility stripped uranium stream
- PDCF laboratory liquid stream
- PDCF low-level liquid waste streams
- MOX facility low-level liquid waste streams

In addition, space would be provided in the WSB for temporary storage and minimal processing (e.g., sorting, packaging) of other waste streams, including solid LLW and TRU waste.

The WSB would occupy approximately 6,970 m^2 (75,000 ft^2) of land and would be a combination concrete and steel-frame structure (DCS 2003a,b, 2004). Concrete would be utilized as necessary to protect against the potential impacts of natural phenomena hazards events. In addition, a concrete-cell configuration would be used in areas where the proposed MOX facility high-alpha stream is processed. Process enclosures adjacent to the cells would provide worker protection to accommodate operations and maintenance activities. The shielding and confinement would also serve as fire isolation barriers. Secondary confinement features, such as dikes, sumps, and leak detection, would be provided for those areas with liquid spill potential. The major pieces of process equipment would be tanks, evaporators, and cementation equipment. Other equipment may include reverse osmosis, filtration, and activated carbon and ion exchange columns.

The processed liquid would be mixed in the WSB with concrete and poured into containers to produce solid waste. Cold chemical processing rooms, waste container storage, and truck loading/unloading areas may also be contained in hardened structures. The waste container storage area would be at grade. The waste receipt area would have tanks to separately receive high-alpha waste, stripped uranium waste, and the PDCF laboratory liquid stream waste. The tank volumes would be sufficient to receive and store waste from six weeks of processing the high-alpha-activity and stripped uranium waste streams by the proposed MOX facility and eight weeks of processing the laboratory liquid stream by the PDCF. Additional receipt storage would be available for low-level liquid waste streams from the proposed MOX facility, PDCF, and WSB internal sources.

The proposed MOX facility would transfer a liquid high-alpha-activity waste and liquid LLW streams to the WSB. The PDCF would transfer LLW streams. Within the WSB, these waste streams would be treated separately. The WSB would process the liquid wastes into TRU waste and LLW solid waste forms acceptable for shipment and disposal at their respective disposal locations. Treated effluents from liquid LLW streams would be discharged to a permitted outfall. The TRU waste form would be stored until cleared for shipment to the Waste Isolation Pilot Plant (WIPP) (DOE 2003). The LLW form would be sent to a suitable disposal site.

Within the WSB, the waste streams would be collected into receipt tanks, chemically adjusted, evaporated, neutralized, solidified in containers, stored, and shipped. These processes would be located inside a hardened (reinforced concrete) structure. Emissions from the process areas would pass through a HEPA filtration confinement system before release through an exhaust stack.

2.2.4.2 Processes Occurring in the WSB

The WSB would be designed to process and solidify three waste streams from the proposed MOX facility and two waste streams from the PDCF. The processes that would be conducted for each waste stream are described below.

2.2.4.2.1 Proposed MOX Facility High-Alpha-Activity Waste Stream

The proposed MOX facility high-alpha-activity waste stream, consisting of the liquid americium waste stream and two other liquid waste streams from the proposed MOX facility, namely the excess acid stream and the alkaline waste stream, would be pumped approximately 610 m (2,000 ft) from the proposed MOX facility to the WSB in a double-walled stainless steel pipe. The maximum volume received would be anticipated to be approximately 33,300 L (8,800 gal) per year, which would be received in approximately 25 transfers, at a frequency of about once every two weeks.

The WSB receipt tanks would be sized to hold three transfers (six weeks capacity in two 9,500-L [2,500-gal] tanks). The MOX facility high-alpha-activity stream collection tanks are sized for three months capacity. This arrangement would provide continued MOX facility processing capacity in the event of a shutdown of WSB operations because of maintenance or other disruptions. The tanks would be agitated or recirculated to mix the contents.

In the WSB, the proposed MOX facility high-alpha-activity waste stream would be sent to an evaporator to reduce its water content. The acidic bottoms collected in the evaporator would be neutralized with sodium hydroxide, mixed with cement, and poured into approved containers. The TRU waste collected in the containers would meet the WIPP waste acceptance criteria and would eventually be shipped to the WIPP for disposal (DOE 2003). The overheads from the evaporation step would be condensed, collected, sampled, and subjected to further evaporation or chemical treatment as necessary and finally would be sent to the Clean Water Treatment System for final treatment and discharge to a permitted outfall (see Section 2.2.4.2.4).

2.2.4.2.2 MOX Facility Stripped Uranium Stream

The proposed MOX facility stripped uranium stream would be pumped approximately 610 m (2,000 ft) from the proposed MOX facility to the WSB in a double-walled stainless steel pipe. The nominal waste volume of this stream would be 174,000 L (46,000 gal) per year, received in approximately 42 transfers at a frequency of about one every week.

The WSB receipt tanks would be sized to hold six transfers (six weeks of MOX facility capacity). The proposed MOX facility tanks would be sized to hold three months of MOX facility waste. The tanks would be agitated or recirculated to mix the waste.

In the WSB, the proposed MOX facility stripped uranium stream would be evaporated, the bottoms neutralized with sodium hydroxide, and the resulting waste mixed with cement and deposited into approved containers. The waste in the containers would be classified as LLW and would be shipped to a LLW disposal facility. The overheads from the evaporation step would be condensed, collected, sampled, and subjected to further evaporation or chemical treatment as necessary and finally would be sent to the Clean Water Treatment System for final treatment and discharge to a permitted outfall (see Section 2.2.4.2.4).

2.2.4.2.3 PDCF Laboratory Liquid Stream

The PDCF laboratory liquid stream would be pumped approximately 240 m (800 ft) to the WSB from the PDCF in a welded-jacketed stainless steel pipe, which would be direct buried. The volume of this waste stream is anticipated to be a nominal 41,600 L (11,000 gal) per year (DCS 2004), and would be received in approximately 12 transfers (3,400 L [900 gal] each) at a frequency of about one transfer every month.

The WSB receipt tank would be sized to hold two transfers (eight weeks of PDCF laboratory liquid stream capacity) in one 11,400-L (3,000-gal) tank. The PDCF tank is sized to provide up to 8 weeks of PDCF processing capacity in the event of a shutdown of WSB operations for maintenance or processing anomalies. The tank would be agitated or recirculated to mix the waste.

In the WSB, the PDCF laboratory liquid stream would be evaporated, the bottoms neutralized with sodium hydroxide, and the resulting waste would be mixed with cement and deposited into approved containers. The waste in the containers would be classified as LLW and would be shipped to a LLW disposal facility. The overheads from the evaporation step would be condensed, collected, sampled, and subjected to further evaporation or chemical treatment as necessary and finally would be sent to the Clean Water Treatment System for final treatment and discharge to a permitted outfall (see Section 2.2.4.2.4).

2.2.4.2.4 MOX Facility and PDCF Low-Level Liquid Streams

The proposed MOX facility and the PDCF would generate various aqueous liquid streams with either very low radioactive contamination or the potential for radioactive contamination due to their origin. These streams would be transferred, through double-walled transfer lines, to a receipt tank or tanks at the WSB. In addition, low-level liquid waste streams would be generated in the WSB from the evaporator overhead associated with the treatment of other liquid waste streams sent to the WSB from the proposed MOX facility and the PDCF (see Sections 2.2.4.2.1, 2.2.4.2.2, and 2.2.4.2.3). All of these waste streams would be transferred to the Clean Water Treatment System in the WSB. The Clean Water Treatment System would be designed using standard wastewater treatment technologies to meet U.S. Environmental Protection Agency (EPA), South Carolina Department of Health and Environmental Control (SCDHEC), and DOE discharge limits for the SRS. The discharges would be to a permitted outfall.

2.2.4.3 Radioactive Effluents and Wastes at the WSB

The WSB would be designed to minimize effluents to the air. The facility would also be designed to minimize effluents to surface water, as discussed in Section 2.2.4.2.4.

As discussed in Section 2.2.4.2, the WSB would receive five liquid waste streams, three from the proposed MOX facility and two from the PDCF, and convert those waste streams to solid TRU waste or solid LLW. An evaluation of waste management impacts for this EIS is presented in Section 4.3.4. The solidified TRU waste would eventually be shipped to WIPP for disposal (DOE 2003). LLW would be disposed of at a suitable disposal site.

2.2.5 Sand Filter Technology Option

This section describes the technology option of using a sand filter for air filtration instead of high-efficiency particulate air (HEPA) filters. Although DCS has selected the use of HEPA filters as its preferred option for removal of particulate contaminants before exhaust air is released to the atmosphere, this EIS also evaluates the use of a sand filter (Orr 2001). The differences in impacts are discussed in Section 4.3.8.

It is useful to understand the physical differences in the two types of filters. HEPA filters are designed to remove extremely fine particles suspended in the air. HEPA filters are enclosed in rigid casing with full-depth pleated filter medium. The filter medium is normally fibrous borosilicate glass, which is formed into a sheet folded into a series of accordion pleats. The standard HEPA filter measures 61 cm × 61 cm × 29.2 cm deep (24 in. × 24 in. × 11.5 in. deep). The filter edge will be a high-temperature silicon gasket to prevent bypass leakage, and improper installation or damage to the sealing surface can dramatically reduce the filter's efficiency and performance. HEPA filters function and are used in the HVAC system similarly to standard home air filters. DCS proposes to use HEPA filters in multiple stages. The proposed MOX facility would have many HEPA filters (Orr 2001).

Sand filters have a long history of use in DOE facilities at the SRS and at the Hanford Site near Richland, Washington. At the SRS, DOE currently uses sand filters in the F-Area, H-Area, and the Savannah River Laboratory. Unlike the case for HEPA filters, a facility would typically use only a single sand filter. A sand filter designed for the proposed MOX facility would be rectangular and would require a surface area of about 313 m^2 (33,650 ft^2). The filter would be about 3 m (10 ft) deep and would consist of gravel layers overlaid with sand layers arranged in order of decreasing particle size (Orr 2001). A coarse sand layer would be placed at the top of the filter to maintain integrity of the lower sand layers during filter operations. Air enters through a supply tunnel at the bottom of the structure and is collected at the top of the sand filter. Large fans or blowers are used to draw the air through the sand filter media. Suspended particles in the air are trapped by the sand filter. No routine maintenance is required during operation of sand filters (Orr 2001).

It is also useful to understand the performance differences in the two types of filters. Both filter types have approximately the same efficiencies for collection of particulates. Neither filter type is designed to trap gases. The filters would perform differently during some accidents. As discussed below, the selection of filter type can affect the facility design.

Several commenters during the public scoping meetings urged the NRC to evaluate the use of sand filters instead of HEPA filters, claiming sand filters would be better from a safety standpoint, particularly in case of a fire at the facility. Fires often generate large volumes of smoke that threaten the effective functioning of the filtration system by rapidly loading the filters with smoke particles. The resulting pressure drop across the filter could cause a break in the filter, followed by the release of contamination to the environment. This situation would not occur with sand filters in case of a fire because they have a much larger surface area that could trap smoke particles (Orr 2001). The integrity of HEPA filters could also be compromised during explosion accidents.

Given the potential vulnerability of HEPA filters during fire accidents, the proposed MOX facility is designed to mitigate the effects of an internal fire. The facility is designed into numerous fire areas to limit the amount of combustibles involved in a single fire; this reduces the amount of soot reaching individual banks of HEPA filters and ensures that the HEPA filters will not fail because of excessive plugging. If a sand filter was used, fewer fire areas could be used because sand filters are more resistant to smoke and sudden pressure changes. However, in the evaluation of the impacts of using sand filters instead of HEPA filters, changes in facility design are not considered.

2.3 Alternatives Considered But Not Analyzed in Detail

This section discusses some of the more significant alternatives identified during the scoping process and alternatives identified by DCS, but that are not subjected to in-depth evaluations in Chapter 4. Such alternatives include alternate locations for the proposed MOX facility in the F-Area, technology and design options, immobilization of surplus plutonium, off-specification MOX fuel, and the Parallex Project.

2.3.1 MOX Facility Location in F-Area

The DOE previously selected the SRS as the location of the proposed MOX facility, after evaluating several alternative sites across the country (DOE 2000). In its subsequent Environmental Report, DCS described the process the DOE used in choosing the specific site for the proposed MOX facility within the SRS F-Area (DCS 2000). The currently proposed location of the MOX facility was selected from five proposed sites within the F-Area. Final site selection was based on three siting qualification criteria that the site must meet and nine siting evaluation criteria that were more qualitative in nature (DCS 2002). The currently proposed location of the facility, as identified in Figure 1.2, was the only location that met all of the qualification criteria and scored the highest when all of evaluation criteria were considered. The criteria used by DCS in the selection process were as follows (DCS 2002):

Siting Qualification Criteria

1. Free from subsurface contamination,
2. Adequate terrain and area, and
3. Free from Resource Conservation and Recovery Act/Comprehensive Environmental Response, Compensation, and Liability Act (RCRA/CERCLA) features.

Siting Evaluation Criteria

1. No known or protected plant or animal species,
2. Water table significantly below the facility substructure,
3. Relatively level area in a higher location for increased security and so as not to block drainage,
4. Proximity to existing roads and the PDCF site,
5. Location with respect to subsurface soft zones,
6. Availability of utilities,
7. Location with respect to wetland areas,
8. Proximity to archaeological features, and
9. Interference with existing site operations.

Based on the above, this EIS does not consider alternatives to the SRS in which to locate the proposed MOX facility, nor does it further consider alternative locations within SRS F-Area.

2.3.2 Technology and Design Options

The general design of the proposed MOX facility was provided in DOE's SPD EIS (DOE 1999a). In developing the detailed proposed MOX facility design, DCS used the technology at Cogema's MELOX and La Hague facilities, with modifications to meet U.S. regulations, codes, and standards. A general description of the proposed MOX facility design is provided in Section 2.2.3. In its Environmental Report, DCS (2002) considered a number of technology and design alternatives. The technology and design alternatives considered by DCS were discussed if they had a possibility of having some potential impact or significance from an environmental perspective. These technology and design alternatives are summarized below. In evaluating these technology and design alternatives, NRC concluded that, with the exception of sand filters compared to HEPA filters, further detailed analysis was not warranted in Chapter 4. This technology option is also summarized in Section 2.2.5.

2.3.2.1 Dry Compared to Wet Impurity Removal

A polishing process is used to remove gallium and other impurities from the plutonium dioxide feedstock before pellet production. These impurities affect the performance of the MOX fuel in a reactor. Although the proposed aqueous (wet) polishing process meets the criteria for controlling the gallium content to less than 120 parts per billion (ppb) (Framatome ANP 2001), it also generates liquid radioactive and mixed wastes. An alternate technology for purifying the plutonium dioxide is the dry process. The dry process generates significantly less liquid waste and involves thermally induced gallium removal (TIGR). However, in an experimental setting, the TIGR process only reduced the gallium content to 25,000 ppb. The DOE considered the dry process in the SPD EIS (DOE 1999a) and concluded that the dry process would not meet the technical requirements for MOX fuel. The best reported gallium removal (Kolman et al. 2000) results in impurity contents are over 100 times the required criteria. Thus, the dry process was not further evaluated because it could not meet the technical specifications set for MOX fuel. In addition, TIGR remains an experimental process requiring further testing to scale the process to production while ensuring uniform pellet feedstock (DCS 2002; Kolman et al. 2000).

2.3.2.2 Reagent Storage

DCS considered two options for locating reagent storage and solution preparation for the aqueous polishing process. The options were to locate the storage and solution preparation process in the same area as the Aqueous Polishing Area or to locate them in a separate building and to pump reagents to the aqueous polishing process. Because of the potential explosion hazards of the chemical reagents, DCS decided to use a separate building to reduce this hazard. Because the design alternative to this approach involves potentially larger environmental impacts, namely, an increase in the explosion accident consequences, consideration of colocating the aqueous polishing and reagent storage is not evaluated in Chapter 4.

DCS also considered whether to store the chemical reagents in aboveground or belowground tanks. Belowground tanks have the advantage of limiting immediate human exposure to spills. However, there is increased environmental risk associated with leaking belowground tanks. DCS decided to use aboveground tanks with concrete curbs to contain potential spills and overflows. The NRC considered the design alternative of belowground storage tanks. However, this alternative would likely pose a greater risk of groundwater contamination. For this reason, consideration of belowground tanks is not evaluated in Chapter 4.

2.3.2.3 Acid Recovery Process

DCS added an evaporator to the acid recovery process. This evaporator reduces the activity of the distillates and recycles approximately half of the volume of distillates in lieu of using fresh demineralized water. This also results in a volume reduction of liquid wastes that would be processed and treated by the WSB. Because the design alternative to this approach involves larger environmental impacts, namely, a demand for more process chemical shipments and handling and larger waste volumes, further consideration of the aqueous polishing process without the acid recovery process as an alternative is not evaluated in Chapter 4.

2.3.2.4 Glovebox Cooling

In the MELOX design, gloveboxes are cooled at a higher air flow rate to remove heat generated from the reactor-grade plutonium. Because weapons-grade plutonium has a lower heat release, gloveboxes at the proposed MOX facility can be cooled using natural convective cooling. This results in a reduced airflow and permits a smaller HEPA filter size. The smaller filter size reduces the volume of solid TRU waste generated by filter replacement. Because the alternative to this design consideration (i.e., higher glovebox air flow) is unnecessary to meet any conceivable alternative relative to the proposed MOX facility's purpose and need to disposition weapons-grade plutonium, use of higher glovebox flows and larger HEPA filter banks is not evaluated as an alternative in Chapter 4.

2.3.2.5 Treatment of Aqueous Laboratory Waste

Aqueous laboratory wastes at the MELOX facility are precipitated and solidified, resulting in TRU wastes. DCS decided to remove the plutonium from the laboratory waste and recycle this plutonium into the aqueous polishing process. This step reduces the classification of the laboratory waste from TRU waste to LLW. Because the alternative laboratory waste management design would involve generation of more TRU waste and, therefore, have larger environmental impacts, inclusion of plutonium in laboratory waste streams is not further evaluated as an alternative in Chapter 4.

2.3.2.6 Pellet Grinding Process

In the facility design, DCS replaced the two-stage cyclone separator in the MOX powder processing operation with a decloggable metallic filter. This filter would reduce the TRU waste volume that would result from the periodic replacement of other filters downstream of the pellet grinding process. Therefore, the use of a two-stage cyclone separator instead of a decloggable filter would result in the generation of additional TRU wastes. Since additional TRU waste poses a larger environmental impact, use of a two-stage cyclone separator is not evaluated further as an alternative in Chapter 4.

2.3.2.7 Facility Heat Exchangers

DCS considered two options to remove heat from the facility. The options were to use water-cooled or air-cooled heat exchangers. Water-cooled exchangers can have impacts associated with cooling tower drift or blowdown. To reduce these potential impacts, DCS decided to use air-cooled heat exchangers. Because the water-cooled exchangers would involve generation of cooling tower drift or blowdown and, therefore, larger environmental impacts, using this type of exchanger is not further evaluated as an alternative in Chapter 4.

2.3.2.8 Physical Security Barriers

DCS considered several options to provide a physical security barrier around the proposed MOX facility. One of these was the construction of an earthen berm. Because this method would have resulted in a larger disturbed area for the site, DCS decided to use physical security barriers that resulted in less land disturbance. Because the earthen berms would involve a larger disturbed area and, therefore, larger environmental impacts, use of berms is not further evaluated as an alternative in Chapter 4.

2.3.2.9 Material Transfer from the PDCF to the Proposed MOX Facility

As discussed in Section 1.2.1, the PDCF would produce plutonium dioxide feedstock for the proposed MOX facility. The material would need to be transferred to the proposed MOX facility. DCS considered three transfer options: (1) tunnel, (2) closed transfer trench, and (3) vehicle transfer. Because the first two options would result in greater land disturbance, DCS decided to use vehicles to transfer the plutonium dioxide feedstock. Because the tunnel or closed transfer trenches would involve a larger disturbed area and, therefore, larger environmental impacts and because vehicle-related impacts would be small for the short distance between the facilities, use of tunnels or trenches is not further evaluated as an alternative in Chapter 4.

2.3.3 Immobilization of Surplus Plutonium

As discussed below, the NRC has concluded that immobilizing surplus plutonium is not a reasonable alternative to the proposed action, and, therefore, this alternative does not require detailed analysis in Chapter 4.

Before the DOE's January 2002 decision to cancel the plutonium immobilization plant, plutonium immobilization was available as a no-action disposition alternative to the proposed action. The DOE had already evaluated the environmental impacts of this alternative as alternative 12a in the SPD EIS (DOE 1999a), so that a new NRC analysis of this alternative was not required. However, as discussed in Section 1.4.1, following the DOE's January 2002 decision, the NRC solicited views on whether the immobilization alternative should still be evaluated in this EIS. The comments solicited did not identify any persuasive reasons to further consider the immobilization alternative.

The NRC has now determined for two reasons that immobilization is no longer a reasonable alternative to the proposed action. First, immobilization of the 34 MT (37.5 tons) of surplus plutonium would not meet a key element of the purpose and need for the proposed action, as described in Section 1.3. Due to budgetary constraints, the DOE decided to cancel the immobilization portion of the surplus plutonium disposition program and adopt a MOX-only approach. The DOE determined that in order to make progress with available funds, only one approach could be supported. The DOE stated that after evaluating the feasibility of implementing two disposition approaches, it believed that the best way to make the most progress with available funds while maintaining Russian interest in and commitment to surplus plutonium disposition was to pursue a MOX-only disposition strategy (DOE 2002a). The DOE further stated that Russia does not consider immobilization alone to be an acceptable approach. In the DOE's judgment, reliance by the United States on immobilization would therefore cause Russia to abandon its plutonium disposition efforts. Because immobilization fails to degrade the isotopic composition of the plutonium, Russia distrusts the immobilization alternative, as it would leave open the possibility of future retrieval and reuse of the plutonium in nuclear weapons (DOE 2002a). As discussed further in Section 1.1.1, the DOE therefore concluded that reliance on a MOX-only approach is the key to successfully completing the September 2000 agreement between Russia and the United States.

The second reason that immobilization is no longer a reasonable alternative to the proposed action is its connection with the conduct of United States foreign policy. Evaluating the immobilization alternative now would involve the NRC in foreign policy matters that the DOE has been conducting on behalf of the United States. In the NRC's view, an alternative that would block the implementation of an agreement with another country involves foreign policy matters that are outside NEPA's scope. Therefore, the NRC concludes that immobilization is not a reasonable alternative requiring detailed analysis in this FEIS.

2.3.4 Off-Specification MOX Fuel

During public information meetings in September 2002, NRC was asked to consider an alternative in which MOX fuel would be manufactured but not irradiated in commercial nuclear power plants. Under this alternative, as understood by the NRC, off-specification fuel rods would be manufactured in the proposed MOX facility and transported to spent fuel pools. These spent fuel pools could be located at either commercial nuclear power plants or interim spent fuel storage installations (ISFSIs). Once at the pool, the rods would be commingled with spent fuel rods, and possibly even incorporated into vacant positions in existing spent fuel assemblies. The final configuration would be a proliferation-resistant form that would be a candidate for the National Academy of Sciences' (NAS') spent fuel standard for surplus plutonium disposition (NAS 2000).

Since the demands for fuel quality and specifications would be lower, the fuel rods could be manufactured "off-specification." The so-called "off-specification" fuel rods would offer both environmental costs and benefits, as described below. Therefore, the NRC gave some consideration to this alternative based on the information provided by principal proponents of this approach (Macfarlane et al. 2001).

The alternative would involve a modified approach to manufacturing MOX fuel. The final powder blend would still have to be homogenized, pressed into pellets, and the pellets sintered in order to manufacture off-specification fuel rods. However, most impurities, including gallium and americium, could remain in the finished rods. This could significantly reduce liquid radioactive waste volumes associated with polishing the feedstock plutonium. As a result, the demand on the WIPP to accommodate solidified high-alpha-activity waste derived from the aqueous polishing process would be reduced.

Since the off-specification rods would not be used in a reactor, any risks of reactor accidents involving MOX fuel would not occur. In addition, the cause of some accidents in the proposed MOX facility would be prevented. For example, if aqueous polishing could be eliminated, then the risks of inadvertent nuclear criticality, solution spills, electrolyzer fires, and explosions would be considerably lower.

Since the concentration of plutonium dioxide in each off-specification rod would not be constrained by reactor fuel specifications, the mass of plutonium dioxide in each rod could be higher. This would result in lower numbers of manufactured rods and correspondingly lower vehicle-related transportation risks associated with transporting rods to any reactor sites. Fewer rods would also reduce the time required to operate the proposed MOX facility, which could result in lower operational costs. Criticality issues arising from the higher concentration of plutonium could be avoided by mixing neutron-absorbing gadolinium and hafnium with the plutonium.

However, there would be environmental costs associated with this alternative. Americium-241 would not be removed by the aqueous polishing process. Since americium-241 is a high-specific-activity alpha-emitter and poses a direct radiation hazard, radiation exposures to facility workers, site workers, and the public would be higher during MOX facility operations, off-specification MOX rod transportation, and handling of the off-specification rods at the reactor site or ISFSI.

The costs of manufacturing off-specification MOX fuel rods would also be affected by the elimination of the "fuel credit." The fuel credit is a project cost offsetting factor that accounts for the price a reactor licensee would pay for completed MOX fuel that meets its specifications. The estimated additional project costs would be $1.0 billion, thereby raising the total project costs from $3.8 billion to $4.8 billion.

The benefit of producing electricity from the use of MOX fuel would also be eliminated by the manufacture of off-specification MOX fuel.

Having qualitatively weighed the costs and benefits of this alternative, the staff find that this alternative likely involves a net increase in environmental costs. Therefore, no compelling reason exists to pursue this alternative in further detail. In addition, it is uncertain that this proposal would meet the National Academy of Sciences' spent fuel standard for surplus plutonium disposition (NAS 2000). The off-specification rods would not be irretrievably configured in irradiated spent fuel, and the isotopic distribution of the plutonium in off-specification rods would not be altered. As a result, this form is unlikely to meet with approval from the Russian Federation, whose parallel progress on plutonium disposition under formal bilateral agreements is integral to the purpose of and need for the proposed action. As discussed above for the immobilization of plutonium alternative, because this alternative does not meet the purpose of and need for the proposed action, the off-specification alternative is not further analyzed in detail in the EIS.

2.3.5 Parallex Project Alternative

Another suggested alternative to the proposed action was to transfer the surplus plutonium to Canada under the Parallex Project. The Parallex Project was identified by DOE in its ROD for the Storage and Disposition of Weapons-Usable Fissile Materials Programmatic Environmental Impact Statement (DOE 1997) as a possible option for dispositioning some of the surplus plutonium. The Parallex Project is a joint Canadian, Russian, and U.S. demonstration effort to evaluate the feasibility of burning MOX fuel in heavy-water-moderated reactors. The Parallex Project is still ongoing. It is a limited scale test of approximately 27 kg (59 lb) of MOX fuel that was manufactured at the DOE's Los Alamos National Laboratory (LANL) and at the Bochvar Institute in Moscow, Russia. This MOX fuel was shipped to Canada and is currently being tested in a Canadian Deuterium Uranium (CANDU) reactor. Following irradiation, additional analyses will be required to evaluate the usefulness of this approach. The DOE prepared an environmental assessment (EA) for this action and issued a Finding of No Significant Impact (FONSI) (DOE 1999b).

The suggested alternative of considering the Parallex Project would mean that the PDCF, the WSB, and the proposed MOX facility would be constructed and operated, but that the MOX fuel would be transferred to Canada for irradiation in heavy-water-moderated reactors there. This suggested alternative would be similar to the proposed action, except that the surplus plutonium would be irradiated in Canada. Implementing this alternative would require a change in national policy regarding the disposition of surplus weapons plutonium that is the responsibility of the DOE. Therefore, this alternative is not considered further in this EIS.

2.3.6 MIX MOX Alternative

During the public comment meetings on the DEIS in March 2003, NRC was asked to consider an alternative in which surplus weapons-grade plutonium would be mixed with reactor-grade plutonium. This alternative was named "MIX MOX" by the proponent and is described further below.

Weapons-grade plutonium has a lower percentage of plutonium-240 than does reactor-grade plutonium. One concern with the immobilization alternative was that it would not isotopically degrade the plutonium. The MOX fuel alternative does isotopically degrade the plutonium. The depleted uranium (uranium-238) and plutonium-239 in MOX fuel would be converted to plutonium-240 when subjected to irradiation in a nuclear reactor. The MIX MOX alternative would change the overall percentage of plutonium-240 by adding/mixing surplus weapons-grade plutonium with reactor-grade plutonium. The source of reactor-grade plutonium would be European stockpiles. For example, Britain has approximately 60 MT of surplus reactor-grade plutonium that was generated from reprocessing spent nuclear fuel. The MIX MOX proponent stated that after the materials were mixed, they could be disposed of in a geologic repository.

Several details of the MIX MOX alternative have not been fully developed. For example, it is not clear if new facilities would be required to perform the mixing and whether any processing of portions of the surplus plutonium would be required prior to mixing. In addition, the percentages of the two plutonium materials required to achieve suitable isotopic degradation have not been determined. The legality, availability, and cost of purchasing the reactor-grade plutonium is uncertain. As such, the environmental impacts cannot be determined. Assuming that existing DOE facilities could be used, it is conceivable that the costs of the MIX MOX alternative could be slightly lower than the proposed action; however, the benefit of producing electricity from the use of MOX fuel would be eliminated by the MIX MOX alternative.

The MIX MOX alternative appears to satisfy one element of the purpose of and need for the proposed action. It appears to result in material that is proliferation resistant and would therefore reduce the threat of nuclear weapons proliferation. However, the MIX MOX alternative does not satisfy the second element of the purpose of and need for the proposed action. The current United States - Russia agreement does not allow for disposition of surplus plutonium using the MIX MOX alternative. Moreover, given that the environmental costs of the proposed action are considered to be small, the MIX MOX alternative is not a clearly superior alternative. Therefore, the NRC concludes that MIX MOX is not a reasonable alternative requiring detailed analysis in this EIS.

2.4 Comparison of Alternatives

In weighing the environmental, economic, and other benefits of the proposed action against its environmental, economic, and other costs, the NRC must also consider and compare reasonable alternatives to the proposed action. These evaluations will be factored into the ultimate decision of whether the action called for is the issuance of the proposed license, with any appropriate conditions to protect environmental values. The proposed action and the no-action (continued storage) alternative are compared in the text below and in Table 2.1. The terms used in impact categorization are defined in the text box to the right.

Determination of the Significance of Potential Environmental Impacts

For purposes of describing impacts in this EIS, each impact was assigned one of the following three significance levels:

- ***Small:*** The environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the environment.
- ***Moderate:*** The environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the environment.
- ***Large:*** The environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the environment.

The impacts of the no-action alternative and the proposed action are compared for each technical area considered in this EIS. The level of impacts associated with the no-action alternative evaluated includes those impacts incurred by continued storage of surplus plutonium at DOE sites if the proposed MOX facility is not approved by the NRC. As stated previously, projected impacts for the no-action alternative were based on the analysis presented in the DOE SPD EIS (DOE 1999a) and were not reevaluated for this EIS.

The proposed action was evaluated for impacts from the following activities:

- Construction, operation, and deactivation and decommissioning of the proposed MOX facility, PDCF, and WSB at the SRS;
- Transport of depleted uranium hexafluoride from a DOE site at Portsmouth, Ohio, to a commercial fuel fabrication plant at Wilmington, North Carolina, to produce uranium dioxide needed as feedstock for the MOX fuel fabrication process;
- Conversion of depleted uranium hexafluoride to uranium dioxide;
- Transport of the uranium dioxide from Wilmington to the SRS;
- Transport of fresh MOX fuel from the SRS to a surrogate reactor site;
- Reactor use of MOX fuel; and
- Transport of spent MOX fuel to a geologic repository.

The continued storage (i.e., the no-action) alternative would result in no new construction at the DOE locations currently storing surplus plutonium, with the possible exception of minor

Table 2.1. Comparison of alternatives[a]

Impact area	Continued storage (no action)	Proposed action
Human Health Risk		
Construction	Not applicable	Human health impacts would be small.
Radiological		Same exposure as SRS employees from existing SRS operations.
Chemical		No adverse impacts from inhalation of construction-related emissions.
Physical hazards		<1 fatality, 122 injuries annually over 3 to 5 years.
Normal Operations	Under current operating conditions, human health impacts would be small.	Human health impacts would be small.
Radiological (annual impacts)		
Collective public dose (person-Sv/yr)	0.029	0.016
Annual LCFs	0.002	0.0009
Public MEI dose (mSv/yr)	0.065	6.1×10^{-5}
Risk of LCF	4×10^{-6}	4×10^{-9}
Facility workers collective dose (person-Sv/yr)	1.4	2.6
Annual LCFs	0.08	0.2
Average facility worker dose (mSv/yr)	≤3.2	<5
Risk of LCF	≤0.0002	<0.0003
Chemical	Insufficient data	No adverse impacts from chemical exposures.
Physical hazards	Insufficient data	<1 fatality, 41 injuries annually over 10 or more years.
Accidents	If an accident occurred, human health impacts would be small to moderate, depending on the type of the accident. Risks would be small.	If an accident occurred, human health impacts would be small, moderate, or large depending on the type of the accident. Risks would be small.
Radiological		
Event	Beyond design basis earthquake	PDCF tritium release (short-term exposure).
Dose to collective public (person-Sv)	6.6	42
LCFs	0.4	3

Table 2.1. Continued

Impact area	Continued storage (no action)	Proposed action
Chemical	No data	Large accidental releases of chlorine or nitrogen tetroxide could have adverse impacts on SRS employees and would require rapid emergency response actions.
Air Quality		
Construction	Continued storage of surplus plutonium at the DOE sites would not require new construction, thus no impacts to air quality would occur.	Air emissions impacts would be small.
Annual standard level for $PM_{2.5}$		<0.1% of standard level.
24-h standard level for $PM_{2.5}$		4.3% of standard level.
CO, SO_2, NO_2 emissions from construction equipment		<0.29% of ambient standard level.
Operations	No violation of air quality standards at DOE sites from continued storage of surplus plutonium.	Air emission impacts would be small.
24-h standard level for $PM_{2.5}$		1.9% of standard level.
$PM_{2.5}$ annual standard level		0.01% of standard level.
Toxic air pollutants and PAHs		<0.04% of South Carolina standard levels.
Prevention of significant deterioration of air quality		<6.0% of PSD Class II Area increment for SO_2 emissions. <6.0% PM_{10} increments to Class II Areas. <1% of Class I increment of PM_{10} standard at Cape Romain National Wildlife Refuge 160 km (100 mi) from proposed facilities.
Hydrology		
Construction	Not applicable	Hydrological impacts would be small.
Surface water		No surface water use or discharges to surface waters during construction.
Groundwater		139 million L/yr (37 million gal/yr). Total use for construction would be 10% of A-Area loop water demand and 3% of excess capacity.

Table 2.1. Continued

Impact area	Continued storage (no action)	Proposed action
Operations	No impacts on water use from continued surplus plutonium storage at DOE sites.	Hydrological impacts would be small.
Surface water		No significant impacts from discharges to an NPDES outfall and discharge of treated sanitary waste effluents.
Groundwater		76 million L/yr (20 million gal/yr). Total use by proposed facilities would be 5% of A-Area loop water demand in 2000 and 2% of excess capacity.
Waste Management		
Construction	No impacts to waste management systems from continued storage of surplus plutonium at DOE sites.	No TRU, LLW, or mixed LLW generation; small impacts to SRS treatment capacity for nonhazardous liquid waste.
Waste volumes generated during a 3-5-yr construction period:		
Hazardous [m^3 (yd^3)]		710 (929)
Nonhazardous liquid [m^3 (million gal)]		300,900 (79.5)
Nonhazardous solid [m^3 (yd^3)]		53,410 (69,858)
Operations	Small impacts on waste management systems from continued storage of surplus plutonium at DOE sites.	Small to moderate impacts on waste management systems at SRS and WIPP.
Waste volumes generated during 10-yr operation period:		
TRU [m^3 (yd^3)]		4,431 (5,796). TRU waste volume would be 13% of SRS storage capacity; 2.6% of WIPP disposal capacity.
Liquid LLW [m^3 (million gal)]		22,786 (6.0). The liquid LLW constitutes 4% of the discharge capacity of SRS.
Solid LLW [m^3 (yd^3)]		6,052 (7,916). Estimated volumes for solid LLW would represent about 21% of the SRS disposal capacity (if disposed of entirely at SRS).
Hazardous/mixed [m^3 (yd^3)]		120 (157). Estimated volume of hazardous waste would represent less than 2% of SRS storage capacity.

Table 2.1. Continued

Impact area	Continued storage (no action)	Proposed action
Nonhazardous liquid [m^3 (million gal)]		602,000 (159). Nonhazardous liquid waste would be 6% of SRS treatment capacity.
Nonhazardous solid [m^3 (yd^3)]		41,400 (54,149). Nonhazardous solid waste would be disposed off-site.
Environmental Justice		
Construction	No impacts would occur since no new construction would be needed for continued storage of surplus plutonium at DOE sites.	No exposure to radiological emissions and no adverse impacts from inhalation of construction-related chemical emissions, regardless of population group or income status.
Normal Operations	Radiological and nonradiological risks from continued storage of surplus plutonium would be small. No disproportionately high and adverse effects would occur.	No disproportionately high and adverse effects would occur from routine operations.
Accidents		An environmental justice impact is possible from a severe accident.
Aesthetics		
Construction and Operation	No impacts would occur because no new construction is needed for continued storage of surplus plutonium at the DOE sites.	Small impacts on visual resources from construction and operation of the proposed facilities.
Cultural and Paleontological Resources		
Construction	No impacts would occur because no new construction is needed for continued storage of surplus plutonium at the DOE sites.	Two archaeological sites, 38 AK 546/547 and 38 AK 757, would be directly affected by construction of the proposed MOX facility. The South Carolina State Historic Preservation Office accepted a data recovery plan for the sites, and data recovery was completed for both sites in 2002. Five additional eligible sites could experience indirect impacts by the construction workforce unless proper mitigation is used.
Operations	No impacts on cultural or paleontological resources are expected from continued storage of surplus plutonium at the DOE sites.	Routine operations would not impact archaeological sites near the proposed facilities.

Table 2.1. Continued

Impact area	Continued storage (no action)	Proposed action
Ecology		
Construction	No impacts would occur since no new construction is anticipated for continued storage of surplus plutonium at the DOE sites.	Impacts from habitat loss or noise generation during construction of the proposed facilities would be small.
Habitat loss		Impacts to wetlands and endangered/ threatened species would be small.
		Up to 14.7 ha (36.4 acres) of woodlands would be cleared for facilities, representing <1% of annual timber harvest at SRS, and trees would be small.
Noise impacts		Construction noise levels as high as 80 dBA could impact wildlife within 122 m (400 ft) of the project area.
Operations	Ecological impacts would be small.	Ecological impacts would be small.
Geology, Seismology, and Soils		
Construction	Continued storage of surplus plutonium at the DOE sites would not impact soils and geology since no new construction is expected.	Impacts to soils and geology would be small. Up to 50 ha (123 acres) would be disturbed in F-Area; some soil erosion and compaction.
Operations	Continued storage of surplus plutonium at the DOE sites would not impact soils and geology.	Impacts to soils and geology from routine operations would be small.
Infrastructure		
Construction	No new construction is expected, thus there would be no impacts to existing DOE infrastructure.	Impacts to existing infrastructure would be small.
Roads		An additional 4.8 to 6.4 km (3 to 4 mi) of roadways would be needed in the F-Area to support construction.
Electrical power		17,700 MWh/yr representing about 3.7% of SRS capacity would be needed during the 5-yr construction period.

Table 2.1. Continued

Impact area	Continued storage (no action)	Proposed action
Water		139 million L/yr (37 million gal/yr) representing about 3.3% of A-Area loop groundwater capacity.
Operations	Impacts occurring at DOE facilities during continued storage of surplus plutonium would be small.	Impacts to existing infrastructure would be small.
Electrical power		Use of about 186,000 MWh/yr, representing 36.4% of F-Area capacity, would occur during normal operations.
Water		76 million L/yr (20.1 million gal/yr) or about 5% of A-Area loop water demand in 2000 and 2% of excess capacity would be used.
Land Use		
Construction	No impacts would occur since no new construction of storage facilities for surplus plutonium is needed at the DOE facilities.	Small impacts to designated land use at SRS would occur for construction of the proposed facilities.
Normal Operations	No impacts to land use would occur at DOE facilities during continued storage of surplus plutonium.	Small impacts to land use would occur from routine operations.
Accidents		Depending on the type and extent of an accident during operations, impacts could be small, moderate, or large. Portions of the F-Area could be precluded from employee use until corrective cleanup and appropriate monitoring measures were implemented. Small, moderate, or large impacts to land use in the immediate vicinity of SRS could occur in the event that a highly unlikely accident results in radioactive material migrating off site.
Noise		
Construction	Not applicable	Small impacts would occur from noise levels generated during construction.
Equipment noise levels		Equipment and vehicle noise would reach levels of 85–90 dBA at distances of 15 m (50 ft) from the source.

Table 2.1. Continued

Impact area	Continued storage (no action)	Proposed action
		Noise levels at the SRS boundary could reach 38 dBA, which is below EPA guidance of 55 dBA for protection of the public.
Operations	No significant impacts would occur at DOE plutonium storage facilities above noise levels currently generated by traffic and worker activities.	Small impacts would occur from noise levels generated during operation.
Process equipment, diesel generators, air-conditioning noise		Noise levels could be as high as <29 dBA at the SRS boundary, which is well below the 55-dBA EPA guidance level.
Socioeconomics		
Construction	Not applicable	Impacts on the REA and ROI would be small.
Employment		1,010 direct jobs, 810 indirect jobs for peak construction year.
Income		$91.9 million in peak construction year.
In-migrating population		350
Operations	No impacts would occur from continued storage of surplus plutonium at DOE facilities.	Small impacts on the REA and ROI would occur during operations.
Employment		490 direct jobs, 780 indirect jobs.
Income		$64 million per year
In-migrating population		180
Cost-Benefit Impacts		
Construction	Continued storage of surplus plutonium at DOE facilities would not result in additional impacts to the REA and ROI.	No significant adverse impacts related to costs would occur from construction of the proposed facilities. Some beneficial impacts would occur. In general, the impacts would be considered small.
REA & ROI impacts		
Employment		1,020 average annual employment
Total income		$370 million
Total regional product		$760 million

Table 2.1. Continued

Impact area	Continued storage (no action)	Proposed action
Operations	Impacts related to costs and benefits from continued storage would be small.	Impacts related to costs and benefits from operation of the proposed facilities would be small.
REA & ROI impacts		
Employment		1,270 jobs
Total income		$640 million
Total regional product		$1,180 million
Net benefit		$1,940 million
National Impacts		
Costs		$4,064 million
Benefits		Economic benefits for materials supplied, services, new scientific knowledge, safe use of plutonium stockpile, generation of electricity from MOX fuel.
Transportation		
Radiological	No intersite transportation expected.	Radiological impacts would be small.
Routine dose to the public (person-Sv)		3.1-5.6
LCFs		0.2-0.3
Dose to the transportation crew (person-Sv)		2.1-5.3
LCFs		0.1-0.3
Accident dose risk to the public (person-Sv)		0.23
LCFs		0.01
Nonradiological	No intersite transportation expected.	Nonradiological impacts would be small.
Vehicle emissions (latent fatalities)		1-2
Accidents (fatalities)		0.078-0.20

[a]Some of the impacts for the no-action alternative are from the entire DOE site, not just activities associated with continued storage. Therefore, the impacts of the no-action alternative are overestimated.

expansion of storage facilities at the Pantex site in Texas. Construction impacts would be small or negligible at Pantex if storage facility expansion was necessary and would occur on previously disturbed land adjacent to the existing storage facilities (DOE 1999a). For all present DOE storage sites, radiological and nonradiological risks would be small. Continued storage would be expected to have no impacts on air quality, water quality, waste management systems, cultural resources, or soils, and the economic cost would be lower than that for the proposed action. However, continued storage would meet none of the DOE's goals for the plutonium disposition program.

Construction of the proposed MOX facility, PDCF, and WSB (hereafter referred to as the proposed facilities) would disturb up to 50.0 ha (123.4 acres) of land. Impacts to endangered or threatened species, wetlands, or aquatic or terrestrial habitats (including woodlands) at the SRS and the F-Area vicinity would be small. Impacts to two prehistoric archaeological sites eligible for listing on the *National Register of Historic Places* (NRHP) have been mitigated through data recovery, and the removal of the fill during construction will be monitored (see Section 5.2.9).

The primary benefit of operation of the proposed MOX facility would be the resulting reduction in the supply of weapons-grade plutonium available for unauthorized use once the plutonium component of MOX fuel has been irradiated in commercial nuclear reactors. Converting surplus plutonium in this manner is viewed as being a safer use/disposition strategy than the continued storage of surplus plutonium at DOE sites, as would occur under the no-action alternative, since it would reduce the number of locations where the various forms of plutonium are stored (DOE 1997). Further, converting weapons-grade plutonium into MOX fuel in the United States — as opposed to immobilizing a portion of it as DOE had previously planned to do — lays the foundation for parallel disposition of weapons-grade plutonium in Russia, which distrusts immobilization for its failure to degrade the plutonium's isotopic composition (DOE 2002a). Converting surplus plutonium into MOX fuel is thus viewed as a better way of ensuring that weapons-usable material will not be obtained by rogue states and terrorist groups. Implementing the proposed action is expected to promote the above nonproliferation objectives. Additionally, building and operating the proposed MOX facility is expected to result in a gain of scientific knowledge relative to the conversion of weapons-grade plutonium into reactor fuel.

In addition to the above primary benefits, there are secondary economic benefits of the proposed action. Impacts of construction on the regional economic area (REA) and region of influence (ROI) would be beneficial with respect to jobs and income. Direct construction jobs for the proposed action would total about 1,010 in the peak construction year. Although in-migration of workers during construction would be greater for the proposed action, no adverse impacts are anticipated to public services, schools, housing availability, or the local transportation network. Construction of the proposed facilities would be expected to generate 91.9 million in total income within the REA during the peak construction year.

During operations, the MOX facility, PDCF, and WSB would be expected to generate 490 direct and 780 indirect jobs, producing a total annual income of $64 million in the REA. Approximately 180 people would be expected to relocate to the SRS area during operation of the proposed facilities. No adverse socioeconomic impacts are expected as the result of proposed facility operations. Adequate public services, schools, and housing exist to satisfy needs of the in-migrating population.

The economic cost benefit analysis for the proposed action showed an overall net benefit to the ROI and REA of $1,940 million. National economic impacts (costs) for the proposed MOX facility, PDCF, and WSB are estimated to be $4,064 million. The economic benefits would include adding employment income in various national economic sectors and adding income to businesses from the purchase of related goods and services.

The following discussion compares the primary and secondary benefits set forth above to the environmental and economic costs of the proposed action.

Construction and routine operation of the proposed MOX facility would not be expected to cause any disproportionately high and adverse impacts to low-income or minority populations in the SRS vicinity. Of the accidents evaluated, a hypothetical tritium release accident at the proposed PDCF had the highest estimated short-term impacts, approximately 3 latent cancer fatalities (LCFs) among members of the off-site public. The same accident also had the highest 1-year exposure impact, up to 100 LCFs among members of the off-site public if ingestion of contaminated crops was considered. However, it is highly unlikely that such an accident would occur, and the risk to any population, including low-income and minority communities, is considered to be low. However, the communities most likely to be affected by a significant accident would be minority or low income, given the demographics and prevailing wind direction. The extent to which low-income or minority population groups would be affected would depend on the amount of material released and the direction and speed of the wind.

Continued storage of plutonium by the DOE at its present locations would not be expected to produce additional LCFs. (Annual LCFs of approximately 0.002 in the surrounding population of the storage sites [DOE 1999a] were estimated.) The annual collective dose to members of the public (i.e., those living and working within 80 km [50 mi] of the SRS) produced by routine operation of the proposed MOX facility, the PDCF, and the WSB would be expected to result in an LCF rate of approximately 0.0009/yr or less. Therefore, continued storage results in higher annual impacts.

No adverse impacts from chemical exposure of workers at the proposed MOX facility are anticipated. Less than one fatality, and approximately 120 worker injuries per year are anticipated during construction of the proposed facilities. Facility operations would result in about 40 injuries per year and less than one fatality per year.

Routine MOX facility operations are expected to produce small air quality impacts and would not result in concentrations above air quality standard levels for criteria pollutants at the SRS. Facility construction would contribute temporarily less than 0.1% of the $PM_{2.5}$ standard level, and facility operation would contribute about 0.01% or less of this level.

Water consumption during operation of the proposed facilities would be an increase of about 5% of the water demand for the A-Area loop in 2000 and about 2% of the excess A-Area loop capacity. Impacts to surface water are expected to be small during facility operations because the concentrations of nonhazardous wastes in the discharge produced by the proposed facilities would be within the guidelines of the existing NPDES permit.

Waste management systems at the SRS would not be adversely affected by wastes generated by the proposed MOX facility, PDCF, and the WSB. Adequate storage capacity and handling procedures are in place at the SRS to process hazardous wastes generated during both construction and facility operations. Nonhazardous liquid and solid wastes would not adversely affect operation of the Central Sanitary Waste Treatment Facility at the SRS.

Transportation of uranium and plutonium feedstock materials, transuranic waste, and fresh MOX fuel would result in approximately 3,300,000 to 8,200,000 km (2,050,000 to 5,100,000 mi) traveled by 1,497 to 3,512 truck shipments over the operations period of the proposed MOX facility. Up to 1 latent cancer fatality (LCF) might be expected because of the radioactive nature of the cargo. (Estimated LCFs for members of the public and the transportation crews were 0.2 to 0.4 and 0.1 to 0.3, respectively.) One to two latent fatalities from vehicle emissions were estimated, and no fatalities (0.078 to 0.20 fatality) from the physical trauma of potential vehicle accidents were estimated.

The use of sand filters was identified during the EIS scoping process as a potential substitute for final HEPA filters. The sand filter technology is described in Section 2.2.5. A comparison between sand filter and HEPA filter impacts is presented in Section 4.3.8. The NRC concludes that the technology option to install a sand filter poses no clear reduction in overall environmental impacts over the installation and use of HEPA filters.

A sand filter typically is designed to use locally available sand and gravel. The outer wall of the sand filter consists of reinforced concrete placed below or partially below grade. It is designed to withstand a design-basis earthquake and/or flood without cracking or leaking. A sand filter designed for the proposed MOX facility would be rectangular and would require a surface area of about 313 m^2 (33,650 ft^2). The filter would be about 3 m (10 ft) deep and would consist of gravel layers overlaid with sand layers arranged in order of decreasing particle size (Orr 2001). A coarse sand layer would be placed at the top of the filter to maintain the integrity of the lower sand layers during filter operations. No routine maintenance is required during operation of sand filters.

Use of the HEPA filters would result in a slightly higher radiological dose to facility workers during the course of normal operations, as discussed in Section 4.3.1.1.2, and the use of a sand filter might result in some accident impacts lower than those estimated in Section 4.3.5.2. As discussed in Section 4.3.2.2, the air filtration method would not have an impact on air quality. Both filter types have approximately the same efficiencies for particulates, and neither filter type is designed to trap gases. In addition, the disposal costs were estimated to be similar for each filter type (Section 4.3.4).

2.5 Recommendation Regarding the Proposed Action

After weighing the costs and benefits of the proposed action and comparing alternatives (see FEIS Sections 2.4 and 4.6), and after considering the comments received on the DEIS (see FEIS Appendix J), the NRC staff, in accordance with 10 CFR 51.91(d), sets forth below its NEPA recommendation regarding the proposed action. The NRC staff recommends that, unless safety issues mandate otherwise, the action called for is the issuance of the proposed license to DCS, with conditions to protect environmental values. In this regard, the NRC staff concludes that (1) the applicable environmental requirements set forth in FEIS Chapter 6 and (2) the proposed mitigation measures discussed in FEIS Chapter 5 would eliminate or substantially lessen any potential adverse environmental impacts associated with the proposed action.

The NRC staff has concluded that the overall benefits of the proposed MOX facility outweigh its disadvantages and costs, based upon consideration of the following:

- The national policy decision to reduce supplies of surplus weapons-grade plutonium, as reflected in agreements between the United States and Russia;
- The small radiological impacts on, and risk to, human health, that would be caused by constructing, operating, and decommissioning the proposed MOX facility;
- The small environmental impact the proposed action would have; and
- The economic benefit to the local community.

As discussed in FEIS Chapter 4, postulated severe accidents evaluated in connection with the proposed action would be expected to produce moderate to large impacts. While the consequences of these bounding accidents would be expected to produce moderate to large impacts, the likelihood of such accidents occurring is expected to be very low (highly unlikely). Accordingly, the NRC concludes in its NEPA analysis that the benefits of the proposed action outweigh its connected risks and costs.

2.6 References for Chapter 2

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3 AFFECTED ENVIRONMENT

3.1 General Site Description

The Mixed Oxide (MOX) Fuel Fabrication Facility (the proposed MOX facility) and its support facilities, the Pit Disassembly and Conversion Facility (PDCF) and the Waste Solidification Building (WSB), are proposed for construction at the U.S. Department of Energy's (DOE's) Savannah River Site (SRS). The SRS is located in the southwestern portion of the state of South Carolina, as shown in Figure 3.1. The SRS is adjacent to the Savannah River, along the state border with Georgia, approximately 20 km (12 mi) southeast of Aiken, South Carolina, and 24 km (15 mi) east of Augusta, Georgia (Arnett and Mamatey 2001b). The U.S. Government owns the SRS, which was set aside in 1950 for the production of nuclear materials for national defense. Since the end of the Cold War in 1991, national priorities have shifted, and the site's priorities are now focused on waste management, environmental restoration, technology development and transfer, and economic development. The SRS covers approximately 803 km^2 (310 mi^2) in an approximately circular tract of land within Aiken, Barnwell, and Allendale Counties in South Carolina. Public access to the SRS is limited according to DOE security regulations.

The proposed facility sites are located adjacent to the north-northwest edge of F-Area near the center of the SRS (see Figure 1.2). F-Area contains facilities for chemical separations, including F Canyon, which is the main processing facility, and waste storage, which includes 20 of the 49 active liquid high-level (radioactive) waste (HLW) tanks on the SRS.

3.2 Geology, Seismology, and Soils

This section summarizes the geology, seismology, and soil conditions of the SRS and discusses site-specific conditions at F-Area. Geologic resources include mineral ores, fossil fuels, and aggregate (sand and gravel) materials that can have significant economic value. The value of soil resources depends upon the soil's ability to grow plants. Certain soils are classified by the U.S. Department of Agriculture, Natural Resources Conservation Service, as prime farmland or other important farmlands. The Farmland Protection Policy Act (*United States Code*, Title 7, Section 4201 *et seq.* [7 U.S.C. 4201] *et seq.*) and its implementing regulations (*Code of Federal Regulations*, Title 7, Part 658 [7 CFR Part 658]) require federal agencies as part of the National Environmental Policy Act (NEPA) process to consider the extent to which federal projects and programs contribute to the unnecessary conversion of important farmlands to nonagricultural uses. The site's geology and soil conditions are important in evaluating how water and potential contaminants move through the subsurface, in evaluating erosion impacts, and in predicting subsidence or landslides. Seismology is important in determining potential impacts from earthquakes.

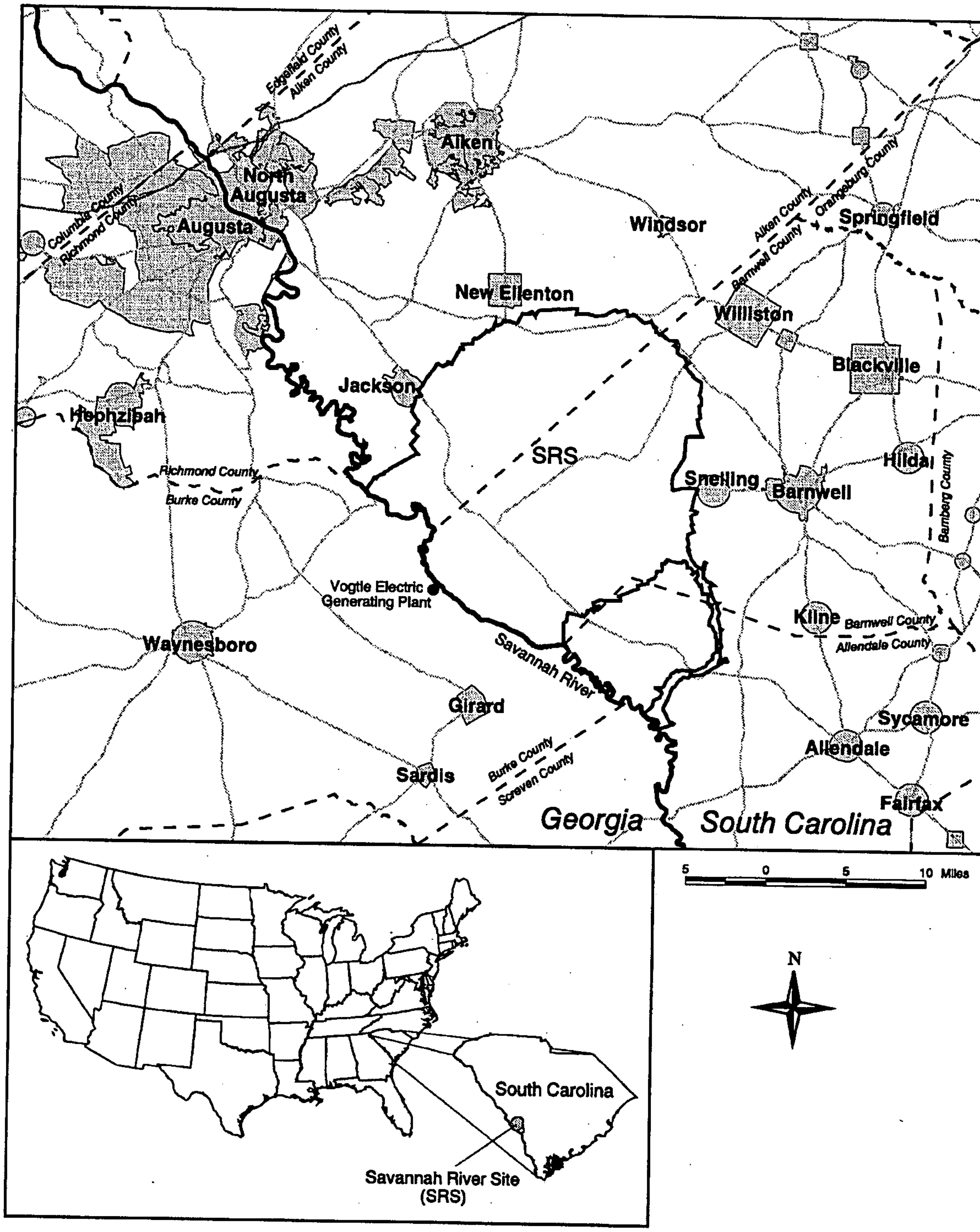

Figure 3.1. Regional location of the SRS.

3.2.1 Geology

The SRS is located in the Aiken Plateau portion of the Upper Atlantic Coastal Plain approximately 32 km (20 mi) east of the Fall Line. The Fall Line is a major physiographic and structural feature that separates the Piedmont and Coastal Plain physiographic provinces in southeastern South Carolina (DOE 1996). Soils within the Piedmont are predominantly derived from the weathering of bedrock. In contrast, soils within the Coastal Plain are predominantly sediments deposited by water. The Coastal Plain sediments are located above bedrock that consists of Paleozoic-age crystalline rock (such as granite) and Triassic-age sedimentary rock (such as siltstone) of the Dunbarton Basin. These sediments thicken from near zero at the Fall Line to about 1,220 m (4,000 ft) at the South Carolina coast (DCS 2003c). In general, the sediments have a regional dip (slant of the top surface) to the southeast. The Aiken Plateau is highly cut by narrow, steep-sided valleys separated by broad, flat areas.

Above the bedrock, the first layer of sediments at the SRS consists of about 210 m (700 ft) of Upper Cretaceous-age quartz sand, pebbly sand, and kaolinitic clay. The next ascending layer (known as the Tinker/Santee Formation) consists of 18 m (60 ft) of Paleocene-age clayey and silty quartz sand, and silt (DCS 2002). Within this layer, there are occasional beds of clean sand, gravel, clay, or carbonate. Deposits of pebbly, clayey sand, conglomerate, and Miocene- and Oligocene-age clay occur at higher elevations. This layer is noteworthy because it contains small, discontinuous, thin calcareous sand zones (i.e., sand containing calcium carbonate) that are potentially subject to dissolution by water. These "soft-zone" areas have the potential to subside, causing settling of the ground surface (WSRC 2000a; DCS 2003c). These areas were encountered in exploratory borings in F-, S-, H-, and Z-Areas of the SRS at depths between 33 and 45 m (100 and 150 ft) (DOE 1995).

The upper sediment layer in F-Area consists of primarily shallow marine quartz sand containing sporadic clay layers (known as the Barnwell Group) (DOE 1999). This layer is about 21 m (70 ft) thick near the western boundary of the SRS and about 52 m (170 ft) thick near the eastern boundary.

There are 11 deep boreholes at the SRS. The closest deep borehole is located just north of an unnamed tributary of Upper Three Runs Creek. The remaining 10 deep boreholes are not located in the vicinity of F-Area.

In 2000, 13 exploratory borings and 63 cone penetration test (CPT) holes were used to identify subsurface conditions at the proposed MOX facility site (DCS 2002). The CPT holes ranged from about 19.5 m (64 ft) to 42.7 m (140 ft) below the existing grade. Some soft zones related to past dissolution and deposition activity were identified at depth. The CPT holes were used to define the limits of the soft zones. The planned locations of heavily loaded structures, such as the MOX Fuel Fabrication Building and the Emergency Diesel Generator Building, were changed to minimize the potential impact of these underlying soft zones.

Except for some small gravel deposits, no economically viable geologic resources occur in the vicinity of F-Area (DOE 1995).

3.2.2 Seismology

On the basis of previous studies at the SRS and elsewhere, there are no known faults capable of producing an earthquake (referred to as capable faults) within the 320-km (200-mi) radius of the site that influence the seismicity of the region, except for poorly constructed faults associated with the Charleston seismic zone (DCS 2003c). Several faults have been identified from subsurface mapping and seismic surveys beneath the SRS. The largest of these is the Pen Branch Fault. It passes through the SRS in a northeast-southwest direction and is located about 5.6 km (3.5 mi) southeast of F-Area (WSRC 2000a). Because there is no evidence of movement along this fault within the last 38 million years, the Pen Branch Fault is considered not capable.

> **Capable Fault**
>
> A fault is described as capable if it has had movement at or near the ground surface at least once within the past 35,000 years, or recurrent movement within the past 500,000 years.

Two large earthquakes have occurred within 300 km (186 mi) of the SRS. The larger of these was the Charleston earthquake of 1886. The Charleston earthquake is the most damaging earthquake known to have occurred in the southeastern United States and one of the largest historic shocks in eastern North America. This earthquake had an estimated Modified Mercalli Intensity of X (USGS 2001); it damaged or destroyed many buildings in the old city of Charleston, killed 60 people, and produced structural damage up to several hundred kilometers from its epicenter. At the SRS, this earthquake had an estimated Richter Scale magnitude ranging from 6.5 to 7.5. The SRS area experienced an estimated peak ground acceleration[1] of 0.10 g (1/10 the acceleration of gravity — 9.81 m/s/s [32.2 ft/s/s]) during this event (DCS 2002).

> **Modified Mercalli Intensity Scale**
>
> The Modified Mercalli Intensity (MMI) Scale is a measure of the shaking strength of an earthquake at different locations in the region where an earthquake is felt. Earthquake intensities are characterized in terms of how the shaking affects people and buildings. The MMI Scale was originally developed in Italy nearly a century ago and includes 12 degrees of shaking. It was modified for use in the United States in 1931.

Three earthquakes have occurred at the SRS during recent years. They occurred on June 8, 1985, August 5, 1988, and May 17, 1997. These earthquakes were small, shallow events and were probably the result of strain release near intrusive bodies or the edges of metamorphic belts, typical of South Carolina Piedmont type seismic

> **Richter Scale**
>
> The magnitude of an earthquake is a measure of the energy released during the event. It is often measured on the Richter Scale, which runs from 0.0 upwards, with the largest earthquakes recorded having a magnitude of 8.6. The Richter Scale is logarithmic; a quake of magnitude 5 is 10 times more destructive than a quake of magnitude 4. Earthquakes greater than magnitude 6.0 can be regarded as significant, with the likelihood of damage and loss of life (Press and Siever 1982).

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1 Peak ground acceleration is the maximum acceleration amplitude (change in velocity with respect to time) measured by a seismic recording of an earthquake (called a strong motion accelerogram).

activity (WSRC 2000a). None of these earthquakes were associated with major faults (e.g., the Pen Branch Fault) in the area. Rather, these earthquakes are inferred to have seismic sources in the lower Paleozoic platform rock at a depth of about 12 km (7.5 mi) (DCS 2001a). These earthquakes had Richter Scale magnitudes of 3.2 or less and had epicenters that were within the SRS boundaries. Earthquakes of this magnitude are not felt, but do register on seismic instruments (Kirkham and Rogers 1981). Seismic alarms at the SRS reactor buildings were not triggered by any of these events (WSRC 2000a).

An earthquake with an average peak ground of 0.20 g is estimated to have an annual probability of exceedance of 1 in 10,000 (1×10^{-4}) at the SRS (DCS 2002, 2003b).

3.2.3 Soils

As discussed in Section 3.2.1, the surface soils at the SRS consist of Coastal Plain sediments. The surface soils are primarily sands and sandy loams with sporadic clay layers (DOE 1999). Currently, a stockpile of soils removed from the Actinide Packaging and Storage Facility (APSF) site on the SRS is mounded up to 15 m (50 ft) thick on the central portion of the proposed facility site in the F-Area. These soils are similar in texture to the natural soils at the site and would be removed from the site during construction.

The majority of soils in F-Area are classified by the U.S. Department of Agriculture, Natural Resources Conservation Service, as the Fuquay-Blanton-Dothan Association. These soils are nearly level to sloping and are well drained. Soils along stream floodplains are classified as the Troup-Pickney-Lucy Association. Both of these soil associations are subject to erosion. Slope stability, however, has not been a significant regional issue.

The surface soils allow precipitation to drain rapidly. Because of their sandy texture and drainage characteristics, some soil units at the SRS meet the requirements as prime farmland. However, the U.S. Department of Agriculture, Natural Resources Conservation Service, does not identify these areas as prime farmlands because they are not available for agricultural use.

Soil sampling was performed in the area of the proposed MOX facility and support buildings as part of a preconstruction baseline environmental monitoring survey conducted between September 2000 and March 2002 (SRS 2002). Fifty locations were identified for sampling by using a statistically based sampling grid. Samples were obtained from depths of between 0 and 30.5 cm (12 in.). Samples were analyzed for metals and radionuclides. None of the metal concentrations exceeded industrial use standards, and all of the radionuclides were well below SRS-developed scenario-specific radionuclide limits.

3.3 Hydrology

This section discusses the hydrologic environment of the SRS and the proposed site for the facilities. Hydrology deals with the properties, distribution, and circulation of water, particularly surface water and groundwater. The surface waters emphasized in this section are the

Savannah River and on-site streams, including treated effluent and runoff discharges to them. Groundwater resources are waters that occur within aquifers (e.g., water-bearing strata that can store and transmit water in significant quantities). These resources are discussed in relation to their use and potential contamination.

3.3.1 Surface Water

The principal surface water feature at the SRS is the Savannah River (see Figure 3.2). It borders the southwest boundary of the site for 32 km (20 mi) (DOE 1996). Six major streams flow through the SRS and discharge to the Savannah River: Upper Three Runs Creek, Beaver Dam Creek, Fourmile Branch, Pen Branch, Steel Creek, and Lower Three Runs Creek. Upper Three Runs Creek has two named tributaries, Tims Branch and Tinker Creek. Pen Branch has one tributary, Indian Grave Branch. Steel Creek also has one tributary, Meyers Branch. None of these bodies of water are federally designated as Wild and Scenic Rivers (DCS 2002). In the vicinity of the F-Area, Upper Three Runs Creek has two unnamed tributaries (see Figure 3.3) that flow to the northwest.

Two man-made lakes are located at the SRS: L Lake, which discharges to Steel Creek, and Par Pond, which discharges to Lower Three Runs Creek (DCS 2002). There are also about 50 other small man-made ponds and about 300 natural Carolina bays (closed depressions capable of holding water) at the SRS. The Carolina bays do not receive any direct effluent discharge; however, they do receive storm-water runoff.

The SRS withdraws surface water from the Savannah River mainly for industrial cooling. In 2000, the SRS withdrew about 49.7 billion L (13.1 billion gal) of water from the river. Most of this water is returned to the river through various discharges (DOE 1999).

The average flow in the Savannah River is 269 m^3/s (9,493 ft^3/s). The 7-day low flow, 10-year recurrence (referred to as "7Q10") flow is 123 m^3/s (4,332 ft^3/s) (WSRC 2000a). This flow is the lowest flow recorded over any 7 consecutive days within any 10-year period. Three large upstream reservoirs (Hartwell, Richard B. Russell, and Strom Thurmond/Clarks Hill) regulate flow in the Savannah River. This regulation is done to lessen the impacts of drought and flooding downstream. Several communities in the area use the Savannah River as a source for domestic water. The closest downstream water intake to the SRS is that of the Beaufort-Jasper Water Authority at Hardeeville, South Carolina, about 130 river miles downstream of the SRS (WSRC 2000a), which withdraws about 340 L/s (5,390 gpm) of water to service a population of 51,000 people.

Treated effluent is discharged to the Savannah River from upstream communities and from treatment facilities at the SRS. The average annual volume of flow discharged by the sewage treatment facilities at the SRS is about 700 million L (185 million gal). These effluents are released under National Pollutant Discharge Elimination System (NPDES) permits. The SRS has five NPDES permits, two (SC0000175 and SC0044903) for industrial wastewater discharges, two (SCR000000 and SCR1000000) for general storm-water discharges, and one (ND0072125) for land application (DOE 1999). Permit SC0000175 regulates 76 outfalls

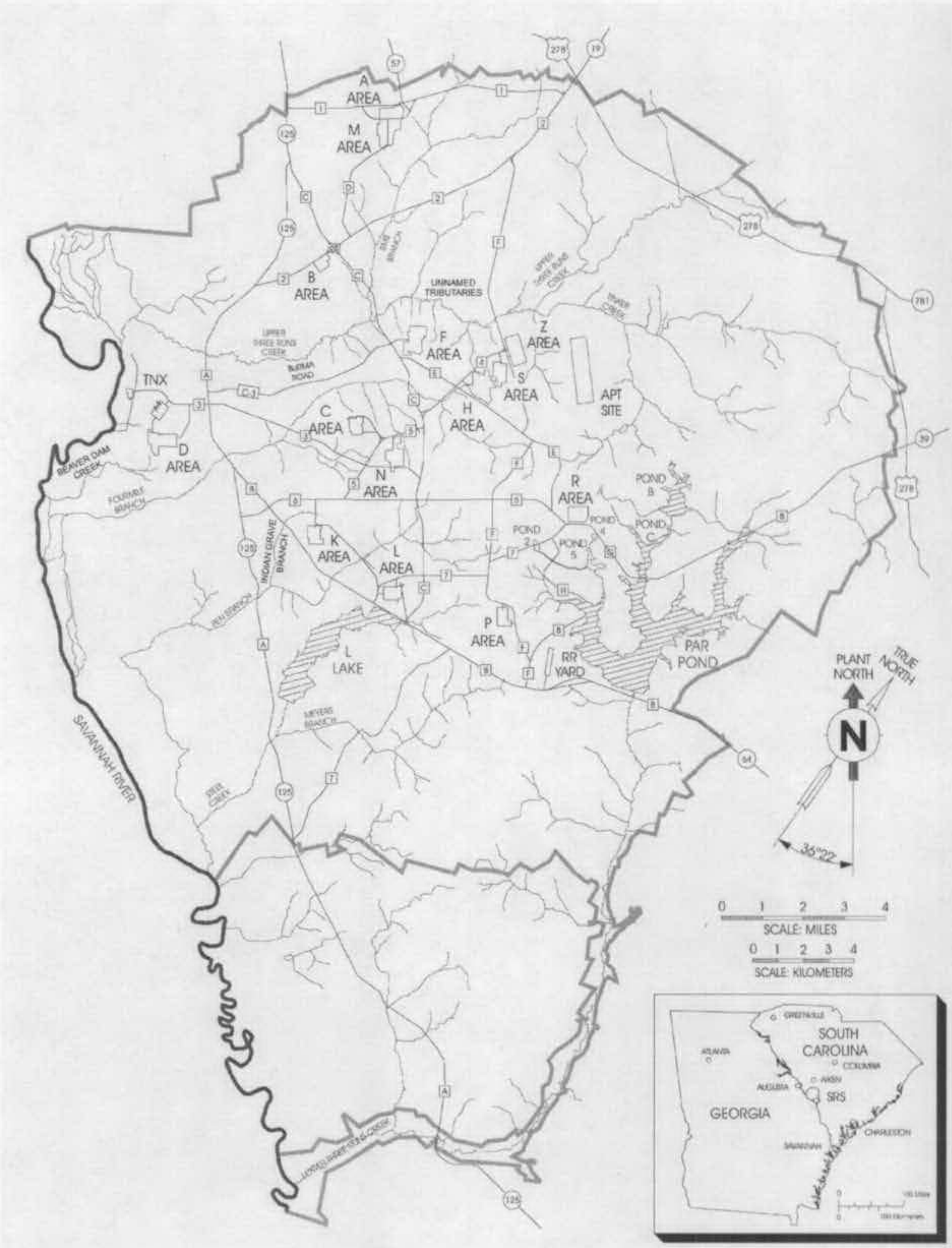

Figure 3.2. Locations of principal surface water features at the SRS (*Source*: DCS 2002).

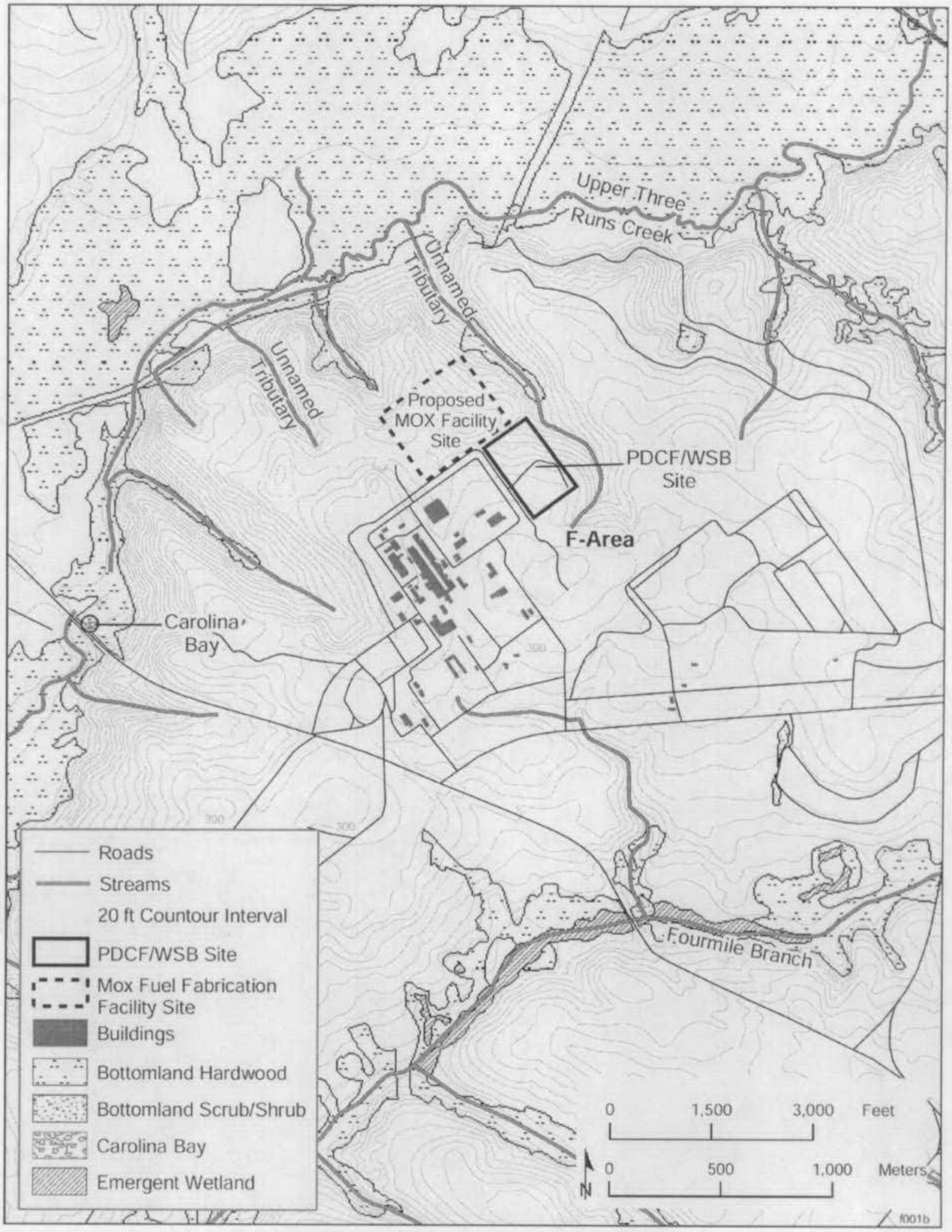

Figure 3.3. Locations of surface water and wetlands in the F-Area (*Source*: Modified from DCS 2002).

(points of discharge); permit SC0044903 regulates another 7 outfalls. The 2000 compliance for these outfalls was 99.7%. The 48 storm-water-only outfalls regulated by the site's storm-water permits are monitored as required. A sediment reduction and erosion plan is required for storm-water runoff from any construction area that exceeds 2 ha (5 acres).

The Savannah River is classified as a freshwater source that is suitable for primary and secondary contact recreation, drinking after appropriate treatment, balanced native aquatic species development, and industrial and agricultural purposes. Primary contact means direct contact with the water, such as while swimming. Secondary contact means having some direct contact with the water but where swallowing is unlikely to occur, such as while fishing. Data from the river's monitoring locations generally indicate that South Carolina's freshwater standards are being met.

Runoff from the land area around F-Area drains to Upper Three Runs Creek and Fourmile Branch (DOE 1999). Runoff from the proposed facilities area drains into unnamed tributaries of Upper Three Runs Creek and flows to the northwest. Runoff from southern portions of the F-Area flow to the southeast into Fourmile Branch. The location for the proposed MOX facility is approximately 670 m (2,200 ft) southeast of Upper Three Runs Creek (WSRC 2000a). An unnamed tributary to Upper Three Runs Creek is located within about 150 m (500 ft) of the proposed MOX facility site (see Figure 3.3). The proposed MOX facility is located about 2,100 m (6,900 ft) north of Fourmile Branch.

Upper Three Runs Creek is a large, cool blackwater stream (i.e., a freshwater stream that has a dark color because of organic debris and tannin-containing compounds) that flows into the Savannah River along the western boundary of the SRS (see Figure 3.2). It drains an area of about 544 km^2 (210 mi^2) and had a mean discharge of 6.9 m^3/s (245 ft^3/s) near its mouth during water year 1995 (WSRC 2000a). A water year is measured from October 1 through September 30. The 7Q10 low-flow is about 2.8 m^3/s (100 ft^3/s). The stream is about 40 km (25 mi) long. It receives water from groundwater aquifer discharges and permitted discharges from several areas at the SRS, including F-Area, S-Area, the Central Sanitary Waste Treatment Facility, and treated industrial wastewater from the Chemical Waste Treatment Facility steam condensate. The stream, however, has never received heated discharges of cooling water from the former SRS production reactors. Flow from the sanitary wastewater discharge averages less than 0.001 m^3/s (0.035 ft^3/s).

Fourmile Branch is a blackwater stream that has been affected by past operational practices at the SRS (DOE 1999). Its headwaters are near the center of the SRS, and it flows southwesterly to the Savannah River. Until June 1985, it received large volumes of hot cooling water from the production reactor in C-Area. While the C-Area reactor was operational, the ambient temperature in Fourmile Branch was 60°C (140°F) (DOE 1999). It has a watershed area of about 54 km^2 (21 mi^2) and receives permitted effluent discharges from F-Area and H-Area. Average flow in the stream is approximately 1.8 m^3/s (64 ft^3/s). The 7Q10 low flow at the same location is about 0.23 m^3/s (8.2 ft^3/s) (WSRC 2000a). In its lower reaches, the stream widens and flows via braided channels through a delta. Downstream of the delta, it reforms into one main channel, with most of the flow discharging into the Savannah River at river mile 152.1; the remainder of the flow enters the Savannah River Swamp.

Under NPDES permit SC0000175, five outfalls discharge effluent to Fourmile Branch. Permitted discharges include 186 basin overflows, cooling water, floor drains, steam condensate, process wastewater, laundry effluent, storm water, sanitary treatment wastewater, ash basin runoff, and lab drains. Within the vicinity of F-Area, there are four permitted outfalls: F2, F3, F4, and F5. Discharge from the F2 outfall averages 0.0048 m^3/s (0.17 ft^3/s). F5 has a flow of 0.0013 m^3/s (0.046 ft^3/s). Outfall F3 is not currently used, but discharges storm water. Outfall F4 is an "administrative outfall" (i.e., an outfall with no pollutant load).

When the Savannah River floods, water from Fourmile Branch flows along the northern boundary of the floodplain and joins with other streams to exit the swamp via Steel Creek instead of flowing directly into the Savannah River. The location for the proposed facilities would not be within the 100-year floodplain of Upper Three Runs Creek (DCS 2002). Similarly, estimated water levels for the probable maximum flood (PMF) for Upper Three Runs Creek are about 15 m (50 ft) below the lowest elevation in F-Area (67 m [220 ft]).

3.3.2 Groundwater

> **Sole Source Aquifer**
>
> - An aquifer that supplies at least 50% of the drinking water to the area above the aquifer.
> - Areas that have no other water supply capable of physically, legally, or economically providing drinking water to local populations.

Several aquifers occur at the SRS (see Figure 3.4). However, no federally designated sole-source aquifers occur there. The uppermost aquifer is known as the Upper Three Runs Aquifer. It occurs at an elevation of about 55 to 67 m (180 to 210 ft) above mean sea level (MSL) in F-Area (DCS 2002). The Upper Three Runs Aquifer lies on top of the leaky Gordon Confining Unit (Green Clay aquitard), which forms a confining layer for the Gordon Aquifer (Congaree Aquifer). The Upper Three Runs Aquifer along with the Gordon Confining Unit and the Gordon Aquifer constitute the Floridan Aquifer System (WSRC 2000a). To the north, the Gordon Confining Unit is not present, and the Gordon and Upper Three Runs Aquifers merge to form the Steed Pond Aquifer. Beneath the Gordon Aquifer is the leaky Crouch Branch Confining Unit (Ellenton aquitard), which, in turn, confines the Crouch Branch Aquifer (Cretaceous Aquifer) (DOE 1999; WSRC 2000a).

Groundwater in aquifers predominantly flows horizontally to points of discharge, such as streams and swamps. In addition, some flow also occurs vertically to either underlying or overlying groundwater aquifers. Groundwater in the Upper Three Runs Aquifer, in general, flows horizontally and discharges to nearby streams. A small portion of the groundwater flows vertically downward to the Gordon Aquifer. Flow in the Gordon Aquifer is mostly horizontal to eventual stream discharge or discharge to the Savannah River, depending on location. Some of the water also flows downward to the underlying Crouch Branch Aquifer. Water in the Crouch Branch Aquifer primarily discharges to Upper Three Runs Creek and the Savannah River. Groundwater beneath the SRS flows slowly at rates that range from inches per year in the clay aquitards that confine the aquifers to several hundred feet per year in the sandy aquifers

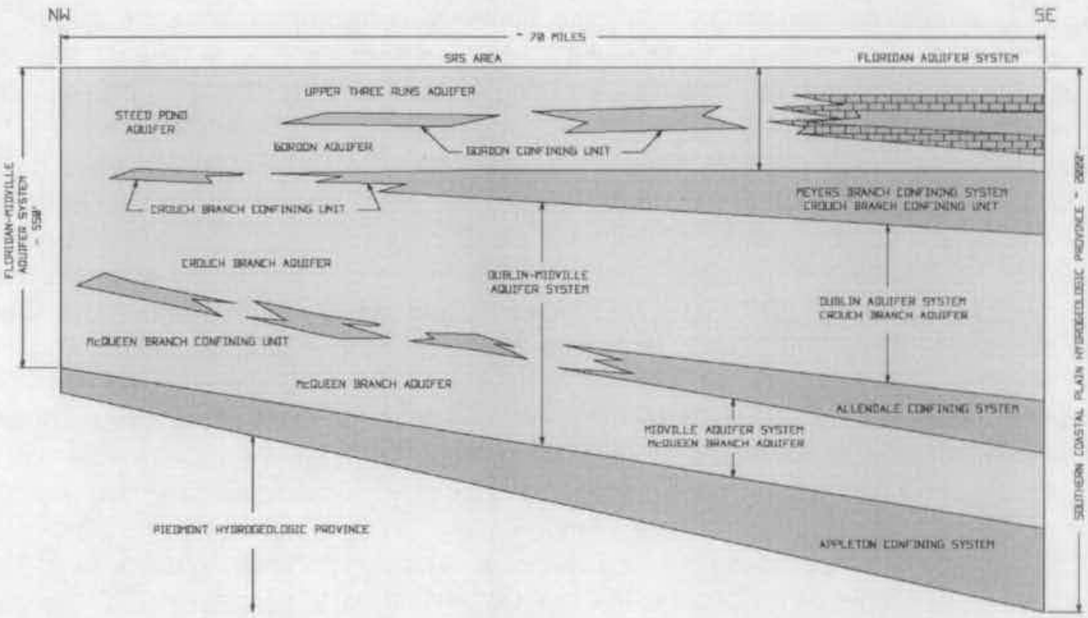

Figure 3.4. Aquifers at the SRS (*Source*: DCS 2001a).

(WSRC 2000c). Average annual recharge to the Upper Three Runs Aquifer is 35.6 cm (14 in.) (WSRC 1997a).

The Crouch Branch Aquifer is an abundant and important water resource for the SRS region. At the SRS, groundwater is the only source of domestic water. All groundwater at the SRS is classified by the U.S. Environmental Protection Agency (EPA) as a Class II water source (i.e., a current and potential source of drinking water). In 2000, the SRS withdrew 7.95 billion L (2.1 billion gal) of groundwater from the Crouch Branch Aquifer in support of site operations. Some nearby towns, such as Aiken, South Carolina, obtain groundwater from the Crouch Branch Aquifer, but most of the rural population draws water from the Gordon, Upper Three Runs, or Steed Pond Aquifers. About 8 billion L/yr (2.1 billion gal/yr) of groundwater is withdrawn from these upper aquifers within a 16-km (10-mi) radius of the site (DCS 2002).

F-Area is located on a groundwater divide between Fourmile Branch and Upper Three Runs Creek. Near-surface groundwater in the southern portion of the F-Area primarily moves laterally and discharges to Fourmile Creek and its tributaries to the south. In the northern portion of the F-Area, including the proposed location of the facilities, near-surface groundwater also primarily moves laterally, but discharges to Upper Three Runs Creek and its tributaries to the north (WSRC 2000c). F-Area is located in a region of groundwater recharge from precipitation.

Beneath the site for the proposed MOX facility, the Upper Three Runs Aquifer is divided into upper and lower zones by the Tan Clay confining unit of the Dry Branch Formation (DCS 2002).

In the area near the proposed MOX facility site, the topography drops sharply to the north toward Upper Three Runs Creek, and the water table occurs in the lower aquifer zone beneath the Tan Clay confining unit. Water table elevation data and computer modeling indicate that shallow groundwater flows away from the Old F-Area Seepage Basin (OFASB) in a north-northwesterly direction and is discharged to a tributary of Upper Three Runs. A small component of this groundwater flows beneath the westernmost corner of the proposed MOX facility site. Depth to groundwater in the area of the OFASB and the proposed MOX facility site ranges from 23.2 to 28.3 m (76 to 93 ft) below the present ground surface. Site preparation for the proposed MOX facility, PDCF, and WSB would involve shallow grading and excavation to a depth of about 12.2 m (40 ft). These activities would not encounter groundwater.

Groundwater varies in quality across the SRS. In some areas, it meets drinking water quality standards; in other areas, such as near waste sites, it does not. The deep Crouch Branch Aquifer is generally unaffected by site operations, except for a location near A-Area, where trichloroethylene contamination has been found. Tritium has been reported in the Gordon Aquifer under the Separation Areas (F- and H-Areas). The Upper Three Runs Aquifer is contaminated with solvents, metals, and low levels of radionuclides near several SRS areas and facilities, including the F-Area.

Groundwater is the only source of domestic water at the SRS. The existing capacity at the SRS is approximately 33.5 billion L/yr (8.9 billion gal/yr). Groundwater rights in South Carolina are associated with the absolute ownership rule. Owners of land overlying a groundwater resource are allowed to withdraw as much water as they desire; however, the state requires users who withdraw more than 138 million L/yr (36.5 million gal/yr) to report their withdrawals. Because the groundwater use at the SRS exceeds this value, DOE is required to report its usage to the state (DCS 2002).

Within F-Area, four groundwater wells are used for process water. Pumping capacities for these wells range from 1,500 to 3,800 L/min (400 to 1,000 gpm). They extract groundwater from the Crouch Branch Aquifer. Two of these wells were formerly used for domestic water supply. The current annual groundwater use at F-Area is 374 million L (98.8 million gal). The estimated capacity of the wells in F-Area is about 4.2 billion L/yr (1.1 billion gal/yr) (DCS 2002).

The F-Area wells are part of a SRS A-Area domestic water loop. The combined capacity of the F-Area and A-Area wells is about 11,360 L/min (3,000 gal/min) (DCS 2003a,b). Water consumption in 2000 averaged 2,850 L/min (754 gal/min). Therefore, an excess capacity of about 8,500 L/min (2,250 gal/min) exists for the A-Area loop. The A-Area loop supplies water to both A-Area and F-Area.

Groundwater quality in F-Area is not significantly different from that of groundwater throughout the rest of the SRS. It is abundant, usually soft, slightly acidic, and low in dissolved solids. F-Area groundwater can exceed drinking water standards for several contaminants. In 1999, 18% of 365 wells sampled at the General Separations and Waste Management Areas (Areas F, E, H, S, and Z) had metal concentrations that exceeded metal drinking water standards; 10% of 471 wells sampled had organic concentrations that exceeded organic drinking water standards; 53% of 483 wells sampled exceeded drinking water standards for tritium; 40% of 372 wells sampled exceeded drinking water standards for other radionuclides; and 31% of 307 wells sampled exceeded drinking water standards for other constituents. The sources of the detected groundwater contamination included burial grounds, waste management facilities, canyon buildings, seepage basins, and saltstone disposal facilities (WSRC 2000c).

Near the F-Area seepage basins and inactive process sewer line, there is widespread radionuclide contamination. Near the F-Area Tank Farm, tritium, mercury, nitrate-nitrite (as nitrogen), cadmium, gross alpha, and lead were detected in concentrations that exceeded drinking water standards in one or more wells. At the Sanitary Sludge Application Site, tritium, specific conductance, lead, and copper values exceeded their drinking water standards in one or more wells. In addition, a subsurface plume of tritium and strontium contamination has recently been found in F-Area. The source of groundwater contamination is from various heavy industrial and nuclear operations over the past 50 years in the F-Area. The contaminant plume appears to originate inside F-Area and extend beneath the MOX facility site, with movement in a fan-like direction of groundwater flow under the proposed MOX facility site.

Contaminated groundwater also exists beneath the OFASB. The OFASB is located about 180 m (600 ft) north of F-Area, immediately adjacent to the western boundary of the proposed MOX facility site. The OFASB has been remediated by filling the basin with clean soil, capping, and stabilizing the contaminated soil within the basin with grout (WSRC 1997a). The results of sampling in the compliance wells for the OFASB indicated that concentrations of several target constituents were above drinking water standards in several wells. These contaminants included iodine-129, nitrate, radium-226, radium-228, strontium-90, tritium, uranium (total), and lead. There is, however, some uncertainty about whether these exceedances are related entirely to OFASB, to upgradient F-Area facilities, or to both. A small component of the contaminant plume from OFASB flows beneath the westernmost corner of the proposed MOX site. Groundwater is monitored on a regular basis with 15 wells. Contaminant fate and transport models predict that the aquifer is expected to return to an uncontaminated state (i.e., a condition in which no maximum contaminant levels are exceeded) within 2 to 115 years, depending on the specific contaminant.

The results of recent groundwater sampling of nine wells distributed uniformly across the proposed MOX facility site indicate that shallow groundwater (i.e., groundwater in the Upper Three Runs Aquifer) is contaminated (SRS 2002). Gross alpha and beta activity, tritium, uranium, and trichloroethylene exceeded maximum contaminant levels for drinking water. Contamination is present beneath the entire MOX site, but is greatest beneath the western edge of the site. The contaminant plume appears to originate inside the F-Area fence and was and is related to F-Area nuclear operations and waste management practices at OFASB.

Groundwater in the Upper Three Runs Aquifer beneath the proposed MOX facility site is contaminated with various heavy industrial and nuclear contaminants. The proposed construction activities will take place at least 9.1 m (30 ft) above the zone of contaminated groundwater.

3.4 Meteorology, Emissions, Air Quality, and Noise

This section discusses the existing meteorology, current airborne pollutant emissions, air quality, and noise environment in the vicinity of the SRS. Section 3.4.1 describes the meteorology, or weather conditions, around the SRS. Meteorology includes the atmospheric conditions that determine where pollutants released into the atmosphere travel and how they are mixed with existing air and become diluted as they travel. Section 3.4.2 describes existing air emissions from the SRS and the surrounding area. Section 3.4.3 describes regional air quality and air quality standards. Air emissions from the proposed MOX facility, the PDCF, and the WSB would combine with existing emissions to affect local and regional air quality. Comparing the resulting combined air quality against the standard levels provides one measure of the facilities' impact on air quality. Section 3.4.4 describes the existing noise environment and applicable regulations. Noise generated by the facilities would combine with existing levels to produce the overall noise impact.

3.4.1 Meteorology[2]

To provide a thorough picture of weather conditions at a given location often requires the use of data from several locations. Different locations that record meteorological data may record different parameters. Data recorded near the site of the proposed action is generally considered most representative of the site. Meteorological data for F-Area (the site of the proposed facilities), H-Area, and Bush Field in Augusta, Georgia, were used to describe meteorological conditions of the affected environment.

> **Meteorology**
>
> *Meteorology* deals with weather conditions. Air pollution meteorology emphasizes weather conditions that determine how pollutants released into the air travel and mix with the air. The more important weather conditions involved in this process include wind speed and direction and atmospheric stability, a measure of how much mixing is occurring in the atmosphere.

The climate at the SRS is characterized by short, mild winters and long, humid summers (DCS 2002). Mountains to the north and west prevent or delay the approach of many cold air masses (Ruffner 1985).

The annual average wind speed is 2.8 m/s (6.2 mph) at Bush Field, which is located in Augusta, Georgia, about 24 km (15 mi) northwest of F-Area. Wind speed is highest in the spring, averaging 3.1 m/s (7.0 mph). March has the highest monthly average wind speed of 3.4 m/s (7.7 mph) and August the lightest, 2.3 m/s (5.1 mph). The prevailing monthly wind direction is from the west-northwest from November through February and variable for the rest of the year. On the basis of observations for 1995-1999, the highest 2-minute wind speed was 20 m/s

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2 Unless otherwise noted, the information presented in this section is based on meteorological data collected at Bush Field in Augusta, Georgia, about 24 km (15 mi) northwest of F-Area, and summarized by the National Climatic Data Center (NOAA 1999).

(45 mph) from the north-northwest in June 1998, and the maximum gust (5-second wind speed) was 25 m/s (55 mph) from the north-northwest in April 1997.

A wind rose based on data from the 5-year period 1992 through 1996 from the 62-m (200-ft) meteorological tower in H-Area at the SRS is presented in Figure 3.5. The wind rose indicates no strongly predominant prevailing wind direction, but the wind is from the northeast about 10% of the time and from the west-southwest over 9% of the time. Annual average wind speeds ranged from 3.6 to 4.2 m/s (8.0 to 9.4 mph) during the 5-year period (DCS 2002).

Wind Rose

A *wind rose* summarizes wind speed and direction graphically as a series of bars pointing in different directions. The direction of a bar shows the direction *from* which the wind blows. Each bar is divided into segments. Each segment represents wind speeds in a given range of speeds, for example, 6-8 m/s. The length of a given segment represents the percentage of the summarized hours that winds blew from the indicated direction with a speed in the given range.

The driest period occurs during the months of October and November, with rainfall increasing after then to a peak in March. A dry period extends from April through early June, followed by a wet period from late June through early September caused primarily by thunderstorms and showers (Ruffner 1985). Average annual precipitation at Bush Field is 114 cm (44.7 in.). Data from 1967 to 1996 at the SRS show an average annual precipitation of 126 cm (49.5 in.) (DCS 2002). Average monthly precipitation ranges from 6.30 cm (2.48 in.) in November to 11.8 cm (4.65 in.) in March. The greatest amount of precipitation recorded in a single month was 37.6 cm (14.8 in.) in October 1990, and the least amount was in October 1953, when only trace amounts of rainfall were recorded. The greatest amount of precipitation recorded in a 24-hour period was 21.8 cm (8.57 in.) in October 1990. Snowfall occurs only one to three times in the winter and usually remains on the ground for only a short period (Ruffner 1985). Annual snowfall averages 3.3 cm (1.3 in.). The greatest monthly snowfall occurred in February 1973, with 35.6 cm (14.0 in.), and the greatest 24-hour snowfall was 34.8 cm (13.7 in.) in the same month. Freezing rain may occur one to three times per winter (Ruffner 1985).

The average annual temperature at Bush Field is 17.5°C (63.5°F). At the SRS, the average annual temperature is 17.3°C (63.2°F) (DCS 2002). January is the coldest month, with an average temperature of 7.39°C (45.3°F), and July the warmest, averaging 26.7°C (80.1°F). Daily extreme temperatures have ranged from 42.2°C (108°F) in August 1983 to -18°C (-1°F) in January 1985. An average of 309 freeze-free days (days with a minimum temperature greater than 0°C [32°F]) occur per year. There are no freeze days from May through September. Temperatures above 32°C (90°F) occur about 73 days per year, with 56 of them occurring in June, July, and August.

Average annual relative humidity at Bush Field ranges from 83% in the early morning to 51% in the afternoon. In July and August, the early morning relative humidity averages 90%, with afternoons averaging 55-56%. At the SRS, comparable values for August are 97% and 50% (DCS 2002). Dew point temperatures at Bush Field range from 1.33°C (34.4°F) in January to 21.0°C (69.7°F) in July. Heavy fog with visibility less than 0.40 km (0.25 mi) occurs on an

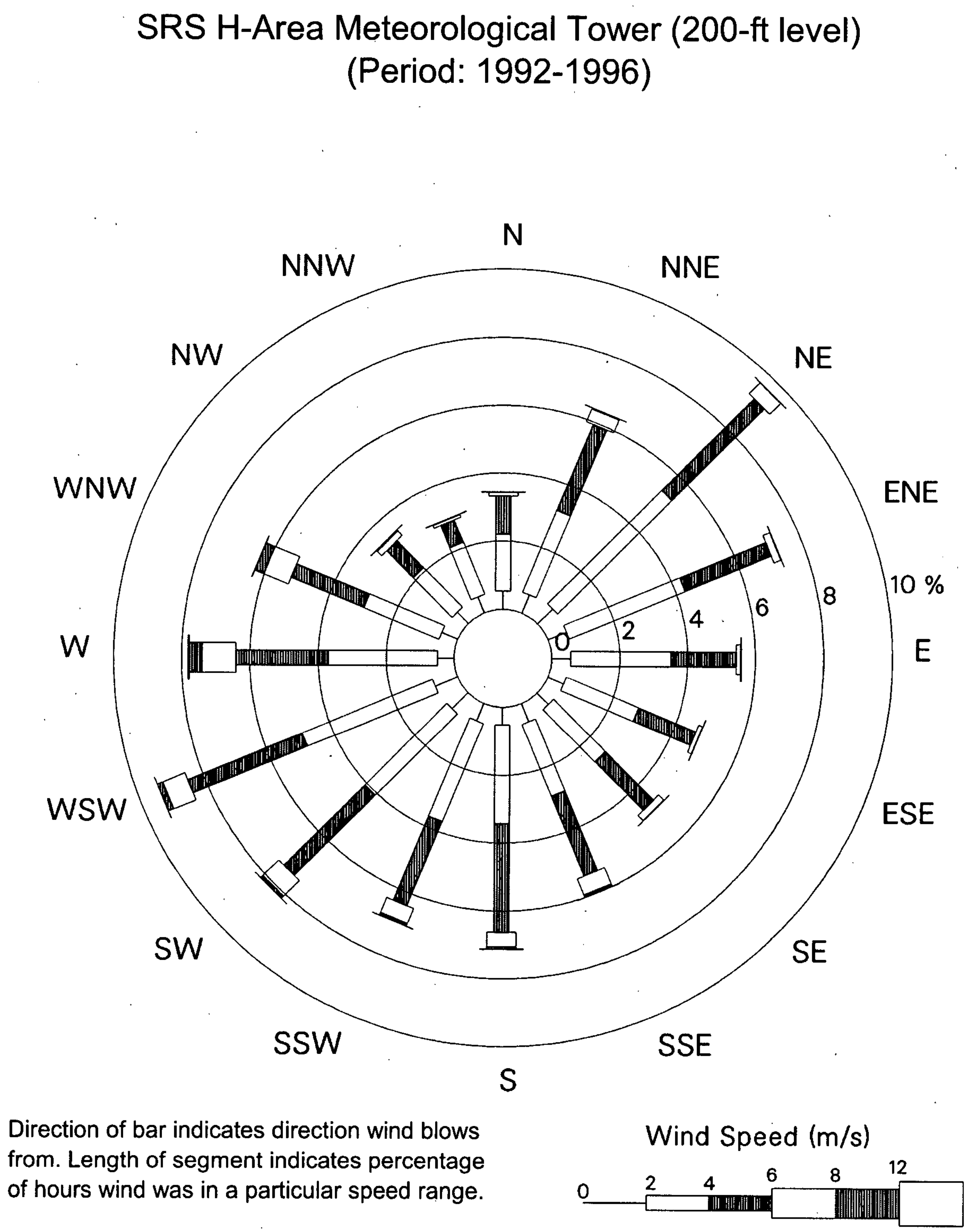


Figure 3.5. Annual wind rose for the SRS (*Source*: Arnett and Mamatey 2000a, Table 31).

average of about 32 days per year. Heavy fog occurs throughout the year but is most likely in November and December.

Thunderstorms, tornadoes, and hurricanes provide occasional severe weather to South Carolina (Ruffner 1985). Thunderstorms occur on an average of 53 days per year at Bush Field. July averages 12.6 thunderstorm days, December 0.7. More than 70% of the thunderstorms occur in the four-month period from May through August. They are most common in the summer months, but the more violent storms generally occur along active cold fronts in spring (Ruffner 1985). Hail with thunderstorms is infrequent and occurs about once every 2 years on the average (DCS 2002).

Tornadoes are rare in South Carolina. Most that do occur are during the period March through June. April is the peak month for tornadoes, with a smaller peak in August and September (Ruffner 1985). For the 49-year period of 1950-1998, an average of 11 tornadoes per year occurred in South Carolina (Storm Prediction Center 2001). Between 1880 and 1995, a total of 17 significant tornadoes were reported in Aiken and Barnwell Counties, South Carolina, and Burke County, Georgia. Nine tornadoes have caused damage on the SRS, one with estimated wind speeds as high as 67 m/s (150 mph). None have caused damage to buildings on the SRS (DCS 2002).

Tropical storms or hurricanes affect South Carolina about once every 2 years. Most do little damage and affect only the costal areas, decreasing in intensity as they move inland. Those that do move far inland can cause considerable flooding (Ruffner 1985). Thirty-six hurricanes caused damage in South Carolina between 1700 and 1989, and the interval between them has ranged from 2 months to 27 years. About 80% have occurred in August and September. Between 1886 and the present, 17 storms (10 hurricanes and 7 tropical storms) have passed within 64 km (40 mi) of the proposed MOX facility site. All the hurricanes had been downgraded to tropical storms or tropical depressions before reaching SRS (Weather Site, Inc. 2003). The only hurricane-force winds measured at the SRS were associated with Hurricane Gracie on September 29, 1959, when wind speeds of 34 m/s (75 mph) were measured at F-Area (DCS 2002).

3.4.2 Emissions

The SRS is classified as a "major source" (of airborne pollutant emissions) under the Clean Air Act (CAA), with potential emissions of more than 227,000 kg/yr (250 tons/yr). The SRS has construction and operating permits from the South Carolina Department of Health and Environmental Control (SCDHEC), Bureau of Air Quality, for about 199 point sources. Thirty-eight of these sources are permitted for air toxics. During 2000, 137 sources operated at least part of the year, and 62 were on cold standby or under construction.

Significant sources of criteria air pollutants[3] or their precursors and toxic air emissions at the SRS include coal-fired powerhouse boilers (two in A-Area and three in H-Area) and No. 2 oil-fired package steam generators (two in K-Area and two portable units). Other facilities emitting nonradiological emissions include 128 pieces of equipment powered by diesel engines, the Defense Waste Processing Facility, groundwater air strippers, the Consolidated Incineration Facility, and controlled burning. During 2000, the SRS continued to be in compliance with permitted emission rates and special conditions (Arnett and Mamatey 2001b).

SRS point source emissions for 1999 are compared with point source and total emissions within the four surrounding counties — Aiken, Allendale, and Barnwell Counties in South Carolina and Burke County in Georgia — in Table 3.1. The SRS contributed less than 6% of the four-county point source emissions of nitrogen oxides (NO_x), sulfur dioxide (SO_2), volatile organic compounds (VOCs), and particulate matter less than 10 μm and less than 2.5 μm in diameter, (PM_{10} and $PM_{2.5}$, respectively) in 1999. The SRS contributed about 17% of the four-county area point source emission of carbon monoxide (CO). However, CO is generated primarily by mobile sources, and the SRS emitted only about 0.20% of the total point and nonpoint CO for the four-county area. Arnett and Mamatey (2001a) provide an inventory of about 200 toxic air pollutant emissions from the SRS for 1999. Table 3.2 lists the emissions that exceeded 0.9 MT (1 ton) per year.

3.4.3 Air Quality

The SRS is located in the Augusta-Aiken Interstate Air Quality Control Region (AQCR) #53, which comprises 6 counties in South Carolina and 13 in Georgia (see Figure 3.6) (EPA 1972). Both South Carolina and Georgia have adopted State Ambient Air Quality Standards (SAAQS) identical to the federal National Ambient Air Quality Standards (NAAQS) for the criteria pollutants (see adjacent text box). In addition, South Carolina has retained the annual standard for total suspended particulates (TSP) and adopted an additional standard for gaseous fluorides (SCDHEC 2000; GDNR 2000).

Air Quality Terms

Particulate matter (PM) is dust, smoke, other solid particles, and liquid droplets in the air. The size of the particulate is important and is measured in micrometers (μm). A micrometer is 1 millionth of a meter (0.000039 in.).

Total suspended particulate (TSP) is PM with a diameter less than 30 μm. *PM_{10}* is PM with a diameter less than 10 μm and *$PM_{2.5}$* is PM with a diameter less than 2.5 μm. The U.S. Environmental Protection Agency (EPA) has set standards for PM_{10} and $PM_{2.5}$ designed to protect human health and welfare.

Criteria pollutants are pollutants for which the EPA has prepared documents detailing their health and welfare impacts and set standards specifying the air concentrations that avoid these impacts. The criteria pollutants are sulfur oxides, nitrogen dioxide, carbon monoxide, PM_{10}, $PM_{2.5}$, lead, and ozone.

Volatile organic compounds (VOCs) are organic vapors in the air that can react with other substances, principally nitrogen oxides, to form ozone. The reactions are energized by sunlight.

Background is a concentration value, usually based on measured pollutant data, that accounts for the impacts of emission sources not included explicitly in the air quality model.

[3] "Criteria" air pollutants are common air pollutants for which federal standards have been established.

Table 3.1. Estimated emissions from four counties around the SRS and SRS point sources in 1999[a]

	Four-county area emissions (tons/yr)[b]		SRS emissions		
				As percentage (%) of four-county area	
Pollutant[c,d]	Point	Total	Total (tons/yr)	Point	Total
CO	712	62,300	124	17	0.20
NO_x	6,800	17,700	337	5.0	1.9
SO_2	14,600	15,400	346	2.4	2.3
PM_{10}	1,250	1,747	54.5	4.4	3.1
$PM_{2.5}$	696	1,120	37.9	5.4	3.4
VOCs	1,770	8,330	7.45	0.42	0.089

[a]Four SRS border counties: Aiken, Barnwell, and Allendale, South Carolina; and Burke, Georgia. "Point" values are for all point sources. "Totals" are for all sources, including point, area, and mobile.

[b]To convert tons to kilograms, multiply by 907.2.

[c]The reference does not include lead. Lead emissions have been lowered by reductions in the lead content of gasoline.

[d]Ozone is not emitted directly and is not listed in this table. It is formed in the air by chemical reactions involving VOCs and NO_x.

Source: EPA (2001).

South Carolina is currently designated as being in attainment (i.e., in compliance with standards) for all criteria pollutants (40 CFR 81.341). Georgia is designated as in attainment except for the 13-county area around Atlanta, which is designated as nonattainment for the 1-hour ozone standard (40 CFR 81.311). A list of the ambient standards and the high and low ambient concentrations at air quality monitoring stations within 80 km (50 mi) of the proposed MOX facility site is shown in Table 3.3. The regulations for Prevention of Significant Deterioration (PSD) of air quality (40 CFR 52.21) place limits on the total

National Ambient Air Quality Standards (NAAQS)

The EPA sets NAAQS for criteria pollutants (sulfur oxides, PM_{10}, $PM_{2.5}$, carbon monoxide, nitrogen dioxide, lead, and ozone). The primary NAAQS specify maximum ambient (outdoor air) concentrations of the criteria pollutants that would protect public health with an adequate margin of safety. Secondary NAAQS specify maximum concentrations that would protect public welfare. If both a primary and a secondary standard exist, the lower (more restrictive) standard is normally used for assessment purposes. Some of the NAAQS for an averaging time of 24 hours or less allow the standard values to be exceeded a limited number of times per year.

Table 3.2. Toxic air pollutant emissions at the SRS in 1999

Pollutant[a]	CAS number[b]	Emissions (tons/yr)[c]
Benzene	71-43-2	4.16
Chloroform	67-66-3	6.30
Formaldehyde	50-0-0	1.28
Formic acid	64-18-6	3.45
Hexane	110-54-3	1.14
Hydrochloric acid	7647-1-0	1.73
Hydrogen sulfide	7783-6-4	5.71
Methoxychlor	67-56-1	1.46
Nitric acid	7697-37-2	1.04
Sodium hydroxide	1310-73-2	1.32
Tetrachloroethylene	127-18-4	2.17
Toluene	108-88-3	1.87
Trichloroethylene	79-1-6	5.53
Xylenes	1330-20-7	4.96

[a]Only pollutants with emissions of more than 1 ton are listed.

[b]Chemical Abstract Services (CAS) number — a number assigned to a specific chemical by CAS. The number avoids the ambiguity associated with multiple names for the same chemical and also avoids problems associated with name differences between languages.

[c]To convert tons to kilograms, multiply by 907.2.

Source: Arnett and Mamatey (2001a, Table 45).

increase in ambient pollution levels above established baseline levels for SO_2, NO_2, and PM_{10}. Under those regulations, the allowable increases are smallest in Class I areas (national parks and wilderness areas). The rest of the country is subject to PSD II increments. States can choose a less stringent set of Class III increments, but no states have chosen to do so. The Cape Romain National Wildlife Refuge, the PSD Class I area closest to the SRS, is about 160 km (100 mi) to the east. The facilities at the SRS have not been required to obtain PSD permits (DCS 2002).

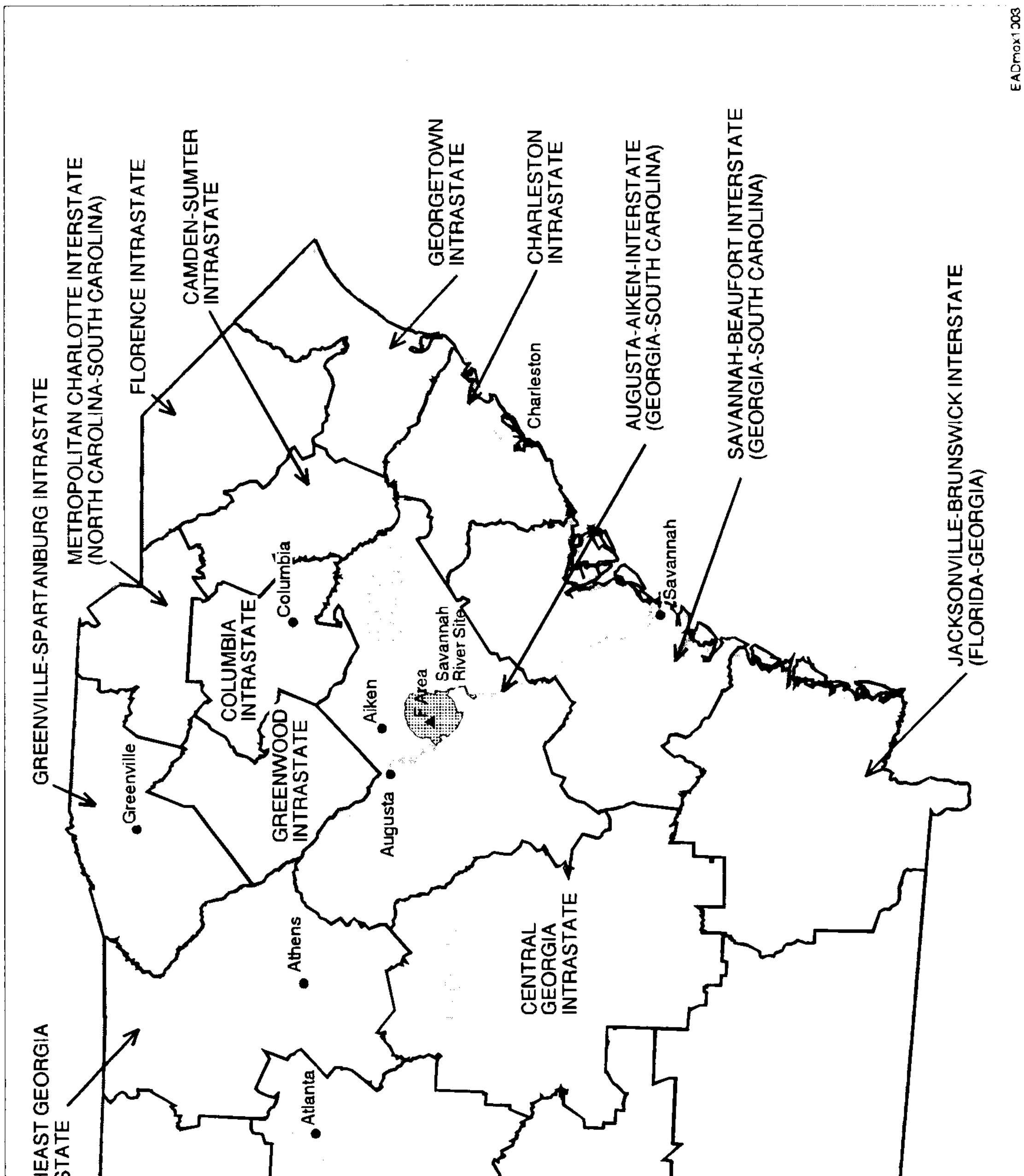


Figure 3.6. Air quality control regions, South Carolina and Georgia.

Table 3.3. Ambient air quality standards and range of pollutant levels in the vicinity of the SRS

Pollutant	Averaging time	Ambient standard (μg/m³)[b,c]	Highest/lowest levels in vicinity of SRS[a]		
			Concentrations (μg/m³)	Locations (city, county, state)	Years
SO_2	3 hours	1,300[d]	180	–, Barnwell, SC	1999
			58	–, Barnwell, SC	1997
	24 hours	365[e]	55	Augusta, Richmond, SC	1997-2000
			13	–, Barnwell, SC	1997-1998
	Annual	80[e]	5.2[f]	–, Aiken, SC/ Augusta, Richmond, GA	1999/ 1997-2000
			2.6[f]	–, Aiken, SC/ –, Barnwell, SC	1996-1998/ 1997-2001
NO_2	Annual	100[g]	9.4	–, Aiken, SC	1997-2000
			5.6	–, Barnwell, SC	1999, 2001
CO	1 hour	40,000[e]	–[h]		–
	8 hours	10,000[e]	–[h]		–
O_3	1 hour	235[g]	233[i]	Augusta, Richmond, SC/ –, Edgefield, SC	1998/1998
			165[i]	–, Edgefield, SC	2001
	8 hours[j]	157[g]	194[k]	Augusta, Richmond, SC	1998
			145[k]	–, Barnwell, SC	2001
PM_{10}	24 hours	150[g]	165[i]	–, Lexington, SC	1997
			36[i]	–, Aiken, SC	2001
	Annual	50[g]	29	–, Lexington, SC	1999
			17	–, Aiken, SC	2001

Table 3.3. Continued

Pollutant	Averaging time	Ambient standard (μg/m³)[b,c]	Highest/lowest levels in vicinity of SRS[a] Concentrations (μg/m³)	Locations (city, county, state)	Years
$PM_{2.5}$	24 hours[j]	65[g]	42[l]	Augusta, Richmond, GA	1999
			17[l]	–, Colleton, SC	2000
	Annual[j]	15[g]	19.9	Augusta, Richmond, GA	1999
			11.2	–, Colleton, SC	2000
Pb	Calendar Quarter	1.5[g]	0.04	–, Lexington, SC	1999
			0.00	Multiple	1997-2001
TSP[m]	Annual	75[e]	41[n]	–, Aiken, SC	1998
			26[n]	–, Lexington, SC	2001

[a]Based on available data for 1997 through 2001 unless otherwise noted. The vicinity of the SRS was taken to be the area within 80 km (50 mi) of the proposed MOX facility and includes all or part of Aiken, Bamberg, Barnwell, Colleton, Edgefield, Hampton, Lexington, and Orangeburg Counties in South Carolina and Burke, Columbia, Jenkins, Richmond, and Screven Counties in Georgia. The listed concentrations are not always directly comparable to the ambient standards. Except for 13 counties around Atlanta, Georgia, that are nonattainment for 1-hour O_3, both South Carolina and Georgia have been designated as in attainment for all implemented standards. Footnote b summarizes criteria for determining standard attainment.

[b]Unless otherwise noted, South Carolina and Georgia SAAQS are the same as NAAQS. South Carolina has additional standards for gaseous fluorides that are not shown because they are not emitted by the proposed facility.

Footnotes continued on next page.

Table 3.3. Continued

[c]Methods of determining whether standards are attained depend on pollutant and averaging time. The 3-hour and 24-hour SO_2 standards and the 1-hour and 8-hour CO standards are not to be exceeded more than once per calendar year. The annual TSP, SO_2, and NO_2 standards are not to be exceeded in any calendar year. The lead standard is not to be exceeded in any calendar quarter. The 1-hour ozone (O_3) standard is attained when the expected number of days per calendar year with maximum hourly concentrations above the standard is less than or equal to one and applies only in areas designated nonattainment when the 8-hour O_3 standard was adopted in July 1977. The 8-hour O_3 standard is attained when the 3-year average of the annual fourth-highest daily maximum 8-hour concentrations is less than or equal to the standard. The 24-hour PM_{10} standard is attained when the expected number of days per calendar year with a 24-hour average concentration above the standard is less than or equal to one. In areas that meet certain criteria, attainment of the 24-hour PM_{10} standard is based on having the 3-year average of the 99th percentile 24-hour averages less than or equal to the standard. The annual PM_{10} standard is met when the 3-year average of the annual means is less than or equal to the standard. The 24-hour $PM_{2.5}$ standard is met when the 3-year average of the 98th percentile 24-hour averages is less than or equal to the standard. The annual $PM_{2.5}$ standard is met when the 3-year average of the annual means is less than or equal to the standard.

[d]Secondary (welfare-based) standard.

[e]Primary (health-based) standard.

[f]Years 2000 and 2001 data for Aiken County not available; years 1999 and 2000 data for Richmond County not available.

[g]Primary and secondary standard.

[h]No CO data in vicinity of SRS for 1997-2001.

[i]Second highest concentration.

[j]NAAQS only; implementation of the standard has been delayed, and states have not developed attainment plans.

[k]Fourth highest concentration.

[l]98th percentile concentration.

[m]South Carolina standard.

[n]Based on South Carolina data for 1998-2001.

Sources: 40 CFR 50; SCDHEC (2002a-d); EPA (2002, 2003a).

3.4.4 Noise

The *Noise Control Act of 1972* and subsequent amendments (*Quiet Communities Act of 1978,* 42 U.S.C. 2901-4918) delegate the authority to regulate noise to the states. However, South Carolina and Georgia do not have noise regulations. The Aiken County Zoning and Development Standards Ordinance limits noise levels by frequency band (see Table 3.4). The EPA guideline recommends an L_{dn}[4] of 55 dBA[5] to protect the public from the effects of noise in typically quiet outdoor and residential areas (EPA 1974). To protect the general population against hearing loss, the EPA guideline recommends an $L_{eq}(24)$[6] (L_{eq} averaged over 24 hours)

Table 3.4. Aiken County maximum allowable noise levels[a]

Frequency band (Hz)	Nighttime[b] sound pressure level at property boundary (dB)	
	Nonresidential	Residential
20-75	69	65
75-150	60	50
150-300	56	43
300-600	51	38
600-1,200	42	33
1,200-2,400	40	30
2,400-4,800	38	28
4,800-10,000	35	20

[a]This table gives nighttime sound pressure levels (SPLs). Allowable daytime levels are generally louder than nighttime levels.

[b]Nighttime: 9:00 p.m. to 7:00 a.m.

Source: DOE (1996).

4 L_{dn} is a 24-hour average sound level that gives additional weight to noise that occurs during the night (10:00 p.m. to 7:00 a.m.).

5 dBA is A-weighted decibels, a unit of weighted sound-pressure level measured by specific methods and using the A-weighting specified by the American National Standards Institute (ANSI). It duplicates the ear's sensitivity to sound.

6 For sounds that vary with time, L_{eq} is the steady sound level that would contain the same total sound energy as the time-varying sound over a given time.

of 70 dBA or less over a 40-year period. The Federal Aviation Administration and the Federal Interagency Committee on Urban Noise have issued land use compatibility guidelines indicating that yearly day-night average sound levels (L_{dn}) of less than 65 dBA are compatible with residential land uses and that, if a community determines it is necessary, levels up to 75 dBA may be compatible with residential uses and transient lodgings (but not mobile homes) if such structures incorporate suitable noise reduction features (14 CFR 150, Appendix A).

Major noise sources in active areas at the SRS include industrial facilities and equipment such as cooling systems, transformers, engines, vents, paging systems; construction and materials-handling equipment; and vehicles. Outside of active operational areas, vehicles and trains generate noise. Most industrial facilities at the SRS are located far enough from the site boundary that the associated noise levels at the boundary would be barely distinguishable from background levels.

Noise impacts to the general public arise primarily from transportation of people and materials to and from the site by vehicles, helicopters, and trains (DCS 2002). A noise survey was conducted in the SRS area in 1989 and 1990 (NUS 1990). Seven off-site locations were selected along major routes used by SRS employees entering and leaving the site. Summer L_{dn} levels ranged from 62 to 72 dBA; winter L_{dn} levels ranged from 51 to 70 dBA. Summer 24-hr L_{eq} levels ranged from 60 to 67 dBA; winter values ranged from 54 to 65 dBA.

3.5 Ecology

This section describes the plant and animal resources at the SRS, with emphasis on those components that could be affected by the construction and operation of the proposed MOX facility and associated Pit Disassembly Conversion Facility/Waste Storage Building (PDCF/WSB) complex. Particular attention is given to species and special habitats protected by the federal government under the Endangered Species Act, as well as species of special concern listed by the states of South Carolina (Aiken and Barnwell counties) and Georgia (Burke County). In addition to federal and state regulations, DOE protects plants, animals, and Carolina bays in DOE Research Set-Aside Areas. Unless otherwise cited, the information presented in this section has been abstracted from DCS (2002).

> **Ecological Resources**
>
> Ecological resources include plant and animal species and the habitats on which they depend (e.g., forests, fields, wetlands, streams, and ponds).

3.5.1 Terrestrial

This section describes the native plant communities and wildlife species at the SRS and in the F-Area where the proposed facilities would be constructed. Wildlife habitats, wildlife management areas, and ecological research sites are also described.

3.5.1.1 Vegetation

At the time land for the SRS was purchased by the government in 1950, about 40% of the site was old field, crop land, or developed by the former town of Ellenton. The remainder of the area was forested (WSRC 1994). As the DOE developed the SRS, the vegetation changed over time. Many of the old fields reverted back to forested areas. In addition, this increase in wooded area also resulted from timber and watershed protection management directed by the U.S. Forest Service (WSRC 1994; DOE 1999).

In 1972, the entire SRS was designated as the nation's first National Environmental Research Park (NERP). Thirty specified areas within the SRS are designated as DOE Research Set-Aside Areas that are reserved for ecological research. These areas total 5,672 ha (14,005 acres), or about 7% of the SRS (Davis and Janecek 1997), and are selected and managed by the Savannah River Ecology Laboratory (SREL) (WSRC 1994). They serve as control areas, providing a context for comparisons with other areas on the SRS that may be affected by human activities. The set-aside areas are located in each of the major vegetation communities characteristic of the SRS (DOE 2000b). The closest set-aside area to the proposed facilities is Set-Aside Area No. 13 (Organic Soils), located about 500 m (1,640 ft) northwest of the proposed facilities. Most of this 310.8-ha (767.3-acre) area is located on the north side of Upper Three Runs Creek. Set-Aside Area No. 15 (Whipple/Office of Health and Environmental Research [OHER] Study Site) is located about 1.8 km [1.1 mi] northeast of the proposed facilities, and three other set-asides (No. 1 [Field 3-412/Ellenton Bay], No. 6 [Beech-Hardwood Forest], and No. 14 [Mature Hardwood Forest]) are located more than 3.4 km (2.1 mi) southwest of the facility area. Upper Three Runs Creek borders or runs through these set-aside areas (Davis and Janecek 1997).

In June 1999, the DOE designated a 4,055-ha (10,012-acre) area of the SRS as a biological and wildlife refuge. This area, known as the Crackerneck Wildlife Management Area (WMA) and Ecological Preserve (Crackerneck WMA), is located in the western portion of the SRS. It is bordered by a narrow buffer zone along South Carolina State Route 125 and by Upper Three Runs Creek. The South Carolina Department of Natural Resources (SCDNR) manages this area (DOE 2000b).

Currently, nearly 90% of the land (72,900 ha [180,000 acres]) at the SRS is forested with upland pine, hardwood, mixed (pine and hardwood), and bottomland hardwood forests. The major upland and wetland forest types at the SRS (including major species and coverage) are listed in Table 3.5. Pine forests cover about 65% of the upland areas of the SRS (DOE 1999). These pine forests are managed by the U.S. Forest Service and have displaced much of the upland hardwood communities (DOE 1991a). Natural resource management is actively practiced on more than 80% of the SRS, including about 73,710 ha (182,000 acres) of commercial forests and 4,860 ha (12,000 acres) of nonforest lands (DOE 2000b; WSRC 1994).

Approximately 5% of land at the SRS is developed with industrial and transportation infrastructure and grassland, old fields, or shrub vegetation (WSRC 1994). This land is generally classified as "facility." The industrial and transportation development includes administrative and production facilities, electrical substations, roads, and railroads and occupies

Table 3.5. Major forest types at the SRS

Forest type	Canopy species	Midstory species	Coverage [hectares (acres)]
Upland Forests			
Dry longleaf pine-scrub oak	Longleaf pine (sparse)	Oaks, black cherry, common persimmon (continuous)	3,058 (7,551)
Longleaf pine	Longleaf pine, loblolly pine, water oak	Black cherry, common persimmon, sand hickory, sassafras, water oak	15,533 (38,353)
Mixed yellow pine	Loblolly, slash and/or longleaf pines	American holly, black cherry, common persimmon, sand hickory, sassafras, water oak, sweetgum, red maple, redbay, sweetbay magnolia	27,020 (66,716)
Southern mixed hardwood	Oaks (white, scarlet, laurel, post, southern red, turkey, bluejack, blackjack), hickories (mockernut, pignut), yellow poplar, blackgum, red maple, sweetgum, white ash, pines (loblolly, longleaf)	Sparkleberry, vaccinium, American holly, black cherry, mockernut hickory, white ash, sassafras, dogwood, Georgia hackberry	12,805 (31,618)
Wetland Forests			
Bottomland	Oaks (water, laurel, overcup, willow), southern magnolia, sweetgum, elms (American, winged), red maple, yellow poplar, river birch, tag alder, waxmyrtle, loblolly pine	American holly, redbay, sweetbay magnolia, ironwood, southern hackberry, red buckeye, honeysuckle	12,531 (30,941)
Southern swamp	Bald cypress, water tupelo, sweetgum	Ashes (water, red), sourgum, red maple, American elm	4,285 (10,581)
Total:			75,232 (185,760)

Sources: DOE (1991a, 2000b); Workman and McLeod (1990); WSRC (1994).

about 1,587 ha (3,919 acres). Vegetated areas associated with the developed areas are actively maintained (lawns and landscaped areas). These associated vegetated areas occur primarily on power line rights-of-way, roadsides, some borrow pits, some burial sites, and in forest openings and occupy about 1,345 ha (3,322 acres) (DOE 2000b). Unless managed, most scrub-shrub areas will develop into forest within 5 to 10 years (WSRC 1994). The vegetated areas also include permanent upland meadows, scrub-shrub areas, and SRS wildlife food plots. Controlled burns of 6,075 to 7,290 ha (15,000 to 18,000 acres) of pine-dominated uplands are conducted annually to reduce flammable materials and to enhance the development of fire-tolerant plant communities and improve wildlife habitat. Additionally, improved planting techniques and seedling survival have resulted in conversion of significant areas of loblolly and slash pine forests to young longleaf pine forests over the past 10 years (DOE 2000b).

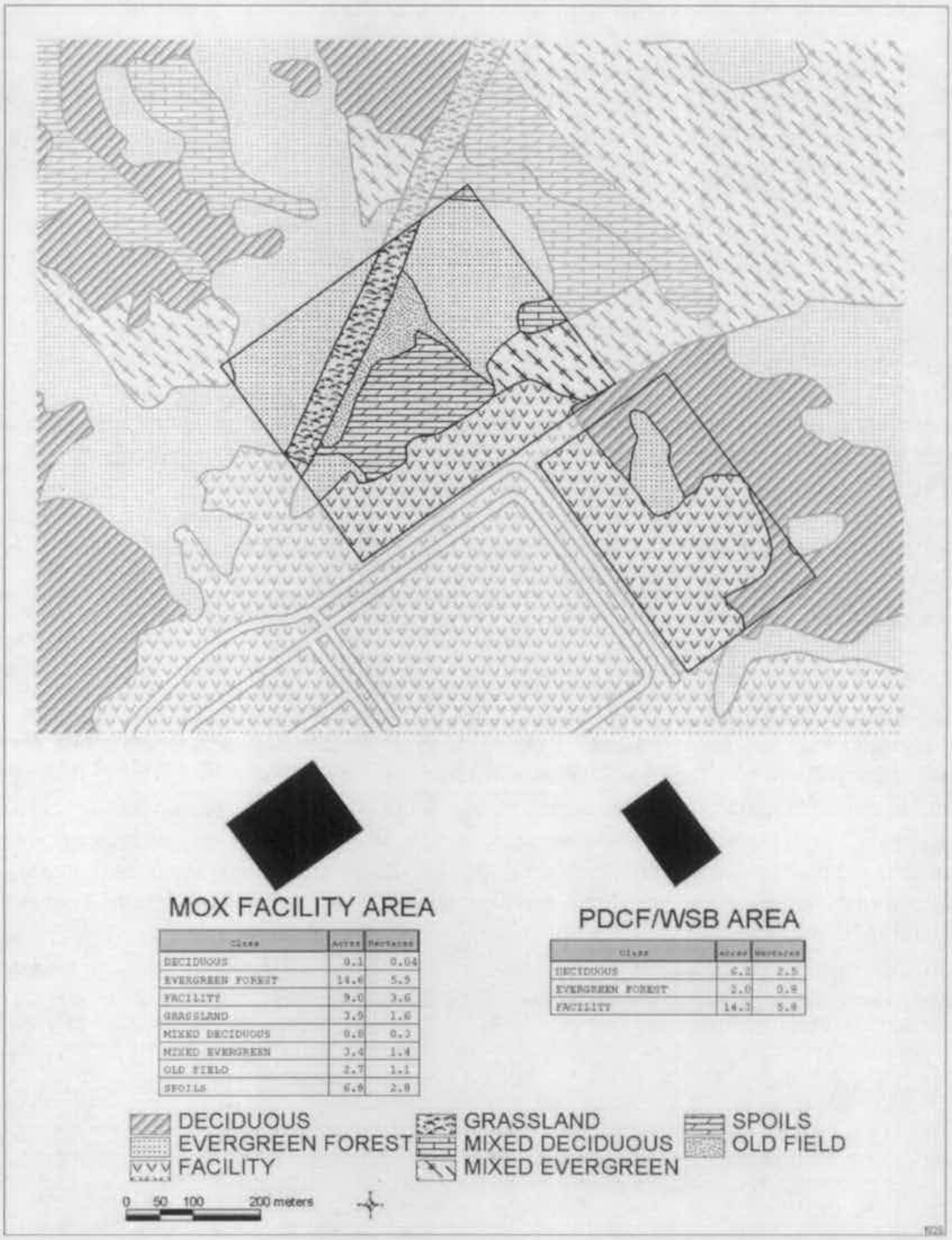
Habitats in the 16.7-ha (41.3-acre) area proposed for the MOX facility include pine (or evergreen) forest (5.9 ha [14.6 acres]), mixed pine (combination of both pine and deciduous [hardwood] species, with pine trees predominant) (1.4 ha [3.4 acres]), mixed deciduous (0.3 ha [0.8 acre]), grassland (1.6 ha [3.9 acres]), "facility" (developed) (3.6 ha [9.0 acres]), old field (fields formerly used for agriculture but now undergoing natural succession) (1.1 ha [2.7 acres]), spoils (2.8 ha [6.8 acres]), and deciduous (hardwood trees, essentially the southern mixed hardwood forest type of Table 3.5) (0.04 ha [0.1 acre]) (see Figure 3.7). The grassland habitat occurs within the transmission line right-of-way that crosses the proposed MOX site. The spoils habitat originated from the excavation for the Actinide Packaging and Storage Facility (APSF) in the F-Area. Although soil was excavated, the APSF was not constructed. This area is covered primarily with various grass and forb species. The standard seed mixture used to establish a plant cover on such areas includes grass and forb species such as unhulled and hulled common Bermuda grass, browntop millet, and unscarified Appalachian lespedeza (Bowling 2001).

Habitats in the 9.1-ha (22.5-acre) area proposed for the PDCF and WSB include pine forest (0.8 ha [2.0 acres]), deciduous (2.5 ha [6.2 acres]), and facility (5.8 ha [14.3 acres]) (see Figure 3.7).

Forested and facilities areas primarily surround the immediate project area (see Figure 3.7). The forested areas are dominated by loblolly pine with some mixed hardwoods (e.g., sweetgum, turkey oak, and water oak). The sparse understory and shrub layers consist of sparkleberry, dogwood, jasmine, and wax myrtle. Also present are areas dominated by a closed canopy of longleaf pine with sweetgum and willow oak as minor components. Vegetation along the unnamed tributaries to Upper Three Runs Creek include loblolly pine, sweetgum, red oak, and sycamore in the canopy, with black cherry, dogwood, and young individuals of the canopy tree species in the understory (Wike and Nelson 2000). The grassland habitat associated with the transmission line also occurs in this area. The OFASB area located west of the proposed MOX facility site also contains a vegetated cover similar to that over the spoils area within the proposed MOX facility site.

3.5.1.2 Wildlife

Among the numerous wildlife species reported from the SRS are 44 species of amphibians, 59 species of reptiles, 258 species of birds, and 54 species of mammals. The SRS has among the highest biodiversity of herpetofauna (reptiles and amphibians) in the United States because of the area's warm, moist climate and its wide variety of habitats (DOE 2000b). Snakes that could occur in the project area include eastern hognose snake, eastern garter snake, eastern coachwhip, scarlet king snake, rat snake, corn snake, and pine snake. Lizards could include the green anole, southern fence lizard, several species of skinks, and the eastern glass lizard. Amphibians could include the southern toad and oak toad. The southern leopard frog, bullfrog, and other frogs and toads could occur in the small drainage basins near the site, while



MOX FACILITY AREA

Class	Acres	Hectares
DECIDUOUS	0.1	0.04
EVERGREEN FOREST	14.6	5.9
FACILITY	9.0	3.6
GRASSLAND	3.9	1.6
MIXED DECIDUOUS	0.8	0.3
MIXED EVERGREEN	3.4	1.4
OLD FIELD	2.7	1.1
SPOILS	6.9	2.8

PDCF/WSB AREA

Class	Acres	Hectares
DECIDUOUS	6.2	2.5
EVERGREEN FOREST	2.0	0.8
FACILITY	14.3	5.8

Figure 3.7. Current land cover in the area of the project site.

amphibians such as tree frogs and salamanders could occur within the unnamed tributary to Upper Three Runs Creek (Conant 1958; Mayer and Wike 1997).

Bird species at the SRS that are very common to abundant include black vulture, eastern kingbird, acadian flycatcher, common crow, northern mockingbird, blue-gray gnatcatcher, ruby-crowned kinglet, red-eyed vireo, northern parula, black-throated warbler, ovenbird, northern cardinal, savannah sparrow, white-throated sparrow, and song sparrow (WSRC 1994). As many as 17,000 ducks and coots are winter migrants at the SRS. Most of these congregate on Par Pond, L Lake, and other large ponds and Carolina bays (DOE 1991a). Wood ducks are the only waterfowl species that commonly breed on the SRS (WSRC 1994). Several mammal species can be found in old field/clearcuts, pine plantations, and scrub oak/longleaf pine habitats (these are the generalized habitat types that occur within the vicinity of the facilities). These species include southern short-tailed shrew, Virginia opossum, golden mouse, oldfield mouse, raccoon, eastern cottontail, and white-tailed deer. Other mammals that can occur within two of these habitat types include least shrew, striped skunk, raccoon, eastern harvest mouse, gray and fox squirrels, southeastern shrew, spotted skunk, feral hog, and gray fox. Several bat species also occur in one or more of these habitats (WSRC 1994).

Populations of white-tailed deer, feral hogs, and beaver are controlled through selective harvest strategies (DOE 2000b), which has included public hunts for white-tailed deer and feral hogs (Noah 1995; DOE 1996). The deer herd is estimated at about 3,000, with harvests averaging about 1,580 animals per hunting season. The feral hog population now exceeds 2,500 (DOE 2000b). The feral hogs originated from free-ranging domestic swine abandoned after resident farmers were relocated in 1952. They now occur over about 70% of the SRS (WSRC 1994). The hogs are trapped wherever they are found. Beavers are trapped where they compromise the safety or operations of roads, railroads, culverts, or research plots, or where they are causing significant resource damage. Increasing numbers of coyotes and armadillos may require the SRS to initiate control measures for these species in the future (DOE 2000b). Other commercial and recreational wildlife resources at the SRS are not exploited over most of the SRS because of restricted access and safety concerns. These species include bobcat, gray and red fox, mink, muskrat, Virginia opossum, river otter, eastern cottontail, raccoon, fox and gray squirrels, waterfowl, northern bobwhite, mourning dove, wild turkey, common snipe, and American woodcock (WSRC 1994). Hunting has been allowed for most of these species (except for bobcat, foxes, river otter, and fox squirrel) at the Crackerneck WMA (SCDNR 2000/2001). However, since late September 2001, hunting has been closed to the general public in this area. A controlled hunt was later allowed to help regulate the SRS deer herd.

The developed areas of the SRS include buildings, parking lots, infrastructure, and landscaped areas. Nevertheless, a number of wildlife species have been reported from these areas. A total of 43 species have been reported from the F-Area, including 4 species of amphibians, 12 species of reptiles, 18 species of birds, and 9 species of mammals. Several bird species are abundant: rock dove, common crow, northern mockingbird, American robin, and European starling. Common mammals include Virginia opossum, eastern cottontail, house mouse, feral cat, striped skunk, and raccoon. The densities of most wildlife species are higher in undeveloped areas then in developed areas. Exceptions include the house sparrow, house finch, rock dove, house mouse, Norway rat, and feral cat. Nevertheless, the use of developed areas of the SRS by wildlife is more common than previously reported, and these areas can be expected to contribute to the site's environmental diversity (Mayer and Wike 1997).

3.5.2 Aquatic

Six major streams and several associated tributaries flow through the SRS, and the Savannah River bounds the southwestern border of the SRS. More than 50 man-made ponds also occur at the SRS (DOE 1999). The two largest are L Lake (405 ha [1,000 acres]), which discharges into Steel Creek, and Par Pond (1,069 ha [2,640 acres]), which discharges into Lower Three Runs Creek (Section 3.3.1). These lakes do not have any direct interactions with the F-Area. Altogether, about 2,000 ha (4,940 acres) of open water occurs at the SRS (WSRC 1994).

At least 81 fish species have been identified at the SRS (DOE 2000b). Sport and commercial fishing on the SRS is allowed only within the Crackerneck WMA. Extensive fishing also occurs in the Savannah River. Commercial fish species include the American shad, hickory shad, and striped bass. Recreational species include largemouth bass, chain pickerel, crappie, bream, sunfish, and catfish (DOE 1996; WSRC 1994, 1997b). The man-made ponds support populations of bass and sunfish (DOE 1999).

Some SRS surface waters are classified as Category I resources. These waters are defined by the U.S. Department of the Interior as unique and irreplaceable on a national or eco-regional basis. These areas would include Carolina bays and cypress-tupelo swamps. Any surface waters supporting species of concern and areas containing high-quality wetlands or headwater streams (e.g., portions of Upper Three Runs Creek) would also be considered for Category I status (DOE 2000b).

The F-Area is drained by Upper Three Runs Creek and Fourmile Branch (see Figure 3.3). Upper Three Runs Creek is the most pristine stream at the SRS and would be considered a Category I resource. It contains more than 550 species of aquatic insects and supports about 60 fish species. The more abundant fish species include bowfin, American eel, redfin pickerel, dusky shiner, yellowfin shiner, coastal shiner, flat bullhead, tadpole madtom, mosquitofish, redbreast sunfish, warmouth, spotted sunfish, and blackbanded darter. More than 10 other fish species are common in Upper Three Runs Creek (Bennett and McFarlane 1983). Upper Three Runs Creek is an important spawning area for blueback herring and provides seasonal nursery habitat for American shad, striped bass, and other Savannah River species (DOE 1999). This stream also appears to be an important spawning site for the spotted sucker (WSRC 1994).

About 48 fish species have been collected from Fourmile Branch. Those in the stream's lower reaches include species common to the Savannah River. The only abundant fish species collected from Fourmile Branch are mosquitofish, redbreast sunfish, and spotted sunfish. Common species include longnose gar, bowfin, golden shiner, bluehead chub, creek chub, creek chubsucker, pirate perch, and brook silverside (Bennett and McFarlane 1983).

Water bodies in the vicinity of the proposed facilities include unnamed tributaries to Upper Three Runs Creek (see Figure 3.3) and small drainages and detention basins associated with permitted discharge outfalls. Macroinvertebrate (e.g., aquatic insects, snails, clams, and worms) and fish surveys indicate that Upper Three Runs Creek is unaffected by SRS NPDES-permitted discharges (Specht and Paller 2001).

3.5.3 Wetlands

> **Wetlands**
>
> *Wetlands* are areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation adapted for life in saturated soil conditions.

More than 20% of the SRS consists of wetlands, including open waters. Most wetlands on the SRS are associated with floodplains, streams, and impoundments. Wetland types on the SRS include bottomland hardwoods, southern swamp (cypress-tupelo), freshwater marshes, and Carolina bays. Areal coverage of forested wetlands is given in Table 3.5. The freshwater marshes total 1,380 ha (3,407 acres), and the Carolina bays total about 785 ha (1,939 acres) (DOE 2000b). The conditions of many wetlands at the SRS are similar to conditions that existed before the government assumed control of the site, except for those wetlands along stream corridors and adjacent portions of the Savannah River swamp that were degraded by thermal releases from reactor operations. These areas have been recovering since cessation of cooling water releases (WSRC 1994).

Over 300 Carolina bays (closed depressions capable of holding water) occur on the SRS (DOE 2000b). Carolina bays are characterized by their elliptical or ovoid shape, with a northwest/southeast orientation of their long axis (WSRC 1994). The Carolina bays on the SRS have remained largely undisturbed since 1950 and thus are valuable examples of these regional wetlands (Schalles et al. 1989). The median size of the Carolina bays is about 0.8 ha (2.0 acres), and only 15 exceed 4 ha (10 acres). The Carolina bays have characteristics similar to other wetlands (e.g., shallow marshes, herbaceous bogs, shrub bogs, or swamp forests). They also have a xeric to hydric (dry to moist) gradient from their peripheral sand rim to the center depression (Schalles et al. 1989). More than 135 species of plants have been identified from these wetlands. Most are dominated by grasses and sedges (Schalles et al. 1989; WSRC 1994). Amphibians are the most prevalent vertebrates that utilize the Carolina bays, but many reptiles, birds, and mammals also have been observed at these wetlands (Schalles et al. 1989). Less than 20 of the Carolina bays contain permanent fish populations. Fish species include redfin pickerel, mud sunfish, lake chubsucker, and mosquito fish (DOE 1999). An accelerated program has been initiated at the SRS to restore impacted Carolina bays (DOE 2000b). No Carolina bays occur near the proposed facility sites.

No wetlands occur on the proposed facility sites. Wetland habitat does occur along the unnamed tributary to Upper Three Runs Creek located near the eastern border of the proposed facility site (see Figure 3.3). The dominant species of vegetation in this wetland are yellow poplar, laurel oak, red maple, red bay, and cherrybark oak. Maiden cane also occurs near the wetland boundary (Wike and Nelson 2000).

3.5.4 Protected Species

> **Protected Species**
>
> *Endangered species.* Any species in danger of extinction throughout all or a significant portion of its range.
>
> *Threatened species.* Any species likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

Table A.1 (Appendix A) lists the threatened, endangered, and other special status species that may be found in the vicinity of the SRS. Appendix A also discusses the federally and state-endangered red-cockaded woodpecker (*Picoides borealis*), which receives special attention at the SRS.

No federal- or state-listed wildlife species have been reported from the proposed project area, but several species may exist in the general vicinity. The American alligator (*Alligator mississippiensis*) is federally threatened (by virtue of its similarity to the endangered American crocodile [*Crocodylus acutus*]). While it is fairly common at the SRS, it has only been recently observed near the F-Area, and its occurrence there is considered uncommon. The federally threatened (state-endangered) bald eagle (*Haliaeetus leucocephalus*) actively nests in the Pen Branch area and in an area south of Par Pond. These areas are 14 km (8.7 mi) and 12 km (7.5 mi) southwest and southeast of the proposed project area, respectively. The closest nesting area of the federally and state-endangered red-cockaded woodpecker to the proposed facility site is about 5 km (3.1 mi) away. The proposed area for the facilities does not occur within red-cockaded woodpecker management areas (see Appendix A). However, all areas containing pines, including those at the proposed sites, provide suitable forage areas for this species. The federally and state-endangered wood stork (*Mycteria americana*) has been observed near the Fourmile Branch delta, about 21 km (13 mi) from the proposed site. The federally endangered (state-endangered) shortnose sturgeon (*Acipenser brevirostrum*) occurs in the Savannah River as far upstream as the SRS.

Walk-through surveys did not reveal any federal- or state-listed wildlife species within the proposed facility area (USFS 2000). The Bachman's sparrow (*Aimophila aestivalis*) is adapted to open meadow and shrubby meadow habitats such as those that occur throughout F-Area. The eastern woodrat (*Neotoma floridana*) could inhabit the transitional areas between the hardwood forest and F-Area facilities, and the moist stream bottom area is suitable for the star-nosed mole (*Condylura cristata*). The upland pine and pine-oak ridge habitats are highly suitable for the southern hognose snake (*Heterodon simus*) and pine snake (*Pituophis melanoleucus*) (USFS 2000). The American sandburrowing mayfly (*Dolania americana*) is a relatively common aquatic insect in Upper Three Runs Creek (WSRC 1994). This species was formerly a candidate species for federal listing, but it is not currently listed by the U.S. Fish and Wildlife Service (USFWS) or State of South Carolina.

More than 1,300 species of plants occur at the SRS (WSRC 1994); however, only 53 species are considered to be sensitive, as determined by state, federal, and global ratings. The smooth coneflower (*Echinacea laevigata*) is the only federally listed (endangered) plant species at the SRS; it is also state endangered. Smooth coneflowers inhabit roadsides and open, sunny areas. The collection of plants from natural populations was a significant factor in the endangerment of the species (Arnold et al. 1998). Three populations of the smooth coneflower have been identified at the SRS. Activities near these known populations are highly restricted (DOE 2000b).

Nearly 300 populations of other sensitive plant species occur at the SRS (DOE 2000b). Included are three populations of the state-listed (species of concern) piedmont azalea (*Rhododendron flammeum*) that have been found along the steep slopes adjacent to the Upper Three Runs Creek floodplain in an area northwest of F-Area (DOE 1999).

Walk-through surveys of the proposed MOX facility site in October 1998 and March 2000 did not reveal any populations of the smooth coneflower (USFS 2000). Because this species is adapted to meadow and open forest habitats, the project area appears to be too disturbed or shady for the coneflower's establishment and successful survival. The survey did indicate that suitable habitat for several rare plant species exists in areas adjacent to the survey site. The hardwood slope provides habitat suitable for leech brush (*Nestronia umbellata*), piedmont azalea, and striped garlic (*Allium cuthbertii*). The moist bottom and lower slope sections are suitable for green-fringed orchid (*Platanthera lacera*) and least trillium (*Trillium pusillum* var. *pusillium*). The upland pine and pine-oak ridge areas are suitable for lance-leaf wild-indigo (*Baptisia lanceolata*) and bearded milk-vetch (*Astragalus villosus*) (USFS 2000).

3.6 Land Use

This section briefly describes land use patterns on and around the SRS. Land use is a classification of parcels of land relative to their suitability for or the actual presence of human activities (e.g., industry, agriculture, recreation, etc.) and natural uses. Natural resource attributes and other environmental characteristics could make a site more suitable for some land uses than for others. Changes in land use may have both beneficial and adverse effects on other resources (e.g., ecological, cultural, geological, and hydrological).

3.6.1 Savannah River Site Land Use

Existing land use at the SRS can be characterized into three main categories: (1) undeveloped/ forest, (2) wetlands/water, and (3) developed. Approximately 73% of the SRS is undeveloped; 22% consists of wetlands, streams, and lakes; and 5% is developed (e.g., facilities, roads, and utility corridors). The forested areas are managed for timber production. The U.S. Forest Service, under an interagency agreement with DOE, harvests approximately 728 ha (1,800 acres) of timber from the SRS each year. Prime farmland soils exist at the SRS, but areas of prime farmland are not identified within the SRS because the land is not available for agricultural activities (DCS 2002). A portion of the SRS is open for fishing, as discussed below for the Crackerneck WMA. Since late September 2001, hunting has been closed to the general public in this area. A limited hunting period was later allowed to control the SRS deer herd.

As discussed in Section 3.5.1.1, the SRS has been designated a National Environmental Research Park by DOE. The scientific community can use the site to study the impacts of human activity on cypress swamp and hardwood forest ecosystems. Approximately 5,700 ha (14,085 acres) of land is set aside at the SRS for nondestructive environmental research (DOE 1999).

The F-Area is generally classified by the SRS land use plan as developed; some areas within F-Area are classified as industrial or heavy industrial.

Future land use at the SRS is determined by the DOE through site development, land use, and future planning processes (DCS 2002). SRS planners have developed a land use zone planning model for the site that is consistent with their past support of a multiple-use planning concept where compatible. Three principal planning zones have been established: Site Industrial, Site Industrial Support, and General Support. The *SRS Long Range Comprehensive Plan* includes the construction and operation of the proposed facilities as part of the plan for its Nuclear Materials Stewardship mission (DOE 2000b). New missions for the SRS in the 21st Century, as stated in the *Savannah River Site Strategic Plan*, include the construction and operation of new facilities for tritium extraction and the storage and disposal of surplus plutonium. In addition to these new facilities, the SRS plans to play an increased role in the advancement of nuclear materials protection, control, and accounting (DOE 2000a).

3.6.2 Off-Site Land Use

Predominant regional land uses in the vicinity of the SRS include urban and residential, industrial, agricultural, and recreational areas. Forest and agricultural land predominantly border the SRS, with only limited urban and residential development. The nearest residences are located to the west, north, and northeast, some within 60 m (200 ft) of the SRS boundary. Farming is diversified throughout the region and includes such crops as peaches, watermelon, cotton, soybeans, corn, and small grains. Incorporated and industrial areas are also present near the site, including textile mills, polystyrene foam and paper plants, chemical processing plants, and a commercial nuclear power plant. Open water and nonforested wetlands occur along the Savannah River Valley. Recreational areas within 80 km (50 mi) of the SRS include Sumter National Forest, Santee National Wildlife Refuge, and Clark's Hill/Strom Thurmond Reservoir. State, county, and local parks include Redcliffe Plantation, Rivers Bridge, Barnwell and Aiken County State Parks in South Carolina, and Mistletoe State Park in Georgia. The Crackerneck WMA, which includes a portion of the SRS along the Savannah River, is open to the public for fishing (DOE 1999).

3.7 Cultural and Paleontological Resources

Cultural resources include archaeological sites and historic structures and features that are protected under the National Historic Preservation Act of 1966, as amended.

Cultural and Paleontological Resources

Cultural resources include archaeological sites, historic structures and features, and traditional cultural properties.

Paleontological resources are the fossil remains of past life forms.

Cultural resources also include traditional cultural properties that are important to a community's practices and beliefs and that are necessary to maintain the community's cultural identity. Cultural resources that meet the eligibility criteria for listing on the *National Register of Historic Places* (NRHP) are considered "significant" resources and must be taken into consideration during the planning of federal projects. Federal agencies are also required to consider the effects of their actions on sites, areas, or other resources (e.g., plants) that are of religious significance to Native Americans as established under the American Indian Religious Freedom Act. Native American graves and burial grounds are protected by the Native American Graves Protection and Repatriation Act.

Paleontological resources are the fossil remains of past life forms. Paleontological resources with significant research potential are protected under the Antiquities Act.

3.7.1 Archaeological Resources

The Savannah River Archaeological Research Program (SRARP) of the South Carolina Institute of Archaeology and Anthropology, University of South Carolina, has been conducting archaeological investigations at the SRS since 1973 (SRARP 1989). The SRARP prepared an archaeological resource management plan for the SRS in 1989. The purpose of the plan is to provide the DOE with a means of addressing future archaeological resource management needs at the SRS and to establish a series of research directions to facilitate better management of these resources. The SRS currently manages its archaeological resources under the terms of a 1990 Programmatic Agreement among the DOE Savannah River Operations Office, the South Carolina State Historic Preservation Officer (SCSHPO), and the Advisory Council on Historic Preservation.

Over a period of more than 25 years, members of the SRARP have been very active in recording more than 850 archaeological sites at the SRS.[7] Although most of these sites have not been formally evaluated for eligibility for listing on the NRHP, 67 sites have been identified as potentially eligible (DOE 1999). In general terms, prehistoric sites within the SRS consist of village sites, base camps, limited-activity sites, quarries, and workshops. Nearly 800 prehistoric sites have been recorded at the SRS (DCS 2002). As detailed below, several prehistoric sites have been recorded within or near the proposed facilities. Two prehistoric sites within the footprints of the proposed facilities and their associated grading area have been determined to be eligible for listing on the NRHP.

Historic sites at the SRS include farmsteads, tenant dwellings, mills, plantations, slave quarters, rice farm dikes, dams, cattle pens, ferry locations, churches, schools, towns, cemeteries, commercial buildings, and roads. About 400 historic sites have been recorded to date at the SRS (DOE 1999). No historic sites have been recorded within the vicinity of the proposed facilities.

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[7] Of the 850 plus sites that have been recorded at the SRS, some are prehistoric, some are historic, and some have both a prehistoric and historic component. For this reason, the sum of prehistoric sites plus historic sites is much greater than the approximate total of 850 sites.

Archaeological surveys have been conducted in the F-Area in the vicinity of the proposed facilities. Fifteen prehistoric sites have been identified. Nine of these sites were recorded during 1993 and 1994 (Cabak et al. 1996). Four sites were recorded during SRS surveys conducted between 1973 and 1977 (Hanson et al. 1978). One site was recorded in 1983 (as cited in Cabak et al. 1996), and the remaining site was recorded in a 1999 survey covering unsurveyed lands remaining for the proposed location of the surplus plutonium disposition facilities (King and Stephenson 2000).

Four sites are located within the area of direct project disturbance. Two of the four prehistoric sites (38AK546/547 and 38AK757) are eligible for listing on the NRHP. Site 38AK546/547, located within the area of the proposed MOX facility, is eligible because of its potential to provide significant information about the prehistory of the Aiken Plateau, in particular the use of ridge slope settings during the Early Mississippian period (King and Stephenson 2000). Site 38AK757 is located within the boundary of the proposed PDCF facility and is important for learning more about the use of upland settings by prehistoric inhabitants of the area during the Mississippian Period (King and Stephenson 2000). Two sites within the area of the proposed MOX facility, 38AK330 and 38AK548, were determined not eligible in consultation with the SCSHPO, and no further work is required for these two sites (Green 2000, as cited in DCS 2002).

Eleven prehistoric sites are located near the proposed facilities. Five of those sites (38AK106, 38AK155, 38AK563, 38AK564, and 38AK581) have been recommended eligible for listing on the NRHP. Site 38AK106 has been recommended eligible on the basis of its integrity, high density of artifacts, and research potential for providing information on the Early Archaic, Early Woodland, and Late Woodland time periods. Site 38AK155 is eligible because of its potential to yield important information on subsistence strategies and the use of upland streamside settings between 3000 B.C. and A.D. 1450 (between the Late Archaic and Early Mississippian periods). Site 38AK563 is important because it contains cultural deposits ranging from the Early Archaic Period through the Late Woodland Period and has the potential to provide information on the changes in human use of the floodplain over a considerable time range. Site 38AK564 has been recommended eligible because it contains stratigraphically[8] separated evidence of site use from the Early Archaic and Late Archaic/Early Woodland time periods. Site 38AK581 contains evidence of numerous occupations by prehistoric people during the Woodland Period. The site has been recommended eligible on the basis that these

Date Ranges of Prehistoric Time Periods Used by Archaeologists at the SRS

Mississippian	A.D. 1100 - 1450
Late Woodland	A.D. 500 - 1100
Middle Woodland	600 B.C. - A.D. 500
Early Woodland	1000 B.C. - 600 B.C.
Late Archaic	3000 B.C. - 1000 B.C.
Middle Archaic	6000 B.C. - 3000 B.C.
Early Archaic	8000 B.C. - 6000 B.C.

Source: SRARP (1989).

[8] Archaeologists look at the position of artifacts relative to layers of soil and other artifacts to help determine sequences of events. Objects found closer to the surface of an undisturbed site were deposited more recently than objects found below them (i.e., an archaeologist would expect to find Woodland Period artifacts in one or more layers of soil above Archaic Period artifacts in a stratigraphically preserved site).

various occupations appear in a well-defined stratigraphic sequence and potentially contain important information about changes that occurred during that time period (Cabak et al. 1996).

3.7.2 Historic Structures

No architectural inventories have been conducted to date at the SRS. The SRS has a number of nuclear production facilities, including facilities important to tritium and plutonium production, that may have historic value as related to events during the Cold War. Construction of the F-Area began in 1951 under the Atomic Energy Commission. The F-Area was historically used for plutonium recovery during DOE's plutonium production phase (DCS 2002). The areas of construction for the proposed facilities do not contain structures. No existing buildings within the F-Area have been identified for reuse, modification, or demolition related to MOX facility activities.

3.7.3 Traditional Cultural Properties

Traditional cultural properties are places and resources important to traditional American cultures, which include, but are not restricted to, Native American cultures. Village sites, ceremonial locations, burials, cemeteries, and natural areas containing important resources, such as traditional plants, are typical types of properties of concern to Native American cultures. Properties of traditional value to immigrant groups (e.g., from Europe and Africa), such as cemeteries, also can be considered as traditional cultural properties. Native American groups with traditional ties to the area include the Apalachee, Cherokee, Chicksaw, Creek, Shawnee, Westo, and Yuchi (DCS 2002). Many of these groups were relocated to the Oklahoma Territory in the 1800s. However, issues related to the American Indian Religious Freedom Act have surfaced within the central Savannah River valley. Native American representatives have expressed concern over traditional plant resources that could exist at the SRS (DOE 1991b; DCS 2002). None of the identified plant resources is currently known to exist in the F-Area. Consultations with appropriate Native American Tribes, Bands, and Nations are underway regarding the proposed MOX facility (Appendix B).

3.7.4 Paleontological Resources

While some fossil-bearing strata are known to exist at the SRS, none are known within the F-Area. Paleontological resources that have been recorded within the SRS area mostly date to 54 to 39 million years ago during the Eocene Age. Those resources include fossil plants, invertebrate fossils, giant oysters, other mollusks, and bryozoa. Most known paleontological resources in the area are considered common and of low research potential (DOE 1999). The discovery of paleontological resources within the area of the proposed facilities is not anticipated.

3.8 Infrastructure

This section briefly describes the existing infrastructure of the SRS as it pertains to the proposed action. Site infrastructure includes utilities, roads, and railroads needed to support construction and operation of the facilities. A detailed discussion of the SRS infrastructure is provided in the DOE Surplus Plutonium Disposition EIS (DOE 1999).

3.8.1 Electricity

The SRS uses a 115-kV power line system in a ring arrangement to supply electricity to the operations areas. Power is supplied by three transmission lines from the South Carolina Electric and Gas Company. The F-Area receives power from the 200-F power loop supplied by the 251-F electrical substation. The current F-Area power consumption rate is about 63,000 MWh/yr; the F-Area total capacity is about 700,000 MWh/yr (DCS 2002). The total SRS usage of electrical power is 370,000 MWh/yr out of a site capacity of 4,400,000 MWh/yr.

3.8.2 Water

Domestic water supplies at the SRS come from a system composed of several wells and water treatment plants. The system includes three wells and a water treatment plant in the A-Area and two wells and a backup water treatment plant in the B-Area. A 43-km (27-mi) piping loop provides domestic water from the A- and B-Areas to other SRS operations areas, including the F-Area (DCS 2002). Current domestic water usage in F-Area is 378 million L/yr (100 million gal/yr) compared with a capacity of 890 million L/yr (235 million gal/yr).

Within F-Area, four deep groundwater wells are used for process water. Pumping capacities for these wells range from 1,500 to 3,800 L/min (400 to 1,000 gpm), and they extract groundwater from the Crouch Branch Aquifer. Two of these wells were formerly used for domestic water supply. The current annual groundwater use at F-Area is 1.4 billion L (370 million gal) (DCS 2002). The estimated capacity of the wells in F-Area is about 4.2 billion L/yr (1.1 billion gal/yr).

3.8.3 Fuel

Coal and oil are used at the SRS to power steam plants located in A-, D-, H- and K-Areas. The produced steam is distributed across the site in an aboveground pipeline distribution system. Coal is delivered by rail and is stored at coal piles in A-, D-, and H-Areas. Number 2 grade fuel oil is delivered by truck and is used in the K-Area. Natural gas is not used at the SRS.

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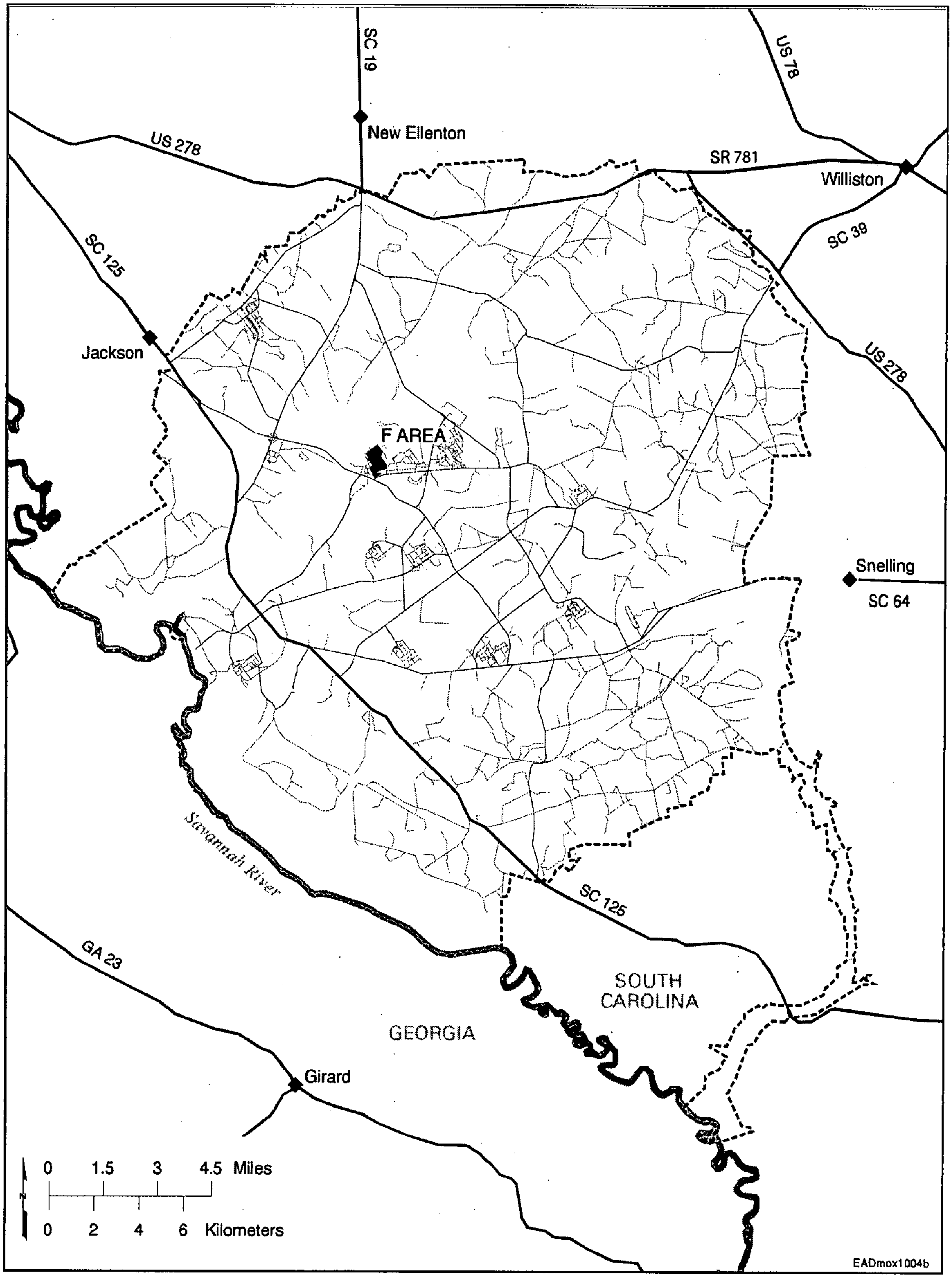

Figure 3.8. Roadways in the vicinity of the SRS.

Current waste generation rates and inventories at the SRS are presented in Table 3.6. Waste management practices at the SRS include minimization, characterization, treatment, storage, transportation, and disposal of waste generated from ongoing site activities. Waste minimization at the SRS is accomplished through source reduction, recycling, and employee participation in pollution prevention programs. Total solid waste volumes have decreased by 70% since 1991.

The types of waste currently managed at the SRS are high-level waste (HLW), transuranic (TRU) waste, mixed TRU waste, low-level waste (LLW), mixed LLW, hazardous waste, and

Table 3.6. Current waste generation rates and inventories at the SRS[a]

Waste type	Generation rate (m^3/yr)	Inventory[b] (m^3)
TRU[c]		
Contact handled	171	6,034
Remotely handled	0.6	1
LLW	8,195	1,616[d]
Mixed LLW		
RCRA	61	7,717
TSCA[e]	<1	3
Hazardous	74	1,416
Nonhazardous		
Liquid	416,100[f]	NA[g]
Solid	6,670	NA

[a]Sources for estimates presented in this table are DOE (1997) for TRU waste, LLW, and mixed LLW; DOE (1996) for hazardous and nonhazardous solid waste; and Sessions (1997) for nonhazardous liquid waste.

[b]Inventory projections were as of end of fiscal year 1996 for those presented in DOE (1997).

[c]Includes mixed TRU waste.

[d]LLW is disposed of on-site at the SRS. The estimated inventory shown is less than the generation rate (for FY1996) because it represents only LLW that had not been disposed of as of the end of FY 1996.

[e]TSCA = Toxic Substances Control Act.

[f]416,000 m^3/yr = 416,100,000 L/yr.

[g]NA = not applicable; nonhazardous wastes are not held in long-term storage.

nonhazardous waste. The first five types contain radioactive material. Of the seven waste types currently managed at the SRS, HLW would not be generated by the proposed MOX facility, the PDCF, or the WSB. The proposed MOX facility would generate a liquid high-alpha-activity waste that would be further processed, resulting in the generation of TRU waste and LLW (DCS 2002).

The TRU wastes generated at the SRS include contaminated equipment, protective clothing, and tools. Most of these wastes are stored on concrete pads that are not covered with soil. TRU waste generated before 1986 is stored on five concrete pads and one asphalt pad that have been covered with approximately 1.2 m (4 ft) of soil. TRU waste generated since 1986 is stored on 13 concrete pads that are not covered with soil. These storage pads are located in the Low-Level Radioactive Waste Disposal Facility, which is located in E-Area (DOE 1995). In 1996, it was decided to vent and purge all buried drums; this process was completed in 1999 (Arnett and Mamatey 2000b). A TRU waste characterization and certification facility to prepare TRU waste for treatment and to certify TRU waste for disposal at the Waste Isolation Pilot Plant (WIPP) is planned for 2007. This TRU waste facility would be built to manage other SRS TRU waste and is independent of the proposed action. In the interim, drums that are certified for shipment to WIPP will be stored on concrete pads in E-Area (DOE 1999).

Waste Types

Transuranic (TRU) waste: Refers to radioactive waste that contains more than 100 nanocuries per gram (nCi/g) of alpha-emitting isotopes with atomic numbers greater than 92 and half-lives greater than 20 years. Such waste results primarily from the fabrication of plutonium weapons and plutonium-bearing reactor fuel. Generally, little or no shielding is required.

Low-level waste (LLW): Refers to radioactive waste that is not classified as HLW, TRU, or spent nuclear fuel (SNF).

Hazardous waste: Refers to nonradioactive waste materials defined by the Resource Conservation and Recovery Act (RCRA) as hazardous wastes. These wastes are considered to pose potential hazard to human health when improperly treated, stored, disposed of, or otherwise managed because of their quantity, concentration, and physical and chemical characteristics. (Note: hazardous waste mixed with low-level [radioactive] waste or TRU waste is referred to as mixed low-level waste or mixed TRU waste, respectively.)

Liquid and solid LLW types are treated at the SRS. Aqueous LLW streams undergo filtration, reverse osmosis, and ion exchange at the F-and H-Area effluent treatment facility (ETF) to remove the radionuclide contaminants. The treated effluent is discharged to Upper Three Runs Creek.

Treatment residuals are eventually immobilized with grout for on-site disposal. Solid LLW is categorized into four groups: low-activity wastes (those that radiate less than 0.002 Sv/h [200 mrem/h] at 5.1 cm [2 in.] from the unshielded container); intermediate-activity wastes (those that radiate greater than 0.002 Sv/h [200 mrem/h] at 5.1 cm [2 in.]); intermediate-activity tritium waste (intermediate-activity waste with more than 3.7×10^{11} Bq [10 Ci] of tritium per container); and long-lived waste (waste contaminated with long-lived isotopes that exceed the waste acceptance criteria [WAC] for on-site disposal) (DCS 2002). Wastes in the first three categories are stored and disposed of in vaults, and wastes in the fourth category are placed in a waste storage building until treatment and disposal technologies are developed. Located in the E-Area, the vaults are below-grade concrete structures, and the storage building is a metal structure on a concrete pad. Disposal facilities at the SRS are projected to meet solid LLW disposal capacity needs for the next 20 years.

Mixed LLW is stored in various tanks and buildings located in the A-, E-, M-, N-, and S-Areas of the SRS. The current mixed waste program at the SRS primarily involves the safe storage of these wastes until treatment and disposal facilities become available. A site treatment plan (WSRC 2000b) for mixed wastes has been developed, as required by the Federal Facility Compliance Act, that specifies treatment technologies or technology development schedules for all SRS mixed waste. During 1999, plans for all mixed LLW were met in accordance with the site treatment plan (Arnett and Mamatey 2000b).

Hazardous waste is managed at the SRS either by accumulating the waste at the generating facility for a maximum of 90 days or storing it in Resource Construction and Recovery Act (RCRA)-permitted hazardous waste storage buildings or on interim storage pads located in the B- and N-Areas. Most of the waste is shipped off-site to commercial RCRA-permitted facilities. In 1999, 297 m^3 (388 yd^3) of hazardous waste was shipped off-site to commercial disposal facilities (Arnett and Mamatey 2000b).

The treatment of nonhazardous wastewater at the SRS has been centralized since 1994 with the completion and operation of the 2.8 million-L/day (0.75 million-gal/day) Central Sanitary Wastewater Treatment Facility. This facility treats sanitary wastewater by an extended aeration activated sludge process that separates the wastewater into clarified effluent and sludge.

The collection, hauling, and disposal of solid sanitary waste at the SRS is privatized, and the waste is sent to the Three Rivers Landfill southwest of the B-Area. Other nonhazardous waste consists of scrap metal, powerhouse ash, domestic sewage, scrap wood, construction debris, and used railroad ties. These wastes are disposed of by means appropriate to their nature.

3.10 Human Health Risk

Human health can be adversely affected by radioactive and hazardous chemical contaminants in the environment. This section discusses how humans can become exposed to these materials, the potential effects of this exposure, potential human receptors considered in this EIS, and the existing conditions at the SRS and the surrounding area. Methods used to estimate the potential for injuries or fatalities among workers are also discussed.

3.10.1 Hazard Exposure Pathways

3.10.1.1 Pathways for Human Exposure to Radiation and Radioactivity

Radioactivity released from the SRS reaches the environment and people in a variety of ways. The routes that radioactive materials follow to get from an SRS facility to the environment and then to people are called pathways. The primary human exposure pathways for these releases are discussed below:

- *Inhalation exposure pathway*: Individuals in the path of airborne emissions would receive a dose from breathing in the radioactive material. Some of this material also deposits on the ground and over time may become resuspended in the air, at which time it may also be inhaled.

- *Direct radiation from contaminated soil*: Material that is deposited on the ground from passing airborne emissions becomes an external exposure source of direct radiation.

- *Immersion in radioactive clouds*: Individuals in the path of radioactive airborne emissions would receive an external dose during immersion in the passing "cloud" of material.

- *Ingestion exposure pathway*: Radioactive materials can be transported through a variety of routes into the human diet. Airborne radioactive material may deposit directly on food crops or animal feed crops, resulting in potential exposure from human ingestion of the food crops or indirectly from ingestion of contaminated animal products. Material deposited on farmland may also be taken up through the roots by human and animal food crops. Material deposited on surface water or land may reach groundwater. Contaminated surface water or groundwater could be used for irrigating crops or direct consumption by humans. Contaminated surface water could also result in contamination of aquatic species, such as fish, which could subsequently be consumed by humans.

One important pathway of radioactive material released from the SRS in the form of particulate matter is the airborne pathway. After being discharged from a stack, the radioactive particulate matter will be carried by wind downwind of the facility, where it will either be inhaled by individuals or settle on the ground. Radioactivity in the soil will cause direct radiation exposures in individuals located near contaminated soil. Soil contamination may also be resuspended into the air by the wind and then inhaled farther downwind. Food produced on farmlands with contaminated soil will also contain this radioactivity. Precipitation runoff from downwind soil will carry radioactivity to local surface waters, such as lakes, rivers, and streams. Finally, radioactivity in surface water may accumulate in fish or other aquatic life that can be consumed by humans.

Radiation and Radioactivity

Radioactivity or *radioactive decay* is the process by which unstable atoms emit *radiation* to reach a more stable state.

Radiation is the movement of energetic particles or waves through matter and space. Radiation comes from radioactive material or from equipment such as x-ray machines. Radiation may be either ionizing radiation or non-ionizing radiation.

Ionizing radiation is radiation that has enough energy to cause atoms to lose electrons and become ions. For example, the radioactive decay of plutonium produces radiation that can ionize matter (e.g., tissue).

Radiation dose is the quantity of radiation energy that is deposited in a material. The radiation dose to humans is measured in units of sieverts (Sv). The unit of rem is also used. One sievert is equal to 100 rem.

Collective dose is the sum of the individual doses received in a given period of time by a specified population. The unit of collective dose is person-sieverts, or person-rem.

The DOE has determined the critical types of radioactivity and pathways for radioactive materials released from SRS operations. Tritium and cesium-137 are the primary contributors to doses to members of the public. The major pathways for tritium released into air were through breathing air and eating food, whereas the major pathway for tritium and cesium-137 released into site streams were through drinking river water and eating fish from the river (DOE 1999). Pathways or routes by which radioactive material moves through the environment to reach humans can be complex. For example, contaminants can settle on grass that is eaten by cows that produce milk that is consumed by humans. The meat of the cows can also be consumed by humans. Another example, more relevant to the SRS, would be game animals that consume contaminated vegetation and then are eaten by humans. A detailed discussion of the many pathways at the SRS is presented in the annual environmental report (Arnett and Mamatey 2001b).

3.10.1.2 Pathways for Human Exposure to Chemicals

Humans can also be exposed to nonradioactive chemicals released to the environment. The DOE has determined that the critical chemicals among those released from SRS operations to the environment are arsenic and benzene (Arnett and Mamatey 2000b). Exposures may occur primarily through inhaling pollutants released to air, drinking contaminated groundwater or surface water, ingesting contaminants in foodstuffs grown in contaminated soil or irrigated with contaminated groundwater, or ingesting contaminated soil.

3.10.1.3 Physical Hazards

Although not attributable to releases of contaminants to the environment, there is a risk of injuries and fatalities from physical hazards for construction and operation workers at any facility. The U.S. Bureau of Labor keeps statistics on the annual number of injuries and fatalities by industry type. Where possible, these statistics have been used to estimate the extent of physical hazard risk for the no-action and proposed action alternatives.

3.10.2 Receptors

Effects of radiation and chemical exposures for the no-action and proposed action alternatives during normal operations were estimated by first calculating the doses to relevant receptors. The analyses considered three groups of people: (1) members of the public, (2) SRS employees, and (3) facility workers. For purposes of this EIS, these three groups are defined as follows:

- *Members of the Public*: Individuals who live and work outside the SRS within 80 km (50 mi) of the proposed facilities:
  - Might be exposed to trace amounts of radioactive and chemical materials released to the environment through exhaust stacks.
  - Could receive radiation and chemical exposures primarily through inhalation of material in the air, external radiation from deposited radioactive material, and ingestion of contaminated food.
- *SRS Employees*: Individuals employed at the SRS who are not workers at the proposed MOX facility, the PDCF, or the WSB. SRS employees include those workers assigned radiological work at other nuclear facilities within the SRS boundary, as well as those who are not assigned radiological work, such as cafeteria workers or persons in administrative positions:
  - Might be exposed to direct radiation from radioactive materials (although at a great distance) and to trace amounts of plutonium or uranium released to the environment through site exhaust stacks.
  - Could receive radiation and chemical exposures primarily through inhalation of material in the air and external radiation from radioactive material deposited on the ground.
  - Work-related physical hazard risks are present.
  - Estimate of impacts to transient population groups (soda machine vendors, etc.) are bounded by impacts to this group.
- *Facility Workers*: Individuals who work at the proposed MOX facility, the PDCF, or the WSB and who receive a radiation dose in the course of employment in which the assigned duties of the individuals involve exposure to radiation or to radioactive material from licensed and unlicensed sources of radiation:

- Might be exposed to direct gamma radiation emitted from radioactive materials, such as depleted uranium compounds.

- Could receive small radiation doses from inhaling uranium, plutonium, or other radionuclides compared with the direct radiation doses resulting from enclosed processes; ventilation controls would be used to inhibit airborne emissions in facilities.

- Would be protected by a dosimetry program to control doses below the maximum regulatory limit of 0.05 Sv/yr (5 rem/yr) for workers (10 CFR 20.1201).

- For chemical exposures, facility workers are addressed under separate regulations (e.g., Occupational Safety and Health Act [OSHA]); their exposures are not quantitatively addressed in this FEIS. However, physical hazards (i.e., risks of injury and fatality) are addressed for both construction and operations workers.

Impacts to a maximally exposed individual (MEI) were also evaluated. The MEI is a hypothetical person who, because of proximity, activities, or living habits, could receive the highest possible dose of radiation or of a hazardous chemical from a given event or process. For members of the public, potential locations for an MEI would be at the site boundary, the closest possible public access points near the operations under consideration. For SRS employees not directly involved in facility operations, MEI locations are considered at distances of 100 m (330 ft) or more from a facility. An MEI for radiation exposure is not always considered for facility workers because these workers are monitored, and their exposure is expected to be kept as low as reasonably achievable (ALARA), with workers being rotated into and out of relatively higher exposure job functions. In such cases, an average worker dose was estimated.

3.10.3 Baseline Radiological Dose and Risk

The radiological baseline in the vicinity of the SRS includes background radiation, man-made (anthropogenic) sources, and radiation from ongoing SRS operations. Background radiation comes from natural sources, such as cosmic radiation and naturally occurring radioactive material, and from anthropogenic sources that cannot be controlled, such as global fallout from nuclear testing or nuclear accidents. Anthropogenic sources, including consumer products (e.g. television sets and smoke detectors) and medical procedures, account for additional exposure. Human exposure to radiation is measured in units of sieverts (Sv). Background radiation levels

What Is a Sievert?

A *sievert* is a unit of radiation dose. The effects of radiation exposure on humans depend on the kind of radiation received, the total amount absorbed by the body, and the tissues involved. A sievert (Sv) is calculated by a formula that takes these three factors into account. Another common unit of radiation dose is the rem (1 Sv = 100 rem). The U.S. average individual radiation dose is about 0.0036 Sv (0.36 rem) or 3.6 millisievert (mSv) [360 millirem (mrem)] from natural background and anthropogenic sources.

Latent Cancer Fatality (LCF)

What it is: The primary adverse health effect from the low-level radiation doses received from proposed MOX facility, PDCF, or WSB operations and potential accidents would be the possible induction of latent cancer fatalities (LCFs). LCFs are a measure of the expected number of additional cancer deaths in a population (or people dying of cancer) as a result of exposure to radiation. Death from cancer induced by exposure to radiation may occur at any time after the exposure takes place. However, latent cancers would be expected to occur in a population from one year to many years after the exposure takes place. To place the significance of these additional LCF risks from exposure to radiation into context, the average individual has approximately 1 chance in 4 of dying from cancer (LCF risk of 0.25).

How it is calculated: The U.S. Environmental Protection Agency has suggested (Eckerman et al. 1999) a conversion factor that for every 100 person-Sv (10,000 person-rem) of collective dose, approximately 6 individuals would ultimately develop a radiologically induced cancer. If this conversion factor is multiplied by the individual dose, the result is the individual increased lifetime probability of developing an LCF. For example, if an individual receives a dose of 0.00033 Sv (0.033 rem), that individual's LCF risk over a lifetime is estimated to be 2×10^{-5}. This risk corresponds to a 1 in 50,000 chance of developing a LCF during that individual's lifetime. If the conversion factor is multiplied by the collective (population) dose, the result is the number of excess LCFs. Because these results are statistical estimates, values for expected LCFs can be, and often are, less than 1.0 for cases involving low doses or small population groups. If a population group collectively receives a dose of 50 Sv (5,000 rem), which would be expressed as a collective dose of 50 person-Sv (5,000 person-rem), the number of potential LCFs experienced from within the exposure group is 3. If the number of LCFs estimated is less than 0.5, on average, no LCFs would be expected.

result in a national annual average individual exposure of approximately 3.0 mSv (300 mrem), with an additional 0.60 mSv (60 mrem) from other anthropogenic sources. A more detailed breakdown of these sources is presented in Table 3.7.

Radiation from SRS operations is estimated by analyzing monitoring data. The SRS has an extensive radiological monitoring network both on- and off-site to assess the effects of site operations on air, surface water, groundwater, soil, terrestrial and aquatic food products, and local game animals. These routine environmental surveillance activities include monitoring airborne and liquid effluent discharges from their points of origin at each operating facility on the SRS to determine compliance with applicable exposure standards. The results of the effluent monitoring and environmental surveillance and the potential radiation doses to members of the public in surrounding areas from those effluents are published annually by the Environmental Monitoring Section of Westinghouse Savannah River Company (e.g., Arnett and Mamatey 2001b).

Airborne emissions from the SRS operations for 2000 are summarized in Table 3.8. Liquid releases for 2000 are summarized in Table 3.9. The estimated off-site radiation doses from both airborne and liquid releases were below all applicable radiation exposure standards for humans and aquatic organisms (Arnett and Mamatey 2001b). The estimated exposures and the applicable standard for each exposure are summarized in Table 3.10. The estimated all-pathway dose to an MEI was 0.0018 mSv (0.18 mrem), which is 0.18% of the DOE's 1.0 mSv (100-mrem) all-pathway dose standard for annual exposure. For an NRC-licensed facility, such as the proposed MOX facility, a dose limit of 1.0 mSv/yr (100 mrem/yr) from operations for an individual member of the public is also applicable (10 CFR 20.1301).

Table 3.7. Sources and contributions to the U.S. average individual radiation dose[a]

Source	Effective dose equivalent [mSv/yr (mrem/yr)]
Natural background radiation	
Cosmic radiation	0.27 (27)
Rocks and soil (external)	0.28 (28)
Internal to body	0.40 (40)
Radon (internal/inhalation)	2.0 (200)
Subtotal	≈2.95 (≈295)
Man-made background radiation	
Weapons test fallout	<0.01 (<1)
Consumer products	0.10 (10)
Medical	
Diagnostic X-rays	0.39 (39)
Nuclear Medicine	0.14 (14)
Subtotal	≈0.64 (≈64)
Total	≈3.60 (≈360)

[a]*Source*: Modified from Arnett and Mamatey (2001b) and NCRP (1987).

Workers at the SRS with the potential to be exposed to external radiation or to inhale airborne radioactivity take part in a monitoring program in accordance with 10 CFR 835 ("Occupational Radiation Protection"). In 2000, 3,382 SRS workers had a measurable dose with a combined total effective dose equivalent (TEDE) of 1.632 person-sievert (person-Sv) (163.2 person-rem) for an average TEDE of 0.00048 Sv (0.048 rem) (DOE undated).

The primary health concerns attributed to radiation exposure are the development of cancer and hereditary (genetic) effects. Although radiation-induced genetic effects have been observed in laboratory animals (given very high doses of radiation), no evidence of genetic effects has been observed among the children born to atomic bomb survivors from Hiroshima and Nagasaki. Thus, latent cancer fatalities (LCFs) are the radiological health effect end point used in this EIS as a measure of human health impacts. A conservative assumption in this regard is that any amount of radiation may pose some risk for causing cancer, and that the risk is higher for higher radiation exposures. A linear, no-threshold dose response relationship is used to describe the relationship between radiation dose and the occurrence of cancer. This dose-response model suggests that any increase in dose, no matter how small, results in an incremental increase in risk. For the purposes of this EIS, the risk of a latent cancer fatality (LCF) is taken to be 0.06 LCF per person-Sv (0.0006 LCF per person-rem). (See the text box in this section for a discussion on LCFs.) This LCF risk factor is a gender- and age-averaged value that accounts for differences between male and female receptors from infancy through old age living in the United States (Eckerman et al. 1999). While female receptors were

Table 3.8. Radioactive atmospheric releases from SRS operations for 2000

Radionuclide	Curies[a]	Radionuclide	Curies[a]
Gases and Vapors		***Particulates (cont.)***	
H-3 (oxide)	3.24×10^{4}	Eu-152	4.13×10^{-5}
H-3 (elem.)	1.24×10^{4}	Eu-154	1.64×10^{-5}
H-3 total	4.48×10^{4}	Eu-155	4.02×10^{-6}
C-14	1.33×10^{-1}	Hg-203	2.23×10^{-10}
Kr-85	5.28×10^{4}	Ra-226	1.74×10^{-5}
I-129	1.71×10^{-3}	Ra-228	2.74×10^{-5}
I-131	6.96×10^{-6}	Ac-228	1.80×10^{-6}
I-133	1.18×10^{-4}	Th-228	5.76×10^{-7}
		Th-230	1.74×10^{-5}
Particulates		Th-232	2.58×10^{-6}
Cr-51	1.21×10^{-4}	Th-234	1.04×10^{-4}
Co-57	3.26×10^{-7}	Ba-133	5.4×10^{-10}
Co-58	1.27×10^{-4}	U-233	1.50×10^{-8}
Co-60	8.60×10^{-4}	U-234	3.98×10^{-4}
Ni-59	4.17×10^{-13}	U-235	1.80×10^{-5}
Ni-63	5.09×10^{-6}	U-236	4.16×10^{-11}
Zn-65	2.23×10^{-5}	U-238	5.20×10^{-4}
Sr-89,90	3.89×10^{-3}	Np-237	2.26×10^{-10}
Zr-95	1.68×10^{-5}	Pu-238	3.59×10^{-4}
Zr-85	1.07×10^{-9}	Pu-239	2.05×10^{-3}
Nb-94	3.95×10^{-10}	Pu-240	1.99×10^{-7}
Nb-95	1.13×10^{-4}	Pu-241	4.09×10^{-6}
Tc-99	8.75×10^{-5}	Pu-242	7.03×10^{-9}
Ru-103	4.23×10^{-5}	Am-241	1.46×10^{-4}
Ru-106	1.04×10^{-5}	Am-243	6.02×10^{-6}
Sb-124	5.63×10^{-10}	Cm-242	4.47×10^{-7}
Sb-125	5.34×10^{-5}	Cm-244	7.68×10^{-5}
Sn-113	6.20×10^{-10}	Cm-245	1.04×10^{-13}
Sn-126	6.45×10^{-14}	Cm-246	3.98×10^{-6}
Cs-134	1.31×10^{-4}	Ar-39	3.30×10^{-5}
Cs-137	8.15×10^{-3}	Na-22	7.90×10^{-11}
Ce-141	4.16×10^{-5}	Mn-54	1.30×10^{-10}
Ce-144	1.44×10^{-4}	Se-79	4.47×10^{-9}
Pa-233	2.23×10^{-10}		
Pr-144	3.68×10^{-13}	Alpha	7.35×10^{-4}
Pr-144m	4.43×10^{-15}	Beta-Gamma	3.57×10^{-2}
Pm-147	1.30×10^{-5}		

[a]One curie (Ci) equals 3.7×10^{10} becquerels (Bq). One Bq equals one disintegration per second (dps).

Source: Modified from Arnett and Mamatey (2001b).

Table 3.9. Radioactive liquid releases from SRS operations for 2000 (including direct and seepage basin migration releases)

Radionuclide	Curies[a]
H-3	5.34×10^{3}
Sr-90	5.44×10^{-2}
Co-60	1.62×10^{-3}
I-129	7.82×10^{-2}
Cs-137	8.81×10^{-2}
U-234	2.87×10^{-5}
U-235	6.18×10^{-6}
U-238	1.97×10^{-4}
Pu-238	2.21×10^{-5}
Pu-239	1.68×10^{-5}
Am-241	1.19×10^{-5}
Cm-244	7.01×10^{-6}
Alpha	1.96×10^{-2}
Beta-Gamma	4.44×10^{-2}

[a]One Ci equals 3.7×10^{10} Bq.

Source: Modified from Arnett and Mamatey (2001b).

estimated to have a slightly higher LCF rate than males, and infants a higher LCF rate than adults, the use of this risk factor for estimating collective LCF risks to the public in this EIS should provide a reasonable average based on current understanding of radiological effects in humans. On the other hand, the collective LCF risks to the facility workers and SRS employees evaluated in this EIS may be conservative (overestimated) because the more susceptible receptors, such as infants, considered in determining the LCF risk factor are not present in the SRS employee population.

3.10.4 Baseline Chemical Exposure and Risk

3.10.4.1 Chemical Risk Assessment Background

As stated in Section 3.10.2, human exposure to nonradioactive chemicals in air, water, or soil may occur through ingestion, inhalation, or contact with skin. Methods used to assess hazards associated with chemical exposures may simply involve a comparison of concentrations in air, water, or soil with health-risk based standards or guidelines available from state and federal agencies (see *SRS Baseline Risks* below). More detailed assessments estimate the extent of

Table 3.10. Estimated radiation exposures to the public from SRS emissions in 2000

Pathway/receptor	Dose	Standard
Air		
Maximally exposed individual [mSv (mrem)]	0.0004 (0.04)	0.10 (10)[a]
Collective population [person-Sv (person-rem)]	0.023 (2.3)	NA[b]
Liquid		
Maximally exposed individual [mSv (mrem)]	0.0014 (0.14)	0.04 (4)[c]
Collective population [person-Sv (person-rem)]	0.039 (3.9)	NA
Total		
Maximally exposed individual [mSv (mrem)]	0.0018 (0.18)[d]	1.0 (100)[e]
Collective population [person-Sv (person-rem)]	0.062 (6.2)[d]	NA

[a]Set by the EPA in "National Emission Standards for Hazardous Air Pollutants — Radionuclides," 40 CFR 61 Subpart H, December 15, 1989.

[b]NA = not applicable.

[c]Adopted from the EPA in DOE Order 5400.5 as set forth in "National Primary Drinking Water Standards," 40 CFR Part 141.11, July 9, 1976.

[d]Sum of the air and liquid pathways.

[e]All pathway dose standard from DOE Order 5400.5.

Source: Arnett and Mamatey (2001b).

human exposure due to a particular source and compare that exposure with benchmark levels for noncarcinogenic risks ("hazard index" approach) or benchmarks for carcinogenic risks.

In estimating either noncancer risks (that is, noncancer adverse health outcomes, such as liver damage or developmental impairment) due to chemical exposures or increased lifetime cancer risk, the first step is to estimate the chemical concentration in air, water, and/or soil, either present from natural sources or attributable to anthropogenic sources. The concentration estimate is combined with an estimate of the human intake level to produce a chemical-specific daily intake estimate. (The intake level is usually from the upper end of the expected range of possible intakes in order to make sure risk estimates take individuals who have unusually high intakes into account). Estimated intakes are compared with chemical-specific reference doses or cancer slope factors. The reference doses and cancer slope factors are developed by the EPA for many commonly used chemicals and are based on a broad range of toxicological data. See the text box for further information on risk estimation procedures.

3.10.4.2 SRS Chemical Baseline Risks

Public water supplies in the vicinity of the SRS are monitored and regulated to be in compliance with health-based federal standards, and remediation programs are underway at the SRS to

Concepts in Estimating Risks from Exposures to Chemicals in Air, Water, and Soil

Reference Dose: Intake level of a chemical that is very unlikely to have noncancer adverse effects; measured in units of milligrams per kilogram of body weight per day (mg/kg-d). Different reference doses often apply for oral and inhalation exposures.

Hazard Quotient: a comparison of the estimated intake level or dose of a chemical in air, water, or soil with its reference dose; expressed as a ratio.

Example: If 5 parts per billion (0.005 mg/L) benzene is in groundwater used for drinking and 2 L is ingested daily by a 70-kg (150-lb) person over a period of 10 years, then
Intake = (0.005 mg/L × 2 L/day)/70 kg = 0.00014 mg/kg-d.
The reference dose for chronic ingestion of benzene is 0.0003 mg/kg-d.
The benzene hazard quotient is 0.00014/0.0003 = 0.5. This hazard quotient is less than 1, indicating that the exposure is unlikely to cause adverse noncancer health effects.

Hazard Index: The sum of hazard quotients for all chemicals to which an individual is exposed. Used as a screening tool, a hazard index of less than 1 indicates that adverse health effects are unlikely. However, a hazard index of greater than 1 does not necessarily mean adverse health effects will occur, because different chemicals may react differently in the human body (that is, they may have different, nonadditive kinds of toxicity).

Slope Factor: an upper-bound estimate of a chemical's probability of causing cancer over a 70-year lifetime, based on the extent of intake during the exposure period and given in units of inverse intake [$(mg/kg\text{-}d)^{-1}$ or 1/(mg/kg-d)]. For a carcinogen, different slope factors often apply for oral and inhalation exposures.

Increased Lifetime Cancer Risk: an upper-bound estimate of the likelihood that an individual will develop cancer as a result of exposure to a cancer-causing chemical. It is the product of the intake level and the slope factor.

Example: benzene is also a cancer-causing chemical with an oral slope factor of up to 0.055 $(mg/kg\text{-}d)^{-1}$.

Assuming 5 parts per billion (0.005 mg/L) in water and calculating intake as above, but averaging over a lifetime of 70 years, the increased lifetime cancer risk for benzene ingestion would be:

0.00014 mg/kg-d x 0.055 $(mg/kg\text{-}d)^{-1}$ x 10-yr exposure/70-yr lifetime = 0.0000011 (also can be stated as 1.1×10^{-6} or 1.1 in 1 million).

This increased risk level would be considered to be small. It is at the lower end of the risk range of 0.000001 (10^{-6}, or 1 in 1 million) to 0.0001 (10^{-4}, or 1 in 10,000) which generally does not require mitigating actions.

control exposure to and eliminate areas of soil contamination. Therefore, the most important potential exposure pathway for workers and the general public would be through inhalation of contaminants released to air from ongoing SRS operations.

The SRS has approximately 200 regulated sources of air emissions. In 1991, the SCDHEC established Air Pollution Control Regulation 61-62.5, Standard No. 8, to regulate hazardous or toxic air pollutant emissions. To demonstrate compliance with this standard, the SRS completed an air emissions inventory and air dispersion modeling for all site sources in 1993, as summarized in Arnett and Mamatey (2001b). An update to the modeling was submitted in 1998 (Dukes 1998). The modeling effort provides estimates of maximum ambient concentrations at or beyond the SRS boundary due to SRS emission sources for about 200 toxic air pollutants (TAPs). The estimated maximum concentrations of the TAPs did not exceed values given in the 2001 version of the SCDHEC standard No. 8 (SCDHEC 2001).

Because regulatory standards are not developed exclusively on the basis of public health considerations, and because the basis for the SCDHEC standard concentrations is not described in available documentation (SCDHEC 2001), the potential for adverse human health impacts was assessed through comparison with health risk-based guideline levels. Specifically, the reported maximum ambient 24-hour average concentrations were modified by a factor of 0.2 to estimate annual average concentrations (based on EPA guidance [EPA 1992]). These estimated annual average concentrations were compared with health risk-based air concentrations developed by the EPA's Office of Air Quality Planning and Standards (OAQPS) (Smith et al. 1999) and with EPA-established reference concentrations for non-cancer effects (EPA 2003b). Although only two TAPs (TCDDs and tetrachloroethylene) exceeded the EPA guideline levels, 10 TAPs had estimated annual average concentrations between the EPA guideline cancer risk level values of 10^{-6} to 10^{-4} (see Table 3.11).

3.10.5 Baseline Physical Hazard Risks

Although worker physical hazard risks (i.e., risks of fatality or injury from on-the-job accidents) can be minimized when workers adhere to safety standards and use protective equipment as necessary, certain rates of accidents have been associated with all types of work. Risks can be calculated on the basis of historical industrywide statistics, as described below.

The expected annual numbers of worker fatalities and injuries for specific industry types are calculated on the basis of rate data from the Bureau of Labor Statistics, as reported by the National Safety Council (NSC 2001), and on the number of annual full-time equivalent (FTE) workers required for manufacturing activities. Employment at the SRS in 2000 was 13,227 people (DCS 2001b). It is assumed that, in general, the types of activities required for these employees would be similar to those for the manufacturing industrial sector, so those fatality and injury rates are used to estimate annual risks. A rate of 3.3 fatalities per 100,000 FTEs and 4.6 injuries per 100 FTEs is used. On the basis of these rates, the estimated annual number of fatalities for SRS workers is less than 1 (specifically, 0.44) per year. The estimated number of injuries is 610 per year (includes only injuries resulting in lost workdays, not including the day of injury). These physical hazard risks represent the baseline risks for existing SRS operations for comparison with impacts under the no-action and proposed action alternatives. However, actual injury and fatality risks over the past 10 years or more have been lower than those predicted on the basis of national statistics.

Table 3.11. Modeled site boundary ambient concentrations of select SRS toxic air pollutant (TAP) emissions in comparison with SCDHEC standards and EPA health risk-based guideline levels

Toxic air pollutant (TAP)	Number of SRS sources	SRS maximum modeled 24-hour average concentration (μg/m³)[a]	SRS Estimated Annual Average Concentration (μg/m³)[b]	SCDHEC standard (μg/m³)	EPA guideline level (μg/m³)[c]
TAPs with ambient level exceeding EPA guideline level					
TCDDs	1	0.00002	4×10^{-6}	0	3×10^{-8} to 3×10^{-6}
Tetrachloroethylene	36	99	20	3,350	0.17-17
TAPs with estimated annual ambient level between EPA Guideline 10^{-6} and 10^{-4} cancer risk level					
Arsenic	7	0.05	0.01	1.0	0.00023-0.023
Benzene	118	4.6	0.9	150	0.13-13 (30)
Beryllium	7	0.009	0.0020	0.01	0.00042-0.042 (0.02)
Bis(chloromethyl)ether	1	0.002	0.0004	0.03	2×10^{-5} to 2×10^{-3}
Carbon tetrachloride	16	4.2	0.84	150	0.067-6.7
Dimethyl benzidine	1	0.002	0.0004	NA	0.00038-0.038
Heptachlor	1	0.01	0.002	2.5	0.00077-0.077
Hydrazine	5	0.06	0.012	0.5	0.0002-0.02
Quinoline	1	0.004	0.0008	NA	0.00029-0.029
Trichloroethylene	38	23	5	6,750	0.5-50

[a]SCDHEC Standard No. 8 requires that the standards be compared with modeled maximum 24-hour average concentrations at or beyond the site boundary.

[b]EPA guideline values should be compared with annual average concentrations; these values were estimated as the maximum 24-hour ambient concentrations multiplied by 0.2.

[c]Where a range is given, the range corresponds to a 10^{-6} to 10^{-4} risk level (that is, the concentration that if inhaled for a lifetime would result in an increased individual risk of developing cancer of between 1 in 1 million and 1 in 10,000). Values in parentheses are verified reference concentrations established by the EPA (2003b), also recognized as important guidelines under SCDHEC Standard No. 8.

Sources: Dukes (1998); SCDHEC (2001); Smith et al. (1999, Table 2).

3.11 Socioeconomics

This section discusses existing socioeconomic conditions in the vicinity of the SRS as they relate to the proposed facilities. The socioeconomic data presented for the SRS describe a regional economic area (REA) comprising 15 counties around the site (see Appendix D) and a region-of-influence (ROI) surrounding the site comprising 4 counties — Columbia and Richmond Counties in Georgia and Aiken and Barnwell Counties in South Carolina. The REA is used to assess the potential regional economic impacts of site activities, specifically impacts on employment and unemployment and on personal income. The REA constitutes a broad market area defined by economic linkages between the various sectors in the regional economy.

The ROI was defined on the basis of the current residential locations of full-time SRS workers directly involved in the SRS activities and encompasses the area in which most of these workers spend their wages and salaries. The ROI is used to assess the impacts of site activities on population, housing, community services, and community fiscal conditions. More than 90% of SRS workers currently reside in these counties (DCS 2001b). In the following sections, data are presented for each of the counties in the ROI.

3.11.1 Population

The population of the ROI was at 475,095 in 2000 (U.S. Bureau of the Census 2002a) and was expected to reach 489,000 by 2001, as shown in Table 3.12. In 2000, 30% of the ROI total (142,552 people) resided in Aiken County (U.S. Bureau of the Census 2001), with 25,337 in the city of Aiken. Over the period 1990-2000, population in the ROI as a whole, in Aiken County, and in the city of Aiken grew slightly, with average growth rates of 1.4%, 1.7%, and 2.5%, respectively. Over the same period, population in South Carolina as a whole grew at a rate of 1.4%.

In 2000, 41% of the ROI population (195,182 persons) resided in the city of Augusta/ Richmond County, Georgia, with 19% (89,288) located in Columbia County, Georgia, and 5% (23,478) in Barnwell County, South Carolina (U.S. Bureau of the Census 2000). Growth in Augusta/Richmond County over the period 1990-2000 was slight at 0.3%, relatively high in Columbia County over the same period at 3.1%, and moderate in Barnwell County at 1.5%. Other incorporated places in the immediate vicinity of the SRS are Barnwell (population 5,035 in 2000), Blackville (2,973), Elko (212), Hilda (436), Jackson (1,625), New Ellenton (2,250), North Augusta (17,574), and Willston (3,307) (U.S. Bureau of the Census 2002a).

3.11.2 Employment and Unemployment

Employment in the REA totaled 207,660 people in 2000 and was expected to reach 214,000 in 2002. Employment grew at an annual average rate of 1.6% between 1990 and 2000 (U.S. Bureau of the Census 1992, 2002b). The economy of the REA is dominated by the trade

Table 3.12. ROI population statistics for selected years

Entity	1990[a]	2000[a]	Average annual growth rate (%), 1990-2000	2002 (projected)
Georgia				
Columbia County	66,031	89,288	3.1	95,000
Richmond County/City of Augusta	189,719	195,182	0.3	196,000
South Carolina				
Aiken County	120,991	142,552	1.7	147,000
City of Aiken	19,872	25,337	2.5	27,000
Barnwell County	20,293	23,478	1.5	24,000
ROI Total	415,394	475,095	1.4	489,000
Georgia	6,478,216	8,186,453	2.4	8,580,000
South Carolina	3,486,703	4,012,012	1.4	4,130,000

[a]*Source*: U.S. Bureau of the Census (2002a).

and service industries, with these activities currently contributing almost 63% of all employment in the REA (see Table 3.13). The manufacturing sector is also a significant employer in the REA, with 27% of total REA employment. Employment at the SRS in 2000 was 13,227 people (DCS 2001b).

Unemployment in the REA steadily declined during the late 1990s from a peak rate of 8.0% in 1993 to the 2002 rate of 5.7% (see Table 3.14) (U.S. Bureau of Labor Statistics 2002). Unemployment in Georgia was 4.7% in August 2002; in South Carolina the rate was 5.7% in that month.

3.11.3 Income

Personal income in the REA was $14.8 billion in 2000 and was expected to reach $15.6 billion in 2002. Personal income grew at an annual average rate of 1.8% over the period 1990-1999 (see Table 3.15). Personal income per capita in the REA also rose in the 1990s and was expected to reach $24,700 in 2002, compared with $23,146 at the beginning of the period.

3.11.4 Housing

Total housing in Columbia County grew at an annual rate of 3.5% over the period 1990-2000 (see Table 3.16), with total housing units expected to reach 35,400 in 2002, reflecting the relatively high growth in county population. About 9,580 new units were added to the existing housing stock in the county between 1990 and 2000. On the basis of annual population growth rates, there were expected to be 2,340 vacant housing units in the county in 2002, with 420 expected to be rental units available to construction workers at the proposed facilities.

Table 3.13. REA employment by industry, 2000

Sector	Employment	Percent of REA total
Agriculture[a]	6,250	3.0
Mining	877	0.4
Construction	11,399	5.5
Manufacturing	55,853	27.0
Transportation and Public Utilities	5,028	2.4
Trade	34,389	17.0
Finance, Insurance and Real Estate	7,783	3.7
Services	86,673	42.0
Other	193	0.1
Total	207,660	

[a]1997 data; U.S. Department of Agriculture (1999).

Source: U.S. Bureau of the Census (2002b), except as noted.

Total housing in the City of Augusta/Richmond County grew at an annual rate of 0.6% over the period 1990-2000 (see Table 3.16), with total housing units expected to reach 82,800 in 2002, reflecting the relatively slow growth in county population. Only 5,000 new units were added to the existing housing stock in the county between 1990 and 2000. On the basis of annual population growth rates, there were projected to be 8,440 vacant housing units in the county in 2002, with 3,550 of those expected to be rental units available to construction workers at the proposed facilities.

Table 3.14. REA unemployment rates

Period	Rate (%)
REA	
1990-2000 average	6.7
2002[a]	5.7
Georgia	
1990-2000 average	5.0
2002[b]	4.7
South Carolina	
1990-2000 average	5.4
2002[b]	5.7

[a]Rate is for July 2002.

[b]Rate is for August 2002.

Source: U.S. Bureau of Labor Statistics (2002).

Total housing in Aiken County grew at an annual rate of 2.3% over the period 1990-2000 (see Table 3.16), with total housing units expected to reach 64,100 in 2002. Growth in the city of Aiken was 2.9% over this period, with 11,900 total housing units expected in 2002. Almost 12,700 new units were added to the existing housing stock in the county between 1990 and 2000, 2,830 of which were built in the city of Aiken. On the basis of annual population growth rates, there were expected to be 6,610 vacant housing units in the county in 2002, with 1,610 expected to be rental units available to construction workers at the proposed facilities.

Table 3.15. REA personal income (2003 dollars)

Parameter	1990[a]	2000[a]	Average annual growth rate (%), 1990-2000	2002 (projected)
Total personal income ($ millions)	12,426	14,814	1.8	15,600
Personal income per capita ($)	23,146	24,681	0.6	25,300

[a]*Source*: U.S. Department of Commerce (2002).

Total housing in Barnwell County grew at an annual rate of 2.6% over the period 1990-2000 (see Table 3.16), with total housing units expected to reach 10,500 in 2002, reflecting the moderate growth in county population. About 2,300 new units were added to the existing housing stock in the county between 1990 and 2000. On the basis of annual population growth rates, there were projected to be 1,210 vacant housing units in the county in 2002, with 300 of those expected to be rental units available to construction workers at the proposed facilities.

Total housing in the ROI as a whole grew at an annual rate of 1.8% over the period 1990-2000 (see Table 3.16), with total housing units expected to reach 202,000 in 2002. About 31,600 new units were added to the existing housing stock in the ROI between 1990 and 2000. On the basis of annual population growth rates, there were projected to be 19,600 vacant housing units in the ROI in 2002, with 5,910 of those expected to be rental units available to construction workers at the proposed facilities.

3.11.5 Community Resources

Construction and operation of the proposed MOX facility, PDCF, and WSB would result in increased revenues and expenditures for local government jurisdictions, including counties, cities, and school districts. Revenues would come primarily from state and local sales taxes associated with employee spending during construction and operation and local property taxes.

Additional revenues would be used to support additional local community services currently provided by each jurisdiction.

Construction and operation of the proposed facilities would result in increased demand for community services in the counties, cities, and school districts likely to host relocating construction workers and operations employees. Additional demands would also be placed on local medical facilities and physician services.

Tables D.1 and D.2 in Appendix D present information on revenues and expenditures by the various local government jurisdictions in the ROI. Tables 3.17 and 3.18 present data on employment and levels of service (number of employees per 1,000 population) for public safety, general local government services, and physicians. Tables 3.19 and 3.20 provide staffing data for school districts and hospitals.

Table 3.16. City, county, and ROI housing characteristics[a]

Parameter	1990[b]	2000[c]	2002 (projected)
Georgia			
Columbia County			
Owner occupied	17,322	25,557	27,100
Rental	4,519	5,563	5,900
Total unoccupied units	1,904	2,201	2,340
Total units	23,745	33,321	35,400
Richmond County/City of Augusta			
Owner occupied	38,762	42,840	43,100
Rental	29,913	31,080	31,300
Total unoccupied units	8,613	8,392	8,440
Total units	77,288	82,312	82,800
South Carolina			
Aiken County			
Owner occupied	33,491	42,036	43,400
Rental	11,392	13,551	14,000
Total unoccupied units	4,383	6,400	6,610
Total units	49,266	61,987	64,100
City of Aiken			
Owner occupied	5,130	6,804	7,140
Rental	2,619	3,483	3,660
Total unoccupied units	794	1,086	1,140
Total units	8,543	11,373	11,900
Barnwell County			
Owner occupied	5,194	6,810	7,010
Rental	1,906	2,211	2,280
Total unoccupied units	754	1,170	1,210
Total units	7,854	10,191	10,500
ROI Total			
Owner occupied	99,673	123,902	128,000
Rental	49,250	54,016	55,200
Total unoccupied units	16,520	19,116	19,600
Total units	165,443	197,034	202,000

[a]Column entries may not add up due to independent rounding.

[b]*Source*: U.S. Bureau of the Census (1994).

[c]*Source*: U.S. Bureau of the Census (2002a).

Table 3.17. Local public service employment (2001)

Part A: Georgia

	Columbia County		Grovetown		Harlem	
	Number	Level of service[a]	Number	Level of service[a]	Number	Level of service[a]
Police protection	147	1.8	17	2.8	7	3.9
Fire protection[b]	3	0	4	0.7	1	0.6
General	435	5.3	33	5.4	14	7.7
Total	585	7.2	54	8.9	22	12.1

	Augusta-Richmond County		Blythe		Hephzibah	
	Number	Level of service[a]	Number	Level of service[a]	Number	Level of service[a]
Police protection	357	1.8	1	1.4	4	1.0
Fire protection[b]	283	1.4	0	0	7	1.8
General	1,673	8.6	1	1.4	4	1.0
Total	2,313	11.9	2	2.8	15	3.9

	State of Georgia level of service[a,c]
Police protection	2.4
Fire protection[b]	1.1
General	52.0
Total	55.4

Part B: South Carolina

	Aiken County		Aiken		Jackson	
	Number	Level of service[a]	Number	Level of service[a]	Number	Level of service[a]
Police protection	131	1.4	54	2.1	4	2.5
Fire protection[b]	78	0.8	-[d]	-[d]	-[d]	-[d]
General	60	0.6	239	9.4	7	4.3
Total	269	2.8	347	13.7	11	6.8

	New Ellenton		North Augusta		Wagener	
	Number	Level of service[a]	Number	Level of service[a]	Number	Level of service[a]
Police protection	4	1.8	48	2.7	3	3.5
Fire protection[b]	-[d]	-[d]	6	0.3	-[d]	-[d]
General	5	2.2	125	7.1	5	5.8
Total	9	4.0	179	10.2	8	9.3

Table 3.17. Continued

	Barnwell County		Barnwell		Blackville	
	Number	Level of service[a]	Number	Level of service[a]	Number	Level of service[a]
Police protection	26	2.1	13	2.6	8	2.7
Fire protection[b]	-[d]	-[d]	3	0.6	1	0.3
General	150	12.3	22	4.4	11	3.7
Total	176	14.5	38	7.6	20	6.7

	Williston		State of South Carolina level of service[a,c]
	Number	Level of service[a]	
Police protection	9	2.7	2.5
Fire protection[b]	1	0.3	0.8
General	12	3.6	54.9
Total	22	6.7	58.2

[a]Level of service represents the number of employees per 1,000 persons in each jurisdiction.

[b]Does not include volunteers.

[c]2000 data.

[d]Police and fire services are provided by a combined department.

Sources: Aiken County: Powell (2001); Barnwell County: Aguilar (2001); Columbia County: J. Johnson (2001); Edgefield County: Harling (2001); Richmond County: Colliander (2001); City of Aiken: Rideout (2001); City of Jackson: S. Johnson (2001); Town of New Ellenton: Bledsoe (2001); City of North Augusta (2000); Town of Wagener: Salley (2001); City of Barnwell: Vargo (2001); Town of Blackville: McDonald (2001); Town of Williston: Fowler (2001); Town of Grovetown: Kent (2001) and Capatillo (2001); Town of Harlem: Moore (2001); City of Augusta (1999); Town of Blythe (2000); Town of Hephzibah (2000); U.S. Bureau of the Census (2000).

3.11.6 Traffic

Vehicular access to the SRS is provided from South Carolina SCs 19, 64, 125, 781, and U.S. Highway 278, as shown in Figures 3.1 and 3.8. Highway 19 runs north from the site through New Ellenton towards Aiken; SC 64 runs in an easterly direction from the site towards Barnwell; SC 125 runs through the site itself in a southeasterly direction between North Augusta and Allendale, passing through Beech Island and Jackson. U.S. 278 also runs through the site, in a southeasterly direction between North Augusta and Barnwell. SC 781 connects U.S. 278 with Willston to the northeast of the site. The northern perimeter of the site is about 16 km (10 mi) from downtown Aiken. Table 3.21 shows average annual daily traffic (AADT) flows over these road segments, together with congestion level designations (levels of service). Levels of service designations were developed by the Transportation Research Board (1985) and range from A to F. Designations A through C represent good traffic operating conditions with some minor delays experienced by motorists; F represents jammed roadway conditions.

Table 3.18. Local physicians data (1997)

County	Number of physicians	Level of service[a]
Georgia		
Columbia County	324	4.0
Richmond County	1,189	6.1
South Carolina		
Aiken County	190	1.4
Barnwell County	14	0.6

[a]Level of service represents the number of physicians per 1,000 persons in each county.

Source: American Medical Association (1999).

Table 3.19. Local school district data (2001)

School district	Number of teachers	Student-to-teacher ratio[a]
South Carolina		
Aiken County	1,486	17.0
Barnwell County		
School District 19	80	14.4
School District 29	70	14.9
School District 45	183	15.3
State total	44,967	15.2
Georgia		
Columbia County	1,064	17.0
Richmond County	2,200	16.0
State total	89,561	16.0

[a]The number of students per teacher in each school district.

Sources: Ferriter (2001); Georgia Department of Education (2000).

Table 3.20. Local medical facility data (2001)

Hospital	Number of staffed beds	Occupancy rate (%)[a]
Aiken Regional Medical Centers	245	56
Barnwell County Hospital	33	37
Georgia Regional Hospital at Augusta	196	79
Medical College of Georgia Hospital	446	56
Select Specialty Hospital	17	NA[b]
St. Joseph Hospital	151	48
University Hospital	553	50
Walton Rehabilitation Institute	58	78
ROI Total	1,699	-

[a]Percent of staffed beds occupied.

[b]NA = not available.

Source: SMG Marketing Group Inc. (Copyright 2001, used with permission).

Table 3.21. Average annual daily traffic (AADT) in the vicinity of the SRS (2000)

Road segment[a]	Traffic volume (AADT)	Level of service[b]
SC 125 in the vicinity of Jackson	13,400	B
U.S. 278 between SC 302 and Barnwell county line	5,400	A
SC 19 in the vicinity of New Ellenton	13,900	B
SC 781 between U.S. 278 and U.S. 78	2,700	A
U.S. 278 to SC 37	2,500	A
SC 64 between SC 20 and Barnwell	6,900	A
SC 125 between SC 17 and Martin	2,100	A

[a]SC = state route (highway); U.S. = U.S. highway.

[b]Level of service designations as developed by the Transportation Research Board (1985). Levels range from A to F, with A representing the best traffic operating conditions and F representing jammed roadway conditions.

Source: McCoy (2001), except as noted.

3.12 Aesthetics

Natural and man-made features give a landscape character and aesthetic quality. The character of a landscape is determined by the elements of form, line, color, and texture; each may influence the character of a landscape to a varying degree. The stronger the influence of any one or all of these elements, and the more visual variety that can successfully coexist in the landscape, the more aesthetic quality present in the landscape

3.12.1 General Description of the Site

The viewshed within the vicinity of the SRS consists principally of agricultural and forested land, with some residential and industrial development. The landscape is characterized mainly by wetland or forest on low mountains and hills with intermittent open land. Vegetation consists of hardwood forests in the low-lying areas and wetland forests, with oak and pine forests on higher ground.

3.12.2 Description of the Location of the Proposed Facilities

Various concrete industrial buildings and other structures, administrative and support buildings, and parking areas are located within the F-Area at the SRS. The largest structures are approximately 30 m (100 ft) high, with some stacks and towers reaching 60 m (200 ft) high. All of the industrial and administrative areas are brightly lit at night and are visible when approached on SRS access roads. The industrial and other developed areas in the vicinity of F-Area, including utility corridors, are generally consistent with a Bureau of Land Management visual resource management (VRM) Class IV designation (activities that lead to major modification of the existing character of the landscape). The remainder of the site fits a VRM Class III (hosting activities which at most only moderately change the existing character of the landscape) or IV designation (DOI 1986a,b).

The closest publicly accessible viewing location is from State Highway 125, about 6 km (4 mi) to the southwest. Public view of F-Area is restricted by the heavily wooded terrain between Route 125 and the site.

3.13 References for Chapter 3

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4 ENVIRONMENTAL CONSEQUENCES

4.1 Introduction

This final environmental impact statement (FEIS) evaluates the potential impacts of the construction, operation, and decommissioning of the Mixed Oxide Fuel Fabrication Facility (the proposed MOX facility) proposed for construction at the Savannah River Site (SRS). Operation of the proposed MOX facility would also require the construction of two support facilities, the Pit Disassembly and Conversion Facility (PDCF) and the Waste Solidification Building (WSB).

Construction of the facilities would involve site preparation, including the clearing and grading of land, realignment of electrical utilities, and addition of access roads. After site preparation, the remaining construction activities would involve excavation for the foundation and erection of the buildings, connection of SRS utilities to the facilities, and final landscaping. Details of the construction and operational impacts are provided in Sections 4.3 and Appendix H. Operational impacts would include routine facility emissions, waste management, and potential accidents. The impacts of the transportation of the MOX feed materials, the fresh MOX fuel, and spent MOX fuel are discussed collectively with the transport of transuranic (TRU) waste generated by MOX fuel production in Section 4.4.1.[1]

Once the fresh MOX fuel was manufactured and transported, it would be irradiated in authorized nuclear reactors as part of the power generation process. Following irradiation, the spent fuel would be temporarily stored at the reactor sites until shipped to a final disposal repository. The potential indirect impacts for the use of MOX fuel in a nuclear reactor are discussed in Section 4.4.3.

An initial evaluation of projected decommissioning impacts is provided in Section 4.3.6. However, the exact nature and scope of these impacts are uncertain because only present-day technologies are considered, and decommissioning of the facilities would occur well into the future.

In addition to considering the proposed action, this FEIS, in Section 4.2, considers the no-action alternative should the U.S. Nuclear Regulatory Commission (NRC) either not authorize construction of the proposed MOX facility, or not license its operation. Under the no-action alternative, the surplus plutonium would continue to be stored at its current storage locations.

As stated in Section 1.4.2, this chapter presents significant or more important environmental impacts of the proposed action and no-action alternative. Impacts considered to be less significant are presented in Appendixes G and H. The technical areas discussed in this chapter include human health, air quality, surface water and groundwater, waste management, and decommissioning. Impacts from potential accidents at the proposed MOX facility, the PDCF,

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[1] Definitions of descriptive terms used to categorize the magnitudes of impacts are provided in Section 2.4.

and the WSB are discussed in Section 4.3.5. Environmental justice is discussed in detail in Section 4.3.7. In addition, transportation impacts are discussed in detail for the proposed action in Section 4.4.1.

Human health impacts include potential exposure to radiological and chemical materials via pathways associated with air, water, soil, and the food chain. Air quality impacts relate to compliance with National Ambient Air Quality Standards (NAAQS) from emissions of chemical pollutants. Surface and groundwater impacts relate to capacity effects from using these waters and to potential changes in quality of these waters. Waste management impacts relate to the types and quantities of both radiological, hazardous, and nonhazardous wastes generated and how those wastes would be handled. Generally technical terms used in this chapter are defined and discussed in Chapter 3. In those cases, the reader is referred back to specific areas of Chapter 3.

4.2 Impacts of the No-Action Alternative

4.2.1 Introduction

As described in Section 2.1, the no-action alternative would be a decision by the NRC not to approve the proposed MOX facility. If such a decision is made, the 34 MT (37.5 tons) of weapons-useable fissile nuclear materials would remain in storage at DOE sites. The impacts of the continued storage of surplus plutonium would be essentially the same as those discussed under the no-action alternative of the *Surplus Plutonium Disposition Final Environmental Impact Statement* (SPD EIS) (DOE 1999a, Section 4.2) and are summarized in the following sections. Some of the impacts for the no-action alternative presented in this EIS represent impacts for the entire DOE site at which the surplus plutonium is currently being stored.

It is possible that limited new construction would be required at one or more sites to upgrade surplus plutonium storage conditions. For example, previous analyses assumed that surplus pits[2] at the Pantex site in Texas would be moved from Zone 4 to Zone 12, but DOE decided to leave the surplus pits in Zone 4 for long-term storage (DOE 2002a). If new construction is required to accommodate continued storage, the impacts of that construction would be addressed under a separate environmental review required by the DOE regulations for implementation of the National Environmental Policy Act (NEPA) (*Code of Federal Regulations* Title 10, Part 1021 [10 CFR 1021]).

The SPD EIS discusses plans to build an Actinide Packaging and Storage Facility (APSF) at the SRS and to move SRS surplus plutonium to that facility for continued storage (DOE 1999a). After publication of the SPD EIS, the APSF project was canceled. Surplus plutonium at the SRS continues to be stored in existing facilities. It should also be noted that the potential impacts of construction and operation of the proposed MOX facility (as summarized in

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[2] A pit is the core element of a nuclear weapon's "primary" or fission component.

Section 4.3) would be avoided by implementation of the continued storage alternative. The impacts of continued storage are presented in the following sections.

The DOE is currently working to close the Rocky Flats Environmental Technology Site (RFETS) by the year 2006. Such a closure entails the shipment of all radioactive waste and special nuclear materials, including the surplus plutonium, to off-site locations. Storage of the RFETS surplus plutonium at other DOE sites currently storing surplus plutonium is expected to result in a long-term reduction of radiological exposure to workers and the public. For example, approximately 6 MT (6.6 tons) of plutonium dioxide is expected to be shipped from the RFETS to the SRS (Roberson 2002). Storage of the additional plutonium material during normal operations was estimated to result in small, if any, impacts to noninvolved workers and the public (DOE 2002c). The eventual removal and return of the shipping containers was estimated to result in a dose of no greater than 1 mrem/yr to a maximally exposed individual (MEI) of the public (DOE 2002c). Thus the cumulative risks from the no-action alternative presented in Table 4.1, which includes the RFETS, are expected to bound the risks that the surplus plutonium will contribute to other DOE storage sites following shipment from the RFETS.

4.2.2 Human Health Risk

4.2.2.1 Radiological Risk

The radiological doses and risks for members of the public are shown in Table 4.1 for all ongoing activities at each of the storage sites; radiological doses and risks from maintaining the surplus plutonium are portions of the totals. The doses are less than 2% of doses associated with natural background (see Section 3.10.3 and Table 3.7 for information on background radiation).

The average annual dose to facility workers maintaining the surplus plutonium inventories at the storage sites is also shown in Table 4.1. The maximum individual worker dose for the sites (3.2 mSv/yr [320 mrem/yr] at Pantex) is 16% of the administrative limit set by DOE (DOE 1999b) and 6% of the radiological limit of 50 mSv/yr (5,000 mrem/yr) as specified in 10 CFR 835, "Occupational Radiation Protection."

4.2.2.2 Chemical Exposure and Risk

Health risks from exposure to hazardous chemicals used in ongoing operations at the storage sites within the DOE complex were estimated in the *Storage and Disposition of Weapons-Usable Fissile Materials Final Programmatic Environmental Impact Statement* (DOE 1996a, Appendix M) (these risks are also summarized in the SPD EIS [DOE 1999a]). The estimated baseline cancer risks for the storage sites include inhalation exposures to all carcinogens measured from site point emission sources. Surplus plutonium storage would account for only a small portion of the total exposures from ongoing operations at the various DOE sites. For members of the public, the estimated increased lifetime cancer risks from continued operations

Table 4.1. Radiological impacts from continued plutonium storage in current locations[a,b]

Site	Annual population dose within 80 km in 2030 [person-Sv (person-rem)]	Expected number of fatal cancers in population from 50 years of storage[c]	Annual dose to the public MEI [mSv (mrem)]	Public MEI 50-year fatal cancer risk[c]	Average worker dose [mSv/yr (mrem/yr)]
Hanford	4.7×10^{-4} (4.7×10^{-2})	1×10^{-3}	4.1×10^{-6} (4.1×10^{-4})	1×10^{-8}	2.5 (250)
INEEL	7.6×10^{-7} (7.6×10^{-5})	2×10^{-6}	1.4×10^{-7} (1.4×10^{-5})	4×10^{-10}	0.26 (26)
Pantex	6.3×10^{-8} (6.3×10^{-6})	2×10^{-7}	1.8×10^{-10} (1.8×10^{-8})	5×10^{-13}	3.2 (320)[d]
SRS	2.9×10^{-6} (2.9×10^{-4})	9×10^{-6}	6.8×10^{-8} (6.8×10^{-6})	2×10^{-10}	2.5 (250)
LLNL	6.7×10^{-5} (6.7×10^{-3})	2×10^{-4}	3.1×10^{-6} (3.1×10^{-4})	9×10^{-9}	2.5 (250)
LANL	0.027 (2.7)	8×10^{-2}	6.5×10^{-2} (6.5)	2×10^{-4}	2.5 (250)
RFETS[e]	1.0×10^{-3} (0.10)	3×10^{-3}	4.8×10^{-3} (0.48)	1×10^{-5}	2.5 (250)

[a]The population doses and cancer risks are from all ongoing activities at each site. The worker doses are for workers involved in surplus plutonium continued storage activities.

[b]MEI = maximally exposed individual, INEEL = Idaho National Engineering and Environmental Laboratory, SRS = Savannah River Site, LLNL = Lawrence Livermore National Laboratory, LANL = Los Alamos National Laboratory, RFETS = Rocky Flats Environmental Technology Site.

[c]Latent cancer fatalities are calculated by multiplying dose by the Federal Guidance Report (FGR) 13 health risk conversion factor of 0.06 fatal cancer per person-Sv (6×10^{-4} fatal cancer per person-rem) (Eckerman et al. 1999).

[d]This is the dose for workers involved in gasket replacement activities projected to occur over a period of 10 years; the dose for other storage workers at Pantex would be 1.16 mSv/yr (116 mrem/yr).

[e]Closure of the RFETS is planned for 2006. As discussed in Section 4.2.2.1, the risks presented here are expected to bound the impacts on storage of the RFETS surplus plutonium at other DOE storage sites.

Source: DOE (1999a, Section 4.2.4, based on data in DOE 1996a).

at all the storage sites were estimated to be lower than or within the risk range of 1×10^{-6} to 1×10^{-4} (the target used by the U.S. Environmental Protection Agency (EPA) to determine whether mitigation actions are needed [EPA 1990; see Section 3.10.4]). Except for Lawrence Livermore National Laboratory (LLNL), the hazard index (HI) for members of the public was also less than 1 in every case (an HI of less than 1 indicates no or small noncancer health risk; see Section 3.10.4). The general public HI for LLNL was estimated as 1.1, narrowly exceeding the noncancer health risk screening criterion. For the site employee populations, the noncancer HI values for all sites except the SRS and LLNL were less than 1; the value for the SRS was 1.2, and the value for LLNL was 2.4. Estimated cancer risks from ongoing operations for employees at several sites (i.e., Idaho National Engineering and Environmental Laboratory [INEEL], SRS, LANL, RFETS) also exceeded EPA's tolerable risk range, although none was greater than 10^{-3}.

The emissions data used as the basis for the HI values and cancer risks from all ongoing operations at the storage sites are several years old. The methods used to estimate the HI values and cancer risks are generally conservative (assuming such things as the public receptor present at the site boundary for 24 hours per day), resulting in overestimates of actual exposure. Furthermore, only a small portion of the total exposures from site emissions would be from plutonium storage activities. Therefore, although it is possible on the basis of the cited data that members of the public (for LLNL) or on-site employees (for several sites) might experience adverse health impacts as a result of exposures from ongoing plutonium storage operations, it is more likely that actual exposures would be less than those that would result in adverse health impacts.

4.2.2.3 Physical Hazards

The number of full-time employees required to maintain continued storage of the excess plutonium at the various sites was not given in the SPD EIS (DOE 1999a). Therefore, it is not possible on the basis of available information to estimate the annual number of fatalities and injuries that would be associated with continued plutonium storage under the no-action alternative.

4.2.2.4 Facility Accidents

The potential for accidental release of plutonium from storage vaults is much lower than for release from MOX fuel fabrication, which involves numerous operations. In the SPD EIS (DOE 1999a), the health risks of beyond-design-basis earthquake events on plutonium storage facilities were reported for the off-site population. Of the DOE sites evaluated, a high value of 0.4 latent cancer fatality (LCF) was reported for the 80-km (50-mi) off-site population at INEEL (see Section 3.10.3 for LCF definition). For a MEI of the public, an explosive airplane crash at Pantex was estimated to result in an LCF probability of 0.04.

There is no known use of hazardous chemicals required for the continued storage of the surplus plutonium at the various storage sites. Therefore, accidental release of hazardous chemicals during continued storage would not be expected.

4.2.3 Air Quality

The SPD EIS (DOE 1999a) summarized ambient concentrations of criteria pollutants (carbon monoxide [CO], nitrogen dioxide [NO_2] , particulate matter with a diameter of 10 μm or less [PM_{10}], and sulfur dioxide [SO_2]) at each storage site from total site contributions, including plutonium storage operations. With one exception, the total site contributions were in compliance with applicable standards. At LLNL, however, the estimated maximum 1-hour ambient concentration of NO_2 was 2.5 times higher than the State of California standard. Because plutonium storage operations do not generate appreciable quantities of NO_2, continued storage of the plutonium would not change the impacts of ongoing operations on air quality at LLNL.

4.2.4 Hydrology

The annual water usage and wastewater discharges for all ongoing activities at each of the storage sites are shown in Table 4.2. Water use and wastewater generation for maintaining the surplus plutonium storage are small portions of the totals. No impacts to surface or groundwater resources from continued storage are anticipated beyond those of existing activities.

4.2.5 Waste Management

For all the storage locations, wastes generated by activities required to maintain continued storage of surplus plutonium would be a portion of the existing waste generation rates and are not anticipated to change appreciably. Continued storage should not have a major impact on waste management activities at any of the sites.

4.3 Impacts of the Proposed Action

This section presents the direct impacts of the proposed action. As discussed in Section 2.2, the proposed action is for NRC to authorize DCS to construct and later operate the proposed MOX facility at the SRS to convert 34 MT (37.5 tons) of surplus plutonium to MOX fuel. Section 4.3.1 presents the estimated impacts to human health. Sections 4.3.2 and 4.3.3 cover potential impacts to air and water, respectively. Waste management impacts (Section 4.3.4), potential accident impacts (Section 4.3.5), and environmental justice impacts (Section 4.3.7)

Table 4.2. Annual water usage and wastewater discharges for the sites of continued plutonium storage

Site	Water requirement (million L/yr)[a]	Wastewater discharge (million L/yr)
Hanford	13,511/195	246
INEEL	0/7,570	540
Pantex	0/249	141
SRS	127,000/13,247	700
LLNL	NA[b]	NA[b]
LANL	0/5,760	693
RFETS	439/0	130

[a]Surface water/groundwater.

[b]NA = not available.

Source: DOE (1996a, Section 4.2).

were also evaluated. The scope of the proposed action includes decommissioning of the proposed facilities (Section 4.3.6).

As discussed in Section 1.4.1, the technology option to substitute sand filters for the proposed high-efficiency particulate air (HEPA) filters was identified during the scoping process. Discussions of the differences in impacts between sand filters and HEPA filters are summarized in Section 4.3.8.

Construction of the proposed MOX facility is assumed to occur over a 5-year period. Construction of the WSB is assumed to occur during the same 5-year period; whereas construction of the PDCF is assumed to begin 2 years after the construction start for the other facilities (DCS 2002c).

If construction of the proposed MOX facility is authorized, DCS plans to submit an application for a 20-year license to possess and use special nuclear material to manufacture MOX fuel. The actual operation period may be 10 to 14 years, with the additional time needed for facility startup, testing, and decommissioning prior to license termination. For purposes of evaluating operational impacts, a 10-year period was assumed for processing the 34 MT (37.5 tons) of surplus plutonium. That period is based on the facility design for a maximum annual throughput of 3.5 MT (3.9 tons) of plutonium. If the actual period of operation is greater than 10 years because the actual throughput is less than the maximum facility design capacity, the annual impacts would be less, but they would occur over a longer time period.

The following sections present potential impacts on human health, air quality, hydrology, waste management, and environmental justice. A discussion of the impacts in other technical areas is presented in Appendix H.

4.3.1 Human Health Risk

4.3.1.1 Radiological Risk

4.3.1.1.1 Construction

The construction workers for the proposed MOX facility, the PDCF, and the WSB, like other workers at the SRS, would be subject to exposure to baseline radiation from other SRS activities. However, no additional radiological impacts to the construction workers, to existing SRS workers, or members of the public off-site are expected from the construction activities because no surface contamination is present.

Although radioactive contamination is present in the groundwater underlying the Old F-Area Seepage Basin and the proposed MOX facility, the primary movement of this contamination is expected to follow the direction of the groundwater flow. This direction is toward the north-northwest, where the groundwater discharges to Upper Three Runs Creek (WSRC 1995), away from the proposed facilities. Another possible source of exposure of the construction workers would be any radioactively contaminated soil in the area disturbed by construction activities. An exploration and sampling program across the project site, however, did not identify any radioactive contaminants (DCS 2000b; Fledderman 2002). As discussed in Section 5.2.8, soil would be further sampled for radioactive contamination before excavation begins at the site. If contamination was found, potential exposures and health impacts to the construction workers would be assessed.

4.3.1.1.2 Operations

Radiological impacts to human health from normal operations would result from releases to the environment and direct exposure of facility workers to sources of radiation (see description in Section 3.10). The impacts were evaluated for three receptor groups (facility workers, SRS employees, and members of the public).

All radiological impacts were assessed in terms of committed dose and associated health effects. The dose calculated was the total effective dose equivalent (TEDE) (10 CFR Part 20), which is the sum of the deep dose equivalent (DDE) from exposure to external radiation and the 50-year committed effective dose equivalent (CEDE) from exposures to internal radiation. Details of the dose calculations are provided in Appendix E. The DDE is the dose equivalent at a tissue depth of 1 cm and applies to external whole-body exposure. The CEDE is the dose equivalent to organs or tissues that is received over a 50-year period following the intake of radioactive material.

For each of the receptor groups, doses were estimated for the group as a whole (population or collective dose) and for an MEI. The MEI was defined as a hypothetical person who — because of proximity, activities, or living habits — could receive the highest possible dose. The MEI for SRS employees and members of the public usually was assumed to be at the location of the highest on-site or off-site air concentrations of contaminants, respectively — even if no individual actually worked or lived there. Under actual conditions, all radiation exposures and releases of radioactive material to the environment are required to be as low as reasonably achievable (ALARA), a practice that has as its objective the attainment of dose levels as far below applicable limits as is practical, taking into account social, technical, economic, and public policy considerations. Annual estimated radiological impacts from normal operations of the proposed MOX facility, the PDCF, and the WSB are provided in Table 4.3.

Facility Workers

MOX facility: Approximately 400 workers are expected to be employed at the MOX facility. Facility workers during normal operations were estimated to receive an annual collective dose of 0.15 person-Sv (15 person-rem). Approximately 0.12 person-Sv (12 person-rem) would be from external exposure and the remaining 0.03 person-Sv (3 person-rem) from internal exposure. The resulting health effects were calculated to be approximately 0.009 LCF/yr. On average, the facility workers' dominant exposure pathway would be external exposure.

Table 4.3. Annual estimated radiological impacts to facility workers, SRS employees, and the public from normal operations at the proposed facilities

Receptor	PDCF		MOX facility		WSB	
	Dose [person-Sv (person-rem)]	Latent cancer fatalities/yr[a]	Dose [person-Sv (person-rem)]	Latent cancer fatalities/yr[a]	Dose [person-Sv (person-rem)]	Latent cancer fatalities/yr[a]
Collective population						
Facility workers	1.97 (197)	0.1	0.15 (15)	0.009	0.50 (50)	0.03
SRS employees (13,295)[b]	0.00031 (0.031)	2×10^{-5}	0.00022 (0.022)	1×10^{-5}	–[c]	–
Public (1,042,000 persons off-site)	0.015(1.5)	0.0009	0.00073 (0.073)	4×10^{-5}	–	–
	PDCF		**MOX facility**		**WSB**	
	Dose [Sv (rem)]	**LCF risk[d]**	**Dose [Sv (rem)]**	**LCF risk[d]**	**Dose [Sv (rem)]**	**LCF risk[d]**
Maximally exposed individual						
Facility worker	0.020 (2.0)	0.001	0.017 (1.7)	0.001	0.020 (2.0)	0.001
SRS employee (225 m to the ENE)	5.6×10^{-7} (5.6×10^{-5})	3×10^{-8}	4.2×10^{-7} (4.2×10^{-5})	3×10^{-8}	–	–
Public (10,680 m to the N)	3.5×10^{-8} (3.5×10^{-6})	2×10^{-9}	5.1×10^{-9} (5.1×10^{-7})	3×10^{-10}	–	–

[a]Latent cancer fatalities are calculated by multiplying dose by the Federal Guidance Report (FGR) 13 health risk conversion factor of 0.06 fatal cancer per person-Sv (6×10^{-4} fatal cancer per person-rem) (Eckerman et al. 1999).

[b]*Source:* Birch (2001).

[c]Impacts from the WSB are included in the proposed MOX facility results.

[d]For annual individual exposure estimates, number represents the lifetime risk of fatality from a radiologically induced cancer.

However, the MEI dose of approximately 0.017 Sv/yr (1.7 rem/yr) with a fatal cancer risk of 1 chance in 1,000 (0.001) was estimated from inhalation exposure. The facility worker estimates were based on operational experience from a similar facility, as discussed in Appendix E.

PDCF: Average annual worker exposures are expected to remain below 0.005 Sv/yr (0.5 rem/yr), the SRS guideline. For 393 workers, an annual collective dose should not exceed 1.97 person-Sv (197 person-rem) with the potential for 0.1 LCFs/yr of operation. The maximum annual exposure to a single facility worker is expected to be maintained less than the DOE administrative limit of 0.02 Sv/yr (2 rem/yr) (DOE 1994). Such an exposure has an expected lifetime risk of developing a fatal cancer of approximately 0.001 (1 chance in 1,000).

WSB: Average annual worker exposures are expected to remain below 0.005 Sv/yr (0.5 rem/yr), the SRS guideline. For 100 workers, an annual collective dose should not exceed 0.50 person-Sv (50 person-rem) with the potential for 0.03 LCFs/yr of operation. The maximum annual exposure to a single facility worker is expected to be maintained at less than the DOE administrative limit of 0.02 Sv/yr (2 rem/yr). Such an exposure has an expected lifetime risk of developing a fatal cancer of approximately 0.001 (1 chance in 1,000).

SRS Employees

MOX facility and WSB: Normal operations were estimated to result in an annual collective SRS employee dose of 0.00022 person-Sv/yr (0.022 person-rem/yr), which corresponds to approximately 1×10^{-5} LCF/yr. The MEI dose was found to occur at a location 225 m (738 ft) east-northeast of the proposed MOX facility stack location. The MEI was estimated to receive a dose of 4.2×10^{-7} Sv/yr (4.2×10^{-5} rem/yr), which results in an annual fatal cancer risk of 3×10^{-8} (1 chance in 33 million).

PDCF: Normal operations were estimated to result in an annual collective dose of 0.00031 person-Sv (0.031 person-rem) to the SRS employee population, resulting in an estimated 2×10^{-5} LCFs/yr of operation. An MEI located 225 m (738 ft) east-northeast of the facility stack location was estimated to receive an annual dose of 5.6×10^{-7} person-Sv (5.6×10^{-5} person-rem). The resulting lifetime LCF is approximately 3×10^{-8} (1 chance in 33 million).

Members of the Public

Operation of the facilities is considered to have an insignificant impact on members of the public. Maximally exposed individuals of the public were estimated to receive exposures that are about 10,000 times less than that received from the baseline radiological exposures as discussed in Section 3.10.3.

MOX facility and WSB: For members of the public, operations were estimated to result in an annual collective population dose of 0.00073 person-Sv/yr (0.073 person-rem/yr), which is about 3.2% of the estimated dose received by the public from air emissions from the SRS for the year 2000 (0.023 person-Sv [2.3 person-rem]), as discussed in Section 3.10. The number of expected annual LCFs from operations was estimated to be 4 x 10^{-5}. The MEI location was determined to be at the SRS fenceline, 10,680 m (35,040 ft) north of the proposed MOX facility stack location. An MEI at this location would receive an estimated annual dose of 5.1 x 10^{-9}Sv/yr (5.1 x 10^{-7} rem/yr). This dose corresponds to an annual fatal cancer risk of 3 x 10^{-10} and is 1.3% of the estimated dose received by the public MEI from air emissions from the SRS for the year 2000 (4 x 10^{-7} Sv [4 × 10^{-5} rem]), as discussed in Section 3.10.

PDCF: Normal operations were estimated to result in an annual collective population dose of 0.015 person-Sv (1.5 person-rem) that corresponds to approximately 0.0009 LCFs/yr of operation. Thus, the average member of the public would receive a dose of approximately 1.4 x 10^{-8} Sv (1.4 x 10^{-6} rem), with an expected lifetime risk of developing a fatal cancer of 9 x 10^{-10} (1 chance in 1.1 billion). The pubic MEI was estimated to receive an individual dose of 3.5 x 10^{-8} Sv (3.5 x 10^{-6} rem) that has an expected lifetime fatal cancer risk of 2 x 10^{-9} (1 chance in 500 million).

4.3.1.2 Chemical Exposure and Risk

4.3.1.2.1 Construction

The potential airborne emissions of criteria pollutants (a group of air pollutants for which federal ambient standards exist) from construction of the proposed MOX facility and supporting facilities are summarized in Section 4.3.2.1. Emissions of toxic air pollutants during construction would be very low (less than 1 kg/yr (2 lb/yr) [DCS 2000a, 2002a]) and would not result in adverse health impacts. The potential ambient concentrations of criteria pollutants at or beyond the SRS boundary resulting from facility construction emissions were modeled. The estimated incremental criteria pollutant levels varied between 0.01% and 5% of the applicable ambient standard levels (see Table 4.6 in Section 4.3.2.1). Levels of criteria pollutants above the ambient standard levels would not be expected in the vicinity of SRS.

Wastewater generated during construction would be transported to the SRS Central Sanitary Wastewater Treatment Facility for treatment (DCS 2002a). No adverse impacts from human exposure to contaminants in wastewater effluents are expected from the construction of the facilities.

Hazardous wastes generated during construction would be shipped off-site to permitted commercial recycling, treatment, and disposal facilities. Exposure to hazardous materials used during construction (e.g., paints, solvents) would be kept to a minimum by following applicable OSHA regulations and precautions, such as ensuring good ventilation and cleaning up small chemical spills as soon as they occur.

If soil contamination from past site activities exists in the construction area for the proposed facilities, construction workers doing excavation work could be exposed, primarily through inhalation or incidental soil ingestion. The project site is located at the northern boundary of the main processing facility in the F-Area. Historically, the site proposed for facility construction has been used as a disposal area for excavated soil from F-Area construction projects (Wike 2000).

A recent limited investigation of possible contamination in the proposed construction area included 50 shallow soil samples (i.e., cores from 0 to 12 in.) (Fledderman 2002). Data were available for 10 metals (aluminum, beryllium, chromium, copper, gallium, iron, lead, manganese, nickel, and zinc). The concentrations in all samples were lower than the corresponding EPA Region IX health-based screening levels for industrial use properties. These results do not indicate an initial cause for concern regarding potential chemical exposures for excavation workers. However, the number of substances analyzed was low, and past operating history shows extensive contamination at SRS with such substances as trichloroethylene and arsenic, which were not analyzed in the soil samples. Also, if contamination was present at lower soil depths it would not have been detected. Therefore, if indications of possible chemical contamination (e.g., chemical odors, presence of old construction rubble) are observed during excavation activities, further soil testing to evaluate the potential for adverse health impacts to construction workers would be necessary.

4.3.1.2.2 Operations

During operations, the proposed MOX facility would use about 30 chemicals for processing, mostly for aqueous polishing to remove impurities from the plutonium (DCS 2004a; Table 3-2; DCS 2002b; 2004b); the chemicals would include dodecane, hydrazine, hydrogen peroxide, hydroxylamine nitrate, nitric acid, nitrogen, nitrogen tetroxide, and tributyl phosphate. The WSB would use three chemicals for waste processing: aluminum nitrate, nitric acid, and sodium hydroxide (DCS 2004a; Table G-2). Operation of the PDCF would require about 15 processing chemicals, including nitrogen, chlorine, sulfuric acid, phosphoric acid, and aluminum sulfate (DOE 1999a; Table E-7). At all three facilities, the chemicals would generally be stored in liquid or compressed gas form. Accidental releases of the process chemicals are discussed in Section 4.3.5.3 and Appendix E. After the chemicals were used in operations, resulting wastes would be recycled through the systems or disposed of at appropriate licensed facilities for hazardous or radioactive waste. The facilities would not discharge any process liquid directly to the environment.

Facility Workers. For normal operations, inhalation exposures and risks for facility workers (those working at the proposed MOX facility and related facilities) are difficult to estimate. This is due, in part, to the large amount of uncertainty associated with estimating airborne chemical concentrations in various rooms of the facilities. For this reason, quantitative estimates of risks to facility workers from inhalation of substances emitted during facility operations were not developed for this FEIS. However, the workplace environment would be monitored to ensure that airborne chemical concentrations were below applicable occupation exposure limits. In addition, health risks from occupational exposure through all pathways would be minimized by using enclosed operations (e.g., gloveboxes) to the extent possible.

SRS Employees and the Public. SRS employees and members of the public could be exposed to chemicals emitted to air, water, or soil from the proposed MOX facility, the PDCF, and the WSB.

In general, the chemicals involved in processing at the three facilities would be used in small amounts, have low volatilities[3], and/or have low toxicities. On the basis of information that emissions of hazardous chemicals from all three facilities to air and water would be very low (Sections 4.3.2 and 4.3.3), no hazard index or increased cancer risk estimates were made for SRS employees and the public. Adverse impacts to SRS employees and the public from exposure to air or water emissions from the facilities would not be expected. Two process chemicals from the proposed MOX facility requiring special consideration, hydrazine and uranium dioxide, are discussed below.

Hydrazine would be used in the aqueous polishing process to separate plutonium from the solvent. Hydrazine is highly reactive and corrosive; it is a carcinogen and a reproductive hazard. The maximum anticipated on-site inventory of hydrazine would be 480 L (126 gal); annual use would be 2,000 L (530 gal). In the Reagent Storage Building, hydrazine would be kept in sealed containers. Prior to use in the aqueous polishing process, the hydrazine would be blanketed with nitrogen (a process in which the nitrogen gas, which does not mix well with hydrazine, shields the liquid hydrazine from unwanted side reactions). As discussed in Section 3.10.4.2, current SRS sitewide hydrazine emissions do not result in exceedance of the ambient level specified in the South Carolina Department of Health and Environmental Control (SCDHEC) standard. During permitting of the proposed MOX facility, demonstration that operational hydrazine emissions would be limited to levels that would not cause exceedance of the SCDHEC standard would be conducted.

During the fuel fabrication process, purified plutonium dioxide powder would be mixed with depleted uranium dioxide powder. The health risk from plutonium exposure is dominated by the radiological risk, whereas the health risk from uranium exposure is dominated by the chemical risk (i.e., possible damage to the kidney). The radiological health risk from plutonium emissions during operations of the proposed MOX facility and related facilities is addressed above in Section 4.3.1.1.2.

In the proposed MOX facility, uranium powder would be processed in closed containers located in gloveboxes to confine contamination to inaccessible areas and keep occupational exposures within specified guideline and standard levels (DCS 2004a). Air exhaust from gloveboxes would be equipped with HEPA filters to collect particulate emissions. Operation of the facility would generate less than 1 g of uranium emissions annually (see Table E.1). These uranium emissions would result in small exposures and chemical health risks for SRS employees and the public.

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[3] A chemical with a "low volatility" does not readily change from a liquid to a gas at a relatively low temperature (e.g., near room temperature).

4.3.1.3 Physical Hazards

4.3.1.3.1 Construction

As with any construction project, there would be occupational hazards to construction workers at the proposed MOX facility and related facilities. Occupational hazards were estimated by using the same method as was discussed in Section 3.10.5 for baseline physical hazards. The annual fatality and injury rates for construction activities used were as follows: 13.6 fatalities per 100,000 full-time workers and 4.2 injuries per 100 full-time workers (NSC 2001). On the basis of this methodology, the annual number of fatalities was calculated to be less than 1 for all facilities, assuming peak year employment (see Table 4.4). The estimated annual number of injuries was about 40 per year for each facility. The injuries included in these numbers are those resulting in lost workdays, not including the day of injury.

4.3.1.3.2 Operations

Occupational hazards associated with normal operations at the proposed MOX facility and related facilities were estimated by the same method discussed in Section 3.10.5; impacts are summarized in Table 4.4. Annual fatality and injury rates used were as follows: 3.3 fatalities per 100,000 full-time workers and 4.6 injuries per 100 full-time workers (NSC 2001). Annual fatality and injury rates for the manufacturing sector were used because that sector was assumed to be the most representative for operational work at the proposed facilities. The annual number of fatalities was estimated to be less than 1 for all facilities. The estimated number of injuries was 36 per year collectively for operation of the proposed MOX facility and the PDCF, and 5 per year for the WSB (includes only injuries resulting in lost workdays, not including the day of injury).

4.3.2 Air Quality

This section presents the maximum potential air quality impacts associated with construction and operation of the proposed MOX facility, the PDCF, and the WSB. Air quality impacts associated with construction and operation of the facilities were assessed by determining the concentrations of pollutants in the air caused by emissions associated with the facilities and comparing those concentrations with generally accepted measures of air quality impact, typically standards set by regulatory agencies. Two types of standards exist. Incremental standards set maximum concentrations that cannot be exceeded by emissions from sources associated with a facility or facilities. Total standards set maximum concentrations that cannot be exceeded by total emissions from both sources associated with a facility or facilities and other nearby sources, such as existing SRS sources.

Determining the air quality concentrations involves three steps. First, the emissions of the sources associated with a facility or facilities are calculated. Next, the incremental concentrations caused by these emissions are determined with an air quality model that uses emissions and meteorological data to estimate concentrations at various locations. To

Table 4.4. Annual physical hazard impacts from normal operations[a]

Facility	Peak year construction FTEs[b]	Annual operations FTEs[b]	Projected annual fatalities – construction	Projected annual fatalities – operations	Projected annual injuries – construction	Projected annual injuries – operations
MOX facility	950	400	0.13	0.013	40	18
PDCF	1,024	400	0.14	0.013	40	18
WSB	1,000	100	0.14	0.003	42	5

[a]Fatality estimates of less than 0.5 should be interpreted as "no expected fatalities." Construction of each of the facilities is projected to require 3 to 5 years. The duration of operations is estimated as 10 or more years.

[b]Full-time equivalent employees; the numbers of FTEs were obtained from DCS (2004a) for the proposed MOX facility and the WSB, and from DOE (1999a) for the PDCF.

determine a total concentration, the impacts of other sources not associated with a facility or facilities must be added to the incremental concentrations. The impacts of these other sources are determined either by additional modeling or by selecting a measured background concentration representative of the impacts of the sources not modeled. Finally, the incremental concentrations due to a facility or facilities alone or the total concentrations due to a facility or facilities and other sources are compared against appropriate measures of impact.

In this analysis, incremental impacts of construction activities and operations were determined separately using the Industrial Source Complex Short Term (ISCST3) air quality model (EPA 1995). (Appendix F provides additional detail on the calculations of emissions and the assumptions and data used in the model.) The ISCST3 model is recommended by the EPA for modeling construction activities and operations. The meteorological data used in modeling came from Athens, or Atlanta, Georgia, and Columbia, South Carolina, nearby locations where meteorological data are recorded. The maximum modeled pollutant concentrations were selected to represent the impact of construction activities or operations.

The impacts of other sources were taken into account by adding two additional concentrations to the facility maximum: an SRS maximum concentration for other sources at the SRS (SRS maxima) and a background concentration representing the overall impact of non-SRS sources. The total concentrations were then compared with the applicable ambient standard levels given in Table 3.3. Facility maxima were compared with the incremental PSD standards to provide another measure of impact.

The background concentrations are those used by the State of South Carolina to evaluate air quality impacts. The SRS environmental staff modeled the maxima in support of its air permit process (SCDHEC 2001). These SRS maxima are based on the assumption that all permitted sources operate at their fully permitted limits; thus these values are conservative estimates of SRS impacts. In addition, for a given pollutant and averaging time, maximum values associated with the proposed action and other SRS facilities are unlikely to occur at the same locations. Adding them together for comparison with the corresponding standard level adds additional conservatism to the procedure.

A slightly different procedure was used to evaluate potential impacts of $PM_{2.5}$. Implementation of the $PM_{2.5}$ standard has been delayed, and states have not developed plans for attaining it. SRS maxima and background values were not available for $PM_{2.5}$. Background values were taken as the maximum concentrations measured at background monitors within 80 km (50 mi)[4] of the SRS and were added to the modeled facility maxima for comparison with applicable standard levels. Background concentrations also were not available for air toxics and are generally considered negligible. Therefore, for air toxics, the sum of the facility maximum concentration and the SRS maxima was taken to be the total concentration for comparison with ambient standard levels.

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[4] $PM_{2.5}$ background values were the 2001 maximum annual average and the maximum 98th percentile concentrations measured at the two rural background monitors within 80 km (50 mi) of the MOX facility. Compliance with the 24-hour $PM_{2.5}$ standard is based on the 98th percentile values being below the standard level.

4.3.2.1 Construction

The earth-moving activities during the construction period for the proposed MOX facility and the WSB will not overlap the earth-moving activity period for the PDCF. The impacts presented below assume simultaneous construction of the proposed MOX facility and the WSB and were found to exceed the impacts from construction of the PDCF. The impacts presented are, therefore, considered to be bounding for construction activities.

During construction, emissions of criteria pollutants (see Section 3.4.2), total suspended particulates (TSP), and volatile organic compounds (VOCs) would include fugitive dust emissions from earthmoving activities, fugitive dust emissions from the concrete batch plant, and exhaust emissions from diesel-powered construction equipment and from worker and delivery vehicles. The emissions associated with constructing the proposed MOX facility and the WSB are listed in Table 4.5. The tabulation does not include emissions of lead, a criteria pollutant. The phaseout of lead in gasoline has led to a significant reduction in lead levels throughout the country. Appendix F summarizes the emission factors and assumptions used in estimating construction emissions.

Fugitive dust emissions would be the emissions of principal concern during construction of the facilities. Dust from construction activities and exhaust from diesel construction equipment would be emitted within the limited area of the construction site. Other vehicles used by construction workers and for deliveries would emit exhaust along various roadways around the site, and this dispersal would reduce the impacts of these emissions relative to emissions from the limited construction area. Therefore, only fugitive dust emissions from construction activities and operation of the concrete batch plant and exhaust emissions from construction equipment were analyzed for the construction phase.

The results of the impact analysis for construction of the proposed MOX facility and the WSB, including the total concentration and its individual components (i.e., the modeled facility maximum, the SRS maximum, and the background concentration) are presented in Table 4.6. As noted above, the totals are conservative in that they overestimate the likely concentrations. Comparison of the total concentrations with applicable ambient standard levels provides a measure of the impact of construction.

Annual maxima would occur 10.7 to 9.5 km (5.9 to 6.7 mi) west northwest of the proposed MOX facility site. Short-term maxima would occur 9.5 to 10.4 km (5.9 to 6.5 mi) west or west northwest of the site except for the 1-hour CO maximum, which would occur 20.6 km (12.8 mi) to the southeast.

The total TSP concentration would be close to, but still less than, the maximum value allowed by the applicable standard. Most of this TSP concentration would be due to existing sources; the TSP concentration from facility construction would be at most only 0.06% of the standard level. Expected PM_{10} ambient levels would not exceed standard levels, and the concentrations from construction of the facilities would be equivalent to, at most, 5.0 and 0.05% of the 24-hour and annual PM_{10} standard levels, respectively.

Table 4.5. MOX facility and WSB construction emissions[a,b,c]

Pollutant	Construction fugitive dust[d]		Concrete batch plant		Construction equipment exhaust	
	Annual (kg/yr)	Hourly (g/h)	Annual (kg/yr)	Hourly (g/h)	Annual (kg/yr)	Hourly (g/h)
TSP	121,000	59,200	5,670	2,730	5,580	2,680
PM_{10}	36,900	17,800	1,640	790	5,580	2,680
$PM_{2.5}$	18,500	8,880	850	409	5,580	2,680
CO	0	0	0	0	25,600	12,300
NO_2	0	0	0	0	67,600	32,500
SO_2	0	0	0	0	6,510	3,130
VOC	0	0	0	0	6,550	3,150

[a]See Appendix F for details on emission calculations.

[b]Hourly values are based on a construction schedule of 8 hours per day, 5 days per week, 52 weeks per year.

[c]The proposed MOX facility and the WSB are assumed to be constructed at the same time. The construction of the PDCF is expected to occur outside the time frame for construction of the other two facilities.

[d]Calculations assume that water is applied to control dust, resulting in a 50% reduction in emissions, and that emissions from earth-moving activities occur over a 9-month period.

Expected $PM_{2.5}$ ambient levels would not exceed standard levels. Construction of the facilities would not exceed 4.3 and 0.070% of the 24-hour annual $PM_{2.5}$ standard levels, respectively.

The CO, SO_2, and NO_2 construction emissions would be from construction equipment exhaust. Concentrations from these emissions would amount to at most 0.29% of any ambient standard level and would not contribute to concentrations in excess of a standard level.

4.3.2.2 Operations

DCS has proposed to treat exhausts from the proposed MOX facility with (at a minimum) a two-stage HEPA filter system to remove radioactive materials before the exhaust is discharged to the atmosphere.

The introduction to Section 4.3.2 provides a short discussion of the method used to assess air quality impacts. Sections 4.3.1 and 4.3.5 discusses the human health impacts of routine and accidental chemical and radiological releases to the air. In addition to the emissions discussed in this section, the facilities also would emit the radionuclides listed in Table E.5.

Table 4.6. Maximum air quality impacts during construction of the facility

		Pollutant concentration (μg/m³)					Percent of standard		Receptor location[a]	
Pollutant	Averaging time	Facility maximum[b]	SRS maximum[c,d]	Background[c]	Total[e]	Ambient standard[f]	Total concentration	Facility maximum	Distance [km (mi)]	Direction
TSP	Annual	0.045	46.6	28	74.6	75	99.5	0.061	10.7 (6.7)	WNW
PM_{10}	24 hours	7.5	97.0	41	145.5	150	97.0	5.0	10.4 (6.5)	WNW
	Annual	0.023	6.9	19	25.9	50	51.8	0.047	10.7 (6.7)	WNW
$PM_{2.5}$	24 hours	2.8	-[g]	27	29.8	65	45.8	4.3	10.4 (6.5)	WNW
	Annual	0.011	-[g]	13.6	13.6	15	90.7	0.070	10.7 (6.7)	WNW
CO	1 hour	40	262.7	10,100	10,400	40,000	26	0.10	20.6 (12.8)	SE
	8 hours	8	67.4	6,800	6,880	10,000	69	0.08	9.5 (5.9)	WNW
SO_2	3 hours	3.7	1,171.3	50	1,225	1,300	94	0.29	9.6 (6.0)	W
	24 hours	0.83	337.2	18	356	365	98	0.23	9.5 (5.9)	WNW
	Annual	0.006	27.1	4	31	80	39	0.008	9.5 (5.9)	WNW
NO_2	Annual	0.063	17.32	9	26	100	26	0.06	9.5 (5.9)	WNW

[a] Location of facility maximum from center of proposed MOX facility site.

[b] Maximum concentration due to facility construction, modeled with ISCST3 model.

[c] Based on SCDHEC (2001) and EPA (2003).

[d] The SRS maxima are based on maximum permitted emissions from SRS sources and do not necessarily quantify actual air quality impacts.

[e] Sum of facility maximum, SRS maximum, and background.

[f] South Carolina and Georgia standards are the same as NAAQS except for TSP, which is a South Carolina standard.

[g] SRS maxima and background levels are not available for $PM_{2.5}$. Values for background are the 2001 maximum annual average and maximum 98 percentile 24-hour average values measured at the two rural background monitors within 80 km (50 mi) of the MOX facility.

For purposes of this analysis, it was assumed that the proposed MOX facility, PDCF, and WSB would operate at the same time. While this may not always be the case, the combined analysis bounds the air quality impacts from normal operations.

The emissions from operation of the facilities are summarized in Table 4.7. It is expected that all these facilities would use electric boilers; there would be no emissions associated with production of hot water or steam. Air pollutants associated with the MOX process would be emitted from the stack located toward the eastern end of the proposed MOX facility. Nonradiological emissions from this stack would be limited to NO_2 from the aqueous polishing process. There would be no process emissions from the PDCF (DOE 1999a, Table G-59). Particulates from the cementation process in the WSB would be controlled to meet the condition specified in the SCDHEC permit.

Emissions from emergency and standby diesel-powered generators and storage of diesel fuel have been considered. Emergency and standby generators and associated fuel storage facilities would be located at each of the three facilities and would emit criteria pollutants, TSP, VOCs, and air toxics (see Table 4.7). The tabulated process VOCs would result from the storage of diesel fuel and would be small because of the low volatility of diesel fuel.

Air Toxics

Air toxics, also known as hazardous air pollutants, are substances judged to have adverse impacts on human health when present in the ambient air. The EPA and some states have issued lists of substances regulated as air toxics. The specific substances listed and the types of regulations applied differ among jurisdictions.

Parking lots and access roads would be paved to minimize fugitive dust emissions. Vehicle combustion emissions would be released along various roadways around the site, and this dispersal would reduce emission impacts compared with the emissions from the emergency/standby generator diesels. Only the process emissions from the facilities and diesel generators were modeled to evaluate emissions for the operations phase.

The results of the impact analysis for normal operations, including the total concentration and its individual components — the modeled facilities maxima, the SRS maximum, and the background levels — are presented in Table 4.8. As noted above, the totals are conservative in that they overestimate the likely total concentration. Impacts during normal operations were estimated by assuming that all three facilities were operating simultaneously. For short-term concentrations of 24 hours or less, emergency generators were assumed to operate 24 hours per day to simulate an extended power loss. For annual averages, the generators and process sources were modeled with emissions appropriate to their expected schedules (see Appendix F). Comparison of the total modeled concentrations with applicable ambient standard levels provides a measure of the potential impact of normal facility operations on air quality.

The total concentrations are all less than the levels stipulated in the corresponding standards, and the three facilities would contribute concentrations equivalent at most to 1.9% (for 24-hour PM_{10}) of the corresponding standard level. Given the conservative overestimation in the SRS maxima, ambient levels above the standard levels would not be expected.

Table 4.7. MOX, PDCF, and WSB operations emissions[a]

	Process		Emergency generators	
Pollutant[b]	Annual (kg/yr)	Hourly (g/h)	Annual (kg/yr)	Hourly (g/h)
TSP	6.00	463	761	4,222
PM_{10}	3.00	234	692	3,740
$PM_{2.5}$	0.90	70.2	649	3,500
SO_2			1,640	11,800
CO			3,440	25,900
NO_2	13,700	31,100	29,300	217,100
VOCs[c]	1.48	0.169	1,160	8,720
Chlorine	15.0	1.71		
Acetone	2.9	9.75		
Benzene			7.48	48.6
Toluene			2.71	17.6
Xylenes			1.86	12.1
Propylene			26.9	175
Formaldehyde			0.760	4.94
Acetaldehyde			0.243	1.58
Acrolein			0.076	0.493
Naphthalene			1.25	8.14
Total PAHs[d]			2.04	13.3

[a]See Appendix F for details on emission calculations.

[b]Except for PAHs, directly emitted criteria pollutants, their precursors, and federally listed air toxics are included. Naphthalene is both an air toxic and a component of PAH.

[c]Process emissions are from storage of diesel fuel.

[d]PAHs = polycyclic aromatic hydrocarbons.

Sources: DCS (2002a,c,d; 2004a,c); DOE (1999a).

The concentrations of toxic air pollutants and total polycyclic aromatic hydrocarbons (PAHs) associated with emissions from emergency and standby generators are all calculated to be less than 0.03% of the South Carolina standard levels.

Comparing the incremental facility concentrations with Prevention of Significant Deterioration (PSD) increments (see Table 4.9) provides another perspective on operational impacts even when a PSD analysis is not required. As the table shows, maximum concentrations for 3-hour and 24-hour averaging times would all be less than 6.0% of the PSD Class II increments

Prevention of Significant Deterioration (PSD)

The NAAQS establish maximum pollutant levels that should not be exceeded. The PSD program limits the deterioration of existing air quality in areas with air cleaner than the NAAQS. The program establishes a baseline level of air quality and specifies increments that cap the increases in pollutant levels above that baseline. The program applies to sulfur oxides, PM_{10}, and nitrogen dioxide emitted by major new or modified sources. Smaller increments apply in special areas such as national parks (Class I areas) than in other areas (Class II areas).

Table 4.8. Maximum air quality impacts during operation of the proposed facilities

		Concentration (μg/m[3])					Percent of standard		Receptor location[a]	
Pollutant	Averaging time	Facility maximum[b]	SRS maximum[c,d]	Background[c]	Total[e]	Ambient standard[f]	Total concentration	Facility increment	Distance (km [mi])	Direction
TSP	Annual	0.0017	46.6	28	74.6	75	99.5	0.002	16.5 (10.2)	NE
PM_{10}	24 hours	1.31	97.0	41	139	150	93.0	0.87	9.6 (6.0)	W
	Annual	0.0015	6.9	19	25.9	50	52	0.003	16.5 (10.2)	NE
$PM_{2.5}$	24 hours	1.21	–[g]	27	28.2	65	43.4	1.9	9.5 (5.9)	WNW
	Annual	0.0014	–[g]	13.6	13.6	15	90.7	0.009	16.5 (10.2)	NE
NO_2	Annual	0.074	17.3	9	26.4	100	26	0.060	16.5 (10.3)	NE
SO_2	3 hours	22	1,171.3	50	1,243	1,300	96	1.7	9.6 (6.0)	W
	24 hours	4.9	337.2	18	360	365	99	1.3	9.5 (5.9)	WNW
	Annual	0.0035	27.1	4	31.1	80	39	0.004	16.8 (10.4)	NE
CO	1 hour	116	262.7	10,100	10,478	40,000	26	0.29	9.7 (6.0)	NW
	8 hours	26	67.4	6,800	6,890	10,000	69	0.26	9.7 (6.0)	NW
Benzene	24 hours	0.019	4.6	NA[h]	4.6	150	3.1	0.01	9.5 (5.9)	WNW
Toluene	24 hours	0.007	14.6	NA	14.6	2,000	0.7	0.0004	9.5 (5.9)	WNW
Xylene	24 hours	0.005	69	NA	69.0	4,350	1.6	0.0001	9.5 (5.9)	WNW
Propylene	24 hours	0.067	NA	NA	NA	NA	NA	NA	9.5 (5.9)	WNW
Formaldehyde	24 hours	0.002	0.15	NA	0.152	7.5	2.0	0.03	9.5 (5.9)	WNW
Acetaldehyde	24 hours	0.0006	<0.01	NA	0.011	1,800	<0.001	<0.0001	9.5 (5.9)	WNW
Acrolein	24 hours	0.0002	<0.01	NA	0.010	1.25	0.82	0.02	9.5 (5.9)	WNW
Naphthalene	24 hours	0.003	<0.01	NA	0.013	1,250	0.001	0.0002	9.5 (5.9)	WNW
Chlorine	24 hours	0.0003	0.04	NA	0.04	75	0.054	0.0004	10.8 (6.7)	N
Acetone	24 hours	0.002	NA	NA	NA	NA	NA	NA	9.8 (6.1)	W
Total PAHs	24 hours	0.005	<0.01	NA	0.015	160	<0.010	0.003	9.5 (5.9)	WNW

[a]Location of facility maximum from center of the proposed MOX facility site.

[b]Maximum concentration due to normal facility operations, modeled using ISCST3 model (EPA 1995).

[c]SCDHEC (2001) and EPA (2003) for criteria pollutants; Hunter (2001) for air toxics.

[d]The SRS maxima are based on maximum permitted emissions from SRS sources and do not necessarily quantify actual air quality impacts.

[e]Sum of facility maximum, SRS maximum, and background.

[f]South Carolina and Georgia standards are same as NAAQS for PM_{10}, $PM_{2.5}$, NO_2, SO_2, and CO. The TSP standard and the air toxic standards are South Carolina standards.

[g]SRS maxima and background levels are not available for $PM_{2.5}$ and acetone. Values for $PM_{2.5}$ background are the 2001 maximum annual average and maximum 98 percentile 24-hour average values measured at the two rural background sites within 80 km (50 mi) of the MOX facility.

[h]NA = not available.

Table 4.9. Comparison of maximum concentration increments and PSD increments[a]

Pollutant	Averaging time	Maximum increment ($\mu g/m^3$)	PSD increment ($\mu g/m^3$)		Percent PSD II increment
			Class I	Class II	
SO_2	3 hours	22	25	512	4.30
	24 hours	4.9	5	91	5.38
	Annual	0.0035	2	20	0.02
NO_2	Annual	0.074	2.5	25	0.30
PM_{10}	24 hours	1.31	8	30	5.33
	Annual	0.0014	4	17	<0.01

[a]Class I increments apply only in Class I areas. An appropriate comparison is made in the text.

for SO_2, NO_2 , and PM_{10}. These pollutants are emitted by the emergency generators, not the processes, and the concentration estimates assume all generators at all three facilities operate continuously. For annual averages, the maximum concentrations would all be less than 0.02% of the PSD Class II increments.

Class I PSD increments were compared with the concentrations expected to be experienced at the closest receptor location to the Cape Romain National Wildlife Refuge, the nearest PSD Class I area. This receptor location is 51 km (32 mi) from the site, near the maximum distance at which the ISCST3 model can reliably estimate concentrations. All concentration increments were less than 1% of the Class I increments. Concentration increments attributable to the three facilities would be even lower at Cape Romain, located about 160 km (100 mi) from the site.

Concentrations of lead and ozone were not modeled. Facility operations would not emit lead. Ozone is formed by photochemical reactions of precursors (including NO_2 and VOCs) in the atmosphere. Contributions of individual sources to ozone formation cannot be quantified accurately. As shown in Tables 3.1 and 4.7, ozone precursor emissions from facility operations would be a small percentage of the four-county totals, about 0.3% and 0.02% for NO_2 and VOCs, respectively. The impact of facility operations on ozone concentrations in the area would be negligible.

Under the Clean Air Act (CAA), federal actions in nonattainment and maintenance areas must demonstrate that they conform to the applicable state implementation plan (SIP). The SRS is located in an attainment area for all NAAQS and is not covered by a maintenance plan. Thus, the requirement to demonstrate conformity with the SIP would not apply to the proposed MOX facility, PDCF, and WSB. At some time in the future, EPA will issue conformity regulations for the new NAAQS for ozone and $PM_{2.5}$. Those regulations could impose requirements to demonstrate conformity with the SIP on the proposed MOX facility, PDCF, or WSB.

4.3.3 Hydrology

4.3.3.1 Surface Water

4.3.3.1.1 Construction

The estimated annual average water use for constructing the proposed MOX facility is 125 million L (33 million gal) (DCS 2002a). An additional 12 million L/yr (3.2 million gal/yr) of water would be needed for constructing the PDCF (DOE 1999a), and 2 million L/yr (0.5 million gal/yr) of water would be needed for constructing the WSB. Because surface water would not be used for supplying this water, there would be no impacts to surface water levels or flows. No direct releases of contaminated effluent are planned for construction operations. Sanitary waste would be collected with a combination of portable toilets and semipermanent facilities connected to the SRS Central Sanitary Waste Treatment Facility. All wastewater would be treated in the sitewide treatment system, which has sufficient hydraulic and organic capacity to treat the flows expected from construction activities (DCS 2002a).

During construction, surface water quality could, however, be impacted by contaminated runoff from sources such as accidental oil or diesel fuel spills and sediment from disturbed areas and from construction materials stockpiled in areas that are exposed to precipitation. Two areas of concern identified in the Scoping Comments (see Appendix I) are Upper Three Runs Creek, which would receive runoff water from the affected area via nearby unnamed tributaries, and the Savannah River, which receives water from Upper Three Runs Creek. To comply with South Carolina standards for storm-water management and sediment reduction, detention ponds would be built at strategic locations as part of the SRS construction program. These detention ponds would be designed to control the release of storm-water runoff at a rate equal to or slightly less than that of the predevelopment stage. Good engineering practices, as required by the SCDHEC (see Chapter 6), such as the use of siltation fences or straw bales to control sediment and runoff, would be followed during construction, and a sediment control plan would be developed for areas exceeding 2 ha (5 acres) that are disturbed by construction (DCS 2002a). Therefore, impacts to surface water quality from construction activities are expected to be small. Similarly, impacts from accidental releases of contaminants such as gasoline, oil, diesel fuel, or paint during construction are expected to produce small impacts on surface water quality because cleanup activities would be prompt and thorough, as required in the facility's Spill Prevention Control and Countermeasures Plan. This plan would be developed by DCS to meet EPA regulations (40 CFR Part 112).

4.3.3.1.2 Operations

Normal operations of the proposed MOX facility would utilize 9.1 million L (2.4 million gal) of water per year (DCS 2002a). An additional 48 million L/yr (12.7 million gal/yr) of water would be needed for operating the PDCF, and 19 million L/yr (5 million gal/yr) of water would be needed for operating the WSB, but none of this water would be from surface water resources.

Therefore, there would be no impacts to surface water levels or flows. The nonhazardous wastewater produced by the proposed facilities would be discharged to an existing National Pollutant Discharge Elimination System (NPDES) outfall (H16) in the F-Area under an existing South Carolina Discharge permit, SC0000175. This water flows into Upper Three Runs Creek and ultimately the Savannah River. Because the concentrations of nonhazardous wastes in the discharge would be under the guidelines of the NPDES permit, impacts to water quality in Upper Three Runs Creek and the Savannah River would be small. The uncontaminated heating, ventilation, and air conditioning (HVAC) condensate would be discharged to the stormwater system in accordance with SCDHEC standard stormwater permit conditions. Sanitary wastewater would be sent to the WSRC Central Sanitary Waste Treatment Facility.

Storm-water runoff from the proposed MOX facility, the PDCF, and the WSB would be controlled under existing NPDES storm-water permits. These permits would limit potential contaminants to safe concentrations, and compliance with the permit conditions would ensure that any surface water impacts were small.

4.3.3.2 Groundwater

4.3.3.2.1 Construction

During construction, the groundwater system beneath the SRS would be directly affected by additional pumping from existing wells because groundwater would be the only source of water used for construction activities. Groundwater for constructing the MOX facilities would be obtained from the A-Area loop, which obtains groundwater from wells in the F- and A-Areas. The capacity of the A-Area loop wells in 2000 was about 11,360 L/min (3,000 gal/min) (DCS 2003a). Water use from the loop, including F-Area use, averaged about 2,850 L/min (754 gal/min) in 2000. Construction of the MOX facility, PDCF, and WSB would require about 264 L/min (70 gal/min). This additional groundwater demand would represent an increase of about 10% for the A-Area loop and about 3% of the excess loop capacity. This withdrawal would have a small impact on the groundwater system at SRS.

In addition to impacts from groundwater use, impacts during construction (e.g., grading and excavating) could also occur because groundwater beneath the proposed MOX facility site is contaminated (Section 3.3.2). Impacts from this contamination would not be measurable because the deepest construction activities would occur at least 9.1 m (30 ft) above the zone of groundwater contamination (DCS 2002a). Because direct releases of contaminated effluent to groundwater during construction are not planned, there would be no direct impacts to groundwater quality. Groundwater quality, however, could still be indirectly affected by accidental releases of contaminated effluents and infiltration of contaminated runoff. However, these impacts are expected to be small because appropriate good engineering practices would be implemented during construction, detention basins would be used to control runoff, and any spills would be promptly and thoroughly cleaned up as required under the facility Stormwater Pollution Prevention Plan.

4.3.3.2.2 Operations

During normal operations, groundwater would be the only source of water used for the facilities, and the groundwater system beneath the SRS would be directly impacted by additional pumping that would deplete the resource. Operation of the proposed MOX facility would require 9.1 million L/yr (2.4 million gal/yr), the PDCF would require 48 million L/yr (12.7 million gal/yr), and the WSB would require 19 million L/yr (5 million gal/yr) (DCS 2002a). This water would be obtained from the A-Area loop groundwater wells. Impacts on the SRS groundwater system would be small because the total water use, approximately 145 L/min (38 gal/min), would represent an increase of about 5% of the water demand for the A-Area loop in 2000 and about 2% of the excess A-Area loop capacity.

Groundwater quality would not be affected because there would be no discharges (either shallow or deep) to underlying aquifers. During the scoping process, several commenters expressed concerns about potential contamination of groundwater resources by plutonium. Because no direct releases of contaminated effluent to the groundwater are planned during normal operations of the proposed facilities and because the facilities would not use settling or holding basins as part of the wastewater treatment system, there would be no direct impacts to groundwater quality (DCS 2002a).

Indirect impacts to groundwater could also occur during normal operations. These impacts would result from discharges to the NPDES outfall and surface spills. The impacts of such spills are expected to be small because appropriate good engineering practices would be implemented during the operational period, discharges would comply with NPDES guidelines, and any spills would be promptly and thoroughly cleaned up as required under the facility Spill Prevention Control and Countermeasures Plan.

4.3.4 Waste Management

This section presents the waste management impacts associated with the construction and operation of the proposed MOX facility, the PDCF, and the WSB. Waste management impacts relate to the types and quantities of radioactive, hazardous, and nonhazardous wastes generated and how these wastes are handled. Wastes generated by the three facilities would be managed similarly to wastes generated by other SRS facilities. The NRC conducted an evaluation to determine if existing and proposed facilities and capacities at SRS and within the DOE complex (e.g., the Waste Isolation Pilot Plant [WIPP]) would be adequate for handling and disposing of the generated waste. Because the types of wastes generated by the proposed MOX facility, the PDCF, and the WSB would be similar to the types of wastes already generated by existing SRS facilities and the volumes would be relatively small compared to the overall existing or projected volumes, the human health impacts discussed in Section 3.10 for current activities at SRS are expected to bound the human health impacts, if any, resulting from the waste generated by the proposed action. Also, the human health impacts discussed in Section 3.10 are not anticipated to change significantly as a result of the waste generated from the proposed action.

The WSB would process waste from both the proposed MOX facility and the PDCF. The waste volumes presented in the tables in this section are based on where the particular waste type is generated (e.g., solid TRU waste generated at the WSB as a result of processing the liquid high-alpha-activity waste transferred from the proposed MOX facility is presented as TRU waste volume for the WSB). The waste types that would be generated include TRU waste, liquid and solid LLW, hazardous/mixed waste, and liquid and solid nonhazardous waste.

4.3.4.1 Construction

The construction of the proposed MOX facility and the WSB is expected to take 5 years; the construction of the PDCF is expected to take 3 years. Waste generated from construction activities would be similar to that from construction of any industrial building and would include liquid and solid waste (nonhazardous) and hazardous wastes. Such solid wastes would be managed consistently with SRS waste management practices (see Section 3.9). No high-level (radioactive) (HLW) waste, TRU waste, low-level (radioactive) (LLW) waste, or mixed LLW would be expected to be generated during construction. No hazardous or radiologically contaminated soil is expected to be generated (DCS 2002a).

Hazardous wastes that would be generated would be similar to those expected during the construction of any industrial facility. Examples of these wastes include liquids (such as motor oil), batteries, and other machinery-related products, cleaning products, and other chemicals (such as insecticides and pesticides). These wastes would be managed in accordance with the hazardous waste management practices in place at the SRS. The current practice includes accumulating the waste at the generating facility (which in this case would be in the F-Area) for a maximum of 90 days as necessary, and packaging such wastes in U.S. Department of Transportation (DOT)-approved containers to ship off-site to permitted commercial recycling, treatment, or disposal facilities.

As shown in Table 4.10, the following waste types and estimated volumes would be generated during construction of the three facilities:

- For the proposed MOX facility: 77 m^3/yr (100 yd^3/yr) of hazardous wastes; 36 million L/yr (9.5 million gal/yr) of nonhazardous liquid waste and 8,410 m^3/yr (11,000 yd^3/yr) of nonhazardous solid waste;

- For the PDCF: 50 m^3/yr (65 yd^3/yr) of hazardous waste, 5.3 million L/yr (1.4 million gal/yr) of nonhazardous liquid waste and 120 m^3/yr (157 yd^3/yr) of nonhazardous solid waste; and

- For the WSB: 35 m^3/yr (46 yd^3/yr) of hazardous waste, 21 million L/yr (6.3 million gal/yr) of nonhazardous liquid waste and 2,200 m^3/yr (2,880 yd^3/yr) of nonhazardous solid waste.

Table 4.10. Annual waste volumes from the construction of the facilities compared with waste management capacities at the SRS

Waste type	Estimated MOX facility construction waste[b]	Estimated PDCF construction waste[c]	Estimated WSB construction waste[b]	SRS capacity[a]		
				Characterization or treatment (annual capacity)	Storage (total capacity in m^3)	Disposal (total capacity in m^3 unless specified)
TRU (m^3/yr)	–[d]	–[d]	–[d]	1,720	34,400	168,500[e]
LLW						
Liquid (L/yr)	–[d]	–[d]	–[d]	17,830,000	NA[f]	594,000,000 L
Solid (m^3/yr)	–[d]	–[d]	–[d]	17,830	NA	30,500
Hazardous[g] (m^3/yr)	77	50	35	17,830	5,170	NA
Nonhazardous						
Liquid[h] (L/yr)	36,000,000	5,300,000	21,000,000	1,033,000,000	NA	NA
Solid (m^3/yr)	8,410	120	2,200	NA	NA	24,900,000[i]

[a]Storage and disposal capacity estimates presented represent total capacity at the SRS. Sources of estimates: DOE (1999a).

[b]The construction period for the proposed MOX facility is assumed to be 5 years; the construction period of the PDCF is assumed to be 3 years. The construction period of the WSB is assumed to be 5 years. Source of estimates: DCS (2003a).

[c]Source of estimates: DOE (1999a).

[d]No radioactive waste would be generated by facility construction.

[e]Value represents limit for TRU waste at the WIPP.

[f]NA = not applicable.

Footnotes continued on next page.

Table 4.10. Continued

[g]Hazardous waste that would be generated is less than 4% of the treatment and about 3% of the storage capacity at the SRS. For estimating impact on the storage capacity, the annual generation rates for the three facilities were summed and the total divided by the storage capacity at the SRS. Hazardous wastes are generally not stored on-site for more than 90 days, consistent with permit requirements. Hazardous wastes are sent off-site for disposal.

[h]Nonhazardous liquid waste generated during construction of the facilities is equivalent to about 6% of the treatment capacity at SRS.

[i]The disposal capacity presented for nonhazardous solid waste is for a privatized landfill (Three Rivers Landfill) that is located on site. The combined volume of nonhazardous solid waste that would be generated from the construction of the three facilities constitutes less than 1% of the disposal capacity at the landfill.

The impact of the facilities construction waste on SRS waste management capacities would be small. The hazardous waste that would be generated would be shipped off-site to permitted facilities. The impacts at these permitted facilities from the proposed MOX facility, PDCF, and WSB wastes are expected to be within the bounds of the evaluations performed for the waste facilities. The nonhazardous liquid waste generated by the facilities would constitute a small percentage of the SRS's capacity for treatment (about 6%). Nonhazardous solid wastes are packaged in conformance with standard industrial practice and shipped to commercial or municipal facilities for recycling or disposal. Estimates for waste volumes that would be generated during construction of the facilities are presented in Table 4.10.

4.3.4.2 Operations

This section describes the waste management impacts of operating the proposed MOX facility, the PDCF, and the WSB. A discussion of radioactive effluents and wastes for each facility is provided in Sections 2.2.2.3, 2.2.3.3, and 2.2.4.3. The WSB would process some waste streams from the proposed MOX facility and PDCF. Other wastes would be managed by existing SRS waste management facilities. This section is divided into two parts. The first part describes where the waste is generated at each facility. A more detailed description of the processes that generate waste is provided in Chapter 2. The second part describes how those wastes would be handled and describes the potential waste management impacts. Consistent with waste management practices at the SRS, all wastes generated from operations of the facilities would be transferred to the WSB or to the appropriate facilities or areas elsewhere within the SRS or outside of the SRS for subsequent treatment, storage, shipment off site, or disposal. The period of operation for the proposed MOX facility is expected to be about 10 years.

Wastes that would be generated and the impacts from such wastes were identified as concerns during scoping. The waste types that would be generated from the three facilities include the following: solid TRU waste, liquid and solid LLW, hazardous/mixed waste, and nonhazardous liquid and solid waste. The estimated waste generation rates from the operation of each of the facilities are discussed in Sections 4.3.4.2.1 and 4.3.4.2.2 and are summarized in Table 4.11. Overall, the operation of the facilities would have a small impact on the SRS waste management system. The DOE has concluded (DOE 2003) that impacts are bounded by its SPD EIS (DOE 1999a).

4.3.4.2.1 Operating Facility Description

MOX Facility. The proposed fabrication of MOX fuel consists primarily of two steps: the aqueous polishing process and the fuel fabrication process. These two processes generate several types of waste that are discussed below. The aqueous polishing step removes impurities from the plutonium. The fuel fabrication process involves the blending of the purified plutonium with the depleted uranium dioxide to form pellets. The pellets would be incorporated

Table 4.11. Waste volumes from the 10-year operational period of the facilities compared with waste management capacities at the SRS

Waste type	Estimated MOX facility operational waste[b]	Estimated PDCF operational waste[b]	Estimated WSB operational waste[b]	SRS capacity[a]		
				Characterization or treatment (annual capacity)	Storage (total capacity)	Disposal (total capacity)
TRU (m^3)[c]	2,340	180	1,911	1,720	34,400	168,500[d]
LLW[e]						
Liquid (L)	10,800,000	416,000	11,570,000	17,830,000	NA[f]	594,000,000
Solid (m^3)	1,760	184	4,108	17,830	NA	30,500
Hazardous[g] (m^3)	110	10	0	17,830	5,170	NA
Nonhazardous[h]						
Liquid (L)	333,000,000	250,000,000	19,000,000	1,033,000,000	NA	NA
Solid (m^3)	13,400	18,000	10,000	NA	NA	NA

[a]Storage and disposal capacity estimates presented represent total capacity at the SRS. Sources of estimates: DOE (1999a).

[b]The facilities are assumed to be in operation for a 10-year period. Sources for estimates: MOX facility (DCS 2004a); PDCF (DOE 1999a and DCS 2004a); WSB (DCS 2004a and DOE 1999a). The volumes presented for WSB TRU and solid LLW represent that generated from processing the high-alpha liquid and stripped uranium waste streams from the MOX facility. Liquid LLW volume was obtained from DCS 2004a (presented on page 5-23 of DCS 2004a as 890 m^3 annually and multiplied by 13 years of approximate operation for the WSB). Hazardous and nonhazardous waste volumes obtained by subtracting PDCF volumes presented in this table from values presented in DCS 2004a Table 5-15c.

[c]The combined values of TRU waste that would be generated from the three facilities is estimated to be approximately 26% and 13% of the treatment and storage capacity, respectively, at the SRS. The generated TRU waste is approximately 2.6% of the disposal capacity at WIPP.

[d]Value represents limit for TRU waste at the WIPP.

Footnotes continued on next page.

Table 4.11. Continued

[e]The volume reported for PDCF (in DOE 1999a) is 60 m^3/yr (or 600 m^3/10 yrs), but the liquid versus solid amounts were not specified. The volume of 41,600 L/yr or 416,000 L (416 m^3) over 10 years, as reported in DCS 2004a, was subtracted from the volume reported in DOE 1999a to obtain the volume for solid LLW (i.e., 600 m^3 – 416 m^3 = 184 m^3). The liquid LLW generated by the three facilities constitutes 4% of the discharge capacity at SRS. The solid LLW generated constitutes about 21% of the disposal capacity at SRS (if disposed of entirely at the SRS). Disposal of solid LLW will either be at the SRS or at another approved facility.

[f]NA = Not applicable.

[g]Hazardous waste that would be generated is less than 1% of the treatment and less than 2% of the storage capacity at the SRS.

[h]The nonhazardous liquid waste generated constitutes about 6% of the treatment capacity at SRS.

into the fuel rods, which would then be placed in fuel assemblies. Figure 4.1 depicts the waste streams and volumes generated and the final disposition for each.

The aqueous polishing process would generate approximately 33,300 L/yr (8,800 gal/yr) of liquid high-alpha waste, 174,000 L/yr (46,000 gal/yr) of stripped uranium waste, 1,078,000 L/yr (285,000 gal/yr) of chloride removal waste, and 10,600 L/yr (2,800 gal/yr) of excess solvent waste. The liquid high-alpha waste consists of three waste streams (liquid americium waste stream, excess acid waste stream, alkaline wash waste stream). The liquid high-alpha waste and the stripped uranium waste stream would be sent to the WSB via separate pipelines for further treatment. Because the liquid high alpha waste and stripped uranium waste would be processed at the WSB, the final waste volumes following processing are included in the discussion of the WSB. The chloride removal waste would be collected in tanks and transferred to the WSB. The excess solvent waste would be sent to SRS facilities or to a commercial facility for treatment and disposal as a contaminated solvent waste.

The fuel fabrication process and maintenance activities would generate approximately 1,340 m^3/yr (1,750 yd^3/yr) of solid nonhazardous waste, 176 m^3/yr (230 yd^3/yr) of solid LLW, and 234 m^3/yr (306 yd^3/yr) of solid TRU waste. The solid non-hazardous waste consists of sanitary waste (e.g., garbage, machine shop waste, and other industrial waste) and non-sanitary waste (e.g, paper, metal cans, plastic and glass bottles).

The MOX facility would also generate approximately 33.3 million L/yr (8.8 million gal/yr) of nonhazardous liquid waste. This waste includes uncontaminated HVAC condensate, rinse water, and sanitary waste from sinks, showers, urinals, and water closets from the inactive area. The uncontaminated HVAC condensate (94,600 L/yr [25,000 gal/yr]) would be discharged to the stormwater system. The remaining nonhazardous liquid waste would be sent to SRS for processing at the CSWTF.

PDCF. The PDCF would be used to recover the plutonium metal from the pits of disassembled weapons and would convert the weapons-grade plutonium to plutonium dioxide powder. The PDCF would accommodate the following surplus plutonium-processing activities: pit receipt, storage, and preparation; pit disassembly; plutonium conversion; oxide blending and sampling; nondestructive assay; product canning; product storage; product inspection and sampling for international inspection; product shipping; declassification of parts not made from special nuclear material (SNM); highly enriched uranium (HEU) decontamination, packaging, storage, and shipping; tritium capture, packaging, and storage; and waste packaging, sampling and certification.

Aside from the 41,600 L/yr (11,000 gal/yr) of laboratory radioactive liquid waste that would be transferred to the WSB for further processing, the operations at the PDCF would also generate about 18 m^3/yr (24 yd^3/yr) of solid TRU waste. TRU waste generated during operations would include spent filters, contaminated beryllium pieces and cuttings, used containers and equipment, paper and cloth wipes, analytical and quality control samples, and solidified inorganic solutions. Liquid TRU wastes would be evaporated or solidified before being packaged for storage. About 60 m^3/yr (78 yd^3/yr) of LLW (assumed to be all solid) would also be generated. LLW generated during operations would originate from activities in the

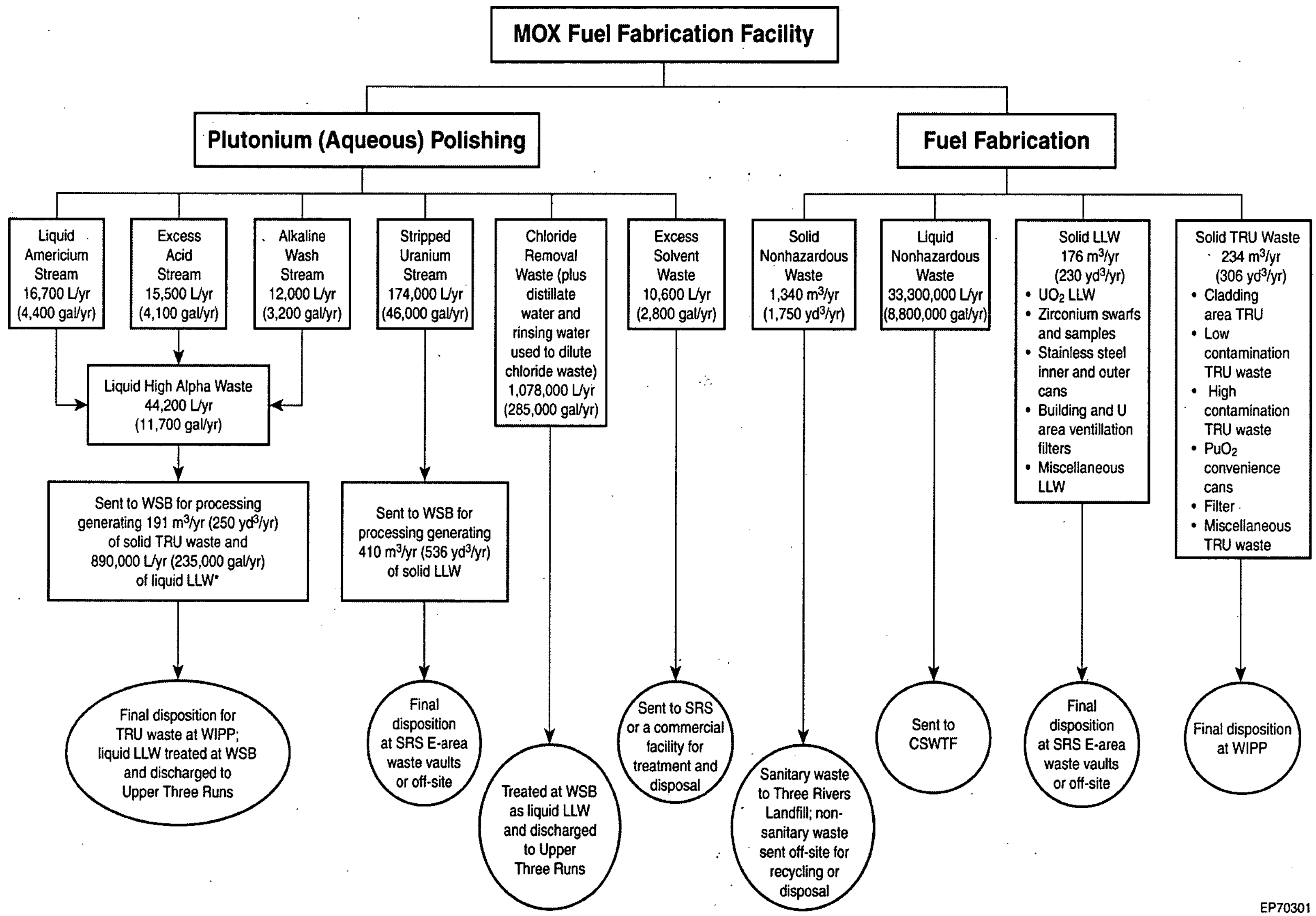

Figure 4.1. Waste streams generated by the proposed MOX facility (*Source*: Modified from DCS 2003a; 2004a).

processing areas. LLW would include equipment, wipes, protective clothing, solidified inorganic solutions, and tritium. Liquid LLW would be evaporated or solidified before being packaged for accumulation. About 1 m^3/yr (1.3 yd^3/yr) of hazardous/mixed waste generated during operations would include spent cleaning solutions, vacuum pump oils, film processing fluids, hydraulic fluids, antifreeze solutions, paints, chemicals, lead packaging, and contaminated rags or wipes. Hazardous waste would be packaged for treatment and disposal at off-site permitted commercial facilities.

Two types of nonhazardous waste would be generated; 25 million L/yr (6.6 million gal/yr) liquid waste and 1,800 m^3/yr (2,350 yd^3/yr) of solid waste. Nonhazardous solid waste would include office garbage, machine shop waste, and other industrial wastes from utility and maintenance operations. Recyclable solid waste would be sent off the site for recycling. Nonhazardous liquid waste would include sanitary waste from sinks, showers, urinals, and water closets and process wastewater from lab sinks and drains, mop water, and cooling tower blowdown.

Waste Solidification Building. The WSB would process three waste streams from the proposed MOX facility (i.e., liquid high-alpha waste, stripped uranium waste, and liquid LLW) and two waste streams from the PDCF (i.e., PDCF laboratory liquid stream and liquid LLW). The WSB would be expected to generate about 191 m^3/yr (250 yd^3/yr) of solid TRU waste from the processing of the liquid high-alpha-activity waste resulting from the aqueous polishing step conducted at the proposed MOX facility. About 890,000 L/yr (235,000 gal/yr) of liquid LLW would also be generated from the processing of the liquid high-alpha-activity waste and the stripped uranium waste from the aqueous polishing step, and the laboratory liquid waste from the PDCF. The waste streams would be batch-transferred as a separate waste to the WSB through separate double-walled stainless steel pipelines. The wastes would be collected in the waste receipt area of the WSB. This area would be equipped with separate collection tanks for each waste type, with capacities to hold waste volumes generated for a period of 6-8 weeks at a time.

Following receipt at the WSB, the high-alpha-activity waste would be reduced in volume by evaporation, and the still bottoms would be neutralized with sodium hydroxide. The distillate would be subjected to further treatment at the WSB and discharged to a permitted outfall. The neutralized bottoms would be blended with cement to produce a solid TRU waste matrix suitable for disposal at WIPP. The high-activity waste overheads (materials that evaporate and are collected) would be transferred to the low-activity waste head tank for a second evaporator process.

The stripped uranium waste and the PDCF laboratory liquids would also be evaporated at the WSB to reduce the volume. As noted above, the high-activity waste overheads would be further evaporated in the low-activity waste evaporator. The process is similar to what would be used for the liquid high-alpha waste. About 410 m^3/yr (536 yd^3/yr) of solid LLW is expected to be generated at the WSB from processing the stripped uranium waste transferred from the proposed MOX facility (DCS 2004c).

4.3.4.2.2 Waste Management Impacts from Operation

This section describes how the TRU, liquid and solid LLW, mixed LLW, hazardous, and nonhazardous wastes would be managed. It also describes the potential waste management impacts for a 10-year period. As discussed above, approximately, 4,431 m^3 (5,796 yd^3) of TRU waste would be generated each 10-year period during the operation of the three facilities. The DOE has a national program for the management and disposal of defense-related TRU waste. Subsequently, waste acceptance criteria (WAC) for receipt of TRU waste at WIPP have been established for contact-handled TRU (CH-TRU) waste. The TRU wastes generated from the proposed MOX facility, the PDCF, and the WSB are expected to be in this category. The WAC that must be met for CH-TRU waste to be transported to, managed at, and disposed of at WIPP address container properties, radiological properties, physical properties, chemical properties, and data package contents. The generator facilities are required to transmit characterization, certification, and shipping data to WIPP before shipping waste.

The liquid LLW generated (22,786,000 L [6.0 million gal]/10 yr) from the three facilities would be transferred to the WSB for treatment and then discharged to the Upper Three Runs Creek consistent with permit discharge limitations. The liquid LLW from the three facilities would be about 4% of the discharge capacities at SRS. Solid LLW generated (6,052 m^3 [7,916 yd^3]/10 yr) would be packaged, certified, and accumulated at the F-Area before transfer to the appropriate facilities for treatment and disposal (at the SRS E-Area waste vaults or at an approved off-site facility). The solid LLW from the three facilities would constitute about 21% of the disposal capacity at SRS (if disposed of entirely at SRS).

Hazardous wastes (120 m^3 [157 yd^3]/10 yr) generated from the three facilities would either be transferred to the SRS for treatment and storage at either on-site or off-site facilities and disposal at off-site, permitted facilities or shipped off site for treatment and disposition at permitted facilities. If the treatment and disposal are assumed to be on-site, the expected wastes volumes from the facilities would represent less than 2% of the capacities at the SRS. Therefore, the facilities' waste should not affect the SRS hazardous waste management system.

Nonhazardous solid waste (41,400 m^3 [54,149 yd^3]/10 yr) generated from the three facilities would be packaged and transported in accordance with standard industrial practices. Recyclable waste would be sent off-site, with the remaining waste (primarily solid sanitary waste) sent to the Three Rivers Landfill for disposal. The nonsanitary waste would be sent off-site for recycling or disposal.

Nonhazardous liquid wastes (602,000,000 L [159 million gal]/10 yr) from the three facilities would be treated before being discharged to the F-Area sanitary sewer system, which connects to the SRS Central Sanitary Wastewater Treatment Facility. The wastes of this type expected to be generated by operations of the facilities are estimated to be about 4% of the capacity of the Central Sanitary Wastewater Treatment Facility. These additional wastes would constitute a small contribution and should not affect the nonhazardous liquid waste management system at the SRS.

Although the current plans call for treating all liquid LLW generated at the proposed MOX facility, the PDCF, and the WSB at the WSB and discharging the treated effluents to a permitted outfall on the SRS site following the NPDES permit guidelines, it is possible that at some future date liquid LLW streams generated at these facilities may be sent to the Effluent Treatment Facility (ETF) on the SRS. If that should happen, the waste management impacts discussed in this EIS would still be comparable to or would bound the impacts that would occur during the management of wastes resulting from the operation of the three facilities, namely the proposed MOX facility, the PDCF, and the WSB.

4.3.5 Accident Impacts

This section discusses hypothetical accidents that could occur at the proposed facilities (the MOX facility, the PDCF, and the WSB), and the estimated maximum impacts that such accidents could produce. Table 4.12 lists the various accidents considered, and Tables 4.13, 4.14, and 4.15 list the estimated radiological impacts on SRS employees, the collective off-site public, and the maximally exposed member of the public, respectively. The potential impacts of accidental chemical releases from the proposed facilities are discussed in Section 4.3.5.3. This section describes the potential accident impacts in more detail and includes a discussion of impacts on local groundwater quality that could result from accidental releases.

4.3.5.1 Accidents Considered

4.3.5.1.1 Proposed MOX Facility

To obtain a possession and use license, DCS is required under 10 CFR Part 70, Subpart H, to perform an integrated safety analysis (ISA) to identify the hazards of the proposed MOX facility in a systematic and comprehensive manner. As an initial part of that process, DCS has completed a safety assessment that identified the following types of events that could lead to releases to the environment — natural phenomena, loss of confinement, internal fire, explosion, load handling events, external man-made events, criticality, direct radiation exposure, and chemical releases (DCS 2002a).

With respect to natural phenomena, DCS has shown that flooding does not pose a credible threat to the proposed MOX facility. For the remainder of the credible natural phenomena events, which include extreme winds, earthquakes, tornadoes, external fires, rain, snow, ice, and lightning, the applicant has committed to design criteria and standards that would prevent accidents associated with these hazards. For this reason, the effects of accidents caused by these phenomena are not described in this EIS.

External man-made events were also considered in DCS's hazard evaluation. These events include hazards from nearby facilities or vehicles. These hazards may include industrial facilities, military facilities, chemical facilities, nearby SRS facilities, pipelines, automobiles, and aircraft. A screening evaluation by DCS determined that credible external man-made events

Table 4.12. Accidents evaluated for the proposed facilities

Facility/ accident	Description
Proposed MOX facility	
Internal fire	A fire was postulated to occur in a storage location for polished plutonium dioxide powder (the PuO_2 Final Dosing Unit). The frequency of this event is considered to be unlikely or lower because multiple failures are required for this event to occur.
Explosion	A hypothetical explosion event was postulated to occur in an aqueous polishing process cell and involved the maximum material at risk in any process cell. Simultaneous failure of the design features and administrative controls resulting in an explosion and the subsequent release of radioactive materials is highly unlikely.
Load handling	The load-handling event postulated to produce the largest radiological consequences was a drop event involving the glovebox in the Jar Storage and Handling Unit. This glovebox would contain jars of plutonium powder. The frequency associated with this event is estimated to be unlikely or lower since multiple failures would be required for this event to occur.
Criticality	A criticality hazard arises whenever fissionable materials (e.g., uranium-235 or plutonium-239) are present in sufficient quantities to attain a self-sustaining fission chain reaction under optimal conditions. Thus, a generic hypothetical criticality event was evaluated.
Chemical releases	Chemical releases were modeled by assuming that the largest container for each chemical in storage at the facility was punctured. Chemical-specific characteristics were used to determine the amount of material released.
PDCF	
Fire	The bounding fire accident was assumed to occur in a plutonium glovebox. Against procedure, a flammable cleaning liquid was assumed to be taken into the glovebox used for blending plutonium powder. The liquid is inadvertently spilled and ignited, involving all of the gloves.
Explosion	Multiple equipment failures and operator errors were postulated to result in the ignition of a hydrogen and oxygen gas mixture in an inert-atmosphere glovebox. The resulting explosive pressure was assumed to damage the glovebox windows but would be insufficient to compromise the building HEPA filtration system.
Leak/spill	A forklift or other heavy vehicle running over a package of plutonium dioxide was postulated as the most catastrophic leak or spill. A portion of the released oxide becomes airborne and is filtered by the HEPA filtration system before entering the environment.

Table 4.12. Continued

Facility/ accident	Description
Criticality	A criticality involving plutonium dioxide powder was postulated because the PDCF handles amounts in excess of that required for such an accident. However, facility design and procedures are intended to preclude such an occurrence. No specific scenario was identified other than multiple failures due to human error.
Earthquake	During an earthquake event, the PDCF was expected to maintain its structural integrity, and the major safety systems, including building confinement and HEPA filtration, were assumed to continue to function. It was conservatively assumed that loose plutonium powder in gloveboxes would be resuspended and result in some minor spills.
Tritium release	Tritium contamination of parts in a glovebox was assumed to be released during a major glovebox fire. The formation of tritiated water vapor is postulated to occur, and the resulting vapor is released through the building ventilation system.
Chemical releases	Chemical releases were modeled by assuming that the largest container for each chemical in storage at the facility was punctured. Chemical-specific characteristics were used to determine the amount of material released.
WSB	
Loss of confinement	A facility-wide spill of all material in the low-activity process area was considered due to natural phenomena or an external event. The high-activity waste in this area is in hardened structures that are designed to withstand such an event (DCS 2003b).
Fire	The bounding fire accident was postulated to be an area fire in the low-activity processing section of the WSB. As a result of structural damage to the facility, thousands of gallons of unprocessed low-activity waste, low-activity bottoms, low-activity overheads, effluent bottoms, and effluent overheads are released.
Earthquake	An earthquake event was assumed to cause a spill of all material in the low-activity process area. A fire was then assumed to occur throughout the entire facility except for within the hardened structure that contains the high-activity cells. The potential impacts are taken to be the sum of the loss of confinement and fire events evaluated for the WSB.
Chemical releases	Chemical releases were modeled by assuming that the largest container for each chemical in storage at the facility was punctured. Chemical-specific characteristics were used to determine the amount of material released.

Table 4.13. Estimated human health radiological impacts to SRS employees from hypothetical facility accidents

	SRS employee MEI			SRS employee population		
Facility/accident	Dose [Sv (rem)]	Likelihood of LCF[a]	Major exposure pathway	Dose [person-Sv (person-rem)]	Fatalities (LCFs)[a]	Major exposure pathway
Pit Disassembly and Conversion Facility						
Criticality	0.00070 (0.070)	4×10^{-5}	External	0.062 (6.2)	0.004	External
Earthquake	4.0×10^{-5} (0.0040)	2×10^{-6}	Inhalation	0.023 (2.3)	0.001	Inhalation
Explosion	0.00033 (0.033)	2×10^{-5}	Inhalation	0.19 (19)	0.01	Inhalation
Fire	1.2×10^{-6} (0.00012)	7×10^{-8}	Inhalation	0.00071 (0.071)	4×10^{-5}	Inhalation
Leak/spill	4.0×10^{-7} (4.0×10^{-5})	2×10^{-8}	Inhalation	0.00023 (0.023)	1×10^{-5}	Inhalation
Tritium release	0.026 (2.6)	0.002	Inhalation	18 (1,800)	1	Inhalation
Proposed MOX Facility						
Criticality	0.023 (2.3)	0.001	External	3.0 (300)	0.2	External
Explosion	0.0068 (0.68)	0.0004	Inhalation	3.9 (390)	0.2	Inhalation
Internal fire	0.00025 (0.025)	2×10^{-5}	Inhalation	0.15 (15)	0.009	Inhalation
Load handling	0.0010 (0.10)	6×10^{-5}	Inhalation	0.60 (60)	0.04	Inhalation
Waste Solidification Building						
Loss of confinement	0.00030 (0.030)	2×10^{-5}	Inhalation	0.16 (16)	0.01	Inhalation
Fire	0.0058 (0.58)	0.0003	Inhalation	3.2 (320)	0.2	Inhalation
Earthquake	0.0061 (0.61)	0.0004	Inhalation	3.4 (340)	0.2	Inhalation

[a]Latent cancer fatalities are calculated by multiplying dose by the FGR 13 health risk conversion factor of 0.06 fatal cancer per person-Sv (6×10^{-4} fatal cancer per person-rem) (Eckerman et al. 1999). Values are rounded to one significant figure.

Table 4.14. Estimated human health radiological impacts to the collective off-site public from hypothetical facility accidents

Facility/accident	Dose [person-Sv (person-rem)]	Fatalities (LCFs)[a]	Major exposure pathway
Short-Term Exposure			
Pit Disassembly and Conversion Facility			
Criticality	0.048 (4.8)	0.003	External
Earthquake	0.054 (5.4)	0.003	Inhalation
Explosion	0.44 (44)	0.03	Inhalation
Fire	0.0017 (0.17)	0.0001	Inhalation
Leak/spill	0.00053 (0.053)	3×10^{-5}	Inhalation
Tritium release	42 (4,200)	3	Inhalation
Proposed MOX Facility			
Criticality	1.3 (130)	0.08	Inhalation
Explosion	9.1 (910)	0.5	Inhalation
Internal fire	0.35 (35)	0.02	Inhalation
Load handling	1.4 (140)	0.08	Inhalation
Waste Solidification Building			
Loss of confinement	0.38 (38)	0.02	Inhalation
Fire	7.3 (730)	0.4	Inhalation
Earthquake	7.7 (770)	0.5	Inhalation
1-Year Exposure without Ingestion			
Pit Disassembly and Conversion Facility			
Criticality	0.052 (5.2)	0.003	External
Earthquake	0.054 (5.4)	0.003	Inhalation
Explosion	0.44 (44)	0.03	Inhalation
Fire	0.0017 (0.17)	0.0001	Inhalation
Leak/spill	0.00053 (0.053)	3×10^{-5}	Inhalation
Tritium release	42 (4,200)	3	Inhalation
Proposed MOX Facility			
Criticality	1.5 (150)	0.09	Inhalation
Explosion	9.1 (910)	0.5	Inhalation
Internal fire	0.35 (35)	0.02	Inhalation
Load handling	1.4 (140)	0.08	Inhalation
Waste Solidification Building			
Loss of confinement	0.38 (38)	0.02	Inhalation
Fire	7.3 (730)	0.4	Inhalation
Earthquake	7.7 (770)	0.5	Inhalation

Table 4.14. Continued

Facility/accident	Dose [person-Sv (person-rem)]	Fatalities (LCFs)[a]	Major exposure pathway
1-Year Exposure with Ingestion			
Pit Disassembly and Conversion Facility			
Criticality	0.13 (13)	0.008	Ingestion
Earthquake	0.16 (16)	0.01	Ingestion
Explosion	1.3 (130)	0.08	Ingestion
Fire	0.0049 (0.49)	0.0003	Ingestion
Leak/spill	0.0016 (0.16)	0.0001	Ingestion
Tritium release	1,800 (180,000)	100	Ingestion
Proposed MOX Facility			
Criticality	9.6 (960)	0.6	Ingestion
Explosion	27 (2,700)	2	Ingestion
Internal fire	1.1 (110)	0.07	Ingestion
Load handling	4.1 (410)	0.2	Ingestion
Waste Solidification Building			
Loss of confinement	0.65 (65)	0.04	Ingestion
Fire	13 (1,300)	0.8	Ingestion
Earthquake	14 (1,400)	0.8	Ingestion

[a]Latent cancer fatalities are calculated by multiplying dose by the FGR 13 health risk conversion factor of 0.06 fatal cancer per person-Sv (6×10^{-4} fatal cancer per person-rem) (Eckerman et al. 1999). Values are rounded to one significant figure.

will not significantly impact facility operations (DCS 2002a). For this reason, the effects of accidents caused by such events are not described in this FEIS.

Direct radiation hazards generally arise from radioactive material or other sources that emit penetrating gamma or neutron radiation. The radioactive material that would be used in the proposed MOX facility produces mostly alpha radiation, which is not as penetrating and is a less significant direct radiation hazard, but could cause adverse health effects when inhaled. As a result, there would be no accidents at the proposed MOX facility that would produce a direct radiation hazard to the public. In addition, other than a criticality event, there would be no accidents that would produce a direct radiation exposure hazard for an SRS employee.

The events for which accident consequences were evaluated in this FEIS are internal fire, explosion, load handling event, criticality, and chemical releases. The methods employed to analyze accident consequences were based on conservative assumptions and were intended to provide a comprehensive, bounding analysis for all potential events up to and including design basis accidents.

Table 4.15. Estimated human health radiological impacts to the maximally exposed member of the public from hypothetical facility accidents

Facility/accident	Dose Dose [mSv (mrem)]	Likelihood of LCF[a]	Major exposure pathway
Short-Term Exposure			
Pit Disassembly and Conversion Facility			
Criticality	0.0038 (0.38)	2×10^{-7}	External
Earthquake	0.0011 (0.11)	7×10^{-8}	Inhalation
Explosion	0.0094 (0.94)	6×10^{-7}	Inhalation
Fire	3.5×10^{-5} (0.0035)	2×10^{-9}	Inhalation
Leak/spill	1.2×10^{-5} (0.0012)	7×10^{-10}	Inhalation
Tritium release	0.90 (90)	5×10^{-5}	Inhalation
Proposed MOX Facility			
Criticality	0.098 (9.8)	6×10^{-6}	External
Explosion	0.2 (20)	1×10^{-5}	Inhalation
Internal fire	0.0077 (0.77)	5×10^{-7}	Inhalation
Load handling	0.030 (3.0)	2×10^{-6}	Inhalation
Waste Solidification Building			
Loss of confinement	0.0081 (0.81)	5×10^{-7}	Inhalation
Fire	0.16 (16)	1×10^{-5}	Inhalation
Earthquake	0.17 (17)	1×10^{-5}	Inhalation
1-Year Exposure without Ingestion			
Pit Disassembly and Conversion Facility			
Criticality	0.0042 (0.42)	3×10^{-7}	External
Earthquake	0.0011 (0.11)	7×10^{-8}	Inhalation
Explosion	0.0094 (0.94)	6×10^{-7}	Inhalation
Fire	3.5×10^{-5} (0.0035)	2×10^{-9}	Inhalation
Leak/spill	1.2×10^{-5} (0.0012)	7×10^{-10}	Inhalation
Tritium release	0.90 (90)	5×10^{-5}	Inhalation
Proposed MOX Facility			
Criticality	0.11 (11)	7×10^{-6}	External
Explosion	0.2 (20)	1×10^{-5}	Inhalation
Internal fire	0.0077 (0.77)	5×10^{-7}	Inhalation
Load handling	0.030 (3.0)	2×10^{-6}	Inhalation
Waste Solidification Building			
Loss of confinement	0.0081 (0.81)	5×10^{-7}	Inhalation
Fire	0.16 (16)	1×10^{-5}	Inhalation
Earthquake	0.17 (17)	1×10^{-5}	Inhalation

Table 4.15. Continued

Facility/accident	Dose Dose [mSv (mrem)]	Likelihood of LCF[a]	Major exposure pathway
1-Year Exposure with Ingestion			
Pit Disassembly and Conversion Facility			
Criticality	0.012 (1.2)	7×10^{-7}	Ingestion
Earthquake	0.0016 (0.16)	1×10^{-7}	Inhalation
Explosion	0.013 (1.3)	8×10^{-7}	Inhalation
Fire	4.9×10^{-5} (0.0049)	3×10^{-9}	Inhalation
Leak/spill	1.3×10^{-5} (0.0013)	8×10^{-10}	Inhalation
Tritium release	39 (3,900)	0.002	Ingestion
Proposed MOX Facility			
Criticality	0.6 (60)	4×10^{-5}	Ingestion
Explosion	0.23 (23)	1×10^{-5}	Inhalation
Internal fire	0.012 (1.2)	7×10^{-7}	Inhalation
Load handling	0.045 (4.5)	3×10^{-6}	Inhalation
Waste Solidification Building			
Loss of confinement	0.010 (1.0)	6×10^{-7}	Inhalation
Fire	0.20 (20)	1×10^{-5}	Inhalation
Earthquake	0.21 (21)	1×10^{-5}	Inhalation

[a]Latent cancer fatalities are calculated by multiplying dose by the FGR 13 health risk conversion factor of 0.06 fatal cancer per person-Sv (6×10^{-4} fatal cancer per person-rem) (Eckerman et al. 1999). Values are rounded to one significant figure.

Radiological release accidents were classified into likelihood categories on the basis of qualitative estimates (DCS 2001, 2002a). The likelihood categories were defined as follows:

- Not Unlikely – Event may occur during the facility's lifetime.
- Unlikely – Event is not expected to occur during the facility's lifetime, but may be considered credible.
- Highly Unlikely – Event originally classified as "not unlikely" or "unlikely" to which sufficient controls have been applied to further reduce its likelihood to an acceptable level.

DCS did not classify the likelihood of chemical release accidents. An assessment was conducted that assumed the largest container for each chemical in storage was punctured, although safety precautions are exercised to avoid such occurrences.

A short description of each event evaluated for the accident risk assessment is given in Table 4.12. Additional details of the assessment methodology are provided in Appendix E.

4.3.5.1.2 Pit Disassembly and Conversion Facility

A wide range of accident scenarios was considered previously for the PDCF (DOE 1999a). Potential accidents from both man-made and natural phenomena were considered. The potential accidents evaluated for this FEIS were taken from DOE (1999a) and are listed in Table 4.12.

4.3.5.1.3 Waste Solidification Building

A procedure similar to those used for the proposed MOX facility and the PDCF was used to identify potential accidents at the WSB. Those accidents considered to be credible were evaluated (DCS 2003b). A description of the accidents is presented in Table 4.12.

4.3.5.2 Radiological Human Health Risk

For exposures to depleted uranium, the health impacts would be expected to be dominated by the chemical toxicity of the compounds rather than by their radiological effects (see Section 4.3.5.3). A lethal exposure from the chemical toxicity of uranium (resulting from kidney failure), would occur with an internal radiation dose of about 0.01 Sv (1 rem) (over a lifetime), a dose that is not considered to have any significant radiation health effects.

Receptors: Radiation doses and health risk effects were calculated for SRS employees and the public. General definitions of these receptor groups are given in Section 3.10.2.

For radiological hazards, the dose consequences to facility workers and SRS employees following an accident would generally be dominated by the 50-year committed effective dose equivalent from radioactive material inhaled immediately following the event. For the purposes of analyses in this FEIS, this period of inhalation is assumed to last 8 hours. This exposure pathway would dominate the dose (except in the case of criticality accidents) because it is assumed that direct exposure to contaminated areas following an accident can be effectively limited. In addition, no food is grown on the SRS, so the consumption of contaminated food is not included in the dose for facility workers or SRS employees. Criticality accidents involve radionuclides, other than uranium or plutonium, that pose a higher direct radiation hazard than do inhalation or ingestion.

Unlike SRS employees, members of the public could reasonably be expected to be exposed to both contaminated soil and food for some time beyond the early phase of an accident if no protective action is taken. Initial food contamination occurs through the direct deposition of airborne radioactive material onto crops. A lower level of contamination occurs through crop root uptake of radioactive material from contaminated soil. Thus, the largest ingestion exposure would occur if crops were ready for harvest immediately following an accidental release. Many stakeholders want to know what could happen if no interdiction of crops occurred. Whether an individual would be exposed to contaminated soil and food would depend on the specific protective actions that the applicant and government agencies might take following an accident. The NRC recognizes that some interdiction would likely occur following a significant accident, even if contamination levels were below the protective action guides. Therefore, three separate sets of impacts to members of the public were assessed for accidents. The first set of impacts is for the early phase (short-term period) of an accident similar to the exposure pathways evaluated for the SRS employees. The second and third sets of impacts are for the intermediate/long-term period (1 year) following an accident. The second set presents the impacts without the ingestion pathway (if interdiction occurred). The third set presents the ingestion pathway included in the impacts (if interdiction did not occur) with crops assumed to be ready for harvest immediately following an accidental release (a bounding analysis). Thus, a range of impacts to the public are presented to provide perspective on the potential exposures associated with the consumption of contaminated crops for the 1-year exposure period.

Population doses were calculated for up to a distance of 80 km (50 mi) from the release point for 10 downwind distances and 16 wind directions. Radiation doses were calculated for the following receptors for accident conditions:

- *SRS employee MEI:* For the purposes of the accident consequence assessment, an employee on the SRS at the point of maximum air concentration located close to, but outside, the facility's protected area fence (at least 100 m [330 ft] or more from the accident location). Exposure pathways assessed were inhalation exposure and direct radiation from the passing cloud of airborne radioactive material (cloudshine) released by the accident. A period of 8 hours of direct radiation exposure from deposited radioactive material on the ground (groundshine) following the accident was also considered.

- *SRS employee population:* All employees on the site located more than 100 m (330 ft) from the accident location outside the facility. The same exposure pathways as evaluated for the SRS employee MEI were evaluated for the collective SRS employee population.

- *Off-site MEI:* A hypothetical individual member of the public living off-site and receiving the maximum exposure from accidental releases. For the purposes of the accident consequence assessment, this individual was assumed to be located at the SRS boundary. A short-term exposure period, involving the same exposure pathways assessed for the SRS employees, and a 1-year exposure period were evaluated. The 1-year exposure evaluation included the short-term exposures, but it also included a 1-year exposure, not 8 hours, to groundshine and a 1-year ingestion exposure to contaminated food grown locally. Contaminated crops were not assumed to be condemned; all locally grown food was assumed to have been consumed.

- *General population:* All members of the public within an 80-km (50-mi) radius of the site where the accident might occur. Short-term and 1-year impacts to the general population were assessed on the basis of the same exposure pathways as for the public, or off-site, MEI.

During an accident, facility workers might be subject to severe physical and thermal (fire) forces and could be exposed to releases of chemicals and radiation. The risk to the facility workers would be very sensitive to the specific circumstances of each accident and would depend on how rapidly the accident developed, the exact location and response of the workers, the direction and amount of the release, the physical and thermal forces causing or caused by the accident, meteorological conditions, and characteristics of the room or building if the accident occurred indoors. Quantitative facility worker accident impacts are not provided in this FEIS. For most events, the applicant has conservatively assumed that consequences to the facility worker MEI would exceed the applicable performance requirements in 10 CFR 70.61 and has identified preventive or mitigative features in the facility's design basis in order to meet the performance requirements. However, it is recognized that worker injuries and fatalities would be possible from chemical, radiological, thermal, and physical forces if an accident did occur.

Impacts: Estimated radiological impacts from the four hypothetical accident scenarios considered are presented in Tables 4.13, 4.14, and 4.15 and are discussed below. While the consequences of many of these accidents are significant, the likelihood of significant accidents will be very low (highly unlikely) through the use of safety systems discussed in DCS's Construction Authorization Request. Thus, the overall risk of significant accidents is considered to be low.

SRS employee population: SRS employees were assumed to be unshielded from the passing plume of airborne radioactivity released during an accident. The impacts for the collective SRS employee population given in Table 4.13 were estimated for inhalation and external radiation exposure. External radiation exposure consisted of cloudshine and groundshine. Groundshine exposure was evaluated for 8 hours following an accident and was negligible, less than approximately 0.02% of the total dose, in all cases. The impacts presented in Table 4.13 are the highest potential impacts to the SRS employee population and were found to occur in the direction of the major F-Area facilities, toward the south-southwest. The dominant exposure pathway was inhalation for all accidents except for the hypothetical criticality events. For those hypothetical criticality events, exposure to cloudshine was estimated to account for approximately 70% of the collective dose; the remaining dose was estimated to result from inhalation.

The SRS employee MEI was estimated to receive a maximum dose, 0.026 Sv (2.6 rem), from the tritium release at the PDCF. This dose was from the inhalation pathway. For this dose, the likelihood of developing a latent fatal cancer was estimated to be 0.002 (about 1 chance in 500). SRS employee MEI impacts for all accidents considered are presented in Table 4.13.

Members of the public: As discussed above, impacts to the public were assessed for a short-term period immediately following the accident and for a 1-year exposure period following the accident that includes the short-term exposures. With the exception of nuclear criticality accident events, inhalation was the dominant exposure pathway for the public in the short term and 1-year exposure without ingestion. Maximum inhalation doses would occur to the west-northwest of the SRS and would be more than 100 million times any external exposure. For the 1-year exposure to the public with ingestion, the ingestion pathway was the dominant exposure pathway. The highest potential 1-year ingestion dose would be to the southwest of the SRS.

Inhalation would account for the remainder of the dose except in the case of the criticality accidents where external exposure and inhalation make up the balance of the dose. Further details of the accident risk analysis are given in Appendix E.

The tritium release accident at the proposed PDCF was estimated to result in the largest short-term exposure. An estimated collective dose of 42 person-Sv (4,200 person-rem) was projected to be received by a population of approximately 309,900 persons extending out to 80 km (50 mi) to the west-northwest of the proposed MOX facility. The average individual dose was projected to be approximately 0.14 mSv (14 mrem), about 4% of the value an individual would receive on an annual basis from existing natural and man-made sources in the SRS vicinity. However, persons living closer to the accident location would receive a higher dose on average as discussed below for the hypothetical public MEI. The collective population dose received from this accident is estimated to have a risk of an additional 3 LCFs in the affected population.

The tritium release accident at the PDCF also produced the largest 1-year collective population doses. For the case without ingestion, the results were the same as discussed above for the short-term impacts because inhalation of the passing airborne emissions was the dominant exposure pathway. For the case with ingestion, the largest impact was calculated for winds blowing toward the southwest, where 18,010 people reside. The estimated collective population dose was 1,800 person-Sv (180,000 person-rem). This dose corresponds to a human health effect of up to 100 LCFs. However, for the purposes of this EIS, all contaminated food that would be grown in an affected area is assumed to be eaten. Because the amount of contaminated food exceeds the amount that would be consumed by persons living within the affected area, it is further assumed that some of the affected food would be shipped out of the region and consumed by persons living outside the region. Excluding ingestion, the dose received by the people residing in the southwest sector was 1.7 person-Sv (170 person-rem). The remainder of the dose was attributed to the ingestion of all contaminated crops in the southwest sector. Therefore, the collective dose of 1,800 person-Sv includes doses to persons both within the affected area and outside the region. As shown in Table 4.15, the public MEI was estimated to receive a dose of 0.039 Sv (3.9 rem) for this hypothetical accident, on the basis of individual consumption rates in Appendix E. Assuming that all 18,010 persons received the MEI dose, which would be an overestimate of the dose, the corresponding collective population dose would be about 40% of the total collective dose estimated above for the case including ingestion. Therefore, the people living within the affected area would receive less than 40% of the collective dose estimated.

The potential 100 LCFs among members of the public estimated from the PDCF tritium release accident is intended to be an upper bound for such an accident when the ingestion of contaminated food is considered. The GENII code used for the accident analysis provides impacts for the four seasons of the year (winter, spring, summer, and autumn), which correspond to various phases of crop growth. Ingestion impacts increase from winter (from radionuclide deposition on soil only) through autumn (from radionuclide deposition on plants immediately prior to harvest). As discussed earlier in this section, when impacts were estimated, crops were assumed to be ready for harvest (autumn) at the time of an accidental release. This assumption was made to place an upper bound on any expected impacts resulting from the ingestion of contaminated food. In addition, ingestion pathway impacts estimated with GENII typically display a steady increase upon progressing from winter through spring, summer, and autumn, resulting from an increase in direct deposition on crops due to increased crop growth. However, in the case of tritium contamination, an ingestion dose of 0 person-Sv was estimated for winter, spring, or summer, and an ingestion dose of 1,800 person-Sv (180,000 person-rem) was estimated for autumn.

GENII incorporates a tritium-specific model that recognizes that tritium, in the form of water vapor, is an integral part of the environment and human metabolism and exchanges readily with other water in the environment. As modeled, the deposited tritium has a chance to dissipate in the environment prior to crop harvest (i.e., winter, spring, and summer impacts), but if deposited immediately prior to harvest (autumn impacts), the tritium is assumed to remain in the crops. Thus, the 100 LCFs calculated from the collective population dose of 1,800 person-Sv (180,000 person-rem) from the PDCF tritium release accident is a high upper-bound estimate because further dissipation of the tritium after crop harvest would be likely to occur before ingestion.

Impacts were assessed for an MEI living at the SRS boundary for short-term, 1-year without ingestion, and 1-year with ingestion exposures. In all three cases, maximum impacts were found to occur to a hypothetical individual located 9,070 m (5.6 mi) northwest of the facilities as a result of the PDCF tritium release accident. As shown in Table 4.15 , the highest estimated dose to the public MEI was 0.90 mSv (90 mrem) in the short term from inhalation exposure. The potential maximum 1-year exposure without ingestion accident impact was estimated to be the same as the short-term exposure impact because both are dominated by inhalation exposure to the passing airborne contaminant plume immediately following an accidental release. If ingestion of contaminated crops is considered, a total exposure of 39 mSv (3,900 mrem) was estimated for the MEI. The resulting health effects were estimated to be a chance of contracting a latent fatal cancer over their lifetime of 5×10^{-5} (1 chance in 20,000) and 0.002 (about 1 chance in 500) as a result of the short-term or 1-year without ingestion exposures and the 1-year with ingestion exposure, respectively.

No mitigative actions were considered in the above analysis for the 1-year MEI exposure with ingestion. However, current Food and Drug Administration (FDA) recommendations (FDA 1998) include a protective action guide (PAG) of 5 mSv (500 mrem) CEDE and 50 mSv (5,000 mrem) committed dose equivalent to an individual tissue or organ, whichever is more limiting. These intervention levels of dose are radiation doses at which protective actions should be considered. The maximum public MEI ingestion dose of 39 mSv (3,900 mrem) would exceed the FDA PAG of 5 mSv (500 mrem) CEDE.

The impacts presented here are intended to provide a comprehensive bounding analysis for all potential events up to and including design basis accidents as discussed in Section 4.3.5.1. While non-credible "worst-case" accidents were not evaluated, a number of conservative assumptions were used to ensure that potential future impacts are bounded. Should an accident occur, potential nearby receptors would be the most vulnerable immediately after the event because they might not be aware of the accident and might not receive notification in time to take protective actions. However, those individuals farther from an accident would be more likely to receive notification in time and would be in a position to reduce doses by taking protective actions. The consequences reported here provide a range of impacts including the assumption that no protective actions are taken. Protective actions include sheltering or evacuation in the short-term and the banning of locally grown food in the long-term. Further, the 1-year results with ingestion presented here are based on the assumption that an accident occurs immediately before harvest. This is a bounding assumption because the direct deposition of radioactivity on crops would cause the highest ingestion exposures. However, long-term exposure without ingestion was also included for perspective. In addition, this analysis assumes that individuals are not sheltered during the accident and passing of the radioactive plume. Thus, the estimated accident impacts presented in this EIS are considered to bound future possible outcomes.

The radiological risks of accidents described in this FEIS are considered to be low because either the likelihood of these accidents would be significantly diminished, or sufficient controls would be applied to ensure the dose consequences are much lower than those presented here. The requirements to reduce the risk of accidents that could result in high consequences are contained in the NRC's regulations in 10 CFR Part 70, "Domestic Licensing of Special Nuclear Material," and the DOE's 10 CFR Part 830 "Nuclear Safety Management." In order to obtain a license to possess and use special nuclear material from the NRC, for example, the applicant must show that the risk of each credible high-consequence event is limited through the use of engineered controls, administrative controls, or both. Pursuant to this and other performance requirements, mitigation measures identified in Chapter 5 of this FEIS include those controls identified by the applicant to reduce the risks of potential accidents.

4.3.5.3 Chemical Human Health Risk

An analysis of potential impacts from accidental chemical releases was conducted. The analysis considered maximum inventories of stored chemicals at the proposed facilities and each chemical's physical characteristics (e.g., volatility) and its toxic concentration levels. Liquid storage containers with the largest chemical inventories were assumed to be punctured (e.g., by a forklift), resulting in a spill of the entire chemical contents of the container on an outdoor concrete surface. In general, it was assumed that the spill would occur onto an impervious surface from which evaporation could occur, rather than onto a soil surface where absorption would limit evaporation. (Two chemical releases were modeled as pressurized releases; see below.) Evaporation from the chemical pool was assumed to be of limited duration, not more than an hour, because of rapid mitigative response. The Areal Locations of Hazardous Atmospheres (ALOHA, Version 5.2.3) model (Reynolds 1992) was used with the aid of a liquid pool evaporation algorithm to assess the downwind consequences of such bounding-case spills. An assessment of the accidental release of uranium dioxide powder was also included.

For each release, potential impacts to two populations were evaluated — the off-site general public and SRS employees. For the SRS employee evaluation, a wind speed of 2.2 m/s (4.9 mph), F atmospheric stability class, and a temperature of 25.8°C (78.5°F), was determined to represent the site-specific 95th percentile concentration. This was established on the basis of the ARCON96 model chi/Q value (ratio of concentration to emissions) estimated at a distance of 100 m (330 ft) from the release. For the off-site general public evaluation, the bounding conditions were determined to be a wind speed of 1.3 m/s (3.0 mph), F atmospheric stability class, and a temperature of 25.8°C (78.5°F), representing site-specific, 95th percentile nighttime bounding meteorology. The 95th percentile meteorology was assumed to be a reasonable approximation of conditions that would produce the 95th percentile concentration consistent with the ARCON96 estimate at 100 m (330 ft). Details on the modeling assumptions are provided in Appendix E.

The criteria levels used to assess potential exposures were temporary emergency exposure limits (TEELs) adopted by the DOE Subcommittee on Consequence Assessment and Protective Action (SCAPA) (Craig 2002). TEEL values are available for about 2000 substances; they are derived by using a hierarchy of other available criteria values (Craig et al. 2000). If Emergency Response Planning Guidelines (ERPGs) developed by panels of toxicologists for the American Conference of Governmental Industrial Hygienists (ACGIH) are available, these are used for the TEEL values. If ERPGs are not available, TEELs usually are based on emergency planning and other guideline levels developed for the protection of workers (Craig 2002).

Several TEEL concentration values are available for each chemical (see text box on next page). For the purposes of this analysis, modeled exposures of SRS employees (assumed to be located 100 m [330 ft] from the release location) to levels greater than TEEL-3 for any chemical were defined as large consequence, and levels less than TEEL-3 but greater than TEEL-2 were defined as moderate consequence. The assessment for the off-site general public differed slightly, as discussed below.

The distance from the release location to the SRS boundary (the nearest location for potential exposures of the general public) is 8.2 km (5.1 mi). Since the ALOHA model restricts release durations to 1 hour, the ambient air concentration at that location could not be readily obtained (the concentrations for downwind distances at times exceeding 1 hour are not directly provided in the ALOHA model). Because plume travel time exceeded 1 hour (i.e., the ALOHA limit) for all of the evaporative spill scenarios considered, the estimated site boundary concentration was obtained by extrapolation methods (see Appendix E). To assess impacts to the general public, site boundary concentrations greater than TEEL-2 levels for any chemical were defined as large consequence, and levels less than TEEL-2 but greater than TEEL-1 were defined as moderate consequence. In addition, the maximum distances from the release point to which chemical TEEL-1 and TEEL-2 air concentrations could extend were estimated using the ALOHA model.

Two release scenarios, one involving nitrogen tetroxide and the other involving chlorine, were modeled as pressurized releases. The HGSYSTEM model (Post 1994a,b; Hanna et al. 1997) was used to simulate pressurized jet releases for punctured containers and the downwind dispersion of the released material. As was done with the ALOHA model for the evaporative dispersion cases, all model runs accounted for the influence of dense vapor cloud behavior on downwind dispersion in releases determined to exhibit this behavior.

Temporary Emergency Exposure Limits (TEELs)

TEEL-1: The maximum concentration in air below which it is believed that nearly all individuals could be exposed for up to one hour *without experiencing other than mild transient adverse health effects or perceiving a clearly defined objectionable odor.*

TEEL-2: The maximum concentration in air below which it is believed that nearly all individuals could be exposed for up to one hour *without experiencing or developing irreversible or other serious health effects or symptoms that could impair their abilities to take protective action.*

TEEL-3: The maximum concentration in air below which it is believed that nearly all individuals could be exposed for up to one hour *without experiencing or developing life-threatening health effects.*

The results of the assessment are summarized in Table 4.16. No accidental releases would result in concentrations exceeding TEEL-1 levels beyond the site boundary. Impacts from these spills on the general public would be small. For all spills, impacts could be minimized with rapid emergency response actions by nearby workers. This response would include quick mitigative action to cover the spill and to minimize evaporation and downwind transport. For SRS employees, impacts could be moderate or large for spills involving chlorine or nitrogen tetroxide. Specific response actions covered under the existing SRS Emergency Response Plan (SRS 2001), including remaining indoors (i.e., sheltering in place) and evacuating (e.g., including rapid evacuation of all nonemergency workers to an upwind location and into designated buildings), would be implemented to minimize worker exposures to spills involving hazardous chemicals of this type. The SRS Emergency Response Plan may be revised to address specific hazards that are not covered in the existing plan subsequent to safety analysis reviews required under DOE chemical safety standards or orders (e.g., DOE-STD-3009-94, DOE Order 420.1).

4.3.5.4 Hydrology

During the scoping process, a concern was raised about groundwater contamination through existing deep boreholes. There are 11 deep boreholes at the SRS. The closest deep borehole is located north of the unnamed tributary that is just north of the proposed MOX facility (see Figure 3.3). Impacts to the groundwater from the proposed facilities have been evaluated. The deep boreholes were determined not to be a credible path by which materials from the proposed facilities could contaminate groundwater, and there would be no discharges to groundwater. Surface spills from the facilities that might travel toward the deep boreholes would be intercepted by the unnamed tributary. Accidental releases that might possibly reach the groundwater would flow in the shallow groundwater aquifer and discharge to Upper Three Runs Creek.

This page is being withheld pursuant to 10 CFR 2.390(a).

Because accidental releases to surface water would be quickly remediated as required by the facility's Spill Prevention Control and Countermeasures Plan, impacts would be negligible. Materials released by leaks or ruptures of vessels and piping used to store and transfer process chemicals and liquid radioactive waste could affect surface water and groundwater. Bulk process chemicals would be stored and chemical mixtures would be prepared in the Reagent Processing Building. DCS has identified a number of chemical process safety controls to prevent significant spills or other accidents that would have the potential to significantly affect the human environment. These measures include administrative controls over segregation and separation of incompatible chemicals, concentration controls on specific reagents, and a process safety instrumentation and control system to measure and control process conditions to ensure safety limits are not exceeded.

Groundwater quality could be indirectly impacted by accidental releases of contaminated effluents or hazardous stored liquids and infiltration of contaminated runoff. Such impacts, however, are expected to be negligible because of adherence to guidelines established in existing NPDES permits and prompt cleanup of any spills as required under the facility's Spill Prevention Control and Countermeasures Plan. Storage vessels for liquid wastes would be located in the Aqueous Polishing Building.

A rupture of the low-level liquid radioactive waste transfer line could release wastewater containing radioactivity at concentrations up to the ETF waste-acceptance criteria levels. DCS, however, has committed to liquid containment features, including containment basins below storage tanks that hold contaminated liquids (stainless-steel-lined floors and portions of walls would be used to create basins in the tank room of the Aqueous Polishing Building) and double-wall pipe and a leak detection system for the transfer line.

The WSB would be connected to the proposed MOX facility and PDCF by stainless steel double-walled pipelines for transfer of stripped uranium wastes and the high-alpha-activity wastes. The waste streams that constitute the high-alpha-activity waste stream include the americium stream, the alkaline wash stream, and the excess acid stream. The combined volumes of these streams would be about 44,200 L/yr (11,700 gal/yr) (DCS 2002a, 2004a). The stripped uranium stream would average about 174,000 L/yr (46,000 gal/yr) during normal operations. The stripped uranium stream would contain only 1% uranium-235 to avoid issues of criticality. To minimize the probability of a pipe failure, both of these waste streams would be transported in double-walled stainless steel pipes. In addition, the pipes would be designed to withstand the effects of a design-basis earthquake and other natural phenomena. If either of these lines ruptured, impacts to surface water or groundwater would be small because of the small quantities of waste involved in the transfer and prompt and thorough cleanup required under the SRS Spill Prevention Control and Countermeasures Plan.

4.3.5.5 Waste Management

Wastes that may be generated from the accident scenarios discussed in this FEIS are expected to be similar in type and of volumes that would be within the bounds of the capacities at the

SRS for waste management. Potential impact to the waste management system at the SRS is expected to be minimal.

4.3.6 Deactivation and Decommissioning

4.3.6.1 Introduction

License termination is considered the final stage of the licensing process for an NRC-licensed facility. License termination entails deactivation and decommissioning of the facility as part of the termination process. Decommissioning involves the removal of the facility safely from service and reduction of residual radioactivity to a level that permits release of the property for unrestricted or restricted use. Termination of the MOX facility license would be governed by 10 CFR 70.38. Decommissioning of the proposed MOX facility would be conducted in accordance with criteria of 10 CFR 20 Subpart E (Radiological Criteria for License Termination). The PDCF and WSB may not be decommissioned after completion of MOX facility operations, but they are included in this evaluation to bound the analysis.

DCS plans to deactivate the proposed MOX facility and request NRC to terminate the license once the facility's mission for disposition of excess plutonium is completed (DCS 2002a). This plan is based on the contract between DOE and DCS that calls for DCS to deactivate the proposed MOX facility and place it in a safe-shutdown condition once operations have ended. In addition, the supporting DOE-owned and -operated support facilities, the PDCF and the WSB, would also require decommissioning once the surplus plutonium mission was completed. The ultimate fate of the facilities would then become the responsibility of DOE. DOE may choose to reuse or decommission the facilities once the surplus plutonium mission has been completed. DOE will make a decision on when and how to decommission the facilities.

Deactivation

Deactivation is the process of removing a facility from operation and placing it in safe-shutdown condition for an extended period of time. Deactivation would involve:

- Removal of unused plutonium and uranium feedstock, process chemicals, and loose surface contamination;
- Depressurization of all facility systems; and
- Sealing of gloveboxes and ventilation systems.

Currently, it is difficult to determine the possible final disposition of the facilities following the completion of their intended mission. The proposed MOX facility would be owned by DOE and operated by DCS under the terms of the DOE-DCS contract and scope of work. The course of decommissioning and future use of all three facilities would depend largely on DOE decisions that would be made at some future date as the facilities approached the end of their operating lives. Since the scoping process identified decommissioning as a significant issue, the potential impacts of decommissioning the facilities are presented below.

4.3.6.2 Decommissioning Process

Options for decommissioning nuclear facilities are discussed generically in NRC's *Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities* (NUREG/CR-0586 [NRC 1988]). As stated in that document, it is the objective of the NRC to conduct decommissioning as an end point of the license termination process.

> **Decommissioning**
>
> *Decommissioning* is the process of decontaminating and dismantling the facilities following deactivation and returning the site to an end state that meets the prescribed regulatory criteria. Decommissioning would involve:
>
> - Chemical decontamination,
> - Physical decontamination of equipment, structures, and materials (e.g., disassembly of equipment and enclosures and removal of materials), and
> - Removal of structures and restoration of the site to a prescribed end state.

Other options, such as safe storage, deferred decommissioning, or restricted release, could have been evaluated. However, for safe storage and deferred decommissioning, the doses to workers during decommissioning would be greater because of the decay of transuranic radionuclides (e.g., plutonium-241 and plutonium-238). That is, the radioactivity in a facility would increase because of the in-growth of daughter products. Restricted release was not considered at this time because the "base case" for decommissioning under 10 CFR Part 20, Subpart E, would be unrestricted release. DCS would need to provide additional justification to support a request for restricted release, which at this point in the project would be speculative.

On the basis of the EIS on decommissioning of nuclear facilities (NRC 1988), it is assumed that the decommissioning process for the facilities would include 2 years of preparation and planning, followed by actual decommissioning activities. In general, decommissioning planning would be conducted during the last 2 years of normal plant operation. During that time, detailed plans and procedures would be prepared, a decommissioning staff would be trained, safety and environmental reports would be prepared (if necessary), and effluent control system modifications would be started.

Work would begin immediately following facility shutdown. Chemical decontamination would be followed by physical decontamination of most plant areas, including disassembly of equipment and enclosures and removal of resulting materials, such as structural components. These materials would be packaged and transported off-site as waste. The main facility and service system (e.g., decommissioning equipment and accessories) would be removed last. Some buildings, such as the Administration Building at the proposed MOX facility might not require any decommissioning prior to release for unrestricted use.

4.3.6.3 Decommissioning Impacts

4.3.6.3.1 Radiological Impacts

Because of the uncertainties involved in future operation of the facilities, most of the specific information needed to assess actual decommissioning impacts would depend on the actual operating history of the facilities. Because of the lack of a full-scale MOX facility, PDCF, and WSB, the analysis conducted for this FEIS has been extrapolated from the generic information provided in NRC's final generic EIS for a small mixed oxide fuel fabrication plant (NUREG/CR-0129; NRC 1979) and from NUREG/CR-0586 (NRC 1988). The extrapolation is based on a comparison of the size of the facilities as represented by the total area covered (square meters or square feet) by the MOX Fuel Fabrication Building plus the PDCF and the WSB. The objective of this analysis is to obtain baseline information pertaining to the radiological impact associated with decommissioning activities. Thus, the radiological impact from the proposed MOX facility was estimated to be about 28 times that in the NRC's generic EIS. Given the uncertainties in the decommissioning activities that would be undertaken at the proposed facilities in the future, this assumption provides a reasonable estimate of the decommissioning impacts. The radiological impacts associated with decommissioning are presented in Table 4.17.

Table 4.17. Summary of radiological impacts from routine facility decommissioning

Exposure	Dose[a] [person-Sv (person-rem)]
Occupational	
Deactivation[b]	6.3 (630)
Decommissioning	19 (1,900)
Transportation[c]	0.99 (99)
Total	27 (2,700)
Public	
Deactivation	8.2×10^{-9} (8.2×10^{-7})
Decommissioning	1.8×10^{-7} (1.8×10^{-5})
Transportation[c]	1.2 (120)
Total	1.2 (120)
Grand total	28 (2,800)

[a]Doses are rounded to two significant figures.

[b]Assumed to follow the same preparation process for long-term custodial care (NRC 1998).

[c]Assumes 686 shipments. Estimated from single shipment risks for TRU waste shipments from the SRS to WIPP presented in Monette et al. (1996).

4.3.6.3.2 Nonradiological Impacts

Geology and Soils. Soils covered by buildings and paved surfaces would be reclaimed to support the designated vegetation type after decommissioning. Soil treatments, including grading, disking, and fertilizer applications, would be used following removal of concrete foundations of structures and asphalt from paved parking areas. The movements of trucks and other vehicles involved in removing concrete and major facility components during decommissioning might result in soil compaction in localized areas. The use of chisel plows or other equipment might be required to loosen the soil in areas where compaction was severe. Depending on the final engineering design for the facility sites, some earth moving might be needed. Soils in the storm-water retention area might be moved and/or graded to prevent erosion and to enhance establishment of plant species on areas to be revegetated. Attempts would be made to grade the area to fit with the existing topography of this portion of F-Area at the time of decommissioning.

Hydrology. The types of impacts to surface and groundwater during decommissioning of the facilities would be similar to those occurring during construction. Water would be used for dust suppression when necessary and might be needed during planting until vegetation becomes established. Runoff from areas being graded after the removal of concrete or asphalt would be minimized through use of silt fences or straw bales to control erosion. No impacts are anticipated to groundwater during decommissioning activities. Impacts to surface water during decommissioning would be small because of the measures employed to control runoff.

Air Quality and Noise. The types of air quality impacts expected during decommissioning of the facilities would be similar to those anticipated during facility construction. Vehicles used during decommissioning might create fugitive dust during dry conditions at the SRS. Fugitive dust would be controlled by watering during these periods. As described in Section 4.3.2.1, impacts to air quality would be small.

Noise associated with dismantling and removal of facility structures from F-Area and the SRS would be localized and temporary. Impacts of noise would be similar to those generated by initial construction of the facility (see Section H.2.1 in Appendix H) and would be small.

Ecology. Assuming that full decommissioning occurs and DCS removes the facilities and allows restricted use of the facility areas on the SRS, the following ecological impacts could occur. Although decommissioning plans may call for removal of facility structures, other areas designed to support operations may not be changed. The 4.5 ha (11.0 acres) occupied by the relocated 115-kV power line would remain in use as the power line continued to provide electricity to other F-Area facilities. Also, the 2.0 ha (5.0 acres) of new roads and road upgrades would remain. The 0.6 ha (1.5 acres) occupied by the storm-water basin might also be retained for that use. If storm-water control was not necessary, this area could provide wetland and pond habitats. The remaining areas located within the fenced boundaries of the facilities and along the pipeline rights-of-way could be revegetated. Revegetation goals could include establishing landscaped lawn around buildings, grass and forb species (e.g., similar to the vegetated conditions on the existing spoils pile area within the proposed location for the proposed MOX facility area), or evergreen and mixed forest habitats. The choice of treatment would depend upon the restricted use planned for the area in the future.

During decommissioning activities, wildlife would be affected in a manner similar to what would occur during construction (see Section H.3.1.1.2 in Appendix H). Impacts would primarily be disturbance and displacement caused by noise and human presence. Following decommissioning, a potentially diverse wildlife community could reoccupy the facility areas. Reforestation of the areas would be the most productive for wildlife, while use of the area for new facilities would be least productive for wildlife.

On the basis of the assessment of impacts to ecological resources during construction of the proposed facilities (Section H.3.1, Appendix H), the impacts of decommissioning are expected to be minor.

Land Use. The F-Area is classified as developed/industrial land. Construction of the proposed facilities is consistent with this classification and the SRS Long Range Comprehensive Plan (DOE 2000b). Decommissioning of the facility site for unrestricted use at SRS would not interfere with current uses or anticipated future uses of the F-Area. Lands in adjacent areas on the SRS managed by the U.S. Forest Service would not be adversely affected by decommissioning activities.

Cultural and Paleontological Resources. Decommissioning is not likely to affect any archaeological sites, historic structures, or traditional cultural properties at the proposed project site. Mitigation measures to avoid impacts during construction of the facility at one prehistoric archaeological site that is eligible for listing on the *National Register of Historic Places* (NRHP) are described in Section H.5.1.1 (Appendix H). Prior to decommissioning, a plan would be developed by DOE describing actions that would be taken to avoid or protect any known or new archaeological sites discovered in areas likely to experience surface disturbance or impacts from runoff because of decommissioning activities. The plan would also address other impacts of decommissioning workers such as unauthorized pedestrian traffic or vehicular activity in the vicinity of known sites or eligible sites. If the mitigation measures described in Section H.5.1.1 are implemented during decommissioning, the impacts to cultural resources could be avoided or minimized.

Nonradiological Impacts of Transportation. Decommissioning would require the transport of demolished structures and components to on-site or off-site disposal areas. The transport of structural materials and components would be along existing SRS roads and local South Carolina highways and would not require new roadway construction. Vehicular traffic on the SRS and local roadways related to decommissioning activities is not expected to affect traffic volume or traffic flow patterns on local roads.

Waste Management. The demolition of the facilities would generate solid waste in the form of structural materials such as concrete and steel and contaminated facility components. The exact quantities and classification of waste types cannot be determined at this time; the information presented here on waste types and volumes is based only on projections. The handling and disposal of wastes produced during decommissioning would comply with all regulatory requirements.

Socioeconomics. The types of impacts to socioeconomic and community resources during the decommissioning of the facilities would be similar to those occurring during their construction. The number of workers expected to be needed for decommissioning is about the same as for construction. Socioeconomic impacts from construction are described in Section H.7.1 (Appendix H). No adverse impacts are anticipated to local communities relative to housing demand for workers or community services from decommissioning activities. Assuming that they would have sufficient notice of the completion of decommissioning impacts, local communities should be able to plan for the loss of revenue generated by the work force. The projected costs of decommissioning are discussed below.

Decontamination and Decommissioning Costs. Uncertainties surrounding the precise nature of activities and, consequently, the magnitude of the cost associated with decommissioning of the proposed MOX facility have meant that no direct estimates of these costs have been made to date. However, estimates have been made on the basis of the costs of decommissioning efforts for a similar facility at the RFETS in Colorado (DCS 2001). Facilities currently being decommissioned at the RFETS have supported activities that are broadly similar to those likely to take place in a MOX fuel fabrication facility and in the associated aqueous polishing facility. These activities at the RFETS have included the manufacture of plutonium weapons components, including casting and machining in dry gloveboxes, and the recovery of plutonium from plutonium residue in "canyon" rooms. On the basis of the volume and types of wastes generated during the decommissioning of those buildings, estimates of the direct costs of decommissioning of the proposed MOX facility and related facilities are about $377 million (FY 2003 dollars).

In addition to the direct costs of the facilities, a number of indirect costs would also be incurred. These costs include site security, residue and fuel deactivation and removal, environmental programs, project management, and costs associated with borrowing funds to finance the project (DCS 2001). Significant contingency allowances would also have to be included.

On the basis of data gathered from other, similarly large nuclear fuel cycle-related projects, it can be concluded that the indirect costs are likely to be roughly approximate to the direct costs of construction and operation. It has also been estimated that decommissioning costs of similar projects are equivalent to about 80% of project capital cost (DOE 1995). Design and construction costs for the MOX, PDCF, and WSB facilities, including contingency, are estimated to be $1,929 million (NNSA 2002). Using both approaches, the total decommissioning cost for the three facilities would, therefore, lie in the range of $758 million to $1,543 million (2003 dollars).

4.3.7 Environmental Justice

4.3.7.1 Introduction

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (Volume 59, page 7629 of the *Federal Register* [59 FR 7629]), issued by President Clinton on February 11, 1994, requires federal agencies to incorporate environmental justice as part of their missions. Specifically, it directs executive branch agencies to address, as appropriate, any disproportionately high and adverse human health or environmental effects of their actions, programs, or policies on minority and low-income populations. Although independent agencies, such as the NRC, were only requested to comply with Executive Order 12898, the NRC, in a letter dated March 31, 1994, stated it would endeavor to carry out the measures set forth in the Executive Order and accompanying memorandum as part of its efforts to comply with the requirements of NEPA. The NRC has developed guidelines for environmental justice analyses described in *Environmental Review Guidance for Licensing Actions Associated with NMSS Programs* (NRC 2001, NRC 2003).

The analysis of the potential impacts of the no-action and proposed action alternatives on environmental justice communities near the SRS uses demographic data from the 2000 census to describe the distribution of minority and low-income populations in the vicinity of the SRS. The definitions of minority and low-income population groups as used in this analysis are as follows:

- **Minority.** Beginning with the 2000 census, where appropriate, the census form allows individuals to designate multiple population group categories to reflect their ethnic or racial origin. Persons are included in the minority category if they classify themselves as belonging to any of the following racial groups: Hispanic, Black or African American, American Indian or Alaska Native, Asian, Native Hawaiian or Other Pacific Islander. In addition, persons who classify themselves as being of multiple racial origin may choose up to six racial groups as the basis of their racial origins. The "minority population" therefore incorporates all persons, including those classifying themselves in multiple racial categories, except those who classify themselves as not of Hispanic origin and as White or "Other Race" (U.S. Bureau of the Census 2002).

- **Low-Income.** Individuals who fall below the poverty line are classified as low-income. The poverty line takes into account family size and age of individuals in the family. In 1999, for example, the poverty line for a family of five with three children below the age of 18 was $19,882 in annual income. For any given family below the poverty line, all family members are considered as being below the poverty line for the purposes of analysis (U.S. Bureau of the Census 2002).

Data on minority and low-income populations are available at the county, census tract, block group, and block level. To fully evaluate the potential environmental justice impacts of the proposed action alternative, the distribution of minority and low-income populations was analyzed at the census block group level. The analysis was based on guidelines for environmental justice analyses described in *Environmental Review Guidance for Licensing Actions Associated with NMSS Programs* (NRC 2001). An 80-km (50-mi)-diameter buffer zone around F-Area at the SRS was used as the basis for the analysis so as to include potential adverse human health or socioeconomic impacts related to the construction and operation at the SRS. Accidental chemical and radiological releases, for example, have the potential to affect minority and low-income population groups located some distance from the site, depending on the size and nature of potential releases and on meteorological conditions. The actual extent of any such effects would depend on the magnitude and nature of any release at the site.

In addition to demographic data, the NRC solicited comments and information regarding the potential for the proposed action to cause disproportionate impacts to environmental justice communities at the public scoping meetings (see Section 1.4.1). The comments received at these meetings are presented in Appendix I, Section 2.2.13. In summary, environmental justice impacts were a concern to many stakeholders. It was stated that contamination could affect fishing resources that might be used for subsistence by low-income and minority population groups some distance downstream of the site. This information further supported NRC's decision to use a larger assessment area for environmental justice impacts. It was also stated that many low-income people rely to a greater extent on food produced from gardens.

Guidelines for performing environmental justice reviews are described in NRC's NUREG-1748 (NRC 2001). The analysis method is multistep and consists of first determining if a site has a potential environmental justice concern based on the identification of low-income and minority populations that could be affected by the proposed action. Next, a determination is made as to whether possible impacts would disproportionately impact low-income or minority populations. In cases where the low-income and minority populations are located next to the site, potential impacts could be disproportionate. In other cases, specific behavior of low-income and minority populations, such as the consumption of a greater portion of homegrown crops and other food items, for example, may result in a disproportionate impact. Finally, if it is determined that there would be a potential impact, an assessment would be made as to whether the impact of any aspect of construction and operation of the proposed facilities, including accidents, on low-income or minority populations would be both "high and adverse."

Block group level data for minority and low-income populations for all block groups within 80 km (50 mi) of F-Area are shown in Tables 4.18 and 4.19. Data for each population group are compared with the state and county minority and low-income totals. The environmental justice impacts of the transportation of MOX fuel were not considered because of the uncertainty surrounding the routes that would be selected and the timing and quantity of MOX fuel shipments. NRC guidelines suggest that disproportionate effects on minority and low-income populations should be considered if the minority or low-income populations in block groups are more than 20 percentage points higher than the state and county levels, or where the local minority or low-income population exceeds 50%. Using data in Table 4.18, adding 20 percentage points to the state average would mean that disproportionate effects on minority populations should be considered if the percentage of minorities in a block group is greater than 57.2% in Georgia and 53.8% in South Carolina. Disproportionate effects on low-income populations should be considered if the percentage of the low-income persons in a block group is greater than 34.7% in Georgia and 35.4% in South Carolina (Table 4.19). Minority and low-income percentages in each block group were also compared with the county minority and low-income averages by adding 20 percentage points to the corresponding county minority and low-income percentages. This analysis considered block groups with minority and low-income populations more than 20 percentage points above the state or county value as block groups that have environmental justice populations. Any block group where minority and low-income populations exceeded 50% of the block group population was also considered in the analysis.

Figures 4.2 and 4.3 show the census block groups for the 80-km (50-mi) buffer zone area. The shaded areas are those block groups where minority and low-income individuals are 20 percentage points higher than the state or county averages, or greater than 50% of the total population in the block group.

Table 4.18. Minority population characteristics in the vicinity of the SRS

County	White	Hispanic	Black	American Indian or Alaskan Native	Asian	Native Hawaiian or other Pacific Islander	Other	Two or more races	Total minority	Percent minority
Georgia										
Bulloch	2,850	138	1,152	3	9	1	25	22	1,212	29.8
Burke	10,433	316	11,343	51	57	3	141	215	11,810	53.1
Columbia	72,862	2,297	9,952	276	2,997	80	703	1,376	15,384	17.4
Emanuel	674	17	274	1	0	0	0	6	281	29.4
Jefferson	3,041	101	2,713	7	15	1	56	52	2,844	48.3
Jenkins	4,827	287	3,472	13	18	8	177	60	3,748	43.7
Lincoln	571	3	129	1	3	0	1	7	141	19.8
McDuffie	3,862	100	1,115	18	17	3	28	50	1,231	24.2
Richmond	91,006	5,545	99,391	552	3,000	249	2,024	3,553	108,769	54.4
Screven	8,234	147	6,963	22	40	8	31	76	7,140	46.4
Warren	579	14	324	3	1	0	0	3	331	36.4
Within 80-km buffer	198,939	8,965	136,828	947	6,157	353	3,186	5,420	152,891	43.5
State	5,327,281	435,227	2,349,542	21,737	173,170	4,246	196,289	114,188	2,859,172	34.9
South Carolina										
Aiken	101,745	3,025	36,442	566	905	36	1,181	1,677	40,807	28.6
Allendale	3,068	181	7,960	10	14	7	95	57	8,143	72.6
Bamberg	6,075	118	10,411	27	32	1	23	89	10,583	63.5
Barnwell	12,956	327	9,990	81	91	8	182	170	10,522	44.8
Colleton	605	102	261	0	0	0	64	20	345	36.3
Edgefield	13,962	503	10,209	81	59	8	107	169	10,633	43.2
Hampton	6,259	482	8,276	28	22	1	102	69	8,498	57.6
Lexington	40,976	957	6,085	186	117	10	517	477	7,392	15.3
McCormick	1,312	21	1,736	2	2	1	3	13	1,757	57.2
Orangeburg	9,888	127	7,983	121	26	4	44	199	8,377	45.9
Saluda	9,679	1,159	5,011	37	4	0	511	111	5,674	37.0
Within 80-km buffer	206,525	7,002	104,364	1,139	1,272	76	2,829	3,051	112,731	35.3
State	2,695,560	95,076	1,185,215	13,718	36,014	1,628	39,926	39,950	1,316,452	32.8

Table 4.19. Low-income population characteristics in the vicinity of the SRS

County	Low-income population	Percent low-income
Georgia		
Bulloch	711	17.3
Burke	6,348	28.7
Columbia	4,462	5.1
Emanuel	214	22.9
Jefferson	1,155	19.6
Jenkins	2,419	28.4
Lincoln	128	18.8
McDuffie	796	15.6
Richmond	37,522	19.5
Screven	3,043	20.1
Warren	142	15.6
Within 80-km buffer	56,940	16.6
State	1,033,793	12.6
South Carolina		
Aiken	19,388	13.9
Allendale	3,466	34.5
Bamberg	4,403	27.8
Barnwell	4,834	20.9
Colleton	212	21.5
Edgefield	3,407	15.5
Hampton	2,747	22.8
Lexington	5,517	11.4
McCormick	492	16.3
Orangeburg	3,260	17.9
Saluda	2,374	15.7
Within 80-km buffer	50,100	16.2
State	547,869	13.7

4.3.7.2 Impacts of the No-Action Alternative

For all the storage sites, radiological and nonradiological risks from continued storage of surplus plutonium would be small regardless of the racial and ethnic composition of the populations surrounding the sites, and independent of the economic status of individuals constituting the populations. Continued storage would have no disproportionately high and adverse effects on minority or low-income populations.

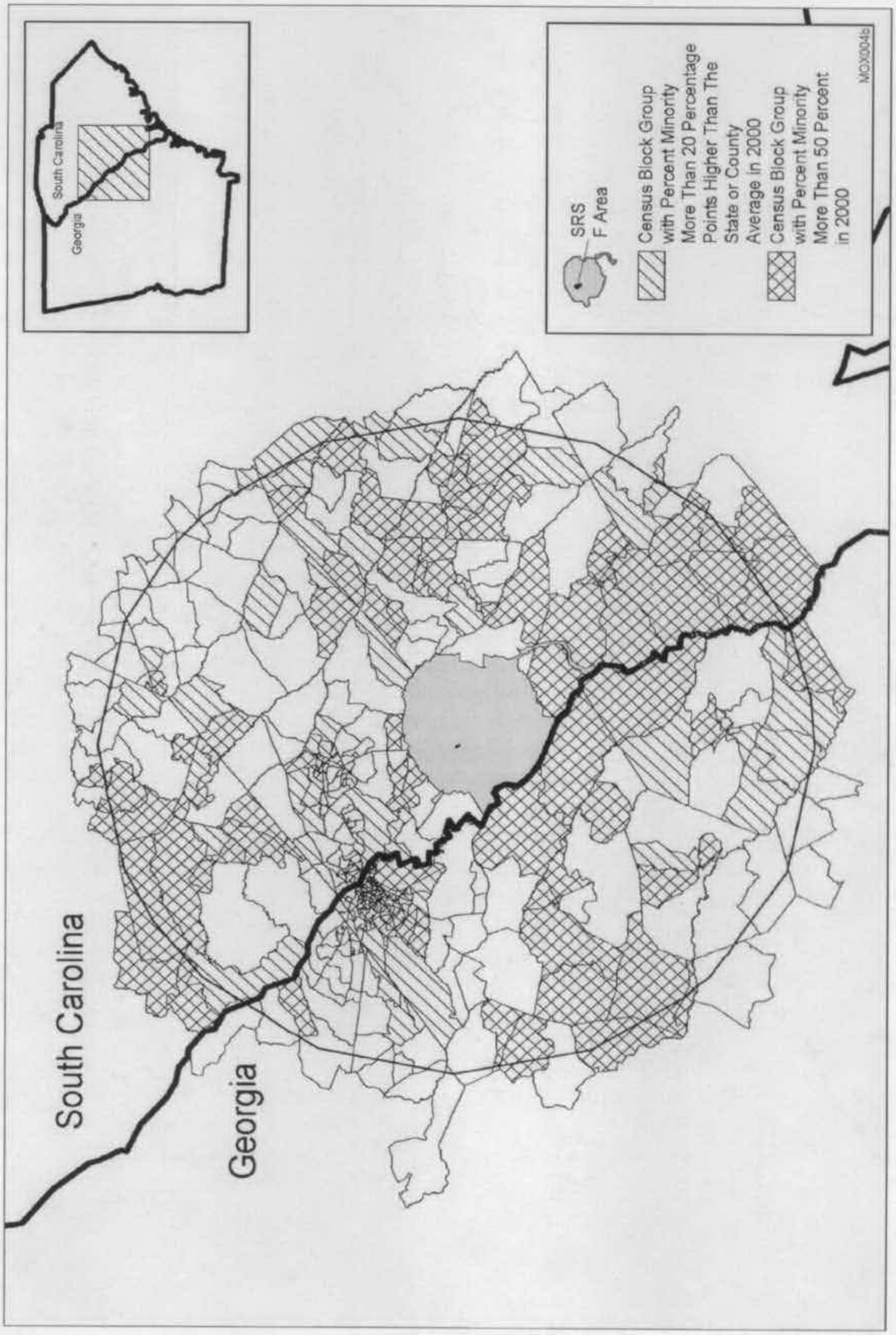

Figure 4.2. Minority population concentration in census block groups within an 80-km (50-mi) radius of the SRS F-Area (*Source*: U.S. Bureau of the Census 2002).

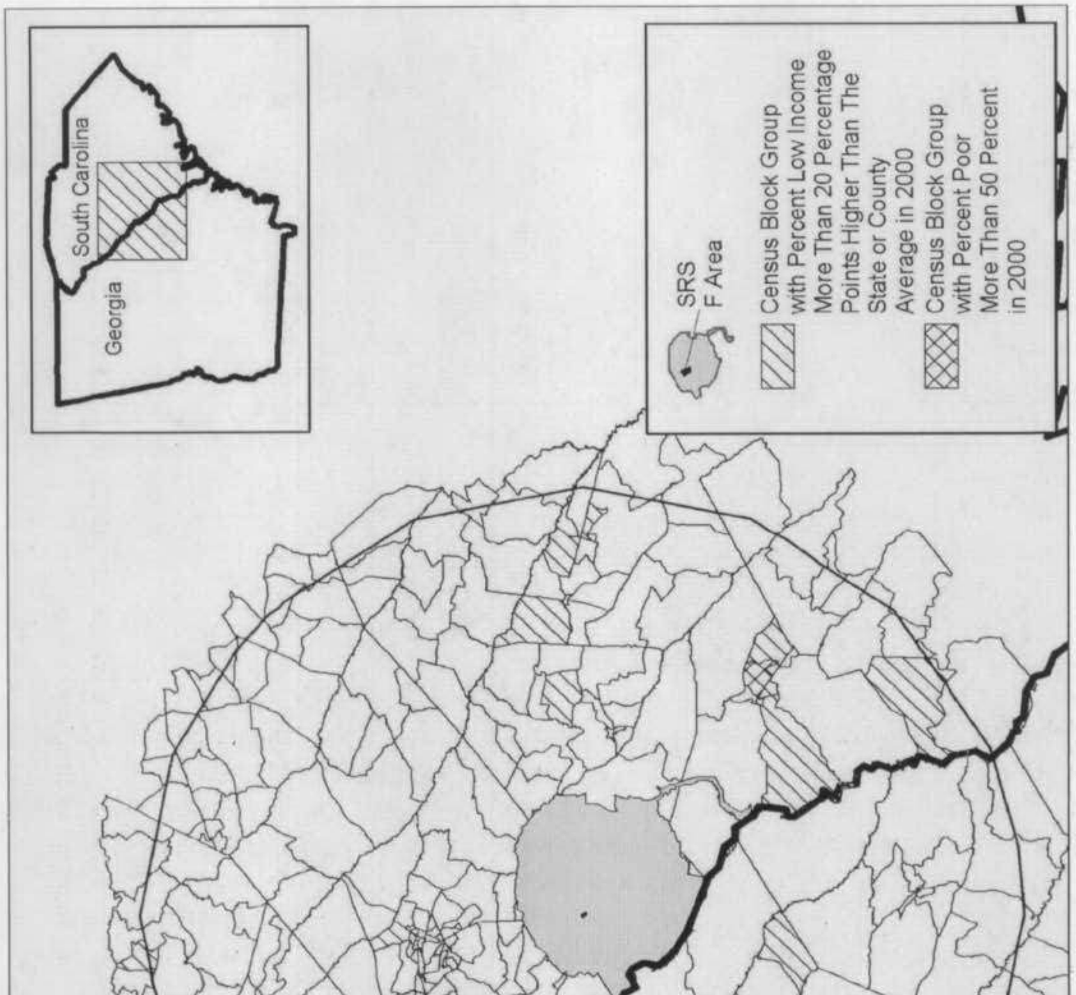

Figure 4.3. Low-income population concentration in census block groups within an 80-km (50-mi) radius of the SRS F-Area (*Source:* U.S. Bureau of the Census 2002).

4.3.7.3 Impacts of the Proposed Action

As discussed above, the analysis of environmental justice impacts is a multistep process. As depicted by the shaded areas in Figures 4.2 and 4.3, low-income and minority populations meeting the definition of environmental justice populations are present within the 80-km (50-mi) assessment area. The next step is to determine whether any impacts would be disproportionate to the low-income or minority populations. Generally, impacts are larger the closer a person is to the source of the impact. Therefore, low-income and minority populations could be disproportionately impacted if they were located closer to the source of the impact than the general population. As depicted in Figures 4.2 and 4.3, the majority of the border of the SRS is populated by predominately minority populations. In addition, specific behavior may result in disproportionate impacts. For example, during the scoping meetings and public meetings on the DEIS, commenters noted that some low-income and minority people relied heavily on homegrown foods and fish from the Savannah River. In addition, it was reported that some in the environmental justice community did not understand the impacts discussed in the DEIS. On the basis of the location of the low-income and minority populations and specific behavior, the NRC concludes that impacts to low-income and minority populations could be disproportionate. The following sections discuss whether the impact of any aspect of construction and operation of the proposed facilities, including accidents, on low-income or minority populations would be both “high and adverse.”

4.3.7.3.1 Construction

No radiological risks and only very low chemical exposure and risk are expected during construction. Chemical exposure would be limited to toxic air pollutants released at levels below applicable standards and would not result in any high adverse health impacts. Because the health impacts on the general population within the 80-km (50-mi) assessment area during construction would be negligible, impacts on the minority and low-income population would be small.

4.3.7.3.2 Routine Operations

Radiological impacts to the general public during routine operation of the proposed facilities would be minimal and would not cause any adverse health impacts. The facilities are expected to produce an annual latent cancer risk of approximately 2×10^{-9} for the MEI member of the public. The annual collective dose to members of the public living and working within 80 km (50 mi) of SRS associated with the facilities is expected to produce an LCF risk of approximately 0.0009 or less. In addition, no surface releases that might enter local streams or interfere with subsistence activities by low-income or minority populations are expected to occur. Because the health impacts of routine operations on the general public would be small and there would be no releases that would affect any water or food used for subsistence, there would be no disproportionately high adverse impact on low-income or minority population groups within the 80-km (50-mi) assessment area.

4.3.7.3.3 Accidents

An airborne release following an accident at the proposed facilities has the potential for causing up to 3 LCFs in the area surrounding SRS in the short term because of inhalation exposure. Up to 100 LCFs could occur following the ingestion of contaminated crops. These estimated latent cancer fatalities apply to the entire population within a given sector, which would include both environmental justice populations and non-environmental justice populations. (See discussion in Section 4.3.5 on the accident assessment methodology). If an accident producing such an airborne release were to occur, people living closer to SRS would be impacted to a greater degree than those living farther away from SRS. In the unlikely event of such an accident at the proposed facilities, many of the communities most likely affected would be minority or low income, given the demographics within the 80-km (50-mi) assessment area (see Figures 4.2 and 4.3). In addition, following a hypothetical accident severe enough to produce such a significant airborne release, impacts would be larger if contaminated crops were ingested. In the long-term, the impacts to low-income and minority groups could be higher because of the reliance on homegrown foods. On the basis of the above estimate of accident impacts and considering that low-income and minority populations would be more likely to rely on homegrown foods, the NRC concludes that the impacts to low-income and minority populations could be high and adverse in the event of an accident as described above. However, it is highly unlikely that such an accident would occur. Therefore, the risk to any population, including low-income and minority communities, is considered to be low.

In the event that accidents producing significant contamination occurred as described above, appropriate measures are expected to be taken to ensure that the impacts to all populations, including low-income and minority populations, would be minimized (see Section 5.2.12). The extent to which low-income or minority population groups would be affected would depend on the amount of material released and the direction and speed at which airborne material was dispersed from the facility by the wind. Although the overall risk would be very small, the greatest short-term risk of exposure following an airborne release would be to the population located to the west-northwest of SRS. The greatest 1-year exposure risk would be to population groups residing to the southwest of the site following the ingestion of contaminated crops. With no ingestion, the greatest 1-year risk would still be to the west-northwest. Airborne releases following an accident would likely have a larger impact area than would an accident that released contaminants directly onto the soil surface. A surface release entering local streams could temporarily interfere with subsistence activities by low-income and minority populations located within a few kilometers downstream of SRS.

Monitoring of contaminant levels in soil and surface water following an accident would provide the public with information on the extent of any contaminated areas. Analysis of contaminated areas to decide how to control use of high health risk areas would reduce the potential impact to local residents.

4.3.7.3.4 Decommissioning

Impacts of decommissioning are not expected to disproportionally affect low income or minority populations in the SRS vicinity. A detailed analysis of impacts would be prepared by DOE in a NEPA document specifically on decommissioning and site closure if plans call for full decommissioning of the facilities. Important elements of the environmental analysis in the DOE NEPA document would likely address the disposal process and locations of disposal sites for structural materials and facility components resulting from decommissioning.

4.3.8 Sand Filter Technology Option

Sand filters are air filtration systems used to prevent the release of radioactive material from nuclear facilities to the atmosphere. In a sand filter, the airborne radioactive material is forced through large beds of stone, gravel, and sand that capture and retain radioactive material. Filtered air is discharged to the atmosphere from a nearby stack.

As discussed in Sections 1.4.1 and 2.2.5, the use of sand filters was identified during the EIS scoping process as a potential substitute for final HEPA filters. Differences in impacts between sand filters and HEPA filters are discussed below. Specifically, this section presents the impacts to human health, air quality, hydrology, waste management, potential accident impacts, and facility decommissioning.

Relative to radiological impacts during routine operations, those human receptors who would be affected by such a change would be the proposed MOX facility workers, SRS employees, and the public. However, the differences in emissions between the two filter types is not significant. Thus, the impacts presented in Section 4.3.2.2 on routine operational impacts from the proposed MOX facility to SRS employees and the public would hold for both sand filters and the proposed HEPA filters. In the case of the proposed MOX facility workers, exposure would occur from maintenance activities during normal operations. Monitoring to ensure adequate performance would be required for both filter types. However, HEPA filters, unlike sand filters, would require periodic replacement in addition to monitoring (Orr 2001). The additional exposure in the case of HEPA filters would be minimized with the use of a bag-in/bag-out system (one that isolates the filters from personnel and the environment during replacement) and the maintenance of practices to limit releases of radioactivity to levels ALARA (Orr 2001).

With regard to chemical risks, the difference in chemical removal efficiency between HEPA filters and sand filters is small. Therefore, the impacts presented in Section 4.3.2.2 would be representative for either filter type.

Because air quality impacts associated with the proposed MOX facility would be dominated by the emission of gaseous chemical compounds, and neither HEPA filters nor sand filters are effective for gases, sand filters do not present a clear advantage over HEPA filters. Air quality impacts would be mitigated by other off-gas treatment systems associated with the proposed action.

If sand filters were chosen over HEPA filters at the proposed MOX facility, excavation would be needed for the filter foundations. Excavation is not expected to extend to a depth likely to encounter groundwater. The depth of the sand filter would depend on spatial configuration and topography at the specific site selected for the filter. A surface area of 3,162 m^2 (33,650 ft^2) would be required for the sand filter (Orr 2001). Operation of a sand filter at the proposed MOX facility would not impact groundwater resources. The filter would be covered to prevent precipitation from enhancing recharge of the underlying aquifers and would have a concrete wall and bottom.

The impact to waste management practices was also evaluated with regards to the type of air filters that could be used during proposed MOX facility operations. The waste volume and associated disposal costs from routine operations using HEPA filters versus use of sand filters are compared in Table 4.20. TRU waste and LLW would be generated if HEPA filters were used, and primarily TRU waste would be generated if sand filters were used.

Relative to radiological impacts resulting from accidents, sand filters may provide a larger margin of safety for SRS employees and the public. Two of the four accidents evaluated, the internal fire event and the explosion event, have the potential to damage HEPA filters. If the major vent duct work itself remained intact for these accidents, filter efficiency would not be lost if sand filters were used, and the impacts for the internal fire event and the explosion event could be approximately 100 times lower than the impacts presented for HEPA filters in Section 4.3.5. (Appendix E presents more information on the amount of radioactivity released from each accident considered.) DCS has committed to a strategy of making explosions highly unlikely if they could result in high consequences to SRS employees and members of the public. By preventing explosions, DCS would prevent impaired function of the facility HEPA filters. Further, DCS would maintain safety controls in the proposed MOX facility that would either prevent fires, or for some areas, ensure that fires are contained to single fire areas that would limit the amount of radioactive material involved a fire. Where fires are limited to fire areas, DCS would ensure that the facility HEPA filters would continue to function in the high temperature and soot environment created by the bounding fire.

The decommissioning impacts described in Section 4.3.6 were based on the proposed use of HEPA filters. However, if a sand filter was used, there is the possibility that it could be left in

Table 4.20. Comparison of waste volume and disposal cost for HEPA and sand filters

Parameter	HEPA filter	Sand filter
Waste amount	2,178 filters	9,543 m^3
Disposal cost[a]	$9,333,000	$8,411,750
Type of waste	TRU, LLW	TRU

[a]Estimated disposal cost for HEPA filters is based on the number of filters required, while the cost for the sand filters is based on total volume of sand and rock requiring disposal.

place, incurring little additional decommissioning work. Otherwise, there could be significant impacts, such as economic costs and human health risks, from excavating the contaminated material and possibly transporting and disposing of significant amounts of low-level or transuranic waste, depending on the level of contamination (Orr 2001).

In conclusion, the technology option to install sand filters would not clearly result in lower net environmental impacts than the use of HEPA filters. By selecting sand filters, DCS could reduce environmental impacts in the areas of human health risk to facility workers and accident mitigation. However, controls on HEPA filter change-out and a DCS safety strategy to prevent accidents that would challenge HEPA filter function provide an equivalent reduction of impacts.

4.4 Indirect Impacts

4.4.1 Transportation

This assessment is based on the transportation assessment presented in the NRC's NUREG-0170 report (NRC 1977). Since that assessment was conducted, computer models and basic assumptions have been refined, but the overall approach to estimating transportation impacts has remained the same.

4.4.1.1 Scope of the Analysis

The technical approach for estimating transportation risks involves use of several computer models and databases. For assessment of normal transport, risks were calculated for the collective populations of all potentially exposed individuals, as well as for an MEI receptor. Potentially exposed populations include those persons living and working along the transport route, those present at vehicle stops, and those on the road near the shipment. The accident assessment included consideration of the probabilities and consequences of a range of possible transportation-related accidents, including low-probability accidents that have high consequences, and high-probability accidents that have low consequences. The details of the transportation analysis are provided in Appendix C. Transportation impacts are presented in Section 4.4.1.2.

Transportation concerns raised during the scoping process for this EIS (see Appendix I) included the impacts of transporting MOX feed materials (depleted uranium hexafluoride [UF_6] and the surplus plutonium metal) transport. As discussed below, impacts from the transportation of depleted uranium and surplus plutonium metal (pit material) feed materials were analyzed. Impacts of transporting the plutonium dioxide from the proposed PDCF to the proposed MOX facility are not considered because of the short distance involved and the absence of public roads in this area (DCS 2002a). The NRC intended to evaluate truck and rail transportation impacts of shipping fresh MOX fuel from the SRS (see Appendix I). However, this FEIS evaluated only truck shipments of such fuel because of the added security provided through the use of the Safeguards Transporter, as described in Appendix C, Section C.2.3.

The transportation risk assessment conducted for operation of the proposed MOX facility involved estimating the potential human health risks during transport of feed and waste materials associated with the MOX fuel fabrication process. The risk assessment also considered the risks associated with the transport of the MOX fuel following fabrication.

Transport of the depleted uranium feed materials analyzed included shipment of depleted UF_6 from Portsmouth, Ohio, to Wilmington, North Carolina, and depleted uranium dioxide (UO_2) from Wilmington to the proposed MOX facility at the SRS. Assessment of the transport of plutonium pit material considered shipments from existing storage sites to the SRS. Of the 34 MT (37.5 tons) of plutonium expected to be processed into MOX fuel, 7.3 MT (8.0 tons) would be initially available at the SRS site. Under a separate action (DOE 2002a), approximately 6 MT (6.6 tons) of surplus plutonium is to be shipped from RFETS to SRS (Roberson 2002), which currently has 1.3 MT (1.4 tons) (DOE 1996a). The proposed action would therefore require the shipment of another 26.7 MT (29.4 tons) of plutonium, approximately 21.3 MT (23.4 tons) of which is expected to come from the Pantex Plant in Texas. This FEIS analyses the transportation impacts of the Pantex shipments and the remaining 5.4 MT (5.9 tons) of plutonium whose origins are not yet determined. However, the remaining plutonium would come from storage at other DOE sites. For the purposes of this FEIS, the analysis assumed that the remaining 5.4 MT (5.9 tons) of plutonium would come from the Hanford Site, the plutonium storage site farthest from the SRS. Thus, the actual transportation impacts are expected to be lower than those presented here because some plutonium from closer storage sites is expected to be used. Impacts of shipping TRU waste from the WSB to the Waste Isolation Pilot Plant (WIPP) in New Mexico were evaluated for two cases that bound the potential number of shipments. No volume reduction of the TRU waste is analyzed for the first option, resulting in approximately 2,300 truck shipments over the life of the project. The second option analyzes a case involving a volume reduction of TRU waste by a 3:1 ratio, shipments being constrained by a wattage limit.

Additionally, the FEIS evaluates the impacts of shipping all the fresh MOX fuel from the SRS to a surrogate commercial nuclear plant. The fresh MOX fuel is expected to be used in reactors in the eastern to midwestern portion of the United States. For purposes of impact assessment, a midwestern site was chosen for the surrogate nuclear plant because such a location maximizes the distances necessary to transport the fuel, thus providing conservative estimates of potential impacts. A surrogate nuclear power plant was chosen because no licensed nuclear plant has applied to NRC for authority to use MOX fuel. Thus, the impacts presented here are expected to bound the impacts for future shipments of fresh MOX fuel.

For all shipments, risks were estimated for truck transport for both normal (incident-free) and accident conditions. In both cases, "vehicle-related" and "cargo-related" impacts were evaluated.

Vehicle-related risks result simply from moving any material from one location to another, independent of the characteristics of the cargo. For example, increased levels of pollution from vehicular emissions during normal conditions may affect human health. Similarly, accidents during transportation may cause fatalities from physical trauma.

Cargo-related risk, on the other hand, refers to risk attributable to the characteristics of the cargo being shipped. The radiological cargo-related risks from the transportation of depleted uranium, surplus plutonium, fresh MOX fuel, and TRU waste would be caused by exposure to ionizing radiation. Exposures to radiation occur during both normal transportation and during accident conditions. In the case of the depleted uranium materials considered, cargo-related risks also include chemical hazards during accident conditions.

The risks from exposure to hazardous chemicals during transportation-related accidents can be either acute (result in immediate injury or fatality) or latent (result in cancer that would present itself after a latency period of several years). The acute health end point — potential irreversible adverse effects — was evaluated for the assessment of cargo-related population impacts from transportation accidents. Accidental releases during transport of the uranium compounds (UF_6 and UO_2) were evaluated quantitatively. The analysis of UF_6 effects included consideration of the formation of hydrogen fluoride (HF) from the reaction of UF_6 with moisture in the air. Chemical health effects from transportation of plutonium compounds were not assessed because the radiological impacts are far greater than any chemical impacts.

Unlike the case for radiological exposure, the acute chemical effects evaluated were assumed to exhibit a threshold nonlinear relationship with exposure; that is, some low level of exposure can be tolerated without inducing a health effect. To estimate risks, chemical-specific concentrations were developed for potential irreversible adverse effects. All individuals exposed at these levels or higher following an accident were included in the transportation risk estimates. In addition to acute health effects, the cargo-related risk of excess cases of latent cancer from accidental chemical exposures could be evaluated. However, none of the chemicals that might be released in any of the transportation accidents involving UF_6, UO_2, plutonium, or the MOX fuel would be carcinogenic. As a result, no predictions for excess chemically induced latent cancers are presented in this assessment for accidental chemical releases.

4.4.1.2 Transportation Impacts

The estimated exposures and the associated human health effects are discussed in this section and summarized in Table 4.21.

4.4.1.2.1 Routine Transportation

Radiological risks during routine transportation would result from the potential exposure of people to low levels of external radiation near a loaded shipment. DOT and NRC regulations — 49 CFR Part 173.441 (*Radiation Level Limitations*) and 10 CFR Part 71.47 (*External Radiation Standards for All Packages*) — were set to maintain these external radiation levels at a value considered to be protective of the public. The maximum allowable external dose rate is 0.1 mSv/h (10 mrem/h) at 2 m (6.5 ft) from the outer lateral sides of the transport vehicle. In this analysis, the external dose rates expected are approximately 0.0024 mSv/h (0.24 mrem/h), 0.0076 mSv/h (0.76 mrem/h), 0.048 mSv/h (4.8 mrem/h), and 0.040 mSv/h (4.0 mrem/h) at 1 m

(3.3 ft) for the UF_6, UO_2, MOX fuel, and TRU waste shipments, respectively (Biwer et al. 1997; DCS 2001; DOE 1997b). Since the regulatory maximum is approximately 0.14 mSv/h (14 mrem/h) at a distance of 1 m (3.3 ft), the external dose rates from the depleted uranium shipments, the MOX fuel shipments, and the TRU waste shipments are expected to be less than 6%, 35%, and 30% respectively, of that regulatory maximum. For this analysis, the external dose rate for the shipments of plutonium metal were set to the regulatory maximum, but it is expected that the dose rate from these shipments would actually be similar to those for the fresh MOX fuel and TRU waste.

Combined total exposures of 3.1 to 5.6 person-Sv (310 to 560 person-rem) and 2.1 to 5.3 person-Sv (210 to 530 person-rem) were estimated for the public and the transportation crews, respectively, from all shipments. The resulting expected LCFs were 0.2 to 0.4 and 0.1 to 0.3, respectively (see Table 4.21). These impacts to the public would be insignificant because the exposure would be spread out over several years among all the people along the transportation routes. If no TRU waste volume reduction occurs, TRU waste shipments from the WSB to WIPP would have the highest average individual dose to the public, 0.0025 mSv (0.53 mrem), estimated from a total collective dose of 3.0 person-Sv (300 person-rem) spread over 566,000 persons along the route. Thus, the routine radiological impacts to the public for the entire shipping campaign would be negligible, an average member of the public would receive only 0.15% or less of the value for exposure to background radiation in one year.

For an MEI member of the public (defined as being located 30 m [98 ft] away from a shipment passing at a speed of 24 km/h [15 mph] [Neuhauser and Kanipe 1992]), the greatest radiological risk would be from the plutonium metal shipments, as shown in Table 4.22. In this case, a risk of 6×10^{-10} (a chance of less than 1 in 1 billion) of contracting a fatal cancer is 0.0003% of the value for an annual exposure to background radiation. However, the value for potential exposure to multiple shipments would be correspondingly higher. For example, if the same MEI were present for three shipments of depleted UO_2, that individual would receive a dose of approximately 1.1×10^{-6} mSv [$3 \times (3.7 \times 10^{-7}$ mSv)].

For transportation crew members, the largest estimated single shipment dose to one transportation crew member was 0.0013 Sv (0.13 rem) for shipments of plutonium from the Hanford Site to the PDCF. In this case, the risk of contracting a fatal cancer is 1 in 13,000.

A total of up to 2 latent fatalities were estimated from vehicle emissions for the entire shipping campaign. Thus, approximately 2 fatalities or less might be expected from vehicle emissions. This vehicle-related impact is insignificant because the proposed action truck travel on U.S. highways for the high end of the entire shipping campaign, 8,200,000 km (5,090,000 mi) as shown in Table 4.21, is only 0.0038% of similar truck travel on an annual basis in the United States, 217,550,000,000 km (135,179,000,000 mi) (BTS 2002).

Table 4.21. Total collective population transportation risks

Parameter	Depleted UF_6	Depleted UO_2	Pu metal	TRU waste[a]	MOX fuel	Total campaign[a]
Origin site	Portsmouth, OH	Wilmington, NC	Storage sites	WSB	MOX facility	
Destination site	Wilmington, NC	MOX facility	PDCF	WIPP	surrogate reactor	
Shipment summary						
Shipments	110	60	430	299-2,314	598	1,497-3,512
Distance (km)[b]	103,000	26,500	1,130,000	730,000-5,650,000	1,280,000	3,280,000-8,200,000
Population impacts						
Cargo-related[c]						
Radiological impacts						
Dose risk (person-Sv)[d]						
Routine crew	0.0061	0.0045	0.72	0.46-3.6	0.93	2.1-5.3
Routine public						
Off-link	0.00044	0.00013	0.12	0.019-0.15	0.038	0.18-0.30
On-link	0.0011	0.00035	0.35	0.058-0.45	0.094	0.50-0.89
Stops	0.0045	0.0018	1.7	0.31-2.4	0.34	2.4-4.4
Total	0.0060	0.0022	2.2	0.39-3.0	0.48	3.1-5.6
Accident[e]	0.0025	0.00049	0.00063	0.063	0.16	0.23
Latent cancer fatalities[f]						
Crew	0.0004	0.0003	0.04	0.03-0.2	0.06	0.1-0.3
Public	0.0005	0.0002	0.1	0.03-0.2	0.04	0.2-0.4
Chemical impacts						
Irreversible adverse effects[g]	1.3×10^{-7}	0	NA[h]	NA	NA	1.3×10^{-7}
Vehicle-related[i]						
Emission fatalities	0.04	0.008	0.3	0.2-1	0.6	1-2
Accident fatalities	0.003	0.0012	0.028	0.017-0.13	0.029	0.078-0.20

Table 4.21. Continued

[a]The number of TRU waste shipments will depend on the waste treatment process used (DCS 2004a). The largest volume reduction estimated would result in the fewest number of shipments. The largest number of shipments corresponds to the minimum amount of TRU waste treatment necessary for shipment.

[b]To convert km to mi, multiply by 1.609.

[c]Cargo-related impacts are impacts attributable to the radioactive or chemical nature of the waste material.

[d]To convert person-Sv to person-rem, multiply by 100.

[e]Accident dose risk is a societal risk and is the product of accident probability and accident consequence.

[f]Latent cancer fatalities are calculated by multiplying dose by the FGR 13 health risk conversion factor of 0.06 fatal cancer per person-Sv (6×10^{-4} fatal cancer per person-rem) (Eckerman et al. 1999).

[g]Potential for irreversible adverse effects from chemical exposures. Exposure to HF or uranium compounds is estimated to result in fatality of approximately 1% or less of those persons experiencing irreversible adverse effects (Policastro et al. 1997).

[h]NA = not applicable.

[i]Vehicle-related impacts are impacts independent of the cargo in the shipment.

Table 4.22. Routine single-shipment impacts to a maximally exposed individual[a]

Shipment type	Dose [mSv (mrem)]	Risk of developing a latent fatal cancer
Depleted UF_6	2.3×10^{-7} (2.3×10^{-5})	1×10^{-11}
Depleted UO_2	3.7×10^{-7} (3.7×10^{-5})	2×10^{-11}
Pu metal	1×10^{-5} (1×10^{-3})	6×10^{-10}
MOX fuel	1.5×10^{-6} (1.5×10^{-4})	9×10^{-11}
TRU waste	2.4×10^{-6} (2.4×10^{-4})	1×10^{-10}

[a]Individual is located 30 m (98 ft) from a passing shipment traveling at 24 km/h (15 mph).

4.4.1.2.2 Accident Impacts

The total radiological collective population accident dose risk to the public from all shipments was estimated to be 0.23 person-Sv (23 person-rem). The resulting estimated LCFs are 0.01 for the entire shipping campaign.

Chemical impacts would be negligible; only 1.3×10^{-7} irreversible adverse effect from depleted UF_6 shipments is expected for the entire shipping campaign. As discussed in Appendix C (Section C.2.6), this value corresponds to approximately 1×10^{-9} fatality.

Total fatalities from direct physical trauma as a result of accidents were estimated to be up to 0.20. Thus, no fatalities are expected from accidents for the entire shipping campaign.

4.4.1.3 Highly Enriched Uranium

As described in Section 2.2.2.2, HEU is a by-product of the plutonium pit disassembly process. This recovered HEU from the PDCF would be shipped to the Y-12 facility at the Oak Ridge Reservation for declassification, storage, and eventual disposition. The transportation risks for these shipments were analyzed and included in estimates presented in the SPD EIS for transport of all radioactive material associated with the conversion of 33 MT (36.4 tons) of plutonium to MOX fuel as part of Alternative 3 (see Table L-6 in DOE 1999a). The total radiological transportation risks for Alternative 3 were 0.024 and 0.038 LCFs expected for transportation workers and the public, respectively. Thus, the transportation risks for the HEU shipments are considered to be insignificant because they represent only a small portion of an insignificant impact.

4.4.1.4 Spent MOX Fuel

Transportation of the spent MOX fuel to a final disposal site would be required after irradiation in a commercial nuclear reactor. The types of transportation risks posed would be the same as those considered above for the uranium and plutonium feed materials, the fresh MOX fuel, and the TRU waste. These risks include the radiological cargo-related risks from routine transport and hypothetical accidents and the vehicle-related risks, such as traffic accident fatalities and potential latent fatalities from vehicle emissions.

Estimating specific transportation risks for the spent MOX fuel is premature at this time because of the uncertainty in the actual location of both the commercial reactors that would be used for irradiation of the fresh MOX fuel and the final disposal site. As discussed in Section 4.4.1.1, the actual commercial reactors that would be used to irradiate the fresh MOX fuel are not yet known. The only disposal site currently under consideration in the United States is the proposed geologic repository at Yucca Mountain in Nye County, Nevada (DOE 2002d). For purposes of complying with NEPA requirements, it is assumed that spent MOX fuel would eventually be shipped to the proposed Yucca Mountain repository. However, the DOE's application for a license to operate the Yucca Mountain repository has not yet been submitted to the NRC. There is no assurance that the DOE's application, if submitted, would be approved.

On a per kilometer traveled basis, the routine radiological and vehicle-related transportation risks for spent MOX fuel would be similar to those estimated in this FEIS for fresh MOX fuel, plutonium metal, or TRU waste. The transportation risks of commercial spent nuclear fuel (SNF) and spent MOX fuel transport in particular were estimated in DOE's EIS concerning disposal of SNF and high-level waste at Yucca Mountain (DOE 2002d). In the mostly legal-weight truck scenario, approximately 53,000 truck shipments were estimated to result in approximately 12 LCFs to workers, 3 LCFs to the public, and 5 traffic fatalities. A rough estimate of the transportation risks of the spent MOX fuel can be obtained based on average shipment risks calculated from these results to show that no fatalities would be expected. Shipment of all the spent MOX fuel, approximately 598 shipments assuming three assemblies per cask, might be expected to result in approximately 0.1 worker LCFs, 0.03 public LCFs, and 0.056 transportation fatalities. Actual impacts would be lower or higher depending on the actual shipment distances relative to the average in the Yucca Mountain EIS (DOE 2002d). Thus, no significant impacts would be expected because the estimated risks are only a very small fraction of the radiological and vehicular risks to which the public are exposed to on a routine basis as discussed in Section 4.4.1.2.1.

4.4.2 Conversion of Uranium Hexafluoride to Uranium Dioxide

As discussed in Section 1.2.2, it is assumed that the conversion of uranium hexafluoride to uranium dioxide would take place at the Global Nuclear Fuel-Americas, LLC facility in Wilmington, North Carolina. The impacts of the general conversion process are described in the environmental assessment for the last license renewal of that facility (NRC 1997). At that time, the Wilmington facility was using the ammonium diuranate (ADU) process and was planning to begin using a new dry conversion process (DCP). The ADU process is a "wet" process that has higher impacts than the DCP. The GE facility currently uses the DCP. The environmental assessment includes a discussion of the impacts from both the ADU process and DCP. Therefore, it is believed that the impacts summarized below would bound impacts from the conversion process if another facility was ultimately selected.

No measurable impacts have been observed to the air, surface water, or vegetation due to releases from the Wilmington facility. Impacts to the shallow groundwater aquifer have occurred. The Wilmington facility produces gaseous, liquid, and solid effluent streams. Gaseous effluents are controlled by the use of HEPA filters and scrubbers permitted by the State of North Carolina, as necessary. Liquid effluents are controlled by the use of treatment systems and wastewater retention basins designed to reduce the concentration of contaminants prior to discharge. Solid wastes are managed through segregation, recycling, off-site disposal, and incineration. Discharges are permitted and are monitored to ensure compliance with permit requirements. Impacts to a hypothetical MEI and to the collective population are summarized in Table 4.23.

4.4.3 MOX Fuel Use

This section evaluates on a generic basis the impacts of using MOX fuel in reactors by summarizing analyses performed by the DOE in the SPD EIS (DOE 1999a).

Table 4.23. Comparison of human exposure for ammonium diuranate (ADU) and dry conversion processes (DCPs)

Pathway/receptor	ADU dose	DCP dose
Air		
Maximally exposed individual [mSv/yr (mrem/yr)]	0.001 (0.1)	0.0005 (0.05)
Collective population [person-Sv (person-rem)]	0.0009 (0.09)	0.00045 (0.045)
Liquid		
Maximally exposed individual [mSv/yr (mrem/yr)]	0.007 (0.7)	0.001 (0.1)
Collective population [person-Sv (person-rem)]	NA[a]	NA
Total		
Maximally exposed individual [mSv/yr (mrem/yr)]	0.008 (0.8)	0.00015 (0.15)
Collective population [person-Sv (person-rem)]	0.0009 (0.09)	0.00045 (0.045)

[a]Not applicable because liquid effluent in the river quickly dilutes to background levels; therefore, the collective dose impact is negligible.

The DOE's analysis is provided in Section 4.28 and Appendix K.7 of the SPD EIS. Impacts resulting from both normal operations and postulated accidents were evaluated for six reactors, two each at the Catawba, McGuire and North Anna nuclear stations. The range of impacts at each of these reactors were considered to reasonably bound the impacts of reactors that could use MOX fuel. Therefore, the range impacts is considered to represent a generic analysis. This range includes impacts from both ice condenser-type reactors (i.e., Catawba and McGurie) and non-ice condenser-type reactors. It was assumed that up to 40% of the fuel assemblies in a generic reactor would contain MOX fuel and that the remaining assemblies would contain the type of low-enriched uranium (LEU) fuel now used by commercial reactors. The impacts resulting from the use of MOX fuel in such a hybrid reactor core were estimated and compared with the impacts that would result from the use of a reactor core containing only LEU fuel.

The impacts from normal operations would be the same whether the reactor core contained 40% MOX fuel or 100% LEU fuel. The public surrounding such a generic reactor was estimated to receive a collective dose in the range of 0.057 person-Sv/yr (5.7 person-rem/yr) to 0.203 person-Sv/yr (20.3 person-rem/yr). The estimated number of annual LCFs produced by such a dose would be less than 0.01. No individual would be expected to receive more than 0.0073 mSv/yr (0.73 mrem/yr) due to reactor operations under normal conditions.

Some of the beyond-design-basis accidents were estimated to cause prompt fatalities in the highly unlikely event that they occurred. The change in the number of prompt fatalities due to the use of MOX fuel was estimated to range from 0 to 28 additional fatalities (815 versus 843 in the worst accident).

These doses are a small fraction of the annual average background dose. For comparison, as discussed in Section 3.10, the average annual natural background radiation dose to an individual in the United States is 3.6 mSv (360 mrem).

The SPD EIS (DOE 1999a) also analyzed potential MOX fuel use impacts from both postulated design-basis and beyond-design-basis accidents. The impacts were estimated in terms of both the consequences (the impacts that would result if the accident occurred) and risks (taken to be the consequences multiplied by the probability of occurrence of the accident). The risk was estimated over a 16-year campaign. The risk, over the entire 16-year period, of a LCF associated with design-basis accidents to the public surrounding a reactor using all LEU fuel ranged from 2.19×10^{-4} to 8.98×10^{-4}. The change in risk of a LCF associated with a reactor using 40% MOX fuel ranged from about 6% lower to 3% greater. For beyond-design-basis accidents, the campaign risk of a LCF to the public surrounding a reactor using all LEU fuel ranged from 0.144 to 5.25×10^{-5}. The change in risk of a LCF associated with a reactor using 40% MOX fuel ranged from about 7% lower to 14% greater.

The analysis in this EIS does not specifically consider impacts from the use of the lead test assembly (LTA) program. The LTA program consists of fabricating, transporting, using in a reactor, and analyzing a limited number of fuel assemblies. The DOE estimated the impact of the LTA program in the SPD EIS. The LTA program is considered to be independent of the proposed action. That is, the NRC decision regarding the proposed MOX facility is not affected by the DOE's decision on how to make and test the LTAs.

On February 27, 2003 (as amended September 23, 2003), Duke Power submitted a license amendment request to irradiate four MOX fuel lead test assemblies in the spring of 2005 in its Catawba Nuclear Station Units 1 & 2 (Docket Nos. 50-413, 50-414). The NRC is currently reviewing this license amendment request. In addition, in order for any specific commercial reactor to use MOX fuel on a production scale, an amendment to a 10 CFR Part 50 license, issued by the NRC, would be required. The NRC would perform its own site-specific NEPA analyses in evaluating any license amendment application it may later receive seeking authorization to use MOX fuel.

Impacts of transporting fresh MOX fuel to reactors is presented in Section 4.4.1.2.1, and impacts of transporting spent MOX fuel to a geologic repository is presented in Section 4.4.1.4. The impacts of disposing of the MOX fuel is included in the FEIS for Yucca Mountain (DOE 2002d).

4.5 Cumulative Impacts

This section assesses potential cumulative impacts of construction and operation of the proposed MOX, PDCF, and WSB facilities. Cumulative impacts are distinguished from the direct and indirect impacts of these facilities, which are discussed in Sections 4.3 and 4.4 and Appendix H. Direct effects are caused by the proposed action and occur at the same time and place. Indirect effects are caused by the proposed action and occur later in time or are farther removed in distance but are still reasonably foreseeable.

> **Cumulative Impacts**
>
> *Cumulative impacts* are potential impacts when the proposed action is added to other past, present, and reasonably foreseeable future actions.

Cumulative impacts were determined by adding the expected impacts of past, present, and reasonably foreseeable future actions to the projected direct and indirect impacts of the proposed MOX, PDCF, and WSB facilities. The impacts of construction and normal operations of the proposed facilities were evaluated for each impact area and are presented in Section 4.3. The impacts of past and present actions were determined from site environmental reports and other available documents (e.g., recent EISs). Reasonably foreseeable future actions include among others, those that would occur if the proposed MOX facility is built and operated, and include actions to be undertaken by the DOE as part of its surplus plutonium disposition program. The impacts of reasonably foreseeable future actions were taken from recently published NEPA analyses. Although the cumulative impact analysis focused on impacts at the SRS and vicinity (Section 4.5.1), an evaluation of cumulative impacts of off-site transportation activities is also included (Section 4.5.2).

4.5.1 Cumulative Impacts at the SRS

A review was conducted of past, present, and reasonably foreseeable future activities on the SRS. Past impacts were included in the cumulative impact assessment only if the residual effects of past actions are still in existence (e.g., past land use changes that are still in effect). Past impacts that have come and gone (e.g., operational impacts of decommissioned facilities) were not included in the cumulative impact assessment. The impacts of present activities and residual past activities at the SRS were determined from annual environmental reports that document the results of ongoing monitoring activities (e.g., Arnett and Mamatey 2001), as well as descriptions of the SRS baseline conditions in various recent DOE EISs. The impacts of past and present activities at the SRS are described qualitatively for each impact area in Chapter 3.

Nuclear facilities within an 80-km (50-mi) radius of the SRS include Georgia Power's Vogtle Electric Generating Plant across the river from the SRS; Chem-Nuclear Inc., a commercial low-level waste burial site just east of the SRS; and Starmet CMI, Inc. (formerly Carolina Metals), located southeast of the SRS, which processes uranium-contaminated metals. Radiological impacts from the operations of the Vogtle Electric Generation Plant, a two-unit commercial nuclear power plant, are small, but they are included in this cumulative impact analysis. The South Carolina Department of Health and Environmental Control Annual Report (SCDHEC 1995) indicates that operation of the Chem-Nuclear Services facility and the Starmet CMI facility do not noticeably affect radiation levels in air or liquid pathways in the vicinity of the SRS.

The counties surrounding the SRS host numerous industrial facilities (e.g., Bridgestone Tire, textile mills, paper product mills, and manufacturing facilities) with permitted air emissions that cumulatively affect regional air quality. South Carolina Electric and Gas Company's Urquhart Station, a three-unit, 250-megawatt, coal- and natural-gas-fired steam electric plant, is located near the SRS in Beech Island, South Carolina. All of these facilities contribute to ambient air quality at the SRS and thus are included within the SRS baseline used in the analysis of cumulative air quality impacts.

A number of construction and operating permits for industrial facilities in Aiken, Barnwell, Allendale, and Edgefield Counties have recently been filed with the South Carolina Department of Health and Environmental Control Bureau of Air Quality. No new permits have been applied for in Augusta-Richmond, Columbia, and Burke Counties in Georgia. In addition, a number of road projects are planned in the area. These include relatively minor improvements in the Aiken and North Augusta, South Carolina, areas that are part of the Augusta Regional Transportation Study and would take place in 2003 through 2007. Additional road projects in the area include improvements to a 13-km (8-mi) portion of US 78 from Montmorenci, South Carolina, to Windsor, South Carolina (to the east of Aiken), and the extension of I-520 across the Savannah River into North Augusta. This latter project would take place in 2006 through 2009.

Construction of new facilities and roads would result in short-term air quality impacts and would only contribute to the cumulative impact of MOX facilities if the construction period of facilities overlapped with the MOX construction or operational period. Impacts to air quality resulting from operations of new facilities and roads would result in changes to regional air quality. It is difficult to adequately predict the contribution of these facilities and roads to cumulative air quality impacts with the information available. All facilities would require permitting, and this permit process would take into consideration regional air quality NAAQS compliance.

Reasonably foreseeable future actions at the SRS were identified by reviewing recent NEPA documents for the site. A brief synopsis of future projects at the SRS that are considered in the cumulative impact analysis is presented in the following paragraphs:

- *Final Defense Waste Processing Facility Supplemental Environmental Impact Statement,* DOE/EIS–0082–S (DOE 1994). The Defense Waste Processing Facility (DWPF) has been constructed at the SRS and is currently processing sludge from SRS HLW tanks. However, SRS baseline data do not include the impacts of all planned DWPF operations, including the processing of salt solution from these tanks. Therefore, the cumulative impact analysis includes some effects of DWPF in the impacts of past and present activities and some in the impacts of reasonably foreseeable future actions.

- *Disposition of Surplus Highly Enriched Uranium Final Environmental Impact Statement,* DOE/EIS-0240 (DOE 1996b). The cumulative impact analysis incorporates an alternative at the SRS that would blend highly enriched uranium to 4% low-enriched uranium as uranyl nitrate hexahydrate (61 FR 40619; August 5, 1996).

- *Final Environmental Impact Statement on Management of Certain Plutonium Residues and Scrub Alloy at the Rocky Flats Environmental Technology Site,* DOE/EIS-0277 (DOE 1998). DOE plans to process certain plutonium-bearing materials currently being stored at the RFETS (64 FR 8068; February 18, 1999, and 66 FR 4803; January 18, 2001). These materials are plutonium residues and scrub alloy remaining from nuclear weapons manufacturing operations. DOE has decided to ship certain residues from the RFETS to the SRS for plutonium separation and stabilization. The separated plutonium would be stored at the SRS pending disposition decisions. Environmental impacts from using the F-Canyon to chemically separate the plutonium from the remaining materials at the SRS are included in the cumulative impact analysis.

- *Final Environmental Impact Statement for the Construction and Operation of a Tritium Extraction Facility at the Savannah River Site,* DOE/EIS-0271 (DOE 1999c). DOE plans to construct and operate a facility at the SRS to extract the tritium from commercial light-water reactor targets and targets of similar design (64 FR 26369; May 14, 1999). The proposed action and alternatives would provide tritium extraction capability to support either reactor or accelerator tritium production. Environmental impacts from the maximum processing option in the EIS are included in the cumulative impact analysis.

- *Surplus Plutonium Disposition Final Environmental Impact Statement,* DOE/EIS-0283 (DOE 1999a). The SPD EIS analyzed implementation of DOE's disposition strategy for surplus plutonium. The decision to site the facilities to implement this strategy at the SRS (as described in 65 FR 1608, January 11, 2000) is the basis for the proposed action analyzed in this EIS. The SPD EIS was used in some cases to determine the impacts of the Pit Disassembly and Conversion Facility for inclusion in the cumulative impact analysis.

- *Savannah River Site Spent Nuclear Fuel Management Final Environmental Impact Statement,* DOE/EIS-0279 (DOE 2000c). The selected alternative in the Record of Decision (ROD) for the Spent Nuclear Fuel Management EIS is to prepare for disposal of about 97% by volume (about 60% by mass) of the aluminum-based fuel considered in the EIS (48 MT [53 tons] heavy metal), using a melt and dilute treatment process (65 FR 48224; August 7, 2000). The impacts of this process are included in the cumulative impact analysis. The remaining 3% by volume (about 40% by mass) would be managed using conventional processing in existing SRS chemical separation facilities. As part of the preferred alternative, DOE will develop and demonstrate the melt and dilute technology. Following development and demonstration of that technology, DOE will begin detailed design, construction testing, and startup of a new treatment and storage facility to combine with a new dry storage facility. The SNF will remain in existing wet storage until treated and will then be placed in dry storage.

- *Savannah River Site High-Level Waste Tank Closure Final Environmental Impact Statement,* DOE/EIS-0303 (DOE 2002b). DOE evaluated three alternatives for tank closure. All of these alternatives would start after bulk waste removal. DOE decided (as described in 67 FR 53784; August 19, 2002) to implement the preferred alternative identified in the EIS (i.e., stabilize tanks and fill with grout). The impacts of this alternative are presented in this cumulative impact analysis.

- *Savannah River Site Waste Management Final Environmental Impact Statement,* DOE/EIS-0217 (DOE 1995). This EIS provides a basis for the selection of a sitewide approach to managing present and future (through 2024) wastes generated at the SRS. These wastes would come from ongoing operations and potential actions, new missions, environmental restoration, and decontamination and decommissioning programs. The EIS evaluated the treatment of wastewater discharges in the Effluent Treatment Facility, F- and H-Area Tank Farm operations and waste removal, and construction and operation of an HLW evaporator in the H-Area Tank Farm. In addition, it evaluated the Consolidated Incineration Facility (CIF) for the treatment of mixed waste, including incineration of benzene waste from the in-tank precipitation (ITP) process. (The CIF has suspended operations and the ITP process is to be replaced by an alternative evaluated in DOE 2001.) The first ROD stated that DOE would configure its waste management systems according to the moderate treatment alternatives described in the EIS (60 FR 55249; October 30, 1995). The second ROD (62 FR 27241; May 9, 1997) was deferred regarding treatment of mixed waste to ensure consistency with the *Approved Site Treatment Plan* (WSRC 2000). The Waste Management EIS is relevant to the assessment of cumulative impacts because it provides the baseline forecast of waste generation from operations, environmental restoration, and decontamination and decommissioning. This forecast was updated in 1999 (Halverson 1999).

- *Final Environmental Impact Statement for the Treatment and Management of Sodium-Bonded Spent Nuclear Fuel,* DOE/EIS-0306 (DOE 2000d). DOE plans to treat all spent nuclear fuel from the Experimental Breeder Reactor-II (EBR-II) and sodium-bonded spent nuclear fuel at Argonne National Laboratory-West (ANL-W) (located at INEEL) (65 FR 56565, September 19, 2000). Fermi-1 sodium-bonded spent nuclear fuel will be stored pending a decision on alternative treatments. DOE does not plan to implement any of the alternatives proposed for the SRS. However, some of the impact projections from other EISs (e.g., cumulative waste generation from the High-Level Waste Tank Closure EIS [DOE 2000a]) include impacts at the SRS from sodium-bonded spent nuclear fuel, and these impacts were excluded from the cumulative impact analysis.

- *Savannah River Site Salt Processing Alternatives Final Supplemental Environmental Impact Statement,* DOE/EIS-0082-S2 (DOE 2001). A process to separate the high-activity and low-activity waste fractions in high-level waste solutions is planned to replace the in-tank precipitation process assessed in the Defense Waste Processing Facility EIS (DOE 1994). The Salt Processing EIS evaluates four alternatives: small tank precipitation; ion exchange; solvent extraction; and direct disposal in grout. The proposed MOX facility cumulative impact analysis includes maximum impacts of the solvent extraction process as selected in the DOE ROD for this project (66 FR 201, p. 52752, October 17, 2001).

- *Environmental Assessment for the Construction and Operation of the Highly Enriched Uranium Blend-Down Facilities at the Savannah River Site,* DOE/EA-1233 (DOE 2000e). DOE plans to construct and operate a low-enriched uranium (LEU) loading station and modifications to the existing HEU blend-down facilities. The process will convert off-specification HEU (60% uranium-235) to less than 20% uranium-235 for use as commercial fuel. The environmental assessment (EA) for this facility indicated that impacts would be either negligible or unmeasurable. A Finding of No Significant Impact was issued on November 3, 2000.

- *Draft Supplemental Programmatic Environmental Impact Statement on Stockpile Stewardship and Management for a Modern Pit Facility*, DOE/EIS-236-S2 (DOE 2003b). A modern pit facility (MPF) has been proposed by DOE's National Nuclear Security Administration to manage and maintain the U.S. nuclear weapons stockpile. DOE has prepared a Supplement to the Programmatic Environmental Impact Statement on Stockpile Stewardship and Management for a Modern Pit Facility. This MPF EIS evaluates the environmental impacts associated with constructing a new MPF at four alternate sites, including the SRS, and across a range of pit production capabilities. The MOX facility cumulative impact analysis incorporates the impacts of the highest pit production rate (450 pits/year).

For all impact areas but employment, it was conservatively assumed that the impacts of past, present, and future activities would occur simultaneously. In reality, there would be less overlap of impacts in time (e.g., the impacts of some projects would be declining during the operational life of the facility), and cumulative impact, therefore, actually would be less than is presented here. Impacts to the MEI were also determined using a conservative approach that assumed the same MEI would be exposed to all concurrent actions (see Section 4.3.1.1.2 for the location of MEI for the proposed MOX facility). In reality, the MEIs for different activities vary and are dependent on the location of the activity (Simpkins 2000).

4.5.1.1 Cumulative Impacts of the MOX, PDCF, and WSB Facilities

Cumulative impacts of the facilities at the SRS were evaluated in detail for (1) air quality; (2) human health; (3) waste generation; (4) resource use (land, electricity, and water); and (5) employment. These impacts were evaluated on the basis of the anticipated effects of facility construction and normal operations (as presented in Section 4.3) and the potential for contributions to existing cumulative impacts on the SRS. The analysis focused primarily on normal facility operations over an assumed 10-year operating period. Construction impacts were considered in the cumulative impact analysis only with respect to the amount of land developed, because other construction impacts would be too short-lived to contribute substantially to cumulative impacts to any resources. Additionally, standard mitigation practices employed during construction (e.g., dust control measures, erosion control) would likely reduce these impacts to negligible levels.

Topics Evaluated and Impact Criteria Used in the Cumulative Impact Analysis

- ***Air quality:*** % NAAQS for criteria pollutants.
- ***Human health:*** Radiological dose to off-site MEI, off-site population, and SRS workers and resultant latent cancer fatalities.
- ***Waste generation:*** Generation rate of various waste types relative to existing SRS capacity.
- ***Resource use:*** Amount of land developed relative to total SRS area; amount of electricity and water used relative to existing SRS capacity.
- ***Employment:*** Number of jobs at the SRS.

Impacts to water quality, geologic resources, ecological resources, aesthetic and scenic resources, and cultural resources are not treated explicitly in the cumulative impact analysis because direct and indirect impacts to these resources are expected to be small (see Sections 4.3 and Appendix H). Facility operations would not contribute to the cumulative impacts of SRS activities on water quality because liquid effluents would be discharged to surface water under existing NPDES permit guidelines. No impacts are anticipated to aesthetic and scenic resources because the facilities would be visually consistent with surrounding SRS industrial facilities and would not be visible from off-site. Impacts to geologic, ecological, and cultural resources are expected to be small and would be limited to the immediate vicinity of the facilities (which would be located on a partially developed site), thus reducing the potential for cumulative impact. Any cumulative impacts to these resources would be proportional to the cumulative impact projected for land development at the SRS.

Cumulative impacts to air quality were evaluated for five pollutants — TSP, PM_{10}, NO_2, SO_2, and CO. Normal operations of the MOX, PDCF, and WSB facilities would result in small contributions (2% or less) to cumulative concentrations of these air pollutants (see Table 4.24). For four air pollutants (annual total suspended particulates, 24-hour PM_{10}, 3-hour SO_2, and 24-hour SO_2), the cumulative total concentrations would be above 90% of the NAAQS and, therefore, approaching noncompliance. However, even without the contributions from operations of the proposed facilities, the cumulative totals for these four pollutants would be above 90% of the NAAQS. The cumulative total concentration of $PM_{2.5}$ could not be

Table 4.24. Estimated cumulative impacts to air quality from MOX, PDCF, and WSB facility operations and other activities at the SRS[a]

Source	Pollutant concentrations ($\mu g/m^3$)								
	TSP, annual	PM_{10} 24 h	PM_{10} annual	NO_2, annual	SO_2 3 h	SO_2 24 h	SO_2 annual	CO 1 h	CO 8 h
SRS baseline[b, c]	74.6	138	25.9	26.3	1,246	355	31.1	10,363	6,867
MOX facility, PDCF, and WSB	0.002	1.3	0.002	0.07	22	4.9	0.004	116	26
SNF management[d]	0.02	0.1	0.02	3.4	1.0	0.1	0.02	9.8	1.3
HEU disposition[e]	0.05	0.01	0.01	0.01	0.7	0.3	0.02	0.1	0.07
Tritium extraction facility[f]	0.0002	0.01	0.00009	0.006	0.09	0.001	0.00009	3.6	0.5
Plutonium residues[g]	0.0	0.0	0.0	0.04	0.0	0.0	0.0	0.0	0.0
Salt processing[h]	0.001	0.07	0.001	0.03	0.4	0.05	0.0005	18.0	2.3
Tank closure[i]	0.005	0.08	0.004	0.03	0.2	0.04	0.002	1.2	0.3
Modern Pit Facility[j]	0.18	0.33	0.07	2.4	1.9	0.83	0.17	6.8	4.7
Total concentration ($\mu g/m^3$)	74.9	139.9	26.0	32.2	1,247.6	361.5	31.3	10,518.2	6,902.5
MOX, PDCF, and WSB contribution (%)	0.00	0.9	0.01	0.23	1.8	1.4	0.01	1.1	0.4
NAAQS ($\mu g/m^3$)	75	150	50	100	1,300	365	80	40,000	10,000
% of standards	99.6	93.3	52.0	32.3	96.0	99.0	39.2	26.3	69.0

[a]Maximum predicted off-site cumulative ground-level concentrations of nonradiological pollutants.

[b]SRS baseline includes the impacts of existing SRS facilities (SRS maximum) and regional emissions (background) from Table 4.8. These values are hypothetical levels that are based on maximum permitted emissions from SRS sources and do not necessarily represent actual air quality conditions.

[c]Includes Defense Waste Processing Facility operations.

[d]*Source:* DOE (2000c).

[e]*Source:* DOE (1996b).

[f]*Source:* DOE (1999c).

[g]*Source:* DOE (1998).

[h]*Source:* DOE (2001) using maximum impact alternative.

[i]*Source:* DOE (2002b).

[j]*Source:* DOE (2003b).

determined because information was not available for many of the future actions considered here. However, the facilities would contribute a very small amount of $PM_{2.5}$ (0.009% of the annual standard) and only when emergency generators were used. It should be noted that all of the air quality analyses are based on very conservative assumptions (e.g., maximum concentrations for all facilities), and it is not likely that NAAQS exceedances would occur at the SRS.

During normal operations, the contribution of the MOX, PDCF, and WSB facilities to cumulative radiological dose to the public would be small (7% or less of total dose; see Table 4.25). The cumulative dose to an MEI would increase by 1% as a result of facility operations. The estimated risk of a LCF resulting from cumulative dose to the MEI is extremely small (4×10^{-7}). The estimated number of LCFs resulting from cumulative collective dose to the off-site population is 0.02. These very small numbers mean that statistically, radiological doses from plant operations would not be expected to cause any latent cancer fatalities in the off-site population.

Cumulative collective dose to workers at SRS would increase approximately 9% as a result of MOX, PDCF, and WSB facility operations. The number of expected LCFs among workers resulting from cumulative dose (that resulting from dose contributions from the SRS baseline, the proposed action, and other reasonably foreseeable future actions) is 1.7. For most types of waste, facility operations would contribute relatively small volumes to the cumulative waste generation volumes at the SRS (see Table 4.26), and existing waste treatment facilities at the SRS have sufficient capacity to treat this cumulative total (see Section 4.3.4.2). The largest proportionate increase would be in the amount of nonhazardous solid waste (approximately 19% increase).

The cumulative impacts of the facilities to land development, electricity usage, and groundwater usage at the SRS would be quite small and well within existing SRS capacity (see Table 4.27). Construction of the facilities would result in a slight increase (1.7%) in the amount of developed land at the SRS, but the cumulative amount of developed land on the SRS would remain quite small (3.9% of the total site). Facility operations would use 186,000 MWh/yr of electricity (3.6% of SRS capacity). Cumulative electricity demand resulting from facility operations and all existing and planned actions would be only 28% of SRS capacity. Facility operations would use 76 million L/yr (20.1 million gal/yr) of groundwater (0.02% of SRS capacity). Cumulative groundwater demand would be only 4.8% of SRS capacity.

Determination of the cumulative impacts on the SRS workforce is complicated by the fact that employment is not expected to be constant during the life of the facility and other existing and planned actions at the SRS discussed in the beginning of Section 4.5.1. The analysis presented here considered the time lines of workforce projections for the SRS baseline and reasonably foreseeable future actions and the year in which the workforce would be highest. The results of these conservative analyses are presented in Table 4.27. Overall, employment at the SRS has decreased from 22,070 in September 1993 to 14,193 in September 2000. Projections indicate that site employment will continue to decline to approximately 10,000 by

Table 4.25. Estimated annual cumulative radiological dose and latent cancer fatalities resulting from MOX, PDCF, and WSB facility operations and other activities at the SRS

	Dose to maximally exposed individual[a]				Collective dose to off-site population				Collective dose to workers	
Source	Air pathway (rem)	Liquid pathway (rem)	Total dose (rem)	Latent cancer fatalities[b]	Air pathway (person-rem)	Liquid pathway (person-rem)	Total dose (person-rem)	Latent cancer fatalities[b]	Total dose (person-rem)	Latent cancer fatalities[b]
SRS baseline[c]	4.0×10^{-5}	1.4×10^{-4}	1.8×10^{-4}	1.1×10^{-7}	2.3	3.9	6.2	3.7×10^{-3}	163	0.1
MOX, PDCF, and WSB	4.0×10^{-6}	–[d]	4.0×10^{-6}	2.4×10^{-9}	1.6	–[d]	1.6	9.4×10^{-4}	262	1.6×10^{-1}
SNF management[e]	1.5×10^{-5}	5.7×10^{-5}	7.2×10^{-5}	4.3×10^{-8}	0.6	0.2	0.8	4.5×10^{-4}	55	3.3×10^{-2}
HEU disposition[f]	2.5×10^{-6}	–[d]	2.5×10^{-6}	1.5×10^{-9}	0.2	–[d]	0.2	9.6×10^{-5}	11.3	6.8×10^{-3}
Tritium extraction facility[g]	2.0×10^{-5}	–[d]	2.0×10^{-5}	1.2×10^{-8}	0.8	–[d]	0.8	4.6×10^{-4}	4.0	2.4×10^{-3}
Plutonium residue management[h]	5.7×10^{-7}	–[d]	5.7×10^{-7}	3.4×10^{-10}	0.006	–[d]	0.006	3.7×10^{-5}	7.6	4.6×10^{-3}
Defense waste processing facility[i]	1.0×10^{-6}	–[d]	1.0×10^{-6}	6.0×10^{-10}	0.07	–[d]	0.07	4.2×10^{-5}	118	7.1×10^{-2}
Salt processing[j]	3.1×10^{-4}	–[d]	3.1×10^{-4}	3×10^{-9}	18.1	–[d]	18.1	1.1×10^{-2}	29	1.7×10^{-2}
DOE complex miscellaneous components[k]	4.4×10^{-6}	4.2×10^{-8}	4.4×10^{-6}	2.7×10^{-11}	0.007	2.4×10^{-4}	0.007	4.3×10^{-6}	2	1.2×10^{-3}
Tank closure[l]	2.5×10^{-8}	–[d]	2.5×10^{-8}	1.5×10^{-11}	0.0014	–[d]	0.0014	8.4×10^{-7}	1,600	1.0
Modern Pit Facility[m]	8.0×10^{-9}	–[d]	8.0×10^{-9}	4.8×10^{-12}	1.3×10^{-6}	–[d]	1.3×10^{-6}	7.8×10^{-10}	560	3.4×10^{-1}
Vogtle Nuclear Power Plant[n]	5.4×10^{-7}	5.4×10^{-5}	5.5×10^{-5}	3.3×10^{-8}	0.04	0.003	0.05	2.7×10^{-5}	–[d]	–[d]
Total	4.0×10^{-4}	2.5×10^{-4}	6.5×10^{-4}	3.9×10^{-7}	23.6	4.1	27.7	0.02	2,812	1.7
MOX, PDCF, and WSB contribution to total (%)	1.0	0.00	0.62	0.62	6.7	0.00	5.7	5.7	9.3	9.3

See next page for footnotes.

Table 4.25. Continued

[a]The MEIs for different facilities for the same pathway and the MEIs for different pathways for the same facility are likely to be different individuals. Therefore, simple addition of doses for all MEIs to estimate the total MEI dose is not accurate, but it is shown here to be conservative, (i.e., to present impacts that are overestimates of what would actually happen).

[b]Latent cancer fatalities are calculated by multiplying dose by the FGR-13 health risk conversion factor of 6×10^{-4} fatal cancer per person-rem (Eckerman 1999).

[c]SRS baseline includes the impacts of existing facilities and the residual impacts of past activities. Values are from Arnett and Mamatey (2001).

[d]Less than minimum reportable levels.

[e]*Source:* DOE (2000c); SNF = spent nuclear fuel.

[f]*Source:* DOE (1996b).

[g]*Source:* DOE (1999c).

[h]*Source:* DOE (1998).

[i]*Source:* DOE (1994).

[j]*Source:* DOE (2001).

[k]*Source:* DCS (2002a).

[l]*Source:* DOE (2002b).

[m]*Source:* DOE (2003b).

[n]*Source:* NRC (1996).

Table 4.26. Estimated cumulative waste generation at the SRS resulting from operation of the MOX, PDCF, and WSB facilities and other activities at the SRS

	Total waste generation over 30-year period (m^3)			Annual waste generation	
Source	Low-level waste	Hazardous-mixed waste	Transuranic waste	Nonhazardous solid waste (m^3)	Nonhazardous liquid waste (L)
SRS baseline[a, b]	120,000	3,900	6,000	6,670	4.2×10^8
MOX, PDCF, and WSB facilities[c]	28,838	120	4,431	4,140	6.0×10^7
Salt processing[d]	920	56	0	–[e]	Negligible
Environmental restoration and D&D activities[d]	62,000	6,200	0	NA[f]	NA
Modern Pit Facility[g]	150,900	290	33,900	6,900	8.2×10^7
Other future actions[h,i]	21,750	4,013	10,100	4,105	2.2×10^7
Total volume	384,408	14,580	54,521	21,815	5.8×10^8
MOX, PDCF, and WSB contribution to total (%)	7.5	0.8	8.1	19.0	10.4
SRS treatment capacity	534,900	534,900	–[j]	–[k]	1.0×10^9
Total volume as % of SRS capacity	71.9	2.7	–[j]	–[k]	58.0

[a]SRS baseline includes the impacts of existing facilities and the residual impacts of past activities.

[b]High-level, low-level, hazardous-mixed, and transuranic waste volumes from DOE (2001); nonhazardous solid and liquid waste volumes from DCS (2002a).

[c]Total waste generation for MOX, PDCF, and WSB operations over a 10-year period, the operational period of these facilities.

[d]*Source:* DOE (2001).

[e]Value presented in DOE (2001) as 61 metric tons/yr.

Footnotes continued on next page.

Table 4.26. Continued

[f]NA = not available.

[g]Source: DOE (2003b).

[h]30-year waste generation volumes include life-cycle waste associated with DWPF operations (DOE 1994), HLW tank closure (DOE 2002b), SNF management (DOE 2000c), Tritium Extraction Facility (DOE 1999c), plutonium residues (DOE 1998), HEU disposition (DOE 1996b), commercial light water reactor waste, and weapons components that could be processed at the SRS. Values presented were derived from values provided in DOE (2001), but were adjusted to remove the contribution from SPD facilities (included in salt processing values) and sodium-bonded SNF management, which no longer involves SRS operations.

[i]Nonhazardous waste volumes include waste generated by activities associated with HEU disposition (DOE 1996b), Tritium Extraction Facility (DOE 1999c), DWPF operations (DOE 1994), and HLW tank closure (DOE 2002b).

[j]Transuranic waste is transported off-site for disposal at the WIPP facility.

[k]Nonhazardous solid waste is recycled or disposed of at on-site and off-site facilities.

Table 4.27. Estimated cumulative impacts to resource use and employment from MOX, PDCF, and WSB facility operations and other activities at the SRS

Source	Land area		Electricity		Groundwater		Employment	
	Developed area (acres)	% Total SRS area	Average annual usage (MWh/yr)	% Total SRS capacity	Average annual usage (L/yr)	% Total SRS capacity	Number of workers	% SRS total
SRS baseline[a]	7,241[b]	3.7	411,000	9.3	1.7×10^{10}	4.7	13,227	78.2
MOX, PDCF, and WSB facilities	123	0.06	186,000	4.2	7.6×10^{7}	0.02	490	2.9
SNF management[b]	0	0.00	15,800	0.4	2.1×10^{8}	0.06	520	3.1
HEU disposition[c]	0	0.00	5,000	0.1	1.9×10^{7}	0.005	125	0.7
Tritium extraction facility[d]	3	0.002	20,600	0.5	NA[e]	NA	400	2.4
Plutonium residue management[f]	0	0.00	1,329	0.03	1.6×10^{7}	0.005	NA	NA
Defense waste processing facility[g]	105	0.05	32,000	0.7	NA	NA	60	0.4
Salt processing[h]	0	0.00	24,000	0.6	1.2×10^{7}	0.003	220	1.3
Tank closure[i]	0	0.00	0	0.0	8.7×10^{6}	0.002	85	0.5
Modern pit facility[j]	171	0.09	545,600	12.4	5.0×10^{8}	0.1	1,797	10.6
Total	7,643	3.9	1,241,329	28.2	1.8×10^{10}	4.8	16,924	100.0

[a]SRS baseline includes the impacts of existing facilities and the residual impacts of past activities.

[b]*Source:* DOE (2000c); SNF = spent nuclear fuel.

[c]*Source:* DOE (1996b).

[d]*Source:* DOE (1999c).

[e]NA = not available.

[f]*Source:* DOE (1998).

[g]*Source:* DOE (1994).

[h]*Source:* DOE (2001).

[i]*Source:* DOE (2000a).

[j]Source: (DOE 2003b).

2010 (DOE 1999c). Facility construction would result in a peak workforce of 1,000 in 2005. Facility operations would support 490 workers annually (3.2% of the total projected for the SRS).

4.5.1.2 Cumulative Impacts of the No-Action Alternative

The no-action alternative would be a decision by the NRC not to approve the proposed MOX facility. Because all the surplus plutonium would remain at the DOE sites, the facilities planned for processing this surplus plutonium at the SRS — the proposed MOX facility, PDCF, and the WSB — would not be constructed. Since none of the surplus plutonium from other DOE sites would be stored at the SRS, none of the projected impacts of these facilities (as presented in Section 4.5.1.1) would occur.

4.5.2 Cumulative Impacts of Transportation

Cumulative impacts of transportation were estimated by adding the contributions from four sources:

- Historical shipments of spent nuclear fuel and radioactive waste;
- Reasonably foreseeable future actions involving the transportation of radioactive materials;
- Spent fuel shipments to a geological repository at Yucca Mountain, Nevada;
- General transportation of radioactive materials not related to any particular action; and
- Transportation of surplus plutonium and depleted uranium to the SRS, fresh MOX fuel from the SRS to a surrogate Midwest nuclear power plant, and TRU waste to the WIPP.

Estimates of contributions from the first four sources to the collective occupational dose and dose to the general population were summarized in the EIS for a geological repository at Yucca Mountain (DOE 2002d). These estimates are presented in Table 4.28. The future SNF shipments listed in Table 4.28 include potential spent MOX fuel shipments to the repository.

The shipment risks from spent MOX fuel are similar to those for typical SNF. Therefore, these risks are expected regardless of the fuel type, normal LEU or MOX, that will be used in existing nuclear power plants in the future. The estimated dose resulting from the proposed action is similar to that resulting from historical shipments of spent nuclear fuel and radioactive waste, 100 times smaller than that resulting from reasonably foreseeable future actions and 1,000 times less than general transportation. The contribution to cumulative occupational and general population dose associated with the proposed action is expected to be insignificant.

Table 4.28. Estimated cumulative transportation impacts of facility operations and shipment of radioactive materials from other sources (1943 to 2048)

Category	Collective occupational dose [person-Sv (person-rem)]	Latent cancer fatalities	Collective dose to the general population [person-Sv (person-rem)]	Latent cancer fatalities
Historical shipments[a]	3.3 (330)	0.2	2.3 (230)	0.1
Reasonably foreseeable future actions[a]	197 (19,670)	12	498 (49,770)	30
Spent fuel shipments to geologic repository[a]	88 (8,800)	5	16 (1,600)	1
General transportation (1943 to 2048)[a]	3,300 (330,000)	198	2,900 (290,000)	174
MOX shipments[b]	2.1-5.3 (210-530)	0.1-0.3	3.3-5.6 (330-560)	0.2-0.4
Total	3,600 (360,000)	200	3,400 (340,000)	200

[a]*Source:* DOE (2002d).

[b]Doses represent total for all shipments associated with the MOX program. (See Table 4.20 [total campaign].)

4.6 Cost-Benefit Analysis

4.6.1 Introduction

This section compares the costs and benefits of the proposed action with the costs and benefits of the no-action alternative. The cost-benefit analysis sets forth the various environmental impacts (both negative and positive) of the proposed action, and the economic costs and benefits of building and operating the proposed MOX facility, the PDCF, and the WSB. Costs and benefits are assessed at both the national and regional levels. At the national level, the overall costs of proposed MOX facility construction and operation are compared with the benefits of plutonium supply reduction. The benefits to national security from plutonium supply reduction are substantial, but these benefits are not quantifiable in terms of dollars and cents.

The national benefits associated with the proposed action that are quantifiable include project expenditures during construction and operation of the proposed MOX facility, the PDCF, and the WSB. Various sectors in the national economy would provide the materials, equipment, and services needed to build and operate these facilities. However, because of the preliminary nature of the data needed to calculate impacts, no quantitative estimate of the impacts of construction and operation of the proposed MOX facility on the national economy was included in this EIS. A significant national benefit of the proposed action would be the avoided cost of continued plutonium storage. These costs are estimated to be approximately $256 million per year (2003 dollars) (NNSA 2002). Another national benefit of the proposed action would be the generation of additional supplies of electricity. However, this analysis does not assign a specific economic value to the electricity that would be generated by the irradiation of MOX fuel given the uncertainty surrounding the associated costs, in particular, the cost of power plant infrastructure upgrades.

There would also be regional costs and benefits associated with construction and operation of the proposed MOX facility. At the regional level, excluding costs and benefits that cannot be quantified, the proposed MOX facility would produce an overall net benefit of $1,940 million (see Table 4.29).

4.6.2 National Costs and Benefits

The primary national benefit of construction and operation of the proposed MOX facility would be a reduction in the supply of weapons-grade plutonium available for unauthorized use. Once the plutonium component in MOX fuel has been irradiated in commercial nuclear reactors, the isotopic composition of the plutonium would be more proliferation resistant. Moreover, since the plutonium would then be part of the resultant high-level nuclear waste, the plutonium would no longer be available for other uses. Compared with the no-action alternative — in which the weapons-grade plutonium would continue to be stored at several existing DOE locations — converting surplus plutonium into MOX fuel and irradiating it better ensures its security, since it would reduce the number of locations where the various forms of plutonium are stored (DOE 1997a). Converting surplus weapons-grade plutonium into MOX fuel is thus viewed as better ensuring that weapons-usable material would not be obtained by rogue states and terrorist groups. Implementing the proposed action would promote the above nonproliferation objectives.

A significant benefit of the MOX program would be the avoided cost of continuing to store the plutonium inventory. These costs are estimated to be approximately $256 million per year (2003 dollars) (NNSA 2002).

For the no-action alternative, although the costs and benefits of continued storage of plutonium in the present DOE locations are not re-evaluated in this analysis, these issues are discussed in the SPD EIS (DOE 1999a). Some of the impacts of the no-action alternative represent impacts of each entire DOE site, not just the impacts of continued storage. Continued storage of plutonium by the DOE at its present locations would not be expected to produce additional LCFs. Annual LCFs of approximately 0.002 in the surrounding population of the storage sites were estimated. The annual collective dose to members of the public (i.e., those living and working within 80 km [50 mi] of the SRS) produced by routine operation of the proposed MOX facility, the PDCF, and the WSB would be expected to result in an LCF rate of approximately 0.0009/yr or less. Therefore, continued storage would result in higher annual impacts.

Table 4.29. Summary of project costs and benefits in the REA (in millions of 2003 dollars, except where noted)

Item	MOX facility[a]
Costs	
Internal costs	
Construction	6
Operation	3
Short-term external costs (construction)	
Housing shortages	2% of vacant rental housing units would be required
Overcrowding in local public facilities	Minimal
Inflation	Minimal
Noise and congestion	Minimal
Water and sewage systems	Minimal
Long-term external costs (operations)	
Housing values	Less than 1% of vacant owner occupied housing would be required
Cost of providing public services	Less than 1% increase in revenues would be required
Deterioration in recreational values	Minimal
Restrictions to water and land	Minimal
Aesthetic values	Minimal
Cultural and historical sites	Minimal
Total REA costs	9
Benefits	
Avoided cost of continued plutonium storage	14
Total tax revenues	110
Economic activity in the REA	
Construction	
Annual average employment	1,020 jobs
Total income	370
Total regional product	760
Operations	
Annual average employment	1,270 jobs
Total Income	640
Total regional product	1,180
Other benefits	
Enhancement of recreational values	Minimal
Increased knowledge of the environment	Minimal
Total REA benefits	1,950
Net REA benefit	+1,940

[a]Data may not add to totals because of independent rounding.

The national costs associated with the proposed action are the total life-cycle costs, which include research and development and pre-capital costs, design and construction costs, operating costs, deactivation costs, and contingency costs. Decommissioning costs are not included given the uncertainty surrounding their magnitude. The total cost of the proposed action is estimated to be $4,064 million (in 2003 dollars), with $2,238 million to cover the cost of the proposed MOX facility and $1,825 million for the PDCF and WSB (NNSA 2002). A significant item included in the estimated total cost of the proposed facilities is the credits associated with the value of the MOX and HEU fuel. These items amount to $1,002 million over the life of the project (NNSA 2002).

4.6.3 Regional Costs and Benefits

The various quantifiable costs and benefits of the proposed MOX facility in the REA are identified in Table 4.29. Costs and benefits are presented for construction and operation, including decommissioning, over a 20-year project life. On balance, the proposed MOX facility would provide a net benefit (total benefits minus total costs) to the REA. The net benefit of the proposed MOX facility would be approximately $1,940 million. Sections 4.6.3.1 and 4.6.3.2 provide a more detailed description of the costs and benefits of the proposed MOX facility.

4.6.3.1 Regional Costs

Both potential internal and external costs are included in the assessment. Potential external costs include both long-term and short-term costs. Long-term external costs can also be associated with potential accidents at the proposed facilities. The impacts of accidents associated with the proposed facilities on agriculture, water, and fisheries resources, and subsequently on the economies of communities surrounding SRS, would be small. In the case of the most serious accidents, potential damage to crops under the plume in the event of an airborne release and the subsequent damage to water resources from the associated runoff would be small because the amount of radioactive material deposited per unit area would be relatively small. Dilution of runoff would occur fairly rapidly in the affected rivers and streams and would not cause any significant risk to the economies of the communities downstream of the location of the proposed facilities. Any interdiction of crops as a result of the deposition of radioactive material would be a limited, one-time event, and if it were to occur at all, would only affect a small number of farm communities.

Although the probability of severe accidents is very low, if such accidents did occur, the people living within 80 km (50 mi) of the SRS would likely be affected. The extent to which the surrounding population would be affected would depend on the amount of material released and the direction and speed at which airborne material was dispersed by wind conditions at the time of the accident. While the overall risk to the surrounding population would be very low (since the probability of severe accidents occurring would be very low), the greatest short-term risk of exposure would be to population groups located to the west-northwest of SRS, while the greatest 1-year risk would be to the southwest of SRS from crop contamination.

Routine operation of the proposed facilities is expected to produce an annual latent cancer risk of about 1 in 250 million for the maximally exposed member of the public. The annual collective dose (associated with the facilities) to members of the public living and working within 80 km (50 mi) of SRS is expected to produce an LCF risk of approximately 0.0009 or less.

No adverse impacts from chemical exposure of workers at the proposed facilities are anticipated. Less than one fatality and approximately 410 worker injuries are expected during the 10-year operating period of the proposed facilities.

Routine proposed facilities operations are expected to produce insignificant impacts to air quality and would not exceed any ambient air quality standards for criteria pollutants at SRS. Maximum levels of $PM_{2.5}$ in the vicinity of SRS already exceed the applicable levels, and facility construction would create an additional 0.07% of the present standard; facility operations would contribute 0.009%.

Water consumption during operation of the proposed MOX facility, PDCF, and WSB would represent an increase of about 5% of the water demand for the A-Area loop in 2000 and about 2% of the excess A-Area loop capacity. Discharges to surface water from the WSB during facility operations would comply with the NPDES permit guidelines.

Waste management systems at SRS would not be adversely affected by wastes generated by the proposed facilities. Adequate storage capacity and handling procedures are in place at SRS to process hazardous wastes generated during both construction and operation. Nonhazardous liquid and solid wastes would not adversely affect the Central Sanitary Waste Treatment Facility.

Other long-term external costs would include the potential impact of the proposed MOX facility, PDCF, and WSB (proposed facilities) on deterioration in recreational values, access restrictions to water or land (including any income lost), aesthetic impacts, impacts on local cultural and historical sites, decreased housing values, and the increased cost of providing local public services.

No impacts to recreational values, local aesthetic quality, or local water or land access would be expected from the proposed facilities. The location of the proposed facilities is close to the center of the SRS, and no recreation opportunities are currently available to the public in the vicinity. The proposed facilities would not change the industrial nature of the F-Area, and since the closest viewing location is about 8 km (5 mi) to the south, no changes in aesthetic quality would be expected (see Appendixes G and H). Construction of the facilities would occur on land already owned by the federal government and would have no impact on water or land access.

Impacts to housing values resulting from facility construction and operation, or to the cost of providing local public services are unlikely because of the relatively small number of long-term new residents that would be expected to move into the REA from elsewhere. Sufficient local housing is likely to be available to absorb new residents. Only 2% of vacant rental housing would be needed for workers during construction and less than 1% of vacant owner-occupied housing would be needed during operations. Changes in local public expenditures to maintain existing levels of public services would likely be small, with five additional local public service employees likely to be required (see Appendixes G and H).

The impacts of MOX fuel transportation, including those on property values, were not considered because of uncertainty surrounding the routes that would be used and the timing of shipments.

Short-term external costs include the contribution of the proposed facilities to housing shortages; local inflation, noise, and congestion; impacts on the local water supply and sewage systems; and crowding in local public schools, hospitals, and other local public facilities.

The proposed facilities would not produce any significant costs in the REA at the SRS in the short term. Sufficient vacant rental units would be available in the REA for use by construction workers, and sufficient owner occupied units would be available to operations employees (see Section G.2.7 in Appendix G). Inflation in prices in the local area is not likely because much of the equipment, materials, and services required would be specialized, and a significant portion would be obtained from outside the REA. Material and equipment expenditures assumed to be made locally would not likely push local industries to capacity, and no labor shortages would be likely. Any construction and managerial positions not filled from within the local labor market would be taken by workers moving to the area from other labor markets in the southeastern United States (see Appendixes G and H).

Noise and congestion from construction activities for the proposed facilities would likely be minor. Additional traffic generated during construction and operation would be unlikely to cause any additional traffic congestion on the major road segments surrounding the site, given the relatively small incremental increase in traffic from the proposed action (see Appendix H). Relatively small utility requirements would mean that no impacts would be expected on the local water supply and sewage systems. Local public schools, hospitals, and other local public facilities are not expected to suffer any overcrowding because of the relatively small number of new residents expected during the construction and operation under the proposed action (see Appendix H).

Internal costs are the life-cycle costs of design, construction, and operation of the project borne by the federal government. The internal costs of the proposed action in the REA are approximated using a cost localization factor that apportions total life-cycle project costs on the basis of the ratio of REA population to total national population. Internal costs apportioned to the REA using this method are small, amounting to $9 million for the proposed action.

4.6.3.2 Regional Benefits

The potential benefits of construction and operation of the proposed facilities include economic benefits — such as employment, income, and gross regional product — and various additional potential benefits — such as enhancement of recreational values, environmental enhancement in support of the protection of wildlife and wildlife habitat, and increased knowledge of the environment.

A significant benefit of the proposed action would be the avoided costs of continued plutonium storage. At the national level, these costs are estimated to be approximately $256 million per year (NNSA 2002) and would be incurred for as long as the material continued to be stored. Application of the same localization factor used in Section 4.6.3.1 to estimate the regional portion of plutonium storage costs avoided with the construction and operation of a MOX facility indicates that $14 million would be saved over what it would cost if plutonium was stored in existing facilities for an additional 25 years.

The measurement of the local employment and income economic benefits is based on the use of regional economic multipliers. These multipliers capture the indirect (off-site) effects of on-site activities associated with construction and operation.

To estimate employment benefits, life-cycle cost estimates were used (NNSA 2002) in association with data on the relationship between direct and indirect (off-site) employment benefits associated with construction and facility operations at the SRS. Data on the relationship between direct and indirect employment for a MOX facility were taken from the SPD EIS (DOE 1999a; see Appendix F, Section 9.2 for more information on the methodology used). By using direct (on-site) facilities employment data taken from the ER (DCS 2002a) as the basis for calculation, the indirect employment impacts during the construction and operation of the proposed facilities were estimated by application of the direct-to-indirect employment multiplier for the project at the SRS from the SPD EIS. The direct impacts of no action were estimated by using the relationship between total annual cost during construction and operation and direct employment for the proposed action. Indirect impacts were then estimated by application of the direct-to-indirect employment multiplier for a proposed MOX facility at the SRS from the SPD EIS (DOE 1999a).

The impacts on regional income of construction and operation were estimated by using employment impact estimates together with average regional income multipliers for the REA taken from IMPLAN regional economic data (MIG Inc. 2001). IMPLAN input-output economic accounts show the flow of commodities to industries from producers and institutional consumers. The accounts also show consumption activities by workers, owners of capital, and imports from outside the region. The IMPLAN model contains 528 sectors representing industries in agriculture, mining, construction, manufacturing, wholesale and retail trade, utilities, finance, insurance and real estate, and consumer and business services. The model also includes information for each sector on employee compensation; proprietary and property income; personal consumption expenditures; federal, state, and local expenditures; inventory and capital formation; and imports and exports.

The benefits of the proposed facilities to the economy of the REA would be significant (see Table 4.29). In the peak year of construction, 1,820 workers would be required for the proposed action. On average, 1,020 jobs would be created for the proposed facilities during the construction period. During operations, 1,270 workers would be required in each year. The facility would also contribute significantly toward personal income within the REA. The proposed facilities would produce $370 million in income over the construction period and $640 million during operations (see Appendix H).

No taxes are paid by the federal government (income, property, or sales taxes), and contractors constructing and operating a facility on behalf of the federal government are currently exempt from local sales taxes in Georgia and South Carolina. Although local tax revenues, primarily state income and sales tax revenues, paid by federal government employees, contractors, and their employees would increase, the increase would be relatively small. During both construction and operation, the proposed facilities would produce approximately $110 million in tax revenues in the REA.

The gross regional product (GRP) provides the best measure of the overall benefits of both alternatives to the economy of the REA. The GRP is the sum of value added in the production of all goods and services in a year and measures the overall level of economic activity in the REA. The proposed facilities would produce $1,950 million in GRP in the REA over the entire life of the project.

4.7 Resource Commitment

Construction of the proposed facilities would result in some impacts that cannot be avoided. Impacts may be irreversible if the future uses of the resource are limited. This section addresses unavoidable, irreversible, and irretrievable impacts of constructing and operating the facility and the relationship between short-term uses of F-Area and the SRS for the facility and long-term productivity. A summary of unavoidable impacts is presented in Table 4.30.

4.7.1 Unavoidable Adverse Environmental Impacts

Geology and Soils. Impacts to geology and soils from construction and operation of the proposed MOX facility, PDCF, and WSB are expected to be insignificant. Restoration work, consisting of final grading and revegetation, would reclaim over half of the 41.9 ha (103.5 acres) of land in the F-Area that would be disturbed during construction. The 41.9-ha (103.5-acre) disturbed area is assumed to include 2 ha (4.9 acres) for laydown area for constructing the PDCF, and 9.7 ha (24 acres) for a laydown area for constructing the WSB.

Some land in the area would be permanently altered because of constructing buildings, roads, and parking lots. The proposed MOX facility would permanently alter 6.9 ha (17 acres) of land, the PDCF would permanently alter 1.2 ha (3 acres), and the WSB would permanently alter about 2.5 ha (6.2 acres). Because soils in the affected areas are not unique within the SRS, and the permanently altered areas represent only about 7% of the land available in F-Area (160 ha [395 acres]) and only about 0.01% of the 80,292 ha (198,400 acres) of land area at SRS (DCS 2002a), overall physical impacts on soil would be insignificant.

Table 4.30. Unavoidable impacts of constructing and operating the proposed facilities

Resource	Unavoidable impacts
Geology and soils	• Construction excavation work may result in release of contaminated materials
Surface water	• Potential impacts to surface water quality by release of nonhazardous discharge effluent, sediment, contaminated runoff, or accidental release of oil or construction equipment fuel
Ecology	• Initial loss of up to 50.0 ha (123.4 acres) of woodland and grassland habitat in F-Area. Over 30 ha (75 acres) would be landscaped following construction.
Land use	• A worst-case accident at the facility could result in minor land use impacts outside of the SRS
Cultural and paleontological resources	• Construction would directly affect two prehistoric archaeological sites that are eligible for listing on the *National Register of Historic Places*
Waste management	• Small impact to waste management system at the SRS • Volumes of TRU and hazardous waste produced by facilities would represent 3% of the WIPP disposal capacity and 2% of the SRS treatment and storage capacity, respectively. • Nonhazardous liquids produced would be about 6% of the capacity at SRS.
Human health risk	• Annual radiological impacts to SRS employees from exposure to radioactive air pollutants are expected to be small at 1×10^{-5} LCFs/yr for the MOX facility and WSB collectively and 2×10^{-5} for the PDCF. The risk from the public's exposure to radioactive air pollutants is also expected to be small, at 4×10^{-5} annual LCFs for MOX and WSB combined, and 9×10^{-4} for the PDCF facilities. • MOX facility workers would have an expected lifetime LCF of about 1 chance in 1,000. • 122 lost workday injuries annually during a 3-5-year construction period • 41 lost workday injuries annually during 10 or more years of operations
Socioeconomics	• Increase in employment of 0.1 of a percentage point during construction • In-migrating workers during construction and operations would require 2% and <1% of vacant housing in the ROI

The potential exists that accidental releases of contaminated material during construction and normal operations might adversely affect receiving soils. However, if good engineering practices were used and any accidental spills were cleaned up promptly and thoroughly, chemical impacts to soil would be insignificant.

Surface Water. Impacts to surface water are expected to be negligible. Because surface water would not be used to supply water for construction or operations, there would be no impacts to surface water levels or flows.

Surface water quality could potentially be impacted by nonhazardous discharge effluent, sediment, contaminated runoff, and accidental releases. However, good engineering practices, compliance with existing NPDES permits, and prompt, thorough cleanup of accidental releases would help to ensure that impacts to surface water quality during construction and normal operations would be insignificant.

Groundwater. The groundwater system beneath the SRS would be directly affected (i.e., used) during construction and normal operations of the proposed facilities because it is the only source of water for these activities. However, the impact to existing groundwater supplies would be small. Projected total water use for the proposed and existing facilities in the A-Area loop, which obtains water from wells in both A-Area and F-Area, represents about 3% of the existing capacity during the construction phase. There would be no releases to underlying aquifers.

No direct impacts to groundwater quality (as opposed to quantity) are expected from construction or normal operations; there would be no releases to underlying aquifers. Water use during operation of the facilities represents an increase of about 5% of the water demand for A-Area loop in 2000 and about 2% of the excess A-Area loop capacity. Groundwater quality could be impacted by discharges to an NPDES outfall and accidental releases of contaminated material. However, impacts are expected to be negligible because of good engineering practices, prompt and thorough cleanup of any spills, and adherence to NPDES permit requirements.

Air Quality. Emissions associated with the construction and normal operation of the proposed facilities would have a negligible effect on air quality. Concentrations of pollutants would remain below standard levels. For both construction and normal operations, contributions of the proposed facilities to TSP, PM_{10}, $PM_{2.5}$, CO, SO_2, NO_2, and PAH concentrations would be 5.0% or less of applicable standard levels.

Noise. Potential noise impacts from construction and operation of the proposed facilities should be negligible at all off-site locations.

Ecology. Impacts of construction on ecological resources would primarily result from the loss and alteration of up to 50.0 ha (123.4 acres) of habitat. The woodland and grassland habitats that would be impacted represent a small fraction of those types of habitats at the SRS. Overall, the adverse impacts related to construction are expected to be limited to the immediate project vicinity and should not affect the viability of any vegetation types or wildlife populations at the SRS.

Sediment and erosion control measures implemented during site preparation and construction should prevent impacts to surface waters, aquatic and wetland resources, and protected fish species. No federally listed species have been reported in the areas that will be disturbed by construction. The SRS has established habitat management areas for the federally and state-endangered red-cockaded woodpecker, but the proposed facilities would not be located within any of these areas.

No adverse impacts to ecological resources are expected from operations of the proposed facilities.

Land Use. Land use of the entire F-Area is currently classified as developed/industrial. Since the facilities would be industrial, no adverse effects to land use would result from their construction or routine operation. If an operational accident occurred, F-Area would remain in developed/industrial land use. A worst-case accident could result in minor impacts to lands outside of the SRS. Future F-Area land use is expected to remain developed/industrial.

Cultural and Paleontological Resources. Construction of the proposed facilities would directly affect two prehistoric sites that are eligible for listing on the NRHP. Data recovery plans have been implemented, excavation has been completed, and monitoring will be conducted during ground-disturbing construction activities. Five additional eligible sites are located in the vicinity of the construction area. Mitigation measures would be taken to ensure that these sites were not disturbed directly or indirectly by construction activities.

No historic structures, traditional cultural property, or fossil-bearing strata have been identified in the project area; therefore, there would be no MOX-related impacts to such resources during construction.

Routine operations are unlikely to affect archaeological resources. However, the potential exists that storm-water detention releases resulting from a heavy rainfall could cause erosion in the area of an eligible site. Periodic monitoring of this site may be required.

An operational accident might affect archaeological resources by restricting access to sites that require regular monitoring. Such an accident might also affect traditional plant resources that might be present on the SRS.

Transportation. The existing road network at the SRS can readily accommodate the additional traffic expected during construction. In addition, the increased construction traffic would have negligible impacts on noise and air emissions. For operations, the impacts of transportation of the uranium and plutonium metal feed materials to the SRS, shipping fresh MOX fuel to a surrogate nuclear power plant site, shipping TRU waste to WIPP, and shipping spent MOX fuel were considered.

For routine transportation, the expected LCFs from radiation exposure could be up to 0.3 each for the public and transportation crews. A total of up to 2 latent fatalities were estimated from vehicle emissions. Thus, up to 2 fatalities might be expected from routine transportation activities.

It is estimated that the radiological transportation risk from accidents is 0.01 LCF over the course of the entire shipping campaign. Chemical impacts from accidents would be negligible: 1.3×10^{-7} irreversible adverse effect (approximately 1×10^{-9} fatality) from depleted UF_6 is expected for the entire shipping campaign. None of the chemicals that might be released in any transportation accident are known to be carcinogens.

Total fatalities from direct physical trauma from accidents were estimated to range as high as 0.20. This value indicates that no fatalities are expected from accidents for the entire shipping campaign.

Infrastructure. Construction activities and normal operational activities are not expected to adversely impact current SRS infrastructures. Projected electrical power, water, and fuel needs are well within existing capacities. The existing infrastructure would require a coordinated upgrading to support all phases of the surplus disposition program at the SRS: the proposed MOX facility, PDCF, and the WSB.

Waste Management. The impacts of facility construction waste on existing SRS waste management capacities would be minimal. The types and volumes of wastes generated would be similar to those that would be expected during the construction of an industrial facility. These wastes would be managed in accordance with current SRS waste management practices. Hazardous waste would be shipped off-site to commercial RCRA permitted facilities. The nonhazardous liquid waste generated would represent less about 6% of the SRS capacity for treatment. Solid waste would be shipped to off-site facilities for recycling or disposal.

Wastes generated by facility operations would have a small to moderate impact on the waste management system at the SRS. Estimated volumes for TRU waste would represent about 13% of SRS storage capacity and 2.6% of the WIPP storage capacity. Estimated volumes for solid low-level waste and hazardous waste would represent about 21% and less than 2% of the SRS disposal and storage capacities, respectively. Nonhazardous liquid wastes generated by facility operations are estimated to be about 6% of the capacity of the Central Sanitary Wastewater Treatment Facility. Nonhazardous solid wastes would be shipped off-site for recycling or disposal.

Human Health Risk. Less than 1 facility annually is predicted during the construction and normal operation phases of the facility. An estimated 122 lost workday injuries would occur annually over the 5-year construction period, and 41 annually over the assumed 10 or more years of operations.

No radiological impacts or adverse health impacts from emissions of toxic air pollutants are expected during the construction phase of the proposed facilities, and no adverse impacts to SRS employees and the public from exposure to emissions of toxic air pollutants are expected during normal operations. Annual radiological impacts to SRS employees for exposure to air emissions from the MOX and WSB facilities collectively and the PDCF are expected to be very small, approximately 1×10^{-5} and 2×10^{-5} LCF/yr, respectively. Similarly, the risk to the public would be small at 3×10^{-10} and 9×10^{-10} LCF/yr.

Hydrazine is the only chemical, aside from the radionuclides, that would be used in MOX processing that is listed as a hazardous air pollutant under the Clean Air Act. During routine operations, off-gas treatment systems would be expected to keep hydrazine emissions to very low levels that would not cause adverse health impacts to the off-site public or noninvolved workers.

Socioeconomics. The potential socioeconomic impacts from constructing and operating the proposed facilities would be insignificant. The increase in the annual average employment growth rate would be less than 0.1 of a percentage point over the duration of construction; even less during the operation phase.

In-migration of 350 people during the peak construction year would have only a marginal effect on population growth requiring 2.0% of the available vacant rental housing units in the region of influence (ROI) for construction and less than 1% of the available vacant owner occupied housing units for facility operations.

There would be no significant impact on public finances or the need for additional local public service employees during construction or normal operation.

Minor impacts would occur to agriculture and commercial fishing as demand for their products increase during construction and normal operation. No significant impacts on agriculture and downstream fisheries are expected from facility operations.

Any impacts associated with the transportation of fresh MOX fuel, including impacts on property values, would be minimal.

Environmental Justice. There would be no unavoidable environmental justice impacts from routine operations.

Aesthetics. The addition of the proposed facilities would not adversely affect the overall aesthetics of the F-Area or the SRS. The size and appearance of facility structures would be similar to those of existing buildings adjacent to the F-Area and would maintain the industrial nature of the F-Area.

Cumulative Impacts. Cumulative impacts of normal operations of the proposed facilities at the SRS were evaluated for air quality, health and safety, waste generation, resource use, and employment. Cumulative impacts for water quality, geologic resources, ecological resources, aesthetic resources, and cultural and paleontological resources were not explicitly addressed because direct and indirect impacts to these resources are expected to be negligible.

Cumulative impacts to air quality from proposed facility operations are not expected to be significant. On the basis of conservative assumptions, facility operations are projected to contribute 2% or less to cumulative concentrations of criteria air pollutants.

During normal operations, the facilities' contribution to cumulative radiological doses to the off-site population would be low (5.7% of the total). A cumulative dose to a MEI would increase by 1.0%. No LCFs are expected from the cumulative dose to the MEI or to the off-site population. Transportation of radioactive materials associated with facility operations would not contribute significantly to cumulative impacts (collective occupational dose, dose to the general public, and LCFs).

For most types of waste, facility operations would contribute 10% or less of the cumulative waste volumes generated at the SRS; existing waste treatment facilities will be able to handle this cumulative total. The largest proportionate increase would be in the amount of nonhazardous solid waste (18.8% of total).

The cumulative impacts of the proposed facilities to land development, electricity usage, and groundwater usage at the SRS would be quite small and well within existing SRS capacities.

Construction activities would result in a peak workforce of 1,000 in the peak construction year, or about 6% of the cumulative SRS employees. Facility operations would support 490 workers annually (2.9% of the total projected workforce for the SRS) and result in a cumulative total of 16,924 employees at the SRS.

4.7.2 Irreversible and Irretrievable Commitments of Resources

This section addresses the major irreversible and irretrievable commitments of resources associated with the no-action alternative and proposed action as described in Chapter 2. A commitment of a resource is irreversible when its primary or secondary impacts limit the future options for a resource. An irretrievable commitment refers to the use or consumption of resources neither renewable nor recoverable for use by future generations.

The 23.6 ha (58.3 acres) within which the proposed MOX facility, PDCF, and WSB would be built and the estimated 15.5 ha (38.3 acres) needed for infrastructure upgrades (e.g., pipeline and powerline rights-of-way, storm-water basin, batch plant, and roads) would be precluded from other uses until the NRC license to operate the facility was terminated (i.e., about 20 years into the future). About 3.6 ha (8.9 acres) of mostly woodland vegetation surrounding the proposed MOX facility site border would require grading for facility construction. Existing habitats would be eliminated, and ecological succession that would typically lead to progression from grassland to woodland vegetation would not occur. Although ultimate decommissioning of the facility could result in removal of all structures and paved surfaces, it is unlikely that woodland habitat comparable in quality to that north and west of the F-Area could become reestablished in less than 50 to 70 years.

Construction and operation activities would involve use of materials that could not be recovered or recycled. Soil excavated to produce the cement used in concrete would be irretrievably lost. Concrete and steel represent the bulk of construction materials. Other major construction materials that would be irretrievably lost or difficult to recycle include aluminum, lumber, piping materials, and electric wires and cables (DCS 2002a).

Water would be used for dust suppression during construction. Except for the water chemically bound in the production of concrete, water needed for construction and operation would eventually be recycled through the atmosphere and surface waters for distribution elsewhere. Water used during operation would be treated and discharged to the environment. Water obtained from groundwater supplies would be replaced through natural recharges of local aquifers. An estimated 760 million L (201 million gal) of water would be needed during the 10-year operating life of the facilities. Construction water requirements would total about 695 million L (185 million gal). A list of resources that would be required for the proposed MOX, PDCF, and WSB facilities is provided in Table 4.31.

Construction, operation, deactivation, and decommissioning of the project site would require a commitment of financial and human resources. Commitments of machinery, construction equipment vehicles, and fossil fuels (e.g., fuel oil and diesel oil) would be needed during the life of the project. None of these resources is expected to be in short supply in the vicinity of the SRS.

No valuable mineral resources are known to be present at the project site or immediate vicinity that could by affected by facility construction and operation security requirements in the F-Area.

4.7.3 Relationship between Short-Term Uses of the Environment and Long-Term Productivity

Short-term uses of the environment for the proposed action include (1) using a 23.6-ha (58.3-acre) area in F-Area for the proposed facilities, and (2) using an additional 15.5 ha (38.3 acres) of land for infrastructure upgrades and a process pipeline right-of-way needed to transport liquid high-level alpha waste from the proposed MOX facility. These uses would allow the U.S. government to fulfill its obligations in a September 2000 agreement with the Russian government to convert surplus weapons-grade plutonium no longer needed for defense purposes into MOX fuel for irradiation in nuclear reactors.

The proposed action would result in favorable short-term effects for the local economy, specifically for the nearby communities of Aiken and North Augusta, South Carolina, and Augusta, Georgia. These communities would benefit from the increase in income generated by direct jobs and workers in support industries in the SRS vicinity.

The use of 39.1 ha (96.6 acres) of land (up to 50.0 ha [123.4 acres] would be disturbed by construction) on the SRS for the facility is consistent with the SRS Long Range Comprehensive Plan (DOE 2000b) and use of the F-Area for processing nuclear materials. The proposed project would require clearing of up to 14.8 ha (36.4 acres) of woodland. Clearing would

Table 4.31. Irreversible and irretrievable commitments of resources for the proposed MOX, PDCF, and WSB facilities

Resource	Consumption
Construction[a]	
Electricity	85,500 MWh
Fuel oil	7.624 million L (1,960,000 gal)
Water	695 million L (185 million gal)
Concrete	149,300 m^3 (195,240 yd^3)
Steel	36,367 MT (40,100 tons)
Operations[b,c]	
Electricity	1,860,000 MWh
Water	760 million L (201 million gal)
Fuel oil	5,362,600 L (1,376,000 gal)
Plutonium	34 MT (37.5 tons)
Depleted uranium	665 MT (726 tons)
Argon	3.7 m^3 (129 million ft^3)
Argon-methane	103,930 m^3 (3.67 million ft^3)
Dodecane	29,144 L (7,700 gal)
Helium	96,570 m^3 (3.41 million ft^3)
Hydrogen	105,070 m^3 (3.71 million ft^3)
Hydrogen peroxide	20,060 L (5,300 gal)
Hydrazine (35%)	15,140 L (4,000 gal)
Hydroxylamine nitrate	348,220 L (92,000 gal)
Manganese nitrate	45.4 kg (100 lb)
Nitric acid	49,205 L (13,000 gal)
Nitrogen	45,310 million m^3 (1.6 billion ft^3)
Nitrogen tetroxide	37,380 million m^3 (1.32 million ft^3)
Oxalic acid dehydrate	40,363 kg (89,000 lb)
Oxygen	20,110 m^3 (710,000 ft^3)
Porogen	2,993 kg (6,600 lb)
Silver nitrate	1,088 kg (2,400 lb)
Sodium carbonate	1,995 kg (4,400 lb)
Sodium hydroxide (10M)	189 L (50 gal)
Tri-butyl phosphate	28,009 L (7,400 gal)
Zinc stearate	2,798 kg (6,170 lb)

[a]Consumption amounts are based on a 5-year construction period.

[b]Represents total volumes for the MOX and PDCF facilities.

[c]Consumption amounts are based on facility operations for an assumed 10-year period. The data on chemicals are only for the proposed MOX facility.

eliminate wildlife habitat in these woodlands. Infrastructure upgrades for electrical supply and additional roadways built for the proposed project would have long-term benefit to F-Area for ongoing and future projects. If DOE decides to decommission the proposed facilities and remove all structures and paved surfaces, the site could be reclaimed to woodland vegetation. Reclamation would require about 50 to 70 years to establish woodlands comparable in species composition to areas that would be cleared for construction.

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5 MITIGATION

5.1 Introduction

This chapter addresses potential means to mitigate adverse environmental impacts from the proposed action as required by Appendix A of Title 10, Part 51, of the *Code of Federal Regulations* (10 CFR Part 51). Mitigation measures for the proposed Pit Disassembly and Conversion Facility (PDCF) have been considered by the U.S. Department of Energy (DOE) in its Surplus Plutonium Disposition Environmental Impact Statement (SPD EIS) (DOE 1999) and January 11, 2000, Record of Decision (DOE 2000, 2002) and are not repeated in this document. The recent DOE supplemental analysis (DOE 2003) discusses impacts related to operation of the proposed Waste Solidification Building (WSB) but does not identify any mitigation measures for the WSB. Therefore, for completeness, the discussion of mitigation measures in this EIS includes potential measures for the WSB. A full discussion of potential mitigation measures for each resource area is provided in Section 5.2, and these measures are summarized in Table 5.1. It is important to note that while potential mitigation measures for the WSB are identified in this EIS, the NRC does not have the regulatory authority to implement mitigation measures for DOE facilities. For the purpose of reaching a final NRC staff decision on its proposed action, the NRC assumes that the DOE will not implement the mitigation measures identified herein that pertain to the proposed WSB.

Under Council of Environmental Quality (CEQ) regulation 40 CFR 1500.2(f), federal agencies shall to the fullest extent possible use all practicable means consistent with the requirements of the National Environmental Policy Act (NEPA) and other essential considerations of national policy to restore and enhance the quality of the human environment and avoid or minimize any possible adverse effects of their actions on the quality of the human environment. The CEQ regulations define mitigation to include the following: (1) avoiding the impact altogether by not taking a certain action or parts of an action; (2) minimizing impacts by limiting the degree or magnitude of the action and its implementation; (3) rectifying the impact by repairing, rehabilitating, or restoring the affected environment; (4) reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; and (5) compensating for the impact by replacing or providing substitute resources or environments. This definition has been used in defining potential mitigation measures.

The NRC staff has reviewed the mitigation measures and has concluded that no additional mitigation measures are required beyond the regulatory requirements and those measures identified by DCS.

5.2 Mitigation Measures

The NRC staff evaluated proposed mitigation measures identified by Duke Cogema Stone & Webster (DCS) (2003) and identified other potential measures that could reduce or eliminate adverse environmental impacts of the proposed mixed oxide (MOX) facility and WSB (as

Table 5.1. Summary of DCS mitigation commitments and additional measures identified by NRC staff for reducing or avoiding impacts[a]

Technical area	Mitigation	Measures proponent
Soils and Hydrology	• Control of pollutants in stormwater discharges during construction will be addressed as provided in the Storm Water Pollution Prevention Plan that Duke Cogema Stone & Webster (DCS) will file with its notice of intent to discharge stormwater during construction under the South Carolina National Pollutant Discharge Elimination System (NPDES) General Permit for stormwater discharges from construction activities (Permit No. SCR100000). Filing of a Storm Water Pollution Prevention Plan is required by Part IV, "Storm Water Pollution Prevention Plans," in Permit No. SCR100000. The South Carolina Department of Health and Environmental Control (SCDHEC) has issued the NPDES General Permit for stormwater discharges from construction activities as provided in South Carolina Regulations (SC Regulation R.61-9.122.28).	REG
	• Erosion and sediment controls will be implemented as provided in the Storm Water Pollution Prevention Plan that DCS will file with its notice of intent to discharge stormwater during construction under the South Carolina NPDES General Permit for stormwater discharges from construction activities (Permit No. SCR100000). Filing of a Storm Water Pollution Prevention Plan is required by Part IV, "Storm Water Pollution Prevention Plans," in Permit No. SCR100000. The SCDHEC has issued the NPDES General Permit for stormwater discharges from construction activities as provided in SC Regulations R.61-9.122.28.	REG
	• Creation of foundations and building of structures for the proposed mixed oxide (MOX) facility, and Waste Solidification Building (WSB) (hereafter "the facilities") will be limited to the upper soil layers, thus minimizing impacts to groundwater.	DCS
	• Good engineering practices will be used during operation and construction to minimize chemical impacts to soils.	DCS
	• Sanitary wastes generated during construction will be collected with a combination of portable toilets and semipermanent facilities connected to the Central Sanitary Waste Treatment Facility.	DCS
	• Regular monitoring of the double-walled liquid high-alpha waste pipeline will be conducted to detect leaks.	DCS

Table 5.1. Continued

Technical area	Mitigation	Measures proponent
Ecology	• The right-of-way for the 610-m (2,000-ft) pipeline to convey liquid high-alpha-activity waste and stripped uranium waste for the proposed MOX facility to the WSB will be less than 7.6 m (25 ft) wide and thus will minimize vegetation removal.	DCS
	• Before construction activities begin, the site would be surveyed for migratory bird nests.	DCS
	• Measures should be taken to protect trees on the MOX site not selected for removal and not controlled after site clearing by the U.S. Department of Agriculture (USDA) Forest Service — Savannah River. If such trees or other landscape features not controlled by the USDA Forest Service — Savannah River are accidentally scarred or damaged, they should be replaced in a manner consistent with the Savannah River Site Natural Resources Management Plan.	NRC
	• Construction crews would receive environmental briefings as appropriate to alert them to specific areas of concern (e.g., possible harassment and other adverse impacts to wildlife species during the construction period) and to explain the reasons for such concern.	NRC
	• Impacts during the clearing of vegetation should be controlled by the USDA Forest Service — Savannah River, consistent with the Savannah River Site Natural Resources Management Plan.	NRC
	• Following construction, site restoration (e.g., soil stabilization and revegetation) would be conducted in compliance with appropriate U.S. Department of Energy (DOE) policies for reclamation of construction areas.	DCS
	• Access roads should be sited on previously disturbed areas where possible to minimize sensitive vegetation removal.	NRC
Air Quality and Noise	• DCS will have a Construction Emissions Control Plan, which will implement a number of good engineering practices to reduce fugitive dust emissions consistent with the requirements in SC Regulation R.61-62.6, "Control of Fugitive Particulate Matter."	REG
	• Particulate emissions from the silo hopper and concrete mixer used in the cementation process during operation of the WSB will be required to meet the conditions specified in the SCDHEC permit.	REG

Table 5.1. Continued

Technical area	Mitigation	Measures proponent
Infrastructure	• Road upgrades for ingress and egress of the proposed MOX site will be conducted in existing traffic rights-of-way.	DCS
Land Use	• No mitigation measures are needed to reduce impacts of the proposed action on land use.	
Waste Management	• No mitigation measures are needed to reduce impacts of the proposed action on the Savannah River Site (SRS) waste management system.	
Human Health Risk	• Radiation doses to workers during construction will be kept to a minimum by using administrative limits and ALARA (as low as reasonably achievable) programs, including worker rotations.	REG
	• Exposure to hydrazine will be limited by complying with SCDHEC emission standards.	REG
	• To minimize adverse effects to facility and SRS workers from exposure to nitrogen tetroxide, DCS should comply with the requirements in the Occupational Safety and Health Administration's (OSHA's) Process Safety Management Rule (29 CFR 1910.119).	REG
	• The radiation exposure of radiographers will be monitored or badged during construction.	REG
	• The radiography contractor will follow the contractor's existing U.S. Nuclear Regulatory Commission (NRC) or agreement-state license in evaluating and monitoring radiographer exposure.	REG
	• Radiation and chemical exposures of facility workers during operations would be kept to a minimum through (1) use of engineering controls to keep airborne chemical concentrations below applicable occupational exposure limits, and (2) use of enclosed operations to the extent possible.	DCS
	• To minimize adverse effects to facility and SRS workers in the event of an accidental release of process chemicals identified as presenting moderate or high risks to workers (as identified in Section 4.3.5.3), DCS has committed in its Construction Authorization Request (CAR) to integrate any emergency preparedness plans for the proposed MOX facility with the DOE SRS Emergency Response Plan.	DCS
	• Construction workers should be protected from inadvertent radiation and chemical exposures by soil testing and analysis prior to excavation to ascertain that levels of radiation and inorganic or organic chemicals in soils would not present a health hazard during construction activities.	NRC

Table 5.1. Continued

Technical area	Mitigation	Measures proponent
Cultural and Paleontological Resources	• Periodic monitoring of nearby eligible archaeological sites shall be conducted to check for possible erosion.	DOE
	• Additional mitigation measures, such as avoidance agreements, shall be determined in consultation with the South Carolina State Historic Preservation Office (SCSHPO).	DOE
	• If inadvertent discoveries of cultural resources occur during site construction, mitigation would follow the guidelines of 36 CFR 800.11 and/or 43 CFR 10.4.	REG
Aesthetics	• No mitigation measures are necessary to reduce aesthetic impacts of the proposed action.	
Socioeconomics	• No mitigation measures are necessary to reduce impacts to socioeconomic factors.	
Environmental Justice	• DCS should work closely with SRS to implement procedures to protect low-income and minority groups in the event of an accidental chemical or radiological release from the proposed facilities that impact areas beyond the SRS boundary.	NRC
	• DCS should conduct focused public information campaigns to provide important information to low-income and minority groups/communities. Included in these campaigns would be descriptions of existing monitoring programs, and information on the nature, extent, and likelihood of any airborne release from the facility. The campaigns would also include a description of the relevant risks associated with the proposed facilities. These campaigns should include information on sheltering and other protection strategies that may be needed, including detailed descriptions of any evacuation procedures that may be required.	NRC
	• DCS should provide public information to local agencies and groups representing low-income or minority groups on existing soil or groundwater contamination monitoring programs and the nature, extent, and likelihood of surface release. Key information would include the extent of any likely damage to drinking water supplies and subsistence resources, and the relevant preventative measures that may be taken.	NRC
	• DCS should meet with local communities providing emergency response services and other emergency facilities to discuss additional measures to ensure that the low-income and minority populations in their jurisdictions are located and fully prepared in the event that sheltering or evacuation procedures are required, in addition to public information campaigns targeting low-income and minority groups. This would include the development of spatial databases providing information on the locations of low-income and minority populations, local resources available to emergency response agencies, and any evacuation routes that might be required.	NRC

Table 5.1. Continued

[a]The mitigation measures are commitments made by DCS that were identified in the ER (DCS 2002) and other potential measures identified by the NRC staff in preparing this EIS. Under the column "Measures proponent," "DCS" refers to the applicant, "DOE" refers to the U.S. Department of Energy, "NRC" refers to the U.S. Nuclear Regulatory Commission, and "REG" refers to a regulatory requirement or a permit/license condition that DCS would be required to implement.

indicated in Table 5.1). The applicant, DCS, has proposed design features and other activities to reduce impacts for the proposed MOX facility. In Table 5.1, the proponent for these mitigation measures is designated as "DCS." In addition, compliance with federal and state regulations, permits, and guidelines will reduce potential impacts (see Chapter 6 for a discussion of applicable environmental regulations and permits). For example, the South Carolina National Pollutant Discharge Elimination System (NPDES) general permit requires the implementation of a Storm Water Pollution and Prevention Plan that would mitigate potential impacts to surface waters from construction activities. The regulations, permits, and guidelines typically recommend best management practices. These practices (i.e., mitigation measures) would be determined during the permitting process, which would occur in the future. For that reason, general types of activities that would comprise best management practices are discussed. The proponent for these mitigation measures is designated as "REG," and for other mitigation measures proposed by the NRC staff, the proponent is designated as "NRC" in Table 5.1. Not all NRC-suggested mitigation measures are within the NRC's regulatory authority.

5.2.1 Hydrology

Surface water resources could be adversely affected by construction of the proposed MOX facility and WSB. Introducing pollutants or erosion into surface waters could impact the quality of the surface water and aquatic organisms. Several design features that would mitigate impacts to surface water were proposed by DCS and the DOE. During construction of the proposed MOX facility and WSB, no direct discharges of contaminated water into Upper Three Runs Creek, Four Mile Branch, or their tributaries, are expected to occur. Sanitary wastes would be collected with a combination of portable toilets and semipermanent facilities connected to the Savannah River Site (SRS) Central Wastewater Treatment Facility. All wastewater would be treated in the sitewide treatment system before release under existing NPDES permits, thus minimizing impacts to surface waters.

Potential impacts from stormwater discharges during construction would be mitigated by compliance with the Storm Water Pollution Prevention Plan that is required by South Carolina Department of Health and Environmental Control (SCDHEC) regulations. DCS plans to file this plan in its notice of intent to discharge storm water during construction under the South Carolina NPDES General Permit for stormwater discharges from construction activities (Permit No. SCR100000). Under the General Permit, best management practices would be followed to divert the flow of runoff water away from exposed soils, store flows, or otherwise limit runoff and the discharge of pollutants from exposed areas to the degree attainable. Such practices might include, but not necessarily be limited to, use of silt fences, earth dikes, drainage swales, sediment traps, check dams, temporary or permanent sediment basins, temporary seeding, permanent seeding, mulching, use of geotextiles, sod stabilization, vegetative buffer strips, protection of trees, and preservation of mature vegetation. Because groundwater would be used as the source of water during construction, groundwater could be adversely affected during construction of the facilities. Because the capacity of the existing wells at SRS are sufficient to meet the needs of the project, further mitigation would not significantly reduce the impacts associated with using groundwater during construction. While construction could directly impact groundwater quality if any of the buildings or structures extended below the surface of the groundwater, the design for the proposed MOX facility and WSB do not involve encroachment on groundwater. Groundwater could be indirectly impacted by infiltration of contaminated surface water or surface spills during construction. These impacts would be mitigated by following appropriate good engineering practices and following the provisions of the required Stormwater Pollution Prevention Plan as discussed above.

During normal operation of the proposed MOX facility and WSB, surface water would not be used. The primary mitigation activities for surface water quality would be ensuring that releases of effluent meet NPDES permit guidelines. Design features proposed by DCS and the DOE include this mitigation strategy. Mixed, hazardous, and radioactive wastes in liquid form would be sent off site for disposition, or sent to SRS waste management facilities, or would be treated and processed at the WSB prior to being discharged to surface waters or converted into a solid waste. See Section 4.3.4 for a further discussion of how such solid wastes would be managed. Stormwater run-off from paved areas would be collected by the stormwater system. The stormwater would be temporarily retained in a detention basin to reduce the amounts of oils and other pollutants from entering surface water. The uncontaminated HVAC condensate would also be discharged to the stormwater system in accordance with SCDHEC standard stormwater permit conditions. The detention basin would also reduce the flow into surface waters following precipitation events.

Water for normal operations would be obtained from existing SRS wells. Because the quantity of water required for operations is within the capacity of the existing wells, further mitigation would not significantly reduce the impacts of using the groundwater during operations. The design features for the project do not include direct releases to underlying aquifers. However, the quality of groundwater could be affected indirectly by receipt of contaminated surface water. As discussed above, design features have been proposed by DCS and the DOE to limit contamination of surface water. Operation of a sand filter, if used, would not directly impact groundwater because the filter would be covered to prevent infiltration and it would have a concrete wall and bottom.

Deactivation and decommissioning could also impact water resources at the site. These impacts would be mitigated by using the methods discussed above for construction.

Accidents could impact surface water and groundwater directly and indirectly. Impacts to surface water would primarily be indirect. These impacts would be produced by contaminated runoff from spill areas. DCS has committed to preparing and implementing a Spill Control and

Countermeasures Plan during operation. A similar plan would be prepared for the WSB. Mitigation would be accomplished by following best management practices in these plans that would include prompt cleanup and removal of contaminated materials. Direct impacts to groundwater could occur if there were a failure in the underground pipelines carrying liquid waste from the proposed MOX facility to the WSB. The impacts would be mitigated by regular monitoring of the system to detect leaks for the double-walled pipelines, and developing contingency plans to remediate any spills promptly and thoroughly.

Further mitigation was not identified by the NRC that would significantly reduce the impacts to surface water or groundwater.

5.2.2 Soils

Soils could be affected by construction activities, normal operations, activities associated with deactivation and decommissioning, and accidents. Several design features proposed by DCS and the DOE were considered to be mitigation measures. The locations selected for the proposed MOX facility and the WSB contain soils that are not unique to the SRS, and there are no soils classified as prime farmlands. In addition, the grading and landscape plans would be designed in part to reduce future erosion following construction activities and limit slope instability.

To a great extent, the impacts of construction on soils would be mitigated by the following SCDHEC regulations (see discussion in Chapter 6) that require installation of sediment detention basins that would catch and hold runoff water. These detention ponds would be situated in strategic locations and would be designed to control the release of storm-water runoff at a rate equal to or slightly less than that of the predevelopment conditions. In addition, following good engineering practices will be required by the Stormwater Pollution Prevention Plan that DCS will file with the State of South Carolina in its Notice of Intent to discharge stormwater during construction under the General Permit for stormwater discharges (Permit No. SCR100000). Such practices could include silt fences, sediment traps, check dams, etc., and would mitigate the consequences of construction including impacts associated with potential spills.

During normal operations, there would be no planned direct discharges of water to the soil, and stack emissions of contaminated particulates would be filtered. These mitigation measures would minimize adverse impacts to the soil.

During deactivation and decommissioning, impacts could once again occur to soils through mobilization of contaminants by water or wind. Mitigation activities for this phase of the project would be the same as those outlined for construction.

Accidents during the lifetime of the facilities could also adversely impact soils. Following the Spill Control and Countermeasures Plan as discussed in Section 5.2.1 would mitigate these potential impacts.

Further mitigation was not identified by the NRC that would significantly reduce the impacts to soils.

5.2.3 Ecology

Construction of the proposed MOX facility and WSB and associated infrastructure would disturb up to 50.0 ha (123.4 acres) of land in the F-Area of the SRS. Several design features proposed by DCS and the DOE were considered to be mitigation measures. The location of the facilities would mitigate many of the construction impacts to ecological resources. The site selected for the facilities would be largely in previously disturbed or developed locations, and there are no designated wetlands or Carolina bays within the areas to be disturbed. For example, a portion of the construction activities for the proposed MOX facility would take place in an area where spoils for previous F-Area construction has been stored, and most of the WSB would be located within "facility" land (e.g., landscaped areas). Also the new, widened, and realigned roads would be located within previously cleared rights-of-way. In addition, the facilities would not be located within either the red-cockaded woodpecker management area or its supplemental management area. Clearing of vegetation should be conducted in accordance with the Savannah River Site Natural Resources Management Plan by the U.S. Department of Agriculture (USDA) Forest Service. Complying with this plan will minimize impacts to ecological resources. Following construction, the cleared and graded areas not covered with facilities, parking lots, or roads would be landscaped. This landscaping would provide habitat for some wildlife species, mitigating the loss of habitat from constructing the facilities.

As discussed in Section 5.2.1, complying with the Storm Water Pollution Prevention Plan would mitigate impacts of ecological resources. Best management practices for soil erosion and sediment control would be used to prevent runoff and dust from entering sensitive habitats and nearby streams (e.g., unnamed tributaries to Upper Three Runs Creek), and direct construction disturbance of nearby streams would be avoided.

Potential mitigation measures to protect ecological resources were identified by the NRC. DCS should take action at the construction site to prevent the workforce from removing vegetation in excess of that needed for construction clearing. To ensure protection of vegetation during construction, DCS should designate an environmental supervisor to supervise vegetation clearance. Any accidentally scarred or damaged trees should be replaced consistent with the Savannah River Site Natural Resources Management Plan. Construction crews should also receive environmental briefings as appropriate to alter them to specific areas of concern (e.g., possible harassment and other adverse impact to wildlife species during the construction period, identification of spills and notification of supervisors) and to explain the reasons for such concerns. In addition, following construction, site restoration (e.g., soil stabilization and revegetation) should be done in compliance with appropriate DOE policies for reclamation of construction areas.

During normal operations, the major mitigation factor would be to limit releases of contaminants (chemicals and radioactive materials) to the environment. The mitigation measures discussed in Section 5.2.1 would also mitigate impacts to ecological resources.

Impacts of deactivation and decommissioning would be mitigated by using the same methods described for construction, particularly those for erosion and sediment control.

Accidents could also impact ecological resources at the proposed facilities. These impacts would be produced primarily by contaminated runoff water entering sensitive habitat. Additional impacts could occur through air emissions from an accident. Mitigation measures would include following the Spill Control and Countermeasures Plan discussed in Section 5.2.1. These mitigation measures would reduce the likelihood of bioaccumulation and biomagnification in the food chain.

The NRC staff has reviewed the mitigation measures for ecological resources and has concluded that no additional mitigation measures are required beyond the regulatory requirements and the measures identified by DCS.

5.2.4 Air Quality

During construction of the proposed MOX facility and WSB, emission of criteria pollutants (carbon monoxide, nitrogen dioxide, and sulfur dioxide [CO, NO_2, and SO_2]), total suspended particulates (TSP), and volatile organic compounds (VOCs) would require mitigation. Of these, suspended particles would be the principal concern. Suspended particles could be produced by fugitive dust from earthmoving activities, fugitive dust from the concrete batch plant, and exhaust emissions from diesel-powered construction equipment and from worker and delivery vehicles. Most of this dust would be generated within the construction site; dust created along roadways in the SRS would be naturally mitigated by dispersal. To a great extent, the impacts of construction on air quality would be mitigated by the following SCDHEC regulations (see discussion in Chapter 6). South Carolina Regulations (SC Regulations R.61-62.6, Control of Fugitive Particulate Matter) require DCS to have a Construction Emissions Control Plan. This plan would implement a number of good engineering practices to reduce fugitive dust emissions. These would include applying, as appropriate, standard dust control practices, such as watering or sweeping roads and water exposed areas. Particulate emissions from the silo hopper and concrete mixer used during the cementation process to construct the WSB would be controlled as provided in a State of South Carolina Permit to Construct the concrete batch plant. The State of South Carolina Permit to Construct would provide for controls on particulate emissions consistent with the requirements in SC Regulations R.61-62.5, Standard No. 4, "Emissions from Process Industries."

During normal operations, air quality impacts would be produced by process emissions, testing of emergency diesel generators, trucks moving materials and wastes, and employee vehicles. Several design features proposed by DCS and the DOE were considered to be mitigation measures. These impacts would be mitigated by using an air filtration system (e.g., high-efficiency air particulate [HEPA] filters or sand filter) to remove radioactive particulates prior to discharge of process exhaust air to the atmosphere and by using internal scrubbers to reduce chemical gas concentrations. Parking lots and access roads would be paved to minimize the emission of fugitive dust during normal operations.

Mitigation activities for deactivation and decommissioning would be similar to those used for construction. These strategies would be primarily aimed at reducing fugitive dust.

In the event of an accident, adverse impacts to the air would be mitigated by the air filtration systems and prompt and thorough cleanup, if necessary.

Further mitigation was not identified by the NRC that would significantly reduce the impacts to air quality.

5.2.5 Noise

Noise is unwanted sound that interferes with or interacts negatively with the human or natural environment. Construction of the proposed MOX facility and WSB could adversely affect the level of noise. These adverse impacts would be mitigated by locating the facilities away from the SRS public boundary and sensitive receptors. The siting of the facilities is considered a design feature that mitigates noise impacts. The level of noise could also be a concern for federally listed or endangered species; however, none are known to occur in F-Area. As discussed in Section H.3.1.1, noise levels could startle small mammals and frighten birds. Generally, these disturbances would be short-term and localized. Construction workers could also be adversely affected by the levels of noise. Compliance with Occupational Safety and Health Administration (OSHA) regulations to implement appropriate hearing protection measures would mitigate noise impacts to workers. These measures include the use of standard silencing packages on construction equipment, administrative controls, engineering controls, and personal hearing protection devices.

During normal operations, noise would be produced by cooling systems, vents, motors, generators, material-handling equipment, employee vehicles, and truck traffic. Impacts of these noises on the public would be mitigated by the location of the facilities (about 8.7 km [5.4 mi] from the site boundary).

Operation workers could also be exposed to noise levels higher than the acceptable limits specified by the OSHA in its noise regulation (29 CFR 1926.52). Appropriate mitigation programs would be implemented according to pertinent OSHA standards to minimize impacts on workers. These programs include the use of administrative control, engineering controls, and personal hearing protection devices.

Mitigation measures used during deactivation and decommissioning of the facilities would be similar to those employed for construction.

Further mitigation was not identified by the NRC that would significantly reduce the impacts from noise.

5.2.6 Infrastructure

Upgrades of roadways to and from the proposed MOX site would be conducted in existing traffic rights-of-way.

5.2.7 Waste Management

During construction of the proposed MOX facility and WSB, hazardous and nonhazardous wastes would be generated. Impacts of hazardous and nonhazardous wastes would be mitigated by managing them in accordance with the hazardous waste management practices in place at the SRS and following applicable state and federal regulations. These practices are discussed in Section 4.3.4. The regulations address collecting, handling, storing, sampling, treating, and disposal of the various types of waste minimize impacts to numerous resources including hydrology, soils, air quality, ecology and human health.

Impacts of wastes generated during normal operations of the facilities would be similarly mitigated by managing them in accordance with the hazardous waste management practices in place at the SRS and following applicable state and federal regulations.

During deactivation and decommissioning, impacts of generated wastes would be mitigated in the same ways as discussed above. Impacts of wastes produced by accidents would be mitigated by rapid and thorough cleanup and by following the prescribed SRS waste management practices.

Further mitigation was not identified by the NRC that would significantly reduce the waste management impacts.

5.2.8 Human Health Risk

As discussed in the previous sections, complying with various regulations will mitigate impacts to construction workers. Impacts of fugitive dust on workers would be mitigated by following the Construction Emissions Control Plan. Occupational hazards (e.g., chemical exposure, noise, physical hazards) to workers would be mitigated by following OSHA guidelines. Impacts from hazardous wastes generated during facility construction would be mitigated by appropriately packaging and shipping the material off-site for commercial recycling, treatment, or disposal. Exposure to hazardous materials such as paints and solvents would be mitigated by following good engineering practices, such as using good ventilation and cleaning up small spills promptly and thoroughly. Wastewater generated during construction would be transported to the CSWTF for treatment prior to release.

During construction of the proposed MOX facility and WSB, workers could be adversely affected by exposure to soil or groundwater previously contaminated by radioactivity or chemicals. Potential mitigation measures were identified by the NRC staff to mitigate the possibility that workers could be exposed to the previously disturbed soils that may be contaminated. As discussed in Section 4.3.1, DCS has conducted limited testing of the previously disturbed soils. Impacts from contaminated soil should be mitigated by conducting further sampling of the soil for radioactive contamination before excavation begins at the site. In addition, workers should be monitored, as appropriate, to ensure that radioactive doses are maintained at levels as low as reasonably achievable.

During normal operations of the proposed MOX facility and WSB, workers could be impacted by exposure to internal and external radiation. These impacts would be mitigated by complying with NRC regulations including instituting monitoring, enforcing administrative limits, and developing ALARA programs that would include worker rotations. DCS has incorporated several design features into the proposed MOX facility design to mitigate exposure to workers and the public. These include, but are not limited to, containment (e.g., gloveboxes), shielding, and air filtration.

During normal operations, workers at the proposed MOX facility and WSB could also be impacted by chemical exposure. Complying with OSHA guidelines and SCDHEC regulations would mitigate adverse impacts from chemicals. Health risks from occupational exposures through all pathways (i.e., inhalation, skin contact [dermal], and ingestion) would be mitigated by using enclosed operations (e.g., gloveboxes) as much as possible. In addition, workplace exposure to such chemicals as hydrazine, that are used in the plutonium polishing process to separate plutonium from the solvent, would be monitored to ensure that airborne concentrations within the facility were kept below the occupational exposure limit. Off-gas treatment systems would be used to limit hydrazine emissions to very low levels that would mitigate adverse human health impacts.

During the fuel fabrication process at the proposed MOX facility, purified plutonium dioxide would be mixed with depleted uranium dioxide. Impacts from this process would be mitigated by performing the mixing in closed containers located in gloveboxes that would confine contamination to inaccessible areas. Air exhaust from the gloveboxes would be passed through HEPA filters to collect particulate emissions.

During normal operations, occupational hazards to workers at the proposed MOX facility and WSB would be mitigated by following OSHA guidelines.

DCS has committed to establishing a protocol with the DOE to integrate DCS's emergency plans with the existing SRS emergency preparedness program. The consequences of accidents (fire, explosion, load handling, and criticality) on human health would be mitigated by following SRS emergency procedures. For fires, key features would include fire barriers, minimizing combustibles and ignition sources, installing ventilation systems with fire dampers and HEPA filters, using nitrogen blanket systems, providing only qualified canisters and containers, incorporating fire suppression and detection systems, developing and following appropriate emergency procedures, providing worker training, and equipping and training local fire brigades. For explosions, the following mitigation devices would be available: scavenging air systems, hydrogen monitoring systems, temperature control systems, chemical addition and concentration control systems, sampling systems, process shutdown controls, operator training, and operations and maintenance procedures. Key mitigation features for load handling include load path restrictions, crane-operating procedures, maintenance procedures, operator training, qualified canisters, reliable load-handling equipment, and ventilation systems with HEPA filters. Key mitigation features for criticality accidents include geometry, mass, and moderation controls.

Mitigation activities for the deactivation and decommissioning of the facilities would be essentially the same as those discussed for construction.

The NRC staff has reviewed the mitigation measures for human health impacts and has concluded that no additional mitigation measures are required beyond the regulatory requirements and the measures identified by DCS.

5.2.9 Cultural, Historical, and Paleontological Resources

Construction of the proposed MOX facility and WSB would directly impact two prehistoric archaeological sites that are eligible for listing on *National Register of Historical Places*. There are no known fossil-bearing strata within the area of the project, and although there are about 400 historic sites or sites with historic components, none of them are located within the location of the proposed facilities.

Impacts of construction to two prehistoric archaeological sites were mitigated in part through data recovery as described in a data recovery plan that was submitted and approved by the South Carolina State Historic Preservation Office (SCSHPO) (Long 2002). When construction activities begin, the removal of fill on the site areas will be monitored by staff members of the SRARP (Gould 2002).

Five additional eligible sites are located in the vicinity of the planned construction, but no direct impacts to these sites are expected. However, indirect impacts could still affect these sites. Possible mitigation activities for these indirect impacts include awareness training for workers so that they would not inadvertently disturb the sites, possible restrictions on where heavy machinery is allowed, and periodic monitoring by staff members of the SRARP to check for possible surface erosion or evidence of other impacts from an increase in F-Area activities (e.g., unauthorized pedestrian or vehicle activity at the archaeological sites). The need for an avoidance agreement for one site or additional mitigation activities for potential erosion at several of the sites should be determined in consultation with the SCSHPO.

Inadvertent discoveries of cultural resources could also occur during site construction. Mitigation of any adverse impacts to these sites would follow the guidelines of 36 CFR 800.11 (historic properties) and/or 43 CFR 10.4 (Native American human remains, funerary objects, objects of cultural patrimony, and objects that are sacred).

During normal operations, archaeological resources are unlikely to be affected. Therefore, no mitigation activities would be required.

Potential impacts of deactivation and decommissioning eligible archaeological sites or historic structures would have to be evaluated at the time of decommissioning. Mitigation measures would be determined in consultation with the SCSHPO.

Further mitigation was not identified by the NRC that would significantly reduce the impacts to cultural, historical, and paleontological resources.

5.2.10 Aesthetics

Construction, operation, deactivation, and decommissioning of the structures associated with the proposed MOX facility and WSB would have a minimal effect on the scenic character of the surrounding area and would be consistent with the VRM Class IV designation of the area. The buildings would be low-rise structures with heights of less than 30 m (100 ft). This height would be similar to that of other buildings in the area. The tallest new structure would be a stack that is 37 m (120 ft) above the existing grade. Impacts of these buildings on visual resources would be mitigated by the presence of trees and rolling terrain that would effectively screen them from view, and the distance of the facility from the nearest publicly accessible viewpoints located on State Highway 125 and SRS Road 1, both approximately 6 km (4 mi) away.

Further mitigation was not identified by the NRC that would significantly reduce the impacts.

5.2.11 Socioeconomics

Construction of the proposed MOX facility and WSB would have a minor beneficial socioeconomic impact on the region. Therefore, further mitigation would not significantly reduce the impacts. Although the region should benefit from the construction, the peak demand for workers could adversely affect other construction activities in the area. These impacts would be mitigated by the short duration of the peak demand for workers (a few months). In addition, given that a majority of workers would be hired from the existing regional labor pool, impacts from worker relocation to area businesses, public services, and facilities would be mitigated.

Transportation impacts during construction would be primarily associated with construction labor. To minimize conflicts with other SRS activities, the work schedule would be coordinated and staggered with other SRS activities to minimize the number of vehicles entering and exiting the SRS during peak commuting periods.

Normal operations of the facilities would require approximately 480 new permanent positions and an additional 780 indirect jobs. Given the population and its rate of growth, no significant socioeconomic impacts are expected, and further mitigation would not significantly reduce the impacts.

The impacts of deactivation and decommissioning of the facility would be similar to those for construction, and mitigation activities would be similar to those previously discussed. No mitigation of socioeconomic impacts would be required for accidents, unless residents were evacuated and prevented from quickly returning to their homes. Such impacts would be mitigated, to the extent possible, by rapid cleanup of the accident.

5.2.12 Environmental Justice

As discussed in Section 4.3.7, impacts to the environmental justice community would not be high and adverse from construction and normal operations associated with the proposed action. Mitigation measures discussed above in Section 5.2.8 would mitigate impacts to the general public including the environmental justice community. Therefore, further mitigation would not significantly reduce impacts specific to the environmental justice community.

Section 4.3.7 discusses possible impacts to the environmental justice community from accidents. In developing mitigation measures for these potential impacts, the NRC considered that accident impacts are different from impacts from construction or normal operations. That is construction and normal operations impacts would occur, if the facilities were authorized to be constructed, but the likelihood of accident impacts is less certain. In addition, mitigation of accident impacts for the general public would also mitigate potential impacts to the environmental justice community. Considering these factors, the NRC identified the following potential mitigation measures specifically to address disproportionate impacts to the environmental justice community from potential accidents.

Various procedures might be used to reduce the potential impacts to low-income and minority groups in the event of an accidental chemical or radiological release from the facilities. As discussed in Sections 4.3.5 and 4.3.7, the potential impacts associated with accidents would be lower if the population exposed to population exposed to a contaminate plume did not ingest crops that could be contaminated. In addition, seeking shelter indoors would reduce the inhalation and direct exposure associated with contaminate plumes. Because the mitigation activities for part of the environmental justice community involve knowing what to do in case of an accident, the NRC believes that education and public outreach are potential methods to mitigate these potential impacts. The potential mitigation activities include development and implementation of the following:

- Focused public information campaigns to provide technical and environmental health information directly to low-income and minority groups, or to local agencies and representative groups; and

- Additional programs directed at local communities providing emergency response services and other emergency facilities to incorporate additional measures to protect low-income and minority populations.

Included in the public information campaigns would be descriptions of existing air and groundwater monitoring programs; the nature, extent, and likelihood of any future airborne or groundwater release from the facilities; and the likely characteristics of environmental and health impacts. Key information would include the extent of any likely damage to drinking water supplies and subsistence resources and the relevant preventive measures that may be taken.

The additional programs under the second group of measures would ensure that the low-income and minority population in local government jurisdictions are located and fully prepared in the event that sheltering or other protection strategies may be required and would ensure that detailed descriptions of evacuation routes that may be used have been developed and distributed. In addition to public information campaigns targeting low-income and minority groups, these programs would include the development of spatial database programs for use by local emergency response planners. These databases would provide information on the locations of low-income and minority populations and the locations of relevant local resources available to emergency response agencies, and would have detailed descriptions of evacuation routes that might be required.

The NRC staff has reviewed the mitigation measures for environmental justice and has concluded that no additional mitigation measures are required beyond the regulatory requirements and the measures identified by DCS.

5.3 References for Chapter 5

DCS (Duke Cogema Stone & Webster) 2002. *Mixed Oxide Fuel Fabrication Facility Environmental Report, Revision 1 & 2*. Docket Number 070-03098. Charlotte, NC.

DCS 2003. *Mixed Oxide Fuel Fabrication Facility Environmental Report, Revision 4.* Docket Number 070-03098. Charlotte, NC. Aug.

DOE (U.S. Department of Energy) 1999. *Surplus Plutonium Disposition Final Environmental Impact Statement*. DOE/EIS-0283. Office of Fissile Materials Disposition, Washington, DC. Nov.

DOE 2000. "Record of Decision for the Surplus Plutonium Disposition Final Environmental Impact Statement." *Federal Register* 65:1608, Jan. 11.

DOE 2002. "Amended Record of Decision for the Surplus Plutonium Disposition Program." *Federal Register* 67:19432, April 19.

DOE 2003. *Changes Needed to the Surplus Plutonium Disposition Program Supplement Analyses and Record of Decision*. DOE/EIS-0283-SA1. Office of Fissile Materials Disposition, Washington, DC, April.

Gould, A.B. 2002. Letter from Gould (Director, Environmental Quality Division, DOE, Savannah River Operations Office, Aiken, SC) to C.C. Long (South Carolina State Historic Preservation Office, Columbia, SC). October 24.

Long, C.C. 2002. Letter from Long (South Carolina State Historic Preservation Office, Columbia, SC) to A.B. Gould (Director, Environmental Quality Division, DOE, Savannah River Operations Office, Aiken, SC). October 24.

6 ENVIRONMENTAL REGULATIONS AND PERMITS

The proposed project would be subject to many federal, state, local, and other legal requirements, and a variety of permits, licenses, and approvals would have to be obtained. Many of these requirements are identified and their status summarized in Table 6.1. For items that are the responsibility of the facility owner or operator, Table 6.1 presents requirement status on the basis of information obtained from the environmental report (ER) (DCS 2002a; 2003a,b; 2004). No independent evaluation was made of the status of consents not discussed in the ER that are the responsibility of the facility owner or operator. For items that are the responsibility of the U.S. Nuclear Regulatory Commission (NRC), references are made to other sections of this environmental impact statement (EIS) that discuss their status.

Because of the early stage of project design, the information in Table 6.1 should not be considered comprehensive or binding. It may later be determined that the facility is subject to additional requirements that are not listed in Table 6.1 or qualifies for exemptions or exclusions from some requirements that are listed.

For ease of reference, the information in Table 6.1 has been divided into the following categories:

- Civilian Use of Nuclear Material,
- Air Quality Protection and Noise Control,
- Protection of Water Resources,
- Waste Management and Pollution Prevention,
- Biotic Resources,
- Cultural Resources,
- Transportation, and
- Other.

Table 6.1. Applicable environmental regulations and consents or activities

Responsible agency	Authority	Requirement	Status
Civilian Use of Nuclear Material			
NRC	Atomic Energy Act of 1954, as amended (AEA) (42 U.S.C. 2011 et seq.); 10 CFR Part 40	*Part 40 License* to receive, possess, use, and transfer depleted uranium	DCS has satisfied this requirement by specifying depleted uranium activities in the Construction Authorization Request for its Part 70 License (DCS 2001, Sections 1.2.2 and 1.2.3, and 2002b).
NRC	AEA; 10 CFR Part 70	*Part 70 License* to receive, possess, use, and transfer plutonium	DCS has applied for this consent by filing a Construction Authorization Request and an Environmental Report with the NRC (DCS 2002a; 2003a,b).
South Carolina Department of Health and Environmental Control (SCDHEC)	AEA; South Carolina (SC) Regulations R.61-63	*Radioactive Materials License* to receive, use, possess, transfer, and dispose of radioactive material, including depleted uranium	DCS has satisfied this requirement by applying for a Part 70 License from the NRC.
Air Quality Protection and Noise Control			
SCDHEC	Clean Air Act (CAA) Section 165 (42 U.S.C. 7475); SC Regulations R.61-62.5 Standard No. 7	*Prevention of Significant Deterioration (PSD) Permit* to construct and operate a new major stationary source of air pollution in an area that complies with National Ambient Air Quality Standards for carbon monoxide, lead, nitrogen dioxide, ozone, sulfur oxides, particulate matter with aerodynamic diameter less than or equal to 10 μm (PM_{10}), and $PM_{2.5}$	DCS has determined that gaseous emissions from the facility would not be enough to trigger the requirement for a PSD Permit (DCS 2002a, Section 7.2.1.1). Section 4.3.2.2 discusses impacts of facility operations on air quality.

Table 6.1. Continued

Responsible agency	Authority	Requirement	Status
SCDHEC	CAA, Title V, Sections 501 - 507 (42 U.S.C. 7661 - 7661f); SC Regulations R.61-62.70	*Title V Operating Permit* for a new or existing stationary source that is a major source; a source subject to National Emission Standards for Hazardous Air Pollutants (NESHAPs); a source subject to New Source Performance Standards (NSPS); or an affected source under the Acid Rain Program	DCS has determined that the quantity of criteria and hazardous air pollutants (other than radionuclides) expected to be emitted during facility operation would not be enough to trigger the requirement for a Title V Operating Permit (DCS 2002a, Section 7.2.1.1). Even so, DCS has initiated consultation with the SCDHEC and plans to submit any permit forms necessary to augment the existing Title V Operating Permit held by the DOE SRS (DCS 2002a, Section 7.2.1.1).
SCDHEC	CAA, Section 112 (42 U.S.C. 7412); 40 CFR Part 61; SC Regulations R.61-62.63	*Approval for Construction* of a new source or modification that is subject to NESHAPs	DCS has determined that the proposed facility would be subject to NESHAPs requirements in 40 CFR Part 61, Subpart H, which govern radionuclide emissions from all DOE-owned or DOE-operated facilities, whether or not they are licensed by the NRC. However, EPA Region IV and SCDHEC approved an alternate calculation methodology that exempted the facility from preparing an application for NESHAPs construction approval (DCS 2002a, Section 7.2.1.1). Section 4.3.2.2 discusses impacts on air quality during routine operation.
SCDHEC	CAA, Section 111 (42 U.S.C. 7411); 40 CFR Part 60; SC Regulations R.61-62.60	*Demonstration of Compliance* with applicable NSPS	DCS has determined that the facility would not trigger the requirement to comply with any NSPS (DCS 2002a, Section 7.2.1.1).

Table 6.1. Continued

Responsible agency	Authority	Requirement	Status
SCDHEC	CAA, Section 112(r) (42 U.S.C. 7412); 40 CFR Part 68, Subpart G; SC Regulations R.61-62.68	*Risk Management Plan* for any stationary source that has more than a threshold quantity of a regulated substance in a process	DCS has determined that a Risk Management Plan is not required because the projected quantities of regulated substances at the facility would not be greater than threshold levels (DCS 2002a, Section 7.1.2).
SCDHEC	SC Pollution Control Act (SC Code of Laws, 1976, as amended, Title 48, Chapter 1); SC Regulations R.61-62.1, Section II.A	*State Construction Permit* to construct, alter, or add to a source of air contaminants within South Carolina, if the emission limits imposed would be more restrictive than those imposed by other federal or state air permitting requirements	DCS plans to develop a Construction Emissions Control Plan and to submit standard permit application forms required by the SCDHEC in order to evaluate the applicability of all state air permitting requirements (DCS 2002a, Section 7.2.1.1).
NRC	CAA, Section 176 (42 U.S.C. 7506); 40 CFR Part 93, Subpart B	*Determination of Conformity* with applicable air quality implementation plans	No air quality implementation plans apply to the area where the facility is located.
Protection of Water Resources			
SCDHEC	Clean Water Act of 1977 (CWA) (33 U.S.C. 1251 et seq.); SC Regulations R.61-9	*National Pollutant Discharge Elimination System (NPDES) Permit for Storm Water Discharges during Construction* for discharges of storm water from any land disturbance activity affecting an area greater than 5 acres	DCS has determined that the facility construction activities would be covered by the South Carolina NPDES General Permit for storm-water discharges from construction activities within the state (Permit No. SCR100000), provided that a notice of intent, supported by a Storm Water Management Pollution Prevention Plan is filed before construction activities are initiated (DCS 2002a, Section 7.2.1.2). DCS plans to submit the notice of intent and required plans at the appropriate time.

Table 6.1. Continued

Responsible agency	Authority	Requirement	Status
SCDHEC	CWA (33 U.S.C. 1251 et seq.); SC Regulations R.61-9	*NPDES Permit for Storm Water Discharges from Industrial Activity Areas* for discharges of storm water from any facility or activity classified as "associated with industrial activity"	DCS has determined that the South Carolina NPDES General Permit for storm-water discharges from industrial activities within the state (Permit No. SCR000000) would cover runoff exposed to pollutants in an industrial activity area at the facility after construction is complete, provided that a notice of intent, supported by a Storm Water Management Pollution Prevention Plan, is filed (DCS 2002a, Section 7.2.1.2). DCS plans to submit the notice of intent and required plan at the appropriate time.
SCDHEC	CWA (33 U.S.C. 1251 et seq.); SC Regulations R.61-9	*NPDES Permit for Wastewater Discharges* for discharges to surface waters of wastewater from industrial facilities	DCS has determined that the facility would not discharge process wastewater. Accordingly, DCS has consulted with the SCDHEC regarding the need for an NPDES permit and plans, as appropriate, to file a notice of intent to discharge non-process wastewater covered by the South Carolina NPDES general permit for utility water discharges (Permit No. SCG 250000) (DCS 2004, Section 7.2.1.2).
SCDHEC	SC Pollution Control Act (SC Code of Laws, 1976, as amended, Title 48, Chapter 1); SC Regulations R.61-67	*State Construction Permit* to construct, alter, or add to wastewater treatment facilities within South Carolina	DCS has initiated consultation with the SCDHEC and at the appropriate time, plans to obtain a permit to construct the tie-in between the existing SRS Central Sanitary Waste Treatment Facility and the sanitary wastewater system from the facility (DCS 2004, Section 7.2.1.2).

Table 6.1. Continued

Responsible agency	Authority	Requirement	Status
SCDHEC	SC Safe Drinking Water Act (SC Code of Laws, 1976, as amended, Title 44, Chapter 55); SC Regulations R.61-58	*Public Water System Construction Permit* for construction, modification, or expansion of any public water system	DCS has initiated consultation with the SRS Environmental Protection Department, which is responsible for compliance with SCDHEC requirements applicable to the existing drinking water systems at the SRS. DCS plans to obtain the necessary permit before construction begins on a tie-in between the existing SRS drinking water system and the facility drinking water system (DCS 2002a, Section 7.2.1.3).
SCDHEC	SC Safe Drinking Water Act (SC Code of Laws, 1976, as amended, Title 44, Chapter 55); SC Regulations R.61-58	*Public Water System Operating Approval* for placing a new, modified, or expanded public water system into service	DCS has initiated consultation with the SRS Environmental Protection Department, which is responsible for compliance with SCDHEC requirements applicable to the existing drinking water systems at the SRS. DCS plans to obtain the necessary operating approval before beginning operation of the tie-in between the existing SRS drinking water system and the facility drinking water system (DCS 2002a, Section 7.2.1.3).
U.S. Environmental Protection Agency (EPA)	CWA (33 U.S.C. 1251 et seq.); 40 CFR Part 112	*Spill Prevention Control and Countermeasures (SPCC) Plan* for any facility that could discharge oil in harmful quantities into navigable waters	DCS plans to prepare the required SPCC Plan (DCS 2002a, Section 7.2.1.2).
SCDHEC	CWA (33 U.S.C. 1251 et seq.); SC Regulations R.61-101	*State Water Quality Certification* certifying that the applicable state water quality standards will not be violated as a result of discharges to navigable waters by an activity authorized by a federal license	The SCDHEC has notified DCS that a State Water Quality Certification in accordance with SC regulation R.61-101 is not required (SCDHEC 2003).

Table 6.1. Continued

Responsible agency	Authority	Requirement	Status
NRC; U.S. Army Corps of Engineers	CWA (33 U.S.C. 1251 et seq.); Executive Order 11988 (42 FR 26951; May 24, 1977) as amended by Executive Order 12148 (44 FR 43239; July 20, 1979)	*Floodplain Assessment* to evaluate the effects of issuing a Part 70 License on any floodplain	DCS has completed a floodplain assessment and incorporated its results into the design of the facility (DCS 2002a, Section 7.1.3 and Table 7-1). Section 3.3.1 discusses the results of the floodplain assessment.
U.S. Department of the Interior (National Park Service); NRC	Wild and Scenic Rivers Act, as amended (16 U.S.C. 1271 et seq.)	*Wild and Scenic Rivers Assessment* to ensure that issuing a Part 70 License will not result in activities that would adversely affect the values for which a river is being studied or has been designated as a wild and scenic river	DCS has determined that no river that is being studied or has been designated as a national wild and scenic river occurs within the SRS (DCS 2002a, Section 4.4.2.1).
U.S. Army Corps of Engineers	CWA (33 U.S.C. 1251 et seq.)	*Section 404 Permit* to discharge dredged or fill material into waters of the United States, including wetlands	DCS has determined that no wetlands are present on the facility site and that no other discharge of dredged or fill material into water of the United States would occur at the facility site (DCS 2002a, Section 4.6.2.2). Therefore, DCS has concluded that no Section 404 permit is required from the U.S. Army Corps of Engineers (DCS 2002a, Section 7.1.3 and Table 7-1).

Table 6.1. Continued

Responsible agency	Authority	Requirement	Status
Waste Management and Pollution Prevention			
EPA; SCDHEC	Resource Conservation and Recovery Act (RCRA), as amended by the Hazardous and Solid Waste Amendments of 1984 (HSWA) (42 U.S.C. 6901 et seq.), Subtitle C; SC Regulations R.61-79.262	*EPA Identification Number* to identify a hazardous waste generator	DCS has determined that the facility would generate small quantities of hazardous wastes. Therefore, DCS plans to file a notice of hazardous waste activity with EPA and obtain an EPA identification number when hazardous waste activities commence at the site (DCS 2002a, Section 7.2.1.4). Hazardous waste generated during facility operations is discussed in Section 4.3.2.4.
SCDHEC	RCRA, as amended by HSWA (42 U.S.C. 6901 et seq.), Subtitle C; SC Regulations R.61-79.270	*Hazardous Waste Facility Permit* for a facility that will store hazardous wastes beyond the allowed accumulation periods, treat hazardous wastes, or dispose of hazardous wastes	DCS has determined that the facility will not store hazardous waste beyond the allowed accumulation time. Also, DCS does not plan to treat or dispose of hazardous waste at the facility. Therefore, DCS has concluded that the facility would not require a hazardous waste facility permit (DCS 2002a, Section 7.2.1.4).
SCDHEC	RCRA, as amended by HSWA (42 U.S.C. 6901 et seq.), Subtitle I; SC Regulations R.61-92	*Underground Storage Tank Installation and Operation Permits* to install and operate an underground storage tank that will contain regulated substances, including petroleum products and other substances defined in Section 101(14) of the Comprehensive Environmental Response Compensation and Liability Act (CERCLA)	DCS has initiated consultation with the SCDHEC regarding underground storage tanks for managing regulated substances at the facility and plans to obtain the necessary permits at the appropriate time (DCS 2002a, Section 7.2.1.4).

Table 6.1. Continued

Responsible agency	Authority	Requirement	Status
Biotic Resources			
NRC; U.S. Fish and Wildlife Service; South Carolina Department of Natural Resources; Georgia Department of Natural Resources	Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.); Migratory Bird Treat Act of 1918 (MBTA), as amended (16 U.S.C. 703-712); Nongame and Endangered Species Conservation Act (SC Code of Laws, 1976, as amended, Title 50, Chapter 15); Endangered Wildlife Act of 1973 (Georgia Laws 1973, p. 932, et seq.); Wildflower Preservation Act of 1973 (Georgia Laws 1973, p. 333, et seq.)	*Consultation* between the NRC, the U.S. Fish and Wildlife Service, and affected states to ensure that activities resulting from issuance of a Part 70 License (1) are not likely to jeopardize the continued existence of any species listed at the federal or state level as endangered or threatened, or result in destruction of critical habitat of such species and (2) will include appropriate precautions to mitigate adverse effects on birds protected by the MBTA	DCS has obtained declarations from the U.S. Fish and Wildlife Service and the South Carolina Department of Natural Resources indicating that facility construction and operation would have no effect on threatened and endangered species under their jurisdictions (DCS 2002a, Sections 7.1.6 and 7.2.3).

Table 6.1. Continued

Responsible agency	Authority	Requirement	Status
Cultural Resources			
NRC; Advisory Council on Historic Preservation; South Carolina State Historic Preservation Officer	National Historic Preservation Act of 1966, as amended (16 U.S.C. 470 et seq.); Archaeological and Historical Preservation Act of 1974 (16 U.S.C. 469-469c-2); Antiquities Act of 1906 (16 U.S.C. 431 et seq.); Archaeological Resources Protection Act of 1979, as amended (16 U.S.C. 470aa-mm)	*Archaeological and Historical Resources Consultation* between the NRC and the State Historic Preservation Officer or Tribal Historic Preservation Officer before allowing federally licensed activities to proceed in an area where archaeological or historic resources might be located	DCS has determined that, while there are no historic sites located within the facility site, there are two prehistoric archaeological sites that are eligible for listing on the *National Register of Historical Places* (DCS 2002a, Section 4.8.2). Mitigation of these sites was completed during August 2002 (DCS 2002a, Table 7-1). Sections 3.7 and 4.3.7.8 describe the required consultations.
NRC	American Indian Religious Freedom Act of 1978 (42 U.S.C. 1996); Native American Graves Protection and Repatriation Act of 1990 (25 U.S.C. 3001, et seq.)	*Native American Resources Consultation* between the NRC and Native Americans to ensure that activities resulting from issuance of a Part 70 License have been designed to protect access to, physical integrity of, and confidentiality of Native American sites	DCS reports that consultation has been initiated with appropriate Native American groups to identify concerns about construction activities associated with a facility such as the MOX facility at the SRS (DCS 2002a, Section 4.8.4). Sections 3.7.3 and 4.2.6.3 discuss the status of this consultation.

Table 6.1. Continued

Responsible agency	Authority	Requirement	Status
Transportation			
U.S. Department of Transportation (DOT); NRC	Hazardous Materials Transportation Act, as amended by the Hazardous Materials Transportation Uniform Safety Act of 1990 and other acts (49 U.S.C. 1501, et seq.); Atomic Energy Act of 1954, as amended (42 U.S.C. 2011, et seq.); 49 CFR 172, 173, 174, 177, and 397; 10 CFR 71	*Packaging, Labeling, and Routing Requirements for Radioactive Materials*	At the appropriate time, DCS will comply with DOT and NRC requirements for packaging, labeling, and routing of radioactive materials. DCS has identified no specific permits, licenses, or approvals that will be required for transportation of materials to or from the facility.
Other			
NRC; U.S. Natural Resource Conservation Service	Farmland Protection Policy Act (7 U.S.C. 4201 et seq.); 7 CFR Part 658	*Prime Farmland Assessment* to consider alternatives to address the adverse effects on prime farmland of activities resulting from issuance of a Part 70 license	DCS has determined that none of the land on the facility site has been identified as prime farmland because the land is not available for agricultural production (DCS 2002a, Section 7.1.7 and Table 7-1).
NRC	National Environmental Policy Act of 1969, as amended (NEPA) (42 U.S.C. 4321 et seq.); 40 CFR 1500 - 1508; 10 CFR Part 51	*Environmental Impact Statement (EIS)* to evaluate the potential environmental impacts of a proposed major federal action that may significantly affect the quality of the human environment, and to consider alternatives to the proposed action	This EIS meets the requirements of the NEPA.

Table 6.1. Continued

Responsible agency	Authority	Requirement	Status
OSHA; South Carolina Department of Labor, Licensing, and Regulation	Occupational Safety and Health Act, as amended (29 U.S.C. 651, et seq.); 29 CFR 1910.119; SC Regulations, Chapter 71, Article 1, Subarticle 6, "South Carolina Occupational Safety and Health Standards for General Industry and Public Sector Marine Terminals"	*Process Hazard Analysis* to identify, evaluate, and control the hazards of a process involving a flammable liquid or gas, hydrocarbon fuel, or highly hazardous chemical at or above the specified threshold quantity	Before operating the proposed facility, DCS would be required to perform a process hazard analysis for nitrogen tetroxide, which would be present at the proposed MOX facility in a quantity greater than the specified threshold quantity.

6.1 References for Chapter 6

DCS (Duke Cogema Stone & Webster) 2001. *Construction Authorization Request for the Mixed Oxide Fuel Fabrication Facility*. Docket Number 070-03098. Charlotte, NC.

DCS 2002a. *Mixed Oxide Fuel Fabrication Facility Environmental Report, Revision 1 & 2*. Docket Number 070-03098. Charlotte, NC.

DCS 2002b. *Amended Construction Authorization Request for the Mixed Oxide Fuel Fabrication Facility*. Docket Number 070-03098. Charlotte, NC.

DCS 2003a. *Mixed Oxide Fuel Fabrication Facility Environmental Report, Revision 3*. Docket number 070-03098. Charlotte, NC. June.

DCS 2003b. *Mixed Oxide Fuel Fabrication Facility Environmental Report, Revision 4*. Docket Number 070-03098. Charlotte, NC. Aug.

DCS 2004. *Mixed Oxide Fuel Fabrication Facility Environmental Report, Revision 5*. Docket Number 070-03098. Charlotte, NC. June 10.

SCDHEC (South Carolina Department of Health and Environmental Control) 2003. "Duke Cogema Stone and Webster (DCS) Mixed Oxide Fuel Fabrication Facility 401 Water Quality Certification." Letter from Q. Epps (Section Manager, Water Quality Certification Standards, Navigable Waters, and Wetlands Programs, SCDHEC, Columbia, SC) to M.L. Birch (Manager, Environment, Safety and Health, DCS, Charlotte, NC) Mar. 3.

7 GLOSSARY

7Q10 flow: The 7-day low flow, 10-year recurrence flow for a river. This flow is the lowest recorded over any 7 consecutive days within any 10-year period.

absorbed dose (*dose*[1]): The amount of energy deposited in any material by ionizing radiation. The unit of absorbed dose, the rad, is a measure of energy absorbed per gram of material.

accident: An unplanned sequence of events resulting in undesirable consequences, such as the release of radioactive or hazardous material to the environment.

accident risk: Risk based on both the severity of an accident (consequence) and the probability that the accident will occur. High-consequence accidents that are unlikely to occur (low probability) may pose a low overall risk. For purposes of comparison, accident risk is typically calculated by multiplying the accident consequence (for example, dose or expected fatalities) by the probability of the accident's occurring.

accident severity categories: A method of characterizing all the possible types of accident scenarios that might occur according to their likely outcome and the probability of occurrence. The *Nuclear Regulatory Commission* method, which is used in this environmental impact statement, divides the spectrum of accidents into eight categories. Category I accidents are the least severe but the most frequent; Category VIII accidents are very severe but very infrequent.

accident source term: The amount of radioactive or hazardous material released to the environment following an accident.

acute: Resulting in immediate impacts.

acute health endpoint: A human health impact involving immediate injury or fatality.

administrative outfall: An authorized liquid waste *outfall* that discharges no pollutants.

Advisory Council on Historic Preservation: Under the National Historic Preservation Act of 1966, the Council reviews federal undertakings that may affect historic structures, sites, or archeological artifacts. Second contact in sequential review that begins with the State Historic Preservation Officer.

An independent federal agency that serves as the chief policy advisor to the President and Congress on matters concerning historic preservation. Included on the 20 member Council are the heads of several federal agencies, including the Secretaries of the Interior and Agriculture.

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[1] Italicized words and phrases are entries in this glossary.

aerosol: Particles of solid or liquid matter that can remain suspended in air from a few minutes to many months, depending on the particle size and weight.

aerosolize: The process of converting a solid or a liquid into an airborne suspension of fine particles (an *aerosol*).

affected environment: For an environmental impact statement (EIS), a description of the existing environment covering information necessary to assess or understand the impacts. It must contain enough detail to support the impact analyses and must highlight environmentally sensitive resources (for example, floodplains, wetlands, threatened and endangered species, archeological resources).

aggregate: The sum total.

air pollutant: Any substance in air which could, if in high enough concentration, harm humans, other animals, vegetation, or material. Pollutants may include almost any natural or artificial composition of matter capable of being airborne.

air quality: A measure of the quantity of pollutants, measured individually, in the air. These levels are often compared to regulatory standards.

Air Quality Control Region (AQCR): An interstate or intrastate area designated by the *U.S. Environmental Protection Agency* for the attainment and maintenance of *National Ambient Air Quality Standards.*

air quality standards: The legally prescribed level of constituents in the outside air that cannot be exceeded during a specific time in a specified area.

air toxics (hazardous air pollutants): Substances that have adverse impacts on human health when present in the *ambient air.*

ALARA (as low as reasonably achievable): An approach to keep radiation exposures (both to the workforce and the public) and releases of radioactive material to the environment at levels that are as low as social, technical, economic, practical, and public policy considerations allow. ALARA is not a dose limit; it is a practice whose objective is the attainment of dose levels as far below applicable limits as possible.

algorithm: A formula or set of steps used to solve a problem.

ALOHA model: A computer model used to assess the impacts of potential chemical releases.

alpha particle (α): A positively charged particle made up of two protons and two neutrons that is emitted in the radioactive decay of certain atoms. An alpha particle is identical to the nucleus of the helium atom. It is easily stopped by a sheet of paper. Since they cannot penetrate human skin, alpha particles are not considered an external exposure hazard. Alpha particles within the body can cause harm, however.

ambient: Undisturbed, natural conditions, such as ambient temperature; surrounding conditions.

ambient air: The surrounding atmosphere, usually the outside air, as it exists around people, plants and structures. It is not the air in immediate proximity to emissions sources.

Ambient Air Quality Standards: Regulations prescribing the levels of airborne pollutants that may not be exceeded during a specified time in a defined area.

American Indian Religious Freedom Act: States that the policy of the United States is to protect and preserve for American Indians their inherent rights of freedom to believe, express, and exercise the traditional religions of the American Indian, Eskimo, Aleut, and Native Hawaiians. These rights include, but are not limited to, access to sites, use and possession of sacred objects, and the freedom to worship through ceremony and traditional rites.

anthropogenic: Produced by human activities.

aqueous process: An operation involving chemicals dissolved in water.

aquifer: A geologic formation that can yield significant quantities of groundwater to wells and springs.

aquitard: A geologic unit that is not permeable enough to transmit significant quantities of water. Aquitards transmit water at a very slow rate to or from an adjacent aquifer.

Archaeological and Historic Preservation Act: A federal law directed at the preservation of historic and archaeological data that would otherwise be lost as a result of federal construction. It authorized the U.S. Department of the Interior to undertake recovery, protection, and preservation of archaeological and historic data.

Archaeological Resources Protection Act of 1979: A federal act protecting cultural resources on federally owned lands. This act requires a permit for archaeological excavations or the removal of any archaeological resources on public or Native American lands.

archaeological site: Any location where humans have altered the terrain or discarded *artifacts* during prehistoric or historic times.

artifact: An object produced or shaped by human beings and of archaeological or historical interest.

as low as reasonably achievable: See *ALARA*.

atom: The smallest unit of an element that is capable of entering into a chemical reaction and displays the properties of the element.

Atomic Energy Act of 1954: A federal law that created the Atomic Energy Commission, which later split into the *Nuclear Regulatory Commission* and the Energy and Research and Development Administration (ERDA). ERDA became part of the *Department of Energy* in 1977. This act encouraged the development and use of nuclear energy and research for the general welfare and the security of the United States. This act authorized the Nuclear Regulatory Commission (NRC) to regulate and license fuel fabrication facilities that seek to receive, possess, use, or transfer special nuclear material.

atomic number: The number of positively charged protons in the nucleus of an atom and the number of electrons on an electrically neutral atom.

attainment area: An area considered to have air quality as good as or better than the National Ambient Air Quality Standards for a given pollutant. An area may be in attainment for one pollutant and nonattaining for others.

attenuate: To lessen the magnitude or severity of an impact or effect.

background radiation: Radiation that is part of our natural world. It can originate from naturally occurring radioactive materials within the Earth and from outer space (cosmic sources). Background radiation also includes global fallout as it exists in the environment from the testing of nuclear explosive devices. Background radiation varies considerably with location.

becquerel (Bq): A unit used to measure radioactivity. One Becquerel is that quantity of a radioactive material that will have one transformation in one second. There are 3.7×10^{10} Bq in one *curie* (Ci).

beta particle (β): Beta particles are electrons except they are not bound to an atom. They cannot travel far from their radioactive source (about one half inch in human tissue and a few yards in air).

beyond design basis accident: An accident generally with more severe impacts to on-site personnel and the public than a *design basis accident*. This accident is used for estimating the impacts of a facility or process.

bioaccumulation: The net accumulation of a chemical by an organism as a result of uptake from all routes of exposure.

biomagnification: The tendency of some chemicals to accumulate to higher concentrations at higher levels in the food chain through dietary accumulation.

biota: The plant and animal life of a region.

blackwater stream: A freshwater stream that has a dark color because of organic debris and tannin-containing compounds.

borrow material: Material such as soil or sand that is removed from one location and used as fill material in another location.

borrow pits: An excavated area from which earthy material has been removed, typically for construction purposes.

bound: To estimate or describe a lower or upper limit on a potential environmental or health consequence when uncertainty exists.

bounding: In the case of accident analysis, that which represents the maximum reasonably foreseeable event or impact.

breach: A general term referring to a hole in a cylinder or container. A breach may be caused by corrosion or by mechanical forces.

bryozoa: Bryozoa are microscopic aquatic animals that live in large colonies of interconnected individuals. Bryozoa are abundant in modern marine environments and are also an important part of the fossil record. They are commonly referred to as sea mats, moss animals, or lace corals.

calcareous sand: Sand containing calcium carbonate, calcium, or limestone; it is usually white or tan.

cancer: A group of diseases characterized by uncontrolled cellular growth. Increased incidence of cancer can be caused by exposure to radiation and some chemicals.

candidate species: Species for which substantial information is available to support proposing that they be added to the federal threatened and endangered species list.

CANDU (Canadian deuterium-uranium reactor): A heavy-water reactor that uses natural uranium as a fuel and heavy water as a *moderator* and a coolant.

canister: A container (generally stainless steel) into which immobilized radioactive waste is placed and sealed.

canopy: The upper forest layer of leaves consisting of the tops of individual trees whose branches sometimes cross each other.

canyon building: A term for a chemical separations plant, inspired by the building's long, high, narrow structure. Chemical separation is a process for extracting uranium and plutonium from dissolved spent nuclear fuel and irradiated targets.

capable fault: A *fault* is described as capable if it has had movement at or near the ground surface at least once within the past 35,000 years, or recurrent movement within the past 500,000 years.

capping: The process of installing a layer of clay or other impermeable material over the top of a closed landfill to prevent entry of rainwater and to minimize the escape of chemicals into the surrounding soil.

carbonate: Rocks and associated minerals that contain carbonate ion, as in calcium carbonate.

carbon monoxide (CO): A colorless, odorless gas that is toxic if breathed in high concentrations over an extended period. Carbon monoxide is a *criteria air pollutant*. One source of carbon monoxide is engine exhaust.

carcinogen: A substance that is capable of producing or inducing cancer.

cargo-related impacts: Transportation risks associated with the nature of the cargo itself.

Carolina bays: Closed, elliptical-shaped depressions capable of holding water. They are a type of *wetland*.

cask (for radioactive materials): A heavily shielded container that meets all applicable regulatory requirements for shipping *spent nuclear fuel* or *high-level waste*.

Category I Resources: Resources (for example, waters) defined by the U.S. Department of the Interior as unique and irreplaceable on a national or eco-regional basis.

Cenozoic: A geologic era dating from approximately 65 million years ago to the present. It is known as the age of mammals.

census blocks: Census blocks are defined by the U.S. Bureau of Census and are the smallest geographic unit for which the Census Bureau tabulates data. Blocks contain data from the 2000 Census of Population, including total population, population by race and ethnicity, age, marital status, population density and the number and composition of households, and information on housing unit types. Many blocks correspond to individual city blocks bounded by streets, but blocks – especially in rural areas – may include many square miles and may have some boundaries that are not streets. The Census Bureau established blocks covering the entire nation for the first time in 1990. Over 8 million blocks are identified for Census 2000.

census block groups: Census block groups are geographic entities consisting of groups of individual census blocks. Census blocks are grouped together so that they contain between 250 and 550 housing units.

census tract: An area usually containing between 2,500 and 8,000 persons that is used for organizing and monitoring census data. The geographic dimensions of census tracts vary widely, depending on population density. Census tracts do not cross county borders.

clay: A rock or mineral fragment of any composition that is smaller than very fine silt grains, having a diameter of less than 0.00016 in. (1/256 mm).

Class II water source: Current and potential drinking water, as classified by the EPA.

Clean Air Act: A federal law that mandates and provides for the enforcement of air pollution control standards from various sources. Its purpose is to protect the health and welfare of the public by controlling air pollution.

closed canopy: A forest *canopy* that is dense enough that the tree crowns fill or nearly fill the canopy layer so that light cannot reach the forest floor directly.

cloudshine: The exposure pathway of direct external exposure from radioactive material suspended in air.

Code of Federal Regulations (CFR): A publication in codified form of all federal regulations in force.

collective dose: The sum of individual doses received by all those exposed to a specified source of radiation in a given period of time. (Also referred to as population dose.)

collective population risk: A measure of possible loss or injury in a group of people that takes into account the probability that the hazard will cause harm and the consequences of that event. The collective population risk does not express the risk to specific individual members of the population.

committed effective dose equivalent (CEDE): The sum of the committed dose equivalents to various tissues of the body, each multiplied by its weighting factor. It does not include contributions from external doses. Committed effective dose equivalent is expressed in units of rem and provides an estimate of the lifetime radiation dose to an individual from radioactive material taken into the body through either inhalation or ingestion.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 (Superfund): An act providing the regulatory framework for the *remediation* of past contamination from hazardous waste. If a site meets the act's requirements for designation, it is ranked along with other Superfund sites on the National Priorities List. This ranking is the U.S. Environmental Protection Agency's way of determining the priority of sites for cleanup.

conservative estimates: Conservative estimates lean on the side of pessimism and toward maximizing estimates of negative impacts.

consortium: A group (of companies) formed to undertake an enterprise beyond the resources of any one member.

contact-handled transuranic waste: Transuranic waste with a surface radiation dose rate not greater than 200 millirems per hour. It can be safely handled without any shielding other than that provided by the waste container itself.

conversion: An operation for changing material from one form, use, or purpose to another.

cooling water: Water circulated through a *nuclear reactor* or processing plant to remove heat.

cosmic radiation: Streams of highly penetrating, charged particles composed of protons, *alpha particles*, and a few heavier nuclei that bombard the earth from outer space. Cosmic radiation is part of the natural background radiation.

cost-benefit analysis: A formal quantitative procedure comparing costs and benefits of a proposed project or act under a set of preestablished rules.

Council on Environmental Quality: The President's Council on Environmental Quality (CEQ) was established by the enactment of *National Environmental Policy Act* (NEPA). The CEQ is responsible for developing regulations to be followed by all federal agencies in developing and implementing their own specific NEPA implementation policies and procedures.

criteria pollutants: Common air pollutants for which *National Ambient Air Quality Standards* have been established by the U.S. Environmental Protection Agency (EPA) under Title I of the *Clean Air Act*. Criteria *pollutants* include *sulfur dioxide*, *nitrogen oxides*, *carbon monoxide*, *ozone*, *particulate matter* (PM_{10} and $PM_{2.5}$), and *lead*. Standards for these pollutants were developed on the basis of scientific knowledge about their health effects.

critical habitat: Specific areas within the geographical range of an *endangered species* that is formally designated by the U.S. Fish and Wildlife Service under the Endangered Species Act as essential for conservation of the species.

criticality: A state in which a self-sustaining nuclear chain reaction is achieved.

cultural resources: *Archaeological sites*, architectural structures or features, traditional-use areas, and Native American scared sites or special use areas.

cumulative impacts: Potential impacts when the proposed action is added to other past, present, and reasonable foreseeable future actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

curie (Ci): The unit used to describe the intensity of radioactivity in a sample of material. A curie is equal to 37 billion disintegrations per second, which is approximately the activity of one gram of radium. It is also a quantity of any nuclide or mixture of nuclides having one curie of radioactivity.

D&D (deactivation and decommissioning): The removal of the facility safely from service and reduction of residual radioactivity to a level that permits release of the property to a specified end state.

deactivation: The process of removing a facility from operation and placing it in a safe and stable condition. Deactivation involves removal hazardous and radioactive materials.

decibel (dB): A standard unit for measuring sound-pressure levels based on a reference sound pressure of 0.0002 dyne per square centimeter. This is the smallest sound a human can hear. In general, a sound doubles in loudness with every increase of slightly more than 3 decibels.

decibel, A-weighted (dBA): A measurement of sound approximating the sensitivity of the human ear and used to characterize the intensity or loudness of sound.

decommissioning: The process of decontaminating and dismantling a facility following deactivation and returning the site to an end state that meets the prescribed regulatory criteria.

deep dose equivalent (DDE): The dose equivalent derived from external radiation at a depth of 1 cm in tissue.

deionized water: Water from which both negative and positive ions have been removed by an ion exchange process.

Department of Energy (DOE): A federal agency whose mission is to achieve efficiency in energy use, diversity in energy sources, a more productive and competitive economy, improved environmental quality, and a secure national defense. It was created in 1977.

depleted uranium: Uranium whose content of the isotope uranium-235 is less than 0.7%, which is the uranium-235 content of naturally occurring uranium.

depleted uranium hexafluoride (UF_6): A compound of *uranium* and fluorine from which most of the uranium-235 isotope has been removed.

dermal absorption: Entry of a substance into the body through the skin.

design basis accident: For nuclear facilities, an assumed abnormal event used to establish the performance requirements of structures, systems, and components that are necessary to keep the facility in a safe shutdown condition indefinitely, or to prevent or mitigate the consequences of such an event, so as to ensure that the public and operating staff are not exposed to radiation in excess of appropriate guideline values.

detention ponds: Engineered depressions in the land that contain storm-water runoff until it can slowly seep back into the ground or evaporate.

direct impact: An effect that results solely from the construction or operation of a proposed action without intermediate steps or processes. Examples include habitat destruction, soil disturbance, air emissions, and water use.

direct jobs: The number of workers required at a site to implement an alternative.

disposition: A process of use or disposal of materials that results in the remaining material being converted to a form that is substantially and inherently more *proliferation* resistant than the original form.

disproportionately high and adverse environmental impact: An adverse environmental impact determined to be unacceptable or above generally accepted norms. A disproportionately high impact refers to an environmental hazard with a risk or rate of exposure for a low-income or minority population that exceeds the risk or rate of exposure for the general population.

disproportionately high and adverse human health effect: Any effect on human health from exposure to environmental hazards that exceeds generally accepted levels of risk and affects low-income and minority populations at a rate that appreciably exceeds the rate for the general population.

dissolution: The chemical dispersal (dissolving) of a solid throughout a liquid medium.

dose (radiation dose): In a general sense, dose is a measure of the amount of energy from *ionizing radiation* deposited in a material. Dose is affected by the type of radiation, the amount of radiation, and the physical properties of the material itself. Radiation dose to humans is measured in units of *sieverts* (Sv) or *rem* (1 Sv = 100 rem).

drainage basin: An aboveground area of the Earth's surface that supplies the water to a particular stream.

ecology: The study of the interrelationships of organisms and their environment.

ecosystem: A group of organisms and their physical environment.

effective dose equivalent: The sum of the products of the dose equivalent to various organs or tissues and the weighting factors applicable to each of the body organs or tissues that are irradiated. This sum is a risk-equivalent value that can be used to estimate the risk of health effects to the exposed individual. The effective dose equivalent includes the *dose* from *radiation* sources internal and/or external to the body and is expressed in units of *rem* or *sievert*.

effluent: A gas or fluid discharged into the environment, treated or untreated. Most frequently, the term applies to wastes discharged to *surface waters*.

emissions: Substances that are discharged into the air.

endangered species: Any species (plant or animal) that is in danger of extinction throughout all or a significant part of its range. Requirements for declaring a species endangered are found in the *Endangered Species Act*.

Endangered Species Act of 1973: An act requiring federal agencies, with the consultation and assistance of the Secretaries of the Interior and Commerce, to ensure that their actions will not likely jeopardize the continued existence of any endangered or threatened species or adversely affect the habitat of such species.

environmental impact statement (EIS): A document required of federal agencies by the *National Environmental Policy Act* for major proposals or legislation that will or could significantly affect the environment. It describes the positive and negative effects of the proposed and alternative actions.

environmental justice: The fair treatment of people of all races, cultures, incomes, and educational levels with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment implies that no population of people should be forced to bear a disproportionate share of the negative environmental impacts of pollution or environmental hazards due to a lack of political or economic strength.

Environmental Protection Agency (EPA): A federal agency that is responsible for setting, or working with state and local governments, to set standards that help control and prevent pollution and minimize the potential health effects in areas of solid and hazardous waste, pesticides, water, air, drinking water, and toxic and radioactive substances. It was created in 1970.

Eocene: A geologic epoch early in the Cenozoic era, dating from approximately 56 to 34 million years ago.

epicenter: The point on the Earth's surface directly above the focus of an earthquake.

equivalent dose: The equivalent dose is a measure of the effect that radiation has on humans. It takes into account the type of radiation and the *absorbed dose*. Not all types of radiation produce the same effects. For example, when considering beta, x-ray, and gamma ray radiation, the equivalent dose (in rem) is equal to the absorbed dose (in rads). For alpha radiation, the equivalent dose is assumed to be 20 times the absorbed dose.

erosion: The removal and transport of materials by wind, ice, or water on the Earth's surface.

exposure: Contact of an organism with a chemical, radiological, or physical agent.

exposure pathways: A route or sequence of processes by which a radioactive or hazardous material may move through the environment to humans or other organisms. Each exposure pathway includes a source or release from a source, an exposure point, and an exposure route.

external exposure: Exposure to radiation or hazardous substance that originates from sources outside of the body.

facility: Any building, structure, system, process, equipment, or activity that fulfills a specific purpose on a site.

facility workers: Persons working at the *Mixed Oxide* Fuel Fabrication Facility who are directly involved with the handling of radioactive or hazardous materials.

fault (geologic): A fracture in rock along which movement of one side relative to the other has occurred.

fauna: Animals, especially those of a specific region, considered as a group.

Federal Facilities Compliance Act of 1992: A federal law that amended the *Resource Conservation Recovery Act* with the objectives of bringing all federal facilities into compliance with applicable federal and state hazardous waste laws, waiving federal sovereign immunity under those laws, and allowing the imposition of fines and penalties. The law requires the U.S. Department of Energy to submit an inventory of all its mixed waste and to develop a treatment plan for mixed waste.

FIREPLUME: A computer code used to evaluate atmospheric dispersion of contaminants in an airborne release plume.

fissile nuclear material: Nuclear materials that are fissionable by slow (thermal) neutrons. Fissile materials include uranium-233, uranium-235, and plutonium-239.

fission: The splitting of a heavy atomic nucleus into at least two nuclei of lighter elements, accompanied by the release of energy and generally one or more neutrons. Fission can occur spontaneously or be induced by neutron bombardment.

floodplain: The lowlands adjoining inland and coastal waters and relatively flat areas, including, at a minimum, that area inundated by a 1% or greater-chance flood in any given year. The level area adjoining a river or stream that is sometimes covered by flood water. The base floodplain is defined as the 100-year (1%) floodplain.

flora: Plants, especially those of a specific region, considered as a group.

fly-ash: Small solid ash particles from the noncombustible portion of fuel that are small enough to escape with the exhaust gases.

forb: An herb other than grass.

fossil: An impression or trace of an animal or plant of past geologic ages that has been preserved in the Earth's crust.

fossil fuel: Natural gas, petroleum, coal, and any form of solid, liquid, or gaseous fuel derived from such materials for the purpose of creating useful heat.

Fujita Scale: The official classification system for tornado damage. The scale ranges from F0 (gale tornado, minor damage, winds up to 72 mph) to F6 (inconceivable tornado, winds 319-379 mph). F2 on the Fujita scale indicates a significant tornado causing significant damage.

fugitive dust: The dust released into the air from activities associated with construction, manufacturing, or vehicles operating on open fields or dirt roads. It is a subset of *fugitive emissions*.

fugitive emissions: Emissions that are not caught by a capture system. They are often caused by equipment leaks, evaporative processes, and windblown disturbances.

full-time equivalent (FTE): Equivalent to a full-time worker. For example, two people, each working half time, constitute one FTE.

gamma radiation (γ): High-energy, short-wavelength electromagnetic radiation emitted from a radioactive nucleus during decay. Gamma radiation frequently accompanies alpha and beta emissions and always accompanies fission. Gamma rays are very penetrating and are best stopped or shielded by dense materials such as lead or uranium. Gamma rays are similar to X-rays but are more energetic.

Gaussian model: An air dispersion model based on the assumption that the time-averaged concentration of a substance emitted from a point source has a Gaussian distribution about the mean centerline. A Gaussian distribution is represented by a symmetrical bell-shaped curve.

glauconitic sand: Sand that contains the mineral glauconite, which consists of a dull green earthy iron potassium silicate.

GENII: A computer software code used to evaluate dose from the migration of radionuclides introduced into the environment that may eventually affect humans through *ingestion*, *inhalation*, or direct radiation.

geologic repository: An underground facility intended for the disposal of nuclear waste. The waste is isolated by placing it in mined cavities in a continuous, stable geologic formation at depths typically greater than 300 m (984 ft).

geology: The science that deals with the study of the materials, processes, environments, and history of the Earth, including the rocks and their formation and structure.

glovebox: An airtight box used to work with hazardous material. It is vented to a closed filtering system, and has gloves attached inside to protect the worker.

gravitational acceleration (g): An acceleration equal to the Earth's gravitational acceleration at sea level (32 feet /second/second).

gross alpha: The total (or gross) radioactivity in a sample due to emission amount of *alpha particles.* It includes both naturally occurring and man-made radiation.

groundshine: Radiation from ground-deposited *radionuclides.*

groundwater: The supply of water found beneath the Earth's surface, usually in *aquifers*, which may supply wells and springs. Generally, all water contained in the ground.

grout: A cementing or sealing mixture of cement and water to which sand, sawdust, or other additives (sometimes waste) may be added. In terms of waste management practices, grouting is used to reduce the mobility of a waste material. In-situ grout is used to stabilize contaminated soil without having to remove it.

habitat: Area where a plant or animal lives.

half-life (radiological): The time in which half the atoms of a radioactive substance decay to another nuclear form. It varies for different radioisotopes from millionths of a second to billions of years.

hazard Index (HI): A measure of the noncancer risk involved in human exposure to a chemical substance. It is the sum of the *hazard quotients* for all chemicals to which an individual is exposed. A Hazard Index value of 1.0 or less means that no adverse human health effects (noncancer) are expected to occur.

hazard quotient (HQ): A comparison of the estimated intake level or dose of a chemical in air, water, or soil with its reference dose; expressed as a ratio.

hazardous waste: According to the *Resource Conservation and Recovery Act*, a waste that because of its characteristics may (1) cause or significantly contribute to an increase in mortality or an increase in serious irreversible illness, or (2) pose a substantial hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed. Hazardous wastes possess at least one of the following characteristics: ignitability, corrosivity, reactivity, or toxicity. Hazardous waste is nonradioactive.

headwaters: The source of a flowing body of water.

health risk conversion factors: Estimates of the expected number of health effects cause by exposure to a given amount of radiation. Health risk conversion factors are multiplied by the estimated radiation dose received by a given population in order to estimate the number of health effects expected to occur as a result of an exposure.

heavy combination trucks: Rigs composed of a separable tractor unit containing the engine and one to three freight trailers connected to each other and the tractor. They are typically used for shipping radioactive wastes.

herpetofauna: Reptiles and amphibians.

HGSYSTEM: A computer code used to assess hazardous chemical impacts.

high-efficiency particulate air (HEPA) filters: A filter designed to remove 99.97% of particles as small as 0.3 micrometers in diameter from a flowing air stream.

high-level (radioactive) waste (HLW): The highly radioactive waste material that results from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid waste derived from the liquid. High-level waste contains a combination of *transuranic waste* and *fission* products in concentrations requiring permanent isolation. High-level waste may include other highly radioactive material that the U.S. Nuclear Regulatory Commission, consistent with existing law, determines by rule requires permanent isolation.

highly enriched uranium: Uranium enriched in the isotope uranium-235 to 20% or above, which thus becomes suitable for nuclear weapons use.

HIGHWAY: A transportation routing model.

historic structures: A standing structure that has historic significance.

human health risk: The likelihood that a given exposure or series of exposures will damage the health of individuals.

hydrazine: A highly reactive and corrosive chemical that is a *carcinogen* and a reproductive hazard. It is the only chemical that would be used in the MOX process that is listed as a hazardous air pollutant under the *Clean Air Act.*

hydrogen fluoride: A colorless, toxic, fuming, corrosive liquid or gas. It is produced when uranium hexafluoride (UF_6) comes in contact with water, such as humidity in the air. It is often a by-product when UF_6 is converted to another chemical form.

hydrology: The study of water, including groundwater, surface water, and rainfall.

ICRP (International Commission on Radiological Protection): An international body tasked with providing an overview of radiation standards and regulations and information to help standardize these regulations.

immobilization: A process used to stabilize waste, thus inhibiting its release into the environment.

impoundment: A natural or artificial body of water confined by a dam, dike, floodgate, or other barrier.

in attainment: In compliance with air quality standards. Areas that are in attainment have air quality that is as good as or better than specified in the *National Ambient Air Quality Standards* for a given pollutant. An area may be in attainment for one pollutant and nonattaining for others.

incremental impact: The impact due to an emission source (or group of sources) in isolation, without including background levels.

indirect impact: An effect that is related to, but removed from a proposed action by an intermediate step or process. An example would be surface-water quality changes resulting from soil erosion at construction sites.

indirect jobs: Jobs generated or lost in related industries within a *regional economic area* as a result of a change in direct employment.

infrastructure: The basic facilities, services, and utilities needed for the functions of an industrial facility or site. Transportation and electrical systems are part of the infrastructure.

ingestion: To take in by mouth. Material that is ingested enters the digestive system.

inhalation: To take in by breathing. Material that is inhaled enters the lungs.

in-migration: People moving into an area, in this case, the region of influence.

in situ: In its natural position or place.

internal exposure: The radiation dose to internal organs and tissues of the body from the ingestion or inhalation of radioactive contaminants in air, water, food, or soil.

invertebrates: Animals without a backbone (insects, for example).

ion: An atom that has too many or too few electrons, causing it to have an electrical charge, and therefore to be chemically active.

ion exchange: A process that removes specific chemicals and radionuclides from a liquid stream (usually water) for the purposes of purification or decontamination. In this process, salts present as charged ions in water are attached to active groups on and in an ion exchange resin, and other ions are discharged into water allowing separation of the two groups of ions.

ionizing radiation: Radiation that has enough energy to remove electrons from atoms, causing them to become charged or ionized.

irradiate: Expose to some form of radiation, usually a nuclear reactor. Irradiated reactor components and fuel are subjected to neutron radiation and become radioactive themselves or produce *isotopes*.

ISCST3: Version 3 of the Short-Term Industrial Source Complex model. It was used to estimate potential air quality impacts from MOX facility construction and operation activities.

isotope: An atom of an element with a specific atomic number and atomic mass. Isotopes of the same element have the same number of protons (atomic number) but different numbers of neutrons (atomic mass). For example, uranium-235 is an isotope of uranium with 93 protons and 143 neutrons; uranium-238 is an isotope of uranium with 92 protons and 146 neutrons.

kaolinitic clay: A fine, usually white *clay* that contains the mineral kaolinite, a hydrous silicate of aluminum.

L_{dn}: A 24-hour average sound level that gives additional weight to noise that occurs during the night (10:00 p.m. to 7:00 a.m.).

L_{eq}: For sounds that vary with time, L_{eq} is the steady sound level that would contain the same total sound energy as the time-varying sound over a given period.

L_{eq}(24): L_{eq} averaged over 24 hours.

Land Disposal Restrictions: Part of the Hazardous and Solid Waste Amendments to RCRA. They restrict land disposal of certain hazardous wastes; these wastes may be land disposed only if they meet specified treatment standards.

land use: A characterization of land surface in terms of its potential utility for various activities.

latent: Occurring some time (usually several years) after exposure.

latent cancer fatalities (LCFs): Deaths resulting from cancer that has become active after a latent period following exposure to a cancer-causing agent. Latent cancer fatalities are similar to naturally occurring cancer and may be expressed at any time after the initial exposure.

latent cancers: Cancers that occur after a latency period of about 10 or more years from the time of exposure.

latency period: The average period of time between exposure to an agent and the onset of a health effect.

latent fatalities (latent mortality): Fatalities that result from acute or chronic environmental exposures to hazardous substances or radiation but that do not occur immediately after exposure.

lead: A gray-white metal that is listed as a criteria air pollutant. Health effects from exposure to lead include brain and kidney damage and learning disabilities.

linear/no threshold hypothesis: A hypothesis that implies, in part, that even small doses of radiation cause some risk of inducing cancer, and doubling of the radiation dose would mean doubling of the expected number of cancers.

listed species: Species that are considered threatened or endangered.

loam: A soil consisting of an easily crumbled mixture of *clay*, *silt*, and sand.

low-enriched uranium (LEU): Uranium enriched in the isotope uranium-235, greater than 0.7% but less than 20% of the total mass. Naturally occurring uranium contains about 0.7% uranium-235, almost all the rest is uranium-238.

low-level (radioactive) waste: Waste that contains radioactivity and is not classified as *high-level waste*, *transuranic waste*, or *spent nuclear fuel*.

low-specific-activity (LSA) drum: A container, such as a 55-gallon drum, that is used to package low-*specific-activity* material. The depleted uranium considered in this EIS is low-specific-activity material.

macroinvertebrates: Small animals, such as larval aquatic insects, that are visible to the naked eye and have no vertebral column.

magnitude: A measure of the total energy released by an earthquake. It is commonly measured in numerical units on the *Richter scale*. Each unit is different from an adjacent unit by a factor of 30.

marsh: An area of low-lying wetlands dominated by grasslike plants.

maximally exposed individual: A hypothetical person who — because of proximity, activities, or living habits — could receive the highest possible dose of radiation or of a hazardous chemical from a given event or process.

meteorology: The science dealing with the atmosphere and its phenomena, especially as relating to weather.

metric ton: A unit of mass equal to approximately 1.1 short (U.S.) tons, or 2,200 pounds.

millirem (mrem): A unit of radiation exposure equal to one-thousandths of a *rem*.

Miocene: A geologic epoch of the *Cenozoic era* dating from approximately 24 to 5 million years ago.

mitigation: A series of actions implemented to ensure that projected impacts will result in no net loss of habitat value or wildlife populations. The purpose of mitigative actions is to avoid, minimize, rectify, or compensate for any adverse environmental impact.

mixed low-level (radioactive) waste: Low-level waste that also contains hazardous chemical components regulated under the *Resource Conservation Recover Act.*

mixed oxide: For the purposes of this EIS, a physical blend of uranium oxide and plutonium oxide.

mixed transuranic waste: Transuranic waste that also contains hazardous chemical components regulated under the *Resource Conservation and Recovery Act.*

mixed waste: Waste that contains both hazardous and radioactive components.

model: A conceptual, mathematical, or physical system obeying certain specified conditions, whose behavior is used to understand the physical system it is attempting to mimic. Models are often used to predict the behavior or outcome of future events.

moderator: A material (usually water, heavy water, or graphite) used in some nuclear reactors to slow down high-velocity neutrons, thereby increasing the likelihood of *fission*. Moderation controls are a factor in mitigating *criticality* accidents.

Modified Mercalli Intensity Scale: A measure of the perceived intensity of earthquake ground shaking, originally developed in Italy nearly a century ago. It includes 12 degrees of shaking from I (not felt by people) to XII (nearly total damage).

molar concentration: The amount of a substance dissolved per unit volume of solution.

National Ambient Air Quality Standards (NAAQS): Air quality standards established by the *Clean Air Act*, as amended. The primary NAAQS are intended to protect the public health with an adequate margin of safety; and the secondary NAAQS are intended to protect the public welfare from any known or anticipated adverse effects of a pollutant.

National Emission Standards for Hazardous Air Pollutants (NESHAPs): A set of national emission standards for listed hazardous pollutants emitted from specific classes or categories of new and existing sources. These standards were implemented in the *Clean Air Act* Amendments of 1977.

National Environmental Policy Act (NEPA) of 1969: A federal law constituting the basic national charter for protection of the environment. The act calls for the preparation of an environmental impact statement (EIS) for every major federal action that may significantly affect the quality of the human or natural environment. The main purpose is to ensure that environmental information is provided to decision makers so that their actions are based on an understanding of the potential environmental and socioeconomic consequences of a proposed action and the reasonable alternatives.

National Historic Preservation Act: A federal law providing that property resources with significant national historic value be placed on the *National Register of Historic Places*. It does not require permits; rather, it mandates consultation with the proper agencies whenever it is determined that a proposed action might impact a historic property.

National Pollutant Discharge Elimination System (NPDES): A federal permitting system controlling the discharge of effluents to surface waters of the United States and regulated through the *Clean Water Act*, as amended.

National Register of Historic Places (NRHP): A list of districts, sites, buildings, structures, and objects of prehistoric or historic local, state, or national significance. The list is maintained by the Secretary of the Interior.

nitrogen oxides (NO_x): The oxides of nitrogen, primarily nitrogen oxide (NO) and nitrogen dioxide (NO_2), that are produced in the combustion of fossil fuels. Nitrogen dioxide emissions constitute an air pollution problem, because they contribute to acid deposition and the formation of atmospheric ozone. Nitrogen oxides are *criteria air pollutants*.

noise: Any sound that is undesirable because it interferes with speech and hearing, is intense enough to damage hearing, or is otherwise annoying (unwanted sound).

Noise Control Act of 1972: A federal law directing all federal agencies to carry out programs in a manner that furthers the national policy of promoting an environment free from noise that jeopardizes health or welfare.

nonattainment area: The U.S. Environmental Protection Agency's designation for an air quality control region (or portion thereof) in which ambient air concentrations of one or more criteria pollutants exceed *National Ambient Air Quality Standards*.

normal operations: Conditions during which facilities and processes operate as expected or designed. In general, normal operations include the occurrence of some infrequent events that, although not considered routine, are not classified as accidents.

Notice of Intent: A notice that an environmental impact statement will be prepared and considered. It describes the proposed action and provides information on issues and potential impacts and invites comments and suggestions on the scope of the environmental impact statement.

nuclear power plant: A facility that converts nuclear energy into electric power. Heat produced in a *nuclear reactor* is used to make steam, which drives a turbine connected to an electric generator.

nuclear reactor: A machine in which a fission chain reaction is maintained for the purpose of irradiating materials or producing heat for the generation of electricity.

Nuclear Regulatory Commission (NRC): The NRC is an independent regulatory agency created out of the Atomic Energy Commission in 1975 to regulate civilian uses of nuclear material. It is responsible for ensuring that activities associated with the operation of nuclear power and fuel cycle plants and the use of radioactive materials in medical, industrial, and research applications are carried out with adequate protection of public health and safety, the environment, and national security.

Nuclear Waste Policy Act of 1982: The act that authorized federal agencies to develop a geologic repository for the permanent storage of *spent nuclear fuel* and *high-level radioactive waste.*

off-link population: Persons living or working within 0.8 km (0.5 mi) of each side of a transportation route.

Oligocene: A geologic epoch of the *Cenozoic era* dating from approximately 34 to 24 million years ago.

on-link population: Persons sharing a transportation route.

order of magnitude: A range of numbers extending from some value to 10 times that value. If, for example, a number is two orders of magnitude greater than another, it is 100 times greater.

organic compounds: A large group of chemical compounds containing mainly carbon, hydrogen, nitrogen, and oxygen. All living organisms are made up of organic compounds.

outfall: The discharge point of a drain, sewer, or pipe into a body of water.

oxide: A compound formed when an element (for example, plutonium) is bonded to oxygen.

ozone: A strong-smelling, reactive toxic chemical gas consisting of three oxygen atoms chemically attached to each other. It is the product of the photochemical process involving the sun's energy and ozone precursors, such as hydrocarbons and oxides of nitrogen. In the stratosphere, ozone protects the Earth from the sun's ultraviolet rays, but in lower levels of the atmosphere, ozone is considered an air pollutant and can cause irritation of the eyes and respiratory tract. Ozone is one of the criteria air pollutants specified under Title I of the *Clean Air Act* and is a major constituent of smog.

PM_{10}: Particulate matter with a diameter less than 10 μm (0.0004 in.). Particles less than this diameter are small enough to be breathed and could be deposited in the lungs. PM_{10} is one of the six criteria air pollutants specified under Title I of the *Clean Air Act.*

$PM_{2.5}$: Particulate matter with a diameter less than 2.5 μm (0.0001 in.). A standard for this material as a *criteria pollutant* has been defined but not yet implemented.

Paleocene: The earliest epoch in the *Cenozoic era*, dating from approximately 65 to 56 million years ago.

paleontology: The study of plant and animal life that existed in former geologic times, particularly through the analysis of *fossils*.

Paleozoic: The longest era of geologic time, dating from approximately 544 to 248 million years ago. Seed-bearing plants, amphibians, and reptiles first appeared in the Paleozoic era.

parameters: Data or values that are input to computer codes or equations. They are quantifiable or measurable characteristics like wind speed, temperature, pH, vehicular speed, duration of exposure, etc.

particulate matter (PM): Fine liquid or solid particles such as dust, smoke, mist, fumes, or smog, found in air or emissions. The size of the *particulates* is measured in micrometers (μ); a micrometer is 1 millionth of a meter (0.000039 in.). Particle size is important because the *Environmental Protection Agency* has set standards for PM_{10} and $PM_{2.5}$ designed to protect human health and welfare. Particulate matter is a *criteria pollutant*.

particulates: Solid particles and liquid droplets small enough to become airborne.

Pascal (Pa): A unit of measurement for pressure in the International System of Units (SI). 1 pascal = 0.0001450 pounds per square inch.

Pasquill atmosphere stability class: A classification scheme that describes the degree of atmospheric turbulence. Categories range from extremely unstable (A) to extremely stable (F). Unstable conditions promote the rapid dispersion of atmospheric contaminants and result in lower contaminant air concentrations compared with stable conditions.

permitted outfalls: *Outfalls* that are regulated by permits.

person-rem: A unit used to measure the radiation exposure to an entire group and to compare the effects of different amounts of radiation on groups of people; it is the product of the average dose equivalent (in *rem*) to a given organ or tissue multiplied by the number of persons in the population of interest.

person-sievert: A unit of radiation exposure. One person-*sievert* is equivalent to 100 *person-rem*.

person-year: The sum of the number of years each person in a study population is at risk; a metric used to aggregate the total population at risk, assuming that 10 people at risk for 1 year is equivalent to 1 person at risk for 10 years.

physiographic province: A region in which the landforms are similar in geologic structure and differ significantly from the landform patterns in adjacent regions.

physiographic regions: Geographic regions based on geologic setting.

pit: The core element of a nuclear weapon's fission component.

plasma arc cutting: Plasma arc cutting uses a high-velocity jet of electrically charged gas to cut metal at temperatures up to 50,000°F.

plume: The elongated pattern of contaminated air or water originating at a point source such as a smoke stack or a hazardous waste disposal area.

plutonium: A heavy, radioactive, metallic element with the atomic number 94. It is produced artificially in a reactor by the bombardment of uranium with neutrons and is used in the production of nuclear weapons. Weapons-usable plutonium consists mainly of plutonium-239.

point source: A source of effluents that is small enough in dimensions that it can be treated as if it were a point. A point source can be either a continuous source or a source that emits effluents only in puffs for a short time.

pollutant: Any material entering the environment that has undesired effects.

pollution: The addition of an undesirable agent to the environment in excess of the rate at which natural processes can degrade, assimilate, or disperse it.

pollution prevention: The use of any process, practice, or product that reduces or eliminates the generation and release of pollutants, hazardous substances, contaminants, and wastes, including those that protect natural resources through conservation or more efficient utilization.

polycyclic aromatic hydrocarbons (PAHs): Organic compounds that include only carbon and hydrogen with a fused ring structure containing at least two benzene (six-sided) rings. Some PAHs are potent human carcinogens. The combustion of organic substances is a common source of atmospheric PAHs.

Prevention of Significant Deterioration (PSD): A program used in development of permits for new or modified industrial facilities in an area that is already in attainment. The intent is to prevent an attainment area from becoming a *non-attainment area*. Allowable increases are lowest in Class I areas (national parks and wilderness areas); the rest of the country is subject to PSD II increments.

Price Anderson Act: First enacted into law in 1957, it limits the liability of the nuclear power industry in the event of an accident.

primary contact recreations: Activities such as swimming and diving where there is direct contact with the water.

prime farmland: Land with the best combination of physical and chemical characteristics for economically producing high yields of food, feed, forage, fiber, and oilseed crops with minimum inputs of fuel, fertilizer, pesticides, and labor. Prime farmland includes cropland, pastureland, rangeland, and forestland.

probable maximum flood: Flood levels predicted for hydrological conditions that maximize the flow of surface waters.

proliferation: The spread of nuclear, biological, and chemical capabilities and the weapons (e.g., missiles) capable of delivering them.

proprietary income: Income from self-employment.

protected species: Species that are protected by federal legislation, such as the Endangered Species Act or the Migratory Bird Treaty Act.

radiation: Energy radiated in the form of waves or particles through matter and space. Radiation comes from radioactive material or from equipment such as X-ray machines. Radiation may be either *ionizing radiation* or non-ionizing radiation.

radiation dose: See *dose*.

radioactive waste: Materials that are radioactive or are contaminated with radioactive materials and for which use, reuse, or recovery are impractical.

radioactivity: The spontaneous decay or disintegration of unstable atomic nuclei, accompanied by the emission of *radiation*. Eventually the unstable nuclei reach a stable state.

radionuclide: An atom that exhibits radioactive properties. Standard practice for naming a radionuclide is to use the name or atomic symbol of the element, followed by its atomic weight. (For example, cobalt-60 [Co-60], a radionuclide of cobalt with an atomic weight of 60.) Radionuclides can be man-made or naturally occurring, can have a long life, and can have potentially mutagenic or carcinogenic effects on the human body.

RADTRAN 4: A computer code that calculates population risks associated with the transport of radioactive materials by truck, rail, air, ship, or barge.

raffinate: The decontaminated salt solution produced by removal of radionuclides from a high-level waste solution.

raptors: Birds of prey (for example, hawks, owls, eagles).

reference dose: The chemical intake level below which noncancer adverse effects are very unlikely. It is measured in units of milligrams per kilogram of body weight per day (mg/kg/d).

regional economic area (REA): A geographic area consisting of an economic node and the surrounding, economically related counties, including the places of work and residences of the labor force. The REA for this EIS is made up of the 15 counties surrounding the Savannah River Site.

region of influence (ROI): The physical area that bounds the environmental, sociological, economic, or cultural features of interest for the purpose of analysis. A site-specific geographic area that includes the counties where approximately 90% of the site's current employees reside. The ROI for this EIS consists of Columbia and Richmond Counties in Georgia and Aiken and Barnwell Counties in South Carolina.

release fraction: The portion, or fraction, of a material that could be released or spilled to the environment during an accident.

rem (roentgen equivalent man): A unit used to derive a quantity called absorbed dose. The dosage of an ionizing radiation that will cause the same biological effect as one *roentgen* of X-ray or gamma-ray exposure; 100 rem is equivalent to one *sievert*.

remediation: Action taken to permanently remedy a release, or threatened release, of a hazardous or radioactive substance to the environment, instead of or in addition to removal.

Resource Conservation and Recovery Act (RCRA): A federal law that provides for a "cradle-to-grave" regulatory program for hazardous waste, including a system for managing hazardous waste from its generation to its ultimate disposal.

Resource Management Class: Four classifications of use to describe different degrees of modification of the landscape. Class I are areas where the natural landscape is preserved, including national wilderness area and wild sections of national wild and scenic rivers; Class II are areas with very limited land development activity, resulting in visual contrasts that are seen but do not attract attention; Class III are areas in which development may attract attention, but the natural landscape still dominates; Class IV are areas in which development activities lead to major modification of the existing character of the landscape.

respirable: Able to be inhaled into the lungs.

Richter Scale: A logarithmic scale used to express the total amount of energy released by an earthquake. The scale has 10 divisions, from 1 (not felt by humans) to 10 (nearly total destruction).

risk: The likelihood of suffering a detrimental effect as a result of exposure to a hazard. In accident analysis, a quantitative or qualitative expression of possible loss that takes into account both the probability that an event will cause harm and the consequences of that event.

Record of Decision (ROD): A document separate from but associated with an environmental impact statement that publicly and officially discloses the responsible agency's decision on the EIS alternative to be implemented.

roentgen: A unit of exposure to ionizing X- or gamma radiation equal to or producing one electrostatic unit of charge per cubic centimeter of air. It is approximately equal to one rad.

runoff: The portion of rainfall, melted snow, or irrigation water that flows across the ground surface and eventually enters streams.

Safe Drinking Water Act: A federal law protecting the quality of public water supplies, water supply and distribution systems, and all sources of drinking water.

Safety Evaluation Report (SER): The SER is an NRC document, associated with a proposed action, that focuses on health and safety issues and compliance with NRC regulations. There are two SERs associated with the MOX facility: one for the construction authorization and another for the operating license application.

sanitary waste: Nonhazardous, nonradioactive liquid and solid waste generated by normal housekeeping activities.

saltstone: A cement-like solid waste form that is a blend of cement, *fly-ash*, and *slag* used to immobilize low-radioactivity salt solutions.

savanna: A grassland with widely scattered trees and shrubs.

scoping: The process of inviting public comment on what should be considered prior to preparation of an environmental impact statement. Scoping assists the preparers of an EIS in defining the proposed action, identifying alternatives, and developing preliminary issues to be addressed in an EIS.

scrub-shrub: Woody vegetation that is less than 20 feet tall, including true shrubs, young trees, and trees or shrubs that are small or stunted because of environmental conditions.

secondary contact recreations: Activities having some direct contact with water, but where swallowing of the water is not likely to occur. An example is fishing.

sedges: Perennial nonwoody plants common to most fresh water *wetlands*. They resemble grasses.

sediment: Eroded soil particles that are deposited downhill or downstream by surface runoff.

seismic: Pertaining to any earth vibration, especially that of an earthquake.

seismic zone: An area defined by the Uniform Building Code (1991) on the basis of its susceptibility to damage as the result of earthquakes. The United States is divided into six zones: Zone 0, no damage; Zone 1, minor damage; Zone 2A (Eastern United States), moderate damage; Zone 2B (Western United States), slightly more damage that 2A; Zone 3, major damage; and Zone 4, areas within Zone 3 nearer certain major fault systems.

seismology: The study of earthquakes.

shielding: Any material that is placed between a source of radiation and people, equipment, or other objects in order to absorb the radiation and reduce radiation exposure.

sievert (Sv): A unit of radiation dose used to express a quantity called *equivalent dose*. This relates the absorbed dose in human tissue to the effective biological damage of the radiation by taking into account the kind of radiation received, the total amount absorbed by the body, and the tissues involved. Not all radiation has the same biological effect, even for the same amount of absorbed dose. One sievert is equivalent to 100 *rem*.

silt: A sedimentary material consisting of fine mineral particles intermediate in size between sand and clay.

siltation: The process by which a river, lake, or other water body becomes clogged with sediment. The process of covering or obstructing with silt.

sinter: To form a homogenous mass by heating without melting.

slag: A glass-like material left as a residue by the smelting of metallic ore.

slope factor: An upper bound estimate of a chemical's probability of causing cancer, based on extent of intake and given in units of inverse intake (1/mg/Kg-d).

source term: The estimated quantities of radionuclides or chemical pollutants released to the environment from a source or group of sources.

special nuclear material: As defined in Section 11 of the *Atomic Energy Act*, " (1) plutonium, uranium enriched in the isotope 233 or in the isotope 235, and any other material which the NRC determines to be special nuclear material, or (2) any material artificially enriched by any of the foregoing."

species of concern: A native species that is not listed as endangered or threatened but that has experienced a long-term decline in population or is vulnerable to a significant decline due to low numbers, restricted distribution, dependence on limited habitat resources, or sensitivity to environmental disturbance.

specific activity: The radioactivity of the radionuclide per unit mass of the nuclide. The specific activity of a material in which the radionuclide is essentially uniformly distributed is the radioactivity per unit mass of the material.

specific conductance: Specific conductance is the electrical conductivity of water normalized to a temperature of 25°C. It is a good measure of the concentration of total dissolved solids and salinity in water.

spent (nuclear) fuel: Fuel that has been withdrawn from a nuclear reactor following irradiation and whose constituents have not been separated. Spent fuel has been burned (irradiated) in a reactor to the extent that it no longer makes an efficient contribution to a nuclear chain reaction. This fuel is more radioactive than it was before *irradiation*.

SRS employees: Persons working at the Savannah River Site but not directly involved with the handling of radioactive or hazardous materials at the MOX facility.

stability class: Stability class describes the potential of atmospheric conditions to disperse pollutants. A relatively stable atmosphere contains very little turbulence so that pollutant concentrations remain high. Unstable atmospheric conditions promote vertical mixing and, thus, lower pollutant concentrations. The original Pasquill Stability Classifications consisted of six classes; A, the most unstable, through F, the most stable.

State Historic Preservation Officer (SHPO): The state officer charged with the identification and protection of prehistoric and historic resources in accordance with the *National Historic Preservation Act*.

subsidence: The process of sinking or settling of a land surface due to natural or artificial causes.

sulfur dioxide (SO_2): A compound of sulfur produced by the burning of sulfur-containing compounds and considered to be a major air pollutant. Sulfur dioxide is a *criteria pollutant.*

surface water: Water on the Earth's surface that is directly exposed to the atmosphere, as distinguished from water in the ground (*groundwater*).

temporary emergency exposure limits (TEELs): The TEEL-1 concentration for a chemical is the maximum concentration in air below which it is believed nearly all individuals could be exposed without experiencing other than mild transient adverse health effects or perceiving a clearly defined objectionable odor. The TEEL-2 value is the maximum concentration in air below which it is believed nearly all individuals could be exposed for up to one hour without experiencing or developing irreversible or other serious health effects or symptoms that could impair their abilities to take protective action. The TEEL-3 value is the maximum concentration in air below which it is believed nearly all individuals could be exposed for up to one hour without experiencing or developing life-threatening health effects.

terrestrial: Pertaining to plants or animals living on land rather than in the water.

threatened species: Any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. Requirements for declaring a species threatened are contained in the *Endangered Species Act.*

threshold non-linear relationship: In a threshold nonlinear relationship, some low level of exposure to a harmful substance can be tolerated without causing a health effect. (See also linear/no threshold hypothesis.)

throughput: A general term that refers to the amount of material handled or processed by a facility in a specified time period.

topography: The shape of the earth's surface. The relative position and elevations of natural and man-made features of an area.

total effective dose equivalent (TEDE): The sum of the effective dose equivalent (EDE) from exposure to external radiation and the 50-year committed effective dose equivalent (CEDE) from exposure to internal radiation.

total suspended particulates (TSP): Particles of solid or liquid matter — such as soot, dust, aerosols, fumes, and mist — up to approximately 30 μm in size, that can be suspended in the air. National, South Carolina, and Georgia Ambient Air Quality Standards all set the annual primary (health-based) TSP level at 75 $\mu g/m^3$.

toxicity: The ability of a substance to cause damage to cells or tissues of living organisms when the substance is inhaled, ingested, or absorbed by the skin.

Toxic Substances Control Act (TSCA): A federal law authorizing the U.S. Environmental Protection Agency to secure information on all new and existing chemical substances and to control any of these substances determined to cause unreasonable risk to public health or the environment. This law requires that the health and environmental effects of all new chemicals be reviewed by the EPA before such chemicals are manufactured for commercial purposes.

traditional cultural properties: Places and resources important to traditional American cultures, which include, but are not restricted to, Native American cultures.

TRAGIS (Transportation Routing Analysis Geographic Information System): A GIS-based transportation and analysis computer model for rail, highway, and waterway transportation modes.

transport index: The radiation dose rate at 1 meter (approximately 3 feet) from the lateral sides of a vehicle transporting radioactive material.

transuranic: Of, relating to, or being any element whose atomic number is higher than that of uranium (that is, 92). All transuranic elements are radioactive.

transuranic (TRU) waste: Radioactive waste that contains more than 100 nanocuries per gram of alpha-emitting isotopes with atomic numbers greater than 92 and half-lives greater than 20 years. Such wastes result primarily from fuel reprocessing and from the fabrication of plutonium weapons and plutonium-bearing reactor fuel.

Triassic: The first period of the Mesozoic era, dating from approximately 246 to 213 million years ago.

trichloroethylene (TCE): An organic solvent and degreaser.

tritium: A radioactive isotope of the element hydrogen, having two neutrons and one proton. It can be taken into the body easily because it is chemically identical to natural hydrogen. Tritium decays by beta emission with a half-life of about 12.5 years.

Type A package: A type of packaging for radioactive materials. The package must withstand the conditions of normal transportation without loss or dispersal of the radioactive contents. It does not usually require special handling or transportation equipment.

Type B package: A more durable type of packaging for radioactive materials than Type A. In addition to meeting all the Type A standards, Type B packaging must also provide a high degree of assurance that the package integrity will be maintained, even during severe accidents, with essentially no loss of the radioactive contents.

unscarified seed: Seed that has not had the hard outer coat scuffed or otherwise treated to improve germination.

Upper Cretaceous: A geologic time period from about 90 to 66 million years ago. The entire Cretaceous period dates from approximately 144 million to 66 million years ago; it is known as the age of dinosaurs.

uranium: A heavy, silvery-white metallic element (atomic number 92) with many radioactive isotopes. One isotope, uranium-235, is most commonly used as a fuel for nuclear fission. Another, uranium-238, is transformed into fissionable plutonium-239 following its capture of a neutron in a nuclear reactor.

uranium dioxide (UO_2): A black crystalline powder that is widely used in the manufacture of fuel pellets for nuclear reactors.

valence: The number of electrons with which a given atom generally bonds, or the number of bonds an atom forms.

vehicle-related impacts: Transportation risks (physical trauma or emissions) that are related to the transportation vehicle itself, not the cargo it is carrying.

viewshed: The extent of the area that may be viewed from a particular location. Viewsheds are generally bounded by topographic features such as hills or mountains.

Visual Resource Management (VRM): A process devised by the Bureau of Land Management to assess the aesthetic quality of a landscape and to design proposed activities in a way that would minimize their visual impact on that landscape. The process consists of a rating of site visual quality followed by a measurement of the degree of contrast between the proposed development activities and the existing landscape.

vitrification: A process by which glass is used to encapsulate or immobilize radioactive wastes.

volatile organic compounds (VOCs): A broad range of *organic compounds*, that readily evaporate and vaporize at normal temperatures and pressures. Examples include certain solvents, paint thinners, degreasers (benzene), chloroform, and methyl alcohol. VOCs can react with other substances, principally nitrogen oxides, to form ozone. The reactions are energized by sunlight.

Waste Isolation Pilot Plant (WIPP): A national disposal site for transuranic and mixed transuranic waste, located in southeastern New Mexico.

waste management: The planning, coordination, and direction of functions related to generation, handling, treatment, storage, transportation, and disposal of waste. It also includes associated pollution prevention and surveillance and maintenance activities.

waste minimization: An action that economically avoids or reduces the generation of waste by source reduction and recycling; or reduces the toxicity of hazardous waste, improving energy usage.

waste stream: A waste or group of wastes with similar physical form, radiological properties, EPA waste codes, or associated *Land Disposal Restriction* treatment standards. A waste stream may result from one or more processes or operations. Also, a waste or group of wastes from a process or a facility with similar physical, chemical, or radiological properties.

wastewater: Water originating from human sanitary water use (domestic wastewater) and from a variety of industrial processes (industrial wastewater).

watershed area: All land and water within the confines of a *drainage basin*.

weapons-grade: Plutonium or *highly enriched uranium*, in metallic form, that was manufactured for weapons application. Weapons-grade plutonium contains less that 7% plutonium 240.

wetland: Land areas exhibiting hydric (moist) soil conditions, saturated or inundated soil during some portion of the year, and plant species tolerant of such conditions. Wetlands include swamps, marshes, and bogs.

Wild and Scenic Rivers Act: The federal law that established the National Wild and Scenic Rivers System. It was designed to preserve and protect the free-flowing condition of selected rivers having outstanding natural, cultural, or recreational features. For federally owned land within the boundaries of rivers in the system, certain activities that would have a direct and adverse effect on the river values may be controlled.

wind rose: A circular diagram showing, for a specific location, the percentage of time the wind blows from each compass direction over a specified period of record. A wind rose for use in assessing consequences of airborne releases also shows the frequency of different wind speeds for each compass direction.

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APPENDIX A:

PROTECTED SPECIES

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Sixty-one threatened, endangered, and other special status species listed by the federal government or the State of South Carolina may be found in the vicinity of the Savannah River Site (SRS). Protected species listed by the state for Aiken and Barnwell Counties (within which most of the SRS is located) and by Georgia for the reach of the Savannah River bordering the SRS and for Burke County across the river from the SRS are listed in Table A.1. Table A.1 also lists the status and habitat preferences for the protected species. Species from Allendale County, South Carolina, and Screven County, Georgia, are not considered because of the distance of these counties from the F-Area. No designated critical habitat for threatened or endangered species exists on the SRS (DOE 1996).

The SRS has established a proactive threatened and endangered species program that includes habitat restoration. In particular, special efforts have been enacted since 1986 to reestablish and expand the population of the federally and state-endangered red-cockaded woodpecker (*Picoides borealis*) at the SRS. The SRS has been divided into three natural resource habitat management areas: (1) a 34,858-ha (86,069-acre) red-cockaded woodpecker habitat management area, (2) a 19,508-ha (48,167-acre) supplemental red-cockaded woodpecker habitat management area, and (3) other-use areas totaling 25,965 ha (64,111 acres) (DOE 2000). Within the red-cockaded woodpecker habitat management area, harvest rotation for loblolly and longleaf pine is set at 100 and 200 years, respectively. These long rotation periods are designed to increase the number of potential cavity nesting trees. Rotation for pines within the supplemental red-cockaded woodpecker habitat management and other-use areas is set at 50 years to encourage woodpecker recovery within the designated red-cockaded woodpecker habitat management area. The bottomland hardwood, upland hardwood, and mixed pine/hardwood timber management areas that do not provide red-cockaded woodpecker habitat are managed on 100-year rotations (DOE 2000). No red-cockaded woodpecker management is practiced within the other-use area (Edwards et al. 1999).

A combination of methods has been used to improve the red-cockaded woodpecker population at the SRS. These methods have included removing southern flying squirrels from red-cockaded woodpecker nesting cavities, excavating new nesting cavities, thinning hardwood midstory trees, and augmenting the number of female red-cockaded woodpeckers at the SRS. The excavation of cavities has allowed nesting use in younger tree stands several decades before the birds would be able to do this on their own (Allen 1990a,b). The annual conversion of slash and loblolly pine areas to longleaf pine also provides a long-term benefit to red-cockaded woodpeckers and other wildlife species associated with the longleaf pine savanna ecosystem (DOE 2000).

The endangered status of the red-cockaded woodpecker is primarily related to the loss of mature pine forests in the southeastern states from logging and fire suppression; only about 1%

of the species' historical habitat remains (WSRC 1994; FWS 2001a). They prefer longleaf and loblolly pines that are more than 70 years old, often selecting those trees with red-heart disease, which softens the core of the tree. They forage in pine trees over 30 years old (WSRC 1994; USAF 1996). The woodpeckers also prefer areas with minimal midstory trees, so as to lessen potential competition (e.g., from other woodpecker species) and predation (e.g., black rat snakes) (FWS 2001a). Other species either compete for or use abandoned red-cockaded woodpecker cavity holes, including southern flying squirrels, chickadees, bluebirds, titmice, herpetofauna (amphibians and reptiles) and insects (particularly bees and wasps) (FWS 2001b).

The red-cockaded woodpecker is a social species, living in a family group that inhabits a collection of cavity trees called a cluster. Each bird in the group maintains its own cavity tree, but only one pair in the group actually nests. A cluster may include from 1 up to 20 or more cavity trees on 1.2 to 24.3 ha (3 to 60 acres), averaging about 4.0 ha (10 acres). Territory size is related to both habitat suitability and population density. The typical territory for a family group ranges from about 50.6 to 81.0 ha (125 to 200 acres), but reported extremes are as low as 24.3 ha (60 acres) and as high as 243 ha (600 acres) (FWS 2001a,b).

The SRS contains two subpopulations of the red-cockaded woodpecker. Currently 26 active clusters with almost 150 individual birds occur on the SRS. In 1985, only four birds were reported from the SRS (DOE 2000). The closest nesting area to the proposed facility site is about 5 km (3.1 mi) away (DOE 1999). The proposed area for the facility does not occur within either the red-cockaded woodpecker habitat management area or the supplemental management area. However, all areas containing pines, including those at the proposed site, provide suitable forage areas for this species.

Table A.1. Rare, threatened, and endangered species from Aiken and Barnwell Counties, South Carolina, and Burke County, Georgia

Species common name (scientific name)	Status, federal/state[a,b]	County locations[c]	Habitat
Plants			
Aethusa-like trepocarpus (*Trepocarpus aethusae*)	–/SC	A	Bottomland hardwoods
American eelgrass (*Vallisneria americana*)	–/SC	Ba	Ponds and streams, mostly in the sandhills
American nailwort (*Paronychia americana*)	–/SC	A, Ba	Sandhills, dry pinelands
Awnpetal meadowbeauty (*Rhexia aristosa*)	–/SC	Ba	Wet depressions, Carolina bays, savannas, pinelands
Bearded milkvetch (*Astragalus villosus*)	–/SC	A, Ba	Pinelands, disturbed sites

Table A.1. Continued

Species common name (scientific name)	Status, federal/state[a,b]	County locations[c]	Habitat
Biennial beeblossum (*Gaura biennis*)	–/SC	A, Ba	Streambanks, meadows, roadsides
Bog spicebush (*Lindera subcoriacea*)	–/RC	A, Ba	Evergreen-shrub bogs, acidic swamp forests, and seepage bogs
Boykin's lobelia (*Lobelia boykinii*)	–/SC	Ba	Cypress ponds, wet pinelands, Carolina bays
Canada moonseed (*Menispermum canadense*)	–/SC	Ba	Moist woods and thickets
Candby's cowbane (*Oxypolis canbyi*)	E/E, E	Ba, Bu	Peaty muck of shallow cypress ponds, wet pine savannas, and adjacent sloughs and drainage ditches
Candy's bulrush (*Scirpus etuberculatus*)	–/SC	A	Swamps and quiet or flowing shallow water
Carolina birds-in-a-nest (*Macbridea caroliniana*)	–/SC	A, Ba	Freshwater margins
Carolina bugbane (*Trautvetteria caroliniensis*)	–/SC	Ba	Woods, especially in damp or wet soils
Carolina larkspur (*Delphinium carolinianum*)	–/SC	A	Dry woods, prairies, and sandhills
Carolina wild petunia (*Ruellia caroliniensis* spp. *ciliosa*)	–/SC	A	Moist or dry woods
Collins' sedge (*Carex collinsii*)	–/SC	A	Bogs, especially white cedar swamps
Creeping St. johnswort (*Hypericum adpressum*)	–/RC	Ba	Marshes, shores, and wet meadows
Cypressknee sedge (*Carex decomposita*)	–/SC	Ba	Wooded swamps
Drowned hornedrush (*Rhynchospora inundata*)	–/SC	A, Ba	Inundated pond margins and wet peat
Durand's white oak (*Quercus sinuata*)	–/SC	Ba	Wooded slopes, edges of streams
Dwarf burhead (*Echinodorus parvulus*)	–/SC	A, Ba	Carolina bays
Eared goldenrod (*Solidago auriculata*)	–/SC	A	Fields, roadsides, open woods

Table A.1. Continued

Species common name (scientific name)	Status, federal/state[a,b]	County locations[c]	Habitat
Eastern leatherwood (*Dirca palustris*)	–/SC	A	Rich, moist woods
Eastern wahoo (*Euonymus atropurpurea*)	–/SC	A	Woodlands and thickets, usually on moist, rich soils
Elliott's croton (*Croton elliottii*)	–/SC	A, Ba	Carolina bays
Faded trillium (*Trillium discolor*)	–/SC	A	Moist woods
False rue anemone (*Enemion biternatum*)	–/RC	A	Moist woods
Flax leaf false-foxglove (*Agalinis linifolia*)	–/RC	A	Wet, sandy soils
Florida bladderwort (*Utricularia floridana*)	–/SC	Ba	Shallow ponds, often within Carolina bays
Georgia beargrass (*Nolina georgiana*)	–/SC	A, Ba	Sandhills
Georgia plume (*Elliottia racemosa*)	–/T	Bu	Sand ridges, dry oak ridges, evergreen hammocks, sandstone outcrops
Green fringed orchid (*Platanthera lacera*)	–/SC	A, Ba	Carolina bays, bottomland hardwoods
Ground juniper (*Juniperus communis*)	–/SC	A	Dry, rocky, or otherwise poor soils
Hooded pitcher plant (*Sarracenia minor*)	–/U	Bu	Acidic soils of open bog, wet savannas, pond margins, low areas in pine flatwoods, sphagnum seeps of bottomland forests, sloughs and ditches
Lance-leaf wild-indigo (*Baptisia lanceolata*)	–/SC	Ba	Pine forests, open woods
Least trillium (*Trillium pusillum* var *pusillum*)	–/NC	A	Alluvial or low woods, savannas
Leechbrush (*Nestronia umbellula*)	–/SC, T	A, Ba, Bu	Dry, open, upland forests of mixed hardwood and pines
Long sedge (*Carex folliculata*)	–/SC	A	Wet or swampy woods

Table A.1. Continued

Species common name (scientific name)	Status, federal/state[a,b]	County locations[c]	Habitat
Loose watermilfoil (*Myriophyllum laxum*)	–/RC	A, Ba	Sinkhole ponds and other shallow, freshwater ponds; and sandy, clear streams draining spring-fed swamps
Lowland brittle fern (*Cystopteris protrusa*)	–/SC	A	Moist woods
Muhlenberg maidencane (*Amphicarpum muehlenbergianum*)	–/SC	Ba	Pastures, pinelands, moist margins of woods, disturbed sites
Narrow-leaved trillium (*Trillium lancifolium*)	–/NC	A	Moist woods
Nutmeg hickory (*Carya myristiciformis*)	–/RC	Ba	Bottomland hardwoods
Pickering's morning-glory (*Stylisma pickeringii* var *pickeringii*)	–/SC	A	Scrub habitats with scant litter accumulation, sparse ground cover, and little canopy cover (scrubby oaks and pines)
Piedmont azalea (*Rhododendron flammeum*)	–/SC	A, Ba	Upland hardwood bluffs
Piedmont bladderwort (*Utricularia olivacea*)	–/SC	Ba	Shallow, acidic ponds
Piedmont cucumber tree (*Magnolia cordata*)	–/SC	A	Rich woods
Piedmont mock bishopweed (*Ptilimnium nodosum*)	E/E	A, Ba	Wet savannas and peaty fringes of pineland pools and cypress ponds
Piedmont three-awned grass (*Aristida condensata*)	–/SC	A	Sand pine scrub, sandhills, disturbed sites
Pine-leaved golden aster (*Pityopsis pinifolia*)	–/SC	A	Barrens, sandy soils
Pink ladyslipper (*Cypripedium acaule*)	–/U	Bu	Acid soils of pine woodlands, upland hardwoods with pines
Pyramid magnolia (*Magnolia pyramidata*)	–/RC	A	Low, moist situations
Red standing-cypress (*Ipomopsis rubra*)	–/SC	A, Ba	Pastures, roadsides
Relict trillium (*Trillium reliquum*)	E/E	A	Rich moist woods on bluffs and ravine slopes

Table A.1. Continued

Species common name (scientific name)	Status, federal/state[a,b]	County locations[c]	Habitat
Reticulated nutrush (*Scleria reticularis*)	–/SC	Ba	Damp, sandy soils and pine barrens
Robbins' spikerush (*Eleocharis robbinsii*)	–/SC	A, Ba	Mud or shallow water
Rose coreopsis (*Coreopsis rosea*)	–/RC	A	Wet, often sandy or acid soils, or in shallow water
Sandhill rosemary (*Ceratiola ericoides*)	–/T	Bu	Very dry, openly vegetated, scrub-oak sandhills
Sandhills milkvetch (*Astragalus michauxii*)	–/SC	Ba	Sandhills, open sandy woods
Sarvis holly (*Ilex amelanchier*)	–/SC	A	Woody streambanks in sandhills, wet depressions, Carolina bays
Scarlet beebalm (*Monarda didyma*)	–/SC	Ba	Moist woods and thickets
Shoals spiderlily (*Hymenocallis coronaria*)	–/NC	A	Major streams and rivers in rocky shoals and in cracks of exposed bedrock
Shortleaf sneezeweed (*Helenium brevifolium*)	–/RC	Ba	Swampy or boggy places and moist pine woods
Shortleaf yelloweyed grass (*Xyris brevifolia*)	–/SC	A	Pine flatwoods, pond margins
Silky camellia (*Stewartia malacodendron*)	–/R	Bu	Rich, wooded bluffs and ravine slopes, transitional areas between sandhills and creek swamps
Slender arrowhead (*Sagittaria isoetiformis*)	–/SC	A, Ba	Carolina bays
Small-flowered buckeye (*Aesculus parviflora*)	–/RC	A	Upland hardwood bluffs
Small-flowered silverbell-tree (*Halesia parviflora*)	–/SC	A, Ba	Dry, sandy, upland sites
Smooth coneflower (*Echinacea laevigata*)	E/E	A, Ba	Meadows and open woodlands on basic or near neutral soils
Southeastern sneezeweed (*Helenium pinnatifidium*)	–/SC	Ba	Wet pinelands
Spatulate seedbox (*Ludwigia spathulata*)	–/SC	A, Ba	Wet depressions, pond margins, Carolina bays
Stalkless yellowcress (*Rorippa sessiliflora*)	–/SC	A	Bottomland hardwoods

Table A.1. Continued

Species common name (scientific name)	Status, federal/state[a,b]	County locations[c]	Habitat
Striped garlic (*Allium cuthbertii*)	–/SC	A, Ba	Sandhills, marshes
Sweet pitcher plant (*Sarracenia rubra*)	–/SC, E	A, Bu	Acidic soils in open bogs, sandhill seeps, wet savannas, low areas in pine flatwoods, along sloughs and ditches
Three-angle spikerush (*Eleocharis tricostata*)	–/SC	Ba	Pine barren ponds
Tracy beakrush (*Rhynchospora tracyi*)	–/SC	Ba	Carolina bays
Upland swamp-privet (*Forestiera ligustrina*)	–/SC	A	Sandy or rocky soils
Water toothleaf (*Stillingia aquatica*)	–/SC	Ba	Grass-sedge wet depressions, bogs
White wicky (*Kalmia cuneata*)	–/NC	A	Borders of Carolina bays and bogs; between sandhills and upland swamps
Winter grape fern (*Botrychium lunarioides*)	–/SC	A	Open fields, meadows, sandy or gravelly streambanks
Yellow pipewort (*Syngonanthus flavidulus*)	–/RC	A	Wet pinelands, pond margins
Invertebrates			
Arogos skipper (*Atrytone arogos*)	–/SC	A	Open fields, meadows, prairies
Barrel floater (*Anodonta couperiana*)	–/SC	Ba	Streams, rivers
Carolina slabshell (*Elliptio congaraea*)	T/E	Ba	Streams, rivers
Eastern creekshell (*Villosa delumbis*)	–/SC	Ba	Streams, rivers
Eastern floater (*Pyganodon cataracta*)	–/SC	Ba	Streams, rivers
Paper pondshell (*Utterbackia imbecillis*)	–/SC	Ba	Streams, rivers
Rayed pink fatmucket (*Lampsilis splendida*)	–/SC	Ba	Streams, rivers

Table A.1. Continued

Species common name (scientific name)	Status, federal/state[a,b]	County locations[c]	Habitat
Southern rainbow (*Villosa vibex*)	–/SC	Ba	Streams, rivers
Yellow lampmussel (*Lampsilis cariosa*)	–/SC	Ba	Streams, rivers
Fish			
Robust redhorse (*Moxostoma robustum*)	–/E	Bu	Mainstream river habitats (e.g., Augusta Shoals of Savannah River)
Shortnose sturgeon (*Acipenser brevirostrum*)	E/E, E	A, Bu	Spawns in large coastal rivers; remainder of year spent in lower reaches or river estuary
Amphibians and Reptiles			
American alligator (*Alligator mississippiensis*)	T(S/A)/–	A, Ba	Savannah River Swamp, Par Pond, Beaver Dam Creek, and other streams
Bird-voiced treefrog (*Hyla avivoca*)	–/SC	A, Ba	Wooded swamps along creeks and larger waterways
Black swamp snake (*Seminatrix pygaea*)	–/SC	A	Cypress ponds
Eastern coral snake (*Micrurus fulvius*)	–/SC	A	Well-drained pine woods; open, dry, or sandy areas; pond and lake borders; and hammocks
Eastern tiger salamander (*Ambystoma tigrinum tigrinum*)	–/SC	A	Savannah River Swamp and Carolina bays
Florida green water snake (*Nerodia floridana*)	–/SC	A	Swamps, marshes, and quiet bodies of water
Gopher frog (*Rana capito*)	–/SC	A, Ba	Gopher tortoise burrows during daylight hours
Gopher tortoise (*Gopherus polyphemus*)	–/E, T	A, Bu	Sandy soil and abundant herbaceous vegetation (e.g., longleaf pine savannas); often forced to inhabit roadsides and old fields
Pine (or gopher) snake (*Pituophis melanoleucus*)	–/SC	A	Flat, sandy pine barrens, sandhills, and dry mountain ridges, usually in or near pine woods

Table A.1. Continued

Species common name (scientific name)	Status, federal/state[a,b]	County locations[c]	Habitat
Southern hognose snake (*Heterodon simus*)	–/SC	A	Sandy woods, fields, and groves, dry river floodplains, and hardwood hammocks
Spotted turtle (*Clemmys guttata*)	–/SC, U	A, Ba, Bu	Heavily vegetated, shallow wetlands with standing or slowly flowing water
Birds			
Bachman's sparrow (*Aimophila aestivalis*)	–/R	Bu	Mature open pine woods, regenerating clearcuts, old pastures with dense ground cover of grasses and forbs, palmetto scrub
Bald eagle (*Haliaeetus leucocephalus*)	T/E	A	Active nests in Pen Branch area and area south of Par Pond
Little blue heron (*Egretta caerulea*)	–/SC	A	Freshwater ponds, lakes, and marshes; coastal saltwater wetlands
Red-cockaded woodpecker (*Picoides borealis*)	E/E, E	A, Ba, Bu	Nests in mature pine forests (particularly longleaf); forages in pine forests
Wood stork (*Mycteria americana*)	E/E, E	Ba, Bu	Variety of freshwater and estuarine wetlands for breeding, feeding, and nesting; nests in trees in standing water or on islands
Mammals			
Black bear (*Ursus americanus*)	–/SC	A	Forests and swamps
Eastern fox squirrel (*Sciurus niger*)	–/SC	A, Ba	Pine forests with interspersed clearings
Eastern woodrat (*Neotoma floridana*)	–/SC	A, Ba	Hummocks, swamps, and cabbage palmetto
Hoary bat (*Lasiurus cinereus*)	–/SC	A	Wooded areas
Rafinesque's big-eared bat (*Corynorhinus rafinesquii*)	–/E	A	Roosts in or near mature forests with water nearby; forage among canopies of large trees

Table A.1. Continued

Species common name (scientific name)	Status, federal/state[a,b]	County locations[c]	Habitat
Spotted skunk (*Spilogale putorius*)	–/SC	A	Brushy or sparsely wooded areas, along streams, among boulders, prairies
Star-nosed mole (*Condylura cristata*)	–/SC	A, Ba	Low, wet ground near lakes and streams

[a]E = endangered; T = threatened; T(S/A) = threatened (similarity of appearance); NC = of concern, national (unofficial, plants only); R = rare; RC = of concern, regional (unofficial, plants only); SC = species of concern; U = unusual; – = not listed.

[b]For species listed from both South Carolina and Georgia counties, the status for South Carolina is provided first.

[c]A = Aiken County, South Carolina; Ba = Barnwell County, South Carolina; Bu = Burke County, Georgia.

Sources: Burt and Grossenheider (1976); Conant (1958); DCS (2002); DOE (1991); Fernald (1989); Flora of North America Editorial Committee (1997); Gleason and Cronquist (1991); Harrar and Harrar (1962); Knox and Sharitz (1990); National Geographic Society (1999); Ozier et al. (1999); Patrick et al. (1995); Petrides (1988); SCDNR (2001a,b); USDA (2001); Workman and McLeod (1990); Wunderlin (1982).

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APPENDIX B:

LETTERS OF CONSULTATION[1]

[1] The following letters have been reproduced from the best available copies.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

September 24, 2001

Mr. John Ross, Chief
United Keetowah Band
of Cherokee Indians
PO Box 746
Tahlequah, OK 74465-0746

Dear Mr. Ross:

The U.S. Nuclear Regulatory Commission (NRC) is evaluating the potential impacts associated with the construction, operation, and deactivation of a proposed Mixed Oxide (MOX) Fuel Fabrication Facility (Facility) to be constructed at the Department of Energy's (DOE) Savannah River Site (SRS) in South Carolina. The NRC has regulatory responsibility for approving and licensing the construction and operation of the proposed MOX facility.

On March 7, 2001, pursuant to the National Environmental Policy Act, the NRC issued a Notice of Intent to prepare an Environmental Impact Statement (EIS) for its action (66 FR 13794). The EIS will address the potential environmental effects of manufacturing MOX fuel from surplus weapons plutonium. Public scoping meetings for the MOX Facility EIS were held on April 17 and 18, 2001, in North Augusta, SC and Savannah, GA, respectively, and on May 8, 2001, in Charlotte, NC.

Two maps are enclosed. The first map shows the general location of the proposed MOX Facility and the locations of two potential recipients of the MOX fuel assemblies, the Catawba Nuclear Station and the William B. McGuire Nuclear Station. Transportation corridors between SRS and the two reactor stations have not yet been identified. The second map shows the proposed location of the MOX Facility at SRS.

Argonne National Laboratory (ANL) is assisting the NRC in preparing the MOX Facility EIS and will be evaluating potential impacts to cultural resources as part of their analysis. An archaeologist from ANL is in the process of researching available documents from SRS on archaeological surveys, historic building inventories, and resources of interest to Native Americans.

The proposed project area has been surveyed for archaeological sites. These surveys have identified five archaeological sites (38AK155, 38AK330, 38AK548, 38AK546/547, and 38AK757) in the project vicinity. Only Site 38AK546/547 will likely be affected by the construction of the MOX Facility. This site has been determined to be eligible for listing on the National Register of Historic Places (NRHP), and a data recovery plan is being implemented to mitigate impacts to this site. The possibility of indirect effects to other nearby sites from activities associated with the construction or operation of the facility will be analyzed during preparation of the EIS. Sites 38AK155 and 38AK757 have also been determined eligible for the NRHP and can be avoided during construction and operation of the MOX Facility to mitigate the potential for adverse impacts to these sites. The remaining two sites were determined not

J. Ross 2

eligible. No traditional cultural properties have been identified in the project area to date. Through previous consultations with Native Americans, some interest has been expressed in traditional plant resources that could exist at SRS. However, none of these plant resources is currently known to exist at the MOX Facility construction site.

The NRC is also initiating consultations regarding the proposed project with points of contact (Tribal Historic Preservation Officers or designated representatives) from the following Native American Tribes, Bands, and Nations, as well as with the South Carolina Department of Archives and History.

Catawba Indian Nation
Ma Chis Lower Alabama Creek Indian Tribe
Pee Dee Indian Association
Muscogee Creek Nation
National Council of the Muscogee Creek
Yuchi Tribal Organization, Inc.

We would appreciate receiving information on concerns or issues you may have regarding the proposed project. We are especially interested in your assistance in identifying properties of known religious or cultural significance that may be affected by the construction and operation of the proposed facility. Sensitive information will remain confidential as stipulated under 36 CFR Part 800.11. Please submit comments to me within 30 days. Your time and consideration are greatly appreciated.

In the meantime, if you have any questions or require further clarification regarding the project please call me at (301) 415-7293, or Jennifer Davis at (301) 415-5874.

Sincerely,

Phyllis Sobel for Charlotte Abrams

Charlotte E. Abrams, Section Chief
Environmental and LLW Section
Environmental and Performance
Assessment Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

Docket: 70-3098
Enclosures: Location maps

cc: See attached list

Letter dated September 24, 2001 to:

Gilbert Blue, Chairperson,
Catawba Indian Nation
PO Box 188
Catawba, SC 29704

Virginia Montoya
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Julie Moss
United Keetowah Band
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R. Perry Beaver, Principal Chief
Muscogee Creek Nation
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Okmulgee, OK 74447

Letter dated September 24, 2001

Distribution:

cc: Arthur B. Gould, Jr.
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Mary Birch, P.E., C.H.P.
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John T. Conway, Chairman
Defense Nuclear Facilities Safety Board
625 Indiana Avenue, Suite 700
Washington, DC 20004

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

September 24, 2001

Mr. Roger Banks, Field Supervisor
U.S. Fish and Wildlife Service
Charleston Ecological Services Field Office
176 Croghan Spur Road, Suite 200
Charleston, SC 29404

SUBJECT: INFORMAL CONSULTATION UNDER SECTION 7 OF THE ENDANGERED SPECIES ACT FOR THE MIXED OXIDE FUEL FABRICATION FACILITY

Dear Mr. Banks:

The U.S. Nuclear Regulatory Commission (NRC) published its Notice of Intent (NOI) to prepare an Environmental Impact Statement (EIS) for construction, operation and deactivation of a Mixed Oxide Fuel Fabrication Facility (MOX FFF) in the Federal Register (66 FR 13794) on March 7, 2001 (copy of NOI enclosed). The MOX FFF would be used to manufacture mixed oxide fuel from surplus weapons plutonium.

The proposed MOX FFF would be constructed in F Area at the Department of Energy's (DOE) Savannah River Site (SRS) in Aiken County, South Carolina (see three enclosed figures). The F Area of SRS is within the Savannah River watershed. NRC requests that the U.S. Fish and Wildlife Service provide information regarding federally listed threatened and endangered species (including candidate and proposed species) that may occur on or in the vicinity of F Area at SRS that should be considered in preparing the EIS.

The MOX FFF and associated infrastructure would occupy approximately 6.9 ha of the 16.6 ha project site. The remainder of the site will be landscaped. The F area is an upland plateau that is designated for industrial use. A portion of the MOX FFF project site was previously used to store excavation material from another facility constructed in the F Area. About 68 percent of the MOX FFF site is composed of planted longleaf and slash pine forest. No wetlands occur within the area proposed for the MOX FFF (see enclosed land cover figure), but wetlands associated with Upper Three Runs Creek are adjacent to and downslope of the project site. Operational impacts would be minimized as airborne and aqueous releases would comply with applicable standards and permit requirements. Preliminary analyses presented in the environmental report for the MOX FFF prepared by the applicant DCS (a consortium formed by Duke Engineering & Services, COGEMA, Inc., and Stone and Webster) indicate that the impacts to ecological resources from facility construction and operation would be limited to the immediate project site vicinity.

R. Banks 2

I wish to thank you in advance for the information on the threatened, endangered, candidate, and proposed species that you believe should be addressed in the EIS. Please mail your response to me within 30 days of the date of this letter.

If you have any questions, please contact me at (301) 415-7293, or Jennifer Davis at (301) 415-5874.

Sincerely,

Phyllis Sobel for Charlotte Abrams

Charlotte E. Abrams, Section Chief
Environmental and LLW Section
Environmental and Performance
Assessment Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

Docket: 70-3098

Enclosures: Notice of Intent
F Area Figures
Land Cover Figure

cc: See attached list

R. Banks 3

Letter to Roger Banks, U.S. Fish and Wildlife Service, SC
dated September 24, 2001

cc: Mary Birch, P.E., C.H.P.
Environment, Safety and Health Manager
Duke COGEMA Stone & Webster
PO Box 31847
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1339 Sinkler Road
Columbia, SC 29206

Edna Foster
120 Balsam Lane
Highlands, NC 28741

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

September 24, 2001

Mr. Jon Ambrose, Program Manager
Georgia Department of Natural Resources
Wildlife Resources Division
Nongame Wildlife & Natural Heritage Section
Georgia Natural Heritage Program
2117 US Hwy 278 SE
Social Circle, GA 30025

SUBJECT: STATE LISTED THREATENED, ENDANGERED AND RARE SPECIES IN THE VICINITY OF THE MIXED OXIDE FUEL FABRICATION FACILITY

Dear Mr. Ambrose:

The U.S. Nuclear Regulatory Commission (NRC) published its Notice of Intent (NOI) to prepare an Environmental Impact Statement (EIS) for construction, operation and deactivation of a Mixed Oxide Fuel Fabrication Facility (MOX FFF) in the Federal Register (66 FR 13794) on March 7, 2001 (copy of NOI enclosed). The MOX FFF would be used to manufacture mixed oxide fuel from surplus weapons plutonium.

The proposed MOX FFF would be constructed in F Area at the Department of Energy's (DOE) Savannah River Site (SRS) in Aiken County, South Carolina, (see three enclosed figures). The SRS borders several counties of Georgia (i.e., Burke and Screven Counties) and the F Area is within the Savannah River watershed. NRC requests that the Georgia Department of Natural Resources provide information regarding state listed threatened, endangered, and rare species that may occur on or in these areas that should be considered in preparing the EIS.

The MOX FFF and associated infrastructure would occupy approximately 6.9 ha of the 16.6 ha project site. The remainder of the site will be landscaped. The F area is an upland plateau that is designated for industrial use. A portion of the MOX FFF project site was previously used to store excavation material from another facility constructed in the F Area. About 68 percent of the MOX FFF site is composed of planted longleaf and slash pine forest. No wetlands occur within the area proposed for the MOX FFF (see enclosed land cover figure), but wetlands associated with the Upper Three Runs Creek are adjacent to and downslope of the project site. Operational impacts would be minimized as airborne and aqueous releases would comply with applicable standards and permit requirements. Preliminary analyses presented in the environmental report for the MOX FFF prepared by the applicant DCS (a consortium formed by Duke Engineering & Services, COGEMA, Inc., and Stone and Webster) indicate that the impacts to ecological resources from facility construction and operation would be limited to the immediate project site vicinity.

J. Ambrose 2

I wish to thank you in advance for the information on the threatened, endangered and rare species in Georgia that you believe should be addressed in the EIS. Please mail your response to me within 30 days of the date of this letter.

If you have any questions, please contact me at (301) 415-7293, or Jennifer Davis at (301) 415-5874.

Sincerely,

Phyllis Sobel for Charlotte Abrams

Charlotte E. Abrams, Section Chief
Environmental and LLW Section
Environmental and Performance
Assessment Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

Docket: 70-3098

Enclosures: Notice of Intent
F Area Figures
Land Cover Figure

cc: See attached list

J. Ambrose 3

Letter to Jon Ambrose, Georgia Department of
Natural Resources, dated September 24, 2001

cc: Mary Birch, P.E., C.H.P.
Environment, Safety and Health Manager
Duke COGEMA Stone & Webster
PO Box 31847
Charlotte, NC 28231-1847

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Environmentalists, Inc.
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Edna Foster
120 Balsam Lane
Highlands, NC 28741

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

September 24, 2001

Ms. Julie Holling
South Carolina Department of Natural Resources
Wildlife and Freshwater Fisheries Division
P.O. Box 167
Columbia, SC 29202

SUBJECT: STATE LISTED THREATENED, ENDANGERED AND RARE SPECIES IN THE VICINITY OF THE MIXED OXIDE FUEL FABRICATION FACILITY

Dear Ms Holling:

The U.S. Nuclear Regulatory Commission (NRC) published its Notice of Intent (NOI) to prepare an Environmental Impact Statement (EIS) for construction, operation and deactivation of a Mixed Oxide Fuel Fabrication Facility (MOX FFF) in the Federal Register (66 FR 13794) on March 7, 2001 (copy of NOI enclosed). The MOX FFF would be used to manufacture mixed oxide fuel from surplus weapons plutonium.

The proposed MOX FFF would be constructed in F Area at the Department of Energy's (DOE) Savannah River Site (SRS) in Aiken County, South Carolina, (see three enclosed figures). NRC requests that the South Carolina Department of Natural Resources provide information regarding state listed threatened, endangered, and rare species that may occur on or in the vicinity of F Area at SRS that should be considered in preparing the EIS.

The MOX FFF and associated infrastructure would occupy approximately 6.9 ha of the 16.6 ha project site. The remainder of the site will be landscaped. The F area is an upland plateau that is designated for industrial use. A portion of the MOX FFF project site was previously used to store excavation material from another project site facility constructed in the F Area. About 68 percent of the MOX FFF site is composed of planted longleaf and slash pine forest. No wetlands occur within the area proposed for the MOX FFF (see enclosed land cover figure), but wetlands associated with Upper Three Runs Creek are adjacent to and downslope of the project site. Operational impacts would be minimized as airborne and aqueous releases would comply with applicable standards and permit requirements. Preliminary analyses presented in the environmental report for the MOX FFF prepared by the applicant DCS (a consortium formed by Duke Engineering & Services, COGEMA, Inc., and Stone and Webster) indicate that the impacts to ecological resources from facility construction and operation would be limited to the immediate project site vicinity.

J. Holling 2

I wish to thank you in advance for the information on the threatened, endangered, and rare species in South Carolina that you believe should be addressed in the EIS. Please mail your response to me within 30 days of the date of this letter.

If you have any questions, please contact me at (301) 415-7293, or Jennifer Davis at (301) 415-5874.

Sincerely,

Phyllis Sobel for Charlotte Abrams

Charlotte E. Abrams, Section Chief
Environmental and LLW Section
Environmental and Performance
Assessment Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

Docket: 70-3098

Enclosures: Notice of Intent
F Area Figures
Land Cover Figure

cc: See attached list

J. Holling 3

Letter to Julie Holling, South Carolina Department of Natural Resources, dated September 24, 2001

cc: Mary Birch, P.E., C.H.P.
Environment, Safety and Health Manager
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Enclosures to letter from Abrams not included.

Department of Energy
National Nuclear Security Administration
Washington, DC 20585

September 25, 2001

Dr. Roger Stroup
South Carolina State Historic Preservation Officer
South Carolina Department of Archives and History
8301 Parklane Road
Columbia, South Carolina 29223

Subject: Designation of Department of Energy as Lead Agency for Mitigation at Proposed Location of the Mixed Oxide Fuel Fabrication Facility

Dear Dr. Stroup:

This letter is to notify you that the U.S. Department of Energy (DOE) and the U.S. Nuclear Regulatory Commission (NRC) are designating DOE as the lead federal agency, pursuant to 36 C.F.R. 800.2 (a)(2), for mitigation of potential effects to Register-eligible site 38AK546. That site is located at the proposed location of the Mixed Oxide Fuel Fabrication Facility (MOX FFF) at DOE's Savannah River Site in South Carolina.

In May 2000, your office concurred with DOE's recommendation that archaeological site 38AK546/547 was eligible under Criterion (d), 36 C.F.R. 60.4, for inclusion in the National Register of Historic Places. Following consultation, your office also concurred with the Mitigation Plan for the site. The mitigation field work is expected to begin in October, 2001.

The MOX FFF, which could affect site 38AK546, is being funded by DOE and is part of DOE's program for the disposition of surplus plutonium. The MOX FFF is also subject to NRC licensing. Thus, the MOX FFF constitutes an undertaking by both DOE and NRC pursuant to 36 C.F.R. 800.16 (y) and sections 106 and 301 of the National Historic Preservation Act, 16 U.S.C. 470f and 470w(7).

Because the potential MOX FFF and affected archaeologic site are located at DOE's Savannah River Site, they are also within the purview of DOE's 1990 "Programmatic Memorandum of Agreement Among the Savannah River Operations Office, United States Department of Energy, the South Carolina State Historic Preservation Officer and the Advisory Council on Historic Preservation Concerning the Management of Archaeological Sites on the Savannah River Site, Aiken, Allendale and Barnwell Counties, South Carolina." Under these circumstances, DOE and NRC have determined that it is appropriate to identify DOE as the lead federal agency for mitigation of site 38AK546.

Please be advised that the NRC will analyze archaeologic impacts and related mitigation in its Environmental Impact Statement, pursuant to the National Environmental Policy Act (NEPA), for the proposed licensing of the MOX FFF. As part of the NEPA process, archaeological information has also been submitted to NRC in the Environmental Report prepared by Duke, Cogema, Stone and Webster (DCS), the MOX FFF license applicant under contract with DOE.

The lead agency approach outlined above has been discussed previously with your office by staff from DOE's Savannah River Site. Both agencies agree that any written correspondence from the SHPO to DOE should be sent to NRC as well. If you should have any additional questions regarding the MOX program or the identification of DOE as lead agency, please feel free to contact Mr. James Johnson at (202) 586-5960 for appropriate coordination.

Sincerely,

J. David Nulton, Director
Reactors Group
Office of Fissile Materials Disposition

Charlotte E. Abrams, Section Chief
Environmental and Low Level Waste Section
Division of Waste Management
U.S. Nuclear Regulatory Commission

cc:
Peter Hastings, DCS
Andrew Persinko, NRC
Allison Blackmon, SRS, ODNN
James V. Johnson, DOE, NN-61

OCT 2 4 2002

Mr. Chad Long
South Carolina State Historic Preservation Office
South Carolina Department of Archives and History
8301 Parklane Road
Columbia, SC 29223

Dear Mr. Long:

SUBJECT: Data Recovery Projects 38AK546 and 38AK757 at the Savannah River Site

I am writing to inform you that the Savannah River Archaeological Research Program (SRARP) has completed the data recovery projects conducted at 38AK546 and 38AK757. The excavations were conducted to mitigate impacts caused by construction of the Mixed Oxide Fuel Facility and the Pit Disassembly and Conversion Facility on the Department of Energy's Savannah River Site.

Investigations at 38AK546 were completed on 19 April 2002 and the excavations at 38AK757 ended on 15 September 2002. Exceeding the recommendations in the data recovery plans for each site, a total of 427 square meters was excavated at 38AK546 and 300 square meters were investigated at 38AK757. Except for monitoring ground disturbing activities associated with actual construction of these facilities, all fieldwork outlined in the data recovery plans has been completed. Staff members from the SRARP will monitor the removal of fill on the site areas when construction begins late next year.

Pending environmental documentation requires that DOE-SR have written concurrence from the SC SHPO that our field obligations have been met. At your convenience please send a written concurrence or if you have questions or need addition information before sending that concurrence, then call Dennis Ryan at (803) 725-8162. Thank you for your assistance in this matter.

Sincerely,

Original Signed by
A. B. Gould

A. B. Gould, Director
Environmental Quality
Management Division

EQMD:DR:orc

OE-03-003

bc: EQMD Read File
Dennis Ryan, EQMD
A. M. Blackmon, ODNN
AMEST Read File
A. King, SRARP

South Carolina Archives & History Center
History & Heritage For All Generations

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022345
ORIG/EQMD

November 21, 2002

Mr. A.B. Gould, Director
Environmental Quality
Department of Energy, Savannah River Operations Office
P.O. Box A
Aiken, SC 29802

RE: Data Recovery Projects 38AK546 and 38AK757 at the Savannah River Site

Dear Mr. Gould:

I am writing to inform you that our office concurs with the Department of Energy's determination that field obligations have been met for data recovery investigations at 38AK546 and 38AK757. The excavations exceeded the requirements of the approved data recovery plans. We look forward to reviewing the results.

This letter was written to assist you with your obligations under Section 106 of the National Historic Preservation Act, as amended, and the regulations codified at 36 CFR Part 800. Please contact me at 803-896-6181 if you have any questions or comments regarding this matter.

Sincerely,

Chad C. Long
Staff Archaeologist
State Historic Preservation Office

cc: Mark Brooks

S. C. Department of Archives & History • 8301 Parklane Road • Columbia • South Carolina • 29223-4905 • (803) 896-6100 • www.state.sc.us/scdah

APPENDIX C:

TRANSPORTATION RISK ANALYSIS

APPENDIX C:

TRANSPORTATION RISK ANALYSIS

This appendix provides the detailed methodology, input parameters and assumptions, and results for the transportation risk analysis performed in support of this Mixed Oxide Fuel Fabrication Facility Environmental Impact Statement (MOX EIS). The analysis evaluates transportation of depleted uranium hexafluoride (UF_6) from the Portsmouth Gaseous Diffusion Plant in Portsmouth, Ohio, to the Global Nuclear Fuel-Americas, LLC Fuel Fabrication Facility in Wilmington, North Carolina; transportation of the uranium dioxide (UO_2) conversion product from Wilmington to the proposed MOX facility; transportation of plutonium metal from U.S. Department of Energy (DOE) storage sites; and transportation of the fresh MOX fuel from the proposed MOX facility to a surrogate nuclear power plant site.

C.1 Methodology

C.1.1 Overview

The transportation risk assessment considers human health risks from routine transport (normal, incident-free conditions) of hazardous materials and from potential accidents. In both cases, risks associated with the nature of the cargo itself, or "cargo-related" impacts, and those related to the transportation vehicle (regardless of type of cargo), or "vehicle-related" impacts, are considered.

C.1.1.1 Routine Transportation Risk

The radiological risk associated with routine transportation is cargo-related and results from the potential exposure of people to low levels of external radiation near a loaded shipment. It is assumed that there are no cargo-related risks posed by incident-free transport of hazardous chemicals. No direct chemical exposure to radioactive material will occur during routine transport because, as discussed in Section C.2.2, these materials will be in packages that are designed and maintained to ensure that they will contain and shield their contents during normal transport. Any leakage or unintended release would be considered under accident risks.

Vehicle-related risks during routine transportation are caused by potential exposure to increased vehicular emissions. These emissions include diesel exhaust, tire and brake particulate emissions, and fugitive dust raised from the roadbed by passing vehicles.

C.1.1.2 Accident Transportation Risk

The cargo-related radiological risk from transportation-related accidents lies in the potential release and dispersal of radioactive material into the environment during an accident and the subsequent exposure of people through multiple exposure pathways, such as exposure to contaminated soil, inhalation, or the ingestion of contaminated food. Cargo-related hazardous chemical accident impacts to human health during transportation come from immediate inhalation exposure resulting from container failure and chemical release during an accident.

Vehicle-related accident risks refer to the potential for transportation-related accidents that result in fatalities caused by physical trauma unrelated to the cargo.

C.1.2 Routine Risk Assessment Methodology

The RADTRAN 4 computer code (Neuhauser and Kanipe 1992) was used in the routine and accident cargo-related risk assessments to estimate the radiological impacts to collective populations. RADTRAN 4 was developed by Sandia National Laboratories to calculate population risks associated with the transportation of radioactive materials by truck, rail, air, ship, or barge. The code has been used extensively for transportation risk assessments since it was originally issued in the late 1970s as RADTRAN (RADTRAN 1) and has been reviewed and updated periodically. RADTRAN 1 was originally developed to facilitate the calculations presented in NUREG-0170 (NRC 1977b).

C.1.2.1 Collective Population Risk

The radiological risk associated with routine transportation results from the potential exposure of people to low-level external radiation in the vicinity of loaded shipments. Even under routine transportation, some radiological exposure could occur. Because the radiological consequences (dose) would occur as a direct result of normal operations, the probability of routine consequences is taken to be 1 in the RADTRAN 4 code. Therefore, the dose risk is equivalent to the estimated dose.

For routine transportation, the RADTRAN 4 computer code considers major groups of potentially exposed persons. The RADTRAN 4 calculations of risk for routine highway and rail transportation include exposures of the following population groups:

- *Persons along the Route (Off-Link Population).* Collective doses were calculated for all persons living or working within 0.8 km (0.5 mi) of each side of a transportation route. The total number of persons within the 1.6-km (1-mi) corridor was calculated separately for each route considered in the assessment.

- *Persons Sharing the Route (On-Link Population).* Collective doses were calculated for persons in all vehicles sharing the transportation route. This group includes persons traveling in the same or opposite directions as the shipment, as well as persons in vehicles passing the shipment.

- *Persons at Stops.* Collective doses were calculated for people who might be exposed while a shipment was stopped en route. For truck transportation, these stops include those for refueling, food, and rest.

- *Crew Members.* Collective doses were calculated for truck transportation crew members involved in the actual shipment of material. Workers involved in loading or unloading were not considered. The doses calculated for the first three population groups were added together to yield the collective dose to the public; the dose calculated for the fourth group represents the collective dose to workers.

The RADTRAN 4 calculations for routine dose generically compute the dose rate as a function of distance from a point source (Neuhauser and Kanipe 1995). Associated with the calculation of routine doses for each exposed population group are parameters such as the radiation field strength, the source-receptor distance, the duration of exposure, vehicular speed, stopping time, traffic density, and route characteristics (such as population density). The RADTRAN manual contains derivations of the equations used and descriptions of these parameters (Neuhauser and Kanipe 1995).

C.1.2.2 Maximally Exposed Individual Risk

In addition to the assessment of the routine collective population risk, the risk to a maximally exposed individual (MEI) was estimated. In RADTRAN 4, the MEI is assumed to be located 30 m (100 ft) from the transport route as the radioactive shipment passes by at a speed of 24 km/h (15 mph).

C.1.2.3 Vehicle-Related Risk

Vehicle-related health risks resulting from routine transportation are associated with the generation of air pollutants by transport vehicles during shipment and would be independent of the radioactive or chemical nature of the shipment. The health endpoint assessed under routine transportation conditions was the excess latent mortality from inhalation of vehicular emissions. These emissions consist of particulate matter in the form of diesel engine exhaust, tire and brake particulates, and fugitive dust raised from the roadway by the transport vehicle. Risk factors for pollutant inhalation in terms of latent mortality have been used in this analysis. Vehicle-related risks from routine transportation were calculated for each shipment by multiplying the total distance traveled by the appropriate risk factor.

C.1.3 Accident Assessment Methodology

As stated above, the radiological transportation accident risk assessment also uses the RADTRAN 4 code for estimating collective population risks. The hazardous chemical transportation accident risk assessment relies on the HGSYSTEM model (Post 1994a,b; Hanna et al. 1994). The model is a widely applied code recognized by the U.S. Environmental Agency (EPA) for use in chemical accident consequence predictions. The FIREPLUME model (Brown et al. 1997) was used to supplement the HGSYSTEM model in the analysis of fire scenarios involving depleted uranium releases. The HGSYSTEM and FIREPLUME models were used previously in assessing the hazardous chemical transportation impacts from transportation of depleted uranium materials (Biwer et al. 1997).

The risk analysis for potential accidents differs fundamentally from the risk analysis for routine transportation because occurrences of accidents are statistical in nature. The accident risk assessment is treated probabilistically in RADTRAN 4 for radiological risk and in the HGSYSTEM approach used to estimate the hazardous chemical component of risk. Accident risk is defined as the product of the accident consequence (dose or exposure) and the probability of the accident's occurring. In this respect, RADTRAN 4 and the HGSYSTEM approach both estimate the collective accident risk to populations by considering a spectrum of transportation-related accidents. The spectrum of accidents was designed to encompass a range of possible accidents, including low-probability accidents that have high consequences, and high-probability accidents that have low consequences (such as "fender benders"). For radiological risk, the results for collective accident risk can be directly compared with the results for routine collective risk because the latter results implicitly incorporate a probability of occurrence of 1 if the shipment takes place. Such is not the case for chemical materials, because routine transport would pose no exposure risk.

C.1.3.1 Radiological Accident Risk Assessment

The RADTRAN 4 calculation of collective accident risk uses models that quantify the range of potential accident severities and the responses of transported packages to accidents. The spectrum of accident severity is divided into several categories, each of which is assigned a conditional probability of occurrence — that is, the probability that if an accident does occur, it will be of a particular severity. Release fractions, defined as the fraction of the material in a package that could be released in an accident, are assigned to each accident severity category on the basis of the physical and chemical form of the material. The model takes into account the mode of transportation and the type of packaging through selection of the appropriate accident probabilities and release fractions, respectively. The accident rates, the definition of accident severity categories, and the release fractions used in this analysis are discussed further in Sections C.2 and C.3.

For accidents involving the release of radioactive material, RADTRAN 4 assumes that the material is dispersed in the environment according to standard Gaussian diffusion models. For the risk assessment, default data for atmospheric dispersion were used, representing an instantaneous ground-level release and a small-diameter source cloud (Neuhauser and Kanipe

1995). The calculation of the collective population dose following the release and dispersal of radioactive material includes the following exposure pathways:

- External exposure to the passing radioactive cloud,
- External exposure to contaminated ground,
- Internal exposure from inhalation of airborne contaminants, and
- Internal exposure from the ingestion of contaminated food.

For the ingestion pathway, state-average food transfer factors, which relate the amount of radioactive material ingested to the amount deposited on the ground, were calculated in accordance with the methods described by U.S. Nuclear Regulatory Commission (NRC) Regulatory Guide 1.109 (NRC 1977a) and were used as input to the RADTRAN code. Doses of radiation from the ingestion or inhalation of radionuclides were calculated by applying standard dose conversion factors (DOE 1988a,b).

C.1.3.2 Chemical Accident Risk Assessment

The risks from exposure to hazardous chemicals during transportation-related accidents can be either acute (resulting in immediate injury or fatality) or latent (resulting in cancer that would present itself after a latency period of several years). The acute health endpoint, potential irreversible adverse effects, was evaluated for the assessment of cargo-related population impacts from transportation accidents. Accidental releases during transport of the uranium compounds (UF_6 and UO_2) were evaluated quantitatively.

The acute effects evaluated were assumed to exhibit a threshold nonlinear relationship with exposure; that is, some low level of exposure can be tolerated without inducing a health effect. To estimate risks, chemical-specific concentrations were developed for potential irreversible adverse effects. All individuals exposed at these levels or higher following an accident were included in the transportation risk estimates. In addition to acute health effects, the cargo-related risk of excess cases of latent cancer from accidental chemical exposures could be evaluated. However, none of the chemicals that might be released in any of the accidents would be carcinogenic. As a result, no predictions for excess latent cancers from accidental chemical releases are presented in this report.

The primary exposure route of concern with respect to accidental release of hazardous chemicals would be inhalation. Although direct exposure to hazardous chemicals via other pathways, such as ingestion or absorption through the skin (dermal absorption), would also be possible, these routes would be expected to result in much lower exposure than the inhalation pathway doses for the uranium compounds. The likelihood of acute effects would be much less for the ingestion and dermal pathways than for inhalation.

The HGSYSTEM model (Version 3.0) (Hanna et al. 1994) has a built-in source-term algorithm that is used to compute the rate, quantity, and type of atmospheric release of a hazardous air pollutant, including pool evaporation from a spill of a volatile organic liquid. The model can be used to evaluate frequently encountered accidental releases from ruptured tanks, drums, and pipes. The model incorporates a chemical data library of physical and chemical properties (such as vapor pressure, boiling point, and molecular weight) for 30 compounds. Physical properties of the chemical released, along with container content input, such as the container geometry and rupture characteristics (e.g., hole size), are used by HGSYSTEM to compute chemical release rate and duration. The risk assessment for hazardous chemicals assumed that particulate releases would be of short duration as liquid and solid (as respirable fraction) aerosols.

The approach for hazardous chemicals incorporates the same accident severity categories and release fractions used by RADTRAN 4 for radiological accidents. The risks associated with the consequences estimated with the HGSYSTEM code were computed separately with a risk quantification spreadsheet program.

C.1.3.3 Vehicle-Related Accident Risk Assessment

The vehicle-related accident risk refers to the potential for transportation accidents that could result directly in fatalities not related to the nature of the cargo in the shipment. This risk represents fatalities from physical trauma. State-average rates for transportation fatalities are used in the assessment. Vehicle-related accident risks are calculated by multiplying the total distance traveled by the rates for transportation fatalities. In all cases, the vehicle-related accident risks are calculated on the basis of distances for round-trip shipment since the presence or absence of cargo would not be a factor in accident frequency.

C.2 Input Parameters and Assumptions

The principal input parameters and assumptions used in the transportation risk assessment are discussed in this section. Where appropriate, applicable government regulations are referenced. Transportation of hazardous chemical and radioactive materials is governed by U.S. Department of Transportation (DOT), NRC, and EPA regulations, and by the Hazardous Materials Transportation Act. These regulations may be found in the *Code of Federal Regulations* (CFR) at 49 CFR Parts 171-178, 49 CFR Parts 383-397, 10 CFR Part 71, and 40 CFR Parts 262 and 265, respectively. State organizations are also involved in regulating such transport within their borders. All transportation-related activities must be in accordance with applicable regulations of these agencies. However, the DOT and NRC have primary regulatory responsibility for shipment of radioactive materials. Those regulations most pertinent to this risk assessment can be found in 49 CFR 173 (*Shippers—General Requirements for Shipments and Packagings*), 49 CFR 397 (*Transportation of Hazardous Materials; Driving and Parking Rules*), and 10 CFR 71 (*Packaging and Transportation of Radioactive Material*).

C.2.1 Route Characteristics

The transportation route selected for a shipment determines the total potentially exposed population and the expected frequency of transportation-related accidents. For truck transportation, the route characteristics most important to the risk assessment include the total shipping distance between each origin-and-destination pair of sites and the population density along the route.

C.2.1.1 Route Selection

The DOT routing regulations concerning radioactive materials on public highways are prescribed in 49 CFR 397.101(*Requirements for Motor Carriers and Drivers*). The objectives of the regulations are to reduce the impacts of transporting radioactive materials, to establish consistent and uniform requirements for route selection, and to identify the role of state and local governments in routing radioactive materials. The regulations attempt to reduce potential hazards by prescribing that populous areas be avoided and that travel times be minimized. In addition, the regulations require that the carrier of radioactive materials ensure that the vehicle is operated on routes that minimize radiological risks, and that accident rates, transit times, population density and activity, time of day, and day of week are considered in determining risk. However, the final determination of the route is left to the discretion of the carrier, such as for shipments of depleted UF_6 and UO_2, unless the shipment contains a "highway route controlled quantity" (HRCQ) of radioactive material as defined in 49 CFR 173.403 (*Definitions*), such as the plutonium metal or the MOX fuel.

A vehicle transporting an HRCQ of radioactive materials is required to use the interstate highway system except when moving from origin to interstate or from interstate to destination, when making necessary repair or rest stops, or when emergency conditions make continued use of the interstate unsafe or impossible. Carriers are required to use interstate circumferential or bypass routes, if available, to avoid populous areas. Any state or Native American tribe may designate other "preferred highways" to replace or supplement the interstate system. Under its authority to regulate interstate transportation safety, the DOT can prohibit state and local bans and restrictions as "undue restraint of interstate commerce." State or local bans can be preempted if inconsistent with the HRCQ regulations. Shipments of TRU waste will follow designated Waste Isolation Pilot Plant (WIPP) routes to the WIPP repository.

For this analysis, representative shipment routes were identified using the WebTRAGIS (Version 1.10) routing model (Johnson and Michelhaugh 2000) for the truck shipments. The routes were selected to be reasonable and consistent with routing regulations and general practice, but they are considered only representative because the actual routes used would be chosen in the future and are often determined by the shipper. At the time of shipment, route selection would reflect current road conditions, including road repairs and traffic congestion.

The HIGHWAY data network in WebTRAGIS is a computerized road atlas that includes a complete description of the interstate highway system and of all U.S. highways. In addition, most principal state highways and many local and community highways are identified. The code is periodically updated to reflect current road conditions and has been compared with reported mileages and observations of commercial trucking firms.

Routes are calculated within the model by minimizing the total impedance between origin and destination. The impedance is basically defined as a function of distance and driving time along a particular segment of highway. The population densities along a route are derived from 2000 census data from the U.S. Bureau of the Census.

The WebTRAGIS database version used was Highway Data Network 2.1. Summary route information on the truck routes used in the analysis is provided in Table C.1.

C.2.1.2 Population Density

Three population density zones — rural, suburban, and urban — were used for the population risk assessment. The fractions of travel and average population density in each zone were determined with the WebTRAGIS routing model. Rural, suburban, and urban areas are characterized according to the following breakdown: rural population densities range from 0 to 54 persons/km^2 (0 to 139 persons/mi^2); suburban densities range from 55 to 1,284 persons/km^2 (140 to 3,326 persons/mi^2); and urban covers all population densities greater than 1,284 persons/km^2 (3,326 persons/mi^2). Use of these three population density zones is based on an aggregation of the 11 population density zones provided in the WebTRAGIS model output. For calculation purposes, information about population density was generated at the state level and used as RADTRAN input for all routes. Route average population densities and other route characteristics are given in Table C.1.

C.2.1.3 Accident and Fatality Rates

For calculating accident risks, vehicle accident involvement and fatality rates are taken from data provided in Saricks and Tompkins (1999). For each transport mode, accident rates are generically defined as the number of accident involvements (or fatalities) in a given year per unit of travel by that mode in the same year. Therefore, the rate is a fractional value — the accident-involvement count is the numerator, and vehicular activity (total traveled distance) is the denominator. Accident rates are derived from multiple-year averages that automatically account for such factors as heavy traffic and adverse weather conditions. For assessment purposes, the total number of expected accidents or fatalities is calculated by multiplying the total shipping distance for a specific case by the appropriate accident or fatality rate.

For truck transportation, the rates presented in Saricks and Tompkins (1999) are specifically for heavy combination trucks involved in interstate commerce. Heavy combination trucks are rigs composed of a separable tractor unit containing the engine and one to three freight trailers connected to each other and the tractor. Heavy combination trucks are typically used for shipping radioactive wastes. Truck accident rates are computed for each state on the basis of

Table C.1. Summary route data

Route		Total distance [km (mi)]	Fraction of travel			Average population density [persons/km^2 (persons/mi^2)]		
Origin	Destination		Rural	Suburban	Urban	Rural	Suburban	Urban
Portsmouth, OH	Wilmington, NC	936 (581)	55.5	40.7	3.9	18.5 (47.8)	366.7 (949.8)	2,155 (5,582)
Wilmington, NC	PDCF	443 (275)	60.1	37.5	2.4	15.7 (40.7)	353.1 (914.6)	2,140 (5,543)
Pantex	PDCF	2,179 (1,354)	67.8	28.5	3.7	13.4 (34.6)	332.4 (861.0)	2,271 (5,882)
Hanford Site	PDCF	4,434 (2,755)	76.7	20.9	2.3	11.3 (29.2)	320.5 (830.1)	2,244 (5,811)
Proposed MOX facility	WIPP	2,442 (1,518)	70.7	26.7	2.6	13.2 (34.2)	315.6 (817.4)	2,173 (5,627)
Proposed MOX facility	Surrogate Nuclear Power Plant	2,147 (1,334)	57.1	37.4	5.5	18.5 (47.8)	342.1 (886.1)	2,366 (6,128)

statistics compiled by the DOT Office of Motor Carriers for 1994 to 1996. Saricks and Tompkins (1999) present accident involvement and fatality counts, estimated kilometers of travel by state, and the corresponding average accident involvement and fatality rates for the 3 years investigated. Fatalities (including of crew members) are deaths that are attributable to the accident and that occurred within 30 days of the accident.

The truck accident assessment presented in this EIS uses accident (fatality) rates for travel on interstate highways. The total accident risk for a case depends on the total distance traveled in various states and does not rely on national average accident statistics. However, for comparative purposes, the national average truck accident rate on interstate highways presented in Saricks and Tompkins (1999) is 3.15×10^{-7} accidents/truck-km (5.07×10^{-7} accidents/mi).

Note that the accident rates used in this assessment were computed using all interstate shipments, regardless of the cargo. Saricks and Kvitek (1994) point out that shippers and carriers of radioactive material generally have a higher-than-average awareness of transportation risk and prepare cargoes and drivers for such shipments accordingly. This preparation should have the twofold effect of reducing component and equipment failure and mitigating the contribution of human error to accident causation. However, these mitigating effects were not considered in the accident assessment.

C.2.2 Packaging

Shipment packaging for radioactive materials must be designed, constructed, and maintained to ensure that it will contain and shield the contents during normal transportation. For more highly radioactive material, the packaging must contain and shield the contents in severe accidents. The type of packaging used is determined by the radioactive hazard associated with the packaged material. The basic types of packaging required by the applicable regulations are designated as Type A, Type B, or industrial packaging (generally for low-specific-activity [LSA] material).

C.2.2.1 Depleted UF_6 and UO_2 Packaging

Depleted UF_6 and UO_2 shipments would use Type A and industrial packaging, respectively. These types of packaging must withstand the conditions of normal transportation without the loss or dispersal of the radioactive contents. "Normal" transportation refers to all transportation conditions except those resulting from accidents or sabotage. Approval of Type A packaging is obtained by demonstrating that the packaging can withstand specified testing conditions intended to simulate normal transportation. Type A packaging usually does not require special handling, packaging, or transportation equipment. The depleted UF_6 would be shipped in Model 30B cylinders (USEC 1999) with overpacks, and the depleted UO_2 would be shipped in 55-gal drums.

C.2.2.2 Plutonium Metal, MOX Fuel, and TRU Waste

The plutonium metal, MOX fuel, and TRU waste would be shipped in Type B packaging. In addition to meeting all the Type A standards, Type B packaging must also provide a high degree of assurance that the package integrity will be maintained even during severe accidents, with essentially no loss of the radioactive contents or serious impairment of the shielding capability. Type B packaging is required for shipping large quantities of radioactive material and must satisfy stringent testing criteria (as specified in 10 CFR 71). The testing criteria were developed to simulate conditions of severe hypothetical accidents, including impact, puncture, fire, and immersion in water. The most widely recognized Type B packagings are the massive casks used to transport highly radioactive spent nuclear fuel from nuclear power stations. Large-capacity cranes and mechanical lifting equipment are usually necessary for handling Type B packagings. Many Type B packagings are transported on trailers specifically designed for that purpose.

Plutonium metal as pits is expected to be shipped in DOE-approved FL containers, while piece parts might be shipped in DOE-approved USA/9975 containers (DOE 1999b). TRU waste would be transported to the WIPP in Type B containers referred to as the Transuranic Package Transporter-II (TRUPACT-II).

The MOX fresh fuel package is a Type B cylindrical container designed to carry three MOX fuel assemblies. MOX fuel does not require specific shielding material, and the containment shell provides a single containment boundary in accordance with 10 CFR 71.63(b)(1). The current design (DCS 2001b) specifies 4.46 m (175 in.) as the overall package length without the impact limiters. The impact limiters themselves are of a conventional polyurethane filled design and have an outer diameter of 1.5 m (60 in.). The outer diameter of the package containment shell is 0.74 m (29 in.). The package is designed to accommodate 3,200 kg (7,100 lb) of payload, including internal supports and the fuel assemblies. The package gross weight is 6,580 kg (14,500 lb).

C.2.3 Shipment Configurations and Number of Shipments

The anticipated shipment information for the proposed action is summarized in Table C.2. Table C.3 lists the radionuclide inventory for each shipment type. Depleted UF_6 shipments would consist of five overpacked 30B cylinders per truck, as depicted in Figure C.1. Each cylinder would contain about 2,277 kg (5,020 lb) of depleted UF_6. Depleted UO_2 shipments would consist of 24 55-gal drums in a commercial covered tractor trailer. Each drum would contain approximately 667 kg (1,470 lb) of depleted UO_2. For this analysis, sufficient quantities of UF_6 and UO_2 were assumed to be shipped so that a total of 34 MT(37.5 tons) of plutonium could be fabricated into MOX fuel assemblies for irradiation as reactor fuel (DCS 2002a). Thus, a total of 110 shipments of depleted UF_6 and 60 shipments of depleted UO_2 would be required.

As discussed in Section 4.4.1.1, it was assumed that 26.7 MT (29.4 tons) of plutonium would require transportation to the PDCF from Pantex and Hanford. On the basis of the information

Table C.2. Shipment information

Origin	Destination	Material	Package type	Amount per package [kg (lb)]	Packages per shipment	Number of shipments
Portsmouth, OH	Wilmington, NC	UF_6	30B cylinder	2,277 (5,020)	5	110
Wilmington, NC	MOX facility	UO_2	30-gal drum	667 (1,470)	24	60
Pantex	PDCF	Pu metal	Type B	62.3 (137)[a]	NA[b]	343
Hanford	PDCF	Pu metal	Type B	62.3 (137)[a]	NA	87
MOX facility	Surrogate nuclear power plant	MOX fuel	Type B	3 assemblies	1	598
WSB	WIPP	TRU waste	TRUPACT-II	2,590 (5,700)[a]	3	299–2,314

[a]Estimated amount per shipment.

[b]Not available, dependent on actual container used.

Table C.3. Single-shipment radionuclide inventories (Ci)[a]

					TRU Waste[c,d]	
Isotopes	UF_6	UO_2	Pu metal	MOX fuel[b]	Volume Reduction	No Volume Reduction
U-234	0.474	0.868	NA[e]	NA	0.0231	0.00299
U-235	0.0445	0.0752	NA	0.00706	0.000530	6.87×10^{-5}
U-238	2.57	4.74	NA	0.438	5.43×10^{-6}	7.04×10^{-7}
Th-234	2.57	4.74	NA	NA	NA	NA
Pa-234m	2.57	4.74	NA	NA	NA	NA
Pu-236	NA	NA	NA	2.22	NA	NA
Pu-238	NA	NA	836	429	0.0822	0.0107
Pu-239	NA	NA	7,070	4,860	0.567	0.0735
Pu-240	NA	NA	1,730	1,080	0.110	0.0142
Pu-241	NA	NA	129,000	43,000	9.88	1.28
Pu-242	NA	NA	0.494	0.0956	3.76×10^{-5}	4.87×10^{-6}
Am-241	NA	NA	3,820	NA	3,650	474

[a]To convert from Ci to Bq, multiply by 3.7×10^{10}.

[b]Source: DCS (2001b).

[c]Source: DCS (2002b).

[d]Source: DCS (2004).

[e]NA = not applicable.

Figure C.1. Trailer carrying five UF_6 cylinders in overpacks (Photo courtesy of United States Enrichment Corporation [USEC 1999]).

presented in Didlake (1998), approximately 62.3 kg (137 lb) of plutonium would be in each shipment. The plutonium would be packaged in a suitable Type B container and shipped via the Safeguards Transporter (SGT) discussed later in this section.

Approximately 1,748 MOX fuel assemblies would be shipped to commercial reactor sites. Transport of the MOX fuel would be by SGT, one MOX fuel package per shipment. Figure C.2 shows a representative shipment configuration. With three assemblies per shipping cask, 598 shipments would be expected between the years 2007 and 2021 (DCS 2002a).

The SGT is a specially designed component of a tractor-trailer vehicle and is used by the Office of Secure Transportation of the DOE Albuquerque National Nuclear Security Administration (NNSA) Service Center for the transport of special nuclear materials, such as plutonium. Since 1975, more than 151 million km (94 million mi) of travel transporting DOE-owned cargo has been accumulated without an accident involving a fatality or a release of radioactive material. Although details of vehicle enhancements and some operational aspects are classified, key characteristics are as follows (DOE 1999b):

- Enhanced structural characteristics and a highly reliable tie-down system to protect the cargo from impact;
- Heightened thermal resistance to protect the cargo in case of fire;
- Established operational and emergency plans and procedures governing the shipment of nuclear materials;
- Couriers who are armed federal officers and who have received vigorous specialized training;
- An armored tractor component that provides courier protection against attack and contains advanced communications equipment;

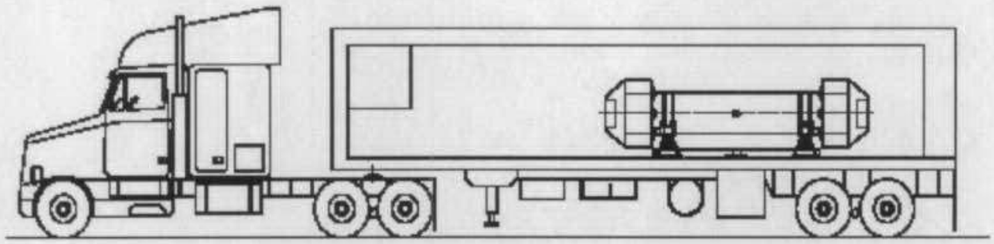

Figure C.2. MOX fresh fuel package loaded in SGT.

- Specially designed escort vehicles containing advanced communications and additional couriers;
- 24-hour-a-day, real-time communications to monitor the location and status of all SGT shipments; and
- Significantly more stringent maintenance standards than those for commercial transport equipment.

TRU waste was assumed to be fixed in cement, placed in standard waste boxes (SWBs), and shipped in TRUPACT-II containers from the WSB to the WIPP for disposal (DCS 2002b; 2004). Each TRUPACT-II contained 2 SWBs, and each truck shipment consisted of 3 TRUPACT-II containers. The number of TRU waste shipments could range from about 23 to 178 shipments per year (DCS 2004). The upper end of the range assumes that no volume reduction of the waste occurs, but the annual throughput in either case contains the same amount of americium. Thus, the total number of shipments over the 13-year operational life of the WSB would range from 299 to 2,314.

C.2.4 Accident Characteristics

Assessment of transportation accident risk takes into account the fraction of material in a package that would be released or spilled to the environment during an accident, commonly referred to as the release fraction. The release fraction is a function of the severity of the accident and the material packaging. For instance, a low-impact accident, such as a "fender-bender," would not be expected to cause any release of material. Conversely, a very severe accident would be expected to release nearly all of the material in a shipment into the environment. The method used to characterize accident severities and the corresponding release fractions for estimating both radioactive and chemical risks are described below.

C.2.4.1 Accident Severity Categories

A method to characterize the potential severity of transportation-related accidents has been described in the NRC NUREG-0170 report, *Final Environmental Statement on the*

Transportation of Radioactive Material by Air and Other Modes (NRC 1977b). The NRC method divides the spectrum of transportation accident severities into eight categories. Other studies have divided the same accident spectrum into six categories (Wilmot 1981), 20 categories (Fischer et al. 1987), or more (Sprung et al. 2000); however, these latter studies focused primarily on accidents involving shipments of spent nuclear fuel (SNF). In this analysis, the NUREG-0170 scheme was used for all shipments.

The NUREG-0170 scheme for accident classification is shown in Figure C.3 for truck transportation. Severity is described as a function of the magnitudes of the mechanical forces (impact) and thermal forces (fire) to which a package may be subjected during an accident. Because all accidents can be described in these terms, severity is independent of the specific accident sequence. In other words, any sequence of events that results in an accident in which a package is subjected to forces within a certain range of values is assigned to the accident severity category associated with that range. The scheme for accident severity is designed to take into account all credible transportation-related accidents, including those accidents with low probability but high consequences and those with high probability but low consequences.

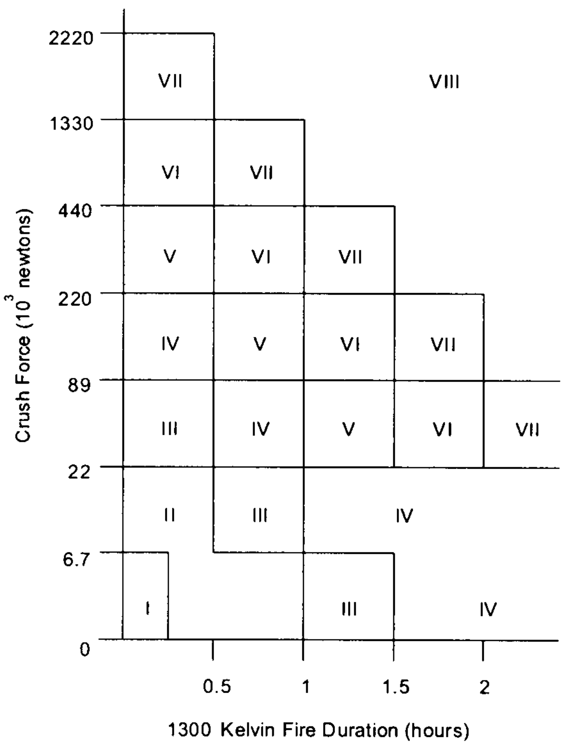

Figure C.3. Scheme for NUREG-0170 classification by accident severity category for truck accidents (*Source*: NRC 1977b).

Each severity category represents a set of accident scenarios defined by a combination of mechanical and thermal forces. A conditional probability of occurrence — that is, the probability that if an accident occurs, it is of a particular severity — is assigned to each category. The fractional occurrences for accidents by accident severity category and population density zone are shown in Table C.4 and are used for estimating both radioactive and chemical risks.

Category I accidents are the least severe but the most frequent; Category VIII accidents are very severe but very infrequent. To determine the expected frequency of an accident of a given severity, the conditional probability in the category is multiplied by the baseline accident rate. Each population density zone has a distinct distribution of accident severities related to differences in average vehicular velocity, traffic density, location (rural, suburban, or urban), and other factors.

C.2.4.2 Package Release Fractions

In NUREG-0170, radiological and chemical consequences are calculated by assigning package release fractions to each accident severity category. The release fraction is defined as the fraction of the material in a package that could be released from the package as the result of an accident of a given severity. Release fractions take into account all mechanisms necessary to create release of material from a damaged package to the environment. Release fractions vary according to the type of package and the physical form of the material.

Representative release fractions for accidents involving depleted UF_6 and UO_2 shipments were taken from NUREG-0170 (NRC 1977b). The recommendations in NUREG-0170 are based on best engineering judgments and have been shown to provide conservative estimates of

Table C.4. Fractional occurrences for truck accidents by severity category and population density zone

Severity category	Fractional occurrence	Fractional occurrence by population density zone		
		Rural	Suburban	Urban
Truck				
I	0.55	0.1	0.1	0.8
II	0.36	0.1	0.1	0.8
III	0.07	0.3	0.4	0.3
IV	0.016	0.3	0.4	0.3
V	0.0028	0.5	0.3	0.2
VI	0.0011	0.7	0.2	0.1
VII	8.5×10^{-5}	0.8	0.1	0.1
VIII	1.5×10^{-5}	0.9	0.05	0.05

Source: NRC (1977b).

material releases following accidents. The release fractions used are those reported in NUREG-0170 for both low-specific-activity (LSA) drums and NRC Type A packages. Release fractions for accidents of each severity category are given in Table C.5. As shown in that table, the amount of material released from the package ranges from zero for minor accidents to 100% for the most severe accidents. As shown in Table C.5, representative release fractions for accidents involving fresh MOX fuel were assumed to be the same as those developed for SNF in the NRC's study (Fischer et al. 1987), commonly referred to as the Modal Study, on the behavior of SNF in Type B containers under accident conditions. These values were derived on the basis of best engineering judgments. These values are expected to be conservative when applied to fresh MOX fuel because the fuel has not yet become embrittled through use.

Also important for the purposes of risk assessment are the fraction of the released material that can be entrained in an aerosol (part of an airborne contaminant plume) and the fraction of the aerosolized material that is also respirable (of a size that can be inhaled into the lungs). These fractions depend on the physical form of the material. Most solid materials are difficult to release in particulate form and are, therefore, relatively nondispersible. Conversely, liquid or gaseous materials are relatively easy to release if the container is breached in an accident.

Table C.5. Estimated release fractions for Type A and Type B packages under various accident severity categories

	Release fraction[a]			
	NUREG-0170			
Severity category	Type A[b]	Type B[c]	Type B[d]	TRUPACT-II[e]
I	0	0	0	0
II	0.01	0	6×10^{-8}	0
III	0.1	0.01	2×10^{-7}	8×10^{-9}
IV	1	0.1	2×10^{-6}	2×10^{-7}
V	1	1	2×10^{-6}	8×10^{-5}
VI	1	1	2×10^{-5}	2×10^{-4}
VII	1	1	2×10^{-5}	2×10^{-4}
VIII	1	1	2×10^{-5}	2×10^{-4}

[a]Values are for total material release fraction (the fraction of material in a package released to the environment during an accident).

[b]*Source:* NRC (1977b), used for depleted UF_6 and UO_2 shipments.

[c]*Source:* NRC (1977b), used for Pu metal shipments.

[d]*Source:* Fischer et al. (1987), used for fresh MOX fuel shipments.

[e]*Source:* DOE (1997). Aerosolized and respirable fractions are both assumed to equal 1.0.

The aerosolized fraction for the UF_6 was taken to be 0.01 except in the case of higher severity accidents (Categories VI through VIII) involving fire, for which it was taken to be 0.33 (Policastro et al. 1997). The respirable fraction was taken to be 1 for all accidents. For UO_2, which was assumed to behave as a loose powder, the aerosolized fraction was set to 0.1, with a respirable fraction of 0.05 (Biwer et al. 1997). The aerosolized fraction and the respirable fraction were taken to be 1×10^{-6} and 0.05, respectively, for the Pu metal expected to behave as immobile material (Neuhauser and Kanipe 1992). For the MOX fuel, the aerosolized fraction was taken to be 1, and the respirable fraction taken to be 0.05 in accordance with spent fuel particulates as derived from NUREG-0170 in Neuhauser and Kanipe (1992). Release fractions used for the TRU waste shipments are given separately in Table C.5.

C.2.4.3 Atmospheric Conditions during Accidents

Hazardous material released to the atmosphere is transported by the wind. The amount of dispersion, or dilution, of the contaminant material in the air depends on the meteorologic conditions at the time of the accident. Because predicting the specific location of an off-site transportation-related accident and the exact meteorologic conditions at the time of the accident is impossible, generic atmospheric conditions were selected for the accident risk assessment. Neutral weather conditions were assumed. These conditions were represented by Pasquill atmospheric stability Class D with a wind speed of 4 m/s (9 mph). Because neutral meteorological conditions are the most frequently occurring atmospheric stability condition in the United States, these conditions are most likely to be present in the event of an accident involving a hazardous material shipment. Observations at National Weather Service surface meteorological stations at more than 300 U.S. locations indicate that on a yearly average, neutral conditions (represented by Pasquill Classes C and D) occur about half (50%) the time; stable conditions (Pasquill Classes E and F) occur about one-third (33%) of the time; and unstable conditions (Pasquill Classes A and B) occur about one-sixth (17%) of the time (Doty et al. 1976). The neutral category predominates in all seasons, but it is most prevalent (nearly 60% of the observations) during winter.

C.2.5 Radiological Risk Assessment Input Parameters and Assumptions

The dose (and, correspondingly, the risk) to populations during routine transportation of radioactive materials is directly proportional to the assumed external dose rate from the shipment. The actual dose rate from the shipment is a complex function of the composition and configuration of shielding and containment materials used in the packaging, the geometry of the loaded shipment, and the characteristics of the radioactive material itself.

Shipments of depleted UF_6 and UO_2 have been studied previously (Biwer et al. 1997) for the Depleted UF_6 Programmatic EIS (PEIS) (DOE 1999a). Representative shipment dose rates were developed using the MicroShield™ shielding code (Negin and Worku 1992). The input to MicroShield™ consisted of the activity of a material, the geometry and composition of the shipping package, and the amount of material in the package. Where multiple packages per shipment were assumed, a dose rate for the shipment was derived from the summation of the individual package dose rates, taking into consideration the configuration of the packages on the transport vehicle and the relative distances to a receptor.

Table C.6 lists the external dose rates developed for the Depleted UF_6 PEIS and used in this transportation analysis. The dose rates are presented in terms of the transport index (TI), which is the dose rate at 1 m (3 ft) from the lateral sides of the transport vehicle. The regulatory limit established in 49 CFR Part 173.441 (*Radiation Level Limitations*) and 10 CFR Part 71.47 (*External Radiation Standards for All Packages*) to protect the public is 0.1 mSv/h (10 mrem/h) at 2 m (6 ft) from the outer lateral sides of the transport vehicle. The estimated dose rate at a distance of 1 m (3 ft) from a truck shipment of depleted UO_2 identical to that considered for this analysis was 0.0076 mSv/h (0.76 mrem/h). Depleted UF_6 in larger, 14-ton cylinders in overcontainers was estimated to have external dose rates of 0.0023 mSv/h (0.23 mrem/h) and 0.0024 mSv/h (0.24 mrem/h) for truck (1 cylinder/tractor-trailer) and rail (4 cylinders/railcar) shipments, respectively. For this analysis, depleted UF_6 shipments, each involving five 30B cylinders, were assumed to have an external dose rate of 0.0024 mSv/h (0.24 mrem/h), which is more consistent with the line source geometry of the railcar shipments in the Depleted UF_6 PEIS (DOE 1999a). These estimated dose rates for the depleted uranium shipments are less than 5% of the allowed maximum value. A value of 0.040 mSv/h (4.0 mrem/h) was used for the WSB TRU waste shipments. This value represents the highest estimated dose rate for TRUPACT-II truck shipments estimated for any TRU waste generator site considered in the *Waste Isolation Pilot Plant Disposal Phase Final Supplemental Environmental Impact Statement* (DOE 1997). For MOX fuel shipments, preliminary analysis has estimated a conservative value of 0.0484 mSv/h (4.84 mrem/h) for the external dose rate at 1 m (DCS 2001a). The regulatory maximum of 0.10 mSv/h (10 mrem/h) at 2 m was assumed for the plutonium metal. This dose rate corresponds approximately to 0.14 mSv/h (14 mrem/h) at 1 m.

In addition to the specific parameters discussed previously, values for a number of general parameters must be specified within the RADTRAN code to calculate radiological risks. These general parameters define basic characteristics of the shipment and traffic and are specific to the mode of transportation. The user's manual for the RADTRAN code (Neuhauser and Kanipe 1992) contains derivations and descriptions of these parameters. The general RADTRAN input parameters used in the radiological transportation risk assessment are summarized in Table C.7.

C.2.6 Hazardous Chemical Risk Assessment Input Parameters and Assumptions

To estimate the consequences of chemical accidents, two potential health effects end points were evaluated: (1) adverse effects and (2) irreversible adverse effects. Potential adverse effects range from mild and transient effects — such as respiratory irritation, redness of the eyes, and skin rash — to more serious and potentially irreversible effects. Potential irreversible adverse effects are defined as effects that generally occur at higher concentrations and are permanent in nature — including death, impaired organ function (such as damaged central nervous system or lungs), and other effects that may impair everyday functions.

Table C.6. External dose rates and package sizes used in RADTRAN

Shipment	Dose rate at 1 m [mSv/h (mrem/h)]	Package size (m)
UF_6	0.0024 (0.24)	12[a]
UO_2	0.0076 (0.76)	6.0[a]
Pu metal	0.14 (14)	9
TRU waste	0.040 (4.0)	7.4
MOX fuel	0.0484 (4.84)	3.66[b]

[a]*Source:* Biwer et al. (1997).

[b]Active length of fuel assembly (DCS 2001a).

Table C.7. General RADTRAN input parameters[a]

Parameter	Truck[b]
Number of crew members	2
Distance from source to crew (m)	3.1
Average vehicular speed (km/h)[c]	
Rural	88.49
Suburban	40.25
Urban	24.16
Stop time (h/km)	0.011
Number of people exposed while stopped	50
Distance for exposure while stopped (m)	20
Number of people per vehicle sharing route	2
Population densities (persons/km^2)[d]	Route specific
One-way traffic count (vehicles/h)	
Rural	470
Suburban	780
Urban	2,800

[a]Accident conditional probabilities are listed by severity category in Table C.4; accident release fractions are given in Table C.5.

[b]*Source:* Biwer et al. (1997).

[c]Fraction of rural and suburban travel on freeways was set to 1 in RADTRAN. Thus, the rural speed was used for both urban and suburban zones.

[d]Route-specific population densities are listed in Table C.1.

For uranium compounds, an intake of 10 mg or more was assumed to cause potential adverse effects (McGuire 1991), and an intake of 30 mg or more was assumed to cause potential irreversible adverse effects. These intake levels are based on NRC guidance (NRC 1994). For hydrogen fluoride (HF), which is a by-product of UF_6 reacting with moisture in the air following an accidental release, potential adverse effects levels were assumed to occur at levels that correspond to Emergency Response Planning Guideline No. 1 (ERPG-1) or equivalent levels, and potential irreversible adverse effects levels were assumed to occur at levels that correspond to ERPG-2 or equivalent levels. The ERPG values have been generated by teams of toxicologists who review all published (as well as some unpublished) data for a given chemical (AIHA 1996). In addition to potential irreversible adverse effects, the number of fatalities from accidental chemical exposures was estimated to facilitate comparisons with radiological impacts. For exposures to uranium and HF, it was estimated that the number of fatalities occurring would be about 1% of the number of irreversible adverse effects (EPA 1993a; Policastro et al. 1997).

Application of the FIREPLUME code involves the choice of a number of parameters that affect the results. Input values were selected to represent reasonable conditions at a generic location without being too conservative. More details about the models and input parameters are presented in Post et al. (1994a,b) and Brown et al. (1997).

C.2.7 Routine Nonradiological Vehicle Emission Risks

Vehicle-related risks during incident-free transportation include incremental risks caused by potential exposure to airborne particulate matter from fugitive dust and vehicular exhaust emissions. The health end point assessed under routine transport conditions is the excess (additional) latent mortality caused by inhalation of vehicular emissions. These emissions are primarily in the form of diesel exhaust and fugitive dust (resuspended particulates from the roadway). Strong epidemiological evidence exists suggesting that increases in ambient air concentrations of PM_{10} (particulate matter with a mean aerodynamic diameter less than or equal to 10 μm) lead to increases in mortality (EPA 1996a,b). Currently, it is assumed that no threshold exists and that the dose-response functions for most health effects associated with PM_{10} exposure, including premature mortality, are linear over the concentration ranges investigated (EPA 1996a). Over both the short and long terms, fatalities (mortality) may result from life-shortening respiratory or cardiovascular diseases (EPA 1996a; Ostro and Chestnut 1998). The long-term fatalities also are assumed to include those from cancer.

The increased ambient air particulate concentrations caused by the transport vehicle, due to fugitive dust and diesel exhaust emissions, were related to such premature latent fatalities in the form of risk factors by Biwer and Butler (1999) for transportation risk assessments. Thus, in this assessment, a value of 8.36×10^{-10} latent fatalities/km for truck transport was used. This value is for heavy combination trucks (truck class VIIIB). The risk factor is for areas with an assumed population density of 1 person/km^2. One-way shipment risks are obtained by multiplying the appropriate risk factor by the average population density along the route and the route distance. The risks reported for routine vehicle risks in this analysis are for round-trip travel of the transport vehicle.

The vehicle risks reported here are estimates based on the best available data. However, as is true for the radiological risks, there is a large, not readily quantifiable, degree of uncertainty in the vehicle emission risk factors. For example, large uncertainties exist as to the extent of increased mortality with an incremental rise in particulate air concentrations and as to whether there are threshold air concentrations that are applicable. Also, estimates of the particulate air concentrations caused by transport vehicles are dependent on location, road conditions, vehicle conditions, and weather.

As discussed by Biwer and Butler (1999), there are large uncertainties in the human health risk factors used to develop the emission risks. In addition, because of the conservatism of the assumptions made to reconcile results with those presented in an EPA study (EPA 1993b), latent fatality risks estimated with the above risk factor may be considered to be near an upper bound. Use of this risk factor for truck class VIIIB will give estimated fatalities comparable to those from accident fatalities in some cases. In addition, the question as to what exactly constitutes a fatality as a direct consequence of increased PM_{10} levels from vehicle emissions is still an open question, but long-term fatalities have been associated with increased levels of PM_{10} (Biwer and Butler 1999).

C.3 Transportation Impacts

Single shipment transportation impacts are presented in Table C.8. Total collective population transportation impacts are presented in Section 4.4.1.3.

C.4 References for Appendix C

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Table C.8. Single-shipment collective population transportation risks

Impact category	Depleted UF_6	Depleted UO_2	Pu metal		MOX	TRU Waste
	From Portsmouth, OH to Wilmington, NC	From Wilmington, NC to MOX facility	From Pantex to PDCF	From Hanford to PDCF	From MOX facility to surrogate commercial reactor	From WSB to WIPP
Population impacts						
Cargo-related[a]						
Radiological impacts						
Dose risk[b] (person-rem)						
Routine crew	0.0055	0.0075	0.14	0.27	0.16	0.16
Routine public						
Off-link	4×10^{-4}	2.2×10^{-4}	0.026	0.035	0.0064	0.0063
On-link	9.8×10^{-4}	5.8×10^{-4}	0.072	0.12	0.016	0.020
Stops	0.0041	0.0029	0.33	0.67	0.057	0.10
Total	0.0054	0.0037	0.43	0.82	0.079	0.13
Accident[c]	0.0023	8.2×10^{-4}	8.8×10^{-5}	3.8×10^{-4}	0.027	0.0027–0.021
Latent cancer fatalities[d]						
Crew fatalities	3×10^{-6}	5×10^{-6}	9×10^{-5}	2×10^{-4}	9×10^{-5}	9×10^{-5}
Public fatalities	5×10^{-6}	3×10^{-6}	3×10^{-4}	5×10^{-4}	6×10^{-5}	8×10^{-5}– 9×10^{-5}
Chemical impacts						
Irreversible adverse effects[e]	1.2×10^{-9}	0	NA[f]	NA	NA	NA
Vehicle-related[g]						
Emission fatalities	4×10^{-4}	1×10^{-4}	7×10^{-4}	9×10^{-4}	0.001	6×10^{-4}
Accident fatalities	2.7×10^{-5}	2×10^{-5}	5.4×10^{-5}	1.1×10^{-4}	4.8×10^{-5}	5.8×10^{-5}

[a]Cargo-related impacts are impacts attributable to the radioactive or chemical nature of the waste material.

[b]To convert from person-rem to person-Sv, multiply by 0.01.

[c]Dose risk is a societal risk and is the product of accident probability and accident consequence.

[d]Latent cancer fatalities are calculated by multiplying dose by the FGR 13 health risk conversion factor of 0.06 fatal cancer per person-Sv (6×10^{-4} fatal cancer per person-rem) (Eckerman et al. 1999).

[e]Potential for irreversible adverse effects from chemical exposures. Exposure to HF or uranium compounds is estimated to result in fatality of approximately 1% or less of those persons experiencing irreversible adverse effects (Policastro et al. 1997).

[f]NA = not applicable.

[g]Vehicle-related impacts are impacts independent of the cargo in the shipment.

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APPENDIX D:

SOCIOECONOMICS

APPENDIX D:

SOCIOECONOMICS

This appendix (1) discusses the methods and briefly describes the data sources that were used to perform the socioeconomic analyses for this environmental impact statement (EIS) (Section D.1) and (2) presents fiscal data collected from each of the counties, cities, and school districts in the region of influence (as defined below) (Section D.2).

D.1 Impact Assessment Methods

The socioeconomic analysis for a Mixed Oxide Fuel Fabrication Facility (the proposed MOX facility), including its supporting facilities, the Pit Disassembly and Conversion Facility (PDCF) and the Waste Solidification Building (WSB), at the Savannah River Site (SRS) assessed impacts at two geographic scales. A regional economic area (REA) was used to assess impacts on employment and income for the various alternatives. An REA is a broad market area defined by the economic linkages among the regional industrial and service sectors and the communities within a region. In this case, the REA consists of 15 counties in South Carolina and Georgia (see Table D.1). A region of influence (ROI) that consists of the four counties in which the majority (90%) of the SRS employees live was used to assess impacts on population, housing, community services, and traffic (see Table D.1).

D.1.1 Impacts on Regional Employment and Income

The assessment of projected impacts of the proposed facilities on regional employment and income was based on the use of regional economic multipliers. These multipliers capture the indirect (off-site) effects of on-site activities associated with construction and operation.

To estimate employment impacts of the proposed MOX facility, the PDCF, and the WSB at the SRS, direct and indirect employment impacts associated with construction and operation were taken from data provided in the Surplus Plutonium Disposition (SPD) EIS (DOE 1999, Appendix F, Section 9.2). The indirect (off-site) employment impacts were estimated from these data by using the relationship between direct and indirect employment of the facilities in the REA at the SRS as estimated in the SPD EIS. By using direct (on-site) facility employment data taken from the project Environmental Report (ER)(DCS 2002) as the basis for calculation, the indirect employment impacts were estimated for the peak year of construction and for the first year of operations.

The impact of facility construction and operation on regional incomes was estimated by using facility employment impact estimates together with average regional income multipliers for the REA taken from Intelligent Multi-Resource Planning (IMPLAN) regional economic data (MIG, Inc., 2001). IMPLAN input-output economic accounts show the flow of commodities to

Table D.1. Jurisdictions included in the regional economic area and ROI at the SRS

Georgia	South Carolina
Regional Economic Area	
Counties	Counties
Burke	Aiken
Columbia	Allendale
Glascock	Bamberg
Jefferson	Barnwell
Jenkins	Edgefield
Lincoln	
McDuffie	
Richmond	
Warren	
Wikes	
Region of Influence	
Counties	Counties
Columbia	Aiken
Richmond	Barnwell
Cities	Cities
Augusta	Aiken
Blythe	Jackson
Grovetown	New Ellenton
Harlem	North Augusta
Hephzibah	Wagener
School Districts	School Districts
Columbia County	Aiken County
Richmond County	Barnwell #19
	Barnwell #29
	Barnwell #45

industries from producers and institutional consumers. The accounts also show consumption activities by workers, owners of capital, and imports from outside the region. The IMPLAN model contains 528 sectors representing industries in agriculture, mining, construction, manufacturing, wholesale and retail trade, utilities, finance, insurance and real estate, and consumer and business services. The model also includes information for each sector on employee compensation; proprietary and property income; personal consumption expenditures; federal, state, and local expenditures; inventory and capital formation; imports; and exports.

Impacts on employment are described in terms of the total number of jobs created in the region in the peak year of construction and in the first year of operation. The relative impact of the increase in employment in the REA was calculated by comparing total facility construction employment over the period in which construction would occur with baseline REA employment forecasts over the same period. Impacts are expressed in terms of the percentage point difference in the average annual employment growth rate with and without facility construction. The forecasts were based on data from the U.S. Department of Commerce (U.S. Bureau of the Census 1992, 2002b).

D.1.2 Impacts on Population

An important consideration in assessing potential impacts of the proposed facilities was the number of workers, families, and children who might move into the ROI (in-migrate), either temporarily or permanently, with construction and operation of the proposed facilities. The capacity of regional labor markets to provide sufficient workers in the appropriate occupations required for facility construction and operation is closely related to the occupational profile of the REA and to occupational unemployment rates. To estimate the in-migration that would occur to satisfy direct labor requirements, the analysis developed estimates of available labor in each direct labor category on the basis of REA unemployment rates applied to each occupational category. In-migration associated with indirect labor requirements was derived from estimates of available labor in the REA economy as a whole able to satisfy the demand for labor by industry sectors in which facility spending would initially occur. The national average household size was used to calculate the number of additional family members who would accompany direct and indirect in-migrating workers.

Impacts on population are described in terms of the total number of in-migrants arriving in the region in the peak year of construction and in the first year of operation. The relative impact of the increase in population in the REA was calculated by comparing total facility construction in-migration over the period in which construction would occur with baseline REA population forecasts over the same period. Impacts are expressed in terms of the percentage point difference in the average annual population growth rate with and without project construction. The forecasts were based on data from the U.S. Census Bureau (U.S. Bureau of the Census 2002a).

D.1.3 Impacts on Local Housing Markets

The in-migration of workers that would occur during construction and operation would have the potential to substantially affect the housing market in the ROI. The analysis considered these impacts by estimating the increase in demand for rental housing units in the peak year of construction and for owner occupied housing in the first year of operation that would result from the in-migration of both direct and indirect workers into the ROI. The impacts on housing are described in terms of the number of rental units required in the peak year of construction and the number of owner occupied units required in the first year of operations. The relative impact on the existing housing in the ROI was estimated by comparing the calculated facility-related housing demand with the forecasted number of vacant rental housing units in the peak year of construction and the forecasted number of vacant owner occupied units in the first year of operations. The forecasts were based on data from the U.S. Census Bureau (U.S. Bureau of the Census 1994, 2002a).

D.1.4 Impacts on Community Services

In-migration associated with construction and operation of the facilities could increase demand for educational services and for other public services (e.g., police and fire protection, health services) in the ROI. Estimates of the total number of in-migrating workers and their families for facility construction and operation were used as a basis for calculating the potential increase in public service demands in the core ROI counties in which the majority of new workers would be expected to locate. Impacts of the facilities on county, city, and school district revenues and expenditures were also calculated on the basis of baseline data provided in the jurisdictions' annual comprehensive financial reports. Impacts were forecasted for the peak year of construction and in the first year of operations on the basis of per capita revenues and expenditures for each jurisdiction. The population forecasts were based on data from the U.S. Census Bureau (U.S. Bureau of the Census 2002a).

Impacts of facility-induced in-migration on community service employment were also calculated for the core ROI counties. The estimated numbers of in-migrating workers and families were used to calculate the numbers of new sworn police officers, firefighters, and general government employees required to maintain the existing levels of service for each community service. Calculations were based on the existing number of employees per 1,000 population for each community service. The analysis of the impact on educational employment estimated the number of teachers in each school district required to maintain existing teacher-student ratios across all student age groups. Impacts on health care employment were estimated by calculating the number of physicians in each county required to maintain the existing level of service. The estimated impacts are given in terms of the number of additional physicians and the number of additional staffed hospital beds required to maintain the existing levels of service (expressed in terms of number of doctors and number of staffed hospital beds per 1,000 population). Information on existing employment and levels of service was collected from the individual jurisdictions providing each service.

D.1.5 Impacts on Traffic

Impacts on traffic in the ROI are described in terms of the effects of the increase in traffic from the facilities on the "levels of service" of major road segments used to commute to and from the site by existing site employees. The analysis allocated trips made by construction workers to individual road segments on the basis of the residential distribution of existing site workers. The impact on the existing annual average number of daily trips was then calculated, and the impact on the level of service provided by each individual segment was estimated. Traffic information used in the analysis was collected from state and county transportation departments.

D.1.6 Impacts of Accidents

The impacts of accidents associated with a MOX facility on agriculture, water, and fisheries resources, and subsequently on the economies of communities surrounding SRS, were not estimated in the EIS because it is not expected that the impacts from an accident would be significant. In the case of the most serious accident, potential damage to crops under the plume in the event of an airborne release and the subsequent damage to water resources from the associated runoff would be small because the amount of radioactive material deposited per unit area would be relatively small. Dilution of runoff would occur fairly rapidly in the affected rivers and streams and would not cause any significant risk to the economies of the communities downstream of the location of the proposed facility. Any interdiction of crops as a result of the deposition of radioactive material would be a limited, one-time event, and if it were to occur at all, only would affect a small number of farm communities. Emergency response activities associated with a release from the facility would be handled by local emergency response and health authorities already prepared for accidents at SRS, with no resulting additional burden on local community financial resources.

D.2 Region of Influence Fiscal Data

Financial data for local governmental bodies and school districts in the ROI for the facilities are presented in Tables D.2 and D.3.

Table D.2. ROI local government financial data ($ millions)

Category	Columbia County, Georgia: Columbia County	Town of Grovetown	Town of Harlem
Revenues			
Taxes	23.4	0.7	0.9
Licenses and permits	0.3	0.0	0.0
Intergovernmental	1.6	1.0	0.0
Charges for services	1.1	0.4	0.2
Fines and forfeits	1.6	0.2	0.1
Miscellaneous	0.9	0.1	0.0
Total	28.9	2.5	1.3
Expenditures			
General government	8.1	0.7	0.2
Public safety	11.8	0.7	0.4
Highways and streets	3.3	0.3	0.2
Health, welfare and sanitation	0.9	0.4	0.1
Culture and recreation	2.5	0.0	0.0
Debt service	0.0	0.0	0.0
Intergovernmental	0.0	0.0	0.0
Other	0.9	0.0	0.0
Total	27.5	2.1	1.0
Revenues less expenditures	+1.4	+0.3	+0.3

Table D.2. Continued

Category	Richmond County, Georgia		
	City of Augusta/ Richmond County	City of Blythe	City of Hephzibah
Revenues			
Taxes	55.9	0.1	0.8
Licenses and permits	2.3	0.0	0.0
Intergovernmental	3.0	0.0	0.0
Charges for services	12.8	0.0	0.0
Fines and forfeits	9.0	0.0	0.0
Miscellaneous	3.0	0.1	0.1
Total	86.0	0.2	0.9
Expenditures			
General government	26.3	0.1	0.1
Public safety	34.2	0.1	0.4
Highways and streets	6.1	0.0	0.0
Health, welfare and sanitation	5.2	0.0	0.0
Culture and recreation	9.3	0.0	0.0
Debt service	2.0	0.0	0.0
Intergovernmental	2.4	0.0	0.0
Other			
Total	85.5	0.2	0.5
Revenues less expenditures	+0.5	0.0	+0.4

Table D.2. Continued

Category	Aiken County, South Carolina		
	Aiken County	City of Aiken	Town of Jackson
Revenues			
Taxes	16.0	6.4	0.2
Licenses and permits	0.6	4.6	0.1
Intergovernmental	7.7	1.5	0.0
Charges for services	2.0	3.7	0.2
Fines and forfeits	3.2	0.6	0.2
Miscellaneous	1.0	11.0	0.0
Total	30.5	27.8	0.7
Expenditures			
General government	12.1	1.6	0.5
Public safety	10.6	5.4	0.1
Highways and streets	3.7	1.9	0.0
Health, welfare and sanitation	1.7	2.4	0.1
Culture and recreation	2.4	2.3	0.0
Debt service	0.0	0.3	0.0
Intergovernmental	0.0	0.0	0.0
Other	0.0	11.8	0.3
Total	30.5	25.7	0.9
Revenues less expenditures	0.0	+2.1	-0.2

Table D.2. Continued

Category	Aiken County, South Carolina		
	Town of New Ellenton	City of North Augusta	Town of Wagener
Revenues			
Taxes	0.3	3.7	0.1
Licenses and permits	0.1	2.0	0.1
Intergovernmental	0.1	0.6	0.0
Charges for services	0.2	0.8	0.1
Fines and forfeits	0.1	0.5	0.0
Miscellaneous	0.0	0.3	0.1
Total	0.8	7.9	0.4
Expenditures			
General government	0.2	1.5	0.2
Public safety	0.4	3.4	0.1
Highways and streets	0.1	0.8	0.0
Health, welfare and sanitation	0.1	0.0	0.1
Culture and recreation	0.1	1.7	0.0
Debt service	0.0	0.0	0.0
Intergovernmental	0.0	0.0	0.0
Other	0.0	0.3	0.0
Total	0.9	7.7	0.4
Revenues less expenditures	-0.1	+0.2	0.0

Table D.2. Continued

Category	Barnwell County	City of Barnwell	Town of Blackville	Town of Williston
	Barnwell County, South Carolina			
Revenues				
Taxes	3.0	1.2	0.4	1.1
Licenses and permits	0.0	0.4	0.1	0.0
Intergovernmental	1.6	0.2	0.1	0.2
Charges for services	0.0	0.2	0.2	0.0
Fines and forfeits	0.0	0.1	0.2	0.0
Miscellaneous	4.3	0.0	0.0	0.0
Total	8.9	2.1	1.0	1.3
Expenditures				
General government	2.5	0.4	0.1	0.2
Public safety	2.0	0.9	0.5	0.6
Highways and streets	0.6	0.2	0.0	0.2
Health, welfare and sanitation	1.1	0.2	0.1	0.2
Culture and recreation	0.2	0.0	0.1	0.0
Debt service	0.2	0.0	0.0	0.0
Intergovernmental	0.0	0.0	0.0	0.0
Other	2.0	0.0	0.1	0.1
Total	8.6	1.7	0.9	1.3
Revenues less expenditures	+0.3	+0.4	+0.1	0.0

Sources: Columbia County, annual financial report, June 30, 2000; City of Grovetown Financial Report, December 31, 2000; City of Harlem Annual Financial Report, December 31, 2000; City of Augusta/Richmond County, Annual Financial Statements, December 31, 1999; City of Blythe, Annual Financial Report, December 31, 2000; City of Hephzibah, Financial Statements and Independent Auditors Report, June 30, 2000; Aiken County, Annual Financial Report, June 30, 2000; City of Aiken, Annual Report, June 30, 2000; Town of Jackson, Financial Statements, June 30, 2000; Town of New Ellenton, Financial Statements, June 30, 1999; City of North Augusta, Annual Financial Statements, December 31, 2000; Town of Wagener, Financial Statements, June 30, 1999; Barnwell County, Audited Financial Statements, June 30, 2000; City of Barnwell, Financial Statements, September 30, 2000; Town of Blackville, Audited General Purpose Financial Statements, June 30, 2000; Town of Williston, Financial Statements, June 30, 2000.

Table D.3. ROI school district financial data ($ millions)

Category	Georgia		South Carolina	
	Columbia County	Richmond County	Aiken County	Barnwell County[a,b]
Revenues				
Local sources	32.8	81.2	31.5	8.9
State sources	64.4	134.6	66.5	20.0
Federal sources	0.1	16.1	0.1	0.1
Other	2.2	0.0	0.0	0.0
Total	99.5	231.9	98.1	29.0
Expenditures				
Administration and instruction	65.5	161.1	65.0	17.7
Services	27.9	48.0	34.6	8.3
Debt service	0.0	0.0	0.0	1.0
Other	0.0	0.0	0.0	1.2
Total	93.4	209.1	99.8	28.2
Revenues less expenditures	+6.1	+22.8	-1.6	+0.8

[a]Includes Williston School District #19, #29, and #45.

[b]Revenue data estimated based on South Carolina Department of Education, 2001 School and District Report Cards, and Williston School District #29, Financial Statements, June 30, 2000.

Sources: Columbia County Board of Education, General Purpose Financial Statements, June 30, 2000; Georgia Department of Education, Local, State and Federal Revenue Report Fiscal Year 2001, available at http://dbl.doe.k12go.us:8001/ows-bin/owo/fin_pack_revenue.display.proc; Consolidated School District of Aiken County Financial Statements, June 30, 2000; South Carolina Department of Education, 2001 School and District Report Cards, available at http://www.unyscschools.com/reportcard/2001/; DCS 2002; Williston School District #29, Financial Statements, June 30, 2000.

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APPENDIX E:

HUMAN HEALTH RISK

APPENDIX E:

HUMAN HEALTH RISK

This appendix provides detailed information concerning the input data and assumptions used in the chemical and radiological human health risk assessments performed for this Mixed Oxide (MOX) Fuel Fabrication Facility Environmental Impact Statement. For chemicals, only accidents are addressed in this appendix; the evaluation of health impacts from chemical exposures during normal operations is discussed in Sections 3.10, 4.2.2, and 4.3.1.

E.1 Chemical

Impacts from the accidental release of chemical materials were assessed for Savannah River Site (SRS) workers outside the restricted area of the facility ("SRS employees") and members of the public. Impacts to facility workers would be sensitive to the specific circumstances of each accident and are not estimated in this assessment.

About 30 MOX process chemicals were identified for use in the proposed MOX facility and support facilities. A chemical was eliminated from the analysis if it had a very low volatility (i.e., vapor pressure <1 Pa (7.5 x 10^{-3} mmHg), had a low toxicity (i.e., a temporary emergency exposure limit 1 [TEEL 1] ≥15 mg/m^3, was stored in small quantities (maximum container quantity <38 L [10 gal]), or was stored and used as a solid. Impacts of a chemical release with these characteristics would be expected to be minimal. Chemicals eliminated from evaporative spill analysis because of very low vapor pressures at ambient temperatures were (1) manganese nitrate, (2) oxalic acid, (3) silver nitrate, (4) uranyl nitrate, (5) sodium hydroxide, (6) aluminum nitrate, and (7) phosphoric acid. Chemicals eliminated because of low toxicity were (1) aluminum sulfate, (2) isopropanol, (3) sodium carbonate, (4) sodium sulfite, and (5) zirconium nitrate. Chemicals eliminated because they are solids were azodicarbonamide, sodium nitrite, and zinc stearate. All other material inventories were analyzed in detail. A spill of sulfuric acid at the PDCF was also eliminated from further analysis based on the assumption that it would contain a concentration of less than 30% sulfur trioxide (i.e., not fuming) and would therefore not pose a toxic inhalation hazard.

The quantity of material released to the atmosphere was determined on the basis of the available physical properties of the spilled chemical (e.g., vapor pressure, mass transfer coefficient), meteorological conditions (e.g., wind speed), and the chemical storage conditions (e.g., temperature, pressure) (see Table E.1). This quantity defined the source term, which was determined either by estimating chemical evaporation rates or pressurized release rates and the associated release durations. The evaporative source term was used as input to the National Oceanic and Atmospheric Administration (NOAA) Areal Locations of Hazardous Atmospheres (ALOHA) dispersion model (Reynolds 1992). Impacts from pressurized releases were simulated with the HGSYSTEM model.

Table E.1. Chemical inventory, spill quantity, concentrations, and mole fraction (MF) calculations[a]

Facility and Chemical name	Formula	MW_{solute} (g/mole)	MW_{sol} (g/mole)	Density: Pure Compound (kg/m^3)	Density: Solution (kg/L)	Concentrations: M_{pure} [100%] (moles/L)	Concentrations: M (moles/L)	Concentrations: (%)	Concentrations: N (moles/ L x #_H atoms)
MOX (BAP and BRP)									
Dodecane	$C_{12}H_{26}$	170.34	170.3	750	0.75	4.4	4.4	100	44.28
Nitrogen tetroxide	N_2O_4	92.01	92	1,450	1.45	15.76	15.76	***100***	15.76
Hydrazine	H_6N_2O	32.05	50.1	1,030	1.01	32.14	11.25	***35***	67.5
Hydrazine-NaOH mixture	N_2H_4-NaOH	32.05	72.0	1,030	1.03	32.14	0.03	0.10	***0.16***
Hydrazine/hydroxylamine nitrate mixture	$H_4N_2O_4 - N_2H_4$	32.05	128.1	1,030	1.54	32.14	***0.15***	0.47	0.6
Hydroxylamine nitrate (HAN)	$H_4N_2O_4$	96.05	114.1	1,540	1.29	16.03	***1.90***	11.8	7.6
Hydrogen peroxide	H_2O_2	34.02	52	1,440	1.27	42.33	14.82	***35***	29.6
Tributyl phosphate (TBP)	$C_{12}H_{27}O_4P$	266.36	266.4	980	0.98	3.68	3.68	***100***	99.3
Nitric acid (13.6 M)	HNO_3	63.01	81	1,380	1.28	21.90	13.6	62.1	***13.6***
Nitric acid (2.1 M)	HNO_3	63.01	81	1,380	1.20	21.90	2.1	9.6	***2.1***
WSB									
Nitric acid (10.1 M)	HNO_3	63.01	81	1,276	1.18	15.74	10.1	**64**	10.1
PDCF[b]									
Chlorine (gas)	Cl_2	70.91	70.9	1,491	1.49	21.03	21.03	***100***	21.03

Table E.1. Continued

Facility and Chemical name	Inventory: Process tank fill quantity (kg)	Inventory: Process tank fill quantity (ga)l	Spill volume: Solution (gal)	Spill volume: Solution (L)	Spill moles: n_{solute} (moles)	Spill moles: $n_{solvent}$ (water) (moles)	Spill moles: $n_{solution}$ (moles)	MF	Spill mass: m_{solute} (kg)	Spill mass: $m_{solvent}$ (x or H_2O) (kg)	Spill mass: $m_{sol.}$ (kg)
MOX (BAP and BRP)											
Dodecane	511	180	180	681	2,998.5	0	2,998.5	1	510.8	0.00	510.8
Nitrogen tetroxide	1,317	240	240	908	14,315.2	0	14,315.2	1	1,317	0.00	1,317
Hydrazine	491	126	126	478	5,371.4	3,491	8,862.8	0.6061	268.9	62.90	331.8
Hydrazine-NaOH mixture	1,497	384	384	1,455	46.6	46,725	46,771.3	0.0010	4.4	841.75	846.1
Hydrazine/hydroxylamine nitrate mixture	2,445	627	627	2,376	356.4	76,012	76,368.8	0.0047	45.7	1,369.36	1,415.0
Hydroxylamine nitrate (HAN)	1,166	200	200	758	1,440.2	1,270	2,709.7	0.5315	138.3	22.87	161.2
Hydrogen peroxide	300	55	55	208	3,088.6	2,008	5,096.2	0.6061	105.1	36.17	141.2
Tributyl phosphate (TBP)	467	126	126	478	1,757.0	0	1,757.0	1	468.0	0.00	468.0
Nitric acid (13.6 M)	841	161	161	610	8,298.6	3,145	11,443.8	0.7252	522.9	56.66	579.6
Nitric acid (2.1 M)	6,901	1,321	1,321	5,007	10,514	9,506	20,020	0.5252	662.5	171.24	833.8
WSB											
Nitric acid (10.1 M)	1,690	350	350	1,327	13,365	4,811	18,176	0.7353	842.1	86.67	928.8
PDCF[b]											
Chlorine (gas)	430	240	240	911	19,158	0	19,158	1	430	0.00	430

[a]In general, chemicals used, concentrations, and process tank fill quantities for the proposed MOX facility were obtained from DCS (2004b, Table 8-2a and DCS 2003a, 2004a); values for the PDCF were obtained from DOE (1999, Appendix E). Concentrations obtained from these sources are in bold italics; others are calculated values.

[b]Sulfuric acid was also listed for this facility with an annual usage of 470 kg. The concentration was not given, so quantitative spill modeling was not performed. If dilute, the solution would have low volatility and would present minimal hazards from accidental spills. However, if it was a concentration of 30% or more sulfur trioxide, sulfuric acid is highly water reactive and could present inhalation risks to facility workers or SRS employees if spilled.

Abbreviations: MOX: proposed MOX Fuel Fabrication Facility; BAP: Aqueous Polishing Area; BRP: Reagent Processing Building; WSB: Waste Solidification Building; PDCF: Pit Disassembly and Conversion Facility.

For modeling potential impacts to the general public at the SRS site boundary (approximately 8.2 km [5.1 mi] from the proposed MOX facility), the estimated source term was used as input to the ALOHA dispersion model. For modeling potential impacts to SRS workers (assumed to be located a minimum of 100 m [330 ft] from the proposed MOX facility), the ARCON96 model (Ramsdell and Simonen 1997) was used because this model accounts for near-field concentrations affected by low wind speeds, plume meander, and building wake effects. This model is also used to be consistent with U.S. Nuclear Regulatory Commission (NRC) guidance regarding control room habitability during a hazardous chemical release (NRC Regulatory Guide 1.78 (NRC 2001). ARCON96 was used for modeling impacts for all receptors (SRS workers and general public) for uranium dioxide powder releases, similar to the modeling done for accidental releases of other radionuclides.

Two of the MOX process chemicals, nitrogen tetroxide and chlorine, are stored as pressurized liquids. Impacts from accidental releases of these two compounds were estimated with the HGSYSTEM model (Post 1994a,b).

Evaporative releases can be considered as either the "puddle" or "direct" source release mode in ALOHA. To use the puddle option, physical properties of the spilled chemical must be known. These properties, such as vapor pressure and molecular weight, are required in estimating evaporation rates. Physical properties are included for approximately 800 pure chemicals in ALOHA's chemical library. Because only two of the 13 MOX chemicals are included in the library and because the effect of dilute solution adjustments to vapor pressure are not allowed in ALOHA, the direct source release option was used to assess impacts for 11 evaporative spill scenarios. A simple evaporation algorithm, similar to ALOHA and other source evaporation codes, such as ADAM (Raj and Morris 1987; Kawamura and MacKay 1987), was incorporated into a spreadsheet along with the necessary physical properties for each of the eight chemicals. A brief description of the spreadsheet algorithm and its limitations and assumptions are given below:

$$Q_{evap} = \frac{A_p * k_m * MW_m * P_{sat}}{R * T_p}, \qquad \text{(E-1)}$$

where

A_p = pool area (m^2),

k_m = mass transfer coefficient (m/s),

MW_m = molecular weight of chemical (g/mole),

P_{sat} = saturation vapor pressure of chemical (Pa),

R = Universal Gas Constant (= 8314.472), and

T_p = pool temperature (K).

The evaporation rate from spilled chemical pools is conservatively assumed to be constant, along with the pool temperature and saturation vapor pressure, for the entire release duration. The saturation vapor pressure is set equal to the partial pressure over the pool. The saturation vapor pressure or the partial pressures of the vapors emanating from the pool are a function of the pool temperature through use of chemical-specific Antoine or Harlacher coefficients for inorganic compounds, and through the use of the Clausius-Clapeyron equation for organic compounds (e.g., tributyl phosphate [TBP]). In addition to the assumption that the saturation vapor pressure is equal to the vapor pressure of the chemical at ambient release conditions, the pool temperature is assumed equal to the ambient temperature for the entire release duration. Two ambient cases were assessed, one representing the 95th percentile temperature during the day and the other the 95th percentile during the night (see discussion of the full set of assumed weather conditions below). In cases where temperature-specific data (e.g., Antione coefficients and equations) were not available, temperature-dependent P_{vap} adjustments from a reference level (e.g., STP) were made using the ratio of vapor pressures (reference level to compound value at specified temperature) for compounds with similar physical properties for which these pressures were known at two representative temperature levels.

Two of the chemical compounds in the inventory are binary mixtures. The vapor pressure of mixtures was estimated using the following equation (CCPS 1996):

$$P_{mixvap} = \frac{\sum_{i=1}^{n} MF_i * P_{vapi} * MW_i * e^{-kP_{vap}t}}{\sum_{i=1}^{n} MF_i * MW_i} \tag{E-2}$$

where

MF_i = mole fraction of component *i*,

P_{vapi} = vapor pressure of component *i*,

k = $k_m A_p / n_T RT$,

n_T = total number of moles of mixture,

MW_i = molecular weight of component *i*, and

t = 1.

Raoult's Law was used to make additional adjustments to spill vapor pressures to account for dilute solutions(such a solution lowers the vapor pressure of the solvent below that of the solute in proportion to the mole fraction of the solute). Table E.1 gives the computed mole fractions used in the analysis, along with the assumed spill volumes and the given chemical inventories and concentrations.

The mass transfer coefficient (k_m), used in most evaporative release models, is computed by one of two main methods used in source emission models, as shown in Equations E-3 and E-4 below. Both values were calculated for each chemical in the analysis and the expression giving the largest mass transfer rate between the liquid and the vapor was used in estimating the chemical-specific evaporative rate:

$$k_m = \frac{N_{Sh} D_{ma}}{d_p} \tag{E-3}$$

$$k_{m_2} = 0.0048\, u_{10}^{7/9}\, d_p^{-1/9} N_{Sc}^{-2/3} \tag{E-4}$$

where

D_{ma} = molecular diffusivity;

d_p = pool depth;

u_{10} = wind speed at 10-m level;

υ_m = kinematic viscosity of the chemical;

N_{Re} = Reynolds number,

= $u_{10} d_p / \upsilon_m$;

N_{Sc} = Schmidt number,

= υ_m / D_{ma};

and

N_{Sh} = Sherwood number,

$= 0.664 N_{Sc}^{1/3} N_{Re}^{1/2} \;\; for \;\; N_{Re} < 320{,}000$

$= 0.037 N_{Sc}^{1/3} [N_{Re}^{0.8} - 15{,}200] \; for \; N_{Re} \geq 320{,}000$.

Chemical-specific molecular diffusivities (i.e., of chemical in air) and kinematic viscosities were used in all cases where data were available. In the absence of data (about one-third of the cases), the molecular diffusivity of water or the kinematic viscosity of air were used as substitutes. This estimate was made to be conservative (i.e., use of Graham's Law to estimate molecular diffusivity would produce a value smaller than that of water).

Pressurized releases (i.e., nitrogen tetroxide and chlorine) were modeled with HGSYSTEM's SPILL, AEROPLUME, and HEGADAS modules. To estimate the effects of building aerodynamic influence, the WAKE module was also run, assuming winds perpendicular to the largest building width. The source term was generated from the SPILL module, which simulates the transient liquid release from a pressurized vessel. AEROPLUME is a multicomponent, two-phase thermodynamic aerosol jet model that simulates steady-state release rates from a rupture or a leaking pressurized vessel and the near-field vapor cloud development of the flashed vapor and aerosol components in expelled jet release. Upon formation of the flow field from the release point and establishment of a heavy aerosol laden cloud, the release is linked to the HEGADAS module to simulate dense vapor cloud dispersion and entrainment of ambient air as the cloud moves and disperses downwind. For the building-influenced case, the WAKE module uses the source term from the SPILL module and simulates the aerodynamics in the wake of structures and neutrally buoyant vapor cloud dispersion beyond the wake. In the near-field, WAKE also simulates the concentration field of a release that may get trapped with the cavity recirculation region close to the building. It can also account for air entrainment and escape of vapors initially captured in the cavity region in back of the building, and the transport and dispersion of contaminants in the far wake and beyond.

Site-specific data used are from a 60-m meteorological tower in the H-Area, relatively close to the proposed MOX location. Hourly wind speed and direction and related fluctuating parameters at the 60-m level were available for a 5-year period from 1992 through 1996. The data were preprocessed at the SRS Plant and sent to Argonne for use in the MOX environmental evaluation. The data were reported in Greenwich Mean Time (GMT) and were adjusted in the analysis for local time. Winds at the 60-m level were adjusted to 10 m with a power-law equation.

As mentioned previously, two sets of meteorological conditions, representative of daytime and nighttime conditions and producing conservative emissions and dispersion, were simulated for each evaporative release scenario. Although daytime releases would have more favorable dispersion conditions than nighttime releases, a larger release rate would occur because of higher ambient temperatures and higher near ground-level wind speeds. Both cases needed to be examined in order to determine the controlling, or "worst-case," site-specific weather conditions.

To be consistent with the ARCON96 model, the 95th percentile daytime and nighttime winds were computed from the 5 years of tower data. Wind speeds were adjusted from the measured 60-m level to the 10-m level by using the standard power-law wind profiles employed in most EPA models (e.g., ISC). The 95th percentile day and night winds are representative of winds that occurred over the measurement period. By definition, 95% of all measured day and night wind speeds at the site would cause more plume dispersion. Similar computations were performed to derive the 95th percentile temperatures, defined as ambient temperatures producing reasonable upper-bound evaporative emission rates. Because higher wind speeds also tend to increase pool evaporation, the 5th percentile wind speeds (i.e., the 5th percentile here is defined as representing the largest wind speeds measured in the 5-year period studies) were also computed. Each of the meteorological cases, including the 95th percentile concentration ARCON case used for estimating 100-m downwind involved worker exposures, is summarized in Table E.2. In addition to wind speed and temperature, the complete set of meteorological parameters used in the ALOHA simulations and the temperatures and wind speeds used in the evaporative spreadsheet calculation tool are summarized in the table. A fourth set of conditions, typical during sunrise or sunset (given in the table), was also run to see if the larger wind speed and neutral conditions would result in more conservative impacts. These conditions resulted in lower impacts and are not further discussed.

Surface roughness was assumed to be 50 cm, which is representative of a good portion of the SRS (Weber 2002). This roughness is large enough to switch the ALOHA computed dispersion coefficients to that representative of urban environments, which will enhance the horizontal and vertical spread of released contaminant as it is advected downwind.

The spill scenario assumed that a forklift punctured a liquid storage tank containing the chemical. Estimates are needed for three key parameters used in determining the evaporation rates (Equation E-1). These parameters are the ambient temperature (T_a), pool area, and vapor pressure. Varying stability conditions, temperatures, and wind speeds were modeled to determine worst-case emission and dispersion conditions. Unlimited mixing was assumed to be consistent with U.S. Environmental Protection Agency (EPA) models (e.g., TSCREEN, ISC) for these conservative nighttime dispersion conditions. The maximum mixing height value, set as a default in ALOHA, is 1,524 m (5,000 ft).

All of the tanks were assumed to be cylindrical in shape with the puncture hole assumed to be located near the tank bottom. Tank dimensions varied depending on the specific chemical inventories. The calculated spill quantities were conservatively assumed to be the full contents of each liquid storage container. The spilled liquid was assumed to spread out on a concrete surface, with a surface roughness of around 3 cm (1.2 in.), to a pool depth of 2.54 cm (1 in.). The final pool area and diameter were computed by assuming a circular pool with a uniform

Table E.2. Scenario meteorology[a,b]

Parameter	Day (95% temp/ 95% winds)	ARCON (95% conc., ARCON)	Night (95% temp/ 95% winds)	Sunrise/ Sunset (95% temp/ 5% winds)
T_a (K)	304.0	299.2	299.2	299.2
T_a (°F)	87.5	78.5	78.5	78.5
u_{10} (m/s)	1.3	2.2	1.3	4.7
Stability	D	F	F	D
Frequency	27%	n/a	11%	100%
z_i (m)	416	n/a	Unlimited	Unlimited
Cloud cover	7/10	Clear to 4/10	Clear to 4/10	Clear to 4/10
RH (%)	85%	65%	65%	65%
Insolation	Slight	Night	Night	Slight

[a]T_a = ambient temperature, u_{10} = wind speed at 10 m, z_i = mixing height, RH = relative humidity.

[b]z_o = surface roughness = 50 cm, season = summer.

Table E.3. Evaporative release modeling results

Chemical	MET	Maximum evaporation rate Q (kg/h)	Release duration[a] t_d (h)	SRS worker exposure @100 m (mg/m³)	Hazard distance TEEL1 Passive (km)	TEEL1 Dense (km)	TEEL2 Passive (km)	TEEL2 Dense (km)	TEEL3 Passive (km)	TEEL3 Dense (km)
Dodecane	Day	0.51	1,000		< 0.01	0.016	< 0.01	< 0.01	< 0.01	< 0.01
	ARCON	0.96	6.1	0.16	-[b]	-	-	-	-	-
	Night	0.31	2,200		0.064	0.054	0.012	0.011	< 0.01	< 0.01
Hydrazine	Day	11.5	28.8		0.41	0.84	0.13	0.26	0.05	0.1
	ARCON	17.4	19.1	2.9	-	-	-	-	-	-
	Night	8.8	37.5		0.93	1.3	0.26	0.4	0.1	0.15
Hydrazine/NaOH	Day	0.13	18,000		0.032	NA[c]	0.01	NA	< 0.010	NA
	ARCON	0.098	23,000	0.02	-	-	-	-	-	-
	Night	0.11	15,000		0.064	NA	0.020	NA	< 0.010	NA
Hydrazine/HAN	Day	30.0	69.8		0.381	NA	0.117	NA	0.045	NA
	ARCON	12.8	163.4	2.2	-	-	-	-	-	-
	Night	23.3	116.5		0.855	NA	0.233	NA	0.086	NA
Hydroxyl-amine nitrate (HAN)	Day	7.7	20.9		0.07	0.135	0.053	0.101	0.024	0.044
	ARCON	11.6	13.9	2.0	-	-	-	-	-	-
	Night	5.9	10.0		0.135	0.206	0.102	0.151	0.045	0.063
Hydrogen peroxide	Day	0.70	202.6		0.023	0.044	< 0.010	0.02	< 0.010	0.011
	ARCON	1.44	155.7	0.2	-	-	-	-	-	-
	Night	0.7	108.4		0.050	0.075	0.022	0.033	0.016	0.022
Tributyl phosphate (TBP)	Day	6.51	71.8		0.103	NA	0.079	NA	0.014	NA
	ARCON	9.81	47.7	1.7	-	-	-	-	-	-
	Night	6.6	26.1		0.233	NA	0.178	NA	0.031	NA
Nitric acid 13.6 M	Day	9.9	58.3		0.197	0.388	0.08	0.146	0.022	0.032
	ARCON	12.9	44.8	2.2	-	-	-	-	-	-
	Night	7.9	38.5		0.417	0.616	0.158	0.223	0.042	0.041
Nitric acid 2.1 M	Day	34.9	23.9		0.378	0.752	0.151	0.282	0.041	0.06
	ARCON	49.5	16.8	8.4	-	-	-	-	-	-
	Night	27.8	11.7		0.86	1.2	0.310	0.412	0.079	0.072
Nitric acid 10.1 M	Day	18.1	46.6		0.269	0.536	0.108	0.204	0.03	0.043
	ARCON	23.5	35.9	4.0	-	-	-	-	-	-
	Night	14.4	58.6		0.586	0.837	0.217	0.299	0.056	0.054

Table E.3. Continued

Chemical		Health index concentration			Downwind concentration at SRS boundary (8.2 km) (mg/m³)
		TEEL 1 (mg/m³)	TEEL 2 (mg/m³)	TEEL 3 (mg/m³)	
Dodecane	Day	7.5	60	750	< 0.7
	ARCON				-
	Night				< 0.7
Hydrazine	Day	0.7	6.6	40	0.004
	ARCON				-
	Night				0.009
Hydrazine/NaOH	Day	0.6	6	40	NS[d]
	ARCON				-
	Night				NS
Hydrazine/HAN	Day	0.6	6	40	NS
	ARCON				-
	Night				NS
Hydroxyl-amine nitrate (HAN)	Day	15	26	125	NS
	ARCON				-
	Night				NS
Hydrogen peroxide	Day	12.5	60	125	NS
	ARCON				-
	Night				NS
Tributyl phosphate (TBP)	Day	6	10	300	NS
	ARCON				-
	Night				NS
Nitric acid 13.6 M	Day	2.5	15	200	NS
	ARCON				-
	Night				0.009
Nitric acid 2.1 M	Day	2.5	15	200	0.011
	ARCON				-
	Night				0.028
Nitric acid 10.1 M	Day	2.5	15	200	NS
	ARCON				-
	Night				0.015

[a]Reported duration is based on maximum spill volume and evaporation rate. However, the ALOHA model restricts the maximum release duration to one hour. At constant wind speed, the highest concentration would occur in this first hour.

[b]"-" = not applicable.

[c]NA = not available.

[d]NS = not significant (less than 0.001 mg/m³).

depth along with the spill volume. The pool size for each of the spill scenarios ranged from 8 m^2 (hydrogen peroxide spill outside the MOX BRP building) to 435 m^2 (nitric acid spill at the WSB).

As previously mentioned, the vapor pressures, as well as other the physical properties required in estimating the evaporation rate from Equation E-1, were computed by using chemical-specific coefficients in Antione or equivalent equations, or (in the absence of temperature dependent data) obtained directly from published literature (e.g., Linde 1999; Perry and Green 1984; NIST 2001; DIPPR 1989). Adjustments for dilute solutions were accounted for by multiplying by the computed mole fraction, the ratio of the number of moles of a substance to the total amount of that substance in a mixture. The physical properties, including the mole fraction adjusted vapor pressures, and the computed chemical specific nondimensional numbers used in computing evaporation rates (e.g., Reynolds Number), are summarized in Table E.4.

Accident consequences for evaporative releases, expressed as the ambient concentration at specified downwind distances, are reported in Table E.3. These concentrations are compared with (TEEL) values, criteria levels for accidental exposures adopted by the DOE Subcommittee on Consequence Assessment and Protective Action (SCAPA) (Craig 2002). TEEL values are available for about 2,000 substances; they are derived by using a hierarchy of other available criteria values (Craig et al. 2000). If Emergency Response Planning Guidelines (ERPGs) developed by panels of toxicologists for the American Conference of Governmental Industrial Hygienists (ACGIH) are available, these are used for the TEEL values. If ERPGs are not available, TEELs usually are based on emergency planning and other guideline levels developed for the protection of workers (Craig 2002). TEEL values are developed for evaluation of different levels of effects, ranging from no or very slight adverse effects to life-threatening effects (see text box in Section 4.3.5.3 for definitions).

To assess impacts for SRS employees, concentrations greater than TEEL-3 levels at 100 m for any chemical were defined as high consequence, and levels less than TEEL-3 but greater than TEEL-2 were defined as moderate consequence. To assess impacts for the general public, SRS boundary concentrations greater than TEEL-2 levels for any chemical were defined as high consequence, and levels less than TEEL-2 but greater than TEEL-1 were defined as moderate consequence. In addition, the hazard distances (i.e., maximum distances from the release point to which chemical TEEL-1, TEEL-2, and TEEL-3 air concentrations could extend) were estimated with the ALOHA model and are listed in Table E.3.

The impacts to SRS workers, located 100 m (330 ft) from the spill, were estimated by multiplying the ARCON96 95th percentile chi/Q value (0.00061 s/m^3) by the estimated evaporation rate, assuming the same wind speed that produces the ARCON96 95th percentile chi/Q (2.2 m/s) and the 95th percentile site-specific temperature (78.5°F) derived from 5 years of data from the meteorological tower in the H-area. For evaporative releases, there would be no worker exposures above the TEEL-2 level. However, spills of hydrazine, hydrazine/HAN mixtures, and nitric acid have the potential to expose SRS employees above the TEEL-1 levels. The resulting health impacts would be temporary and mild. The 100-m (330-ft) concentration

Table E.4. Physical property data

Chemical/ property[a]	Dodecane	Nitrogen tetroxide (N_2O_4)	Nitric acid (HNO_3)	Hydrazine (H_6N_2O)	HAN[b] ($H_4N_2O_4$)
MW	170.4	92.0	63.1	50.06	96.04
ρ_l (kg/L)	0.75	1.443	1.383	1.03	1.54
ρ_v (kg/m^3)	–[c]	3.2-998.9[d]	2.012	0.95	0.981
k_m (m/s)	–	NA[e]	2.67×10^{-4} to 5.76×10^{-4}	5.26×10^{-3}	6.17×10^{-3}
D_m (m^2/s)	7.15×10^{-6}	NA	1.19×10^{-5}	1.65×10^{-5}	1.63×10^{-5}
ν_k (m^2/s)	–	NA	5.84×10^{-4}	1.28×10^{-5}	6.65×10^{-6}
P_{Vap} (Pa) (78.9 °F)	2,039	2,038.5	4,540.8 to 6,269.9[f]	1,235.5	281.5
P_{Vap} (Pa) (87.5 °F)	2,720	2,701.9	5,800.2 to 8,008.9[f]	1,637.5	373.1
N_{Sc}	–	NA	49.7	0.909	0.923
N_{sh}	–	NA	271 to 458	593	829
N_{Re}	–	NA	12,307 to 35,254	423,749	534,226

Chemical/ property[a]	Hydrazine-HAN ($H_4N_2O_4$-N_2H_4)	Hydrazine-NaOH (N_2H_4-NaOH)	Tributyl phosphate ($C_{12}H_{27}O_4P$)	Hydrogen peroxide (H_2O_2)	Chlorine (Cl)
MW	128.09	93.99	266.36	34.02	70.91
ρ_l (kg/L)	1.54[g]	2.13	0.979	1.44	1.49
ρ_v (kg/m^3)	–	–	–	2.72	4.72 to 432.5[d]
k_m (m/s)	3.82×10^{-4}	5.26×10^{-3}	8.86×10^{-4}	5.07×10^{-3}	NA
D_m (m^2/s)	–	–	–	1.62×10^{-5}	NA
ν_k (m^2/s)	–	–	–	7.92×10^{-4}	NA
P_{Vap} (Pa) (78.9 °F)	289.7	2.2	134.8	1,912.2	8.02×10^5
P_{Vap} (Pa) (87.5 °F)	379.0	2.6	135.3	1,978.0	9.37×10^5

Table E.4. Continued

Chemical/ property[a]	Hydrazine-HAN ($H_4N_2O_4$-N_2H_4)	Hydrazine-NaOH (N_2H_4-NaOH)	Tributyl phosphate ($C_{12}H_{27}O_4P$)	Hydrogen peroxide (H_2O_2)	Chlorine (Cl)
N_{Sc}	0.625	0.625	0.625	48.9	NA
N_{sh}	1,439	1,090	524	177	NA
N_{Re}	945,897	1,251,896	424,029	5,307	NA

[a]ρ_l = liquid density, ρ_v = vapor density, k_m = mass transfer coefficient, D_m = molecular diffusivity, P_{vap} = vapor pressure, ν_k = kinematic viscosity, N_{Sc} = Schmidt number, N_{Sh} = Sherwood number, N_{Re} = Reynolds number.

[b]Hydroxylamine nitrate.

[c]– = not available.

[d]Aerosol vapor mixture density from jet release is initially very high; it is diluted over time to its vapor density at ambient conditions.

[e]NA = not applicable, modeled as a pressurized release.

[f]Nitric acid (1.21 N) [4,540.8 (78.9°F), 5,800.2 (89.5°F)]; Nitric acid (7.9 N) [5,764.2 (78.9°F), 7,362.9 (89.5°F)]; Nitric acid (13.6 N) [6,269.9 (78.9°F), 8,008.9 (89.5°F)].

[g]No published value available, set equal to the HAN published density at STP.

reference level for SRS employees is consistent with the SRS Emergency Response Plan (SRS 2001), which defines the facility boundary as follows:

> "Generally, the facility boundary is the fence line for a property, protected area or a limited area, depending upon the facility. When a physical boundary is unavailable, the distance of 100 meters from the point of release or edge of the spill is used. Area/facility-specific Emergency Preparedness Hazard Assessment Documents identify facility boundaries and should be referenced."

Since the wind speed and atmospheric stability generating the upper-bound impacts for nighttime conditions were 1.3 m/s with stable conditions (i.e., PG Class F), the plume transport time or the time it would take the release to reach the nearest SRS boundary (8.2 km downwind) would be almost 2 hours. Because ALOHA restricts the maximum release duration and plume transport time to one hour or less, ALOHA impact estimates at the SRS boundary could not be made for the low wind speed assumed in the simulations. Therefore, maximum impact estimates at the SRS boundary were made by using a formula for a ground-level release producing maximum ground-level concentrations (i.e., on the plume centerline at the surface), similar to that used in ALOHA. Ground-level centerline passive plume concentrations were estimated using the following formula, derived from the standard Gaussian equation:

$C(x,0,0) = Q/\pi u \sigma_y \sigma_z$. Dense gas estimates at the fence line were estimated by increasing the wind speed from 1.3 to 2 m/s to shorten the transport time to the fence line to less than one hour. The ALOHA-estimated concentration was then multiplied by 1.3 [chi/u(2) x u(1.3)] to arrive at the estimated SRS boundary concentration. The highest concentrations at this distance occurred subsequent to transition to a purely passive plume (i.e., no negative buoyancy influences from density effects). Estimates at 100 m using the above expression compared well (no more than a 1 to 2% difference) with the ALOHA estimate at the same location.

The ALOHA estimated hazard distances are also given in Table E.3 for evaporative plumes exhibiting dense vapor cloud dispersion. These plumes disperse downwind to a transition point at which ambient air entrainment into the cloud sufficiently dilutes concentrations so that the plume continues to disperse from that point downwind as a neutrally buoyant plume. The releases considered that initially behave as dense clouds produced the largest hazard distance. The largest potential health hazard was shown to extend 1.3 km (0.8 mi) downwind for an accidental spill of 478 L (126 gal) of 35% hydrazine.

Releases of two materials, nitrogen tetroxide and chlorine, were modeled as pressurized releases. The analysis showed that these pressurized releases would potentially produce very large exposures to SRS workers at a distance of 100 m (330 ft) because the concentrated dense gas plume could extend to this distance for a short time. The concentrations within the jet plume would approach 10,000 and 1,500 mg/m^3 at 100 m (330 ft) for nitrogen tetroxide and chlorine, respectively. The TEEL-2 hazard distance for accidental releases of both substances could extend to 4 km (2.5 mi) from the release location. The high concentrations close to the source are primarily due to the release of a pressurized, two-phased vapor-aerosol, which forms a dense vapor cloud. It should be noted that building influences on the heavy vapor cloud are not accounted for in the AEROPLUME and HEGADAS simulations. Such influences on passive releases are accounted for in the WAKE model, but not the combination of building aerodynamics and density effects. The estimated 100-m (330-ft) exposure calculated with the WAKE model approached 1,600 mg/m^3 and 500 mg/m^3 for nitrogen tetroxide and chlorine, respectively. The actual concentrations would likely fall between the two modeled results for each chemical.

E.2 Radiological

Risks from radioactive materials were assessed for workers involved in facility operations ("facility workers") at the proposed MOX facility, the PDCF, and the WSB; other SRS workers outside the restricted area of the facility site ("SRS employees"); and members of the public.

E.2.1 Normal Operations

E.2.1.1 Facility Workers

For facility workers, external radiation from the direct handling of radioactive materials and/or the close working distances to radiation sources would be the primary exposure pathway. Radiation exposures through inhalation and incidental ingestion of contaminated particulates would be possible but for the average worker would be expected to be very small compared with exposures to external radiation.

Operations that could result in potential airborne radiological emissions would be conducted under fume hoods or in gloveboxes. Even if airborne releases from the gloveboxes did occur, the use of high-efficiency particulate air (HEPA) filters and protective air circulation systems would reduce the airborne pollutants in the working place to a minimal level. Exposures from inhalation could also be prevented by implementation of as-low-as-reasonably-achievable (ALARA) practices, such as requiring workers to wear respirators while performing activities with potential for generating airborne emissions. Potential exposure from incidental ingestion of particulate matter could be reduced by workers' wearing gloves and exercising good working practices.

For the proposed MOX facility, radiation exposure was estimated on the basis of exposures received during operation of a similar facility, the MELOX plant in Marcoule, France. External dose rates at the MELOX plant were extrapolated on the basis of the plutonium composition of the MELOX MOX fuel (8.5%) and proposed facility MOX fuel (5%) (DCS 2001b). Scaling was done by using the ratios of the photon and neutron intensities for the two concentrations. An annual collective external dose of 0.10 person-Sv (10 person-rem) was estimated for the processing area. An additional annual external dose of 0.02 person-Sv (2 person-rem) was assumed for the aqueous polishing area because no data were available (DCS 2001b). Thus, an annual external exposure of 0.12 person-Sv (12 person-rem) was estimated for facility workers.

Facility workers may also receive an internal dose. At the MELOX plant, from 1996 through July 2001, 41 individuals had received an internal radiation exposure: 30 had received <10% of the annual limit on intake (ALI), 10 ranging from 10% to 33.3% ALI, and 1 ranging from 33.3% to 100% ALI. With an intake of 100% ALI, an individual receives a dose of 0.05 Sv (5 rem). Because design and management measures at the MELOX plant are similar to those planned for the proposed facility, a MOX facility worker MEI may receive a dose of 0.017 Sv (1.7 rem), corresponding to a 33% ALI, in a year. The total dose of 0.13 person-Sv (13 person-rem) over this 5-year period results in an average internal dose of less than 0.03 person-Sv (3 person-rem) per year (assuming the full 50-year dose commitment in the year of exposure) (DCS 2001b). Thus, the annual collective facility worker exposure is estimated to be 0.15 person-Sv (15 person-rem), the sum of the estimated external and internal exposures.

For the PDCF and WSB, no historical operational experience is available to provide a reasonable estimate of the worker exposures. Because these two facilities would be owned and operated by the DOE, individual facility worker exposure would be maintained below 0.005 Sv/yr (0.5 rem/yr), the SRS site guideline, which is below the DOE administrative limit of 0.02 Sv/yr (2 rem/yr) (DOE 1994). However, using best practices under the ALARA principle, the average individual dose should be kept close to or lower than the average SRS radiological worker dose of 0.00048 Sv/yr (0.048 rem/yr) (DOE undated).

The information on radiation sources, worker activities, and number of required workers is subject to a large degree of uncertainty, as are the estimated collective and MEI worker doses. However, the radiation dose to the individual worker would be monitored and maintained below the NRC annual occupational total effective dose limit of 0.05 Sv (5 rem) (*Code of Federal Regulations*, Title 10, Part 20 [10 CFR 20]).

E.2.1.2 SRS Employees

Inhalation of contaminated particulates and external exposure to the plume of routine airborne releases from the plant and to soil contaminated by deposition of those airborne releases were considered for SRS employees. Because they would be located farther from the radiation sources handled in the three facilities than would facility workers, those SRS employees would not be exposed to direct external radiation from those sources. However, secondary external radiation would be possible from the deposited radionuclides on ground surfaces and from airborne radionuclides when the emission plume from the stack of the facilities passed the locations of the SRS employees.

The GENII computer code (Napier et al. 1988) was used to estimate radiological impacts to the SRS employees on the basis of emissions data shown in Table E.5. GENII has been used for the same application in several previous environmental impact statement projects, such as the *Final Waste Management Programmatic Environmental Impact Statement for Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Waste* (WM PEIS) (DOE 1997). The GENII code uses either site-specific or representative meteorological data (joint frequency data) selected to estimate the air concentrations at downwind locations. The code implements the internal dosimetry models recommended by the International Commission on Radiological Protection (ICRP) in Publication 26 (ICRP 1977) and Publication 30 (ICRP 1979). The GENII code considers the transport of radioactive material in air, soil, water, and food sources to the human body.

The SRS employee population distribution used to estimate the SRS employee dose is given in Table E.6. This distribution is centered at the proposed MOX facility and involves a total population of 13,295 site workers. A stack height of 37 m (121 ft) (as specified in Section 3.1.1 of DCS 2002a) was used as the release height for normal emissions from the proposed MOX facility. WSB emissions were included in the proposed MOX facility estimates (DCS 2002a,b). An estimated stack height of 35 m (115 ft) was used as the release height for emissions from the PDCF (LANL 1998). Five years of weather information in the form of joint frequency data (1992-1996 average [as shown in Table E.7]) was used for the air dispersion calculations. On an annual basis, the total time of external exposure to the plume and contaminated soil for all SRS employees was assumed to be 0.5 year (NRC 1977). Resuspension of contaminated soil

Table E.5. Estimated annual radiological releases from the facilities during normal operations

	Airborne releases (μCi/yr)[a]	
Isotope	**Proposed MOX facility and WSB[b]**	**PDCF[c]**
Plutonium-236	1.3×10^{-8}	9.3×10^{-11}
Plutonium-238	8.5	0.065
Plutonium-239	91	0.69
Plutonium-240	23	0.18
Plutonium-241	101	0.69
Plutonium-242	6.1×10^{-3}	4.8×10^{-5}
Americium-241	48	0.37
Uranium-234	5.1×10^{-3}	NA[d]
Uranium-235	2.1×10^{-4}	NA
Uranium-238	0.012	NA
Tritium	NA	1.1×10^{9}

[a]To convert from microcuries (μCi) to becquerels (Bq), multiply by 3.7×10^{4} (or 37,000).

[b]*Source:* DCS (2002a).

[c]*Source*: DOE (1999).

[d]NA = not applicable.

was not considered, and the soil was assumed to be previously uncontaminated. Ingestion of contaminated foodstuffs was not considered because food is not grown on-site and consumed.

The maximally exposed individual (MEI) for the SRS employees was assumed to be within the SRS boundary (but outside the facility site) at a location that would have the maximum air concentration and would thus yield the largest radiation dose. On an annual basis, the total time of annual external exposure to the plume and contaminated soil for the MEI was assumed to be 0.7 year. For the inhalation pathway, an exposure time of 1 year was assumed (NRC 1977).

E.2.1.3 Members of the Public

The GENII code was used to assess radiation exposures of members of the public outside the SRS boundaries. The exposure pathways analyzed included inhalation of contaminated particulates, external radiation from deposited radionuclides and from airborne radionuclides, and ingestion of contaminated food products (plants, meat, and dairy products). Plants grown in the area where the emission plume passed could become contaminated by deposition of

Table E.6. SRS employee population distribution centered at the proposed MOX facility on the SRS

Direction	Population by distance (mi[a])						Total
	0 to 1	1 to 2	2 to 3	3 to 4	4 to 5	5 to 10	
S	1,191	0	225	171	0	397	1,984
SSW	592	0	0	0	0	7	600
SW	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0
W	0	0	1,728	110	0	0	1,839
WNW	0	0	0	0	0	0	0
NW	0	0	0	0	2,408	897	3,305
NNW	0	0	0	0	0	0	0
N	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0
ENE	0	0	18	0	0	5	23
E	0	438	1,863	0	0	0	2,300
ESE	0	722	754	0	0	0	1,476
SE	70	101	26	0	0	25	221
SSE	282	0	0	1,164	0	100	1,547
Total	2,135	1,260	4,614	1,446	2,408	1,432	13,295

[a]To convert from miles to kilometers, multiply by 1.61.

Source: Birch (2001), Attachment A.10.

radionuclides on the leaves or ground surfaces. Radionuclides deposited on leaves could subsequently translocate to the edible portions of the plants, and those deposited on ground surfaces could subsequently be absorbed by plant roots. Livestock and their products could become contaminated if the livestock ate the contaminated surface soil and plants.

The off-site population distribution out to 80 km (50 mi), centered at F-Area, for the SRS area used in the assessment is given in Table E.8. The annual time of external exposure to the plume and contaminated soil for the general public off-site was assumed to be 0.5 year (NRC 1977). No credit for shielding was given for inhalation exposure. Ingestion parameters are provided in Table E.9. Food production data for the area surrounding the SRS are provided in Table E.10.

For the public, the location of the MEI was considered to be at the SRS boundary as a conservative assumption. Table E.11 lists the distance from the proposed MOX facility to the SRS boundary for the 16 compass directions from which the MEI was determined. Because of the close proximity of the PDCF and WSB to the proposed MOX facility, the same MEI receptor locations were used for these facilities. The annual external exposure to the plume and contaminated soil for the public off-site MEI was assumed to be 0.7 year (NRC 1977). No credit for shielding was given for inhalation exposure. Ingestion parameters are provided in Table E.9.

Table E.7. Joint frequency distribution used for calculation of receptor dose from facility air emissions

Wind speed (m/s)	Stability class	Wind direction															
		S	SSW	SW	WSW	W	WNW	NW	NNW	N	NNE	NE	ENE	E	ESE	SE	SSE
	A	0.25	0.20	0.24	0.24	0.21	0.18	0.15	0.18	0.17	0.17	0.21	0.22	0.18	0.18	0.16	0.21
	B	0	0.03	0.03	0.03	0.01	0.00	0.00	0.01	0.01	0.01	0.03	0.03	0.00	0.03	0.03	0.02
	C	0.02	0.01	0.01	0.02	0.01	0.01	0.02	0.03	0.03	0.01	0.01	0.01	0.01	0.02	0.01	0.01
0.89	D	0.01	0.02	0.00	0.02	0.02	0.01	0.01	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.03
	E	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0	0	0.00	0.00	0.00
	F	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00
	G	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00
	A	0.88	0.73	0.92	1.04	1.06	0.79	0.70	0.55	0.74	0.78	1.12	1.37	1.19	0.82	0.56	0.57
	B	0.24	0.36	0.43	0.44	0.35	0.25	0.19	0.21	0.26	0.24	0.34	0.38	0.29	0.25	0.16	0.16
	C	0.15	0.39	0.73	0.50	0.39	0.24	0.24	0.29	0.33	0.36	0.43	0.49	0.34	0.28	0.23	0.18
2.46	D	0.09	0.25	0.59	0.34	0.31	0.27	0.34	0.37	0.42	0.39	0.38	0.33	0.30	0.22	0.26	0.21
	E	0.01	0.09	0.28	0.11	0.08	0.16	0.17	0.18	0.26	0.22	0.19	0.20	0.13	0.13	0.11	0.13
	F	0.01	0.02	0.02	0.01	0.00	0.03	0.02	0.03	0.03	0.03	0.02	0.05	0.00	0.01	0.02	0.04
	G	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	A	1.03	0.66	0.53	0.50	0.44	0.30	0.26	0.20	0.37	0.43	0.60	0.70	0.71	0.48	0.24	0.36
	B	0.21	0.57	0.65	0.67	0.32	0.23	0.16	0.19	0.31	0.33	0.55	0.75	0.55	0.36	0.16	0.18
	C	0.16	0.69	1.49	0.86	0.67	0.44	0.42	0.42	0.52	0.58	0.74	0.78	0.78	0.57	0.27	0.14
4.47	D	0.12	0.52	1.64	0.95	0.81	0.70	0.84	1.12	1.48	1.05	1.26	1.27	1.01	0.88	0.50	0.20
	E	0.06	0.64	1.08	0.81	0.62	0.62	0.82	0.98	1.20	1.10	1.06	1.12	0.63	0.47	0.42	0.24
	F	0.02	0.22	0.19	0.07	0.10	0.16	0.18	0.17	0.22	0.16	0.21	0.27	0.07	0.06	0.05	0.06
	G	0.00	0.02	0.01	0.00	0.00	0.01	0.01	0.01	0.02	0.01	0.01	0.02	0.00	0.00	0.00	0.00
	A	0.21	0.18	0.03	0.03	0.01	0.02	0.02	0.01	0.02	0.04	0.05	0.10	0.09	0.11	0.03	0.09
	B	0.02	0.17	0.12	0.04	0.04	0.03	0.05	0.04	0.04	0.09	0.18	0.31	0.46	0.34	0.09	0.03
	C	0.00	0.18	0.46	0.21	0.08	0.09	0.16	0.22	0.20	0.29	0.41	0.46	0.73	0.62	0.13	0.01
6.93	D	0.00	0.09	0.19	0.08	0.05	0.06	0.13	0.46	0.43	0.24	0.24	0.12	0.13	0.11	0.07	0.00
	E	0.00	0.09	0.06	0.09	0.07	0.05	0.05	0.09	0.13	0.10	0.19	0.07	0.02	0.02	0.01	0.00
	F	0.00	0.04	0.02	0.03	0.01	0.03	0.02	0.01	0.01	0.01	0.03	0.02	0.01	0.00	0.00	0.00
	G	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	A	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.02	0.00	0.01
	B	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.03	0.08	0.06	0.01	0.00
	C	0.00	0.01	0.00	0.00	0.01	0.00	0.01	0.04	0.04	0.05	0.05	0.08	0.18	0.10	0.02	0.00
9.61	D	0.00	0.00	0.00	0	0.00	0.00	0.00	0.03	0.02	0.02	0.01	0.00	0.02	0.00	0.00	0.00
	E	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
	F	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	G	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table E.7. Continued

Wind speed (m/s)	Stability class	Wind direction															
		S	SSW	SW	WSW	W	WNW	NW	NNW	N	NNE	NE	ENE	E	ESE	SE	SSE
	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11.2	D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	E	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	G	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Source: DCS (2002a).

Table E.8. Projected off-site population distribution at the SRS for the public for the year 2030

Direction	Population by distance (miles[a])						Total
	0 to 5	5 to 10	10 to 20	20 to 30	30 to 40	40 to 50	
S	0	0	920	2696	11,367	6,013	20,996
SSW	0	15	1,317	3,692	8,115	4,376	17,515
SW	0	186	1,978	7,732	3,535	4,579	18,010
WSW	0	171	2,572	7,553	4,368	10,385	25,049
W	0	407	10,186	17,766	15,109	11,753	55,221
WNW	0	2,331	8,556	219,212	54,849	24,980	309,928
NW	0	1,861	25,692	137,243	15,851	5,567	186,214
NNW	0	1,978	33,320	18,925	11,627	5,648	71,498
N	0	3,500	36,210	15,530	11,294	17,670	84,204
NNE	0	397	3,010	3,515	6,925	28,857	42,704
NE	0	14	2,609	4,611	8,850	19,325	35,409
ENE	0	0	5,535	7,865	8,764	53,785	75,949
E	0	2	8,061	8,590	18,423	9,310	44,386
ESE	0	14	3,658	4,352	5,466	488	13,978
SE	0	0	951	7,673	7,409	17,619	33,652
SSE	0	0	615	1,154	1767	4,234	7,770
Total	0	10,876	145,190	468,109	193,719	224,589	1,042,483

[a]To convert from miles to kilometers, multiply by 1.61.

Source: DCS (2002a).

E.2.2 Accidents

For the proposed MOX facility, four accident events were considered for detailed analysis, as discussed in Section 4.3.5.1. In each case, the amount of material released to the atmosphere was determined by multiplying the amount of material present (material at risk [MAR]) by the fraction of material involved in the event (damage ratio), fraction of material released that is airborne and respirable, and the fraction of material transported through a confinement mechanism (leak path factor). The values used for these parameters and the initial amount of plutonium material assumed to be present for each accident considered are given in Table E.12. Table E.13 lists the activity by radionuclide estimated to be released to the environment for each hypothetical accident.

Accident events considered for the PDCF and the WSB were discussed in Section 4.3.5.1. Six accident events were considered for the PDCF as taken from DOE (1999). Three accident events for the WSB were considered (DCS 2002a,b; Bowling 2002; DCS 2003b). Table E.13 lists the activity by radionuclide estimated to be released to the environment for each hypothetical accident.

Table E.9. Ingestion parameters used in GENII for calculation of radiological exposure of the public for normal and accidental air emissions

Parameter	Value: Maximally exposed individual	Value: Population
Terrestrial food		
Consumption rate (kg/yr)[a]		
Leafy vegetables	43	21
Root vegetables	92	66
Fruit	120	60
Grain	64	67
Crop yield (kg/m²)[b]		
Leafy vegetables	1.5	1.5
Root vegetables	4	4
Fruit	2	2
Grain	0.8	0.8
Hold time between harvest and storage (days)[b]		
Leafy vegetables	1	14
Root vegetables	5	14
Fruit	5	14
Grain	180	180
Animal products		
Consumption rate (kg/yr)		
Beef[a]	81	43
Milk[a]	230	120
Poultry[b]	18	8.5
Eggs[b]	30	20
Holdup time (days)[b]		
Beef	15	34
Milk	1	3
Poultry	1	34
Eggs	1	18
Production rate (kg/yr)	NA[c]	-[d]
Diet fraction for animal food sources[b]		
Stored feed		
Beef	0.25	0.25
Milk	0.25	0.25
Poultry	1	1
Eggs	1	1
Fresh forage		
Beef	0.75	0.75
Milk	0.75	0.75

Table E.9. Continued

Parameter	Value: Maximally exposed individual	Value: Population
Growing time for animal food sources (days)[b]		
Stored feed		
Beef	90	90
Milk	45	45
Poultry	90	90
Eggs	90	90
Fresh forage		
Beef	45	45
Milk	30	30
Yield of animal food sources (kg/m^3)[b]		
Stored feed		
Beef	0.8	0.8
Milk	2	2
Poultry	0.8	0.8
Eggs	0.8	0.8
Fresh forage		
Beef	2	2
Milk	1.5	1.5
Storage time for animal food sources (days)[b]		
Stored feed		
Beef	180	180
Milk	100	100
Poultry	180	180
Eggs	180	180
Fresh forage		
Beef	100	100
Milk	0	0

[a]*Source*: Arnett and Mamatey (2001).

[b]GENII default values.

[c]NA = not applicable.

[d]See Section E.1.3 and Table E.8.

Table E.10. Food production data used in GENII for calculation of radiological ingestion exposure of the public for normal and accidental air emissions

Product/ direction	Production (kg/yr) by distance (mi[a])					
	0 to 5	5 to 10	10 to 20	20 to 30	30 to 40	40 to 50
Leafy vegetables						
S	0	0	0	0	0	1.0×10^5
SSW	0	0	0	0	0	1.0×10^5
SW	0	3.4×10^5	0	0	0	1.1×10^3
WSW	0	3.7×10^2	3.3×10^1	0	1.6×10^3	8.8×10^3
W	0	1.3×10^3	1.3×10^2	0	2.8×10^3	4.1×10^3
WNW	0	1.4×10^3	3.4×10^3	0	0	0
NW	0	1.4×10^3	6.3×10^3	4.7×10^3	0	0
NNW	0	1.3×10^3	6.9×10^3	8.7×10^3	8.6	2.4×10^3
N	0	1.1×10^3	6.9×10^3	1.2×10^4	1.1×10^4	4.8×10^4
NNE	0	5.9×10^2	6.9×10^3	1.2×10^4	3.1×10^5	9.6×10^5
NE	0	4.6×10^1	6.0×10^3	3.1×10^4	2.5×10^5	7.7×10^5
ENE	0	0	7.6	3.2×10^4	1.6×10^5	2.1×10^5
E	0	0	0	0	2.3×10^4	1.3×10^5
ESE	0	0	0	0	0	1.0×10^5
SE	0	0	0	0	0	1.0×10^5
SSE	0	0	0	0	0	1.0×10^5
Root vegetables						
S	0	0	1.8×10^6	3.1×10^6	4.1×10^6	6.3×10^6
SSW	0	3.1×10^3	2.1×10^6	3.4×10^6	4.3×10^6	6.7×10^6
SW	0	9.7×10^7	2.2×10^6	3.6×10^6	4.8×10^6	5.8×10^6
WSW	0	1.1×10^5	2.1×10^6	3.6×10^6	5.3×10^6	8.0×10^6
W	0	1.8×10^5	2.3×10^5	1.3×10^6	3.4×10^6	4.4×10^6
WNW	0	1.9×10^5	5.0×10^5	1.1×10^5	5.4×10^4	3.2×10^5
NW	0	2.0×10^5	8.8×10^5	8.2×10^5	4.0×10^5	1.4×10^5
NNW	0	1.9×10^5	9.6×10^5	1.3×10^6	7.3×10^5	1.2×10^6
N	0	1.5×10^5	9.6×10^5	1.6×10^6	1.7×10^6	2.4×10^6
NNE	0	8.1×10^4	9.6×10^5	1.6×10^6	2.5×10^6	3.8×10^6
NE	0	6.3×10^3	1.2×10^6	2.6×10^6	4.2×10^6	5.1×10^6
ENE	0	0	3.4×10^6	6.3×10^6	7.8×10^6	9.9×10^6
E	0	0	3.6×10^6	6.3×10^6	7.9×10^6	1.0×10^7
ESE	0	0	3.3×10^6	6.6×10^6	8.4×10^6	5.3×10^6
SE	0	0	6.4×10^7	6.8×10^6	8.8×10^6	9.2×10^6
SSE	0	0	3.8×10^7	3.0×10^7	6.7×10^6	7.8×10^6
Fruit						
S	0	0	3.9×10^5	1.1×10^6	1.7×10^6	2.5×10^6
SSW	0	6.9×10^2	4.5×10^5	8.7×10^5	1.4×10^6	2.3×10^6
SW	0	3.3×10^7	4.8×10^5	7.9×10^5	1.2×10^6	1.2×10^6
WSW	0	4.4×10^4	4.7×10^5	7.9×10^5	1.0×10^6	8.8×10^5
W	0	1.1×10^5	4.5×10^4	2.7×10^5	4.4×10^5	3.9×10^5
WNW	0	1.2×10^5	2.8×10^5	1.1×10^3	2.3×10^2	1.3×10^3
NW	0	1.2×10^5	5.3×10^5	2.8×10^6	6.6×10^6	2.2×10^6
NNW	0	1.1×10^5	5.8×10^5	2.8×10^6	1.2×10^7	1.4×10^7
N	0	9.0×10^4	5.8×10^5	9.7×10^5	5.1×10^6	4.8×10^6
NNE	0	4.9×10^4	5.8×10^5	9.7×10^5	1.0×10^6	7.4×10^5
NE	0	3.9×10^3	5.3×10^5	8.9×10^5	1.0×10^6	7.5×10^5
ENE	0	0	2.5×10^5	4.9×10^5	8.5×10^5	1.1×10^6

Table E.10. Continued

Product/ direction	Production (kg/yr) by distance (mi[a])					
	0 to 5	5 to 10	10 to 20	20 to 30	30 to 40	40 to 50
E	0	0	2.6×10^5	3.4×10^5	1.6×10^5	7.0×10^5
ESE	0	0	2.4×10^5	4.0×10^5	1.8×10^5	5.6×10^4
SE	0	0	4.3×10^6	3.1×10^5	3.7×10^5	3.1×10^5
SSE	0	0	2.6×10^6	2.0×10^6	1.1×10^6	1.0×10^6
Grains						
S	0	0	2.6×10^6	7.4×10^6	1.1×10^7	1.5×10^7
SSW	0	4.5×10^3	2.9×10^6	6.0×10^6	1.1×10^7	1.4×10^7
SW	0	1.1×10^8	3.1×10^6	5.1×10^6	8.2×10^6	1.0×10^7
WSW	0	1.4×10^5	3.0×10^6	5.1×10^6	8.1×10^6	1.5×10^7
W	0	2.1×10^5	6.4×10^5	2.2×10^6	6.1×10^6	7.9×10^6
WNW	0	2.2×10^5	7.6×10^5	7.2×10^5	2.6×10^5	6.5×10^5
NW	0	2.2×10^5	1.0×10^6	1.2×10^6	7.5×10^5	3.3×10^5
NNW	0	2.1×10^5	1.1×10^6	1.6×10^6	1.3×10^6	2.0×10^6
N	0	1.7×10^5	1.1×10^6	1.8×10^6	2.3×10^6	4.1×10^6
NNE	0	9.3×10^4	1.1×10^6	1.8×10^6	2.7×10^6	3.6×10^6
NE	0	7.3×10^3	1.3×10^6	3.6×10^6	6.1×10^6	6.9×10^6
ENE	0	0	4.0×10^6	8.7×10^6	1.4×10^7	1.8×10^7
E	0	0	4.2×10^6	9.0×10^6	1.6×10^7	1.9×10^7
ESE	0	0	3.9×10^6	8.9×10^6	1.6×10^7	1.2×10^7
SE	0	0	8.2×10^7	1.1×10^7	1.5×10^7	1.7×10^7
SSE	0	0	5.2×10^7	5.2×10^7	1.3×10^7	1.6×10^7
Beef						
S	0	0	1.2×10^5	4.6×10^5	7.3×10^5	9.9×10^5
SSW	0	2.2×10^2	1.5×10^5	3.4×10^5	6.9×10^5	9.3×10^5
SW	0	6.0×10^4	1.5×10^5	2.5×10^5	4.6×10^5	6.1×10^5
WSW	0	1.0×10^4	1.5×10^5	2.5×10^5	4.1×10^5	7.9×10^5
W	0	2.1×10^4	4.0×10^4	1.2×10^5	3.4×10^5	5.1×10^5
WNW	0	2.2×10^4	7.0×10^4	5.0×10^4	9.5×10^4	1.8×10^5
NW	0	2.3×10^4	1.1×10^5	1.4×10^5	1.6×10^5	2.1×10^5
NNW	0	2.2×10^4	1.1×10^5	1.8×10^5	2.3×10^5	3.5×10^5
N	0	1.7×10^4	1.1×10^5	1.9×10^5	3.1×10^5	6.5×10^5
NNE	0	9.6×10^3	1.1×10^5	1.9×10^5	2.5×10^5	2.9×10^5
NE	0	7.5×10^2	1.0×10^5	2.6×10^5	4.3×10^5	5.0×10^5
ENE	0	0	2.4×10^4	2.2×10^5	8.2×10^5	1.1×10^6
E	0	0	2.6×10^4	1.4×10^5	5.2×10^5	8.8×10^5
ESE	0	0	2.4×10^4	8.2×10^4	3.4×10^5	4.5×10^5
SE	0	0	4.8×10^5	6.4×10^4	2.0×10^5	5.2×10^5
SSE	0	0	3.6×10^5	5.8×10^5	4.3×10^5	6.7×10^5
Poultry						
S	0	0	0	0	0	5.4×10^4
SSW	0	0	0	0	0	6.7×10^4
SW	0	4.7×10^7	0	0	0	4.5×10^1
WSW	0	5.1×10^4	4.5×10^3	0	6.1×10^1	3.5×10^2
W	0	1.7×10^5	1.8×10^4	0	1.1×10^2	1.6×10^2
WNW	0	1.9×10^5	4.6×10^5	0	0	5.1×10^3
NW	0	1.9×10^5	8.6×10^5	6.4×10^5	0	3.0×10^5
NNW	0	1.8×10^5	9.4×10^5	1.2×10^6	1.2×10^3	5.4×10^5
N	0	1.5×10^5	9.4×10^5	1.6×10^6	1.7×10^6	3.6×10^6
NNE	0	8.0×10^4	9.4×10^5	1.6×10^6	1.3×10^6	5.4×10^3

Table E.10. Continued

Product/ direction	Production (kg/yr) by distance (mi[a])					
	0 to 5	5 to 10	10 to 20	20 to 30	30 to 40	40 to 50
NE	0	6.3×10^3	8.2×10^5	1.2×10^6	9.7×10^5	0
ENE	0	0	1.1×10^3	0	0	0
E	0	0	0	0	0	1.0×10^5
ESE	0	0	0	0	0	1.0×10^5
SE	0	0	0	0	0	1.0×10^5
SSE	0	0	0	0	0	1.0×10^5
Milk						
S	0	0	5.5×10^5	6.2×10^5	6.5×10^5	7.6×10^5
SSW	0	9.7×10^2	6.4×10^5	2.9×10^6	7.9×10^6	8.1×10^6
SW	0	3.2×10^6	6.7×10^5	1.1×10^6	3.8×10^6	2.9×10^6
WSW	0	2.2×10^4	6.6×10^5	1.1×10^6	2.0×10^6	4.4×10^6
W	0	1.2×10^4	4.9×10^4	3.8×10^5	1.8×10^6	3.5×10^6
WNW	0	1.3×10^4	3.1×10^4	0	4.7×10^4	1.2×10^6
NW	0	1.3×10^4	5.8×10^4	4.4×10^5	1.1×10^6	7.9×10^5
NNW	0	1.2×10^4	6.4×10^4	4.3×10^5	2.0×10^6	3.3×10^6
N	0	9.9×10^3	6.4×10^4	1.1×10^5	1.9×10^6	7.4×10^6
NNE	0	5.4×10^3	6.4×10^4	1.1×10^5	3.9×10^5	9.7×10^6
NE	0	4.2×10^2	5.5×10^4	6.9×10^5	1.7×10^6	1.8×10^6
ENE	0	0	7.0×10^1	1.1×10^6	4.6×10^6	5.6×10^6
E	0	0	0	9.6×10^5	4.2×10^6	5.7×10^6
ESE	0	0	0	3.2×10^5	2.6×10^6	1.6×10^6
SE	0	0	2.4×10^4	1.2×10^4	4.2×10^4	1.2×10^5
SSE	0	0	2.0×10^5	3.2×10^5	3.5×10^5	3.9×10^5
Eggs						
S	0	0	6.3×10^2	0	0	8.3×10^4
SSW	0	0	0	0	0	1.0×10^5
SW	0	6.2×10^5	0	0	0	9.1×10^1
WSW	0	0	0	0	1.2×10^2	7.0×10^2
W	0	0	0	0	2.2×10^2	3.3×10^2
WNW	0	0	0	0	0	1.0×10^5
NW	0	0	0	1.2×10^5	3.2×10^5	1.1×10^5
NNW	0	0	0	1.0×10^5	5.9×10^5	6.4×10^5
N	0	0	0	0	1.7×10^5	2.9×10^1
NNE	0	0	0	0	0	1.0×10^5
NE	0	0	4.1×10^3	4.0×10^3	1.6×10^2	1.2×10^2
ENE	0	0	4.3×10^4	5.5×10^4	5.0×10^2	6.3×10^2
E	0	0	4.5×10^4	5.6×10^4	7.1×10^1	4.0×10^2
ESE	0	0	4.2×10^4	5.8×10^4	1.2×10^2	0
SE	0	0	6.3×10^5	1.2×10^3	0	0
SSE	0	0	3.1×10^5	0	0	0

[a]To convert from miles to kilograms, multiply by 1.61.

Source: DCS (2002a).

E.2.2.1 SRS Employees

Table E.11. Centerline distance to site boundary from the proposed MOX facility stack for the primary 16 compass directions

Direction	Distance (m)
S	20,480
SSW	17,700
SW	12,130
WSW	15,000
W	9,490
WNW	9,930
NW	9,070
NNW	9,720
N	10,680
NNE	13,060
NE	16,520
ENE	19,040
E	19,150
ESE	20,030
SE	21,130
SSE	20,580

SRS employees downwind of an accident might be exposed to airborne radioactive contamination. Exposure would result primarily from external radiation from the radioactive contamination in the passing plume (cloudshine) released from the accident location and inhalation of the airborne contaminants. Short-term exposure to external radiation from ground-deposited radionuclides (groundshine) might also occur.

The GENII computer code (Napier et al. 1988) was also used to assess the radiological impacts to the sitewide population of SRS employees for each accident considered. The SRS employee population distribution used for the accident analysis is given in Table E.6, and the joint-frequency weather data are given in Table E.7. A ground-level release (1-m [3.3-ft] release height) was assumed for all accidents. To provide a conservative estimate for the impacts, 95% meteorology (meteorological conditions that produce impacts that are not exceeded 95% of the time) was used. Employees were assumed to be unshielded during passage of the contaminant plume from an accident. Both the inhalation and external exposure pathways were considered. Further external exposure to ground contamination for a period of 5.6 hours (8 hours with a shielding factor of 0.7) after the accident was also considered. Resuspension of contaminated soil was not considered, and the soil was assumed to be previously uncontaminated. Ingestion of contaminated foodstuffs was not considered because food is not grown on-site and consumed. Accident impacts to the SRS employee population are presented in Section 4.3.5.2 (see Table 4.13).

Table E.12. Source terms for detailed accident analyses

Hypothetical accident event	Quantity of plutonium at risk (kg)	Damage ratio	Respirable release fraction	Leak path factor
Internal fire	62 (polished)	1	0.0006	0.0001
Load handling	254 (polished)	1	0.0006	0.0001
Explosion	75 (unpolished)	1	0.01	0.0001
Criticality	41.5 (unpolished)	1	0.0005[a]	0.0001[b]

[a]For particulate matter, respirable release fraction = 1 for gases.

[b]For particulate matter, leak path factor = 1 for gases.

Sources: DCS (2002a, 2004a); Brown (2001).

Table E.13. Radionuclide quantities (Ci)[a] released to the atmosphere for each accident type

	Proposed MOX facility				WSB		
Isotope	Internal fire	Load handling	Explosion	Criticality	Loss of confinement	Fire	Earthquake
Pu-238	2.2×10^{-5}	9.2×10^{-5}	4.5×10^{-4}	6.0×10^{-13}	1.2×10^{-5}	2.4×10^{-4}	2.5×10^{-4}
Pu-239	1.9×10^{-4}	7.7×10^{-4}	3.8×10^{-3}	5.0×10^{-12}	8.0×10^{-5}	1.6×10^{-3}	1.6×10^{-3}
Pu-240	4.6×10^{-5}	1.9×10^{-4}	9.2×10^{-4}	1.3×10^{-12}	3.0×10^{-5}	5.7×10^{-4}	6.0×10^{-4}
Pu-241	3.4×10^{-3}	1.4×10^{-2}	6.8×10^{-2}	9.0×10^{-11}	1.4×10^{-3}	2.8×10^{-2}	3.0×10^{-2}
Pu-242	1.3×10^{-8}	5.3×10^{-8}	2.6×10^{-7}	3.5×10^{-16}	NA[b]	NA	NA
Am-241	NA	NA	2.0×10^{-3}	2.1×10^{-12}	NA	NA	NA
U-234	NA	NA	NA	NA	5.2×10^{-4}	1.0×10^{-2}	1.1×10^{-2}
U-235	NA	NA	NA	NA	9.2×10^{-6}	1.8×10^{-4}	1.9×10^{-4}
U-238	NA	NA	NA	NA	1.4×10^{-4}	2.7×10^{-3}	2.9×10^{-3}
Kr-83m	NA	NA	NA	1.1×10^{2}	NA	NA	NA
Kr-85m	NA	NA	NA	7.1×10^{1}	NA	NA	NA
Kr-85	NA	NA	NA	8.4×10^{-4}	NA	NA	NA
Kr-87	NA	NA	NA	4.3×10^{2}	NA	NA	NA
Kr-88	NA	NA	NA	2.3×10^{2}	NA	NA	NA
Kr-89	NA	NA	NA	1.3×10^{4}	NA	NA	NA
Xe-131m	NA	NA	NA	1.0×10^{-1}	NA	NA	NA
Xe-133m	NA	NA	NA	2.2	NA	NA	NA
Xe-133	NA	NA	NA	2.7×10^{1}	NA	NA	NA
Xe-135m	NA	NA	NA	3.3×10^{3}	NA	NA	NA
Xe-135	NA	NA	NA	4.1×10^{2}	NA	NA	NA
Xe-137	NA	NA	NA	4.9×10^{4}	NA	NA	NA
Xe-138	NA	NA	NA	1.1×10^{4}	NA	NA	NA
Te-134	NA	NA	NA	NA	NA	NA	NA
I-131	NA	NA	NA	2.8	NA	NA	NA
I-132	NA	NA	NA	2.9×10^{2}	NA	NA	NA
I-133	NA	NA	NA	4.1×10^{1}	NA	NA	NA
I-134	NA	NA	NA	1.1×10^{3}	NA	NA	NA
I-135	NA	NA	NA	1.1×10^{2}	NA	NA	NA
H-3	NA	NA	NA	NA	NA	NA	NA

Table E.13. Continued

	PDCF					
Isotope	Criticality	Earthquake	Explosion	Fire	Leak/spill	Tritium release
Pu-238	NA	2.62×10^{-6}	2.15×10^{-5}	8.06×10^{-8}	2.62×10^{-8}	NA
Pu-239	3.5×10^{-8}	2.22×10^{-5}	1.82×10^{-4}	6.82×10^{-7}	2.21×10^{-7}	NA
Pu-240	3.3×10^{-8}	5.43×10^{-6}	4.45×10^{-5}	1.67×10^{-7}	5.40×10^{-8}	NA
Pu-241	8.3×10^{-7}	4.04×10^{-4}	3.31×10^{-3}	1.24×10^{-5}	4.00×10^{-6}	NA
Pu-242	6.1×10^{-11}	1.55×10^{-9}	1.27×10^{-8}	4.76×10^{-11}	1.53×10^{-11}	NA
Am-241	2.0×10^{-7}	1.20×10^{-5}	9.82×10^{-5}	3.68×10^{-7}	1.18×10^{-7}	NA
U-234	NA	NA	NA	NA	NA	NA
U-235	NA	NA	NA	NA	NA	NA
Kr-83m	1.3	NA	NA	NA	NA	NA
Kr-85m	3.0	NA	NA	NA	NA	NA
Kr-85	NA	NA	NA	NA	NA	NA
Kr-87	1.9×10^{1}	NA	NA	NA	NA	NA
Kr-88	5.5×10^{1}	NA	NA	NA	NA	NA
Kr-89	NA	NA	NA	NA	NA	NA
Xe-131m	NA	NA	NA	NA	NA	NA
Xe-133m	NA	NA	NA	NA	NA	NA
Xe-133	4.5×10^{-1}	NA	NA	NA	NA	NA
Xe-135m	2.8×10^{1}	NA	NA	NA	NA	NA
Xe-135	8.0	NA	NA	NA	NA	NA
Xe-137	NA	NA	NA	NA	NA	NA
Xe-138	3.5×10^{2}	NA	NA	NA	NA	NA
Te-134	2.1×10^{1}	NA	NA	NA	NA	NA
I-131	4.3×10^{-2}	NA	NA	NA	NA	NA
I-132	3.5×10^{-1}	NA	NA	NA	NA	NA
I-133	7.5×10^{-1}	NA	NA	NA	NA	NA
I-134	9.5	NA	NA	NA	NA	NA
I-135	2.5	NA	NA	NA	NA	NA
H-3	NA	NA	NA	NA	NA	1.90×10^{5}

[a]To convert from curies (Ci) to becquerels (Bq), multiply by 3.7×10^{10}.

[b]NA = not applicable.

Radiological impacts to an MEI of the SRS employee population were assessed by assuming that the MEI was located outside the facility boundary, 100 m (330 ft) from the accident location. Inhalation exposure and external exposure from the passing radioactive cloud were evaluated. The ARCON96 computer code (Ramsdell and Simonen 1997) was used to estimate contaminant air concentrations at the MEI receptor location following an accidental release. ARCON96 was designed to model air dispersion in the vicinity of buildings. The code uses hourly meteorological data in order to estimate relative air concentrations of atmospheric releases. Ten years, 1987 to 1996, of hourly meteorological data and a building area of 6,580 m^2 (70,825 ft^2) (DCS 2001a) were used as input to the code. The 95th percentile relative concentration, the air concentration that is more than what might be expected 95% of the time, in any given direction for the 0- to 2-hour averaging period was conservatively used to estimate impacts. This 95th percentile relative concentration was calculated to be 6.1×10^{-4} s/m^3.

An inhalation rate of 3.47×10^{-4} m^3/s (NRC 1972), which includes consideration of an 8-hour shift, was then used in conjunction with inhalation dose conversion factors from Federal Guidance Report (FGR) 11 (Eckerman et al. 1988) to estimate inhalation exposure. The most conservative (largest) dose conversion factor among the clearance classes for each radionuclide was used. For external exposure, the external dose conversion factors from FGR 12 (Eckerman and Ryman 1993) were used. Estimated impacts to the SRS employee MEI are presented in Table 4.13 (Chapter 4) of this EIS. With the exception of the criticality accidents, inhalation exposure was the dominant impact. External exposure to cloudshine from the passing radioactive cloud after the criticality accident accounted for approximately 93% of the estimated dose to the MEI.

E.2.2.2 Members of the Public

Radiation exposures to members of the off-site public were assessed for hypothetical accidental releases. Impacts from a short-term exposure and one-year exposures (with and without ingestion) were evaluated for each accident. Exposure pathways evaluated for short-term exposures were inhalation, cloudshine, and groundshine. For 1-year exposures with ingestion, ingestion of contaminated crops was considered in addition to the short-term exposure pathways.

The GENII computer code (Napier et al. 1988) was used to assess the radiological impacts to the collective off-site population (members of the public) for each accident considered. The off-site population distribution used for the accident analysis is given in Table E.8, and the joint-frequency weather data are given in Table E.7. A ground-level release (1-m [3.3-ft] release height) was assumed for all accidents. To provide a conservative estimate for the impacts, 95% meteorology (weather conditions that produce impacts that are not exceeded 95% of the time) was used. For the short-term exposure, no credit was given for shielding for the inhalation and external exposures to the passing airborne plume. Exposure to groundshine was evaluated for 8 hours, but a shielding factor of 0.5 (NRC 1977) was used.

For the 1-year exposure periods, the length of time of external exposure to contaminated soil was 0.5 year (NRC 1977), and no credit was given for shielding for the inhalation exposure and external exposure to the passing airborne plume. For the 1-year exposure period with ingestion, ingestion parameters are provided in Table E.9. Food production data for the area surrounding the SRS are provided in Table E.10. The estimated impacts for each accident in the short term and after 1 year of exposure are presented in Table 4.14 (Chapter 4). No mitigative actions were assumed.

Accident impacts to an MEI member of the public were determined using the GENII code for both short-term and 1-year exposures following an accidental release. Potential MEIs were assumed to live at the site boundary, one at each of the 16 compass directions, as given in Table E.11. Exposure pathways considered in the analysis included inhalation, external exposure from the passing plume and contaminated soil, and, in the case for 1-year exposure with ingestion, ingestion of contaminated foodstuffs. The same release height and meteorology conditions as used for the population accident impacts were used for the MEI analysis. The amount of time of external exposure to contaminated soil was 8 hours (with a 0.7 shielding factor) and 0.7 year (NRC 1977) for the short-term and 1-year exposure periods, respectively. No credit for shielding was given for the inhalation and external exposures to the passing airborne plume. As a conservative assumption, potential MEIs were assumed to consume locally grown food for the 1-year exposure period with ingestion. Ingestion parameters are provided in Table E.9. The estimated impacts for each accident are given in Table 4.15 (Chapter 4) for the short-term and 1-year exposure periods. No mitigative actions were assumed.

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Appendices F through L

Final Report

U.S. Nuclear Regulatory Commission
Office of Nuclear Material Safety and Safeguards
Washington, DC 20555-0001

NUREG-1767, Vol. 2

Environmental Impact Statement on the Construction and Operation of a Proposed Mixed Oxide Fuel Fabrication Facility at the Savannah River Site, South Carolina

Appendices F through L

Final Report

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Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

APPENDIX F:

AIR QUALITY IMPACT ASSESSMENT

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F.1 Introduction

Air quality impacts are generally assessed by determining the concentrations of pollutants in the air caused by the major sources associated with an action. For an action proposed for the future, the assessment is based on projected pollutant concentrations determined by computer modeling. This projection involves three steps. First, the emissions of the sources are calculated. Most frequently, this calculation requires knowing the activity level of the source and applying an appropriate set of emission factors that specify the quantity of air pollutants emitted per unit of activity.

In the second step, the pollutant concentrations in the air associated with these emissions are determined for various locations (receptors) by using an air quality model. The model uses information on the emissions along with meteorological conditions, source and receptor elevations, and source characteristics to estimate concentrations. Meteorological conditions included in these calculations are ambient temperature, wind speed and direction, mixing heights, and atmospheric stability. Source characteristics include location, temperature, diameter, exit velocity, and height for stacks; size and orientation for area sources; and initial horizontal and vertical dispersions for volume sources.

Finally, the modeled concentrations are compared with standard measures of impact, typically ambient air quality standards set by regulatory agencies, such as the National Ambient Air Quality Standards (NAAQS) or state standards and Prevention of Significant Deterioration (PSD) increments. The standards and increments depend on the averaging time, with periods of 1, 3, 8, and 24 hours, and annual being specified in the NAAQS. The air quality model uses hourly emissions and meteorological data and can be executed to produce concentrations for periods corresponding to the selected impact measures.

For the Mixed Oxide Fuel Fabrication Facility (proposed MOX facility), the Pit Disassembly and Conversion Facility (PDCF), and the Waste Solidification Building (WSB), air emissions from construction activities and operations were estimated on the basis of standard references and site-specific data or were taken from previous work on the facilities. Ambient concentrations were then computed with a model recommended by the U.S. Environmental Protection Agency (EPA). Five years of meteorological data taken at locations near the Savannah River Site (SRS) were used in the modeling. Pollutant concentrations at the SRS boundary and at off-site receptor locations were modeled. Section F.2 discusses estimating emissions associated with the facility; Section F.3 discusses the air quality model, its data input, and modeling assumptions.

F.2 Emission Estimates

This section discusses the methods used to calculate emissions projected to be associated with construction and operation of the facility.

F.2.1 Construction Emissions

Construction fugitive dust, emissions from the concrete batch plant, and exhaust emissions from construction equipment were modeled for the construction phase. Emissions from fuel storage, refueling construction equipment, and worker and delivery vehicles were not modeled. Because of the low volatility of diesel fuel, emissions from storing diesel fuel and refueling construction equipment would be negligible. Emissions from worker and delivery vehicles would be dispersed along roadways around the site and would have lesser impacts than emissions from the limited construction area.

The activity levels, associated emission factors, and other data used to calculate emissions for the construction sources are shown in Table F.1. Construction of the proposed MOX facility is expected to disturb about 39 ha (96 acres), of which 28 ha (69 acres) would be located on the proposed MOX facility site itself, be contiguous to the site, or be used for fill on the PDCF site during proposed MOX facility construction (DCS 2002a). The remaining 11 ha (27 acres) would be used for ancillary activities, such as road work and utility corridors. Construction of the concrete batch plant would disturb an additional 4.0 ha (10 acres). Only limited portions of most of these areas would be disturbed at any time, and the disturbance of a given section would last only a short time. It was assumed that 50% of the contiguous 28-ha (69-acre) area would be disturbed at any one time and that heavy earth-moving activities would occur over a 6-month period. For the ancillary areas, emissions were estimated assuming that construction would last 6 months and that only about 10% of the area would be disturbed at any time. Modeling was carried out for the entire disturbed area. It was further assumed that 30% of the construction fugitive emissions would be particulate matter with a diameter less than or equal to 10 μm (PM_{10}) (EPA 1988) and that 15% would be $PM_{2.5}$ (Kinsey and Cowherd 1992). Disturbed areas would be watered to control dust emissions, reducing emissions by 50% (EPA 2002).

Construction of the concrete batch plant would disturb 4.0 ha (10 acres) (DCS 2002a). The entire disturbed area was assumed to be part of the contiguous site, and emissions calculation and modeling used the same assumptions as were used for the proposed MOX facility construction fugitive emissions.

Construction of the PDCF was assumed to disturb about 14 ha (35 acres) (DCS 2002b). The contiguous site area was assumed to account for about two-thirds of the total and dispersed ancillary activities the remainder. Emissions calculation and modeling used the same assumptions as were used for modeling MOX facility construction fugitive emissions.

Construction of the WSB was assumed to disturb about 2 ha (5 acres) (DCS 2002a). The entire disturbed area was assumed to be part of the contiguous site. Emissions calculations

Table F.1. Emission factors, activity levels, and emissions for facility construction

Source	Pollutant[a]	Emission factor	Annual activity: MOX	Annual activity: PDCF	Annual activity: WSB	Annual activity: Batch plant
Construction fugitives[b]	PM	0.6 tons/acre/mo[c]	Site: 69 acres; 5 months Ancillary: 35 acres; 6 months	Site: 23 acres; 12 months Ancillary: 12 acres; 6 months	5 acres; 5 months	10 acres; 5 months
	PM_{10}	-[d]				
	$PM_{2.5}$	-				
Batch plant[e]	PM	0.2 lb/yd^3[f]	NA[g]	NA	NA	62,500 yd^3/yr[h]
	PM_{10}	0.058[f]	NA	NA	NA	
	$PM_{2.5}$	NA	NA	NA	NA	
Equipment exhaust[i]	CO	14.67 kg/10^3 liters[j]	1,250,000 liters diesel fuel/yr[k]	495,000 liters diesel fuel/yr[l]	114,000 liters/diesel fuel/yr[m]	0[n]
	VOCs	3.76 kg/10^3 liters[j]				
	NO_x	38.75 kg/10^3 liters[j]				
	SO_x	3.74 kg/10^3 liters[j]				
	PM	3.20 kg/10^3 liters[j]				
	PM_{10}	3.20 kg/10^3 liters				
	$PM_{2.5}$	3.20 kg/10^3 liters				

Source	Pollutant[a]	Annual emissions (kg/yr): MOX	PDCF	WSB	Batch plant	Hourly emissions (g/h)[o]: MOX	PDCF	WSB	Batch plant
Construction fugitives[b]	PM	103,000	79,900	6,800	13,600	49,400	38,400	3,270	6,540
	PM_{10}	30,800	24,000	2,040	4,080	14,800	11,500	981	1,960
	$PM_{2.5}$	15,400	12,000	1,020	2,040	7,410	5,760	491	981
Batch plant[e]	PM	NA	NA	—[l]	5,670	NA	NA	NA	2,730
	PM_{10}	NA	NA	—[l]	1,640	NA	NA	NA	790
	$PM_{2.5}$	NA	NA	—[l]	850	NA	NA	NA	409
Equipment exhaust[i]	CO	18,300	7,260	1,670	—[p]	8,810	3,490	801	—[p]
	VOCs	4,690	1,960	427	—[p]	2,260	894	205	—[p]
	NO_x	48,400	19,200	4,400	—[p]	23,300	9,220	2,120	—[p]
	SO_x	4,670	1,850	424	—[p]	2,240	889	204	—[p]
	PM	4,000	1,580	363	—[p]	1,920	761	175	—[p]
	PM_{10}	4,000	1,580	363	—[p]	1,920	761	175	—[p]
	$PM_{2.5}$	4,000	1,580	363	—[p]	1,920	761	175	—[p]

[a]PM = particulate matter with a diameter equal to or less than about 30 μm; PM_{10} = particulate matter with a diameter equal to or less than 10 μm; $PM_{2.5}$ = particulate matter with a diameter less than 2.5 μm; CO = carbon monoxide; VOC = volatile organic compound; NO_x = nitrogen oxides; SO_x = sulfur oxides.

[b]PM_{10} taken as 30% of PM (EPA 1988); $PM_{2.5}$ taken as 15% of PM (Kinsey and Cowherd 1992).

[c]*Source:* EPA (2002, Section 13.2.3) and a 50% reduction in emissions due to watering used to control dust.

Footnotes continue on next page.

Table F.1. Continued

[d]- indicates emissions calculated as percentage of PM.

[e]$PM_{2.5}$ taken as 15% of PM (EPA 2002, Category 3, Table B.2-2, Appendix B-2).

[f]*Source:* EPA (2002, Section 11.12).

[g]NA = not applicable.

[h]*Source:* DCS (2002a); includes concrete for both the proposed MOX facility and the WSB.

[i]All emissions assumed to be $PM_{2.5}$.

[j]*Source:* EPA (1985, Table II-7.1).

[k]*Source:* DCS (2002b, Table 5.5).

[l]*Source:* DOE (1999, Table 5.5).

[m]*Source:* DCS (2002b, Table G-4).

[n]Fuel use for construction of batch plant included in fuel use for the proposed MOX facility.

[o]Hourly emissions based on annual rates assuming construction activities occur 8 hours per day, five days per week, 52 weeks per year.

[p]Emissions included in emissions from the proposed MOX facility.

and modeling used the same assumptions as were used for proposed MOX facility construction fugitive emissions.

The concrete batch plant is expected to produce 47,800 m^3 (62,500 yd^3) of concrete annually (DCS 2002a). This amount would be sufficient for both proposed MOX facility and WSB construction. The emission factors used in the modeling represent the total particulate matter process emissions from concrete batching. $PM_{2.5}$ was taken as 15% of the particulate matter, on the basis of the cumulative weight-percent distribution for Category 3 in EPA (2002, Table B.2-2).

Information on the mix of construction equipment types that would be used at the site was not available. It was assumed that all construction equipment would be diesel powered. The factors presented in Table F.1 are averages over the different types of equipment listed in EPA (1985, Table II-7.1). Factors for off-highway trucks and the miscellaneous category were excluded from the averages. Particulate emissions from diesel engines are expected to have small diameters, so it was assumed that all particulate emissions would be in the $PM_{2.5}$ category.

Hourly emission rates for all three sources were calculated from annual rates on the basis of a construction schedule of 8 hours per day, 5 days per week, and 52 weeks per year. This assumption leads to higher hourly emissions and thus is more conservative than assuming a longer work day or a longer work week.

F.2.2 Emissions during Operation

Emissions from the facility processes and from operation of the emergency and standby generators were modeled for the operation phase of the facilities. As for the construction phase, emissions from worker and delivery vehicles were not included.

Table F.2 summarizes the activity levels and emissions from standby and emergency diesel-powered generators at the proposed MOX facility and WSB. There would be six engines at the proposed MOX facility expected to operate a total of 804 h/yr. Each engine would use about 522 L (138 gal) of diesel fuel per hour or 418,477 L/yr (110,550 gal/yr) for all six engines (DCS 2004a; DCS 2004b). Vendor-supplied emission factors were available for criteria pollutants. The calculation of air toxic emissions used standard emission factors from EPA (2002) and assumed a heating value of 137,000 Btu/gal for diesel fuel.

Detailed information on emergency generator use at the PDCF was unavailable. Total fuel use during operation is expected to be 37,998 L (10,038 gal/yr) (DOE 1999, Table E-7). Table G-59 in DOE (1999) gives the annual emissions of criteria pollutants from the PDCF. Annual toxic emissions from PDCF generators were estimated using standard emission factors from EPA (2002) and assuming heating value of 137,000 Btu/gal for diesel fuel. Annual operating hours were not available. Hourly emissions were calculated assuming 86 hours/yr of operation, the same as the annual operating hours for the standby generators in the MOX facility (DCS 2004b). This procedure may overestimate the PDCF emissions, because the annual PDCF fuel use includes diesel, fuel oil, and gasoline, not just fuel for the emergency generators.

The WSB is expected to have one emergency generator that will operate about 250 h/yr. Engine-specific emission factors were available for criteria pollutants (DCS 2002a). Air toxic emissions from proposed MOX facility emergency generators were scaled by the ratio of proposed MOX facility and WSB annual hours of operation to estimate WSB emergency generator emissions.

Table F.3 summarizes process emissions. The aqueous polishing process at the proposed MOX facility would emit nitrogen dioxide. The chlorine would come from chloride in the plutonium feedstock (DCS 2002b). Hourly emissions were based on 8,760 h/yr of continuous operation.

The PDCF would have no process emissions (DOE 1999, Table G-59). The WSB would emit particulates when the cement silo is operated and when cement is withdrawn into the weigh hopper and mixed during the waste cementation process. Hourly emissions are based on the assumption that silo operations, including cement delivery, would occur 12 times per year and would be completed in less than one hour. The WSB would process about 25 batches of waste per year. Each batch would require operating each of two hoppers for 1 hour and each of two mixers for 12 hours (DCS 2002a). Depending on the final process design, evaporation of acidic waste in the WSB could emit up to 9,175 kg/yr (20,230 lb/yr) of nitrogen dioxide. An amount of acetone would also be emitted.

Table F.2. Emission factors, activity levels, and emissions for emergency generators

Facility	Pollutant	Emission factor (lb/10^6 Btu)[b,c]	Activity	Emissions[a] (kg)	
				Annual	Hourly
MOX	CO	6.43	6 engines; 804 engine-hours/yr	2,350	17.5
	VOC	2.88		1,050	7.85
	NO_x	67.0		24,500	183
	SO_x	3.9		1,420	10.6
	PM	0.63		230	1.72
	PM_{10}	0.52[d]		189	1.41
	$PM_{2.5}$	0.49[e]		177	1.32
	Benzene	0.000776		5.33	0.0400
	Toluene	0.000281		1.93	0.0144
	Xylenes	0.000193		1.33	0.00990
	Propylene	0.00279		19.1	0.143
	Formaldehyde	0.0000789		0.543	0.00405
	Acetaldehyde	0.0000252		0.173	0.00129
	Acrolein	0.00000788		0.0542	0.000404
	Naphthalene[f]	0.00013		0.894	0.00667
	Total PAHs[g]	<0.000212		1.46	0.01
PDCF	CO		10,038 gal/yr fuel; 86 engine-hours/yr	520[h]	6.05
	VOC			58[h]	0.674
	NO_x			2,000[h]	23.3
	SO_x			34[h]	0.395
	PM			50[h]	0.581
	PM_{10}			41[d]	0.478
	$PM_{2.5}$			39[e]	0.448
	Benzene	0.000776		0.485	0.00563
	Toluene	0.000281		0.175	0.00204
	Xylenes	0.000193		0.121	0.00140
	Propylene	0.00279		1.74	0.0203
	Formaldehyde	0.0000789		0.049	0.000573
	Acetaldehyde	0.0000252		0.016	0.000183
	Acrolein	0.00000788		0.005	0.0000572
	Naphthalene[f]	0.00013		0.081	0.000944
	Total PAHs[g]	<0.000212		0.132	0.00154
WSB[i]	CO	24.92	1 engine; 250 engine-hours/yr	575	2.30
	VOC	5.07		50.0	0.20
	NO_x	1.62		2,830	11.3
	SO_x	0.44		184	0.735
	PM	4.24		481	1.93
	PM_{10}	4.07[d]		462	1.85
	$PM_{2.5}$	3.81[e]		433	1.73
	Benzene			1.66	0.0066
	Toluene			0.601	0.0024
	Xylenes			0.413	0.0017

Table F.2. Continued

Facility	Pollutant	Emission factor (lb/10^6 Btu)[b,c]	Activity	Emissions[a] (kg)	
				Annual	Hourly
	Propylene			5.97	0.024
	Formaldehyde			0.169	0.00068
	Acetaldehyde			0.054	0.00022
	Acrolein			0.017	0.00007
	Naphthalene[g]			0.278	0.0011
	Total PAHs[h]			0.454	0.0018

[a]If needed, a heating value of 137,000 Btu/gal was used for diesel fuel to calculate emissions.

[b]*Source* (unless otherwise specified): Criteria pollutants: DCS (2002a); Air toxics: EPA (2002, Section 3.4-5).

[c]Units: Criteria pollutants = lb/(engine-hour). Air toxics = lb/10^6 Btu.

[d]Based on a ratio of PM_{10}/PM factor in Table 3.4-2, EPA (2002).

[e]$PM_{2.5}$ taken as 90/96 of PM_{10} (Category 1, Table B.2-2, Appendix B-2, EPA [2002]).

[f]Included in total PAHs.

[g]PAHs = polycyclic aromatic hydrocarbons.

[h]*Source*: DOE (1999, Table G-59).

[i]Annual emissions of air toxics at the WSB were calculated from those at the proposed MOX facility based on the ratio of annual operating hours (= 250/804).

Storage of diesel fuel for use in emergency and standby generators would emit volatile organic compounds (VOCs) at each facility. Emission estimates from DCS (2004b) were used to estimate emissions from the other two facilities. Proposed MOX facility fuel storage emissions were scaled by the ratio of proposed MOX facility and PDCF annual fuel uses to estimate PDCF fuel storage emissions, and were scaled by the ratio of proposed MOX facility and WSB annual hours of operation to estimate WSB emissions.

F.3 Air Quality Modeling

This section presents information on the air quality model and modeling assumptions, meteorological data, source data, receptors, and terrain data used to estimate the air quality impacts of the facility.

Table F.3. Process emissions during operations

Facility	Operation	Pollutant	Emissions Annual (kg/yr)	Emissions Hourly (g/h)
MOX[a]	Aqueous polishing	NO_2	4,480	511
	Chlorine in Pu	Chlorine	15	1.7
	Diesel fuel storage	VOC	1.03	0.12
PDCF	Diesel fuel storage	VOC	0.094	0.011
WSB[b]	Silo operations	PM	5.55	463
		PM_{10}	2.78	231
		$PM_{2.5}$	0.833	69.4
	Cementation	PM	0.450	5.14
		PM_{10}	0.225	2.57
		$PM_{2.5}$	0.068	70.2
		Acetone	2.93	9.75
	Acidic waste evaporation	NO_2	<9800	<30,600
	Diesel fuel storage	VOC	0.11	0.013

[a]*Source*: DCS (2004b, Table 5-7).

[b]*Sources:* DCS (2002a-c, 2004a,b).

F.3.1 Air Quality Model

Version 3 of the Industrial Source Complex Short-Term (ISCST3) model (EPA 1995) was used to estimate potential impacts of facility construction and operation on ambient air quality. ISCST3 has numerous options that can be set to make the calculations conform to the actual situation being modeled. The following options were used for the facility model runs: (1) the regulatory default options, (2) building downwash, and (3) rural dispersion.

In its guideline on air quality modeling, the EPA (1999) specifies ISCST3 as the "guideline" model for a wide variety of regulatory applications. The modeling guideline also specifies a set of "regulatory options," specific settings for some of the options included in the model. The model was always run using the regulatory options.

In addition, as specified in the guideline, effective building widths were included in the operation runs to account for building-induced downwash of pollutants released from the facility stack. These effective widths were calculated from the physical widths and heights by using EPA's Building Profile Input Program (BPIP) (EPA 1993). The physical dimensions for the proposed MOX facility and nearby buildings were taken from DCS (2002a). No information was available in the dimensions of the PDCF. Dimensions for the WSB were taken from DCS (2002a).

The way air pollutants disperse differs between predominantly urban and predominantly rural areas. The SRS and the surrounding area are generally rural rather than urban in character, so the model was run in the rural mode.

F.3.2 Meteorological Data

The ISCST3 code uses hourly surface data (wind speed, wind direction, ambient temperature, and atmospheric stability) and twice-daily mixing-heights. Modeling for the facility used 5 years of surface data collected at Columbia, South Carolina, for the period from 1990 through 1994. Mixing height data came from Athens, Georgia, for the period from 1990 through August 1994. The Athens site was moved to Atlanta, Georgia, in September 1994.

F.3.3 Source Data

The characteristics used to model the sources are listed in Table F.4. Volume source dimensions were converted into the initial dispersion values in Table F.4 on the basis of the suggestions in EPA (1995).

F.3.3.1 Construction

Construction fugitive emissions were modeled as square area sources centered on the associated facility site and oriented with its sides parallel to the site's side. It was assumed that 50% of the area would be disturbed at any time.

Thirty-nine ha (96 acres) of the 43 ha (106 acres) disturbed during construction of the proposed MOX facility would be the site itself, contiguous areas, fill area on the PDCF site, and work on roads and utilities (DCS 2002a). This 39-ha (96-acre) area was modeled to estimate the impact of construction fugitives. One-half of this area corresponds to a square 441 m (1,450 ft) on a side. The remaining 4.0 ha (10 acres) of the disturbed area would be the site of the batch plant (whose construction fugitives were modeled as a square at the appropriate location).

The total area disturbed during PDCF construction is expected to be 36 ha (90 acres) (DOE 1996, Section 4). About two-thirds of this total, the same fraction as used for the proposed MOX facility, was modeled. One-half of this area corresponds to a square about 344 m (1,140 ft) on a side.

The modeled area for WSB construction was taken as one-half of the entire area of the site, 2.0 ha (5.0 acres), corresponding to a square about 101 m (330 ft) on a side.

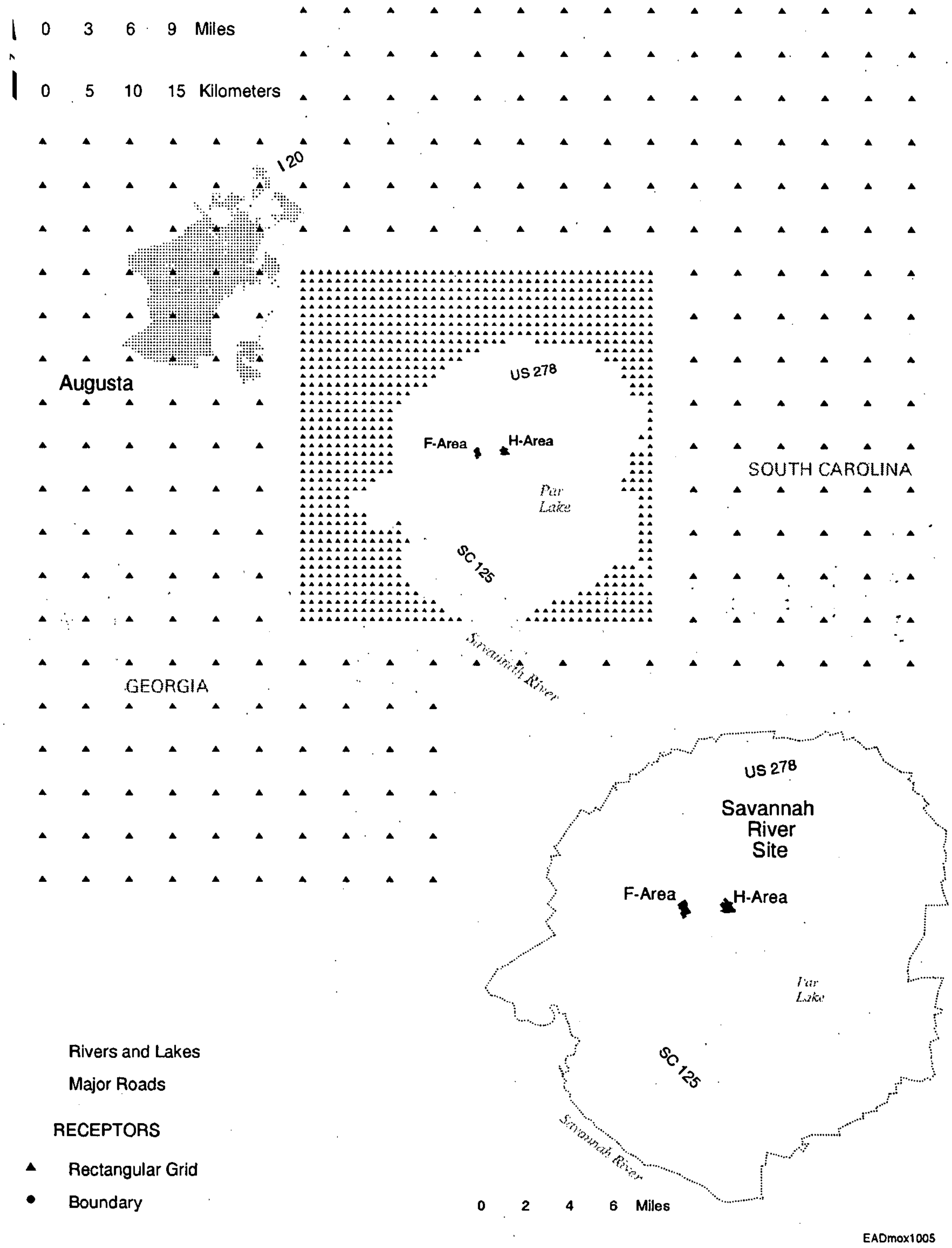

Figure F.1. Receptor locations used in air quality modeling.

Table F.4. Characteristics of modeled sources

Source	Source characteristics							
				Initial dispersion[a] (m)		Release characteristics		
	Modeled type	Release height (m)	Length (m)	Horizontal	Vertical	Temperature (K)	Velocity (m/s)	Diameter (m)
Construction fugitives-proposed MOX facility	Area	1	441	NA[b]	NA	NA	NA	NA
Construction fugitives-PDCF	Area	344	344	NA	NA	NA	NA	NA
Construction fugitives-WSB	Area	101	101	NA	NA	NA	NA	NA
Construction fugitives-batch plant	Area	142	NA	NA	NA	NA	NA	NA
Concrete batch plant	Volume	4.6	NA	7.5	2.1	NA	NA	NA
Construction equipment exhaust-proposed MOX facility	Volume	3.1	NA	87	1.4	NA	NA	NA
Construction equipment exhaust-PDCF	Volume	3.1	NA	80	1.4	NA	NA	NA
Construction equipment exhaust-WSB	Volume	3.1	NA	23	1.4	NA	NA	NA
Proposed MOX facility stack[c]	Point	36.6	NA	NA	NA	290.3	16.7	2.59
WSB silo stack	Point	15.2	NA	NA	NA	290.3	0.031	0.457
WSB mixer/hopper stack	Point	12.2	NA	NA	NA	290.3	0.031	0.203
WSB main stack	Point	24.4	NA	NA	NA	290.3	3.0	1.52
Emergency generators	Point	14.3	NA	NA	NA	1180	98.5	0.204

[a]Volume source dimensions were converted into the initial dispersion values using the suggestions in EPA (1995).

[b]NA = not applicable.

[c]*Source:* DCS (2001).

During operations, the concrete batch plant was modeled as a volume source. In ISCST3, volume sources are square in the horizontal plane. Batching activities were assumed to take place in a square about 32 m (110 ft) on a side, corresponding to an area of about 0.10 ha (0.26 acre). The plant structure was assumed to be about 9.1 m (30 ft) high. A release height of 4.6 m (15 ft) was taken as representative of all batching activities.

Emissions from construction equipment exhaust would be released over the same area as the construction fugitive emissions and were modeled as volume sources located at the center of the facility sites. An exhaust release height of 3.1 m (10 ft) was assumed for the construction equipment.

For short-term averages, all construction sources were assumed to operate 8 hours per day — from 8:00 a.m. to 12 p.m. and from 1 p.m. to 5 p.m. Emissions were assumed to be zero during other hours. Annual averages were calculated by assuming a construction schedule of 260 days per year as discussed in Section F.2.1.

F.3.3.2 Operation

Facility stacks were modeled as points (see Table F.4). There would be a single stack on the proposed MOX facility and two on the WSB. One WSB stack would exhaust the silo, another would exhaust hoppers and mixers, and the main stack would provide general building exhaust.

Emissions from the standby and emergency generators were modeled as points using representative release characteristics.

Different approaches were used to estimate short-term impacts for periods of 24 hours and less and annual impacts. The proposed MOX facility process was assumed to operate continuously, and the same rate was used for estimating both short-term and annual impacts. The WSB would operate in a batch mode, as discussed above. For short-term impacts, emissions were assumed to occur during a 12-hour period from 6 a.m. to 6 p.m. at actual rates. Annual impacts were estimated on the basis of 12 hours per day of operations at rates consistent with the expected annual emissions. The emergency and standby generators would operate intermittently for testing and for unscheduled emergencies. Short-term impacts were assessed by assuming that the generators for all three facilities would operate 24 hours per day to simulate an extended emergency. Annual impacts were assessed by assuming 8,760 hours per year of operation at rates consistent with the expected annual emissions.

F.3.4 Receptor Data

Two types of receptors were used in the analysis: boundary receptors and off-site receptors. The receptor network is shown in Figure F.1. The boundary receptors were located every 200 m (660 ft) along the SRS boundary. No boundary receptors were placed along the narrow section of the SRS extending south and southwest along Lower Three Runs Creek to the Savannah River. The off-site receptors consisted of two Cartesian grids oriented along the north-south direction and extending 50 km (31 mi) in each direction from the facility site. From the SRS boundary out to 20 km (12 mi), the grid spacing was 1.0 km (0.62 mi). Farther out, the grid spacing was 5.0 km (3.1 mi).

F.3.5 Terrain Data

Terrain effects were included in all the modeling runs. Terrain data for sources and receptors were taken from electronic data available from the U.S. Geological Survey (2001) 1:24,000 scale (7.5-minute series) digital elevation model. The grade level for the proposed MOX facility was taken as 83 m (270 ft) above mean sea level (DCS 2002b).

F.4 References for Appendix F

DCS (Duke Cogema Stone, and Webster) 2001. *Changes to Mixed Oxide Fuel Fabrication Facility Environmental Report*. Letter with attachments submitted by P. S. Hastings (DCS, Charlotte, NC) to U.S. Nuclear Regulatory Commission (Washington, DC). Dec. 11.

DCS 2002a. *Responses to the Request for Additional Information on the Environmental Report Revisions 1 & 2*. DCS-NRC-000116, Docket Number 070-03098. Charlotte, NC. Oct. 29.

DCS 2002b. *Mixed Oxide Fuel Fabrication Facility Environmental Report Revision 1 & 2*. Docket Number 070-03098. Charlotte, NC.

DCS 2002c. *Corrections to Responses to the Request for Additional Information on the Environmental Report Revisions 1 & 2*. Letter with attachments from P. S. Hastings (DCS, Charlotte, NC) to U.S. Nuclear Regulatory Commission (Washington, DC). Nov. 15.

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EPA 1999. *Appendix W to Part 51 — Guideline on Air Quality Models.* 40 CFR 51. Washington, DC. July 1.

EPA 2002. *Compilation of Air Pollutant Emission Factors, Vol. I: Stationary Point and Area Sources, Supplements A-F and Updates 2001 and 2002.* AP-42, Fifth Edition. Available at http://www.eap.gov/ttn/chief/ap42.html.

Kinsey, J.S., and C. Cowherd, Jr. 1992. "Fugitive Dust." In *Air Pollution Engineering Manual.* A.J. Bunicore and W.T. Davis (eds.). Van Nostrand Reinhold, New York, NY.

U.S. Geological Survey 2001. "7.5 Minute Digital Elevation Models (DEM)." Available at http://edcwww.cr.usgs.gov/doc/edchome/ndcdb/7_min_dem/states.html.

APPENDIX G:

ADDITIONAL IMPACTS OF THE NO-ACTION ALTERNATIVE

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Appendix G includes impacts of the no-action alternative that are not addressed in Chapter 4.[1] Technical areas included in the appendix are geology, seismology, and soils; noise; ecology; land use; cultural and paleontological resources; infrastructure; socioeconomics; and esthetics. Other potential impacts are addressed in Chapter 4.

G.1 Geology, Seismology, and Soils

In general, continued storage of surplus plutonium at current storage locations would have no impact on geology or seismology at the sites. If new construction was required to upgrade storage facilities at any of the sites, there could be localized, small effects on soils, such as compaction and erosion, as a result of construction activities.

G.2 Noise

The ongoing operations at the storage sites would result in no appreciable change from current levels of traffic noise and on-site operational noise. Nontraffic noise sources are far enough from off-site areas that the noise of operations would not be expected to cause annoyance to the public. However, some noise sources could be close enough to on-site noise-sensitive areas to result in impacts, such as the disturbance of wildlife.

G.3 Ecology

No construction or demolition of buildings is planned under the continued storage option. If any modifications were required to ensure safe storage, they would not result in appreciable change to current conditions. Therefore, continued storage would have negligible impacts on ecological resources. At Pantex, any upgrading of existing storage facilities would occur in an area that is currently disturbed, so small impacts to biota would occur. Also, no impacts to threatened and endangered species would be expected (DOE 1996, pg. 4-207). Regardless, the impacts of new construction would be addressed under a separate environmental review conducted by the U.S. Department of Energy (DOE).

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[1] Terms used to categorize impacts are defined in Section 2.4.

G.4 Land Use

No new land use is planned in association with continued storage of surplus plutonium, except possibly at the Pantex site. If upgrading of the storage facility at Pantex was required, it would take place on previously disturbed land and would have minimal impacts on existing land use plans.

G.5 Cultural and Paleontological Resources

No impacts on cultural or paleontological resources are expected from the continued storage of surplus plutonium.

G.6 Infrastructure

Detailed data on infrastructure for the current storage sites are presented in the Storage and Disposition Programmatic Environmental Impact Statement (S&D PEIS) (DOE 1996, Section 4.2). The infrastructure of the sites would be capable of supporting all anticipated missions and functions associated with continued storage.

G.7 Socioeconomics

As stated in the S&D PEIS (DOE 1996), under continued storage, the existing storage facilities at the sites would remain operational. No new employment or in-migration of workers would be required.

G.8 Aesthetics

Continued storage would not result in any adverse impacts to visual resources at the storage sites.

G.9 Reference for Appendix G

DOE (U.S. Department of Energy) 1996. *Storage and Disposition of Weapons-Usable Fissile Materials Final Programmatic Environmental Impact Statement*. DOE/EIS-0229. Office of Fissile Materials Disposition, Washington, DC. Dec.

APPENDIX H:

ADDITIONAL IMPACTS OF THE PROPOSED ACTION

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Appendix H discusses impacts[1] of constructing and operating the proposed Mixed Oxide (MOX) Fuel Fabrication facility, the Pit Disassembly and Conversion Facility (PDCF), and the Waste Solidification Building (WSB) that are not addressed in Chapter 4. Technical areas included in the appendix are geology, seismology, and soils; noise; ecology; land use; cultural and paleontological resources; infrastructure; and socioeconomics. Other impacts of construction related to human health risk, air quality, hydrology, waste management, deactivation and decommissioning, environmental justice, and cost benefit analysis are discussed in Chapter 4.

H.1 Geology, Seismology, and Soils

H.1.1 Construction

Construction activities for the proposed action would have no effects on geology or seismology at the Savannah River Site (SRS). For example, no deep well injection of wastewater would occur that could modify seismic activity.

The proposed facilities would be constructed entirely within F-Area on the SRS. F-Area occupies about 160 ha (395 acres) of land within the 80,292-ha (198,400-acre) SRS. Activities such as clearing, excavating, compacting, and grading during construction would physically disturb a total of about 41.9 ha (103.5 acres) of land (DCS 2002). Of this disturbed area, 10.6 ha (26 acres) would be permanently altered by construction of buildings, roads, and paved parking lots. Construction of the facilities would, therefore, disturb about 26% of the land in F-Area (about 0.05% of the land area available at the SRS). This impact would be small and temporary; remediation following construction would return about 60% of the disturbed land to its original condition. The 10.6 ha (26 acres) of land permanently altered by construction would represent about 7% of the land available in F-Area (0.01% of the land area at the SRS). Because the soils that would be affected by construction activities are not unique within the SRS and the disturbed and permanently altered areas would represent a small percentage of the land area available, physical impacts on soil would be small.

In addition to physical disturbance, soils could be chemically impacted during construction of the facility. For example, contaminated material from the construction site could be mobilized by runoff water or transported by wind, and accidental releases of contaminated material could adversely affect soils. However, because good engineering practices would be used during construction, sediment detention basins would be constructed, and any accidental spills would

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[1] Terms used to categorize impacts are defined in Section 2.4.

be promptly cleaned up as required by the DCS's Spill Prevention Control and Countermeasures Plan, chemical impacts on soils would be small.

H.1.2 Operations

Normal operation of the proposed facilities would have no impact on geology or seismology at the SRS (e.g., there are no planned deep well injections of effluents that could modify seismic activity), but normal operation could have localized, minor effects on soil.

The 10.6 ha (26 acres) of land covered by buildings, roads, and parking lots (DCS 2002) would remain physically altered. This land area would represent about 7% of the land area available in F-Area (0.01% of the land area at the SRS). Because the soils that would be altered are not unique within the SRS and the areas represent only a small percentage of the land available, overall physical impacts of normal operations on soil would be localized and small.

In addition to the physical alteration of soil, soils in the vicinity of the facility could be chemically impacted during normal operations. For example, contaminated material from the site might be mobilized by runoff water or transported by wind. However, with the use of good engineering practices during normal operations, chemical impacts on soils would be small.

H.2 Noise

H.2.1 Construction

Equipment and vehicle operation would be the primary sources of noise during construction. Soil movement, land clearing, and excavation activities typically generate noise levels in the 85- to 90-dBA range at a distance of 15 m (50 ft) from the source (EPA 1974). Noise levels decrease 6 dB for each doubling of the distance from a point source (MPCA 2001). The boundary closest to the proposed MOX facility site is about 8.7 km (5.4 mi) away. Thus, construction of the proposed MOX facility would cause noise levels of about 30 to 35 dBA at the closest boundary location. A second construction site for the PDCF and WSB would add at most 3 dBA.

This noise estimate is likely to be an upper bound because it does not account for additional attenuation due to noise absorption in the air and the effects of terrain and vegetation. The 33- to 38-dBA level is below the U.S. Environmental Protection Agency (EPA) guideline of 55 dBA for protection of the public and is less than the levels found along roadways around the SRS by more than 17 dBA (Section 3.4.4). If two sound levels differ by 10 dBA or more, adding the lower level contributes very little to the upper level. Thus potential noise impacts from construction activities should be small at all off-site locations.

H.2.2 Operations

Noise sources during operation of the three facilities would include outdoor air conditioning systems, transformers, fans, pumps, and vents for emergency and standby diesel generators. Noise levels from interior sources are expected to be damped to imperceptible levels outside the proposed MOX facility buildings (DCS 2002). Employee vehicles, delivery trucks, and material-handling equipment would also produce noise.

No measurements of noise associated with facility systems were available. As an example, however, sound-level measurements taken during operation of a chemical weapons incinerator in Toole, Utah, were less than 73 dBA within 30 m (100 ft) of the facility's abatement equipment (Andersen 2000). Noise levels decrease 6 dB for each doubling of the distance from a point source (MPCA 2001). The closest boundary is about 8.7 km (5.4 mi) from the proposed MOX facility. On the basis of the 73-dBA value for the Utah facility, operation of the proposed MOX facility might result in noise levels of about 25 dBA at the closest boundary location. Operations at the PDCF and WSB would add at most 4 dBA, giving a maximum noise impact of about 29 dBA. This estimate is likely to be an upper bound, because it does not account for additional attenuation from absorption in the air and effects of terrain and vegetation. The 29-dBA level is below the EPA guideline of 55 dBA for protection of the public and is more than 20 dBA less than the noise levels occurring along roadways around the SRS (Section 3.4.4). As mentioned above, if two sound levels differ by 10 dBA or more, adding the lower level contributes very little to the upper level. Thus, potential noise impacts from operation of the facility should be small at all off-site locations.

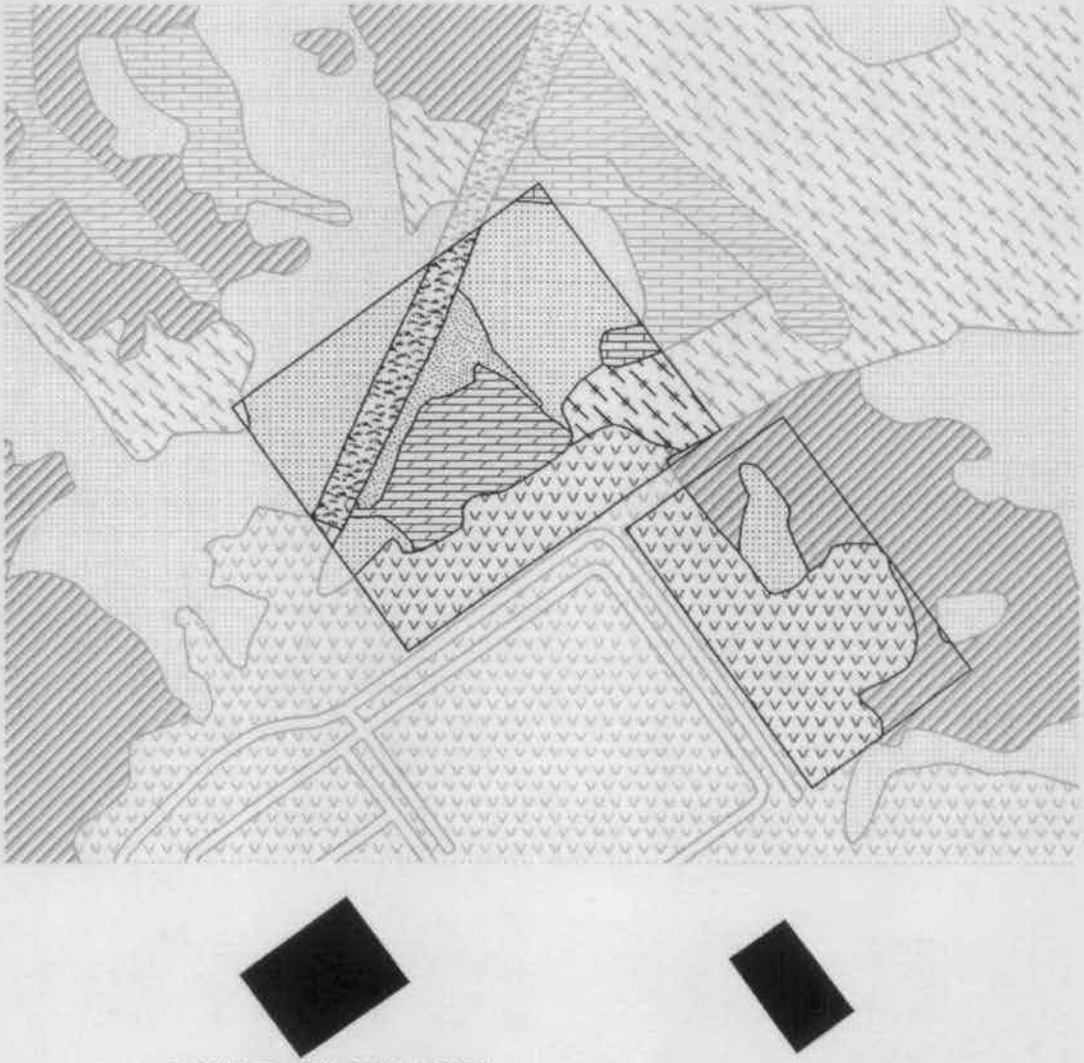
H.3 Ecology

H.3.1 Construction

H.3.1.1 Terrestrial

H.3.1.1.1 Vegetation

Impacts of facility construction to terrestrial resources would primarily result from the clearing and grading of the land for new facilities and infrastructure. A total land area of up to 50.0 ha (123.4 acres) would be affected by construction. About 26.2 ha (64.7 acres) would be cleared and graded within the areas designated for the proposed facilities (see Figure H.1). These site preparation activities would disturb 6.8 ha (16.9 acres) of pine forest, 1.4 ha (3.5 acres) of mixed pine forest, 0.3 ha (0.8 acres) of mixed deciduous forest, 2.6 ha (6.3 acres) of upland deciduous forest, 1.6 ha (4.0 acres) of grassland habitat, 1.1 ha (2.8 acres) of old field, 2.8 ha (6.9 acres) of spoils, and 9.5 ha (23.5 acres) of "facility" lands. An additional 3.6 ha (8.9 acres) would be graded around portions of the facility boundary. This grading would disturb mostly woodland vegetation. About 11.9 ha (29.5 acres) of the area within the facility site boundaries



MOX FACILITY AREA

Class	Acres	Hectares
DECIDUOUS	0.1	0.04
EVERGREEN FOREST	14.6	5.9
FACILITY	9.0	3.6
GRASSLAND	3.9	1.6
MIXED DECIDUOUS	0.8	0.3
MIXED EVERGREEN	3.4	1.4
OLD FIELD	2.7	1.1
SPOILS	6.8	2.8

PDCF/WSB AREA

Class	Acres	Hectares
DECIDUOUS	6.2	2.5
EVERGREEN FOREST	2.0	0.8
FACILITY	14.3	5.8

Figure H.1. Areas affected by facility construction activities.

would be developed with buildings, other facilities, and paving. The remainder of the areas would be landscaped (e.g., with grass) (DCS 2002). Thus, after construction, the proposed MOX and PDCF/WSB facility areas would be considered as part of the industrial/transportation land cover type, as described by DOE (2000b).

The maximum of 14.7 ha (36.4 acres) of woodlands cleared for the proposed facilities would be a comparatively small percentage of the 1,762 ha (4,350 acres) of timber harvested each year at the SRS. Furthermore, this annual timber harvest is only about 1% of the standing volume of commercial forest land at the SRS (DOE 2000b).

New, widened, and realigned roadways would be required for the facilities. Most of the roadways would be located within previously cleared road rights-of-way. However, about 2.0 ha (5.0 acres) of new roads would be located in two areas of evergreen forest. The existing storm-water outfall and drainageways would need to be relocated. New storm-water basins would likely be constructed southeast of the proposed MOX facility. The storm-water basin would be located within the area cleared and graded for the proposed MOX and PDCF/WSB facilities. The existing 0.2-ha (0.6-acre) F-Area storm-water basin would be graded and resized to create the new 0.6-ha (1.5-acre) MOX facility storm-water basin. Drainage from this storm-water basin would flow toward an unnamed tributary of Upper Three Runs Creek (see Figure 3.3). This storm-water basin would not be located within a designated wetland area. About 0.6 ha (1.5 acres) would be disturbed for the waste pipeline to the WSB. The pipeline would be located within the industrial/transportation land cover type. A portion of the 115-kV electric transmission line would need to be relocated. This relocation may occur within the area disturbed for the proposed MOX facility. Otherwise, an additional 4.5 ha (11.0 acres) may need to be disturbed for the relocation. The area for this relocation has not been specified, but it would probably be within upland wooded areas. Similarly, 4.0 ha (10 acres) could be disturbed for the batch plant and less than 3.8 ha (9.5 acres) for miscellaneous utilities along the perimeter road.

Other possible adverse construction effects to vegetation could include the localized deposition of dust and other particulate matter from the operation of vehicles and machinery. This deposition could inhibit photosynthesis and, if chronic, could kill affected plants. In addition, soil compaction caused by heavy machinery could destroy the ground flora and indirectly damage roots of trees (by reducing soil aeration and altering soil structure). These potential impacts would be localized in the areas immediately outside the facility site boundary.

H.3.1.1.2 Wildlife

The primary construction impacts on terrestrial wildlife would result from the temporary to permanent loss and alteration of up to 50.0 ha (123.4 acres) of habitat for the facilities and associated infrastructure. Clearing and grading prior to actual construction would have localized adverse effects on animal populations on the SRS. Less mobile animals (e.g., some reptiles, amphibians, and small mammals) within the project area could be destroyed during land-clearing operations. Before construction activities (including clearing) began, the site would be surveyed for nests of migratory birds to ensure that such species would not be affected (DCS 2002). Larger and more mobile wildlife in the area would be disturbed by these activities and move to other available habitats.

Construction noise and human activity would cause additional impacts to wildlife. On the basis of noise level information provided in Section H.2, construction noise levels at about 122 m (400 ft) could still be as high as 80 dBA. This level of noise could startle or frighten birds and small mammals (DOE 2000a). Although noise levels would be relatively low beyond this distance, the occurrence of human activity could also displace some wildlife. Some wildlife might be driven from the area permanently, while others might become accustomed to these disturbances and return to the area. Generally, these disturbances would be short-term and localized (DOE 2000a). Increased traffic could also increase the number of animals killed while crossing roads.

Following construction, all but about 11.9 ha (29.5 acres) cleared and graded for the proposed facilities would be landscaped (e.g., grass with scattered bushes and small trees). This landscaping would provide habitat for some wildlife species (Mayer and Wike 1997). Clearing of 2.0 ha (5.0 acres) of evergreen forest for roadways would eliminate a minimal amount of wildlife habitat at the SRS. Overall, the adverse impacts of construction are expected to be limited to the immediate project vicinity and should not affect the viability of any wildlife populations at the SRS.

H.3.1.2 Aquatic

Construction of the facilities would eliminate a small storm-water basin located near the southern boundary of the proposed MOX facility. This basin is shallow with little vegetation and mostly bare shoreline, thus providing minimal value to wildlife. Its loss would not jeopardize any species at the SRS. Additionally, this loss would be compensated for by construction of the new storm-water basins. The new basins would potentially be a more viable aquatic habitat than the existing storm-water basin. No direct impacts to streams (such as rerouting or channelization) would result from facility construction. Water required for construction would be drawn from existing groundwater wells in F-Area (Section 4.3.3.2.1). Indirect aquatic impacts could occur if unprotected soils eroded into the unnamed tributary of Upper Three Runs Creek that is located adjacent to the construction site. Such erosion could increase stream sedimentation and turbidity, possibly degrading water quality and adversely affecting aquatic organisms. However, use of standard erosion-control techniques as required by the South Carolina Department of Health and Environmental Control (SCDHEC) would be implemented to minimize erosion and subsequent potential increases in turbidity to the unnamed tributary of Upper Three Runs (see Section 4.3.3.1.1).

H.3.1.3 Wetlands

Direct impacts (such as dredging or filling) to wetlands from facility construction would be small. Indirect impacts could occur if unprotected soils eroded into wetlands adjacent to the construction site and adversely affected hydrological and ecological conditions there. However, erosion control techniques would be implemented to prevent construction-related runoff of soils (see Section 4.3.3.1.1). Careful attention to sediment and erosion control during site preparation and construction would protect wetland resources near the facility site (Wike and Nelson 2000). The impacts of construction on wetlands would be small.

H.3.1.4 Protected Species

Construction activities are not expected to have direct impacts on any of the federally listed species on the SRS because they have not been reported to occur in the areas to be disturbed by construction. Indirect impacts could occur to listed wildlife species from disturbance (e.g., noise and human presence). Also, clearing would eliminate habitat that could provide support to some of the species. In particular, the pine trees that would be removed could provide forage habitat for the red-cockaded woodpecker. However, the pines to be removed are a negligible portion of those present throughout the SRS. Also, the facility site is not located within either the red-cockaded woodpecker management area or the supplemental management area.

Transmission line rights-of-way provide suitable habitat for the smooth coneflower. Therefore, the right-of-way for the proposed MOX facility was surveyed, and no smooth coneflowers were observed. The U.S. Fish and Wildlife Service has concurred that the proposed action will not affect any resources under their jurisdiction (Duncan 2001).

Implementation of standard erosion-control practices would prevent potential impacts (see Section 4.3.3.1.1) to protected fish species (i.e., shortnose sturgeon) or wildlife species that utilize or forage in aquatic habitats (e.g., wood stork and American alligator) in potential suitable habitat in surface waters receiving runoff from the facility sites.

H.3.2 Operations

Within the facilities' boundaries and in most associated infrastructure areas, vegetation would be limited to landscaped lawns. A more diverse vegetation community (e.g., grassland/forb/ scrub-shrub land cover) would be maintained within the transmission line right-of-way.

Noise would probably be the most notable impact of routine operation of the facilities on wildlife and would be localized to within a radius of about 61 m (200 ft) of the facility. Scrubbers and filters would be used on the facilities, so no impacts to wildlife would be expected from airborne releases of contaminants (DCS 2002). The presence of the facilities would increase the potential of bird collisions with structures (Klem 1990). However, this source of bird mortality would not cause impacts at the population level.

No liquid process effluents would be directly released by operation of the PDCF and the proposed MOX facility. Liquid effluents would be treated at the WSB. There would be no impacts to aquatic or wetland biota from these effluents. Storm water would be collected and routed through the existing SRS NPDES-permitted outfall or new outfalls, and sanitary wastewater would be treated in the sitewide treatment system (DCS 2002). Thus, adverse impacts to aquatic or wetland biota would be small. Detention ponds and associated drainage ditches would provide habitat that could support a number of wildlife species (Mayer and Wike 1997).

No adverse impacts to protected species would be expected from facility operations because of the suitable habitats and minimal facility releases to the environment. Habitat suitable for the smooth coneflower would develop within the rerouted segment of the transmission line right-of-way, but the potential for a population of that plant to develop in this area is remote.

H.4 Land Use

H.4.1 Construction

Up to 50 ha (123.4 acres) of F-Area would be disturbed during construction of the facilities. Land use of the entire F-Area at the SRS, including the areas of proposed construction for the facilities, is classified as developed/industrial. Thus, the proposed use of the project area is consistent with this classification and with the SRS Long Range Comprehensive Plan (DOE 2000b). No adverse effect to land use would result from construction of the facilities.

H.4.2 Operations

The proposed facilities are industrial, and their operation would be consistent with the classification of the F-Area land use as developed/industrial. Therefore, there would be no adverse effect to land use as a result of routine operation of the facilities.

H.5 Cultural and Paleontological Resources

H.5.1 Construction

H.5.1.1 Archaeological Resources

Construction of the proposed facilities would directly affect two prehistoric archaeological sites that are eligible for listing on the *National Register of Historic Places* (NRHP) (Sites 38AK546/547 and 38AK757). Data recovery plans detailing the proposed mitigation for the adverse impacts to Sites 38AK546/547 and 38AK757 have been prepared and accepted by the South Carolina State Historic Preservation Office (SCSHPO) (Gould 2001; Marcil 2001). Site 38AK546/547 was excavated according to the data recovery plan to mitigate the adverse effects to that site from construction of the proposed MOX facility. Data recovery for Site

38AK546/547 was completed April 19, 2002. Site 38AK757 was excavated according to its data recovery plan to mitigate the adverse effect to that site from construction of the PDCF. Data recovery for Site 38AK757 was completed September 15, 2002. Monitoring of fill removal on the sites during construction is also expected to occur as part of the planned mitigation (Gould 2002). Concurrence of the SCSHPO that these investigations have met the obligations set forth in the data recovery plans was provided in November 2002 (Long 2002).

Five additional eligible sites are located in the vicinity of the construction area (Sites 38AK106, 38AK155, 38AK563, 38AK564, and 38AK581), but no direct impacts to these sites are expected as a result of facility construction. Mitigation measures might be needed to avoid the possibility of indirect effects to these sites. Such measures could include conducting awareness training for workers so they would not inadvertently disturb the sites and possibly imposing restrictions regarding where heavy machinery is allowed. Mitigation might also include periodic monitoring to check for possible erosion caused by surface runoff during construction or evidence of other impacts resulting from an increase in F-Area activities (e.g., unauthorized pedestrian or vehicular activity at the archaeological sites). The potential exists for erosion to occur along the current drainage at the outfall east-northeast of the proposed facilities that may affect eligible sites (38AK106, 38AK563, and 38AK564). Minor erosion potential at another small drainage may affect Site 38AK581. Although direct impacts are not expected to Site 38AK155, the site is located very near an area previously identified as grading area for the proposed MOX facility. Depending on the final footprint of the grading and fill area for the proposed MOX facility, Site 38AK155 may require monitoring to ensure avoidance of the site to prevent any direct or indirect impacts from construction activities. An updated contour map of the proposed grading area was not available at the time this EIS was being prepared. A memorandum of agreement with the SCSHPO stipulating avoidance of the site and how it is to be implemented could be required. Specific mitigation measures would be determined in consultation with the SCSHPO.

H.5.1.2 Historic Structures

No structures are located in the facility project area; therefore, no impacts to historic structures would occur during the construction of the facilities.

H.5.1.3 Traditional Cultural Properties

No traditional cultural properties have been identified near the proposed facilities. Consultation with appropriate Native American groups has been initiated to request information on any concerns regarding the potential for the MOX facility to affect traditional cultural properties. Copies of the consultation letters are presented in Appendix B.

H.5.1.4 Paleontological Resources

No fossil-bearing strata are known to exist within the F-Area; therefore, no impacts to paleontological resources are expected during construction.

H.5.2 Operations

Archaeological resources are unlikely to be affected by routine operation of the facilities. Ground disturbance and outdoor activities outside of the original construction footprint are not part of routine operations.

Traditional cultural properties and paleontological resources are not known to be present in F-Area, and, thus, none would be affected during routine facility operations.

H.6 Infrastructure

H.6.1 Construction

Construction activities are not expected to adversely impact current SRS infrastructure. The maximum water and electrical power demands during construction of the facilities were estimated by DOE in the Surplus Plutonium Disposition Environmental Impact Statement (SPD EIS) (DOE 1999) and by DCS (DCS 2002). Electrical power needed during construction of the facilities is estimated to be 17,700 MWh/yr. This power represents only about 3.7% of the current electrical power available (482,700 MWh/yr) at the SRS (DOE 1999). Maximum water requirements are not projected to exceed 139 million L/yr (37 million gal/yr), or about 3.3% of the A-Area loop excess capacity.

No new off-site roads would be constructed or improved to bring construction materials or workers to the SRS from local communities. An additional 4.8 to 6.4 km (3 to 4 mi) of roadways would be necessary to support facility construction activities within the F-Area.

The existing SRS road network plus the additional roads in F-Area needed for construction site access can readily accommodate the additional traffic expected during construction of the facilities. Some workers are expected to carpool during construction. During peak construction and assuming all three facilities are constructed simultaneously, the increase in the number of average daily one-way traffic on the roads leading to F-Area is expected to be about 30%.

The total diesel fuel required for a 5-year construction period is estimated to be about 7,624,000 L (1,960,000 gal). On-site storage of this volume of fuel is not anticipated because the majority of diesel fuel would be used in construction equipment that would likely be refueled each day by tanker trucks.

The surplus plutonium disposition program at the SRS would require a coordinated upgrading of the infrastructure to support the proposed MOX facility, the PDCF, and the WSB (DCS 2002). A storm-water retention pond and a sedimentation basin will be developed to handle runoff from all three of these facilities that are planned to be constructed in the same general vicinity within the F-Area.

H.6.2 Operations

The SRS infrastructure would not be adversely affected by operations of the proposed facilities. Infrastructure for the facilities would be modified and upgraded before and during construction to accommodate operational needs. Electrical power required during operation of the proposed facilities is estimated to be 186,000 MWh/yr, or about 36.4% of the available electrical capacity in the F-Area (DCS 2002).

Service and process water usage in the F-Area is currently about 374 million L/yr (98.8 million gal/yr) (DCS 2002). The available capacity is 4.2 billion L/yr (1.1 billion gal/yr), and the annual water demand for facility operations would be about 76 million L/yr (20.1 million gal/yr). Water needs for the proposed facilities would represent about 2% of the excess A-Area loop capacity.

Fuel oil would be used to test the diesel generators that would provide emergency power for operations in the event of a failure of the electrical supply system. An estimated 430,100 L/yr (179,000 gal/yr) of diesel fuel would be needed for generator testing (DCS 2002; DOE 1999).

The traffic from 510 permanent workers traveling to and from the facility might cause some impacts during peak travel periods. Local roads providing access to the SRS and on-site roadways experience traffic congestion during peak commuter periods. If individuals elect to participate in carpools, the impact on traffic flow and volume would tend to be reduced.

H.7 Socioeconomics

H.7.1 Construction

This section discusses the potential socioeconomic consequences from constructing the proposed MOX facility, PDCF, and WSB at the SRS. The socioeconomic analysis includes the effects on employment, income, and regional growth in a 15-county regional economic area (REA) and on population, housing, and community resources in a 4-county region of influence (ROI). Impacts on traffic are provided for the road network in the vicinity of the SRS in Aiken County. Impacts from construction are summarized in Table H.1.

In addition to the impacts shown in the table, minor impacts would also occur to agriculture in the REA and commercial fishing downstream of the SRS as demand for the products of these

Table H.1. Effects of construction on socioeconomics[a]

Impact category	Impacts
Employment (number of jobs in REA)[b]	
Direct	1,010
Indirect	810
Total	1,820
Income (millions of 2003 $)	
Direct	51.0
Indirect	40.9
Total	91.9
Population (number of new ROI residents)	350
Housing (number of ROI units required)	130
Public Finances (% impact on fiscal balance)	
Cities in ROI[c]	<1
Counties in ROI[d]	<1
Schools in ROI[e]	<1
Public service employment (number of new employees in ROI)	
Police officers	1
Firefighters	0
General	2
Physicians	1
Teachers	1
Number of new staffed hospital beds in the ROI	1
Traffic (impact on current levels of service in Aiken County)	None

[a]Impacts are shown for the peak year of construction (2005).

[b]Employment data based on DCS (2002) and NNSA (2002).

[c]Includes impacts that would occur in the South Carolina cities of Aiken, Jackson, New Ellenton, North Augusta, Wagener, Barnwell, Blackville, Williston and the Georgia cities of Grovetown, Harlem, Augusta, Blythe, and Hephzibah.

[d]Includes impacts that would occur in Aiken and Barnwell Counties in South Carolina and in Columbia and Richmond Counties in Georgia.

[e]Includes impacts that would occur in Aiken County, Barnwell County #19, #29, #45, Columbia County, and Richmond County school districts.

industries increases with the growth in REA payroll and salary expenditures resulting from the construction of the facilities.

The potential socioeconomic impacts from constructing the facilities would be relatively small. Construction activities would create direct employment of approximately 1,010 people in the peak construction year and an additional 810 indirect jobs in the REA (see Table H.1). Construction activities would increase the annual average employment growth rate by less than 0.1 of a percentage point over the duration of construction. Facility employment and associated wages and salaries would also produce about $88 million of income in the peak year of construction.

In the peak year of construction, about 350 people would move to the ROI (in-migrate) (see Table H.1). However, in-migration would have only a marginal effect on population growth and would require only 2% of the vacant rental housing in the ROI during the peak year. No significant impact on public finances would occur as a result of in-migration, and five additional local public service employees would be required to maintain existing levels of service in the various local public service jurisdictions in the ROI. In addition, on-site employee commuting patterns would have no impact on levels of service in the local transportation network surrounding the site.

H.7.2 Operations

This section presents the potential socioeconomic consequences from operating the proposed facilities at the SRS. As for the construction evaluation, the socioeconomic analysis for operations covers the effects on employment, income, and regional growth in the 15-county REA and on population, housing, and community resources in the four-county ROI. Impacts on traffic are provided for the road network in the vicinity of the SRS in Aiken County. Impacts from operation are summarized in Table H.2.

In addition to the impacts shown in the table, insignificant impacts would also occur to agriculture in the REA and commercial fishing downstream of the SRS as demand for the products of these industries increases with the growth in REA payroll and salary expenditures resulting from the operation of the facilities.

The potential socioeconomic impacts from operating the facilities would be relatively small. Operational activities would create about 490 direct jobs annually and an additional 780 indirect jobs in the REA (see Table H.2). The facilities would produce $64 million in direct and indirect income annually during operations.

About 180 people would move to the area at the beginning of facility operation (see Table H.2). However, in-migration would have only a marginal effect on population growth and would require less than 1% of the vacant owner-occupied housing in the area during facility operations. No significant impact on public finances would occur as a result of in-migration, and two new local public service employees would be required to maintain existing levels of service in the various local public service jurisdictions in the ROI. In addition, on-site employee

Table H.2. Effects of operations on socioeconomics[a]

Impact factor	Impacts
Employment (number of jobs in REA)[b]	
Direct	490
Indirect	780
Total	1,270
Income (millions of 2003 $)	
Direct	24.6
Indirect	39.6
Total	64.2
Population (number of new ROI residents)	180
Housing (number of ROI units required)	70
Public finances (% impact on fiscal balance)	
Cities in ROI[c]	<1
Counties in ROI[d]	<1
Schools in ROI[e]	<1
Public service employment (number of new employees in ROI)	
Police officers	0
Firefighters	0
General	1
Physicians	0
Teachers	1
Number of new staffed hospital beds in the ROI	0
Traffic (impact on current levels of service in Aiken County)	None

[a]Impacts are shown for the first year of operations (2008).

[b]Employment data taken from DCS (2002).

[c]Includes impacts that would occur in the South Carolina cities of Aiken, Jackson, New Ellenton, North Augusta, Wagener, Barnwell, Blackville, Williston and the Georgia cities of Grovetown, Harlem, Augusta, Blythe and Hephzibah.

[d]Includes impacts that would occur in Aiken and Barnwell Counties in South Carolina, and in Columbia and Richmond Counties in Georgia.

[e]Includes impacts that would occur in Aiken County, Barnwell County #19, #29, #45, Columbia County, and Richmond County school districts.

commuting patterns would have no impact on levels of service in the local transportation network surrounding the site.

Any impacts that would occur with the transportation of MOX fuel, including impacts on property values, would be minimal. This conclusion is reached because it is likely that the current transportation of other hazardous materials and the risk of accidents involving those materials are already captured in housing values in the vicinity of transportation routes. An accident involving MOX fuel may only create significant additional impacts on the housing market if residents were prevented from quickly returning to their homes.

H.8 Aesthetics

H.8.1 Construction

During construction of the proposed facilities, large construction cranes and fugitive dust produced by earthmoving equipment may be visible to the general public from the nearest publicly accessible viewpoint, located on State Highway 125 and SRS Road 1, both more than 6.5 km (4 mi) away. Once the proposed facilities were constructed, however, the height, size, and appearance of the new structures would be similar to existing buildings adjacent to the F-Area site and would therefore maintain the industrial nature of F-Area and be consistent with the current VRM Class IV designation of the site. The newly constructed facilities themselves would not generally be visible from off-site, with visibility restricted by the undulating terrain and the forested nature of the landscape.

H.8.2 Operations

During operations, it is unlikely that any additional visual impacts would occur beyond those resulting from the presence of the facilities. Exhaust stacks located on or near the proposed facilities would not generally be visible to members of the public because of the undulating, forested nature of the landscape. While any emissions from these stacks, as well as other evidence of operations at each facility (such as area lighting), might be visible from the nearest viewing point, these aspects of facility operation would be some distance away and therefore would not affect the current VRM Class IV designation of the site.

H.9 Accident Impacts

H.9.1 Geology, Seismology, and Soils

Accidental releases of contaminated material might adversely affect soils. However, use of good engineering practices and implementation of appropriate cleanup procedures following the accident would result in small chemical impacts on soils.

H.9.2 Ecology

An operational accident at the facility could potentially impact biota in natural plant communities and streams near the facility. The degree to which impacts would occur would depend on the type of accident, kind and amount of contaminants released, and wind direction at the time of release. Natural areas likely to experience the greatest impact would be those located immediately north and northeast of the facility. Prompt action to clean up or otherwise mitigate contaminants released during an accident would reduce the likelihood of contaminant bioaccumulation and biomagnification in the food chain. No protected species are known to occur within these areas (see Section 3.5.4 and Appendix A).

H.9.3 Land Use

An operational accident at the facility would be unlikely to affect land use within the F-Area, the SRS, or the region. The entire F-Area would remain developed/industrial land use if an operational accident were to occur. Access to the area might be temporarily restricted during cleanup operations following an accident. Minor impacts to lands outside of the SRS might be anticipated in the event of a worst-case accident, but most impacts would remain within the SRS boundary. Future use of the central portion of the SRS, which includes the F-Area, is expected to be maintained by the federal government as industrial (DOE 2000b).

H.9.4 Cultural and Paleontological Resources

An operational accident at the facilities might affect significant archaeological resources in the vicinity of the project area by restricting access to sites that currently require regular monitoring. This impact would likely be temporary, depending on the duration of cleanup after the accident.

It is possible that important nuclear production facilities that have historic value related to events during the Cold War could be temporarily affected during an operational accident. It is also possible that traditional plant resources of concern to Native Americans could be affected during an operational accident. No other traditional cultural properties that could be affected have been identified to date but may be identified as a result of the ongoing consultation.

Paleontological resources are unlikely to be affected by an operational accident at the facilities.

H.9.5 Socioeconomics

An operational accident at the facilities could impact the workforce if the accident was severe enough to result in lost work time. The extent of impacts to the local economy would depend on employment income losses during closure of the facilities following an accident. An accident involving fresh MOX fuel during transport might create significant additional impacts on the housing market only if residents were evacuated and prevented from quickly returning to their homes.

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APPENDIX I:

SCOPING SUMMARY REPORT

DOCKET 70-3098

ENVIRONMENTAL IMPACT STATEMENT SCOPING PROCESS

SCOPING SUMMARY REPORT

Mixed Oxide Fuel Fabrication Facility
Savannah River Site

August 2001

U.S. Nuclear Regulatory Commission
Rockville, Maryland

TABLE OF CONTENTS

ABBREVIATIONS

ADAMS	Agency wide Document Access and Management System
CAR	Construction Authorization Request
DCS	Duke Cogema Stone & Webster
DOE	U.S. Department of Energy
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ER	Environmental Report
H&S	human health and safety
HEPA	high-energy particulate air
HLW	high-level (radioactive) waste
MINATOM	Ministry for Atomic Energy of the Russian Federation
MOX	mixed oxide
MOX FFF	Mixed Oxide Fuel Fabrication Facility
MT	metric tons
NEPA	National Environmental Policy Act
NAACP	National Association for the Advancement of Colored People
NMSS	Nuclear Material Safety and Safeguards (part of the Nuclear Regulatory Commission)
NRC	U.S. Nuclear Regulatory Commission
NOI	Notice of Intent
ROD	Record of Decision
SER	Safety Evaluation Report
SPD	surplus plutonium disposition
SRS	Savannah River Site
YMP	Yucca Mountain Project

1. INTRODUCTION

On March 7, 2001, the United States Nuclear Regulatory Commission (NRC) issued a notice of intent (NOI) in the *Federal Register* (66 FR 13794) to prepare an environmental impact statement (EIS). As indicated in the NOI, the proposed major federal action requiring the EIS is the construction and operation of a mixed oxide (MOX) fuel fabrication facility (MOX FFF) at the Savannah River Site (SRS) near Aiken, South Carolina. If authorized under the requirements of 10 CFR Part 70, Duke Cogema Stone & Webster (DCS), a contractor chosen by the United States Department of Energy (DOE), would build and operate the proposed MOX FFF. The EIS will examine the potential environmental impacts of manufacturing MOX fuel from surplus weapons-grade plutonium. The potential impacts associated with processing 36.4 tons (33 metric tons (MT)) of this surplus plutonium will be evaluated. The evaluation of these impacts will be based on the proposed maximum annual MOX FFF capacity of 3.5 MT.

Under the present technical review schedule, the EIS will be used to support a decision in 2002 by the NRC whether or not to authorize construction of the proposed MOX FFF. The current schedule is to publish the draft EIS in February 2002. Following a public comment period, the draft EIS would be revised, and a final EIS would be published in September 2002. No cooperating agencies have been identified during the scoping process. NRC, as the lead agency, will prepare the EIS with the assistance of Argonne National Laboratory.

In addition to the EIS for the MOX FFF, NRC will prepare two safety evaluation reports (SERs) on health and safety issues raised by the proposed action. The first SER will evaluate such issues raised by the construction authorization request submitted by DCS in February 2001. A second SER will evaluate health and safety issues raised by the DCS request for authority to operate the proposed MOX FFF, which DCS plans to submit in July of 2002. The SERs document our evaluation of the safety of DCS's applications and compliance with applicable regulations. As discussed later in Section 3, the EIS will analyze both construction and operation impacts.

In the NOI, NRC announced plans for two scoping meetings: one in North Augusta, South Carolina, on April 17, 2001, and another scoping meeting in Savannah, Georgia, on April 18, 2001. In a second *Federal Register* notice on April 11, 2001 (66 FR 18223), NRC announced that a third scoping meeting would be held in Charlotte, North Carolina, on May 8, 2001. Announcements of the meetings were also made on the World Wide Web at the NRC MOX FFF Information Home Page, (http://www.nrc.gov/NRC/NMSS/MOX), through an electronic newsletter, through radio advertisements, through press releases, and through direct mailing to individuals who had attended past meetings associated with MOX. Announcements of the meetings were also made in the following local newspapers:

- The Augusta Chronicle (Thursday, April 12, & Sunday, April 15)
- Aiken Standard (Thursday, April 12, & Sunday, April 15)
- North Augusta Star (Thursday, April 12, & Sunday, April 15)
- Savannah Morning News (Thursday, April 12, & Sunday, April 15)
- The State News, Columbia, SC (Sunday, May 6)
- The Charlotte Observer (Sunday, May 6)

The three scoping meetings were held as planned. At each meeting, the NRC staff distributed background materials on the MOX fuel program and NRC's plans for conducting licensing and environmental reviews for the MOX FFF. An open house held before each meeting provided attendees an opportunity to view informational materials and talk informally with NRC staff. During the meeting, the NRC staff presented an overview of NRC'S role in the MOX FFF licensing process and described NRC'S approach to meeting its obligations under the National Environmental Policy Act (NEPA). The presentations were followed by a question and answer period in which the NRC staff responded to questions from attendees. The majority of time at the meetings was devoted to allowing individuals to express their views on the scope of the EIS. Transcripts of the meetings can be viewed on the World Wide Web at the NRC MOX FFF Information Homepage (http://www.nrc.gov/NRC/NMSS/MOX).

A total of about 300 individuals attended the three scoping meetings, and about 80 of them asked questions or provided oral comments at the meetings. In addition, approximately 60 individuals or organizations submitted written comments to NRC by regular mail, fax transmittal, e-mail, or in person at the meetings. Some of the individuals who provided written comments also spoke at the meetings. Some individuals attended and offered comments at more than one meeting.

The public comments are discussed in Section 2 of this summary. All comments received through May 21, 2001, the date announced in the NOI for closing of the scoping period, were considered. Comments received after this date were considered to the extent possible in preparing this report. The comments have been categorized by subject under the following issue headings:

- NEPA Issues
- Policy Issues
- Alternatives
- Ecology, Air and Water
- Cultural Resources
- Cumulative Impacts
- Human Health Impacts
- MOX Fuel Processing
- Transportation Issues
- Waste Management
- Socioeconomics
- Security and Terrorism
- Environmental Justice
- Decommissioning vs. Deactivation
- SRS Infrastructure and Existing Conditions
- Reactor Use Issues
- Lead Test Assemblies

The scope of the EIS and summary of issues that will be addressed in the EIS are discussed in Section 3. Although issues raised during the scoping period will be considered in the preparation of the MOX FFF EIS, some of those issues will either be analyzed in less detail or will not be analyzed at all, depending on their relevance to the proposed action and the anticipated impacts. Issues that will be considered, but not analyzed in detail, are summarized in Section 4. The preliminary outline for the EIS is included as Attachment A.

2. SCOPING COMMENT SUMMARY

2.1 INTRODUCTION

Several commenters voiced their support for the MOX fuel option, stating that it was the best option for using excess plutonium. They cited the commercial MOX reactors in Europe along with an experimental MOX program in the United States as evidence that MOX technology is both safe and feasible. They also believed that converting the plutonium to MOX fuel would make it more difficult to recover the plutonium for future use in nuclear weapons than if it were disposed of by immobilization (i.e., conversion of surplus plutonium into plutonium oxide and then into a ceramic or glass form suitable for disposal in a geologic repository). These commenters also supported the SRS as the best location for the MOX FFF, citing experience, expertise, and existing infrastructure.

Although they were in favor of reducing quantities of weapons-grade plutonium, other commenters felt that the MOX program was not the best method for addressing non-proliferation. These commenters preferred immobilization or continued storage to the MOX alternative. These commenters believed that immobilization would offer the greatest deterrent to terrorism and felt that proceeding with the MOX project would lead to widespread reprocessing of spent nuclear fuel. Several commenters voiced their opposition to the project, but did not provide any basis or provide comments on the scope of the EIS.

Several commenters had specific questions or comments on the Environmental Report (ER) and Construction Authorization Request (CAR) prepared by DCS. These comments will be considered in NRC's review of the ER and in the preparation of the EIS and Safety Evaluation Report (SER).

The following summary groups the comments received during the scoping period, both at scoping meetings and through written submittals to the NRC, by technical area and issue.

2.2 SUMMARY of COMMENTS

2.2.1 NEPA Issues

Consideration of Reactor Use Impacts: A few people commented that NRC should limit the scope of the MOX FFF EIS to the environmental impacts of constructing, operating, and deactivating the MOX FFF. They believed that analyzing impacts of the reactors using the MOX fuel as part of the current MOX FFF EIS would create a "double jeopardy" for DCS in that the company would have to provide data twice: now for MOX FFF licensing and again during the license amendment process for the reactors in which the fuel was to be used. One commenter noted that in order to avoid being accused of segmentation (not looking at the full consequences of an action) the EIS must include reactor impacts in its analysis. Several commenters wanted a supplemental EIS to be prepared for the reactor sites if reactor impacts are not addressed in the MOX FFF EIS. Further discussion of reactor use impacts is provided in Section 2.2.16.

NEPA Coverage for Actions in a Foreign Country: A few commenters believed that the link between the U.S. and Russian programs is so strong that, under NEPA, the United States would be obligated to consider environmental impacts of MOX in Russia. One organization indicated that there was a precedent for conducting a NEPA analysis for a major federal action having a significant impact in a foreign country. (No specific example was provided.) Another commenter stated that environmental impacts occurring outside the United States and within the borders of a sovereign nation are outside the scope of NEPA.

Supplemental EIS: Several commenters thought that DOE's Surplus Plutonium Disposition (SPD) EIS should be supplemented. They contended that the original EIS did not adequately address the need for the action and the alternatives and that DOE did not conduct an adequate life-cycle analysis of the all-MOX option and the all immobilization option. They maintained that if DOE does not prepare a supplemental EIS, NRC needs to evaluate the full range of alternatives related to the MOX program.

Proprietary Information: A few commenters wanted NRC to evaluate the harm to the public caused by withholding information labeled proprietary. They claimed that there was not enough technical information to adequately evaluate the CAR, especially with respect to health and safety. For example, a complete list of source terms was not available. They would also like to examine the types of information that can be categorized as proprietary.

Use of Existing DOE Documentation and Decisions: A few commenters wanted NRC to make full use of environmental documentation already prepared by DOE and avoid reevaluation of issues where DOE has already made a decision. This position includes adopting the DOE decision that the need for the MOX FFF has been established.

Additional Scoping Meetings: Several commenters asked for additional scoping meetings: at reactor sites, along transportation routes, and specifically at Columbia, South Carolina. In addition, several commenters asked that the scoping period be extended beyond the May 21 deadline.

Communicating Information to the Public: A number of people commented on NRC's efforts to communicate information to the public. There were complaints that ADAMS (Agency wide Document Access and Management System), the system that NRC uses for viewing documents, is not user friendly and that since it was implemented the local public reading rooms at nuclear power plants were eliminated. These commenters felt NRC should provide a computer at the NRC reading room and that the CAR and ER should be made available free of charge. One commenter asked for more informational meetings before the draft EIS is issued. Another commenter wanted NRC to indicate how it will handle distribution of MOX information to the public in the future. A request was made for NRC and DCS to define terms such as "highly unlikely" and "unlikely" and to involve the public in determining the appropriateness of these definitions.

2.2.2 Policy Issues

Price Anderson: The Price-Anderson Act limits the liability of organizations in the event of an incident involving nuclear materials. A commenter asked NRC to put a license condition on the MOX fuel project that MOX fuel cannot be covered by Price-Anderson. A commenter wanted the EIS to include a full disclosure of who is legally (and financially) responsible for MOX fuel accidents, including transportation impacts and reactor accidents.

NRC's Role as Lead Agency: A commenter stated that NRC was too closely tied to the nuclear power industry to impartially evaluate the plutonium fuel project. A commenter stated the belief that NRC receives funding from this regulated community and, at times, acts as an advocate for nuclear power. A commenter asked that NRC support an independent review of DOE's plutonium work, as recommended by the National Research Council in March 1988.

NRC Experience and Precedent: Several commenters thought that NRC was not qualified to regulate and oversee weapons-grade plutonium. They contended that there is no precedent for NRC to analyze reactor impacts as part of a licensing action for a fuel fabrication facility.

Conflict of Interest: A few commenters expressed concern that NRC may not be sufficiently independent from DOE to review the DCS application. Another commenter asked if using Argonne National Laboratory (a DOE Laboratory) as the contractor preparing the NRC EIS represented a conflict of interest.

Agency Interactions: Some commenters thought that the interactions of NRC, DOE, SRS, and DCS should be considered, particularly in terms of their regulatory roles. One commenter thought the EIS should address the question of who owns the MOX fuel at each stage of the process. Commenters were particularly concerned because both DOE and NRC have regulatory roles related to waste disposal. A commenter wanted to know which agency would have jurisdiction over the waste at each stage of the MOX process. Another commenter stated that the commercial and military nuclear waste materials should remain separate.

Non-Proliferation: A comment was made that the United States should reevaluate its non-proliferation agreement with Russia. A commenter argued that MINATOM (Ministry for Atomic Energy of the Russian Federation) intends to take money from the United States and other western countries and build a plutonium fuel infrastructure and export plutonium fuel.

Another commenter thought that the EIS should consider the proliferation impacts of constructing a MOX FFF, which (according to the commenter) violates a long-standing U.S. policy of separating civilian use and military applications of nuclear technology. According to this commenter, MOX would encourage other countries to develop reprocessing, which would have serious non-proliferation consequences. The possible use of the .polishing. portion of the facility for missions other than purifying plutonium for MOX use was also a concern.

Savannah River Site (SRS) Cleanup Funds: Some commenters wanted the EIS to consider the impacts of recent cuts in cleanup and restoration funds to the SRS. One commenter viewed this as the transfer of funds from the SRS cleanup to plutonium production.

Changes in Project Direction: Some commenters wanted the EIS to consider the impacts that would result if the proposed pit disassembly facility was canceled in favor of using existing infrastructure at the SRS. Another commenter felt that this issue had been adequately explored in the DOE SPD EIS and that NRC should be limited to evaluating the cumulative impacts of this related action.

A commenter asked that the EIS consider the impacts of building a MOX facility and then indefinitely suspending or canceling its use if the Russian political situation changes. Another commenter wanted the EIS to determine the cost of the MOX project if the Russian program were canceled.

Some commenters wanted the EIS to assess the impacts on the MOX program caused by delaying immobilization, in particular the impacts of indefinitely storing the plutonium. Commenters were also concerned that delaying or canceling the immobilization project could lead to greater quantities of MOX fuel.

A commenter thought the EIS should consider the environmental impacts of new reprocessing missions at the SRS that could be triggered by the MOX project. A commenter noted that commercial reprocessing is proposed in legislation in Congress and that the current ban is being reviewed by the Bush administration.

International Implications/Treaties: A commenter pointed out that there were several international treaties that must be identified and analyzed for impacts of MOX commercialization in the United States, including the Nuclear Non-Proliferation Treaty of 1968, the Stockholm Declaration on the Human Environment, and the Law of the Sea Convention.

2.2.3 Alternatives

No-action - Continued Storage: Some commenters wanted NRC to fully develop and advance the No-action Alternative. They pointed out that the Bush administration has questioned the U.S. government's commitment to a dual track approach to plutonium disposition and that it is not clear that the MOX program will go forward in Russia. Furthermore, the immobilization program has been postponed. Given this situation, the MOX program could be subject to continued review, making status quo (continued storage) a likely No-action Alternative. Therefore, some commenters wanted the EIS to consider the implications of the SRS becoming a long-term storage facility for the nation's surplus plutonium if the MOX program did not proceed.

One commenter wondered if adopting the No-action Alternative would be a tacit (indirect) way of saying that the MOX process cannot be done safely. Some commenters wanted NRC to explore the effect the No-action Alternative would have on proliferation and acts of terrorism.

No-action - 100 Percent Immobilization: Several commenters wanted the EIS to consider the costs and programmatic requirements of a 100 percent immobilization alternative. They believed that this was a viable alternative if the MOX project was not licensed. A few commenters specifically thought the EIS should consider (1) cost savings from not pursuing the MOX program, (2) the short- and long-term storage and monitoring requirements of plutonium pits and oxides until immobilization is complete, and (3) decreased waste volumes as compared to the MOX process. Another commenter felt that considering a 100 percent immobilization alternative would be inappropriate since DOE has already set surplus plutonium disposition policy.

One commenter wanted the alternatives to include building an immobilization (vitrification) plant at the Nevada Test Site to minimize transportation distances and maximize distances to population centers.

Conversion of All Surplus Plutonium to MOX Fuel: A few commenters wanted the EIS to consider the impacts of an all-MOX alternative. Many commenters wanted the EIS to be very specific in the quantity of plutonium that would be converted to MOX fuel. These commenters believe that addressing the quantity generically or leaving it open ended could lead to widespread reprocessing of spent nuclear fuel. A commenter wanted the EIS to consider a range of plutonium quantities for processing, suggesting that the amount may ultimately be greater than the 50 metric tons specified by the SPD EIS.

Range of Alternatives: A few commenters wanted to restrict the scope of the NRC EIS to the Proposed Action, the No-action Alternative, siting alternatives within the F-Area, and a reasonable range of MOX FFF design alternatives. They also stated that the official statement of proposed action and no-action should be broadened to include the issuance of a license to possess and use special nuclear material at the MOX Fuel Fabrication Facility. Other commenters wanted to make sure that the no-action alternatives were considered viable options. That is, the no-action alternatives should be defined so that the EIS could select a no-action alternative and not just do an analysis because it was required by law.

The Parallex Project: Some commenters stated that the No-action Alternative from NRC could mean 100 percent immobilization and immobilization has already been delayed. These commenters wanted the EIS to consider the possibility that DOE would export the surplus plutonium to Canada under the Parallex Project. [Note: The Parallex (parallel experiment) Project would be a joint agreement between Russia, Canada, and the United States to demonstrate the feasibility of burning MOX fuel in a heavy-water-moderated reactor, located at Chalk River, Ontario. The project would use MOX fuel made in the United States and Russia from surplus weapons-usable plutonium out of both countries' nuclear stockpiles.]

Aqueous vs. Dry Purification Process: Some commenters wanted NRC to evaluate both the wet and the dry plutonium purification processes. The analysis should include a cost/benefit analysis that weighs the effectiveness of the process against the costs, the effects the impurities have on the MOX fuel use, waste streams, quantities of waste, etc.

Contingency Issues: One commenter wanted to make sure that the impacts of unusable MOX fuel were assessed, noting that historically MOX production has exceeded use and that if the MOX fuel is stored too long, the plutonium converts to americium, which ruins the reactivity.

2.2.4 Ecology, Air, and Water

Surface Water Impacts: One commenter pointed out that the choice of F-Area for the MOX facilities would probably hasten whatever impacts there would be to Upper Three Runs Creek. The commenter wanted the impact analysis to consider the current conditions of the F-Area, pointing out that it was already contaminated.

Groundwater Quality: A number of commenters expressed concerns about potential contamination of groundwater by plutonium, especially since there are a number groundwater aquifers beneath the F-Area. The Floridian aquifer was specifically mentioned. The point was made that there is already existing groundwater contamination from radioactive releases (primarily tritium) from the SRS (communities downstream from the SRS in both South Carolina and Georgia have already been affected; tritium has been found in wells and surface water). Commenters pointed out that there is the potential that liquid radioactive waste generated by the MOX process, which would contain plutonium, would be stored in the same tanks that "caused" the tritium releases. One commenter pointed out that plutonium studies at the Nevada Test Site and at West Valley in New York have shown that plutonium has migrated much faster than predicted. A commenter wondered if the contaminated water would move between the soil and aquifers via the deep rock borings at the SRS.

Several commenters were concerned that any further contamination of the Savannah River could push the ecosystems "over the edge" and cause serious long-term consequences for human health and the economy that depends on resources from the river. They stated that existing water quality in the Savannah River, and Georgia in general, is compromised and that according to U.S. Environmental Protection Agency (EPA) data the Savannah River is already among the 10 most contaminated rivers in the country.

One commenter wanted the EIS to look at the effects of radioactive storm-water runoff on the ecology of the surrounding area. This commenter thought that storm-water runoff from retention ponds should be captured, not released to creeks.

HEPA vs. Sand Filters: Several people commented on the decision to use high-efficiency particulate air (HEPA) filters instead of sand filters for air filtration in the MOX facility. The point was made that the SRS prefers sand filters which are more efficient, safer and more reliable than HEPA filters. They wanted the EIS to consider the use of sand filters in its analysis.

Air Emissions: A commenter stated that the EIS should look at all air contaminants released by the MOX process, how contaminants will be removed and scrubbed from the air stream, and the probable path of contamination spread through the air. Other commenters noted that over the years, tritium had been released through the air pollution stacks and had fallen back to Earth as radioactive tritiated water, which contaminated the region's well water and agricultural products. One commenter questioned why the MOX FFF would be exempted from the National Emission Standards for Hazardous Air Pollutants as was suggested in the ER prepared by DCS. Another commenter stated that the EIS should consider air emissions from the emergency generators and volatile organic compounds from diesel storage tanks.

Tidal Wetlands: Some commenters were concerned about impacts to tidal wetlands along the Georgia coast, stating that they represent about one-third of the remaining tidal wetlands along the Atlantic shore of the United States. A commenter noted that in addition to ecological impacts, there is the potential for economic impacts to fisheries and other natural marine resources, as high as $1 billion annually.

General Ecological Impacts: Several commenters felt the ecological impacts were very important and that the EIS should look at the ecological impacts of the proposed facility. One commenter suggested using an ecological system upstream from the site as a benchmark; other commenters stated the impacts to endangered species and habitat should be re-evaluated given the changes to MOX design from what was presented in the DOE SPD EIS, in particular the changes in the waste streams and incremental volumes of waste.

2.2.5 Cultural Resources

One commenter thought the EIS should discuss the impacts of having deadly radioactive wastes in proximity to ancient cultural archeological sites. Another commenter questioned how cultural resources could be managed without a programmatic memorandum.

2.2.6 Cumulative Impacts

Some commenters wanted cumulative impacts to consider all existing (baseline) contamination and future actions at the SRS. Another commenter suggested that this should include all the auxiliary facilities associated with the MOX project. Chemical as well as radiological impacts should be evaluated. One commenter noted that any radioactive contamination of natural resources could have a cumulative adverse effect on businesses that rely on natural resources. Another commenter noted that cumulative build up of contaminated sediments could directly impact human health. It was noted that the Savannah River is currently among the 10 most contaminated rivers in the country and that further contamination would "push the ecosystem over the edge." A commenter thought cumulative impacts would be the appropriate place to consider the impacts on existing SRS infrastructure if construction of the pit disassembly facility was canceled.

2.2.7 Human Health Impacts

Safety Record: Several people expressed concern that DCS did not have an environmental and safety compliance record specific to DCS; there were only individual records for Duke, Cogema, and Stone & Webster. Commenters thought that it was inappropriate for DCS to use the safety data from the Westinghouse contract site. They pointed out that DCS has not established a safety culture; probability assessments and reliance on the fact that nothing bad has happened yet do not prove acceptability. Commenters wanted the EIS to evaluate Cogema's safety record in Canada and France.

Risk Determination: A commenter wanted the degree of uncertainty associated with the risk calculations used in models to be included, especially when data used to support the models were not based on weapons grade plutonium. Another commenter wanted the health-based standards to be based on EPA's 1 in 1 million accepted deaths rather than the 1 in 10,000 allowed by NRC.

Radiation Hazards: A commenter stated that in addition to looking at cancer fatalities, the EIS should address noncancer effects resulting from ionizing radiation exposures, such as immune deficiencies and genetic defects. A commenter thought that accident impacts should consider radiation exposure impacts to all individuals (including children, the unborn, the sick, and the elderly), not only the "standard man."

A commenter wanted the EIS to assess the dose to workers that would result from the MOX process. The analysis should include every worker involved: those at the MOX facility, workers at nuclear laundries, workers at reactor sites, workers at waste disposal sites, etc. A few commenters wanted to know what measures would be taken to protect MOX construction workers from the existing contamination at the MOX site.

Chemical Hazards: A commenter wanted the EIS to include the health effects of chemical exposure both during normal conditions and accident scenarios. The EIS should consider the fact that there will be a radioactive component to the chemical exposure.

Emergency Preparedness: Several commenters were concerned that DCS had not prepared an emergency management plan for the MOX facility. According to commenters, DCS claimed that a plan was not needed because its models showed that the public radiation dose during a major accident would be within regulatory limits. These commenters wanted the EIS to address the implications of running the MOX program with and without an emergency management plan.

A few commenters wanted the EIS to address the SRS Emergency Management Plan. One commenter expressed concern about impacts to the public from a rupture of a high-level waste tank containing MOX waste.

One commenter wanted to be assured that the SRS would communicate safety related information to the public in a timely manner. According to this commenter, there had been a situation where SRS had failed to warn the public about a tritium release that came downstream from the site.

Some commenters thought that the EIS should evaluate the impacts (costs) of having to upgrade the emergency response equipment and train emergency responders in the communities surrounding the SRS and the reactors and along transportation routes. One commenter made the point that many of the emergency responders are volunteers. Some commenters wanted the EIS to identify the capabilities of local, regional, and national medical facilities to manage acute and long-term casualties resulting from an accidental release. It was noted that medical facilities along transport routes are seldom adequately equipped to treat radiation victims.

A few commenters thought that using computer models to predict possible releases was inadequate and wanted the EIS to include the costs of purchasing and maintaining monitoring equipment on-site and off-site out to 40 miles. This would include monitoring of air, ground, water, vegetation, and livestock. The instrumentation should cover all forms of radiation, including alpha. A commenter stated that it was in the public's interest to know the measured amount of radiation as opposed to a calculated amount.

One commenter stated that an iodized prophylaxis, which could be used to prevent thyroid damage (including cancer), had been approved by the NRC. This commenter wants sufficient quantities to be in place in the event of an accidental release from the MOX FFF. (Note: An iodized prophylaxis is a non-radioactive form of iodine that is administered before exposure to saturate the thyroid and prevent the later uptake of any airborne radioactive iodine that might be dispersed in a nuclear accident. Any additional iodine that is later inhaled or ingested is eliminated by the kidneys.)

Accidents Related to the MOX Process: A commenter wanted the EIS to discuss the worst-case scenario for an accident related to plutonium processing and the safety factors that would be used to protect the public. All the consequences, not just the probability-weighted risks from accidents, need to be considered. Doses to populations as well as to individuals should be provided. Another commenter thought that the EIS should analyze the impacts caused by a criticality accident due to dust accumulation in the air ducts. There was a comment that the accident analyses should include a plutonium fire, given that plutonium is highly flammable in several of its states. A few commenters wanted the EIS to consider the impacts of accidents involving ruptures or explosions of the tanks used to store liquid radioactive waste. One commenter stated that power outages to the tanks could eventually lead to conditions that could cause the tanks to explode.

Other Accident Issues: Some commenters felt that accident analyses in DOE's EIS were inadequate and that detailed accident analyses should be done for the MOX FFF EIS.

Commenters expressed concern that the design basis earthquake assumed by DCS was not as severe as the one normally assumed by DOE for the SRS; this could also be true for the high winds or tornado design basis. A commenter felt that corners were being cut by using less stringent parameters.

A commenter wanted the EIS accident analyses to include scenarios like plane crashes, insider sabotage, missile attacks, truck bombings, the facility dropping into a sinkhole (there are soft zones near the MOX FFF location), and events happening in other nearby areas that could cripple the facility. One commenter wanted the EIS to provide details on the most probable accident.

One commenter thought that human error should be considered in accident analysis, noting that hazards in nuclear power plants are a combination of human and technical errors and that human failings cannot be completely eliminated by using engineering controls.

2.2.8 MOX Fuel Processing

Concerns were raised about the safety of the proposed design for the MOX FFF, in particular the sintering (baking) process that converts the MOX fuel pellets to a ceramic form. Commenters felt that the design for furnace confinement did not adequately protect the public from a plutonium release. A commenter stated that heating the plutonium in an inert atmosphere that contains some hydrogen could result in a hydrogen burn or an explosion if certain controls were violated. Commenters pointed out that similar work at the SRS is carried out in glove boxes, which provides additional containment in case of an accidental release.

A commenter wanted NRC (and the DOE) to conduct a thorough review of all MOX fuel specifications and quality control procedures. This commenter stated that failure to do so would compromise nuclear safety. In addition, the specifications and procedures must be provided to the public.

2.2.9 Transportation Issues

General Transportation Issues: A commenter wanted to know what security measures will be taken to protect the public during MOX fuel transport. In addition, the commenter also wanted the EIS to look at the impacts of transporting the surplus plutonium and the uranium hexafluoride gas to the SRS and of transporting the spent fuel to the storage facility. One commenter asked if the current transportation casks would work for the MOX spent fuel rods.

Some commenters wanted to know how the transport of nuclear materials related to the MOX project would affect traffic and emergency vehicles and if certain highways (specifically Highway 73) would be closed during transport.

A commenter asked what corporate entity would be responsible for the transport of MOX fuel through North and South Carolina and if they would be exempt from liability insurance for transport as they are exempt from liability in operations under Price-Anderson.

A few commenters believed it was not appropriate for NRC to rely on the DOE transportation analyses.

One state agency wanted NRC to consider their comments on the DOE Surplus Plutonium Disposition Final EIS (DOE/EIS-0283) when conducting the MOX FFF EIS analysis and safety review, particularly with respect to transportation and emergency preparedness.

Risks from Transportation Accidents: Some commenters thought that the EIS should evaluate the impacts of transportation accidents on communities in the transportation corridors. Impacts from both truck and rail accidents should be included. In addition to human health impacts, the effects on homes, schools, churches, etc. need to be considered.

One commenter wanted to make sure the transportation risk analysis was put in the proper perspective; for example, the exposure to the public in the event of an accident would be equivalent to that of a dental x-ray. Transportation risks should be compared to those of an exploding gas truck (again, for perspective). DOE's transportation statistics should be compared to those from the Department of Transportation.

2.2.10 Waste Management

Wastes Associated with the MOX FFF: Several commenters expressed concerns about high activity alpha liquid radioactive wastes resulting from the aqueous process that is proposed for removing gallium and other unwanted material from the weapons-grade plutonium. Commenters wanted the EIS to look at the types of wastes produced by this process (solid, liquid, and gaseous), waste storage, treatment, and ultimate disposal; they also wanted details included on the radiological and chemical character of the waste.

There were concerns that not enough waste tanks exist at the SRS to store the large quantities (estimates were as high as 81,000 gallons annually) of liquid radioactive waste that would be generated. One commenter suggested that the existing liquid waste (35 million gallons) be vitrified. Another asked if there would be liquid waste storage tanks dedicated to the MOX FFF.

High-Level Waste: A few commenters raised concerns over waste material supposedly leaking from high-level waste (HLW) storage tanks at the SRS. One commenter noted that 95 percent of the HLW generation from 2000 to 2070 would be from the SRS and wanted the EIS to determine what percentage will be from the plutonium processing facilities.

Low-Level Waste: One commenter stated that NRC must consider the fact that North Carolina will soon be excluded from using the Barnwell site for low-level waste disposal.

Wastes Associated with Converting DUF_6 to DUO_2: A commenter requested that the EIS consider wastes associated with converting depleted uranium hexafluoride to depleted uranium dioxide.

Spent Fuel Storage: Several commenters were concerned that a final waste site for spent fuel rods has not been determined and that reactor sites currently have spent fuel rods with no place to go. The EIS should address the impacts from the storage of spent MOX fuel at the reactor sites.

Secondary Wastes: A commenter wanted the EIS to include the chemical and radiological character, quantities, treatment methods, and destination of waste produced by the treatment of the original waste (secondary waste). The details should be comparable to those used for primary waste.

2.2.11 Socioeconomics

Economic Effects of Radioactive Contamination on Natural Resources: Some commenters wanted the EIS to assess the economic damage that would result from any radioactive contamination of natural resources. They maintained that the contamination would have a lasting, possibly cumulative, adverse effect on businesses that would not be solved by "cleanup" alone. A commenter pointed out that the economy of the Savannah region was very dependent on natural resources. According to this commenter, about one out of five jobs is related directly or indirectly to natural resources: commercial and recreational fishing, tourism, and seafood processing. About $1 billion in business is associated with these industries; even a reduction of 1 percent would be $10 million.

Cost/Benefit Analysis: Some commenters thought that a full cost/benefit analysis of the MOX program should be conducted, including use of MOX as a fuel. The analysis should extend beyond the usual "region of influence" to include national and international impacts as well. The analysis should also be looked at from the perspective of the taxpayer. A national-scale study of costs of the MOX program should be prepared as a report to the General Accounting Office.

Several commenters wanted the EIS to consider the cost of using MOX fuel in a reactor. They stated that Cogema in France recently admitted that the reactor fuel made with separated plutonium was three to four times more expensive than the conventional fuel made with low-enriched uranium. They also pointed out that the cost of using blended highly enriched uranium is lower, as would be the cost for mined uranium, and even uranium processed from the sea.

Costs of the MOX Program: A commenter noted that over the past four years, the estimated cost of the MOX program has doubled. The concern was that in a risk/benefit culture the environment is often compromised to keep expenses down. This commenter did not want the environment to "take the hit" for higher costs.

Electricity Rates: A commenter wanted the EIS to assess costs associated with the MOX program. There were concerns that project cost overruns would be passed on to consumers in the form of rate increases, as has happened, according to the commenter, in the past with the Vogtle nuclear power station.

Government Subsidy of Nuclear Power: A commenter was concerned about the impacts that "yet another" subsidy (funding) of nuclear power would have on the whole energy economy. Would the utilities be paid twice for the same kilowatt hour, once by taxpayers and again by ratepayers? That is, the taxpayers would be paying to produce the MOX fuel, and ratepayers would still be charged the same for electricity from fuel paid for by them (taxpayers). This commenter thought that the plutonium fuel subsidy would give an unfair advantage to nuclear energy suppliers in contrast to the nationwide effort to create a level playing field for energy producers. Also, the subsidy would put other sustainable energy technologies (solar and fuel cells) at a disadvantage. A comment was made that the MOX program no longer had a non-proliferation mission; it was really a subsidy to build a fuel infrastructure in this country using non-proliferation funds.

Land value: Some commenters wanted the EIS to consider the economic impacts on landholders along transportation routes. This would include transportation during all phases: delivery of the surplus plutonium to the SRS; transport of the MOX fuel to the reactors; and transport of the spent fuel to the repository.

2.2.12 Security and Terrorism

Many commenters were concerned about the increased threat of terrorism that would result from the transport of weapons-grade plutonium. A comment was made that the MOX program causes unnecessary transportation of nuclear material, thereby increasing the risk of accident or interception by terrorists. Commenters suggested that both the Proposed Action and the No-action Alternatives should look at the environmental and human impacts resulting from an act of terrorism, including the detonation of a nuclear weapon. One commenter suggested that the EIS should evaluate both foreign and domestic terrorism. Another felt that NRC regulations governing security were inadequate.

Some people thought that immobilization was the best technology for making weapons-grade plutonium less attractive to terrorists. Their arguments included the following: (1) immobilized plutonium would still be highly radioactive, thus making it more theft proof; (2) MOX fuel is very vulnerable to theft since it is not highly radioactive; the plutonium can be separated chemically and is still weapons grade; and (3) plutonium processing cannot properly account for all the plutonium that passes through the fuel cycle; incremental amounts can be systematically removed and used to make terrorist weapons. Other commenters felt that converting the surplus plutonium to MOX fuel was the more effective means of making it unavailable to terrorists.

2.2.13 Environmental Justice

General Comment: One commenter indicated that the National Association for the Advancement of Colored People (NAACP) would be monitoring the environmental justice part of the MOX project carefully. Another commenter pointed out that most African American workers in the area are a captive workforce since few companies are willing to move near the SRS; the same is true for poor whites. Some commenters suggested that the environmental justice analysis in the EIS evaluate the decision making to locate the proposed MOX FFF in the South.

Communicating Information: Concern was expressed that information related to the MOX project was not reaching the African American community. It was suggested that information be conveyed directly via their churches or the NAACP rather than expecting people to search the *Federal Register* for information.

Applicable Geographic Area: One commenter stated that it was not clear how environmental justice would be used in the decision making process. Some commenters thought that the geographic area considered for environmental justice should include communities both downwind and downstream of the MOX FFF. It should also include communities along transportation routes and near reactors. One commenter questioned why NRC had changed the region of analysis from a 4-mile radius to 50-mile radius from the MOX facility. Another commenter encouraged NRC to apply the guidance of the NMSS Policy and Procedures Letter 1-50, Rev 2, "Environmental Justice in NEPA Documents," to its MOX FFF EIS. According to this commenter, the document recommends that a 4-mile radius be used for evaluating Environmental Justice when a facility is in a rural area; evaluations beyond this distance are not warranted.

Subsistence Fishing: A few commenters stated the EIS should consider the effects of radioactive contamination on subsistence fishing. A commenter stated that people of modest income often depend on fishing local rivers for a greater proportion of their nutrition. This could lead to a situation where impacts to surface water could result in a greater than average risk to those modest income individuals.

Civil Liberties: A commenter expressed a general concern about the effects that the use of MOX fuel would have on civil liberties in local, regional, national, and international communities. Infringements on the civilian population due to the security necessary to guard the plutonium was specifically mentioned.

2.2.14 Decommissioning vs. Deactivation

Some commenters thought that the EIS should analyze the impacts of MOX FFF commissioning (not just deactivation) and any site remediation following decommissioning. Issues such as how the closure and removal will be funded need to be addressed. The terminal facility condition should be compared to its present condition. The NRC should have regulatory responsibility for the facility through the entire project life, including decommissioning. One commenter felt that consideration of decommissioning impacts at this time would be too remote and speculative, pointing out that since the CAR called for the MOX facility to be turned over to DOE at the conclusion of the contract and prior to decommissioning, decommissioning should not be within the scope of the MOX FFF EIS.

2.2.15 SRS Infrastructure and Existing Conditions

Infrastructure: Several people wanted the EIS to address MOX FFF impacts on existing infrastructure. Some commenters wanted the EIS to consider the impacts of processing weapons-grade plutonium at a 50-year-old site with reported cracks in the concrete. There were also commenters who thought the EIS should compare the impacts of the MOX FFF being a dedicated site (including waste storage tanks) to those associated with using existing SRS infrastructure.

Existing Conditions: One commenter thought that the description of existing conditions at the SRS should include the status of all nuclear materials on site, with a discussion of criticality issues.

2.2.16 Reactor Use Issues

General: A commenter noted that in order to avoid being accused of segmentation (not looking at the full consequences of an action) the EIS must include reactor impacts in its analysis. Other commenters wanted assurance that the MOX FFF EIS would be specific to the reactors actually designated to use the MOX fuel and would not ultimately be transferable to all United States reactors. They indicated that, if reactor impacts are not specifically addressed in this EIS, that EIS's should be performed for each reactor site prior to allowing use of MOX fuel.

Another commenter stated the prospect of analyzing reactor impacts as part of the current MOX FFF EIS would create a double jeopardy for DCS in that the company would have to provide data twice: now for MOX FFF licensing and then again during the license amendment process for the reactor.

Reactor Program Licensing and Implementation: A commenter wanted to know what the impacts would be if the Duke reactor license expired before the MOX fuel was used, if the reactors could not meet licensing requirements, or if Duke decided to shut its reactors down early because they were too expensive to run. A commenter wanted the EIS to consider the impacts that would result if the reactor portion of the MOX program was never implemented. Another commenter asked if the MOX FFF EIS would consider impacts of using MOX fuel and the revisions to the existing operating licenses at the Catawba and McGuire plants.

Plutonium Purification: A commenter asked that the EIS assess the impacts on the environment from imperfect gallium removal and the potential of the fuel's "falling apart in the reactor." This commenter noted that both the dry and the aqueous process for removing impurities from the weapons-grade plutonium have their faults . the aqueous process is environmentally destructive (it creates large quantities of high-level alpha liquid waste) and the dry process does not remove gallium as effectively. The tolerance level for gallium in the fuel should be determined.

Use of MOX Fuel in Reactors: Many commenters wanted the EIS to include a thorough investigation of the impacts of using weapons-grade plutonium in commercial reactors. Several commenters wanted the analyses to be specific to the reactor designs at the Catawba and McGuire plants. Commenters contended that weapons-grade plutonium has never been fabricated into fuel before and has never been used in a commercial reactor. They felt it was inadequate to use the MOX program experience in Europe as an analog in safety and performance analyses because the plutonium for MOX fuel in the European reactors comes from spent fuel from nuclear reactors, not weapons-grade plutonium. It was pointed out that the plutonium from dismantled weapons contains a different mix of isotopes than plutonium obtained from reprocessing spent fuel. It was also stated that the experience with low-enriched uranium fuel was not directly applicable because of the different mix of plutonium in that type of fuel and because of differences in performance of the two fuels. The commenters wanted NRC to evaluate the performance of the MOX fuel made specifically with weapons-grade plutonium at the concentrations proposed by DCS.

A few commenters stated that the DOE SPD EIS had already specifically evaluated the use of MOX fuel in the McGuire Nuclear Station and Catawba Nuclear Station reactors, which are the proposed mission reactors. They stated additional evaluations would be more appropriately made at the time of reactor operating license amendment application and that including reactor impacts in the MOX FFF EIS would delay the MOX FFF licensing process, increasing government costs with no commensurate benefit to public health and safety.

Thermal Pollution: Some commenters were concerned about the impacts of thermal pollution from reactors using MOX fuel. They stated that since the temperature in MOX fuel will be hotter, more ice and water will be needed for cooling and the temperature of water at Lake Norman will increase. One commenter maintained that this hotter water is changing the ecology, even down to the microscopic level of the food chain. This commenter stated that even now Lake Norman is warm enough for at least one alligator to survive.

Evacuation Issues: Many commenters were concerned about whether the population could be evacuated in time, should an accidental release occur. Traffic on the exits to Interstate 77 around Lake Norman was mentioned as being particularly bad; exit 28 was also mentioned. Another commenter felt that evacuation plans should go beyond the 10-mile radius that the NRC mentions in its publications.

Risks from Reactor Accidents: Several commenters stated that DOE's Surplus Plutonium Disposition EIS addressed generic reactor impacts rather than those specific to the Duke Power reactors that would be using the MOX fuel. They wanted reactor design-specific impacts to be addressed, rather than addressing the accident impacts generically.

Some commenters expressed concern that reactors used at Catawba and McGuire posed a greater likelihood for an accident than did other types of reactors currently in use in this country. Of particular concern were safety issues related to the use of ice condensers for cooling and the so-called "eggshell" containment at Catawba and McGuire. The point was made that ice condenser reactors lack steel-reinforced containment domes. In addition, a commenter pointed out that there had been violations involving Duke Power's failure to ensure that ice condenser inlet doors would be able to open if needed, and a forced outage could occur due to a blocked flow channel in portions of the ice condenser.

Comments were made that the Duke Power reactors were already suffering from embrittlement (a condition that causes materials to break without bending). There were concerns that the MOX fuel would cause a higher rate of embrittlement because it burns at such high temperatures. A more specific comment focused on analyzing accident consequences due to loss of power (including backup power) at the reactors.

One commenter pointed out that a severe accident at the Catawba reactors could result in a 25 percent increase in the latent cancer fatalities downwind of the reactor, resulting in anywhere from hundreds to thousands of additional cancer deaths. Another commenter wanted the EIS to consider the impacts of using plutonium fuel rather than uranium oxide fuel. A commenter stated that even DOE has admitted that the operation of nuclear power plants with plutonium fuel rather than uranium oxide fuel increases the deaths in certain accident scenarios. According to a commenter, one accident scenario had 8 percent more deaths from use of plutonium fuels rather than uranium fuel; another had 14 percent.

2.2.17 Lead Test Assemblies

Some commenters wanted NRC to fully provide and review all procedures for the fabrication of the lead test assemblies, including review of all the facilities involved, their records, quality control procedures, and the transport implications.

3. SCOPE OF THE EIS AND SUMMARY OF ISSUES TO BE ADDRESSED

The NEPA (Public Law 91-90, as amended), and the NRC's implementing regulations for NEPA (10 CFR Part 51), specify in general terms what should be included in an EIS prepared by the NRC. Regulations established by the Council on Environmental Quality (40 CFR Parts 1500-1508), while not binding on the NRC, provide useful guidance.

Pursuant to 10 CFR § 51.71(a), in addition to public comments received during the scoping process, the contents of the draft EIS will depend in part on the December 2000 environmental report submitted by DCS. Pursuant to 10 CFR § 51.71(b), the draft EIS will consider major points of view and objections concerning the environmental impacts of the proposed action raised by other Federal, State, and local agencies, and by any affected groups of Native Americans. Pursuant to 10 CFR § 51.71(c), the draft EIS will list all Federal permits, licenses, approvals, and other entitlements which must be obtained in implementing the proposed action, and will describe the compliance status with these requirements. Any uncertainty as to the applicability of these requirements will be reflected in the draft EIS.

Pursuant to 10 CFR § 51.71(d), the draft EIS analysis will include a consideration of the economic, technical, and other benefits and costs of the proposed action, and alternatives to the proposed action. In the draft analysis, due consideration will be given to compliance with environmental quality standards and regulations that have been imposed by Federal, State, regional, and local agencies having responsibility for environmental protection, including any applicable zoning and land-use regulations and water pollution limitations or requirements established or imposed pursuant to the Federal Water Pollution Control Act. The environmental impact of the proposed action will be considered in the draft analysis with respect to matters covered by such standards and requirements regardless of whether a certification or license from the appropriate authority has been obtained. Compliance with the environmental quality standards and requirements of the Federal Water Pollution Control Act (imposed by the United States Environmental Protection Agency or designated permitting states) is not a subject for and does not negate the requirement for NRC to weigh all environmental effects of the proposed action, including the degradation, if any, of water quality, and to consider alternatives to the proposed action that are available for reducing adverse effects. While satisfaction of NRC standards and criteria pertaining to radiological effects will be necessary to meet the licensing requirements of the Atomic Energy Act, the draft analysis will, for the purposes of NEPA, consider the radiological effects of the proposed action and alternatives.

Pursuant to 10 CFR § 51.71(e), the draft EIS may include a preliminary recommendation by the NRC staff respecting the proposed action. Any such recommendation would be reached after considering the environmental effects of the proposed action and reasonable alternatives, and after weighing the costs and benefits of the proposed action.

The scoping process summarized in this report helped to determine the scope of the MOX FFF EIS and identified the significant issues to be analyzed in depth. For instance, in response to comments received during the scoping process, the EIS will evaluate the potential impacts of using sand filters instead of HEPA filters, and the potential impacts of using both wet and dry plutonium purification processes in manufacturing MOX fuel. Other options may be identified and analyzed. The EIS will also evaluate the degree to which impacts would vary depending on where within the SRS F-Area the proposed MOX FFF may be located. This will include consideration of surface water impacts as suggested by a commenter. Cumulative impacts of the proposed action will be addressed in detail.

The No-action Alternative, not licensing the MOX FFF, was also refined through the scoping process. In addition to the potential environmental impacts of the proposed action, the EIS will evaluate two no-action alternatives: (1) continued storage of all of the surplus weapons-grade plutonium at the present DOE sites in an unaltered form; and (2) immobilizing all of the surplus weapons-grade plutonium at the SRS site. Other alternatives may be identified and analyzed during the preparation of the draft EIS.

Issues to be analyzed in depth pertain to the construction, operation, deactivation and decommissioning of the MOX FFF, and transportation of fresh MOX fuel. Ordinarily, an NRC environmental impact statement also discusses in detail the need for the proposed action. Here, however, DOE has already addressed the need for the MOX FFF (*see* Section 2.2 of the DCS Environmental Report), and the EIS will reference the purpose and need analyses performed by DOE pursuant to NEPA. Impacts associated with transportation of materials to the SRS for the purpose of manufacturing MOX fuel, impacts of converting the depleted uranium, impacts of reactor use of MOX fuel, and the transportation and disposal of spent MOX fuel will be discussed. The EIS will recognize previous NEPA analyses performed by the DOE, including (1) the *Surplus Plutonium Disposition Final Environmental Impact Statement* (SPD EIS) (DOE/EIS-0283); *(2) Final Programmatic Environmental Impact Statement for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride* (DOE/EIS-0269); *(3) Draft Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye*

County, Nevada (YMP EIS) (DOE/EIS-0250D); and (4) the Supplement to the Draft YMP EIS (DOE/EIS-0250D-S). Discussion of impacts associated with the two No-action Alternatives will be based largely on the SPD EIS.

Our goal in writing the EIS is to set forth the impact analyses in a manner which is readily understandable by the public. Decisions and the rationale for those decisions will be described in sufficient detail early in the EIS. Significant impacts will be discussed in greater detail in the body of the EIS. Topical areas whose impacts are less significant will be discussed in appendices to the EIS, with an explanation of why they were found to be less significant. This should allow readers of the body of the EIS to focus on issues that were important in reaching the conclusions of the EIS. The following topical areas and issues will be analyzed in the EIS:

- ***Geology and Seismicity.*** The EIS will describe the geologic and seismic characteristics of the proposed site. Evaluation of the potential for earthquakes, ground motion, soil stability concerns, surface rupturing, and any other major geologic or seismic considerations that would affect the suitability of the proposed site for the construction of the MOX FFF will be addressed primarily in the construction SER and summarized in the EIS. The EIS will not, however, evaluate the safety aspects associated with these site characteristics which will be addressed in the SER.

- ***Hydrology.*** The EIS will assess the potential impacts of the proposed project on surface water, storm-water runoff, and groundwater resources including the Floridian aquifer. The assessment will consider water resources, water quality, water use, flood plains, and the probable maximum flood (the largest flood that is likely to occur). The environmental mobility of the significant radionuclides, including plutonium, will be assessed. The EIS will not, however, evaluate the safety aspects associated with these site characteristics which will be addressed in the SER.

- ***Air Quality.*** Potential air quality impacts of the proposed project will be evaluated in the EIS. The evaluation will include potential impacts resulting from construction activities and operation (both with HEPA filters and sand filters) and will compare the anticipated air quality impacts, if any, with relevant standards.

- ***Ecology.*** The EIS will assess the potential environmental impacts of the proposed facility on ecological resources, including wetlands, plant and animal species, and threatened or endangered species and critical habitat that may occur in the area. As appropriate, the assessment will include potential effects on wildlife migration patterns; mitigation measures to address adverse impacts will be analyzed.

- ***Land Use.*** An analysis of impacts of accidents on existing land use along transportation corridors will be conducted. The EIS will also discuss the impacts of the MOX FFF on future land use on the SRS.

- ***Cultural Resources.*** The EIS will assess potential impacts of the proposed project on the historic and archaeological resources of the area. The EIS will also describe the programmatic framework of how cultural resources are evaluated at SRS and for the MOX FFF.

- ***Transportation.*** As discussed above, the transportation impacts of shipping MOX feedstock to SRS and shipping spent MOX fuel to a geologic repository will be discussed. The EIS will contain an analysis of potential impacts resulting from the transportation of fresh MOX fuel, and will assume (for purposes of ensuring that NEPA's objectives are met) that one or more commercial power reactors will later be authorized to use MOX fuel. Accordingly, the EIS will consider relevant aspects of both rail and truck transport of the fuel from the proposed MOX facility to the Catawba and McGuire reactors. The EIS will discuss the number, type, and frequency of shipments, as well as routing considerations and the quantities of MOX fuel being shipped. The impacts of transportation will be evaluated primarily in terms of radiological exposure risk to the population during normal transportation (including handling, transfer, and inspection) and under credible accident scenarios. The non-radiological impacts of transportation will also be identified and evaluated. The impacts on the usability or level of service of the roads, particularly near the SRS (such as Highway 73), will also be evaluated.

- ***Infrastructure.*** The EIS will address issues related to availability and adequacy of the infrastructure at the SRS such as waste treatment, and utility services to handle the needs of the proposed facility. The EIS will also consider impacts from any upgrades to these infrastructure.

- ***Waste Management.*** Waste management was identified as a significant issue by many commenters. The EIS will document the quantities, types, treatment, and disposal of the various potential waste streams. The EIS will also consider the impacts of storage of waste, such as the impacts on the existing high level waste tanks at SRS. The EIS will analyze the incremental impacts of MOX FFF wastes to existing facilities at SRS and at other DOE and non-DOE facilities. The EIS will evaluate the impacts of wastes generated at the MOX FFF either specifically or through incorporation of reference material from existing NEPA documents that analyze the overall waste management impacts at the SRS.

- ***Socioeconomics.*** The socioeconomic issues that fall within the scope of the EIS include the direct and indirect economic impacts on city, county, and school district revenues and expenditures, property values, residential and commercial development, housing, and public services in a four county region surrounding SRS. In addition, the economic effects on employment (including agricultural employment), unemployment and income in a 15-county region will be evaluated. These would include potential economic impacts to commercial fishing downstream of SRS. The EIS will include an analysis of the impacts on these resources that would result from the construction and operation of the proposed facility. National level impacts will be discussed under cost-benefit analysis.

- ***Environmental Justice.*** Potential for disproportionately high or adverse human health or environmental impacts on the minority and low-income populations will be evaluated and discussed at the census block level. Environmental justice will not be evaluated in detail along transportation routes because of the uncertainty associated with routing.

- ***Aesthetics.*** The EIS will analyze the visual impacts from the MOX facility being constructed in the F-Area at the SRS.

- ***Human Health Impacts.*** The potential human health impacts of the proposed facility on the workers and the general public will be evaluated for normal operations (including handling, transfer, and inspection activities) and under accident conditions. Potential exposures to radioactive elements and to chemicals will be considered. Both cancer and non-cancer health effects will be evaluated, as appropriate. Calculations for the general public account for sensitive populations as well as normal healthy adults. Models, assumptions, and supporting data used to develop the impacts from these potential exposures will be clearly described. The SER will assess the impacts associated with all credible accidents at the proposed facility, both from natural events and human activities. The EIS will analyze the potential environmental impacts resulting from bounding credible accidents at the proposed facility.

  Emergency preparedness and environmental monitoring were raised as significant issues by several commenters. The need and extent for emergency preparedness and environmental monitoring, in context of the EIS, would be considered as mitigation measures for potential impacts. These issues may be discussed in the EIS to the extent that they are required as mitigation measures. Emergency preparedness and environmental monitoring will be addressed in greater detail in the operation SER .

- ***Decommissioning.*** The December 2000 Environmental Report (ER) submitted by DCS considered only deactivation. Evaluating the impacts of decommissioning was identified during the scoping process as a significant issue and is required by NEPA. The EIS will evaluate the impacts of deactivating and decommissioning the proposed MOX FFF.

- ***Cumulative Impacts.*** The EIS will analyze the potential cumulative impacts of the proposed facility when added to other past, present, and reasonably foreseeable future actions. This will include impacts from auxiliary and infrastructure facilities associated with the MOX project. It will also include impacts to resources such as the Savannah River.

- ***Unavoidable Adverse Environmental Impacts.*** A discussion will be provided on the potential environmental impacts that could not be avoided if the proposed action were to be implemented.

- ***Irreversible and Irretrievable Commitment of Resources.*** The irreversible and irretrievable commitment of resources, including land use, materials, and energy will be discussed. Potential waste minimization and pollution prevention activities and mitigation measures will be discussed.

- ***Cost/Benefit Analysis.*** The EIS will include a cost/benefit analysis that summarizes the environmental and other costs and benefits of the proposed action.

- ***Compliance with Applicable Regulations.*** The EIS will present a listing of the relevant permits and regulations that are believed to apply to the proposed facility.

Pertinent proprietary information, although not available to the public, will be reviewed by the NRC in preparing the SERs and the EIS. As indicated above, all available documentation generated by DOE and other agencies that is related to dispositioning of surplus weapons-grade plutonium and MOX fuel production will be used, as appropriate.

4. ISSUES CONSIDERED PERIPHERAL, OUTSIDE THE SCOPE OF THE PROPOSED ACTION, OR COVERED BY PRIOR ENVIRONMENTAL REVIEW

Issues raised during the scoping period for the MOX FFF EIS are summarized in Section 2. Section 3 outlines the subjects and issues that will be addressed in depth in the EIS. Issues raised during the scoping period have been considered in the preparation of this scoping report and are reflected in Section 2. As discussed below, certain issues will not be addressed in depth in the EIS. Major categories of these issues and the reasons for not analyzing them in detail in the EIS are explained below. In general, these issues are not directly related to the assessment of potential impacts from the proposed major federal action now under consideration. The lack of in depth discussion in the EIS, however, does not imply that an issue or concern lacks value. Issues beyond the scope of the EIS may be appropriately discussed and decided in other venues. For example, many commenters were concerned about the lack of a safety record for DCS. This issue will be addressed in the SERs.

4.1 PREVIOUS DOE DECISIONS

A number of commenters requested that the SPD EIS prepared by DOE be supplemented and many of the decisions already made by DOE be revisited. Because the scope of the MOX FFF EIS is limited to the licensing action now under review by NRC, which is specific to the MOX FFF, issues pertaining to decisions already made by DOE will be addressed by referencing the appropriate DOE analysis.

4.2 INTERNATIONAL AGREEMENTS AND NATIONAL, STATE, OR LOCAL LAWS, STATUTES, AND REGULATIONS

Comments that seek to alter international treaties or affect national, state, or local laws, statutes, or regulations (e.g., comments that asked to alter Price-Anderson Act limits) will not be addressed, because they do not pertain to reasonably foreseeable impacts arising from the proposed construction and operation of the MOX FFF.

4.3 REACTOR USE OF MOX FUEL

Comments on the scope of assessing reactor use impacts in the EIS for the MOX FFF were varied (see Section 2.2.16). The NRC will consider the environmental impacts resulting from the use of MOX fuel, pursuant to 10 CFR Part 51, if and when nuclear power plant operators apply for a license amendment to use such fuel. Nevertheless, since a MOX FFF is expected to fabricate fuel for use in one or more nuclear power reactors, it is reasonable to consider the impacts of reactor use as an indirect impact in the EIS. At this time, NRC is aware that two plants, McGuire and Catawba, are considering using MOX fuel under the DOE program. The NRC is aware that DOE has analyzed the reactor use impacts of MOX fuel in its SPD EIS. Scoping comments related to reactor use impacts that were determined to be beyond the scope of this EIS will be forwarded to the appropriate NRC offices.

4.4 COST AND READINESS TO RESPOND TO EMERGENCIES

A number of commenters requested that the MOX FFF EIS analyze the impacts of having to upgrade the emergency response equipment and retrain emergency responders in the communities around the SRS, at the reactors, and along transportation routes. Other commenters requested that the EIS identify capabilities of local, regional, and national medical facilities to manage the casualties resulting from potential accidental releases and assess the readiness of communities to evacuate certain areas along the transportation routes in case of an accident. The human health impacts of potential accidents will be analyzed in the EIS. However, the costs associated with emergency preparedness and capabilities of local, regional, and national communities to respond to emergencies will not be analyzed, because such impacts are not specific to the proposed action. It is not anticipated that activities related to the proposed action will require any emergency response capabilities among communities beyond what they already have for similar purposes. Issues related to general emergency preparedness of communities are outside the scope of this EIS.

4.5 POTENTIAL DELAYS IN DOE PROGRAMS

Several commenters wanted to know what would happen if the DOE programs related to weapons-grade plutonium disposition and the opening of the HLW repository were delayed. Any such potential delays are either speculative or do not clearly affect the licensing review of the MOX FFF by the NRC. Unless it is reasonably foreseeable that a change in a DOE program or that of any other federal agency (e.g., a formal decision either has been announced or is expected to be announced soon) will have a substantive effect on the licensing of the MOX FFF, the EIS process will continue as scheduled, and the impacts of potential delays will not be analyzed in the EIS.

4.6 IMPACTS FROM TERRORISM

Many commenters raised a number of different issues concerning terrorism. However, the EIS will not address the impacts of terrorism, because these impacts are not considered to be reasonably foreseeable as a result of the proposed action.

4.7 IMPACTS OF ACTIONS IN THE RUSSIAN FEDERATION

All activities in the Russian Federation related to manufacture of MOX fuel from Russian-origin weapons-grade plutonium as part of an agreement between that country and the United States are being undertaken by the Russian authorities. They are not subject to NEPA and, therefore, will not be analyzed in the EIS.

4.8 PROPRIETARY INFORMATION

NRC will evaluate all pertinent proprietary information in its decision to grant authorization to construct the MOX FFF and to grant a license to DCS to possess special nuclear material. However, by law, NRC has to protect the proprietary information from public disclosure. Therefore, proprietary data will not be released to the public.

Attachment A

Preliminary Outline
for the Mixed Oxide Fuel Fabrication Facility EIS

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Appendix E - Radiological Analysis

APPENDIX J:

PUBLIC COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT AND NRC RESPONSES

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J.1 Overview

The U.S. Nuclear Regulatory Commission (NRC) issued the Draft Environmental Impact Statement (DEIS) for public review and comment in February 2003 in accordance with Title 10, Parts 51.73 and 51.74 of the *Code of Federal Regulations* (10 CFR 51.73 and 51.74) and 40 CFR 1503.1. The NRC provided a 75-day public comment period (which ended May 14, 2003) on the DEIS. The length of the comment period exceeded the minimum of 45 days specified in 10 CFR 51.73.

During the comment period, the NRC held three public meetings to receive oral comments regarding the contents of the DEIS. These public meetings were held on March 25, 2003, in Savannah, Georgia; March 26, 2003, in North Augusta, South Carolina; and March 27, 2003, in Charlotte, North Carolina. The NRC published notice of these meetings in the *Federal Register* (68 Fed. Reg. 97208, February 28, 2003), on its Web site, and in local newspapers.

Approximately 45 people provided oral comments at the public meetings. A certified court reporter recorded the oral comments and prepared written transcripts. The transcripts of the public meetings are part of the public record for the proposed project and were used in developing the comment summaries contained in this appendix. In addition to oral comments received at the public meetings, the NRC received written comments, letters, facsimile transmittals, and e-mails regarding the DEIS and associated issues. The written comments and transcripts are reproduced in Appendix L.

The NRC has reviewed each comment letter and all transcripts of the public meetings and has grouped comments relating to similar issues and topics, as permitted by the Council on Environmental Quality's (CEQ's) National Environmental Policy Act (NEPA) regulations and the NRC regulations at 10 CFR 51.91 and 40 CFR 1503.4(b). Because the comments were voluminous, this appendix provides summaries of all substantive comments received on the DEIS. The NRC then prepared responses to each of the comments or summaries of comments. Commenters are identified in each summary with a commenter number. Appendix K contains an index of commenter names, commenter numbers, and the Agency-wide Documents Access and Management System (ADAMS) accession number. ADAMS is the NRC's document management system that is available through NRC's Web site (www.nrc.gov). The accession number would be used to locate specific documents in the ADAMS system.

Many of the comments specifically addressed the scope of the environmental review, analyses, and issues contained in the DEIS, including existing conditions, potential impacts, proposed mitigation, the NRC review process, and the public comment period. Detailed responses to each of these comments are provided in this appendix.

Many comments addressed topics and issues that were not part of the environmental review process for the proposed action. Those comments include questions about the NRC's safety evaluation of the proposed mixed oxide (MOX) fuel fabrication facility, general statements of support or opposition to nuclear power, observations regarding past Savannah River Site (SRS) activities, comments on the NRC regulatory process in general, and comments on policies of the NRC and the U.S. Department of Energy (DOE). This appendix includes summaries of these comments. It does not, however, include detailed responses to such comments because they address issues that do not directly relate to the environmental effects of the proposed action and are outside the scope of the NEPA review of the proposed action.

The following sections present the comments, or summaries of those comments, along with the NRC's responses to them. When comments have resulted in modification or supplementation of information presented in the DEIS, those changes are noted. All changes made to the DEIS are indicated by side bars in the margin of the Final Environmental Impact Statement (FEIS). In some cases, the comments do not warrant a detailed response; in those cases, an explanation is provided as to why no further response is necessary. In all cases, the NRC sought to respond to all comments received during the public comment period. The sections referenced in the comments pertain to the DEIS. In general, the term "EIS" is used to apply to both the DEIS and FEIS. The term "FEIS" is used when noting that changes were made in the DEIS, or where section numbers have changed from the DEIS to the FEIS. Similarly, the term "SER" (safety evaluation report) is used to apply to both the SER for construction and the SER for operations.

J.2 Noteworthy Changes from the Draft Environmental Impact Statement

Several noteworthy changes have occurred since the issuance of the DEIS. Those changes include revisions to the human health risk of the proposed action, environmental justice impacts, and mitigation measures. These changes have resulted from (1) errors identified in the DEIS, (2) resolution of open issues in the draft SER (DSER), (3) changes to the Duke Cogema Stone & Webster (DCS) Environmental Report (ER), and (4) comments received on the DEIS. Section J.2.1 summarizes each of these causes, and Section J.2.2 summarizes changes in the human health risk, environmental justice, and mitigation sections of the FEIS.

J.2.1 Causes of Changes in the DEIS

J.2.1.1 Errors in the DEIS

After publishing the DEIS, the NRC identified an error in the accident analysis for the proposed action. On March 6, 2003, the NRC sent a letter to stakeholders who were sent a copy of the

DEIS to inform them of the calculational error. The NRC also published a notice of the error in the *Federal Register* (68 FR 12720). This error was associated with a flaw in the tritium model option in a computer code, GENII version 1.485, used by the NRC staff. The staff used the tritium model in its analysis of a large accidental tritium release from the Pit Disassembly and Conversion Facility (PDCF). During a review of this error, the NRC staff identified an additional error in Table D-1 of the DCS ER. This table presents a statistical summary of meteorological data over a 5-year period at the SRS. As part of this summary, wind speed ranges were incorrectly labeled as "meters per second" instead of "miles per hour." These errors affected the radiological doses from normal operations and from potential accidents. The NRC discussed these errors at the public meetings on the DEIS in March 2003. The NRC also issued errata sheets to stakeholders and posted these data on its MOX Web site.

J.2.1.2 Resolution of Open Issues in the NRC's Safety Review

Several open issues were identified in Appendix A of the DSER for construction of the proposed MOX facility issued on April 30, 2003. These open issues were areas where the NRC staff concluded that DCS had not met the requirements in 10 CFR 70.23(b). One of these issues (open item VS-1) related to the use of a leak path factor for two banks of high-efficiency particulate air (HEPA) filters under accident conditions. The leak path factor is an estimate of the percentage of contamination that would pass through the confinement systems during an accident. DCS had suggested using a leak path factor of 1×10^{-4}. In the DEIS, the NRC used a leak path factor of 1×10^{-2} in its accident analysis (see DEIS, Table E.12) for hypothetical internal fire and explosion events. As discussed in the DSER for construction, the NRC staff concluded that a leak path factor of 1×10^{-4} was appropriate for hypothetical internal fire and explosion events.

J.2.1.3 Changes to the DCS Environmental Report

On June 20, 2003, DCS submitted Revision 3 of its ER, on August 13, 2003, DCS submitted Revision 4 of its ER, and on June 10, 2004, DCS submitted Revision 5 of its ER. These revisions are summarized in the following sections.

Revision 3 Updates

The ER was updated in Revision 3 to include (1) responses to requests for additional information, (2) corrections to Revisions 1 and 2, (3) corrections resulting from an error in Table D-1 (see Section J.2.1), and (4) the latest design information for the Waste Solidification Building (WSB). In addition, DCS provided confirmation from the South Carolina Department of Health and Environmental Control that the proposed MOX facility does not need a Clean Water Act 401 Certification. DCS had previously replied to NRC requests for additional information in letters dated October 29, 2002, December 10, 2002, and December 12, 2002. The responses to the request for additional information were considered in the preparation of the DEIS.

Corrections to ER Revisions 1 and 2 consisted of clarifying Table 3-3 on page 3-53 of the ER. That table presents the aqueous polishing waste streams. The first column lists the names of several waste streams. The second column of the table originally showed a volume associated with a waste stream and another volume that was noted as "(max)." The second column in Revision 3 of the ER provides the same volumes; however, it has been clarified that the original number in column 2 applies to waste that would be generated from plutonium coming from the PDCF, and the "(max)" volume pertains to waste that would be generated from the alternate feedstock plutonium (see Section 2.2.3.2.1 of the EIS). The volumes in the original and revised Table 3-3 are the same, except that the high-alpha waste from PDCF plutonium changed from 54,135 L/yr to 58,136 L/yr (14,301 gal/yr to 15,358 gal/yr), and the liquid low-level (radioactive waste) (LLW) to the effluent treatment facility (ETF) from PDCF plutonium changed from 1,280,340 L/yr to 1,105,340 L/yr (338,230 gal/yr to 292,000 gal/yr).

As discussed above (Section J.2.2), errors were identified in the wind data contained in Table D-1 of the ER. The table has been corrected. These wind data were used in calculating the radiation dose associated with normal operations. Subsequently, DCS corrected the normal operational radiation doses of the ER (see pages 5-19 and 5-21, and Table 5-11 [page 5-85] of the ER).

Appendix G of the ER was revised to reflect the information for the preliminary design of the WSB. Appendix G of the ER Revisions 1 and 2 was based on conceptual design information. The following discusses noteworthy changes. The WSB will now process three waste streams (i.e., high-alpha-liquid waste from the MOX facility, stripped uranium waste from the MOX facility, and laboratory liquid waste from the PDCF). The WSB will no longer process the laboratory concentrated liquid waste stream from the PDCF. This waste stream will be processed at the PDCF. In evolution from conceptual design to preliminary design, the process changed slightly, and some of the tank sizes and numbers of tanks changed. The maximum capacity of high-alpha waste increased by 3,785 L (1,000 gal), and the maximum capacity of low-activity waste increased by 11,356 L (3,000 gal). The size of the low-activity waste evaporator capacity increased from 1,893 L to 2,271 L (500 gal to 600 gal). In addition, all waste transfers between facilities (i.e., MOX facility to WSB and PDCF to WSB) via pipelines would use a single flush of the pipeline instead of the two flushes originally proposed for transfers from PDCF, and no flushes for transfers from the proposed MOX facility.

Some of the impacts estimated for the WSB were also revised. In some cases, the impacts from the plutonium immobilization facility presented in the DOE Surplus Plutonium Disposition Environmental Impact Statement (SPD EIS) were used as bounding estimates for impacts from the WSB. The impacts for the WSB in the revised ER no longer reference the SPD EIS. In other cases, the impacts have changed as a result of the evolution of the WSB design. The water usage during construction was revised from 95 million L/yr to 1,968,414 L/yr (2.5 million gal/yr to 520,000 gal/yr). The water usage during operation was revised from 110 million L/yr to 19 million L/yr (29 million gal/yr to 5 million gal/yr). Nonhazardous liquid waste generated during construction was changed from 21 million L/yr to 240 million L/yr (6 million gal/yr to 63 million gal/yr). Air quality impacts were revised to eliminate the stand-by diesel generator and fugitive emissions from fuel storage tanks and to add emissions from cement storage tanks. Utility infrastructure demands (Table G-4 of the ER) were typically significantly lower.

The americium quantity in the final Waste Isolation Pilot Plant (WIPP) waste container was revised from 0.02 kg to 0.18 kg (20 g to 180 g).

The concentrations of various materials were also revised as a result of design changes and to reflect a more accurate representation of waste expected to be received by the WSB. The estimated concentration of PDCF laboratory liquids (Table G-8 of the ER) increased by approximately 1.6 times. The estimated concentration of the MOX stripped uranium waste stream (Table G-10 of the ER) increased by approximately 1.25 times, with the exception of uranium-235. The concentration of uranium-235 decreased to account for the waste acceptance requirement at the WSB that the uranium-235 percentage be less than 1% by weight. The estimated concentration of the MOX high alpha waste stream (Table G-11 of the ER) increased by approximately 3 times, with the exception of uranium-234 and uranium-235. The uranium-234 concentration increased by about 2 times, and the uranium-235 concentration increased by about 4.6 times. The estimated concentration of waste being processed (Table G-12 of the ER) varied slightly; however, the americium concentration increased by about 3 times in the feed, 2 times in the bottoms concentration, and by about 1.5 times in the overhead concentrations.

Radiation doses to the public from the WSB increased from 5×10^{-6} mSv/yr to 0.29 mSv/yr (5×10^{-8} mrem/yr to 2.9×10^{-3} mrem/yr) for normal operations. Radiation doses for facility workers were estimated as being below 2.0 person-Sv/yr (200 person-rem/yr), with a commitment that the average annual dose to workers would be below 5.0 mSv/yr (500 mrem/yr). The accident scenarios changed and the bounding accident also changed. Previously, three potential accidents at the WSB were considered: a fire in the low-activity area of the building, an explosion in the high-activity evaporator, and a facilitywide loss of confinement event caused by natural phenomena or an external event. The loss of confinement and fire accident events were revised with changes in the volumes and radionuclide concentrations of the waste streams involved in the accidents. This included the release of approximately 2 Ci and 1 Ci of americium to the environment for the loss of confinement and fire accidents, respectively. The original WSB explosion accident was removed from consideration because sufficient controls were determined to be in place to prevent such an occurrence. The postulated earthquake, previously considered to be a potential cause of the loss of confinement accident discussed above, was revised to include a fire event in conjunction with the loss of confinement. Thus, the postulated earthquake was added as a separate evaluation, the impacts being the sum of those estimated for the loss of confinement and fire accidents.

Revision 4 Updates

The ER was updated in Revision 4 to include revised design information for the WSB. These updates included an increase in the volume of solid LLW from 175 m^3 (228 yd^3) to 205 m^3 (265 yd^3). The volume of nonhazardous liquid waste was changed from 240 million L/yr to 21 million L/yr (63 million gal/yr to 6 million gal/yr). The annual consumption of cement at the WSB increased from 227,000 kg to 340,000 kg (500,000 lb to 750,000 lb), and the on-site inventory of nitric acid decreased from 8,000 L to 1,000 L (2,000 gal to 350 gal). The WSB accident source terms were revised in Revision 4 of the ER. The changes in the WSB design were made to preclude the release of americium to the environment. Tables G-13 and G-14 were added to provide the material released to the environment from a postulated accident. The consequences of the accident analysis are summarized in Table G-16. The maximum estimated impact to a site worker changed from 0.788 Sv to 0.00529 Sv (78.8 rem to 0.529 rem). The maximum estimated impact to a member of the public at the SRS site boundary changed from 1.35×10^{-3} Sv to 9.8×10^{-6} Sv (1.35×10^{-1} rem to 9.8×10^{-4} rem).

Revision 5 Updates

The updates in Revision 5 of the ER concerned modifications to the WSB facility design to accommodate changes in waste volumes. Volume changes were primarily a result of the impacts from process optimizations, the removal of the silver recovery process, and the decision to route the liquid LLW streams to the WSB for treatment rather than the SRS Effluent Treatment Facility. However, discharges of the treated liquid effluents to surface water for the proposed action would remain approximately the same. Radiation doses to facility workers were not affected because administrative limits were used to compute exposure. Waste volumes during the 10-yr operation period were revised from: 23,500 m^3 to 20,800 m^3 for liquid LLW, 3,900 to 6,468 m^3 for solid LLW, 1,030 to 120 m^3 for hazardous/mixed waste, 5,180 to 4,431 m^3 for TRU waste, 43,500,000 to 602,000 m^3 for nonhazardous liquid waste, and 39,900 to 41,000 m^3 for nonhazardous solid waste.

Further information on TRU waste treatment plans was incorporated into Revision 5 of the ER. Current plans call for volume reduction of the TRU waste before packaging and shipment to WIPP. An upper bound of approximately 8,240 m^3 would be generated over the project lifetime if volume reduction at the WSB were not considered. The bounding impacts for shipment of the non-reduced TRU waste to WIPP were added to provide a potential range of transportation impacts. The number of TRU waste shipments over the WSB operating lifetime ranged from 299 to 2,314. No accidental fatalities or latent cancer fatalities from radiation exposure were estimated. Up to one latent fatality from vehicle emissions was estimated for the bounding case.

Revision 5 of the ER also removed references to the controlled area boundary. No changes to impacts presented in the EIS were required as a result of this administrative change.

J.2.1.4 Comments on the DEIS

Comments received in the areas of (1) accident scenario and assumptions, (2) mitigation measures, (3) air quality, and (4) waste management resulted in noteworthy changes to the DEIS. Specific comments are discussed below. A summary of all the comments is provided in Section J.3.

Accident Scenario and Assumptions: Comments on the DEIS varied from stating that the accidents analyzed were overly conservative to stating that the accidents underestimated the potential impacts. Many commenters questioned the assumption in the 1-year exposure scenario that people would be allowed to ingest contaminated crops. Questions were raised regarding the computer code that was used to estimate the impacts from hypothetical accidents. It was stated that the accident scenarios lacked realism.

Additional text was added to Section 4.3.5 to clarify the assumptions used in the accident analysis. In addition, a third accident scenario was included. This scenario assumes a 1-year exposure period; however, crop ingestion is not included. The inhalation pathway immediately following the accident and direct radiation pathway from contaminates deposited on the ground from the hypothetical plume are included. The NRC reviewed the comments concerning the use of the GENII code and determined that using the code was appropriate for purposes of estimating impacts in the EIS from hypothetical accidents. The results of the accident analysis are discussed in Section J.2.2.1 below.

Mitigation: Comments on the DEIS varied from stating that the proposed mitigation measures were overly prescriptive to stating that the proposed mitigation measures were inadequate and lacked detail. Commenters stated that the NRC used an overly broad definition for mitigation such as stating that compliance with regulations was considered mitigation. The mitigation, measures proposed for the potential environmental justice impacts were viewed by some commenters as being unacceptable or inadequate.

The NRC determined that applying a broad definition of mitigation was consistent with CEQ regulations and guidance. The mitigation discussion (Chapter 5) was revised to better identify the proponent of the mitigation. As noted above, the impacts resulting from potential accidents has changed in the FEIS. The rationale for developing mitigation measures for potential environmental justice impacts has been added to the FEIS.

Air Quality: The statements in the DEIS regarding existing exceedances of the $PM_{2.5}$ (particulate matter with a diameter less than or equal to 2.5 micrometers) standard for both the 24-hour and annual averaging periods, and the adequacy of the air quality data used to establish background values were questioned. The DEIS data were based in part on an air quality monitoring station that was a source-oriented, special-purpose monitor and thus not appropriate for developing a background value of $PM_{2.5}$. Data from air quality monitoring stations greater than 80 km (50 mi) from the SRS were also improperly used to establish background values in the DEIS.

The background data were reanalyzed using updated data (see Section 3.4.3 and Table 3.3 of the FEIS). Table 3.3 in the FEIS presents the results of this update and includes both the highest and lowest ambient levels; the DEIS presented only the highest level. The air quality impact analysis in Sections 4.3.2.1 and 4.3.2.2 (Tables 4.6 and 4.8) were revised using the new background values. The FEIS concludes in Section 4.3.2 that the $PM_{2.5}$ standard levels would not be exceeded in the vicinity of the proposed MOX facility.

Waste Management: Commenters felt that the waste management section was confusing and difficult to follow. The DEIS reported liquid waste volumes in cubic meters (m^3) rather than gallons (gal) or liters (L). The waste management section in the FEIS (Section 4.3.4) has been revised to describe how the waste is generated from each facility, how the waste will be processed or treated by the SRS, and what the overall impacts of the proposed action are to SRS waste management capabilities.

J.2.2 Changes in the DEIS

J.2.2.1 Revisions to the Human Health Risk of the Proposed Action

Human health risk impacts are discussed in Section 4.3.1 of the EIS. In the DEIS, radiological and chemical impacts from the construction and operation of the PDCF, the proposed MOX facility, and the WSB were estimated to be well within regulatory limits for both workers and members of the public. The same outcome was determined in the revised analysis, which used the corrected wind speed data, resulting in an increase in impacts to SRS employees and the public, and which used lower ingestion rates of root vegetables, fruit, and grain for a maximally exposed member of the public for the radiological impacts, resulting in lower impacts.

The accident with the highest radiological impacts in the DEIS was the hypothetical explosion at the proposed MOX facility, with up to 50 latent cancer fatalities (LCFs) in the collective population estimated as a result of the short-term exposure, and up to 200 LCFs if all the contaminated crops were assumed to be eaten. The NRC has since allowed more credit (a factor of 100) to be given to the HEPA filtration system in the proposed MOX facility for the reduction in the amount released in both the hypothetical explosion and fire accidents at the proposed MOX facility. Thus, the impacts of these accidents were estimated to be a factor of 100 lower in the reanalysis for the FEIS. In the interim, the WSB accident analysis was revised on the basis of new scenarios and/or source terms, resulting in lower impacts by a factor of 2 or more.

J.2.2.2 Revisions to the Environmental Justice Impacts

Environmental justice impacts are discussed in Section 4.3.7 of the EIS. The DEIS concluded that the no-action alternative would have no disproportionately high and adverse effects on minority and low-income populations. The DEIS concluded that construction and operation of the proposed facilities would not result in disproportionately high and adverse effects on minority and low-income populations. On the basis of the accident analysis in the DEIS, the DEIS concluded that there was a potential for low-income or minority communities to be disproportionately impacted. Mitigation measures were proposed in Section 5.2.12 of the DEIS.

As discussed above, the NRC revised its accident analysis based on several factors. On the basis of the revised analysis and information in the ER, the NRC concludes that the impacts from potential accidents to low-income and minority populations could be high and adverse. The NRC believes that it is appropriate to mitigate these potential impacts. The NRC has revised the suggested mitigation measures for potential environmental justice impacts in Chapter 5.

J.2.2.3 Revisions to Mitigation Measures

Mitigation measures are discussed in Chapter 5 of the EIS. The NRC revised the mitigation discussion to state that mitigation measures for the PDCF were previously evaluated by the DOE and are not discussed further by the NRC. Therefore, the mitigation discussion is limited to the proposed MOX facility and WSB. Text has been added to clarify mitigation measures that are required by laws and regulations, those that are suggested by DCS as good practices, and those that were identified by the NRC.

The NRC staff has reviewed the mitigation measures and has concluded that no additional mitigation measures are required beyond the regulatory requirements and those measures identified by DCS.

J.3 Public Comments and NRC Responses

Sections J.3.1 and J.3.2 discuss comments related to general opposition or general support for the MOX project, respectively. Sections J.3.3 through J.3.11 cover policy issues, including purpose and need (J.3.3), the NEPA process (J.3.4), and the NRC licensing process (J.3.5). Comments on the scope of the EIS are covered in Sections J.3.6 through J.3.9. Sections J.3.10 and J.3.11 discuss the alternatives to the proposed action. Sections J.3.12 through J.3.29 discuss pertinent comments on technical issues and follow the order that such issues are discussed in the draft EIS. The last section (J.3.30) responds to editorial comments.

Readers can use Appendix K to link comment numbers to commenters. For example, for the comments number 10-002, the document number is 10 and the individual comment number is 2. Appendix L prints each comment document and indicates comments and comment numbers in the margin.

The following acronyms appear frequently and are not spelled out with each use:

DCS	Duke Cogema Stone & Webster
DEIS	draft environmental impact statement
EIS	environmental impact statement
FEIS	final environmental impact statement
MOX ER	Mixed Oxide Fuel Fabrication Facility Environmental Report
MOX facility	Mixed Oxide Fuel Fabrication Facility

J.3.1 General Opposition

J.3.1.1 Comments: 10-002 79-001 116-004
44-002 83-001

Comment: Opposition to the proposed MOX project was expressed because it was viewed as experimental. It was stated that, for experimental programs, prototype models are usually developed before final designs. It was noted no similar facility exists in this country. Because of this, it was suggested that the Nuclear Regulatory Commission (NRC) proceed with caution.

Response: The technology for the proposed MOX facility is based on two existing facilities in France. This technology has been adapted to comply with U.S. requirements or incorporate U.S. preferences. U.S. requirements include requirements in the areas of contracts, regulatory compliance, quality, design codes and standards, site and utility interface, security, and safety practices and principles. U.S. preferences refer to differences in the U.S. MOX design compared to the French design, including different throughputs, differences resulting from isotopic differences in the plutonium, component selection, and maintenance and operation. The design has progressed from a conceptual design, where differences in the U.S. and French technology were identified, to a preliminary design. The NRC is reviewing the principal structures, systems and components of the proposed MOX facility to assure that its design is adequately safe. The NRC staff's findings to date will be discussed in the safety evaluation report (SER) for construction. The NRC will review the final design if and when DCS submits a license application. The NRC's review of the final design will be documented in the SER for operations. For further information see Section 1.1.2 of the EIS.

J.3.1.2 Comments: 66-001
91-007

Comment: Opposition to the proposed MOX facility was expressed. It was believed that the assumptions and critical aspects of the analysis in the DEIS were flawed. Immobilization was considered to be a legitimate alternative that should have been assessed in more detail.

Response: The Nuclear Regulatory Commission (NRC) acknowledges the concerns expressed in the comments. The assumptions and critical aspects of the analysis for the proposed MOX facility were based on sound engineering and scientific principles. Immobilization was considered (see Section 2.3.3 of the EIS) but was not considered a reasonable alternative.

There the NRC sets forth two reasons why immobilization of plutonium is no longer a reasonable alternative to the proposed action (building and operating the proposed MOX facility).

First, immobilization of the 34 MT (37.5 tons) of surplus plutonium would not meet a key element of the purpose and need for the proposed action, as described in Section 1.3. Due to budgetary constraints, the DOE decided to cancel the immobilization portion of the surplus plutonium disposition program and adopt a MOX-only approach. The DOE determined that in order to make progress with available funds, only one approach could be supported. The DOE stated that after evaluating the feasibility of implementing two disposition approaches, it believed that the best way to make the most progress with available funds while maintaining Russian interest in and commitment to surplus plutonium disposition was to pursue a MOX-only disposition strategy. The DOE further stated that Russia does not consider immobilization alone to be an acceptable approach. In the DOE's judgment, reliance by the United States on immobilization would therefore cause Russia to abandon its plutonium disposition efforts. Because immobilization fails to degrade the isotopic composition of the plutonium, Russia distrusts the immobilization alternative as it would leave open the possibility of future retrieval and reuse of the plutonium in nuclear weapons. As discussed further in Section 1.1.1, the DOE therefore concluded that reliance on a MOX-only approach is the key to successfully completing the September 2000 agreement between Russia and the United States.

The second reason that immobilization is no longer a reasonable alternative to the proposed action is its connection with the conduct of United States foreign policy. Evaluating the immobilization alternative now would involve the NRC in foreign policy matters that the DOE has been conducting on behalf of the United States. In the NRC's view, an alternative that would block the implementation of an agreement with another country involves foreign policy matters that are outside NEPA's scope. Therefore, the NRC concludes that immobilization is not a reasonable alternative requiring detailed analysis in this FEIS.

J.3.1.3	Comments:	2-004	61-001	105-001
		24-009	64-001	

Comment: The Nuclear Regulatory Commission (NRC) should not approve the construction and operation of the proposed MOX facility.

Response: The NRC acknowledges the concerns expressed in the comments. Section 1.3 of the EIS discusses the need for the proposed action, particularly as part of a larger strategy for plutonium disposition. This strategy is intended to protect against the proliferation of material capable of being used in weapons of mass destruction.

J.3.1.4	Comments:	4-005	85-002
		20-001	96-001

Comment: The proposed MOX project will contribute to the legacy of radioactive and chemical contamination at the Savannah River Site (SRS).

Response: The Department of Energy (DOE) is currently involved in treating and restoring contaminated sites at the SRS. Section 3.9 of the EIS discusses the current waste management program in place at the SRS. The program consists of waste minimization, characterization, treatment, storage, transportation, and disposal. Section 4.3.4 of the EIS discusses waste management associated with construction and operation of the proposed MOX facility, the Pit Disassembly and Conversion Facility (PDCF), and the Waste Solidification Building (WSB). All wastes associated with the project would be treated and/or disposed of in accordance with applicable regulations. This issue is further discussed in Comment J.3.7.4.

J.3.1.5	Comments:	8-001	30-001	46-001
		12-001	32-004	99-001

Comment: Opposition was expressed for any activity that involves the manufacture, processing, and transportation of radioactive materials. Local communities should not have to be exposed to increased nuclear contamination or waste.

Response: The Nuclear Regulatory Commission (NRC) acknowledges the commenters' opposition to activities that involve the transportation, handling, and processing of nuclear materials. The EIS describes the actions that would be undertaken to protect the safety of both workers and the public. This includes following all applicable NRC regulations and Department of Energy orders pertaining to the transport, storage, handling, and processing of special nuclear materials.

J.3.1.6	Comments:	10-006	69-001	90-001	106-001
		10-022	71-004	98-001	109-001
		22-003	77-009	98-010	110-001
		44-006	84-001	104-001	112-001

Comment: Several commenters opposed the proposed project believing it to have an unacceptable level of risk to humans and the environment. The safety of the proposed MOX facility was questioned, particularly in regards to terrorist threats. Safety considerations were also expressed concerning the transportation of special nuclear materials. It was stated that the MOX facility would be counterproductive in reducing nuclear risks because it would allow plutonium to enter civilian commerce and the international marketplace. Instead of the proposed project, safer and cleaner alternatives (i.e., immobilization or no action) should be pursued.

Response: The Nuclear Regulatory Commission acknowledges the commenters' opposition to the proposed action as a means of surplus plutonium disposition. The goal of the surplus plutonium disposition program is to securely dispose of surplus plutonium and thereby reduce the threat of nuclear weapons proliferation.

The proposed action fulfills the goal of the surplus plutonium disposition program. The design, construction, and operation of the proposed MOX facility are expected to be within reasonable cost limits. Further, MOX fuel production benefits national security by reducing plutonium supplies. National security would improve because the number of locations where plutonium is currently stored would be reduced. Thus, converting surplus plutonium to MOX fuel was viewed by the Department of Energy (DOE) as a means of ensuring that the plutonium would not be obtained by rogue states and terrorist groups.

For a full discussion of the proposed action alternative and the immobilization alternative, see Sections 2.2 and 2.3.3 of the EIS, respectively. The impacts of the proposed action are discussed in Section 4.3 of the EIS.

Continuing research and development activities are expected to minimize technical risks of the proposed action. Further, the MOX Facility would be contained within the SRS, which is a secure DOE site.

Transportation of nuclear materials to or from the MOX Facility would be done in accordance with applicable orders and regulations. Couriers would be required to pass a background investigation, receive DOE's highest security clearance, be certified to operate safe, secure trailer/Safeguards Transporter, possess mental alertness, and meet physical performance requirements. Couriers are also trained in firearms, tactics, and driving. Furthermore, couriers receive specialized training in physical fitness, communications, radiation, and hazards detection. Emergency management training for couriers includes the above-mentioned areas, nuclear weapons safety, hazardous materials safety, emergency response training, general firefighting, and fire prevention explosive hazards. Any licensee seeking authority to use MOX fuel in a commercial reactor must apply to the NRC for a license amendment. Any such use of MOX fuel would involve a once-through cycle with no reprocessing of the spent MOX fuel.

J.3.1.7 Comment: 105-014

Comment: Stakeholders, who are concerned and alarmed by the proposed actions, are supposed to be protected by an impartial, unbiased and fair assessment performed by our government protectors (e.g., DOE, NRC, etc.). This DEIS fails to demonstrate that the public will be protected. The DEIS is biased in favor of the proposed action. This is illegal and fails the spirit of the laws meant to protect the citizens of this United States of America. It should be clear that the Nuclear Regulatory Commission (NRC) has good reasons to reject the requested license.

Response: The NRC has prepared this MOX facility EIS in accordance with the provisions of the National Environmental Policy Act (NEPA) (42 U.S.C. 4321 et seq.) and the related Council on Environmental Quality (CEQ) and NRC implementation regulations (40 CFR 1500 – 1508 and 10 CFR Part 51). As discussed in Section 1.1.2, this EIS is part of the NRC's decision making process regarding the potential licensing of the proposed MOX facility. The primary objective of the EIS is to provide a comprehensive description of the proposed action, alternatives, and the potential environmental impacts. Section 1.1.1 of the EIS provides an overview of the Surplus Plutonium Disposition Program and the steps that have led to the MOX fuel approach being selected as the preferred alternative by the DOE in its program for reducing the supplies of weapons-grade plutonium. The previous EISs evaluated relevant alternatives that resulted in the decision to proceed with the MOX facility as the preferred alternative. Section 2.3 of the EIS explains why several alternatives were not analyzed in detail in the current EIS. The no-action alternative, which is assessed in the current EIS, is the continued storage of surplus plutonium at seven DOE facilities. This alternative was analyzed in detail in the Surplus Plutonium Disposal EIS prepared by DOE in 1999.

J.3.2 General Support

Comments:	11-001	17-001	26-001	51-001	57-001	63-001
	14-001	21-001	49-001	54-001	59-001	86-001
	16-001	25-001	50-001	55-001	60-001	

Comment: Commenters indicated general support for the proposed MOX facility, including issuing the license for its construction and operation in a timely manner. The proposed MOX facility will contribute to worldwide safety and security by making nuclear materials unusable as weapons. Additionally, construction and operation of the proposed MOX facility will provide benefits to the local economy. The proposed MOX facility will also provide a source of clean fuel for generating electricity. It is believed that the proposed MOX facility will operate safely. Confidence was also expressed in the technical abilities of all parties involved with the proposed MOX facility.

Response: The Nuclear Regulatory Commission acknowledges the comments in support of the proposed action and the agencies and organizations that are involved in the project.

J.3.3 Purpose and Need

J.3.3.1 Comments: 37-003
53-010
72-003

Comment: Reliance on the United States-Russia Agreement for the purpose and need statement was questioned. This reliance has resulted in the dismissal of other alternatives. The statements made by the U.S. Department of Energy that Russia will only proceed with the agreement if the United States disposes of its excess plutonium through MOX fuel production are unsupported. The NRC's reliance on the DOE's statements, that MOX was the only practical alternative that Russia would accept, limited the NRC's detailed consideration of other alternatives. The commenters questioned the NRC's elimination of other alternatives, solely to avoid violating the United States-Russia Agreement. The status of the agreement should be addressed in the DEIS. It was felt that the NRC's hiding behind the United States-Russia Agreement was misleading because the United States does not follow international nuclear treaties. The U.S. government has pulled out of several international treaties. Therefore, stating that the United States does not want to interfere with the United States-Russia Agreement is erroneous.

Response: Section 1.3 of the EIS discusses the purpose and need for the proposed NRC licensing action (authorizing the construction and operation of a facility to make MOX fuel). This action is part of the larger surplus plutonium disposition program being implemented by the U.S. Department of Energy (DOE). As described in Section 1.1.1 of the EIS, the DOE program stems from decisions made by the United States and the Russian Federation to mutually reduce each nation's stockpiles of weapons-grade plutonium. In September 2000, the United States and the Russian Federation agreed to disposition 34 metric tons (37.5 tons) of surplus weapons-grade plutonium from each nation's stockpiles. In implementing its part of this agreement on behalf of the United States, the DOE in 2002 decided that for budgetary reasons it could no longer pursue its planned hybrid approach under which part of the 37.5 tons of surplus weapons-grade plutonium would have been immobilized. In addition, the DOE in its Amended Record of Decision (ROD) stated that a MOX-only approach best ensures the joint reduction of existing plutonium stockpiles and is the key to successfully completing the United States-Russia Agreement. Accordingly, the DOE canceled its plans to build and operate a plutonium immobilization plant. Instead, the proposed MOX facility – if it is built and operated – would convert the 34 metric tons (37.5 tons) of surplus weapons-grade plutonium into MOX fuel. This fuel would then be irradiated in nuclear reactors authorized to use such fuel, thereby making the plutonium component of the fuel inaccessible for reuse as nuclear weapons material. As stated in Section 1.3 of the EIS, the general purpose of and need for the proposed MOX facility is thus to help reduce the threat of nuclear weapons proliferation by ensuring that surplus weapons plutonium is converted to a proliferation resistant form.

The statement of purpose and need is used to differentiate alternatives that should be analyzed in detail from those that do not need to be analyzed in detail. While national policy does not generally preclude alternatives that can be considered in an EIS, an EIS need not consider alternatives that would change U.S. foreign policy. Therefore, the NRC concluded that the proposed action to build and operate a MOX facility and any reasonable alternatives to that proposed action should be consistent with the United States-Russia Agreement and the goal of both the United States and Russia disposing of surplus plutonium. The fact that the United States has, in some cases, withdrawn or not fulfilled unrelated agreements or treaties in the past is not germane.

Additional comments were received relative to the United States-Russia Agreement. These comments and their responses can be found in Section J.3.7, Scope - DOE Policy and J.3.11, Alternatives - Immobilization.

J.3.3.2 Comment: 96-022

Comment: Concern was expressed that a new plutonium pit disassembly and conversion facility (PDCF) would be constructed at the Savannah River Site.

Response: The PDCF is needed to remove the plutonium from weapons pits and convert it to a form that can enter the proposed MOX facility for conversion to reactor fuel.

J.3.4 NEPA Process

J.3.4.1	Comments:	5-002	32-001	46-002	96-009
		5-003	45-003	77-008	96-015
		7-003	45-002	96-004	96-015

Comment: The lack of influence of the general public opinion on the National Environmental Policy Act (NEPA) process and Nuclear Regulatory Commission (NRC) decision making was raised. It was stated that the NRC does not care about the more than 200,000 people living in Savannah and Chatham County or those Georgians and South Carolinians living downwind and downstream of the Savannah River Site (SRS). Individuals believed that everyone in Savannah could be opposed to the proposed MOX facility and this issue would not affect the NRC's decisions. Some comments indicated the decision was already made and the NRC was just going through the motions. It was stated that the MOX DEIS was a clear violation of NEPA. This raised the issue that the NRC licensing process was not a democratic process. Furthermore, the decision of whether to move forward with the proposed MOX facility would be decided by people who will not be living near the proposed facility. It was also felt that the people who could be affected by the proposed MOX facility should be notified and that additional outreach to disadvantaged or vulnerable communities should be done.

Response: The NRC has a well defined process for determining whether to grant a license for the proposed MOX facility. The NRC follows a process required by federal regulations and NEPA. For the proposed MOX facility, the NRC's decision making process included the preparation of an environmental impact statement (EIS) that seeks the opinions of affected stakeholders. In determining the scope of the environmental review, the NRC contacted affected communities, including disadvantaged and vulnerable communities, to determine significant issues prior to conducting any analysis (See Section 1.4 of the EIS). Additional meetings were held with stakeholders to inform them of the progress of the NRC's environmental review and to solicit comments on the DEIS after it was published. The NRC advertised the availability of the DEIS and mailed copies of the DEIS to approximately 600 people. The NRC will take into consideration the FEIS findings and safety analyses before any final decisions are made.

J.3.4.2	Comments:	61-006	96-010	96-024
		64-003	96-023	97-001

Comment: The timing of the environmental impact statement (EIS) in the overall licensing process was questioned. It was suggested that the Nuclear Regulatory Commission (NRC) should do another EIS because of the uncertainty about what the actual process, parameters and scope will be. It was also suggested that the NRC extend the comment period on this DEIS until the safety evaluation report (SER) for the operating license is complete. It was stated that the NRC might need to redo its analysis as future decisions unfold if the report is to be fully responsive to the proposed actions. In addition, there may be a potential segmentation problem with regard to the way the NRC has chosen to evaluate this particular action. Specifically, there was a concern about the adequacy of the

NRC's evaluation of connected actions, such as the use of MOX fuel and the effects of accident sequences at the McGuire and Catawba reactors.

Response: The EIS includes construction, operation and decommissioning impacts associated with the proposed action. Impacts include those from connected actions as discussed in Section 1.2.2 of the EIS. The connected actions included impacts from using MOX fuel in reactors. As discussed in Section 4.4.3 of the EIS, the impacts from using MOX fuel are presented in a generic fashion and include impacts from normal operations at reactors as well as impacts from potential accidents.

Although many of the design details for the proposed MOX facility have yet to be finalized, the impacts associated with operating were analyzed based on experience from similar facilities in France. The estimated impacts provided by DCS were reviewed and found to be sufficient for purposes of preparing the EIS. If, later in the process, the impacts are greater than those presented in the EIS, the NRC would determine whether a supplemental EIS would be required.

J.3.4.3 Comments: 9-004
35-006
43-006

Comment: It was suggested that the Nuclear Regulatory Commission (NRC) conduct an independent external review of the DEIS.

Response: Part of the National Environmental Policy Act (NEPA) process is a review of the DEIS preliminary findings by the public and other stakeholders. The DEIS is published for public comment, and comments received by the NRC are considered in finalizing the EIS. This process provides for independent external review by the public. In addition, there was a concern raised during a scoping meeting regarding a potential conflict of interest because the NRC is using Argonne National Laboratory to assist in preparing the EIS of a Department of Energy (DOE) linked facility. To allay any concerns about the use of Argonne, the NRC hired the Center for Nuclear Waste Regulatory Analysis (CNWRA) to conduct an independent external review of the DEIS, the comment response document, and the FEIS. The CNWRA is a non-profit, independent group that was established to assist the NRC in reviewing high level waste documents prepared by the DOE and its contractors. The CNWRA has been shown to not have any conflicts of interest with respect to the DOE.

J.3.4.4 Comments: 10-007 66-006 97-001
44-007 96-008 97-006

Comment: An extension of the formal comment period beyond the adjusted May 14, 2003, deadline was requested. The reasons for the requests included the timing of information provided by the Nuclear Regulatory Commission (NRC) regarding two errors in the DEIS and the complex nature of the DEIS. Also it was stated that the public should be given the opportunity to compare the DEIS and the safety evaluation report (SER) together and be allowed to have a 30-day overlapping period.

Response: The NRC considered the requests for extending the comment period and determined that 75 days was adequate to allow stakeholder review and comment (10 CFR 51.73). Although the radiological dose values changed as a result of errors identified by the NRC, the revised values did not change the conclusions and preliminary recommendation of the DEIS.

J.3.4.5 Comments:

5-003	23-001	61-002	75-001
7-001	45-003	62-001	96-023
13-002	47-003	62-003	96-024
19-001	55-002	66-006	96-028

Comment: In accordance with the National Environmental Policy Act (NEPA) process, citizens must be informed of the proposed action and provided the opportunity to comment when the DEIS is published. The citizens in the area surrounding the Savannah River Site (SRS) felt the NRC did not sufficiently inform the local citizens about the public meetings. Some individuals believed the meetings were held only to tell the public what will be done next, and the citizens had no input in the process. There were general requests to hold additional meetings so citizens would not be rushed in reviewing the DEIS. There were also requests to hold meetings in Columbia and Charleston, SC. Several individuals requested additional meetings be held in North Augusta, which is in the area most highly affected by the proposed MOX facility. Likewise, commenters indicated additional meetings should be held in black communities, which also would likely be affected. It was recommended that the Nuclear Regulatory Commission (NRC) delay its decision until environmental justice communities' input could be considered in the decision making process.

Response: The NRC acknowledges the concerns expressed by the commenters. The NRC considers the distribution of the DEIS and the public meeting notification process to be adequate.

In accordance with NRC regulations, the NRC staff published a notice of availability for the DEIS in the Federal Register (68 Fed. Reg. 9728, February 28, 2003). In the notice, the NRC staff provided information on how to obtain a free copy of the DEIS, listed contact people, and listed information about the public meetings. From February 28, 2003, to May 2003, the NRC distributed over 750 copies of the DEIS to state and local government officials and to the general public. Due to the vast amount of material in the DEIS, the NRC extended the comment period to May 14, 2003, and notified the public of the extension in the Federal Register (68 Fed. Reg. 12720, March 17, 2003).

During the comment period, the NRC held three public meetings regarding the DEIS (March 25, 2003, Savannah, GA; March 26, 2003, North Augusta, SC; and March 27, 2003, Charlotte, NC) to receive oral public comments on the DEIS. The NRC sent out invitation letters to over 550 citizens informing them of the meetings. The NRC also advertised the meetings in the local papers and on the local government television channels in Savannah, North Augusta, and Charlotte. These meetings were held to give interested citizens an opportunity to ask questions and to offer comments. Based on the number of commenters, it was necessary to limit the length of each comment in order to provide as many people as possible with an opportunity to speak. When announcing the time limitations, the agency emphasized that detailed comments could be submitted in writing.

The NRC staff selected the meeting venues in an effort to reach those members of the public who would most likely be affected by any impacts of the proposed action. The NRC staff participated in one meeting hosted by the Imani Group and the Citizens for Environmental Justice to provide additional project information to members of the community concerned with environmental justice. Based on these public involvement activities, the NRC considers the public meetings for the DEIS sufficient to fulfill its NEPA requirements.

J.3.4.6 Comments: 8-002, 96-008, 46-003, 96-031, 95-001

Comment: It was stated that the DEIS was difficult to understand and form impressions about. It was stated that the DEIS should be more "community and user friendly" by clearly stating what is proposed, why, and potential real impacts on the environment, health, economy, and ecology of the operation of the proposed MOX facility. A specific case was mentioned with the use of the words significant and insignificant, indicating that a definition of significant would be helpful.

Response: The Nuclear Regulatory Commission (NRC) staff notes the comments about document readability and shares the commenters' belief that an EIS should be written in plain language. The NRC believes that the EIS is written in plain language. However, the NRC recognizes that the EIS contains highly technical aspects that may be difficult to understand. In preparing the EIS, the staff attempted to write to as broad and diverse an audience as possible. The way impacts have been characterized has been changed from significant or insignificant in the DEIS to small, moderate and high. Definitions for these qualifiers are provided in Section 2.4 of the FEIS.

J.3.4.7 Comments: 10-007 44-007 96-003 96-029
13-002 59-002 96-018

Comment: It was felt that the DEIS presented misleading information, particularly the environmental impact portion of the DEIS. It was stated that documents must not be published for comment with incorrect calculations, and if this occurs the process for commenting must be extended. Given the errors in the DEIS, it was questioned how the public could be sure that the information was correct. In addition it was stated that the DEIS was published containing large computer errors miscalculating high death counts in low income, minority communities. It was also stated that there may have been a number of inadequacies found that causes even more concern about the concreteness of the data. It was suggested that the Nuclear Regulatory Commission (NRC) did not adequately inform local communities about the error or provide sufficient opportunity for them to comment on these errors. It was suggested that additional public meetings needed to be held.

Response: The NRC shares the concern about having mistakenly published erroneous information. The NRC identified the errors shortly after the DEIS was published. When the NRC discovered the errors, it took steps to quickly notify stakeholders and provide corrected information. Moreover, the NRC extended the comment period by 30 days. The NRC published in the Federal Register (68 Fed. Reg. 12720, March 17, 2003) information pertaining to the errors, explaining the errors and providing information on how to contact the NRC staff for additional information. At the subsequent public meetings, the NRC identified additional errors and informed the public that errata sheets would be mailed. The NRC staff mailed over 700 copies of the errata sheets to the public after these meetings were held.

J.3.4.8 Comment: 116-001

Comment: Arbitrary deadlines appear to be the managing force behind the MOX safety review. Deadlines should take a back seat to safety, so that the public develops confidence that the Nuclear Regulatory Commission (NRC) is protecting them.

Response: We agree with the commenter. The NRC's primary mission is the protection of public health and safety and the environment. As discussed in Section 1.1.2 of the EIS, the NRC's licensing decisions are based on an environmental review and a safety review. The NRC does not permit regulated action to be taken until both reviews are completed and any outstanding safety issues are satisfactorily resolved. While internal schedules must be established to manage projects, the NRC's decisions are not based on schedules.

J.3.4.9 Comment: 116-018

Comment: The terms "unlikely," "highly unlikely," and "incredible" should be associated with quantitative criteria that meet some standard.

Response: The Nuclear Regulatory Commission (NRC) has not associated quantitative criteria with the terms "unlikely," "highly unlikely" or "incredible." The regulations in 10 CFR

Part 70 allow applicants to propose definitions for these terms, which may be qualitative or quantitative. The applicant, DCS, has defined "unlikely" to mean events that are not expected to occur during the lifetime of the facility but may be considered credible. "Highly unlikely," as defined by the applicant, means events originally classified as not unlikely or unlikely to which sufficient principal structures, systems and components are applied to further reduce their likelihood to an acceptable level. The applicant also defined "not credible" events as those natural phenomena or external man-made events with an extremely low initiating event frequency and process events that are not possible.

J.3.5 Licensing Process

J.3.5.1	Comments:	13-001	80-001	93-001
		61-003	81-003	103-001
		78-002	92-001	

Comment: The use of a two part licensing process (construction and operation) for the proposed MOX facility was of concern to stakeholders. Several comments indicated that both construction and operation were not adequately addressed in the DEIS. The comments reflected that the MOX application was split into two parts (construction and operation), but the DEIS contained no review of the operations data. Separating these two parts of the licensing process was considered irresponsible. It was felt that the environmental impacts of operation must be considered before the DEIS process is complete. Stakeholders felt that the Nuclear Regulatory Commission (NRC) was going to sign off on the DEIS before operational plans were taken into consideration and environmental impacts of operation were analyzed.

Response: The ER submitted by DCS (as revised) contains sufficient information to analyze the potential environmental impacts of constructing and operating the proposed MOX facility. On the basis of this information, the EIS sets forth the NRC's environmental analysis. The NRC's NEPA regulations do not call for delaying the NRC's environmental review until completion of its operational safety review. On the contrary, to meet its NEPA obligations, the NRC must begin its environmental review early enough to allow completion before any action is taken that would significantly affect the environment. With respect to the proposed MOX facility, the environmental effects would begin with construction, and are not confined to operation. Accordingly, the NRC has properly completed its environmental review at the pre-construction stage.

J.3.5.2 Comment: 29-003

Comment: Questions were raised about the financial responsibility of the MOX project. A question was raised about who would be responsible for the decontamination of the four Duke reactors in the event of a financial collapse. In addition it was asked, whether the Duke reactors provide enough spent fuel to make MOX fabrication economical if the demand for electricity decreases.

Response: The financial health of Duke Power has no bearing on whether DCS has demonstrated that it will be able to obtain funds sufficient to build, operate, and decontaminate the proposed MOX facility in accordance with Nuclear Regulatory Commission (NRC) regulations on the environmental impacts of the proposed action's costs or benefits. NRC regulations (10 CFR 50.75) require existing reactor licensees, such as Duke Power, to provide financial assurance for decommissioning power reactors. The amount is based on either a standard NRC formula provided in the regulation or a plant specific cost estimate performed by the licensee. The funding must then be set aside as prepayment or in an external sinking fund such as a trust or escrow account or by other guaranteed method. The existing reactor licensee must report to the NRC every two years on the status of the decommissioning fund (every year after decommissioning has begun) and the NRC reviews these reports. Additionally, there are limitations on the amount of the decommissioning funds which may be spent until the existing reactor licensee has submitted a post-shutdown plant specific decommissioning cost estimate.

Although the rate has varied, the demand for electricity in the U.S. has steadily increased. The NRC expects that the Duke reactors will provide a reliable demand for the MOX reactor fuel.

J.3.5.3 Comment: 76-001

Comment: The EIS addresses the question of cost versus benefits throughout the document. Because of the consideration of cost and benefits, it raises the question of whether the Nuclear Regulatory Commission (NRC) is not a promoter of nuclear energy. As such, it was further questioned whether the NRC could act impartially and would act in the public interest.

Response: The Energy Reorganization Act of 1974 established the NRC as an independent government agency whose mission is the protection of public health and safety and the environment from the commercial uses of nuclear materials. Prior to 1974, the Atomic Energy Commission, the predecessor agency to the NRC and the Department of Energy, was criticized for both regulating and promoting nuclear energy. Therefore, the NRC was established as an independent agency that reports to Congress rather than the Executive Branch.

J.3.5.4 Comment: 95-003

Comment: The Nuclear Regulatory Commission (NRC) should use its influence on other policy-makers to review what is being proposed and redirect the surplus plutonium disposition program in a way that addresses the legitimate concerns of those living downstream of the Savannah River Site (SRS).

Response: As discussed in Section 1.1.2 of the EIS, Congress gave the NRC licensing and related regulatory authority over the proposed MOX facility. As part of its mission to protect public health and safety and the environment, the NRC is preparing a safety review and an environmental review of the proposed MOX facility, in accordance with NRC regulations, the National Environmental Policy Act, and the Atomic Energy Act.

As noted in the comment, the NRC does not have jurisdiction over the SRS. However, part of the EIS process includes consideration of alternatives and impacts that may be outside an agency's regulatory authority. As discussed in Section 1.2.2 of the EIS, the NRC has included the impacts of connected DOE facilities. Furthermore, the existing environmental conditions at the SRS have been presented in Chapter 3 of the EIS. Another part of the EIS process is issuing the EIS in draft form for public comment. This includes seeking comments from other federal and State agencies, such as the Department of Energy, the Environmental Protection Agency, and the South Carolina Department of Health and Environmental Control. In addition, the NRC has proposed mitigation measures in Chapter 5 of the EIS to reduce potential impacts from the proposed action, including connected DOE facilities.

J.3.5.5 Comment: 116-005

Comment: The Nuclear Regulatory Commission (NRC) is licensing the proposed MOX facility and is not licensing the Waste Solidification Building (WSB) or the Pit Disassembly and Conversion Facility (PDCF). The proposed MOX facility will generate chemical and radioactive waste, which is then transferred to unlicenced facilities for disposal. Given the polluting history of the Savannah River Site (SRS), it was suggested the NRC get involved with the proper disposal of the wastes generated by MOX. Incineration, burial, and transport of chemical and radioactive wastes require the NRC to become involved through the EIS in a proper outcome. The NRC should reconsider the bounds of its EIS.

Response: As noted in the comment, the NRC does not have regulatory (licensing) authority over the Department of Energy's PDCF, WSB, or waste processing and disposal facilities. Section 1.2.2 of the EIS discusses connected actions that are considered in the EIS. These include impacts from the PDCF, WSB, and waste processing and disposal facilities. Impacts for various resource areas from the PDCF and WSB are discussed in Chapter 4 and Appendix H of the EIS. The impacts associated with waste management are discussed in Section 4.3.4. Existing contamination at the SRS is discussed in the affected environment portions of the EIS (Chapter 3). The impacts referenced by the commenter are discussed in the EIS. Under NEPA, the NRC is obligated to consider impacts of connected actions such as waste management. However, acting on the suggestion that the NRC get involved with the DOE's waste disposal efforts would be outside of the NRC's regulatory authority.

J.3.6 Scope – General

J.3.6.1 Comments: 5-004 32-002 56-005 19-008 45-004

Comment: The use of a 50-mile radius as a boundary to assess impacts was questioned. It was stated that a major accident could impact an area greater than 60 miles, and the Chernobyl accident was cited as an example. The DEIS does not address the environmental impacts on the Savannah area. It was suggested that the evaluation of environmental justice impacts should be expanded to include impacts to downstream communities regardless of their racial or income demographics.

Response: The geographic area, in which impacts are assessed, varies depending on the type of technical area being evaluated. For example, cultural resource impacts are evaluated only in the vicinity of the site, because constructing and operating the proposed MOX facility would not impact cultural resources at a great distance from the proposed MOX site. But, air quality impacts are evaluated both on local and regional scales, and the cost-benefit analysis evaluates impacts on national and regional scales. The geographic area used to assess human health impacts to the public was selected to be a 50-mile radius from the proposed MOX site. The estimated doses to the public would decrease with distance from the site, because accident impacts to the public result from airborne plumes and the concentration of the plume decreases significantly with distance. The 50-mile area was considered sufficient to reasonably bound the impacts from a postulated accident without diluting collective doses to the public. This 50-mile area was also used in assessing the environmental justice impacts.

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,* issued in 1994, directs executive branch agencies to address, as appropriate, any disproportionately high and adverse human health or environmental effects of their actions, programs, or policies on minority populations and low-income populations. Guidelines for performing environmental justice reviews are described in the Nuclear Regulatory Commission's NUREG-1748. The first step in the process is to determine if a site has a potential environmental justice concern based on the identification of low-income and minority populations that could be affected by the proposed action. The next step is to determine whether possible impacts would disproportionately impact these populations. Finally, if it is determined that there would be a potential impact, as assessment would be made as to whether the impact of any aspect of the construction or operations of the proposed facilities (including accidents) on low-income or minority populations would be both "high and adverse." (See Section 4.3.7.1 for a more detailed description.)

As discussed above, the 50-mile area was considered sufficient to reasonably bound the impacts to human health. Savannah, Georgia, is located just outside the 50-mile radius and is not expected to be significantly impacted by airborne release from the most severe accident evaluated. As discussed in Section 4.3.7.3, the EIS considered impacts to downstream communities, including impacts to surface water quality of the Savannah River.

(Also, see Comment J.3.29.1 for further information.) The scope of the EIS is thus considered sufficient.

J.3.6.2 Comments: 33-001 77-001
72-014 96-033

Comment: The scope of the DEIS and the range of impacts assessed was considered to be too limited and not broad enough in scale. For example, an assessment of risk for humans and the environment should be done to include all the processes involved in the MOX production, in its transport, and in its use as a fuel. It was felt that the reactor use evaluation should include impacts on affiliated nuclear services such as nuclear laundries, component repair, decontamination services, and decommissioning. It was suggested that a programmatic EIS must be conducted that considers and addresses all parts of the MOX related activities which includes the current MOX EIS, supplemental EIS for the license renewal for the four Duke nuclear power plants, the lead test assemblies, MOX use in reactors and new plutonium processing. It was felt that the cost benefit analysis should include other types of costs.

It was stated that information in the DEIS was presented in a fragmented manner and that it is very difficult to see the whole picture.

Response: The scope of the proposed action is described in Section 1.2 of the EIS. It includes impacts for transportation of feedstock material, conversion of depleted uranium, processing of metal plutonium into powder at the Pit Disassembly and Conversion Facility, fabrication of MOX fuel at the proposed MOX facility, waste management, transport of fresh, unirradiated fuel, use of MOX fuel in reactors, transportation of spent MOX fuel, and decommissioning the surplus plutonium disposition facilities. This range of activities is considered sufficient to reasonably bound the full range of impacts associated with the potential construction and operation of the proposed MOX facility. The cost benefit analysis is presented in Section 4.6 of the EIS and includes a variety of costs on both the national and regional scale. It is not clear from the comments which other costs should be considered. While the impacts associated with various resource areas are discussed in detail in Chapter 4 of the EIS, a concise summary of the impacts of the proposed action and no-action alternatives is provided in Section 2.4.

As discussed in Section 4.4.3, the impacts associated with using MOX fuel are discussed in the Department of Energy's (DOE) Surplus Plutonium Disposition (SPD) EIS. The DOE's analysis is provided in Section 4.28 and Appendix K.7 of the SPD EIS and includes the areas of concern to the commenter.

As discussed in Section 1.1 of the EIS, the DOE is responsible for the overall surplus plutonium disposition program. Pursuant to Congressional mandate, the NRC is responsible for only a small portion of the surplus plutonium disposition program, namely regulatory authority over the proposed MOX facility. It would be inappropriate for the NRC to conduct a programmatic EIS, duplicating analyses previously performed in the SPD EIS. The NRC is performing a separate National Environmental Policy Act (NEPA) review pertaining to the pending license amendment request to use MOX lead test assemblies at those reactors.

J.3.6.3 Comments: 14-004 89-008
63-004 89-014

Comment: The inclusion of impacts from the Pit Disassembly and Conversion Facility (PDCF) and Waste Solidification Building (WSB) was questioned. It was stated that the DEIS places unwarranted emphasis on impacts associated solely with the PDCF. The PDCF is not necessarily solely required to support the proposed MOX facility. The Nuclear Regulatory Commission (NRC) creates the implication that impacts from the PDCF will not occur if the MOX construction authorization is denied. PDCF and MOX are two separate actions. The DOE has previously prepared an EIS for the PDCF, with the finding that the facility provides adequate protection to the public and the environment. The NRC should not subject the PDCF facility to National Environmental Policy Act (NEPA) double jeopardy. It was further stated that the NRC should not have re-analyzed impacts associated with the PDCF, because the EIS is limited to the licensing action now under review. It was also stated that the EIS presents the impacts associated with the WSB out of context. It was stated that the WSB is part of the PDCF complex and should be discussed as such. Both the proposed MOX facility and PDCF comprise major production buildings and several smaller associated buildings. Similar waste from the PDCF and proposed MOX facility that would have been processed separately is now processed in a single WSB, thereby reducing the amount of space and equipment needed for both the proposed MOX facility and PDCF. The DEIS should be revised so as not to give the impression that the WSB is a major stand-alone facility.

Response: Section 1.1.2 of the EIS discusses connected actions to the proposed action (i.e., potential licensing of the proposed MOX facility). In determining that the PDCF and WSB are "connected actions," the NRC found that in order for the proposed MOX facility to fulfill its functions, the DOE would need to build and operate the proposed PDCF and WSB. As discussed in Section 1.4, the NRC concluded that because of the Department of Energy's (DOE's) decision to pursue a MOX-only approach, the PDCF no longer had independent utility apart from the proposed MOX facility. The impacts for the PDCF were taken from the DOE Surplus Plutonium Disposition EIS, except where the impacts were reanalyzed to be consistent with the methodology used by the NRC for the proposed MOX facility. The NRC determined that presenting impacts derived from inconsistent methodologies would not be helpful to the public in understanding the overall impacts associated with the potential construction and operation of the proposed MOX facility. It is recognized that the PDCF would be a DOE facility and as such could be used by the DOE to perform other missions as appropriate. However, the PDCF impacts associated with the proposed action have been appropriately included here to avoid an improper segmentation of the potential impacts discussion.

The NRC recognizes that waste processing at the proposed MOX facility and the PDCF was included in previous DOE EISs. However, the previous DOE EISs did not consider the WSB as a separate facility. Issues associated with waste management are a significant concern to stakeholders. The NRC believes that presenting the impacts associated with the WSB separately will add to the understanding of the overall impacts related to managing wastes associated with the proposed action. The impacts of the WSB were provided by the applicant in Appendix G of its ER. The WSB is discussed in the EIS in terms of being a "support" facility to the proposed MOX facility and PDCF. Therefore, the scope of the EIS appropriately includes impacts from the PDCF and the WSB.

J.3.6.4 Comment: 77-007

Comment: It was suggested that either the Department of Energy or the Nuclear Regulatory Commission (NRC) should prepare an EIS on the waste management in the manufacture and use of MOX fuel.

Response: The impacts on waste management associated with making MOX fuel are discussed in Section 4.3.4 of the EIS. The EIS concludes that the waste management capabilities at the Savannah River Site (SRS) and within the DOE complex (e.g., the Waste Isolation Pilot Plant) are adequate to handle the estimated types and volumes of waste associated with the proposed action. As discussed in Section 4.4.3 of the EIS, the impacts associated with using MOX fuel in reactors are based on the Department of Energy's Surplus Plutonium Disposition (SPD) EIS. Section 4.28.2.2 of the SPD EIS states that the volume of waste from reactors is not expected to increase as a result of reactors using MOX fuel. It further states that waste handling processes at reactors would also not be expected to change as a result of reactors using MOX fuel. The scope of the EIS is sufficient to address this comment.

J.3.6.5 Comment: 93-003

Comment: Concern was expressed that the DEIS will provide a substrate for future MOX fuel fabrication facilities that the Nuclear Regulatory Commission (NRC) might license. As such, it is important to note that the plutonium under consideration is from dismantled warheads that were once from reprocessed irradiated fuel. The current proposal is not representative of any other MOX fuel fabrication facility that might be licensed in the future under Part 70, where waste reprocessing would be an integral part of the proposal and need to be considered. In this case, the Pit Disassembly and Conversion radiation doses and other impacts must be considered a part of the current process.

Response: This EIS evaluates impacts of the proposed action (i.e., potential licensing of the proposed MOX facility at the Savannah River Site) and alternatives to the proposed action. The impacts of the proposed action are facility and site specific, and include, as the commenter suggested, impacts from the Pit Disassembly and Conversion facility and other impacts considered part of the current process. While some impacts such as MOX fuel transport and MOX fuel use in reactors are presented on a generic basis, this EIS is not considered to be broad enough in scope to be considered suitable to support any future consideration of a generic MOX fuel fabrication. Further, as noted by the commenter, there are significant isotopic differences in plutonium from surplus nuclear weapons and plutonium derived from reprocessing spent nuclear fuel that would require substantial design changes for any mixed oxide fuel fabrication facility that would use plutonium derived from reprocessing.

J.3.6.6 Comment: 97-013

Comment: The DEIS appears to use averages. Frequencies and likelihoods do not appear to be incorporated. This DEIS pertains to a proposed facility that would be licensed under 10 CFR Part 70, which included consequence and likelihood bins (e.g., see the Construction Authorization Request and the safety evaluation report). The DEIS should explicitly consider consequences and likelihoods.

Response: In general, the EIS assumes that a potential consequence would occur (i.e., a probability of one). Conservative models and parameters are used in estimating the potential consequences. For example, meteorological data used in the air transport model would only be exceeded 5% of the time. In evaluating the consequences of potential accidents, the Nuclear Regulatory Commission assumed that accidents could be possible, even though the applicant has proposed controls to reduce the likelihood and severity of accidents. In other words, the impacts discussed in the EIS are based on radiation doses and chemical exposures, were an accident to occur. No estimates of accident probability or likelihood are used in the calculation of these doses and exposures. Therefore, no consideration of probability or likelihood is required to estimate the environmental impacts presented in the DEIS.

J.3.6.7 Comment: 98-009

Comment: The DEIS must address the full impacts of the proposed action including how it is likely contributing to the eventual production of nuclear weapons components at the Savannah River Site (SRS) and the use of the site for permanent nuclear waste burial. A full accounting of what and how much plutonium is coming from where and being used for what project when it arrives should be done and made available to the public.

Response: The scope of the proposed action is described in Section 1.2 of the EIS. The scope of the proposed action includes connected actions that are closely related to the proposed action (i.e., potential licensing of the proposed MOX facility). The connected actions include impacts from some Department of Energy activities at the SRS such as the proposed construction and operation of the Pit Disassembly and Conversion Facility and the Waste Solidification Building, and related infrastructure upgrades at the SRS. However, this EIS does not address DOE activities that are not connected to the proposed action such as consideration of facilities to produce nuclear weapons or waste disposal not directly related to the proposed action. The consideration of actions suggested by the comment are outside the scope of this EIS. Related issues are discussed in Comment J.3.7.6.

J.3.6.8 Comment: 86-007

Comment: Section 1.4.1, page 1-12 of the DEIS states "Because the scope of this DEIS is limited to the licensing action now under review by the NRC, which is specific to the proposed MOX facility, issues pertaining to decisions already made by the DOE are addressed by referencing the appropriate DOE analysis." The statement is misleading. Although the Nuclear Regulatory Commission (NRC) indicated that they would rely on the appropriate Department of Energy (DOE) analyses, the NRC recalculated accident analyses described in the DOE Surplus Plutonium Disposition (SPD) EIS using extremely conservative models and assumptions resulting in significantly different impacts than in the DOE SPD EIS.

Response: As discussed in Section 1.2.2 of the EIS, two DOE facilities (Pit Disassembly and Conversion Facility and Waste Solidification Building) would support the proposed MOX facility and are considered to be connected actions. The impact assessments and information supporting the impact assessments from the DOE EISs were used in the estimation of impacts in the DEIS. In some cases, the impact values used are taken directly from the DOE EIS. In other cases, because the NRC used different codes, models and scenarios in estimating the human health impacts (such as referred to in the comment) the NRC used supporting data from the DOE EIS to estimate impacts from these facilities that was consistent with the methodology used to estimate the impacts from the proposed MOX facility.

J.3.6.9	Comments:	12-004	24-004	64-004	92-003
		13-004	30-003	71-009	93-010

Comment: The use of a generic analysis was questioned, given the unique nature of the proposed Catawba and McGuire candidate reactors ice condenser type containment and the population surrounding these reactors. It was felt that the DEIS for the proposed MOX facility both could and should include an analysis of the use of MOX fuel at the Catawba and McGuire reactors. Concern was expressed that the MOX EIS may be the only opportunity for the public to comment on using MOX fuel in reactors, unless interveners force the Nuclear Regulatory Commission (NRC) to prepare an EIS when the NRC considers a specific license amendment to use MOX fuel in a reactor. In that light, it was stated that the DEIS fails to analyze weaknesses in Catawba and McGuire ice condenser type reactors. These reactors have thin containment which is more likely to rupture in case of a severe accident. Issues related to reactor aging and MOX fuel use should be evaluated, including the impact of large component replacement after using MOX fuel. Given the past drought conditions in the south, thermal impacts of using MOX fuel should be evaluated for these reactors, including impacts on Lake Wylie, the Catawba River, and Lake Norman. The DEIS should acknowledge that Catawba and McGuire have higher latent cancer fatalities from accidents compared with other reactor sites in the country. It was stated that the Charlotte, North Carolina area could become a nuclear wasteland for decades if a worst-case accident happened.

Response: As discussed in Section 4.4.3 of the EIS, the generic analysis is based on an assessment presented in the DOE's Surplus Plutonium Disposition (SPD EIS) (Section 4.28 and Appendix K.7 of that document). In the SPD EIS three reactor stations (Catawba, McGuire and North Anna) were evaluated. The reactor use impacts presented in the DEIS present an aggregate of the range of impacts. Therefore, specific attributes and limitations of these reactors were considered in determining the impacts of using MOX fuel. For example, the impacts included projection of population growth surrounding these reactors. The text in Section 4.4.3 has been revised to reflect the basis of the generic impact assessments. Impacts of thermal discharges to surface waters were not evaluated as part of the generic analysis. These impacts are considered to be reactor site-specific, and therefore, would be evaluated within the scope of the NRC consideration of site-specific requests to use MOX fuel. The NRC staff believes that the impacts presented in the DEIS are a reasonable estimate of the potential impacts of using MOX fuel in reactors. As discussed in EIS Section 4.4.3, the NRC will perform its own site-specific National Environmental Policy Act (NEPA) and safety review in evaluating whether any specific reactor could use MOX fuel. Therefore, the scope of the EIS is considered adequate to bound the impacts raised in the comments.

J.3.6.10 Comment: 77-003

Comment: The use of lead test assemblies (LTA) was not addressed in the DEIS. This would include impacts associated with transporting the lead test assemblies to the reactor and using the lead test assembles in the reactor.

Response: The use of lead test assemblies was not specifically addressed in the DEIS. However, the Department of Energy assessed the impact of the LTA program in its Surplus Plutonium Disposition EIS. The LTA program is considered to be independent of the proposed action. Text as been added to Section 4.4.3 of the FEIS to clarify this point.

J.3.7 Scope – DOE Policy

J.3.7.1 Comments: 19-010 56-006
47-001 82-006

Comment: The surplus plutonium program in the United States is connected through agreements to a similar program in the Russian Federation. The Russian MOX program is not moving as quickly as the U.S. program. The question of whether the Russian Federation was in violation of the United States-Russia Agreement was raised. It was felt that the U.S. MOX program should be delayed until the Russian program was fully funded and proceeding on track. Given the changes the Department of Energy (DOE) made in the surplus plutonium disposition program and the uncertainties with the future of this program, the timing of the Nuclear Regulatory Commission's (NRC's) action was questioned. It was felt that the DOE should clearly state what is really going to be done with the surplus plutonium and other facilities supporting this program before the NRC considers authorizing Duke Cogema Stone & Webster (DCS) to construct the proposed MOX facility. It was also felt that given the ongoing war and state of the world that the overall surplus plutonium program and DEIS should be put on hold.

Response: As noted in Section 1.1.1 of the EIS, the MOX program is one part of the overall U.S. surplus plutonium disposition program. The DOE is responsible for fissile material in the United States including the disposition of surplus weapons plutonium. Coordination and implementation of the disposition agreement with Russia is the responsibility of the DOE. Because the applicant, DCS, is a DOE contractor, any decision by the DOE to delay or cancel the surplus plutonium disposition program would be relayed to DCS as appropriate. The NRC does not have a role in establishing foreign policy or in defining the surplus plutonium disposition program. Rather, the NRC deals with the regulation of nuclear materials and facilities. With regard to the proposed MOX facility, the NRC has received an application from DCS and has decided to prepare an EIS. The NRC is required to review the application and make a decision regarding whether the proposed facility can be constructed and operated safely. If DCS, as directed by the DOE, decides to withdraw its application, the NRC would cease work. The NRC cannot unilaterally stop work on a project based on international policy grounds that deal with issues outside the scope of the NRC's mission. Furthermore, if the DOE makes changes to the surplus plutonium disposition program that would affect the impacts associated with the proposed MOX facility, then the NRC would consider those changes when they occur and take appropriate action. Therefore, these comments are considered beyond the scope of the EIS.

J.3.7.2 Comments: 48-001
61-008
93-008

Comment: The United States-Russia Agreement allows for immobilization. Specifically, Article 3 of the agreement allows for disposition by one of the following methods: irradiation, immobilization, or any other method agreed to by the parties in writing. The DEIS should acknowledge that the immobilization alternative is allowed under the United States-Russia Agreement. It was stated that Russia declined immobilization for itself, but would accept the U.S. immobilizing its plutonium. It was also stated that Russia should not dictate how the U.S. disposes of its surplus plutonium and that the U.S. should select a method that provides for environmental protection.

Response: The United States-Russia Agreement is discussed in Section 1.1.1 of the EIS. The EIS states that "Under this agreement, disposition may be accomplished either by immobilization or by MOX fuel fabrication and subsequent irradiation." Text in the FEIS has been added to more accurately describe that immobilization of plutonium is allowed by the United States-Russia Agreement.

The Department of Energy's (DOE's)surplus plutonium disposition program and the United States-Russia Agreement are the basis for determining the purpose and need of the proposed project. Once the purpose and need of the proposed project is established, the Nuclear Regulatory Commission (NRC) must determine which alternatives are considered reasonable and would accomplish the purpose and need of the project.

Because the purpose and need is based on the DOE's surplus plutonium disposition program, the DOE's amended Record of Decision (ROD) affected the purpose and need of this EIS. In the amended ROD, the DOE stated that budgetary constraints no longer allowed it to pursue the hybrid approach for disposition of surplus plutonium. The DOE determined that for budgetary reasons it needed to select a single disposition approach. In the DOE's judgment, Russia did not consider immobilization alone to be an acceptable approach for achieving joint disposition of excess plutonium. The DOE indicated that Russia may abandon its plutonium disposition efforts if the DOE selected an immobilization only approach. Thus, the DOE selected the MOX-only approach because in the DOE's judgment it was the key to successfully completing the United States-Russia Agreement

The DOE decided to pursue a MOX-only approach in its amended ROD, and the NRC has no reason to question the validity of a DOE policy decision regarding a DOE project and foreign policy matters.

Additional comments were received relative to the purpose and need, and the immobilization alternative. Responses to these comments are in Sections J.3.3 and J.3.11, respectively.

J.3.7.3 Comments: 10-010 48-002 98-003
44-010 96-032

Comment: The status of the Department of Energy (DOE) National Environmental Policy Act (NEPA) review for the Pit Disassembly and Conversion Facility (PDCF) and the Waste Solidification Building (WSB) is not covered in the MOX DEIS in sufficient detail. Furthermore, legal issues may be raised if the MOX DEIS NEPA review is used by the DOE for the WSB. Considering these issues and given all the changes in the Surplus Plutonium Disposition (SPD) program, the DOE should supplement its NEPA analyses to include consideration of the immobilization alternative, the PDCF and the WSB facilities. If the DOE fails to supplement its NEPA analyses, the Nuclear Regulatory Commission (NRC) should deny the application because the DOE did not comply with the NEPA requirements.

Response: NEPA requires federal agencies, including the DOE and the NRC, to consider environmental impacts in their decision making processes. If an agency action is considered to be a major federal action, the agency must prepare an environmental impact statement. Each agency is responsible for its own NEPA documentation.

The DOE has prepared two EISs for the surplus plutonium disposition program. The impacts for the PDCF were covered in DOE's *Surplus Plutonium Disposition Final Environmental Impact Statement* (DOE/EIS-0283). The NRC used appropriate materials from the DOE EISs in the preparation of its environmental impact statement. This is discussed in Section 1.4.4 of this EIS.

As discussed in Sections 1.2.2 and 2.2 of the EIS, the WSB and PDCF are considered connected actions to the licensing of the proposed MOX facility. Therefore, impacts associated with those facilities are included in the discussion of impacts for the proposed action. It is important to note that while there is an overlap in the consideration of environmental impacts for the WSB and PDCF, the NRC does not have safety or licensing authority over those proposed DOE facilities. The impacts of building and operating the WSB were addressed in DCS's Environmental Report and are covered in the MOX EIS. The NRC believes that the impacts associated with the WSB are sufficiently addressed in its EIS to allow the NRC to make a decision as to whether construction of the proposed MOX facility should be authorized. Whether the DOE performs an independent NEPA analysis for its own project is not within the NRC's discretion. Therefore, these comments are beyond the scope of the NRC EIS.

The DOE issued a Supplement Analysis (SA) on April 17, 2003, to its amended Record of Decision (ROD) of April 19, 2002. This SA evaluated the changes to the surplus plutonium disposition program announced in the amended ROD. The SA's purpose was to determine whether the SPD EIS, prepared by the DOE, should be supplemented, whether a new EIS should be prepared, or whether the DOE found in the SA that no further NEPA documentation on its part was required. The DOE concluded that changes in the surplus plutonium disposition program do not result in impacts that are significantly different from those evaluated in the SPD EIS; therefore, no further NEPA documentation is required.

J.3.7.4	Comments:	3-001	39-003	93-006
		5-006	45-006	114-006
		38-001	48-005	

Comment: Concerns were expressed about how the Department of Energy (DOE) should best allocate funding for its various missions. The comments suggested using funding for clean up activities at the Savannah River Site (SRS) in contrast with long-term funding for the surplus plutonium disposition program. Funding clean up activities was preferred because they would benefit the local Augusta and Aiken economies without subjecting surrounding communities to toxic and nuclear waste generated by the surplus plutonium disposition program. Concern was expressed regarding the availability of long-term funding for the surplus plutonium disposition program and that lack of funding could result in indefinite storage of the depleted uranium and surplus plutonium at the SRS. It was also stated that the proposed MOX facility should not be built until nuclear material in Russia is secured and that the limited funds should be used for that purpose. An additional concern was the possible U.S. funding of the Russian plutonium disposition program.

Response: The costs of the NRC's proposed action are discussed in the cost-benefit analysis section of the EIS (Section 4.6). The DOE has budgetary responsibility for the surplus plutonium disposition program, including any possible funding of the Russian MOX program, as well as clean up activities at the SRS. Costs and funding issues other than those associated with the NRC's proposed action are beyond the scope of the EIS.

J.3.7.5	Comments:	48-003	93-009	114-001
		61-004	98-003	114-002

Comment: The quantity of surplus plutonium in the disposition program was questioned. The comment raised the legal basis for 34 metric tons (37.5 tons) of surplus plutonium being considered in the MOX DEIS verses 27 metric tons (29.7 tons) of plutonium that has been declared surplus by the Department of Energy (DOE). In addition, the quantity of plutonium that would be shipped from DOE's Rocky Flats site to the Savannah River Site (SRS) was questioned. The Surplus Plutonium Disposition (SPD) EIS prepared by the DOE evaluated the impacts of up to 50 metric tons (55 tons) of plutonium. The fate of the remaining surplus plutonium was questioned. Concerns were expressed that this plutonium would go to the SRS for long-term storage. In addition, because the Pit Disassembly and Conversion Facility (PDCF) would not be operational at the start of the proposed MOX facility, concern was expressed over what plutonium would be used initially by the proposed MOX facility. It was further questioned on what basis the Nuclear Regulatory Commission (NRC) assumes that there will be any surplus plutonium.

Response: The quantity of plutonium evaluated in the NRC DEIS is 34 metric tons (37.5 tons). The quantity is based on the application submitted by DCS (Construction Authorization Request and Environmental Report). The specific source and form of surplus plutonium was not specified. General locations and quantities of surplus plutonium are provided in Table 1.1 of the EIS. The plutonium may be in metal form that would be processed by the PDCF prior to being received by the proposed MOX facility or it may be alternative feed stock that could go directly to the proposed MOX facility. As discussed in Section 1.2.2, the EIS assumes that 25.6 metric tons (28.2 tons) of plutonium that would be used by the proposed MOX facility would be in the form of plutonium dioxide from the PDCF. The remaining quantity of plutonium would be "alternate feedstock" that could be used by the proposed MOX facility without being processed by the PDCF. The DOE will determine which specific plutonium is used to obtain the 34 metric tons (37.4 tons) and how any remaining surplus plutonium (i.e. 50 metric tons noted in the comment) will be handled. Additionally, at the Savannah public meeting, a representative from the Department of Energy discussed the quantity of plutonium to be shipped from the Rocky Flats site to the SRS. The DOE decided in its amended Record of Decision to transfer that material from the Rocky Flats site to the SRS. This decision was independent of the proposed action.

J.3.7.6	Comments:	05-008	10-021	44-008	71-013	72-012	93-009
		10-008	12-002	44-009	71-015	77-004	98-004
		10-009	24-008	45-008	72-011	93-008	

Comment: The conflict in national policy between the consideration to build a modern pit facility and the Surplus Plutonium Disposition program arose. It was stated that the surplus plutonium disposition program is no longer swords into plow shares. It was also stated that the U.S. has no cohesive surplus weapons disposition policy. The decisions in the DEIS regarding which alternatives were evaluated were based on the desire to not conflict with foreign policy. Given this apparent conflict, it was suggested that the Nuclear Regulatory

Commission (NRC) should delay its decision until the EIS on the modern pit facility is issued and commented on.

There was concern about the amount of plutonium that would eventually be located at the Savannah River Site (SRS), the area of the country where it would be coming from, and how the plutonium would be used (dispositioned as surplus or used to make new nuclear weapons). The possibility that the proposed MOX facility could be used to produce new plutonium for weapons or reprocessing existing commercial spent nuclear fuel was a concern. This concern was tied with the Tennessee Valley Authority tritium production program. There was also a concern that the Pit Disassembly and Conversion Facility (PDCF) could be used for processing plutonium that would be used to make new nuclear weapons. It was noted that the risk of an accident at the PDCF would increase by processing more plutonium, thereby increasing exposure to workers and the public. It was suggested that another Department of Energy (DOE) EIS is necessary for a complete assessment of the plutonium missions at the SRS. The EIS for the proposed MOX facility should include impacts associated with using the proposed facility as part of making new nuclear weapons.

Response: The DOE prepared a programmatic EIS for Stockpile Stewardship and Management (SSM PEIS) in 1996. In September of 2002, the DOE National Nuclear Security Administration (NNSA) issued a notice of intent to prepare a supplemental programmatic EIS to the SSM PEIS regarding a modern pit facility. The new supplemental programmatic EIS (SPEIS) is intended to support two NNSA decisions: (1) whether to proceed with a modern pit facility, and (2) if so, where to locate it. The DOE recently (May 30, 2003) issued the draft SPEIS for public comment. The draft SPEIS states that the preferred alternative would be to construct and operate a new modern pit facility but did not select a preferred host site. The preliminary project schedule indicates that the planning and definition phase would continue through 2006 followed by an execution phase through 2016. The proposed modern pit facility would not start operating until 2018.

The concern that building a MOX facility to disposition surplus weapons plutonium conflicts with building a modern pit facility to make new weapons pits is a national policy issue that rests with the Department of Energy. Thus, the comments addressing the DOE decisions are beyond the scope of this EIS. The concerns that the proposed MOX facility could be used in the process of making new weapon pits is speculative at this point. Moreover, the current plan presented by DCS, under review by the Nuclear Regulatory Commission (NRC), is limited to making MOX fuel from 34 metric tons (37.5 tons) of surplus weapons plutonium. Therefore, these comments are beyond the scope of this EIS.

J.3.7.7	Comments:	10-011	92-004	96-019
		13-005	96-019	114-003
		44-011	98-005	

Comment: Four reactors at the Catawba and McGuire stations are potential candidates to use (irradiate) MOX fuel. However, additional reactors, that have not been identified in the surplus disposition program, will be required to use the remaining fuel. The DEIS fails to acknowledge the possibility of insufficient reactor capacity to keep pace with the production of MOX fuel. Concern was expressed regarding the impacts if the Vogtle Plant, which is located near the Savannah River Site (SRS) and had previously expressed interest in using MOX fuel, was selected to use MOX fuel in the future. The DEIS should state the environmental risk, if there is one, from failure to promptly use the proposed quantity of MOX fuel. Having an excess of MOX fuel at the SRS may also pose security risks.

Response: For the purpose of this EIS, it was assumed that the Department of Energy (DOE) would identify additional reactors that would irradiate MOX fuel beyond that amount which the four units at Catawba and McGuire nuclear power stations could accommodate. This bounds the environmental impacts of the proposed action, such as impacts resulting from the transportation of feedstock to the proposed facilities, processing and manufacturing activities at the proposed facilities, transportation of MOX fuel, and waste generation. If the DOE does not later identify additional reactors to use MOX fuel and the impacts were limited to those resulting from the disposition of only 25.6 metric tons (28.2 tons) of surplus plutonium, environmental impacts would be lower. Before any particular reactor (e.g., the Vogtle Plant) is authorized to use MOX fuel, the NRC would perform a site-specific environmental review. Such site-specific impacts are outside the scope of this EIS.

J.3.7.8 Comments: 2-002 71-011
24-005 72-004

Comment: Concerns were expressed that the proposed action would not eliminate the plutonium. Instead, the use of MOX fuel in reactors would produce more plutonium. This idea would be counter to the non-proliferation strategy of converting surplus plutonium into MOX fuel. The availability of plutonium will increase as both the United States and Russia use plutonium as reactor fuel. Placing the material in commercial power plants would further nuclear weapons proliferation and not safeguard the plutonium from use in weapons of mass destruction. Concerns were also expressed that MOX fuel will be irradiated in reactors other than those in Russia and the United States. Specifically, MOX fuel may be used in nuclear reactors of countries that trade with Russia and are viewed as "evil" or "rogue" nations by the United States. The question was raised why the U.S. would accept a program that would send weapons grade plutonium to other countries including Iran and Syria if Russia will not accept alternatives that do not isotopically degrade weapons plutonium.

Response: Irradiating MOX fuel in reactors would produce more plutonium. However, this plutonium would be highly radioactive and thus unavailable for unauthorized use. This would help reduce the threat of nuclear weapons proliferation by ensuring that surplus plutonium is converted to proliferation-resistant forms. The Department of Energy (DOE) decided, in previous National Environmental Policy Act (NEPA) documentation and based, in part, on the recommendations of the National Academy of Sciences in the *Management and Disposition of Excess Weapons Plutonium* (NAS 1994), that the manufacture and use of MOX fuel poses an acceptable disposition approach that creates a proliferation-resistant form of plutonium. Further consideration of the adequacy of this approach is beyond the scope of the Nuclear Regulatory Commission's environmental review (see EIS Appendix I, Section 4.1).

J.3.7.9 Comments: 10-005
44-005

Comment: It has been the national policy to separate the military and civilian uses of nuclear materials. The use of surplus weapons plutonium in civilian reactors blurs the distinction between the military and civilian nuclear programs.

Response: This national policy (embodied in the Energy Reorganization Act of 1974) remains the same. In 1974, Congress created the Energy Research and Development Administration (which later became the Department of Energy [DOE]) to oversee the military uses of nuclear materials, among other functions. The Energy Reorganization Act of 1974 also established the Nuclear Regulatory Commission (NRC) as an independent regulatory agency that is separate from the DOE. The NRC was created to regulate the commercial use of nuclear materials. The NRC does not view its licensing authority over the proposed MOX facility as changing the above-described separation of functions enacted by Congress in 1974.

J.3.7.10 Comments: 8-004 34-001 95-002
32-003 36-001 105-006

Comment: Several previous and future Department of Energy (DOE) decisions were questioned. The question of locating the proposed MOX facility at the Savannah River Site (SRS) was raised. It was felt that since most of the surplus plutonium is located in Texas and Colorado that the proposed MOX facility should be located closer to these locations to minimize transportation impacts. It was questioned if political or socioeconomic and demographic characteristics were the reason for selecting the SRS. It was suggested that the DOE should hold public meetings to answer questions relative to the surplus plutonium disposition program that are outside of the Nuclear Regulatory Commission's (NRC's) domain. Future decisions relative to the ultimate fate of the surplus plutonium disposition facilities were questioned. It was stated that the DOE had sworn to decommission these facilities at the end of the mission. It was questioned as to what guarantees the public has that this is true. It was also stated that the facility should be located farther away from large cities to reduce the risk to people from accidents.

Response: The DOE in its Surplus Plutonium Disposition (SPD) EIS looked at the impacts of siting the surplus plutonium disposition facilities at numerous locations. The SPD EIS concluded that the facilities should be located at the SRS. The basis of this decision is presented in the SPD EIS. As discussed in the March 7, 2001, Notice of Intent to prepare an EIS, issues pertaining to decisions already made by the DOE will not be revisited by the Nuclear Regulatory Commission (NRC). Therefore, consideration of locating the proposed MOX facility at another location is beyond the scope of the EIS.

The EIS includes the impacts of decommissioning the surplus plutonium disposition facilities. As discussed in Section 4.3.6.1, the contract between DCS and the DOE calls for DCS to deactivate the proposed MOX facility and place it in safe-shutdown once operations have ended. The ultimate fate of the surplus disposition facilities would be the responsibility of the DOE. NRC regulations require the facilities it licenses to be decommissioned in a timely manner. DCS would be required to get an exemption or other waiver from the NRC to transfer the facility to the DOE prior to decommissioning. Since this has not been requested, the EIS includes impacts from decommissioning the facility.

J.3.7.11 Comment: 87-001

Comment: The Waste Solidification Building (WSB) is part of the Pit Disassembly and Conversion Facility (PDCF), which will be constructed after the proposed MOX facility is operational. The Department of Energy (DOE) has changed the design of the proposed MOX facility, which was originally to include equipment to solidify radioactive liquid waste, but now, according to the DOE's Supplement Analysis and Amended Record of Decision of April 2003, this equipment is to be located in the WSB. The DOE's current schedule, laid out in its February 15, 2002, Report to Congress, calls for construction of a MOX facility 2004-2007, once licensed by the Nuclear Regulatory Commission (NRC), with operations beginning in 2007. The PDCF will be constructed from 2006-2009, with startup in 2009. Furthermore, it is unclear which DOE plutonium stocks would be processed at the proposed MOX facility until the PDCF is completed. Clearly the DOE cannot use plutonium metal until the PDCF is completed. The remaining plutonium stocks have a variety of impurities which will require aqueous polishing which will create waste streams. The DEIS does not address the issue of what will happen to these waste streams in the interim. The DEIS should address the scheduling issues with regards to the treatment of radioactive waste.

Response: As discussed in Section 1.2.2 of the EIS, the impacts of the proposed action evaluated in the EIS are based on the assumption that approximately 25.6 metric tons (28.2 tons) of the plutonium will be processed as plutonium dioxide from the PDCF. The remaining 8.4 metric tons (9.4 tons) would be alternate feedstock. The NRC has evaluated the impacts based on the applicant's request of 34 metric tons (3.5 tons). Should the quantity of pit and alternative feedstock plutonium change in the future, the NRC would evaluate these possible changes on the environmental impacts and determine if additional analyses were required. The current plan is that the proposed MOX facility and WSB would be completed about the same time. Therefore, waste facilities would be operational prior to processing any alternative feedstock. It is anticipated that the proposed MOX facility, if its operation is authorized by the NRC, would begin processing alternative feedstock. The PDCF does not need to be operational to process alternate feedstock. Therefore, the scope of the EIS is considered adequate to address the issOctober 28, 2004ues raised in the comment.

J.3.8 Scope – Safety Evaluation Report

J.3.8.1 Comments: 10-020 62-003 97-003 105-005
18-001 96-035 97-005

Comment: Concern was expressed that the distinction between the Safety Evaluation Report (SER) SER and the Environmental Impact Statement (EIS) was confusing and needed to be simplified. The DEIS does not discuss if the Nuclear Regulatory Commission (NRC) finds the technical designs proposed by DCS to be adequate. It was suggested that the DEIS should contain a detailed evaluation of the proposed facilities against guidance for radiological facilities, including design criteria, technical specifications, and American National Standards Institute (ANSI) standards. It was stated that compliance with NRC risk goals and metrics should be provided in the DEIS. Furthermore, the DEIS lacks sufficient information on design bases to judge the operability of the facilities, general safety, and validity of projected off-site effects of accidents. Given the large number of process steps and complexity to make MOX fuel, it was questioned if this could be done safely. It was also stated that there must be no acceptance of any number of potential deaths. The DEIS focuses on programmatic and administrative controls for many hazards including potential accidents that could produce serious injuries and/or fatalities with relatively high likelihoods. The DEIS does not emphasize actual mitigation and/or prevention of the hazardous phenomena.

Concern was also expressed about having the opportunity to comment on the SER. It was suggested that comments or questions raised during the DEIS comment period pertaining to the SER should be transferred to contacts within the NRC working on the SER. It was further stated that the person who made the comment be included in a pool of participants interested in the SER. In addition, the SER needed to be throughly studied by the NRC before making any decisions.

Response: In evaluating applications, the NRC conducts an environmental review. An environmental review is documented in the EIS, and a safety review is documented in the safety evaluation report (SER). A discussion of the NRC's decision making process regarding the potential licensing of the proposed MOX facility is provided in Section 1.1.2 of the EIS. Text has been added in the FEIS to better discuss the relationship between the content of the SER and the EIS. The clarifying text describes the different purposes of an SER and an EIS. Generally, the purpose of an SER is to evaluate the safety of an applicant's proposed action. The purpose of an EIS is to evaluate environmental impacts of a proposed action and alternatives.

Where safety measures proposed by an applicant would have no direct environmental impact, the staff's evaluation of such measures is set forth only in the SER. Similarly, environmental issues carrying no safety significance (e.g., displacement or damage of archeological resources) are only discussed in the EIS. However, if there is a nexus between safety and potential environmental impacts, such as the human health and environmental consequences of potential accidents, these issues are described in both the SER and the EIS.

The SER for the construction of the proposed MOX facility evaluates safety systems and controls against the safety basis in NRC regulations. Many of the comments were general in nature and pertained to the safety discussions in the SER. The NRC staff safety evaluations are not repeated in the EIS. Some comments pertained to specific topics discussed in the SER that are beyond the scope of the EIS (see below). As requested, comments on the DEIS that pertain to the SER rather than the EIS have been forwarded to appropriate NRC staff for consideration in preparing the SER. As discussed in Section 1.1.2 of the EIS, the NRC takes into consideration findings in both the SER and EIS prior to making any licensing decisions.

J.3.8.2	Comments:	4-004	74-001	96-012	116-011
		43-003	82-003	96-025	
		52-002	88-002	96-036	

Comment: Concern was expressed about the adequacy of the emergency plans. Commenters indicated that an emergency plan for evacuating the Savannah and Chatham area must be evaluated. Having a tested and certified evacuation plan, to include areas downwind and downstream of the proposed facility, must be a prerequisite to going forward with the licensing process. If there is no evacuation plan, then the Nuclear Regulatory Commission (NRC) should deny the license. When the emergency plan is put into effect, it was questioned whether the surrounding areas near the Savannah River would receive the emergency plan after it is evaluated. The at-risk population should be educated about the emergency plan, and this should include drills and exercises. Another area of concern was the absence of an off-site emergency plan by DCS for any accident scenario. Concerns were expressed that NRC had stated that general emergency preparedness of communities is outside the scope of this EIS.

Response: The concerns expressed in the comments address safety issues that are outside the scope of the EIS. The baseline design criteria for emergency capability are stated in 10 CFR 70.64(a)(6). The design of the proposed MOX facility must provide for emergency capability to maintain control of (1) licensed material and hazardous chemicals produced from licensed material; (2) evacuation of on-site personnel; and (3) on-site emergency facilities and services that facilitate the use of available off-site services. In Chapter 14 of the applicant's Construction Authorization Request, DCS committed to providing an evaluation demonstrating that an off-site emergency plan is not required. Such an evaluation will be part of the DCS application for a license to possess and use special nuclear material, which has not yet been submitted. The NRC found this approach acceptable. The NRC, as part of its review of any such license application, would evaluate whether an off-site emergency plan is required. DCS has further committed to establish a protocol with the DOE to integrate its emergency plans with the existing Savannah River Site (SRS) emergency preparedness program. This protocol would be reviewed by the NRC as part of its evaluation of any later DCS application for a license to possess and use special nuclear material. The commitment by DCS to integrate its emergency plans with the existing SRS emergency preparedness program has been identified as a mitigation measure to mitigate potential impacts of a chemical accident. Mitigation of chemical impacts is further discussed in Section 5.2.8 of the EIS.

J.3.8.3 Comments: 4-002 44-012 73-003
10-020 56-003 105-003
19-009 65-004

Comment: Concerns were raised about the safety and environmental record of entities associated with the MOX project. Specifically, the involvement of COGEMA in the consortium of DCS caused significant concern. It was stated that COGEMA is an irresponsible company and should not be involved in the project because of sites like La Hague that have had poor environmental and safety records. It was stated that it may not be possible to get adequate information about COGEMA because France is far less open than the United States about its nuclear operations. Furthermore, it will be difficult to know if DCS will do it right, since it did not exist before the proposed plutonium fuel project.

Concern was expressed that our government is not concerned with the previous track record of COGEMA, Stone & Webster, and Duke Energy in handling commercial plutonium and nuclear waste. It was stated that evaluating issues associated with safety records in the EIS is permitted under the National Environmental Policy Act (NEPA). It was felt the DEIS should include background discussions on the entities composing DCS. Furthermore, the DEIS should examine the entities financial stability and environmental and safety records.

Response: These comments raise issues which are beyond the scope of the EIS. An applicant is required to demonstrate its qualifications in a license application. Nuclear Regulatory Commission (NRC) staff will document its evaluation of the applicant's qualifications in a safety evaluation report (SER). Related safety issues regarding the applicant's qualifications are discussed in Chapter 4 and 15 of the draft SER issued in April 2003. NEPA and implementing regulations by the NRC (10 CFR Part 51) and the Council on Environmental Quality (40 CFR Part 1500) do not require consideration of an applicant's qualifications in an EIS.

J.3.8.4 Comments: 67-003 96-021
93-002 116-010
93-015

Comment: Concerns were raised regarding the safeguarding of MOX material to prevent theft or loss during its processing, use, and storage. The issue of safeguarding MOX material was not addressed in the DEIS. Likewise, comments indicated concerns about tracking the inventory of plutonium and any other radioactive materials involved in the process. The DEIS did not reference problems in materials accounting at other U.S. facilities such as Rocky Flats. The problems at Rocky Flats led to spontaneous plutonium combustion. These safeguard issues are not addressed in the DEIS; and therefore, the DEIS does not fully document all the environmental impacts of the proposed MOX facility. An additional concern involved who would be responsible for plutonium security at the Savannah River Site.

Response: These comments raise issues which are beyond the scope of the EIS. The issues referenced above would be addressed in an SER, if DCS later files an application for a license to possess and use special nuclear material at the proposed MOX facility.

J.3.8.5 Comments: 18-001
116-012

Comment: The design bases and the analysis of criticality for the construction and operation of the proposed MOX facility were not addressed in the DEIS. In terms of accidents, only "generic accidents" were considered. Furthermore, "generic" was not described. Pertinent descriptions of the "generic" accident should include the bounds and bases for the assumed number of total fissions, peak pulse, and duration of the incident. A discussion of the observed differences between solution and solid incidents should be provided in the DEIS. It should be shown that the design provides criticality controls against all foreseen accidents, but also will mitigate consequences for the types of incidents that have occurred. Concern was expressed regarding a criticality event in pipes, especially between facilities. It was questioned whether the Nuclear Regulatory Commission (NRC) had complete jurisdiction to review these scenarios.

Response: These comments raise issues which are generally beyond the scope of the EIS. Nuclear criticality safety design issues, including the relevant bases, criticality analysis, and differences between solution and solid incidents, are discussed in Chapter 6 of the draft SER (safety evaluation report) issued in April 2003. The potential impacts of a criticality accident are discussed in Section 4.3.5 and Appendix E of the EIS. The amount of special nuclear material considered in the hypothetical accident is provided in Table E.12 of the EIS. NRC regulations require that criticality events be made highly unlikely. As discussed in Section 1.1.2 of the EIS, the NRC will prepare two safety evaluation reports. The SER for construction evaluates the safety systems and controls. The detailed review of the criticality safety program, which will include evaluating criticality in pipes, will be performed if and when DCS submits an application for a license to possess and use special nuclear material at the proposed MOX facility. Prior to authorizing construction or issuing an operating license, NRC staff will determine if the criticality safety program meets the NRC regulations.

J.3.8.6 Comments: 100-001 111-001
105-003 113-001

Comment: The DEIS should include a containment chapter. This chapter would include a discussion of the need for preventing the release of plutonium under all conceivable conditions and the need for measures that maintain plutonium management under all possible conditions. Given the hazardous nature of plutonium, precautions should be specified to prevent inadvertent releases of plutonium. Inadvertent releases have occurred in the past at the Kerr McGee Cimarron, Oklahoma site; the Nuclear Fuel Services West Valley, New York site; the Midwest Fuel Recovery near Morris, Illinois; and at the LaHague and Sellafield sites in Europe.

Response: These comments raise issues which are generally beyond the scope of the EIS. The applicant has proposed features in the MOX facility to both maintain confinement of radioactive material and minimize contamination of the facility. These features are designed with consideration of past experiences with handling plutonium. Some of these features are reusable storage cans to transfer material between process areas, gloveboxes, welded tank and piping in certain process areas, process cells with robust access controls, and multiple ventilation confinement zones throughout the facility. The staff's evaluation of these features is described in Chapter 11 of the draft SER issued in April 2003. The impacts of a loss of confinement accident are discussed in Section 4.3.5 and Appendix E of the EIS.

J.3.8.7 Comment: 116-014

Comment: DCS plans to use both preventive and mitigative measures in accident evaluations. The EIS should have considered a more conservative approach that would allow for the accident and mitigate the consequences while simultaneously designing to prevent the accident.

Response: Nuclear Regulatory Commission (NRC) safety regulations require that the risk of high and intermediate consequence events be limited. To meet these performance requirements, applicants may either prevent such accidents or mitigate the consequences of the accidents. Even though the probability of the accident occurring is unlikely or highly unlikely, for the purposes of the EIS, it is assumed that the accidents will happen, and the estimated consequences of the accidents are presented without taking credit for preventive measures. Mitigation measures, including mitigation features for accidents, are presented in Chapter 5 of the EIS. The principal structures, systems, and components (PSSCs), including PSSCs to prevent accidents and mitigate consequences for the proposed MOX facility, are evaluated in the draft SER issued in April 2003.

J.3.8.8 Comment: 116-020

Comment: It was questioned whether both off-site and on-site radiation monitors are planned. Details on the types and capability of the monitors to measure the various types of radiation (e.g., alpha, beta, gamma, and neutron) and the calibration frequency of the monitors were requested.

Response: These comments raise issues which are beyond the scope of the EIS. As discussed in Section 1.1.2 of the EIS, two safety evaluation reports will be issued by the Nuclear Regulatory Commission (NRC) prior to making decisions on whether to authorize construction and operation of the proposed MOX facility. Effluent and environmental monitoring are discussed in Chapter 10 of the draft SER for construction issued in April 2003. Radiation monitoring was not identified by DCS as a principle safety system component; and therefore, details requested in the comment have not been developed. Effluent and environmental monitoring are required by NRC regulation (10 CFR Part 20), and the details and adequacy of such monitoring systems and programs would be evaluated if and when the NRC receives a DCS application for a license to possess and use special nuclear material.

J.3.8.9 Comments: 53-011
99-002

Comment: Concerns were expressed regarding the foreign ownership, control, and influence in the MOX project. It was stated that this is a French project that primarily benefits the French government. It was questioned whether a French company should be involved with handling plutonium.

Response: These comments raise issues which are beyond the scope of the EIS. Related safety issues regarding foreign influence and control are discussed in Chapter 1 of the draft SER issued in April 2003.

J.3.9 Scope – Terrorism

J.3.9.1 Comments:

5-005	24-010	56-001	71-010	88-001	112-004
10-001	30-002	58-001	71-012	91-006	114-009
13-007	44-001	65-002	77-006	93-005	114-013
19-002	45-005	66-008	82-001	96-020	116-002
24-002	52-001	68-002	85-004	103-004	

Comment: The treatment of terrorism or lack thereof in the DEIS was a significant concern with many commenters. There was a concern with the Commission decision addressing whether terrorism must be considered in an Environmental Impact Statement. It was stated in the Commission decision (CLI-02-24, December 2002), that the Nuclear Regulatory Commission (NRC) is not obligated to consider risks associated with terrorism in any environmental impact statement. It was felt that this ruling sets a dangerous precedent and that the NRC is ignoring the imminent danger of terrorism.

Terrorism was not examined in the broad sense. It was stated that terrorist activities had not been evaluated with regard to accident scenarios, latent cancer fatalities, and costs in the DEIS. The comments stressed that the threat of terrorism cannot be ignored. Citizens felt the DEIS did not address a terrorist attack on the proposed MOX facility to the extent that it should have considered increased risk of terrorism in the world today. Citizens also felt that the DEIS did not address environmental risk from sabotage or malevolent attacks. It was stated that not addressing terrorism was unacceptable. A question was raised about how the terrorism issue was going to be addressed. It was stated that the issue of terrorism is supposedly going to be addressed in agency reviews.

The DEIS fails to acquaint the public with dangers associated with the possible impacts of terrorist events. It was stated that recent simulations of terrorist attacks strongly suggest that conventional methods for defending nuclear facilities are inadequate, and therefore it is reasonable to conclude that risk assessment strategies are woefully insufficient as a basis for making decisions such as those inherent to the proposed MOX facility. It was felt that the public needs to be given information that will allow them to help themselves in case of a terrorist event, because there is danger in ignorance. Concern was expressed in Charlotte that with its large population and with it being a financial center, it may be even more of a target, if the Duke reactors used MOX fuel. A question was also posed about who will protect us if the NRC doesn't take into consideration all the possible risks.

Response: These comments raise issues which are beyond the scope of the EIS. But, as stated in CLI-02-24, although the NRC has declined to consider terrorism in the context of NEPA, the NRC is devoting substantial time and attention to terrorism-related matters. For example, as part of fulfilling its mission to protect public health and safety and common defense and security pursuant to the Atomic Energy Act, the NRC staff is conducting vulnerability assessments of commercial uses of radioactive material. The NRC has assessed potential vulnerabilities of radioactive dispersal devices, dirty bombs, and other diversion type activities. The NRC has issued interim compensatory measures and a number of other orders imposing enhanced security requirements on its licensees. Also, the NRC has acted to increase security awareness in its applicants.

J.3.9.2	Comments:	2-001	19-004	41-001	58-002	71-012	114-011
		4-003	19-005	47-002	65-001	91-006	
		10-001	24-010	56-001	68-002	93-019	
		15-002	39-002	56-002	71-003	114-009	

Comment: The proposed MOX facility would be the central point for storing uranium and plutonium. Concern was expressed that having 100 percent of the plutonium in the U.S. in one location, rather than spreading out the plutonium at numerous locations is a prime situation for a terrorist attack. There was concern expressed about shipping of the plutonium and uranium to the Savannah River Site (SRS) and the possibility of a terrorist attack. It was felt that the risk of terrorism would be increased during the shipment process. A question was raised regarding the logic of the Nuclear Regulatory Commission (NRC) stating in the DEIS that terrorism is not reasonably foreseeable and therefore would not be analyzed. The comments indicated that the transportation, storage, and processing of 34 metric tons (37.5 tons) of plutonium makes the plutonium a target of terrorism. The logic of shipping plutonium in the western part of the United States to the southeastern part of the United States was also questioned. Concern was expressed as to whether there would be protection during the transport of the plutonium. It was felt that the public outcry in the Northeast, Southwest, Northwest, and West has managed to prevent a license being issued for plutonium storage in those areas. Concern was also expressed about shipping the MOX fuel to commercial reactors in the Southeast which would be an open invitation for terrorism.

Response: These comments raise issues which are beyond the scope of the EIS. As discussed in Section 1.2.2 of the EIS, surplus weapons plutonium is currently stored at seven Department of Energy (DOE) sites. It should be recognized that the DEIS discusses DOE plutonium that has been declared as surplus for national defense and does not address other plutonium stockpiles within the DOE complex. In its amended Record of

Decision, the DOE stated 6.6 metric tons (7.3 tons) of surplus plutonium would be shipped from the Rocky Flats site to the SRS.

The transport of the surplus plutonium and fresh, unirradiated MOX fuel would be conducted by the DOE, and the DOE is responsible for ensuring its protection. This type of transport has been used to ship nuclear weapons, nuclear components, and special nuclear material for close to 50 years. This type of transport is discussed in Section 4.4.1 and Appendix C of the EIS.

J.3.10 Alternatives – General

J.3.10.1 Comments: 5-009 72-002 73-002
45-009 72-015 105-009

Comment: The no-action alternative was supported over the preliminary recommendation of the proposed action. The no-action alternative would save a great deal of money, not result in transporting plutonium at this time of war, and get us back on the right track on how to deal with dismantling weapons of mass destruction here in the United States. It was suggested that Congressman Max Burns, and Congressman James Clyburn should intervene and stop this project from proceeding forward. The $309 million in the 2004 budget appropriation for the plutonium disposition program could be much better spent in some other area.

Response: Section 1.3 of the EIS discusses the need for the proposed action, particularly as part of a larger strategy for plutonium disposition, under international agreements. The strategy is intended to protect against proliferation of materials capable of making weapons of mass destruction. The no-action alternative would not meet the purpose and need of this project. The NRC staff's NEPA recommendation regarding the proposed action is discussed in Section 2.5.

J.3.10.2 Comments: 2-003
87-004

Comment: Off-specification MOX and immobilization alternatives should be considered in the DEIS. It was suggested that the off-specification MOX alternative could be expanded to include using other materials as a radiation barrier other than spent nuclear fuel. Most reactors do not have facilities to separate fuel pins from assemblies, which would be required by countries that do not have large quantities of high-level waste waiting to be vitrified. Instead of using spent fuel, one could adopt a variant of the can-in-canister approach planned for the immobilization facility. One could emplace the pellets of off-spec MOX into high-level waste glass, for instance.

Response: In Section 2.3.4 of the EIS, the Nuclear Regulatory Commission (NRC) considers the off-specification alternative and concludes that the direct radiation hazard to workers and the public in implementing this alternative would be greater than the hazards of the proposed action. For example, the activities associated with the off-specification fuel alternative (fuel fabrication, MOX fuel transportation, and handling off-specification rods at the reactor site and at a geologic repository or Independent Spent Fuel Storage Installation) would result in greater direct radiation hazards. Also, the benefit of producing electricity from MOX fuel would not occur with the production of off-specification fuel. Placing off-specification fuel in waste glass would result in an additional processing step compared to production of MOX fuel. Worker risks from handling radioactive materials would be increased, as would costs of vitrifying off-specification fuel.

In Section 2.3.3 of the EIS, the NRC sets forth two reasons for not considering immobilization of plutonium a reasonable alternative to the proposed action (building and operating the proposed MOX facility). First, immobilization would not satisfy the purpose and need of the proposed action, because Russia does not consider immobilization alone to be an acceptable approach for achieving joint disposition of excess plutonium. The United States-Russia Agreement (White House 2000) discusses several approaches including immobilization. However, the Department of Energy (DOE) indicated that Russia would abandon its plutonium disposition efforts if the DOE selected an immobilization-only approach. Because of budget constraints, the DOE only had the ability to select one method for disposal of surplus plutonium. The DOE selected the MOX-only approach based on its judgment that it was the key to successfully completing the United States-Russia Agreement.

The second reason for no longer considering immobilization to be a reasonable alternative relates to the conduct of U.S. foreign policy. In the NRC's view, an alternative that would block the implementation of a foreign policy agreement between the U.S. and another country involves matters outside the scope of the National Environmental Policy Act.

J.3.10.3 Comments: 72-001 74-002
72-005 93-007

Comment: The Nuclear Regulatory Commission (NRC) could further point out to the Department of Energy (DOE) that it could facilitate the isotopic degradation with no reactor use and also reduce a proliferation threat by acquiring reactor grade plutonium from other countries and mixing U.S. and Russian surplus plutonium with these stocks. At that point it would be possible to immobilize or make off-spec MOX with this plutonium. Irradiated fuel could be used as the radiation barrier for this waste form.

Response: Text has been added in Section 2.3.6 of the FEIS to discuss the alternative suggested in the comment.

J.3.10.4 Comment: 19-003

Comment: Under the National Environmental Policy Act (NEPA) a range of other options including no action should be presented. This DEIS offers only the preferred option versus no option. The same should be true for the choice of the F-Area.

Response: The commenter used the term "options" presumably referring to the number of alternatives that are required by NEPA. The Nuclear Regulatory Commission (NRC) and Council on Environmental Quality (CEQ) regulations for implementing the procedural provisions of NEPA do not specify the number of alternatives that must be addressed in an EIS. The NRC chose to evaluate, in detail, the no action alternative and the proposed action. Section 2.3 of the EIS discusses a number of alternatives that were considered but were not evaluated in detail for the reasons discussed in the individual subsections. DCS conducted a siting study for the proposed MOX facility at the Savannah River Site (SRS) and reported its methodology and basis for choosing F-Area for a MOX fuel fabrication facility in Section 5.7.2.3 of the Environmental Report. The NRC evaluated the DCS Siting Study and concluded that F-Area is the most suitable location on the SRS for the proposed MOX facility.

J.3.10.5 Comments: 82-005
84-003
88-004

Comment: Cheaper and safer methods of achieving the same ends have not been thoroughly explored. The DEIS should consider other alternatives that would less negatively impact our environment.

Response: The Nuclear Regulatory Commission (NRC) considered other alternatives for disposing of surplus weapons grade plutonium that may have been more cost beneficial but they did not qualify as reasonable alternatives under the National Environmental Policy Act (NEPA). Immobilization was considered but was not evaluated in detail for the reasons discussed in EIS Section 2.3.3. The NRC also evaluated the no action alternative of leaving the plutonium at existing Department of Energy installations.

J.3.10.6 Comment: 116-006

Comment: The Nuclear Regulatory Commission (NRC) should alternatively consider a self-sufficient MOX facility with a Waste Solidification Building (WSB) and Pit Disassembly and Conversion Facility (PDCF) totally separate and independent of the remainder of the Savannah River Site (SRS). The necessary design changes should be included and reviewed at this time with a revised EIS.

Response: The NRC has no legal basis to authorize the building and operation of an independent WSB and PDCF. Moreover, such facilities would require separate support services that would substantially increase the impacts (both environmental and monetary) associated with the alternative without clear benefit over the proposed action. Therefore, the suggested alternative is not considered to be a reasonable one under NEPA.

J.3.10.7 Comments: 14-002
63-002

Comment: The safety and environmental risks associated with the no action alternative have been significantly understated. The no-action alternative assumes that the Department of Energy's (DOE's) surplus plutonium would remain in storage at seven DOE sites. The DEIS does not state the period of storage, and it appears that impacts are near-term and based on maintaining the status quo. We believe current methods of storage are only valid for a limited and finite time frame; storage without subsequent actions is not realistic for time frames of 100 years plus. At some time in the future, actions will be required to either repackage or disposition stored materials. The no-action alternative should assess the incremental added risk resulting from (1) actions to periodically process and repackage materials in long-term storage and (2) actions to eventually remove the materials from storage and preparation for disposition.

Response: The analysis of the no-action alternative impacts in the DEIS was based on all ongoing activities at each of the storage sites (and thus, the impacts are likely overestimated rather than underestimated for current storage activities). The impacts associated with possible future repackaging of some containers to maintain their integrity and with preparation of materials for disposition have not been included, since the extent of these hypothetical future activities cannot be known at this time. However, these activities would be conducted by radiation workers, with doses monitored to remain below DOE administrative limits. (For example, rotation of workers could be employed to minimize annual doses). All current storage locations are in secure areas without public access. By maintaining and monitoring the inventory, any exposures of the general public would be avoided. Therefore, it is not necessary to quantify the risk from repackaging and material preparation for the no-action alternative.

J.3.10.8 Comments: 10-016 97-017 115-002
73-005 97-018 116-013

Comment: It was recommended that both a sand filter and high-efficiency particulate air (HEPA) filters be used to protect workers at the Savannah River Site (SRS). The validity of the statement in the DEIS that the use of sand filters would not clearly result in lower net environmental impacts as compared to the use of HEPA filters was questioned considering that HEPA filters require administrative controls to maintain their efficiency. The brief discussions in the DEIS regarding the use of sand and HEPA filters imply better performance from sand filters, particularly during accidents. It is recommended that approaches more consistent with Nuclear Regulatory Commission (NRC) and nuclear industry practices in these areas, with reasonable mitigation, prevention and/or conservatism, be endorsed by the DEIS. The DEIS should include references and supporting information to support the conclusions regarding HEPA filters. Some individuals felt that HEPA filters are an unreliable means of controlling radionuclide emissions. Specifically, alpha emitters like plutonium can creep through multiple HEPA filters in sequence. The HEPA filter efficiency for plutonium is not known because of alpha migration, particle re-entrainment, and alpha recoil. A sand filter, unlike HEPA filters, is not subject to deterioration from exposure to chemical emissions. The DEIS should include a discussion of measures the applicant plans to use to protect HEPA filters from chemical degradation.

Response: Consistent with the NRC's mission of protecting the public health and safety, the NRC regulations require that workers at the SRS and other members of the public be protected from routine facility emissions. The applicant has proposed using HEPA filters to reduce radionuclide emissions to acceptable levels. The NRC, in the draft SER issued in April 2003, has reviewed the use of HEPA filters and concluded that the proposed system provides adequate assurance of safety to members of the public, including SRS workers. Therefore, using both filtration systems is not required to achieve adequate protection of the public.

The conclusions relative to the technology option to install a sand filter are presented in Section 4.3.8 of the EIS. This section discusses administrative controls that are required to maintain HEPA filter efficiency. The assumption is that the HEPA filters would be maintained, similar to the assumption that a sand filter would be designed and constructed properly. Reliance on commitments to maintain safety is considered sufficient for estimating the environmental impacts from alternatives. Information used to support the safety basis of these commitments is discussed in Chapter 11 of the draft SER and is not repeated in the EIS. Text has been added to Section 4.3.8 of the FEIS to note the differences in sand and HEPA filter degradation and response to chemicals. The EIS states that by selecting sand filters, environmental impacts could be reduced in the specific areas of human health risk to the facility worker and accident mitigation. However, the sand filter option would not clearly result in lower net overall environmental impacts than the use of HEPA filters. Therefore, using a sand filter is not a clearly superior option.

J.3.10.9 Comment: 86-016

Comment: Section 2.2.5, page 2-18, line 29 of the DEIS states "Large fans or blowers are used to circulate the air through the sand filter media." The sentence is misleading and implies a re-circulating system rather than the "once through" system that is used. The blowers are used to draw air through the sand filter media.

Response: The text in Section 2.2.5 of the FEIS has been revised per the comment.

J.3.10.10 Comment: 86-017

Comment: Section 2.2.5, page 2-19 of the DEIS states "The facility is designed into numerous fire zones, in part to limit the exposure of individual banks of HEPA filters to failure." This sentence should read: "The facility is divided into numerous fire zones, to limit the amount of combustibles involved in a single fire which reduces the amount of soot reaching individual banks of HEPA filters and assures that the HEPA filters will not fail due to excessive plugging."

Response: The text in Section 2.2.5 of the FEIS has been revised per the comment.

J.3.11 Alternatives – Immobilization

J.3.11.1 Comments: 69-002
108-003

Comment: The immobilization of surplus weapons plutonium as a means of disposition was supported. It was stated that immobilization was the best option, rather than making MOX fuel.

Response: As stated in Section 1.1 of the EIS, the Department of Energy (DOE) is responsible for the surplus plutonium disposition program in the United States. As such, it is the DOE's responsibility to determine how surplus plutonium is dispositioned. The DOE has prepared two environmental impact statements for the surplus plutonium disposition program that evaluated a number of alternatives at a number of different locations within the DOE complex. The environmental impacts associated with immobilizing surplus plutonium have been previously considered by the DOE. The DOE decided in its April 2002 amended record of decision to pursue a MOX-only approach and to cancel plans to immobilize surplus plutonium. For more information on the DOE's decision to pursue a MOX-only approach, see Section 2.3.3 of the EIS and Comment J.3.7.2.

J.3.11.2 Comments:

4-001	37-002	64-002	81-002	96-006	112-002
10-023	37-004	68-001	87-003	96-027	114-008
13-003	40-001	71-013	87-005	103-002	
15-001	58-003	78-001	91-001	105-008	
24-007	61-007	80-003	92-002	105-010	

Comment: Failure to consider the immobilization alternative in detail, in the DEIS, was questioned. It was stated the Department of Energy's (DOE's) decision to cancel immobilization should not limit the Nuclear Regulatory Commission's (NRC's) analysis of the alternative. The DOE's decision was based on budget constraints not conflict with Russian and United States policy. This decision was considered to be abysmal. It was also stated that the DOE has additional surplus plutonium that it not suitable to be made into MOX fuel and that the DOE may later decide to pursue immobilization in the future. It was stated that the DEIS does not provide opportunity for stakeholders to comment on the immobilization alternative as a viable and cost effective option.

Immobilization would effectively achieve the MOX program's stated goal to safeguard weapons grade plutonium. It was felt that the DOE should fund this alternative and support it through further research and development to resolve outstanding technical issues with immobilizing plutonium. Immobilization was viewed as being superior to the proposed action (building and operating the proposed MOX facility) for a number of reasons. Immobilization was considered to be less costly and less risky while providing a large number of jobs in the area. Because immobilization is faster than making MOX fuel, immobilization was considered to be beneficial for limiting diversion, theft and accidents. Immobilization was considered to be more environmentally sound and safer to workers. Immobilization would help manage existing waste at the Savannah River Site while not producing a significant amount of new waste. Immobilization, unlike storage, addresses proliferation concerns and provides jobs. Immobilization would make the plutonium less attractive to terrorists and saboteurs. For these reasons, it was felt that an in-depth comparison of immobilization and the proposed action was required by the National Environmental Policy Act (NEPA). It was also suggested because of the cost and complexity of the proposed MOX facility that immobilization could be implemented as an interim solution to allow for better science to be applied in the future.

It was stated that making MOX fuel would send the wrong message to the international community by setting an example for the civilian use of plutonium and advance the technology associated with using plutonium. Also, the MOX fuel program was seen as a stepping stone for future reprocessing in the United States. In contrast, immobilization did not have these perceived draw backs.

NRC solicited comments in the Spring of 2002 on whether the NRC should continue to consider immobilization as an alternative in the DEIS. The question of who commented and how those comments are considered was raised.

Response: The DOE is responsible for the surplus plutonium disposition program in the United States. As such, it is the DOE's responsibility to determine how surplus plutonium is dispositioned. The DOE has prepared two environmental impact statements for the surplus plutonium disposition program that evaluated a number of alternatives at a number of different locations within the DOE complex. The comparison of the environmental impacts between immobilization of surplus plutonium and making MOX fuel have been previously considered by the DOE. Therefore, they do not need to be reiterated in the FEIS.

Furthermore, as discussed in Section 2.3 of the EIS, the immobilization alternative is considered by the NRC, but not evaluated in detail. The rationale for deciding not to evaluate the immobilization alternative in detail is set forth in EIS Section 2.3.3.

As noted in the comment, the NRC solicited stakeholder views on whether the NRC should still consider immobilization as an alternative in the DEIS. This is discussed in Section 1.4.1 of the EIS. The NRC reviewed the written comments and oral comments made at three public meetings and determined that no persuasive reasons were identified requiring a detailed evaluation of the immobilization alternative.

Additional comments relative to the purpose and need can be found in Section J.3.3.

J.3.11.3	Comments:	5-001	58-003	93-004	105-012
		45-001	72-013	98-002	114-007

Comment: The rationale for not considering the immobilization alternative to be reasonable based on a desire to keep the Russians at the negotiating table was questioned. The fact that Russia does not trust immobilization was not considered an acceptable reason to eliminate consideration of immobilization as an alternative. Additional arrangements could be made for Russia to verify the United States' disposal of the surplus plutonium.

Response: As discussed in EIS Section 2.3.3, part of the reason for eliminating detailed consideration of the immobilization alternative was based on the Nuclear Regulatory Commission's (NRC's) view that given DOE's 2002 amended ROD, a decision to consider the immobilization alternative would involve the NRC in foreign policy matters that are outside NEPA's scope. The Department of Energy (DOE) is the lead federal agency responsible for implementing national policy associated with the surplus plutonium disposition program and in implementing related agreements with Russia.

J.3.11.4 Comment: 86-002

Comment: The decision not to consider immobilization as an alternative to making MOX fuel (the proposed action) was supported. It was recognized that the Department of Energy, as the federal agency charged with developing the surplus plutonium disposition strategy, has already eliminated immobilization as a viable alternative.

Response: This comment is consistent with the EIS.

J.3.11.5 Comment: 105-002

Comment: The DEIS should select the cheapest disposition method as the preferred alternative. The Department of Energy (DOE) has stated that the immobilization plan is less expensive and has greater cost certainty. It was stated that the cost-benefit analysis ignores the cost to taxpayers. The cancellation of immobilization was viewed as a cost versus safety trade-off.

Response: Issues associated with not considering immobilization in the EIS are discussed in more detail in Comments J.3.11.1 and J.3.11.2. The decision on a preferred alternative is based on many factors, including costs. Other factors such as benefits, safety, and environmental harm are also considered. The cost-benefit analysis looks at both national and regional costs. The cost to taxpayers is evaluated in Section 4.6.2 of the FEIS.

J.3.12 Human Health Risk

J.3.12.1 Comment: 10-013

Comment: The Nuclear Regulatory Commission's (NRC'S) choice to use the less-protective health standard of 1 in 10,000 "accepted deaths" in the DEIS rather than the Environmental Protection Agency's 1 in 1 million was questioned.

Response: The basis for the commenter's view that the DEIS used a standard of 1 in 10,000 "accepted deaths" is not clear. In evaluating exposures to carcinogens, the Environmental Protection Agency (EPA) does consider an increased risk range of from 1 in 1 million to 1 in 10,000 additional cancers as a guideline to determine whether mitigation actions are needed. For example, mitigation actions are generally required if increased risks are greater than 1 in 10,000; mitigation actions are generally not required if increased risks are less than 1 in 1 million, and mitigation actions may be discretionary or limited if they are within the risk range.

In the EIS, radiological doses under both the no-action alternative and the proposed action are compared with NRC standard and guideline levels. The NRC annual dose limit for exposures of any individuals in the general public is 1 mSv (100 mrem), used with the provision that doses should also be kept as far below these limits as is reasonably achievable. For comparison, the annual average individual exposure in the U.S. is 3.6 mSv (360 mrem) (3 mSv [300 mrem] from natural sources and 0.6 mSv [60 mrem] from man-made sources). The 1 mSv (100 mrem) per year dose limit corresponds to an increased latent cancer fatality (LCF) risk of about 6 in 100,000 for an individual. Estimated risks from radiological exposures for maximally exposed members of the general public under normal operations were 4 in 1 million and 4 in 1 billion additional chance of an LCF for the no-action alternative and the proposed action, respectively (see Table 2.1).

For exposures to chemicals under the no-action alternative, the increased cancer risks to the general public would be within the risk range of 1 in 1 million to 1 in 10,000 additional probability of developing cancer for an individual (see Section 4.2.2.2). The risk under the proposed action was not quantified, because the emissions would be small.

The EIS cites the standards and guidelines to use for comparison with calculated doses and risks, but the estimated values for both alternatives are meant to be compared with each other to facilitate decision-making for the proposed project.

J.3.12.2 Comments: 6-001
42-001
42-002

Comment: The proposed project has some risks associated with it. Safety and the health of employees, the general public, and animals should be a number one priority at the Savannah River Site (SRS).

Response: There is some level of human health risk associated with both the no-action alternative of continued storage, and also with the proposed action of constructing and operating the proposed MOX facility. Specifically, estimated risks from radiological exposures for maximally exposed members of the general public under normal operations were 4 in 1 million and 4 in 1 billion additional chance of a latent cancer fatality for the no-action alternative and the proposed action, respectively (see Table 2.1 of the EIS). The risks to the general public from exposures to chemicals under the no-action alternative were not explicitly quantified for the DEIS, but the increased cancer risks to the general public were estimated to be within the risk range of 1 in 1 million to 1 in 10,000 additional probability of developing cancer for an individual (see Section 4.2.2.2). The chemical risk to the general public under the proposed action was not quantified because the emissions would be small. The chemical and radiological risks for workers under the proposed action and the no-action alternative were within regulatory standard and guideline levels. Risks from accidents are generally low, although some low probability accidents could result in injuries to facility workers and SRS employees.

J.3.12.3 Comment: 66-005

Comment: The data in the DEIS prevents corroboration of the human health impact figures. The document is therefore deficient and suspect because these values can not be corroborated and because of the inclusion of the Waste Solidification Building (WSB) and the Pit Disassembly and Conversion Facility (PDCF). It was suggested that additional and corrected data be provided so that the public can offer meaningful comments.

Response: It is unclear what the commenter means by "prevents corroboration of human health impacts figures." The intent of the document was to provide enough details on the methods used to estimate health risks so that readers could understand those methods. Details on the methods are discussed in Section 3.10 and in Appendix E of the EIS. Risks associated with the WSB and PDCF were included in the analyses.

J.3.12.4 Comment: 52-003

Comment: The environmental impacts, human health risks, and waste management of the Pit Disassembly and Conversion Facility (PDCF) and the proposed MOX facility must be specifically evaluated. Latent cancer facilities associated with the proposed Waste Solidification Building (WSB) and all substantial handling and transport are significant portions of the real cost of this mission and are minimized in the DEIS. The DEIS should be revised.

Response: The radiological human health risks associated with normal operation of the proposed MOX facility, PDCF, and WSB are evaluated in Section 4.3.1.1 of the EIS (see Table 4.3 for a summary); the chemical risks are evaluated in Section 4.3.1.2. The radiological risk estimates are based on estimated air emissions provided by the applicant, DCS. The applicant stated that emissions to water would be small because any liquid discharges from the WSB would be under the existing NPDES permit guidelines. Additionally, chemical emissions to air were stated to be small because process controls limit the release of chemicals to the environment, and engineering controls and personal protective equipment protect workers from significant exposures, as necessary. Therefore, human health risk from chemical exposures would be small.

Because facility solid and liquid wastes would be treated and/or disposed of in accordance with applicable Nuclear Regulatory Commission regulations and Department of Energy Orders, significant exposure of workers or the public to chemical or radiological materials in these wastes would not be expected to occur. The waste facilities to which these wastes would be shipped are permitted facilities required to handle incoming wastes in ways which minimize impacts to the environment (including minimizing the potential for human exposures).

J.3.12.5 Comment: 53-005

Comment: The affected environment chapter should state what the impacts are from chemicals released at the Savannah River Site (SRS), not which chemicals are being released at a rate of more than one ton per year.

Response: The air quality section of the Affected Environment (Section 3.4.2 of the EIS) discusses site emissions and gives the tons/year of toxic air pollutant emissions (Table 3.2). The Human Health Risk section (3.10.4.2) discusses the baseline environment for chemical exposures associated with the SRS site (for example, potential receptors, pathways of exposure, and exposure sources). For chemical exposures, modeling results for the SRS boundary ambient air concentration of toxic pollutants from SRS point sources are summarized and compared with health-based guideline levels.

J.3.12.6 Comment: 66-003

Comment: Any accident would not likely create a uniform offsite dispersion among the population limited to a 160 pound man with effects stopping at one year. Using Federal Guidance Report 13 (FGR 13), which does not consider gender, race, or age differences in response to radiation exposure, results in cumulative errors in the DEIS. Further, an actual accident may cascade into several of the scenarios illustrated in the EIS, compounding health effects. The impacts of the proposed MOX facility were questioned because the DEIS says that statistically no fatalities will occur during normal operations, while the figures say that 50 people will die by latent cancer fatalities. The DEIS must be corrected to reflect these concerns.

Response: The EIS provides a conservative estimate of accident impacts and an independent review of previous accident analyses performed for the MOX facility, the Pit Disassembly and Conversion Facility and the Waste Solidification Building. The accident results presented were for a given direction from the SRS estimated to provide the largest potential dose to the exposed population, with exposure decreasing as a function of distance from the accident location. The largest exposure for most accidents occurs in the short-term from inhalation. If ingestion is considered, the highest exposure also occurs in the first year. In either case, the potential internal intake of the radioactive contamination results in a long-term internal exposure that was taken into account by the 50-year dose conversion factors used.

The health risk conversion factor is not limited to a standard man. As discussed in EIS Section 3.10.3, the FGR 13 health risk conversion factor of 0.06 fatal cancers per person-Sv (0.0006 fatal cancers per person-rem) is from the latest available study that provides a combined gender, age-averaged risk coefficient deemed to be representative of the public.

It was estimated in the DEIS that up to 50 latent cancer fatalities (LCFs) from short-term exposure could occur. In the FEIS, the LCF estimates for the public varied from 3×10^{-5} to 3 for the short-term exposure scenario, and from 0.0001 to 100 for the 1-year exposure scenario (see Table 4.14 in the FEIS). However, conservative assumptions were used in the analysis to provide an upper bound on the estimated consequences. In addition, the likelihood of such an accident is very small. Thus, the overall risk (consequence times probability of accident occurring) of anyone dying from LCFs related to potential MOX facility accidents during its operational lifetime is much less than one (see Table 4.15 in the FEIS).

J.3.12.7 Comment: 86-033

Comment: In Sections 3.10.4.2 and 4.3.1.2.2, the DEIS uses data completely out of context to reach erroneous conclusions on several points. The data presented in Table 3.11 for 'SRS maximum modeled ambient concentration' and 'SCDHEC standard' are maximum 24-hour averages; i.e., the maximum value that occurred at the Savannah River Site (SRS) boundary over a single 24-hour period for a one-year period of analysis. Conversely, the Environmental Protection Agency (EPA) risk guideline levels assume a long term exposure. Since the wind does not blow in the same direction all through the year, the long term (e.g., annual) average concentration for a pollutant will be much less than the maximum 24-hour average.

Table 3.11 and accompanying text should be revised to indicate clearly the context of the information that is being presented (i.e., averaging period) and to remove any implication that SRS air toxic emissions pose unacceptable risk to the public, or that (implicitly) the South Carolina Department of Health and Environmental Control (SCDHEC) standards to not adequately protect public health.

The DEIS is wrong to state (page 3-54, lines 24-25) that any of the modeled-estimated concentrations (24- hour) from the 1998 submittal to the SCDHEC exceeds ambient standards. The SCDHEC Air Pollution Control Regulation 61-62.5, Standard 8, states that model estimated concentrations for pollutants with a zero standard are to be rounded to the hundredths decimal place. By applying this guidance to the four pollutants for which the SRS allegedly exceeds the standard (see Table 3.11), the maximum site boundary concentration becomes 0.00. These pollutants, therefore, meet the SCDHEC standard of 0.00 in each case.

Response: The comparison of modeled ambient levels of toxic air pollutants (TAPs) at the SRS with health-based guideline levels is appropriate and has been retained. However, some of the revisions and qualifiers suggested have been added to the text, as detailed below. Also, the comment was correct in stating that, when rounding is conducted in accordance with SCDHEC instructions, no standards are exceeded. The suggested text and table change to delete reference to exceeding SCDHEC standards has been made.

The most recent available version of the SCDHEC Standard No. 8 for Toxic Air Pollutants (dated Oct 26, 2001; available at http://www.scdhec.net/eqc/baq/html/regulatory.html), gives no details on the criteria or methods used to develop the standard concentrations. Under National Environmental Policy Act regulations, it is generally recognized that comparison with regulatory standards is not sufficient to demonstrate the absence of adverse impacts, because many criteria are considered in establishing regulations. For example, maximum contaminant levels (MCLs) for drinking water are enforceable standards established with consideration of adverse health impacts and best available treatment technology and cost considerations. Therefore, it is appropriate to compare the modeled ambient air TAP levels with levels known to be based only on the potential for adverse human health impacts. Furthermore, Standard No. 8 itself recognized the applicability of U.S. EPA reference concentrations in evaluating ambient air levels; several of the standards have a footnote that states "Verified reference concentration (RfC) established by the United States Environmental Protection Agency." However, there are many U.S. EPA RfC values that are not reflected in the SCDHEC standards. No information is given in the standard to explain this discrepancy.

Text has been added to Section 3.10.4.2 of the FEIS to clarify that the modeled concentrations are maximum 24-hour averages. The comment correctly pointed out that it is overly conservative to compare maximum 24-hr averages with the EPA guidelines for long-term exposures; however, it was deemed better to use a conversion factor of 0.2 (based on guidance in documentation for EPA's SCREEN3 model) rather than the suggested factor of 0.01.

J.3.12.8 Comment: 86-034

Comment: In Section 3.10.4.2, page 3-54 of the DEIS, the statutory authority for the statement "However, emissions of the pollutants listed in Table 3.11 may require further investigation by the Savannah River Site to determine that ambient levels are not of concern with respect to human health impacts" was questioned.

Response: The sentence referred to has been deleted from the text.

J.3.12.9 Comments: 86-037
86-040
86-041

Comment: Reliance on Occupational Health and Safety Administration (OSHA) and South Carolina Department of Health and Environmental Control (SCDHEC) regulations as mitigation during construction and operation was questioned. On page 4-11, Section 4.3.1.2.1, the DEIS discusses exposure to hazardous materials during construction. Exposure to hazardous materials used during construction will be minimized by following applicable OSHA regulations and precautions. No additional mitigations are necessary. Rather, the DEIS should state that exposure to hazardous materials used during construction will be minimized by following applicable OSHA regulations and precautions.

Similarly in Section 4.3.1.2.2, the DEIS states, "However, the workplace environment would be monitored to ensure that airborne chemical concentrations were below applicable occupation exposure limits." Exposure to hazardous chemicals used during operations will be minimized by following applicable OSHA regulations and precautions. No additional mitigation measures are necessary. Rather, the DEIS should state that exposure to hazardous materials used during operations will be minimized by following applicable OSHA regulations and precautions. In addition, hydrazine emissions from the proposed MOX facility will be subject to South Carolina Department of Health and Environmental Control regulations. No additional mitigations are necessary; DCS will comply with SCDHEC air quality regulations.

Response: The text in Section 4.3.1.2.1 has been changed in the FEIS to indicate that exposure to hazardous materials used during construction (e.g., paints, solvents) would be limited by following applicable OSHA regulations and precautions, such as ensuring good ventilation and cleaning up small chemical spills as soon as they occur.

As indicated in Chapter 5, the Nuclear Regulatory Commission considers complying with OSHA regulations to be a form of mitigation. Following applicable OSHA regulations during operations includes monitoring the workplace environment to ensure that airborne chemical concentrations are within exposure limits. The text in Section 4.3.1.2.2 has also been changed to note that DCS will demonstrate that operational hydrazine emissions would be limited to levels that would not cause exceedance of the SCDHEC standards.

J.3.12.10 Comment: 86-038

Comment: In Section 4.3.1.2.1, page 4-12 of the DEIS, the statement, "The 29 October 2002 correspondence from DCS to NRC responding to requests for additional information included the results of the 'further sampling' referred to in the DEIS. The DEIS should have included the results of this report which confirm the previous DCS conclusion that there are no significant concentrations of radioisotopes or chemicals in the soil, that would be hazardous to construction workers health" is incorrect.

Response: The referenced characterization report (*Plutonium Disposition Program (PDP) Preconstruction Environmental Monitoring Report* [Fledderman 2002]) contained limited data for nonradiological constituents in soil (e.g., only 10 metals analyzed, no organic compounds analyzed), and only included shallow soil samples. The data from the report have been summarized and added to the discussion in Section 4.3.1.2.1 of the FEIS, but the conclusion that more testing may be required if evidence of possible contamination is encountered during excavation is retained.

J.3.12.11 Comment: 89-039

Comment: In Section 3.10.5, the DEIS states that a rate of 3.3 fatalities/l000 full-time equivalents (FTEs) and 4.6 injuries/100 FTEs is used based on Bureau of Labor Statistics/National Safety Council data. National safety statistics are not appropriate to represent baseline risks for estimating Savannah River Site (SRS) operations. There have been no fatalities for over 200,000 FTEs of operations or construction since 1989. The lost workday injury rate for SRS operations during the past 6 years (1997 – 2002) has averaged 0.38 cases per 200,000 hours (100 FTEs), less than 10% of the value cited in the DEIS.

Response: National statistics for physical hazards are used to estimate the risks from the no-action alternative and the proposed action, so these national rates are used in the affected environment section (Section 3.10.5 of the EIS) to provide a baseline for comparison. However, text has been added to this section to acknowledge that actual injury rates at the SRS are lower than those predicted based on national averages.

J.3.12.12 Comment: 89-045

Comment: In Section 4.3.1.2.2, page 4-13 of the DEIS, the discussion of mixing and blanketing is unclear. A blanket of nitrogen above the hydrazine does not mix with the liquid hydrazine that is forwarded to the process.

Response: The text in Section 4.3.1.2.2 has been changed in the FEIS to clarify that the purpose of blanketing with nitrogen is to shield the liquid hydrazine from unwanted side reactions.

J.3.12.13 Comment: 89-050

Comment: It is not appropriate to assume in the DEIS that 240 gal of chlorine would be stored at the Pit Disassembly and Conversion Facility since the Surplus Plutonium Disposition (SPD) EIS indicates that the quantities of hazardous chemicals are generally small, and does not indicate that chlorine is an exception to that statement. The SPD EIS Table E-7 indicates that chlorine will be used in the pit conversion facility, and the discussion of the accident analysis on Page K-7 indicates that "On an industrial scale, the quantities of hazardous chemicals are generally small — No substantial hazardous chemical releases are expected."

Response: The SPD EIS Table E-7 lists an annual operational resource requirement of 62 m^3 of chlorine gas, which corresponds to approximately 240 gallons of liquid chlorine. The EIS accident analyses include all hazardous chemicals stored in any of the facilities in quantities greater than 10 gallons (see EIS Appendix E). Chlorine was assumed to be stored as a pressurized liquid, as is common in industrial facilities. The analyses showed that an accidental chlorine release would not have adverse impacts for the general public at the Savannah River Site (SRS) boundary, but that it could result in high adverse impacts for workers.

J.3.12.14 Comment: 97-009

Comment: A temperature of 25.8°C (78.5°F) is stated as an average. This is not a reasonable average nor does it provide any margin. Temperatures in excess of this would be anticipated to occur many times each year (i.e., an anticipated, annual event). In addition, solar heating effects on the structure (the Reagent Storage Building is a metal structure), other buildings and storage areas, and during deliveries could push local ambient temperatures in excess of 120°F. Thus, the assumed average temperature does not address anticipated conditions that occur annually nor do they provide any margin or conservatism. A higher temperature should be used for vapor pressures and release calculations.

Response: The 25.8°C (78.5°F) 95th percentile nighttime temperature is representative of conditions corresponding to the site-specific annual 95th percentile concentration determined from the radiological accidental release modeling. Review and analysis of on-site historical meteorological measurements taken at a nearby Savannah River Site operated tower shows that this temperature is exceeded only 5% of the time during nighttime low-wind speed conditions. The 95th percentile daytime temperature was found to be 30.8°C (87.5°F). Therefore, use of a value representing the 95th percentile is considered representative of a reasonable upper bound. These values were chosen to maintain consistency with the radiological accident assessment, and with Nuclear Regulatory Commission guidance. Details and rationale for the meteorological conditions assumed for accident modeling are provided in Appendix E, Section E.1 of the EIS.

J.3.12.15 Comment: 97-012

Comment: Nitrogen tetroxide is a chemical that requires great care during handling and use, as discovered from the space and missile programs. It boils at near ambient conditions and significantly dissociates into nitrogen dioxide at temperatures slightly above ambient, which greatly increases the effect of releases. It can also cause common mode failures. In addition, the nitrogen tetraoxide would be pressurized in the proposed MOX facility. The DEIS is not clear if this been accounted for in the analyses. The DEIS indicates an estimated concentration of 1,600 mg/m^3 at 100 meters. This is a potentially lethal concentration and would likely result in large numbers of serious injuries and fatalities if the release occurred at the proposed MOX facility, and could negatively impact adequate safeguarding of nuclear materials. The DEIS does not discuss adequate mitigation and/or prevention of such events. The DEIS should acknowledge and address these concerns.

Response: In EIS analyses, the accidental release of nitrogen tetroxide is modeled as a pressurized release. Nitrogen tetroxide is identified in the accident impacts, chemical human health risks section of the EIS (4.3.5.3) as a chemical which, if accidentally released, could cause high adverse impacts to workers. Nitrogen tetroxide would be regulated by the Occupational Health and Safety Administration (OSHA) under its Process Safety Management Rule (29 CFR 1910.119). The Process Safety Rule contains requirements for preventing or minimizing the consequences of catastrophic releases of toxic, reactive, flammable, or explosive chemicals. Under this rule, DCS would perform a hazard analysis, develop and implement written operating procedures that provide clear instructions for safely conducting activities involving process chemicals covered by the rule, develop and implement a training program, develop and implement an inspection and testing program, and develop and implement an emergency planning and response program. Text has been added to Table 5.1 to reflect these mitigation measures.

J.3.12.16 Comment: 107-002

Comment: The DEIS discusses the need to demonstrate that the offgas treatment system will limit hydrazine, (listed as a hazardous air pollutant under the Clean Air Act), to very low levels. The DEIS states that these levels would not cause adverse health impacts to members of the public or employees. Information about plans for monitoring the offgas treatment system for hydrazine should be included in the FEIS.

Response: During Clean Air Act permitting, it must be demonstrated that hydrazine emissions will not cause exceedance of the South Caroline Department of Health and Environmental Control ambient standard of 0.06 $\mu g/m^3$ at the Savannah River Site boundary. This may be demonstrated in a variety of ways. It is possible that mass balance calculations based on the annual usage of hydrazine, coupled with conservative assumptions on fugitive emissions and air dispersion modeling, would indicate that an offgas treatment system is not necessary. These issues would be further investigated by DCS during the permitting process.

J.3.12.17 Comment: 85-003

Comment: Concern was express regarding the safety and health of all the individuals in this area. Additional attention and study of these safety issues should be undertaken. The DEIS does not provide conclusive evidence that this site is currently "safe" for the community that lives around its borders, much less that the people will be safe when this facility is built.

Response: The methods used to estimate safety and health impacts in the EIS were designed to ensure – through uniform and careful selection of assumptions, models, and input parameters – that impacts would not be underestimated and that relative comparisons among the alternatives would be meaningful.

Based on these methods, the DEIS identified some level of human health risk to the off-site public associated with both the no-action alternative of continued storage, and also with the proposed action of constructing and operating the proposed MOX facility. Specifically, estimated risks from radiological exposures for maximally exposed members of the general public under normal operations were 4 in 1 million and 4 in 1 billion additional chance of a latent cancer fatality for the no-action alternative and proposed action, respectively (see Table 2.1 of the FEIS). For exposures to chemicals under the no-action alternative, the estimated increased cancer risks to the general public were within the risk range of 1 in 1 million to 1 in 10,000 additional probability of developing cancer for an individual (see Section 4.2.2.2 of the FEIS). The chemical risk under the proposed action was not quantified, because the emissions would be small. Risks from accidents are generally low, although some low probability accidents could result in increased cancer risks (from radiological exposures) or injuries (from chemical exposures) for facility workers and Savannah River Site employees.

Investigation of the health records of the surrounding communities is beyond the scope of the EIS. However, the human health impact assessment (discussed above) did not indicate that the proposed action would result in an increase in adverse health effects in the surrounding communities.

J.3.12.18 Comment: 86-039

Comment: In Section 4.3.1.2.2, page 4-12, lines 19-21 of the DEIS, the list is missing oxalic acid, sodium hydroxide, and sodium carbonate all of which were listed in MOX ER Table 3-2.

Response: The chemicals listed in the DEIS text were not intended to include all the chemicals used in the process. The text has been revised in Section 4.3.1.2.2 of the FEIS to add a reference to Appendix E, where all the chemicals used are listed. Appendix E also explains why accidental releases of some of the chemicals were not modeled (i.e., some were dropped because they would be stored in quantities of less than 10 gallons; some were dropped because a temporary emergency exposure limit-1 (TEEL-1) value of greater than 15 mg/m^3 indicated low toxicity).

J.3.12.19 Comment: 86-060

Comment: Table 4.16 presents a larger volume of nitrogen tetroxide (i.e. 240 gallons or 912 liters) in a storage/transportation cylinder than is planned to be used at the proposed MOX facility. DCS intends to use a storage/transportation cylinder containing 2000 lb (907 kg) of nitrogen tetroxide. This corresponds to 630 liters of nitrogen tetroxide.

Response: The assumed container sizes for accidental chemical releases were obtained from the October 31, 2002, revision of the Construction Authorization Request (CAR). Table 8-2a of the CAR gives a container size of 240 gallons (1 ton) for nitrogen tetroxide.

Although DCS may have now revised its plans for the nitrogen tetroxide cylinder size to be used at the facility, the outcome of the assessment would not change if the storage volume were reduced by approximately one third. That is to say, an unmitigated accidental release of either volume would not cause adverse impacts for the off-site general public, but could result in moderate to large adverse impacts for the Savannah River Site employee population. Preventive planning and mitigation measures in case of spill are required when extremely hazardous substances are in use at industrial facilities.

J.3.12.20 Comment: 97-008

Comment: Section 4.3.5.3, page 4-42 of the DEIS discusses the potential effects from chemical releases and accidents. The DEIS uses temporary emergency exposure limits (TEELs) which are adopted by the Department of Energy Subcommittee on Consequence Assessment and Protective Action (SCAPA). TEEL values also change frequently and may underestimate potential concerns and required mitigative or preventative methods. It is recommended that more conservative and regulator-endorsed values are used. This may involve a methodology to select the lowest values from Acute Exposure Guideline Levels (AEGLs), Immediately Dangerous to Life or Health (IDLHs), Military Air Guidelines (MAGs), and National Institute for Occupational Safety and Health (NIOSH)/Occupational Safety and Health Administration (OSHA).

Response: It is agreed that certain acute exposure guideline values have received a higher level of research and peer review than others, and that those higher quality values should be used if available. Acute Exposure Guideline Level (AEGL) values would be the most preferable, because the AEGLs are derived by an independent panel of experts under the auspices of the National Research Council's Committee on Toxicology, and because the criteria for AEGL derivation take into account sensitive individuals (i.e., they would be protective for nearly all people). AEGL values are derived for three tiers of effects – essentially a threshold level below which no adverse effects would be expected (AEGL-1), a threshold level below which only minor adverse effects would be expected (AEGL-2), and a threshold level below which life-threatening effects would not occur (AEGL-3). AEGL values are currently available for only nine chemicals, and none of these are chemicals that would be used in the proposed facilities.

Of the 15 chemicals for which air dispersion modeling was conducted for the EIS accident analysis, 12 have IDLH values and two have NIOSH/OSHA ceiling values. Acute exposure guidelines not mentioned by the commenter are the Emergency Response Planning Guidelines (ERPGs) developed by the American Conference of Governmental Industrial Hygienists (ACGIH). These values are similar to the AEGL values in that three effect levels are derived for each chemical (with definitions similar to those for the AEGL values). The ERPG values are widely used for emergency response planning, because they are derived by panels of toxicologists reviewing all available data, and because they are well documented. ERPG values are available for about 100 chemicals. ERPG values were available for 6 of the 15 chemicals in the EIS analysis.

Temporary emergency exposure limit (TEEL) values are not intended to supercede values derived more rigorously through critical review of all available toxicity literature for a chemical. They are specifically "temporary emergency exposure limits" to be used only when other values (that is, AEGLs or ERPGs) are not available. In fact, whenever ERPG values are available for a given chemical, those values are adopted as the TEEL values. However, when data are lacking, the process of deriving TEELs is very similar to what the commenter suggested; there is a hierarchy that uses IDLH values to approximate the potentially life-threatening value (TEEL-3), uses IDLH/10 or ceiling values to approximate the irreversible injury threshold, and uses occupational short-term exposure limits to approximate the minor injury threshold. (Craig et al., 2000, "Derivation of Temporary Emergency Exposure Limits (TEELs)," J. of Applied Toxicology, 20, 11-20). Modified values from other countries, such as Germany's maximum allowable concentrations (MAKs) for occupational exposures, may also be used if no U.S. values are available. If none of these data are available, other data such as (lethal concentration) LC50 values are used. TEELs are now available for over 2000 substances. Because the TEEL values do incorporate readily available regulatory and guideline values, they are the best alternative for use in evaluating accidental exposures when AEGL or ERPG values are not available.

In EIS Appendix E, Section E.1 (Accidents, Chemical Human Health Risk), text has been added to explain the different acute emergency planning values that are available, and why the ERPG and TEEL values were chosen. An additional change that has been incorporated into the analysis is that the TEEL values used to evaluate the hypothetical hydrazine release have been changed from those for hydrazine hydrate to those for hydrazine. ERPG values are available for hydrazine (but not hydrazine hydrate), and the TEEL values are the same as the ERPG values. These ERPG (also TEEL) values are considered to better represent the toxicological database for hydrazine.

J.3.12.21 Comments: 86-114
86-115

Comment: In Table E.1 of the DEIS, the solution molecular weight (94 g/mole) and the solution density (2.13 kg/l) for hydrazine/sodium hydroxide appear to be incorrect.

Response: Table E.1 of the FEIS has been changed to reflect the correct molecular weights and densities for hydrazine and sodium hydroxide.

J.3.12.22 Comment: 86-116

Comment: In Table E.3 of the DEIS, evaporation rates and vapor pressures of evaporating chemicals appear to be incorrectly calculated for chemicals where mole fractions were used to calculate the vapor pressures, which in turn were used to calculate the evaporation rates.

Response: Mole fractions were estimated based upon the data provided on storage and process chemical compositions and concentrations.

J.3.12.23 Comment: 97-010

Comment: The chemicals are used in processes within the proposed MOX facility. Process temperatures will likely exceed ambient temperatures considerably. For example, solvent extraction processes routinely can exceed 50°C (122°F) , while evaporators can exceed 100°C (212°F). These higher temperatures should be used as appropriate for modeling the evaporation of process spills and may necessitate the use of other models (e.g., flashing and bulk convection) for estimating release rates.

Response: None of the bounding chemical accidents analyzed in the DEIS involved process accidents (i.e., accidents that occur during aqueous polishing or fuel fabrication at the proposed MOX facility). Therefore, the chemical accident analyses did not consider temperatures of chemicals during processing.

J.3.12.24 Comments: 86-058
89-049

Comment: The temporary emergency exposure limit (TEEL) values given for hydrazine hydrate in Table 4.16 are the TEEL values for hydrazine hydrate, aqueous solutions. DCS plans to use hydrazine monohydrate. The TEEL values for hydrazine monohydrate should be used instead of hydrazine hydrate.

Response: The MOX ER (Rev 3, June 2003), Table 3-2 (Chemical Consumption and Onsite Inventory) lists hydrazine (35%) as a process chemical, with an annual usage of 530 gallons, and an onsite inventory of 126 gallons. The EIS uses the TEEL values for hydrazine hydrate, aqueous solutions, to evaluate an accidental hydrazine release. The assessment has been revised to evaluate an accidental release on the basis of comparison with the TEEL values for hydrazine, which are the same as the Emergency Response Planning Guideline (ERPG) values and have received thorough critical review. The ALOHA model used to estimate the downwind hydrazine concentrations takes into account the concentrations of the released chemical (in this case, 35%). The use of the peer-reviewed ERPG values for evaluating the hydrazine release is preferable to using either the TEEL values for hydrazine hydrate or for hydrazine monohydrate, which have not received the same level of review and may be based on default data (see Comment J.3.12.20 for more information).

J.3.12.25 Comments: 86-059
86-113

Comment: The DEIS appears to contain an erroneous calculation of solute mole fraction and vapor pressure for hydrazine/sodium hydroxide, hydrazine/hydroxylamine nitrate, hydrogen peroxide, hydroxylamine nitrate, nitric acid, which has resulted in significantly larger estimates of the modeled airborne concentrations and distances to reach the temporary emergency exposure limit (TEEL) limits.

Response: The assumptions and calculations made to estimate spill evaporation rates were based upon data supplied by DCS. The calculations were checked by the Nuclear Regulatory Commission and are consistent with the chemical inventory data supplied and the assumptions necessary to carry out the calculations. The commenter provided no supporting data or calculations to substantiate an error in the mole fraction calculations.

J.3.13 Human Health – Radiological Risk

J.3.13.1 Comments: 24-003
71-008

Comment: It was suggested that long-term, well-controlled, epidemiologic studies of workers and other potentially exposed populations be conducted by impartial, qualified scientists. Such studies should have been conducted on populations which might have been exposed through air, water and food ingestion. Such studies should not be prejudiced by prior assumptions, such as extrapolating data derived from the flawed studies of Hiroshima and Nagasaki, which were limited to the survivors of those acute massive exposures. It is difficult to justify the absence of such studies and further how a DEIS can be adequately carried out in the absence of such data. The DEIS would have more validity if risk factors were based more upon such information. Effects of chronic low dose radiation have been reported by scientists such as Drs. Alice Stewart and Dr. Steve Wing (UNC Chapel Hill). Absent the use of such epidemiologic data, skepticism is warranted regarding the estimated health risks presented in the DEIS.

Response: Health effects of low levels of radiation exposure are not determined solely on the basis of the Hiroshima and Nagasaki studies. Other epidemiological studies are used as well, such as those on patients exposed during medical treatment, occupational exposures of workers in the nuclear industries, and exposures of people in high natural background radiation areas. These studies have been ongoing for a long time, some for close to half a century, and they have been periodically updated and reviewed by a number of organizations, including the National Academy of Sciences. To date, no excess cancers have been identified below a dose of about 5 rem that can be attributed to radiation exposure. However, current understanding of the initiation and development of cancer, as well as available data, do not support a reliable conclusion that there are no effects below this level. It is therefore the cautious policy of the Federal Government to assume that the risk of cancer at low-levels of radiation exposure increases linearly in proportion to the dose, with no cut-off level below which there is no risk. This assumption is conservative in that it is likely to overestimate the risks at low levels of radiation exposure, which may be zero, but is not likely to underestimate such risks.

J.3.13.2 Comment: 37-001

Comment: It was stated that comparing human dosage that we receive from natural sources and things that we cannot avoid or things that we choose to benefit our health, such as radiation from the cosmic universe, medical exams, chest X-rays, with dosage from harmful radioactive isotopes that we do not choose is an obfuscation of the impacts.

Response: The comparison of human dosage we receive from natural or medical sources is intended to provide a unit of measure, a sense of scale, that the public may use to assess the estimated risks presented in the EIS.

J.3.13.3 Comment: 53-004

Comment: The DEIS does not state what the radiological impacts are. It provides potential radiological doses, but does not state what the impact is in terms of specific measurements such as curies or becquerels. The DEIS should state the quantity of radioactive material that is being released.

Response: Estimated releases of radioactivity for normal operations and accidents are presented in Appendix E, in Tables E.5 (microcuries per year) and E.13 (curies), respectively.

J.3.13.4 Comment: 53-006

Comment: The DEIS does not discuss the impacts of americium. Americium is significant because it poses a risk that is disproportionate to the risk of plutonium and there will be large waste streams of americium. It was suggested that the americium could be used or recycled in smoke detectors or other commercial products. The DEIS should state the hazards of americium.

Response: Americium is a hazardous radioactive material similar to plutonium that has been accounted for in the impact analyses (See Tables E.5 and E.13). Americium is not any different in its radiation effects from other radioactive materials of the same category, namely alpha radiation emitters, and it poses the same types of hazards. The differences in risk between americium and other alpha emitters such as plutonium is factored into, and considered, in the calculation of dose. A given dose equivalent of radiation poses the same risk, regardless of the source of the radiation that causes it. The amount of americium in a smoke detector is very small, approximately 1 microcurie. The amount of americium estimated to be separated from the plutonium is orders of magnitude larger than needed for this application and must be disposed of properly.

J.3.13.5 Comments: 71-005
71-007

Comment: Building and operating the proposed MOX facility at the Savannah River Site would place workers' health at greater risk from unnecessarily increasing their plutonium exposure. It places populations in nearby areas at increased risks of exposure to plutonium and other byproducts of such a facility.

Response: All operations at the proposed MOX facility would be carried out in a manner that reduces the risks to workers, the public, and the environment in accordance with Nuclear Regulatory Commission regulations. The main difference between exposure to plutonium and exposure to any other radioactive material is that, because plutonium often produces higher doses from a given amount of material than many other radioactive materials, it must be kept at low levels throughout the work areas. This is taken into account in the design of the facility.

J.3.13.6 Comments: 71-001 86-069 94-001
72-009 86-112
86-056 93-014

Comment: Concern was expressed regarding the data and basis on which radiation exposure and health risks were determined. The use of "standard man" does not adequately reflect radiation impacts to young and old people that are at a much higher risk. It was stated that a millirem is not a millirem. The health risk depends on other factors such as age and sex. It was suggested that the Nuclear Regulatory Commission (NRC) should follow the Environmental Protection Agency (EPA) and adopt a separate set of evaluation standards for childhood cancers. In addition, the use of the EPA Federal Guidance Report 13 (FGR 13) health risk conversion factor was questioned. The FGR 13 risk factor relies on studies not yet incorporated into international standards and is another overly conservative assumption used in the risk assessment that results in an order of magnitude higher risk.

Response: The effects of low dose radiation are still being debated in the international scientific community after decades of study. The current approach attempts to ensure that the assessed impacts do not underestimate any potential hazards. It is true that young people tend to be more susceptible to radiation than adults. The use of FGR 13 data takes this into account because these dose conversion factors consider exposure to all age groups in a typical US population and calculates the average risk to such a population. These factors take into consideration the risk of exposure from childhood for a lifetime for children, as well as lifetime exposure starting at adulthood. The FGR 13 health risk conversion factor of 0.06 fatal cancers per person-Sv (0.0006 fatal cancers per person-rem) used in the EIS is from the latest available study that provides a combined gender, age-averaged risk coefficient deemed to be representative of the public.

The FGR 13 health risk conversion factor is based on U.S. population mortality statistics, but incorporates many of the more recent recommendations from the International Commission on Radiological Protection (ICRP), such as ICRP publications 66 and 67, since ICRP Publication 60. ICRP Publication 60 recommended a factor of 0.05 fatal cancers per person-Sv (0.0005 fatal cancers per person-rem; see Table 3 of that publication) for the public. The FGR 13 value of 0.06 fatal cancers per person-Sv (the next possible higher value considering the uncertainties involved) is only 20% higher, not an order of magnitude higher as suggested in some comments. The use of the FGR 13 risk factor, rounded to one significant figure, has been used by the NRC and other Federal agencies and is considered to be an appropriate estimate of the risks associated with radiation dose.

J.3.13.7 Comments: 53-002
73-001
105-004

Comment: The public health effects from radiation exposure in the DEIS are expressed in terms of cancer effects. If that is the only health consequence that is going to be addressed, at least say why other consequences are not being addressed, what you know and what you don't know about the impacts of ionizing radiation. It was suggested that, based on research by Dr. John Gothman, ischemic heart disease should be considered. It was stated that in Barnwell County there is a 15% elevated level of ischemic heart disease above the average of the State of South Carolina. In addition, birth defects and mental retardation (genetic damages) are more prevalent than cancer, but because they occur in the children of the workers they are often overlooked.

Response: The only effect of concern at the low levels of radiation considered in this EIS are the development of cancer and possible genetic effects. Genetic effects have not been demonstrated to occur in humans, and the only effect of concern here is cancer. Other radiation effects do occur, but at much higher doses than can arise in this case. Mental retardation also does occur, but again, only at much higher radiation levels than those considered here. To protect against these effects, female workers who are, or may be, pregnant are given the option of requesting to be assigned duties that involve much reduced radiation exposure levels, until the end of the pregnancy.

The extent to which low levels of radiation cause cancer is currently the subject of scientific debate. The NRC used conservative assumptions and values to estimate potential LCFs from hypothetical accidents so as not to underestimate potential impacts. Because statistical data on low level radiation exposure and from previous accidents are inconclusive as to the inducement of cancer, these assumptions were based on extrapolation of data from exposure of humans to high levels of radiation, much higher than members of the public would expect to receive if an accident occurred at any of the proposed facilities.

Ischemic heart disease has a variety of causes as does cancer. To determine if the 15% elevated level is even statistically significant, regardless of the cause, a detailed analysis of the other counties in the area and potential confounding factors would first have to be conducted. The text in Section 3.10.3 of the FEIS was revised to indicate that cancer is the primary risk from radiation and that hereditary risks are also possible.

J.3.13.8 Comments: 73-004
115-001

Comment: The national emission standards for radionuclides, other than radon, from Department of Energy facilities states that emissions of radio nuclides to the air shall not exceed that which would cause any member of the public to receive a dose of ten millirems per year. Emission measurements from the stacks are stipulated in the existing Title V permit. But the millirem standard for the maximum allowable dose to the public is an ambient standard, not an emission limit. The existing permit fails to require any direct measurement of radioactive dose to the public, and cannot be enforced as a practical matter. This is a serious problem for many of the radionuclide-emitting facilities, including the proposed MOX facility.

The Savannah River Site does not currently meet five Title V emission standards with the existing operations. The addition of the Pit Disassembly and Conversion Facility (PDCF), the Waste Solidification Building (WSB), proposed MOX facility, the potential the siting of the Modern Pit Facility, and the potential use of the incinerator during the term of operation of the proposed MOX facility may cause additional violations.

The EIS must show that any additional activities, and cumulative and additive activities would not result in exceeding the National Emission Standards for Hazardous Air Pollutant (NESHAPs) limit when combined with current operations. Further, the NESHAP is written in millirems to individuals off site. There is no current monitoring done by the DOE, or reported in the DEIS that can, in fact confirm public doses from all current sources of radiation exposure to the public at the Savanna River Site.

Response: The primary restriction placed by NESHAPS is the 10-mrem/yr dose to any member of the public from air emissions. Placing restrictions on emissions is an indirect way of ensuring that this restriction is met. Whether the restriction is placed on the dose, or on emissions, it is necessary to use dose models that allow calculation of the dose to the public resulting from the emissions, to show that this 10-mrem/yr value is met. The main aim, therefore, is to ensure that the total of all air emissions from the facility does not result in a dose that exceeds this value. Emissions are monitored or estimated, and even though direct limits may not be imposed on them in a manner similar to that in Title V, the monitoring data are used to calculate the public doses to show compliance with all applicable limits. If other facilities in the vicinity of the MOX facility also contribute to public dose, adjustments will be made to ensure that the total dose does not exceed any applicable limit.

Conservative assumptions in dose modeling are used to ensure that the calculated dose to a maximally exposed member of the public is not underestimated. A maximally exposed individual (MEI) of the public is expected to receive approximately 0.04 mrem per year as a result of air emissions from SRS operations as presented in Table 3.10 in Section 3.10.3. Using conservative assumptions, the estimated exposure to a public MEI from operation of the proposed MOX facility, PDCF, and WSB was 0.0025 mrem per year as presented in Table 4.3 in Section 4.3.1.1.2. The combined exposure to current SRS activities and the MOX facilities would be about 0.0425 mrem, or about 0.425% of the 10 mrem NESHAP standard.

J.3.13.9 Comment: 86-117

Comment: In Section E.2.l.2, page E-17, line 32, the DEIS states that "To obtain conservative estimates of potential exposure and doses, the SRS employees were assumed to be exposed to radiation from airborne emissions without any shielding by buildings or other structures." If factors of 0.5 and 0.7 from U.S. NRC 1.109 were used as stated on the next page, shielding was taken into account.

Response: The sentence in Appendix E, Section E.2.1.2, was removed from the text.

J.3.13.10 Comment: 86-118

Comment: In Section E.2.1.2, page E-18, line 37, the DEIS states that the total time of external exposure to a plume and contaminated soils for SRS employees was assumed to be 0.5 year. This is an incorrect interpretation of the 0.5 factor in U.S. NRC 1.109. The 0.5 accounts for shielding while the individual is present. When the individual is present approximately 23% of the time (2000/365/24), this factor is further reduced by 0.5.

Response: The factor of 0.5 does account for shielding while the individual is present. However, the bulk of the emissions from the MOX-related facilities during operations would occur while the Savannah River Site employees are present. Thus, it is not reasonable to assume a further reduction in exposure.

J.3.13.11 Comments: 86-119
86-120

Comment: In Section E.2.1.2, page E-18, line 45, the DEIS states that the total time of external exposure to a plume and contaminated soils for a maximally exposed individual was assumed to be 0.7 year. For the inhalation pathway, an exposure time of 1 year was assumed. This is an incorrect interpretation of the 0.7 factor in U.S. NRC Regulatory Guide 1.109. The 0.7 accounts for shielding while the individual is present. The individual is present approximately 23% of the time (2000/365/24) and this factor is further reduced by the 0.7 factor.

Response: The factor of 0.7 does account for shielding while the individual is present. However, the bulk of the emissions from the MOX-related facilities during operations will occur while the Savannah River Site employees are present. Thus, it is not reasonable to assume a further reduction in external exposure to the plume. The factor of 0.7 for external exposure to contaminated soil was retained as a conservative assumption that does not affect the estimated impacts. External exposure from the plume and soil was approximately 5 orders of magnitude less than the inhalation exposure.

J.3.13.12 Comment: 89-044

Comment: In Section 4.3.1.1.1, the number of facility workers at the proposed MOX facility should be stated as was done for the Pit Disassembly and Conversion Facility and the Waste Solidification Building.

Response: The number of facility workers at the proposed MOX facility was added to the discussion in Section 4.3.1.1.2.

J.3.13.13 Comments: 52-004 93-018
92-006 114-002

Comment: The DEIS assumes a 10-year MOX program but DCS plans to apply for a 20-year license. This assumption would tend to underestimate the human health impacts. Given the uncertainty in operational periods for the Pit Disassembly and Conversion Facility, the DEIS must analyze dose, risk and cost-benefit impacts of MOX production over 20-year duration.

Response: The rationale for assessing the 10-year operational period impacts is presented in Section 1.21 of the EIS (Proposed Action). As discussed, the minimum amount of time it would take the facilities to process the plutonium under consideration would be approximately 10 years, if the facilities were operated at their maximum design capacity. Thus, the highest human health impacts would occur on an annual basis as reported in EIS Section 4.3.1 (Human Health Risks) because a 10-year operational period was assumed. The assumption of a longer operational period, such as 20 years, would be less conservative because the annual impacts would be proportionately less since the impacts would occur over a longer period of time.

J.3.13.14 Comments: 1-001
116-017

Comment: The EIS estimates latent cancer fatalities (LCFs) from radiation exposure in a deterministic fashion without regard to any uncertainty in the estimate. Indeed, the estimate for the result of low doses should at least include the possibility of zero effect. The estimate of LCFs in the DEIS has already been the subject of media reports and public concern. This is an important issue that must be resolved.

The LCFs currently calculated in DEIS should be listed as the "upper limit." The number of LCFs should be expressed as a range that includes zero effect. This opinion is supported by the Health Physics Society position paper, *Radiation Risk in Perspective*, of January 1996, reaffirmed March 2001. The Society of Nuclear Medicine and the American College of Nuclear Medicine voted unanimously to support that position.

The potential for positive health benefits from radiation exposure should be included at least as a note to the LCF discussion. There are ample references for the basis of this point.

The European Committee on Radiation Risk (ECRR) has published a 2003 set of recommendations on health effects of ionizing radiation exposure at low doses for radiation protection purposes. Regulator's Edition: Brussels, January 2003. This information should be compared with the information the NRC uses and the NRC should indicate which is valid.

Response: The estimated risk of LCFs is likely to represent an upper limit, and it is possible that there are no such risks at these low levels of exposure, which the proposed action is expected to produce. However, current knowledge does not permit reaching such a conclusion. It is therefore Federal policy, as well as the recommendations of all national and international advisory organizations, to assume that there is a risk at any dose level, and that this risk increases linearly with dose. The opinion expressed in the Health Physics Society Position Paper appears to be reasonable, but it does not provide sufficient supporting data to permit adoption of this position in Federal regulatory policy.

J.3.13.15 Comment: 27-009

Comment: The pathways discussed in Section 3.10.1.1 do not identify atmospheric particulate matter that has settled on the ground and that can be introduced into groundwater by recharging precipitation in a recharge area, or if the deposits are washed into surface water by overland runoff in areas where the surface water is in hydraulic connection with the ground water. It is suggested that the potential for groundwater contamination from atmospheric particulate matter deposited on the land surface at the MOX or F-Area sites be addressed in the DEIS.

Response: The potential impacts from the pathway suggested in the comment (i.e., airborne release to soil deposition to groundwater to humans) was not explicitly considered in this EIS. There is the potential that contamination from atmospheric deposition could reach groundwater; however, the contribution of this pathway to human exposure would be much less than the human health impacts presented in this EIS for several reasons. The upper aquifer at the SRS is not used for drinking water, and significant dilution of any contamination would occur before the groundwater exited the SRS. Therefore, any contamination of this aquifer would not contribute significantly to human health impacts. A detailed discussion of the many pathways from operations at the SRS is presented in the SRS annual environmental report (Arnett and Mamatey 2001b) (see reference section for Chapter 3). The pathway suggested by the commenter is not listed as a significant pathway from airborne releases.

J.3.13.16 Comment: 53-003

Comment: The DEIS should state the value of natural background radiation at the Savannah River Site (SRS), not the national level. Because of the lower elevation, the lower radon levels, and the small number of basements, the natural background is different from the national average. In addition, the harm and benefits caused by natural background radiation needs to be presented in the DEIS.

Response: Natural background radiation in the Savannah River Site area, which includes consideration of the site's elevation and radon levels, is expected to be near the national average as presented in Chapter 7 of the *Savannah River Site Environmental Report for 2000* (WSRC-TR-2000-00328). Natural background radiation has the potential to cause latent cancer fatalities as does man-made radiation.

J.3.13.17 Comment: 86-035

Comment: The requirement for additional soil sampling discussed in Section 4.3.1.1.1, page 4-8 of the DEIS was questioned. The October 29, 2002, correspondence from DCS to the Nuclear Regulatory Commission responding to requests for additional information included the results of the 'further sampling' referred to in the DEIS. The DEIS should have included the results of this report which confirm the previous DCS conclusion that there are no significant concentrations of radioisotopes or chemicals in the soil, that would be hazardous to construction workers' health.

Response: Although no contamination is expected, further sampling may be necessary. The text was revised to include the reference to the sample results described in the October 29, 2002, correspondence, but the results do not include samples to the depth that will be required for building foundations in the area of the spoils pile. Samples were only taken down to a depth of 12 inches. Samples were not taken at the depths required to sample both the entire extent of the spoils pile and the ground underlying the spoils pile in areas which could be disturbed by construction activities.

J.3.13.18 Comment: 86-036

Comment: The DEIS (Section 4.3.1.1.2, page 4-8 and in Appendix E, page E-16) includes internal exposures for workers from normal operations. Since internal exposures would only result from breaches of containment, these exposures should not be considered as part of normal operations, but should be considered only in the accident impacts assessment.

Response: Ideally, internal exposures are not expected under a normal operating environment. In practice, there will be some internal exposure during the course of normal operations because of residual levels of contamination.

J.3.13.19 Comment: 86-123

Comment: The values of ingestion parameters in Table E.9 for the maximally exposed individual (MEI) and the general public were questioned. Each line repeats the same number (276 kg/yr for the MEI and 163 kg/yr for the population), when this should be the total for all three.

Response: The values used for ingestion parameters for root vegetables, fruit, and grain were taken directly from Appendix D, Table D-4 (page D-20), of the MOX ER (Mixed Oxide Fuel Fabrication Facility Report, Revision 1&2) submitted by DCS. The values have been revised as suggested in the comment based on Savannah River Site data.

J.3.13.20 Comment: 86-125

Comment: Table E.13 does not include uranium-238, 99% of uranium inventory.

Response: The comment pertains to accidents and not normal operations. MOX ER Table D-7 lists source terms for isotopes released during normal operations, not from accidents as listed in Appendix E, Table E.13. Uranium-238 was not listed in DCS 2002b (App. E reference) as a component of the waste streams involved in potential accidents at the Waste Solidification Building.

J.3.13.21 Comment: 93-011

Comment: It is not acceptable to sign off on the environmental impacts of construction of the proposed MOX facility without a more detailed explanation of the impact of bull dozer activity on this contaminated site. The movement of soil that is contaminated will have an impact not only on workers, but also on those off site because particulates will be lofted into the atmosphere. The DEIS states on page 4-8 that any doses to workers from such contamination would be assessed. The DEIS does not describe who will make this assessment of workers and why the assessment would not include the off-site public.

Response: Although no contamination is expected, further sampling may be necessary because samples were only taken down to a depth of 12 inches. Samples were not taken at the depths required to sample both the entire extent of the spoils pile and the ground underlying the spoils pile in areas which could be disturbed by construction activities. It would be the responsibility of DCS and the Department of Energy to assess the risks from movement of contaminated soil if any were to be found. Any assessment of risks would necessarily include impacts to the off-site population.

J.3.13.22 Comments: 101-002
102-002

Comment: An 11% increase in the cumulative and collective dose to workers at the Savannah River Site (SRS) as a result of the proposed MOX facility, the Pit Disassembly and Conversion Facility (PDCF), and Waste Solidification Building (WSB) operations, is alarming and significant.

Response: The contribution of the MOX program to the cumulative collective dose to SRS workers was revised from 11.4% to 9.3% in Table 4.25 in Section 4.5.1.1 of the FEIS. As discussed in Section 4.3.1.1.2, each of the workers at the PDCF and the WSB was assumed to receive less than the SRS guideline maximum exposure (0.5 rem/yr). Due to lack of operational data and a desire not to understate potential risks, the cumulative collective dose to SRS workers was based on this maximum exposure which resulted in the contribution of 9.3% by the PDCF, the proposed MOX facility, and the WSB. However, the average SRS worker involved in radiological operations receives approximately 0.048 rem/yr as presented in Section 3.10.3. This average dose is ten times less than the allowed maximum. Thus, the contribution of the proposed MOX facility (15 person-rem) with a more realistic estimate (10% of maximum allowed) for the PDCF and WSB (1.97 + 0.5 person-rem) would contribute about 17.5 person-rem (rather than 257 person-rem) to a revised annual site total of 2,572.5 person-rem, or about 0.7%.

J.3.13.23 Comment: 105-013

Comment: DCS uses data from the MELOX plant in Marcoule, France to estimate worker radiation dose at 0.009 latent cancer fatalities (LCF) per year. There is no way to confirm this data, and people who oppose the proposed action have no means to substantiate their claims. The 0.009 LCF per year estimate is not accurate, but opponents have been unfairly denied the means to prove it.

Response: The annual latent cancer fatality rate for MOX facility workers of 0.009 is a reasonable estimate for the 400 workers expected at the proposed MOX facility. If the average annual dose per worker at the Savannah River Site of 0.048 person-rem is assumed (see Section 3.10.3), an annual collective worker dose of 19.2 person-rem (0.01 LCF) is the result. Such a result is very close to the value of 0.009 LCFs.

J.3.14 Accidents

J.3.14.1 Comments: 10-012
64-006

Comment: The Nuclear Regulatory Commission (NRC) concluded that there are minimal risks to human health if plutonium fuel is produced at the Savannah River Site (SRS). It was noted that this project represents a real and unacceptable risk, especially to workers.

The report states that "credible" accidents will be studied in either the EIS or the safety evaluation report (SER). The DEIS should define the term "credible accident" and state what the impacts are for "non-credible accidents."

Response: The NRC does not evaluate the impacts of worst-case or non-credible accidents in its NEPA analyses. Credible accidents evaluated in the EIS include those caused by natural phenomena hazards and other possible process hazards. For NRC-licensed fuel-fabrication facilities, the risk of credible high and intermediate consequence events will be limited in accordance with 10 CFR Part 70. The principal structures, systems and components relied upon to reduce these risks are evaluated in the SERs.

J.3.14.2 Comment: 19-006

Comment: This DEIS estimated 400 deaths in the minority community based on computer modeling and is now coming back to revise that to 50. Although modeling is a valid technique for estimating the unknown, it must be based on realistic choices of variables and not too many of them. The assumptions need to be justified. A lot more information is needed about how the number were obtained.

Response: All assumptions and sources of data input into the computer models for radiological impacts were provided in Appendix E, Section E.2 of the EIS.

J.3.14.3 Comment: 53-008

Comment: Concern was expressed with a tritium accident. It was stated that there is not a list of the number of curies that are postulated to be released in an accident. Also, the routine releases at the pit disassembly and conversion facility were not documented. Three years ago it was about 1000 curies per year tritium being released. Concern was expressed regarding the amount of tritium already released by the Savannah River Site.

Response: The amount of tritium postulated to be released in the Pit Disassembly and Conversion Facility (PDCF) tritium accident was listed in Table E.13 in Appendix E. The amount of tritium assumed to be released from normal operations at the PDCF was listed in Table E.5 in Appendix E of the EIS.

J.3.14.4 Comment: 116-007

Comment: Concern was expressed about how to deal with natural phenomenon such as an earthquake. It is not obvious that the worst-case earthquake would not devastate the current MOX design. If principal system and structure components (PSSCs) survive an earthquake, non-PSSC equipment and structures might not survive and their destruction could have an adverse impact on the PSSCs. The worst-case earthquake could also cause explosions, spills, criticality accidents, fires, and leaks of radioactive material. The DEIS should review this worst-case scenario.

Response: The NRC does not evaluate worst-case scenarios in its NEPA analyses. But in developing its seismic safety design for the proposed MOX facility, DCS was required to consider the most severe documented earthquake for the site (the 1886 Charleston earthquake). Moreover, EIS Section 4.3.5.1.1 provides a bounding NEPA analysis for potential events up to and including design basis accidents. DCS has committed to design the proposed MOX facility to ensure PSSCs survive the design basis earthquake without subsequently exceeding the dose limits set forth in the 10 CFR Part 70 performance requirements.

J.3.14.5 Comment: 116-008

Comment: It was suggested that the postulated accidents should be evaluated in conjunction with a hurricane, when the winds are fiercest.

Response: As stated in Section 4.3.5.1.1 of the EIS, hurricanes were evaluated as the cause of accidents but were found not to be capable of causing a release of radioactive material to the environment. Most major operations at the Savannah River Site such as MOX operations would be expected to be shutdown or suspended pending the approach of a hurricane due to the potential disruption of electricity and supplies. Small environmental impacts might be expected if an accident were to occur simultaneously with a hurricane, but the winds associated with the hurricane would be capable of diluting any releases to the point where no appreciable dose to receptors more than a few hundred meters downwind would be expected.

J.3.14.6 Comment: 116-019

Comment: The DEIS should include the impact of the worst-case hydrogen explosion.

Response: The NRC does not evaluate worst-case scenarios in its NEPA analyses. As discussed in Section 4.3.5.1.1, the EIS attempted to provide a comprehensive, bounding analysis for all potential events up to and including design basis accidents. Impacts of the hypothetical hydrogen explosion accident postulated at the proposed MOX facility were given in Section 4.3.5.2.

J.3.14.7 Comment: 3-002

Comment: Concern was expressed regarding the impacts resulting from serious accidents in the area surrounding the Savannah River Site and in the Savannah area.

Response: Pursuant to the requirements of 10 CFR Part 70, the risk of credible high and intermediate consequence events at the proposed MOX facility must be reduced to acceptable levels before operation of the MOX facility would be authorized. As described in the draft SER for construction, DCS has identified principal structures, systems and components (PSSCs) to prevent or mitigate these events, and will maintain these PSSCs in accordance with an approved quality assurance program. To reduce the risk of accidents at the Waste Solidification Building and the Pit Disassembly and Conversion Facility, these proposed Department of Energy facilities would have to meet the requirements of 10 CFR 830 for facility nuclear safety, 10 CFR 835 for worker protection, and other DOE orders and regulations.

J.3.14.8	Comments:	14-003	63-003	86-051
		50-002	86-003	86-052

Comment: The risk to offsite population in the hypothetical accident analysis is significantly overstated. In analyzing the impact to off-site population from a hypothetical tritium release from the Pit Disassembly and Conversion Facility, the DEIS assumes and calculates a dose by ingestion during the one-year post-accident period. This scenario is simply not possible. An assumption that the South Carolina Department of Health and Environmental Control and the Georgia Environmental Protection Division would ignore contamination of agricultural products for one year is incredulous and an insult to their training, demonstrated performance and professional status. This impossible assumption must be eliminated and the analysis revised.

Response: In Section 4.3.5.2, the EIS discusses the possibility that the 1-year exposure accident consequences would be lower if contaminated food was not eaten. It further discusses the Food and Drug Administration protective action guides for interventions. A new 1-year exposure scenario without consideration of crop ingestion has been added to Section 4.3.5.2. The Nuclear Regulatory Commission recognizes that some interdiction would likely occur following a significant accident, even if contamination levels were below the protective action guides. Additional text has been added to clarify the reasonableness of the assumption regarding interdiction. Many stakeholders wanted to know what could happen if no interdiction of crops occurred. Therefore, the accident analysis also reports the 1-year exposure including the ingestion pathway. The 1-year exposure scenario including the ingestion pathway is provided as an upper bound estimate of the impacts of a potential significant accident. It should be recognized that many factors would result in a more realistic (lower) estimate of potential accident consequences. These include the selection of the computer code (See Comment J.3.13.16), and conservatism used in defining the potential accident scenario (See Comment J.3.13.9). However, for purposes of the National Environmental Policy Act, staff included a more realistic estimate of the impacts from potential accidents and an estimate that bounds the potential accident consequences.

J.3.14.9	Comments:	17-002	86-066	89-006
		50-002	89-001	94-001
		60-002	89-005	

Comment: The DEIS has considered worst-case scenarios in the accident analysis. The likelihood of these accidents is extremely remote and cannot be considered "reasonably foreseeable" as required for a National Environmental Policy Act (NEPA) analysis. Furthermore, the assumptions made in performing the accident analysis were overly conservative by orders of magnitudes, leading to unrealistically high human health impacts. These assumptions include the use of the GENII code for performing the analysis as well as ignoring engineered safety features or procedures such as permitting the ingestion of contaminated food.

Response: The NRC does not evaluate worst-case scenarios in its NEPA analyses. As discussed in Section 4.3.5.2, the EIS attempted to provide a comprehensive, bounding analysis for potential events up to and including design basis accidents. All accidents were taken from either the Surplus Plutonium Disposition EIS for the Pit Disassembly and Conversion Facility (PDCF) accidents or the MOX ER for the proposed MOX facility and Waste Solidification Building (WSB) accidents. No beyond design basis accidents for the PDCF were considered and no such accidents were considered in the MOX ER. However, the leak path factors for the MOX explosion and fire accidents were revised from 0.01 to 0.0001 to give more credit to the high-efficiency particulate air (HEPA) filters in reducing the amount of radioactivity released to the environment in the analyses as reported in Section 4.3.5.2.

The EIS provides a conservative estimate of accident impacts and an independent review of previous accident analyses performed for the proposed MOX facility, the PDCF, and the WSB. Concerns have been expressed about the use of the GENII code for accidents and the inclusion of ingestion doses in the impacts. As discussed in more detail in Comment J.3.14.20, the conservative nature of the GENII accident dispersion model was tempered by the use of direction-specific 95th percentile meteorology rather than 99.5th percentile as suggested by Nuclear Regulatory Commission Regulatory Guide 1.145. The rational for inclusion of ingestion doses in the impacts is discussed further in the response to Comment J.3.14.8.

Thus, the accident impacts presented in this EIS are conservative in nature. The accidents are reasonably foreseeable and not overly conservative by orders of magnitude. Additional text was added to Section 4.3.5.2 of the FEIS to discuss the uncertainties involved in the assumptions and calculations.

As discussed in Section 2.5, it is estimated that the construction and operation of the proposed MOX facility would have small radiological impacts on, and risk to, human health. This finding is borne out by the low impacts assessed while using conservative assumptions.

J.3.14.10 Comments: 22-001
53-002

Comment: Concern was expressed with the use of hypothetical rather than real data for accidents. It was stated that the DEIS should have used the facts from real radioactive accidents instead of hypothetical accidents. It was suggested that these accidents affected generations of Americans not just the generation living when the accident occurred. The DEIS should explain why the only health consequence that was considered was latent cancer fatalities.

Response: The accidents evaluated were those considered to be reasonably foreseeable given the processes and procedures needed at the proposed MOX facility, the Pit Disassembly and Conversion Facility (PDCF), and the Waste Solidification Building (WSB). Data based on actual accidents does not exist for many of the potential hazards evaluated in the EIS.

Genetic effects and the development of cancer are the primary health concerns attributed to radiation exposure. Latent cancer fatalities (LCFs) are the radiological health effect end point used in this EIS as a measure of human health impacts. Although radiation-induced genetic effects have been observed in laboratory animals (given very high doses of radiation), no evidence of genetic effects has been observed among the children born to atomic bomb survivors from Hiroshima and Nagasaki. Thus, there is no basis for estimating genetic effects in descendants of persons exposed to high doses of ionizing radiation.

The extent to which low levels of radiation cause cancer is currently the subject of scientific debate. The Nuclear Regulatory Commission (NRC) used conservative assumptions and values to estimate potential LCFs from hypothetical accidents so as not to underestimate potential impacts. Because statistical data on low level radiation exposure and from previous accidents are inconclusive as to the inducement of cancer, the NRC's assumptions were based on extrapolation of data from exposure of humans to high levels of radiation, much higher than members of the public would expect to receive if an accident occurred.

J.3.14.11 Comment: 25-002

Comment: The DEIS, which included both the MOX plant and the Pit Disassembly and Conversion Facility (PDCF), did not contain sufficient detail to allow an independent assessment of their analyses. However, its worse-case incident, which occurred in PDCF, not the MOX plant, seems grossly exaggerated. A fire in a modern plutonium cabinet or glove box would be unlikely to generate either the heat or the releases of plutonium and tritium that was assumed. Any plutonium in such a fire, if it occurred, would not dissipate to the public. The assumption was made that the government would not collect the contaminated food to keep it from being eaten was questioned. Surely this hypothetical incident scenario is supposed to be at least remotely possible. This draft EIS needs significant revision.

Response: The accident scenarios evaluated in the EIS are based on information in the MOX ER and the DOE's SPD EIS. This included a fire in a glovebox that released plutonium and tritium. All accident release source terms and site-specific input data necessary to perform an independent assessment were provided in Appendix E of the EIS.

As stated in response to many of the above comments, the accidents considered were not worst-case accidents. The response to Comment J.3.14 8 discusses why the food ingestion pathway was included.

J.3.14.12 Comments: 62-002
116-003

Comment: The DEIS states that credible or reasonably foreseeable accidents are considered. Several past accidents that were previously considered "incredible" including Three Mile Island #2 in 1979; Chernobyl in 1986, the N.Y. City Twin Towers in 1993 and again in 2001 were provided as examples. The probability that these events would happen in the manner in which they occurred (before they occurred) is very, very small. Yet, the incredible happened. The DEIS should also consider "incredible" events and worst-case accidents.

Response: Worst-case accidents and specific terrorist initiated events are not considered to be reasonably foreseeable and are therefore not considered in this EIS.

J.3.14.13 Comment: 97-004

Comment: The analyses in the DEIS do not appear to address uncertainties - including uncertainties in design, uncertainties and inaccuracies in models, uncertainties in input parameters, and excluded or overlooked effects. In addition, the sensitivity of the results to changes in assumptions and parameters is unclear. It is recommended that uncertainty and sensitivity be addressed and included in the DEIS.

Response: The analyses in the EIS are based on the best, current information available. If significant changes in design or function are made, a future supplement to the EIS might be required. Furthermore, conservative assumptions and input parameter values were used so as not to underestimate risks.

J.3.14.14 Comments: 97-007 101-001
97-015 102-001
96-017

Comment: Concern was expressed regarding the computer codes that were used to estimate radiological impacts, including errors miscalculating the number of deaths in low income, African American communities as a result of a severe MOX accident. It is not clear if the computer codes are endorsed by Nuclear Regulatory Commission (NRC) regulations and/or guidance, and if they meet NRC quality assurance requirements, including verification and validation for the specific site and application. Concern was also expressed regarding the uncertainty of additional errors in the DEIS.

Response: The computer codes selected for performing the analysis have a proven track record in accident analysis and National Environmental Policy Act compliance. The accident input parameters and assumptions provided by DCS for the MOX facility and Waste Solidification Building accidents as well as those for the Pit Disassembly and Conversion Facility accidents from the Surplus Plutonium Disposition EIS have been carefully scrutinized by the NRC as part of the licensing process for appropriateness and modified if necessary. The preparation of the EIS followed applicable NRC guidance and regulations. The NRC reviewed analyses performed by the contractor, Argonne National Laboratory (ANL). ANL does have a quality assurance program that was followed in the preparation of the DEIS. In addition, the NRC retained the Center for Nuclear Waste Regulatory Analysis to review the DEIS prior to publication. A discussion of the quality assurance associated with the GENII code is provided in the response to Comment J.3.14.16.

J.3.14.15 Comments: 64-006
86-003
86-051

Comment: The bounding accident for the Mixed Oxide Fuel Fabrication Facility – an explosion in an aqueous polishing cell – was not properly characterized. The discussion provided in Section 4.3.5.2 and Table 4.12 fails to explain that the accident is prevented. See Draft Safety Evaluation Report on the Construction Authorization Request for the Mixed Oxide Fuel Fabrication Facility (SER for construction) Table 10.1-3, footnote b. The DEIS should clearly state that an explosion in an aqueous polishing cell is provided for illustrative purposes because, pursuant to NRC's own regulations, the design safety features, will prevent such an accident. The Draft EIS further fosters a misimpression on the public by postulating that, once this hypothetical accident occurs, neither DCS, the Department of Energy, the Nuclear Regulatory Commission, nor the States of South Carolina or Georgia would take any intervention to protect the public by removing contaminated food or soil. See Draft EIS page 4-36, lines 8-18. In fact, the document further assumes that contaminated food is distributed outside the immediate vicinity of the Savannah River Site. See Draft EIS page 4-41 lines 25-3 8. These assumptions are inconsistent with the NRC guidance to use "reasonably foreseeable" accident evaluations that are coordinated with the SER for construction. The DEIS should state the probability associated with the various accidents.

Response: The explosion event at the proposed MOX facility was characterized according to information in the MOX ER and considered to be "highly unlikely" because of the design features of the facility. However, as noted in Section 1.1.2, the EIS is broader in scope than the SER and has a different focus. The EIS assumes that an accident will occur and estimates potential impacts to human health and the environment from the accident. The likelihood of accident consequences is evaluated in describing the risk associated with a postulated accident. The FSER is concerned with documenting the NRC staff's safety findings of an applicant's application. As discussed in Section 1.1.2, information in the SER, that is not germane to environmental impacts, is not repeated in the EIS. Although conservative assumptions were applied to the source term and release fraction, the event would have been classified as "not credible" if the initiation of the event was totally out of the realm of possibility.

See Comment J.3.14.8 for the response to removing the ingestion pathway.

J.3.14.16 Comments: 86-053 89-007
86-066 94-001
89-002

Comment: The GENII code is not an appropriate model for estimating accident impacts to the collective public. A number of conservative assumptions compounded lead to excessively conservative results. Of major concern are 1) the use of the plume centerline air concentrations for the entire sector being analyzed, which results in unrealistically high impacts, and 2) the modeling of crop harvest immediately following an accidental release leads to excessive impacts from the food ingestion pathway.

Response: The GENII code was selected in order for the Nuclear Regulatory Commission (NRC) to perform an independent analysis of proposed MOX facility, Pit Disassembly and Conversion Facility (PDCF), and Waste Solidification Building (WSB) accidents. MACCS2 had been previously used to perform analyses for the proposed MOX facility and PDCF. These two codes were the only codes recommended for the DOE Safety Analysis Toolbox in the area of radiological dispersion and consequence analysis (WSRC-MS-2001-00091). The GENII code was developed under software quality assurance guidelines based on the American Society of Mechanical Engineers Nuclear Quality Assurance-1 (ASME NQA-1) standard. As with all accident analysis codes, both GENII and MACCS2 have been cited for problems with software quality assurance (WSRC-MS-2002-00118) which was an additional reason for using GENII as a peer-reviewed alternative to MACCS2. The error in the GENII tritium accident module regarding the use of the food grid was identified by the NRC during development of the EIS and a workaround developed in consultation with the code developer.

The GENII code has also been used in numerous previous environmental impacts statements in the analysis of accident impacts (e.g., DOE/EIS-0161, *Final Programmatic Environmental Impact Statement for Tritium Supply and Recycling*; DOE/EIS-0200-F, *Final Waste Management Programmatic Environmental Impact Statement for Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Waste*; DOE/EIS-0269, *Programmatic Environmental Impact Statement for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride*; DOE/EIS-0277, *Final Environmental Impact Statement on Management of Certain Plutonium Residues and Scrub Alloy Stored at the Rocky Flats Environmental Technology Site*).

Due to the conservativism inherent in the GENII accident population dose model, the direction-specific 95th percentile impacts were assessed rather than the direction-specific 99.5th percentile as suggested in Regulatory Guide 1.145. The response to Comment J.3.14.20 provides more information on this subject. In addition, it is not always apparent when the results from MACCS2 are conservative. For example, the site-wide 95th percentile result from the PDCF tritium accident from the Surplus Plutonium Disposition EIS (DOE/EIS-0283) was 110 person-rem in the short-term. Use of later 1987 weather data (worst-case for 1987 through 1996 as used in the MOX ER and in this EIS) in MACCS2 for the same accident results in a dose of approximately 70 person-rem, a 40% difference.

The accident analysis performed using GENII provided ingestion impacts for four different times during the year designated as "winter," "spring," "summer," and "autumn" by the code. These four seasons represent different stages in the growth cycle of crops potentially affected over the course of a year by an accidental release of radioactive material. The impacts for "autumn," representative of conditions immediately prior to harvest, were chosen for presentation in the DEIS. Such impacts were included to provide perspective on what could happen without the interdiction of crops or if contaminant levels fell below protective action guidelines.

In summary, the NRC performed an independent accident analysis with a computer code with an established track record in the area of accident analysis. Conservative assumptions were used but not to the extent that the analysis could be considered overly conservative.

J.3.14.17 Comment: 86-057

Comment: In Section 4.3.5.2 of the DEIS, the meteorological conditions for the proposed MOX facility hypothetical explosion involves winds directed to the west-northwest. The meteorological conditions for the Pit Disassembly and Conversion Facility hypothetical tritium release involves winds directed to the southwest. It is not intuitively obvious why both accident evaluations do not have the same meteorological conditions.

Response: As discussed in Section 4.3.5.2 of the EIS, the inhalation pathway dominates the short-term exposure. Thus, the west-northwest sector has the highest impacts because of the larger number of people in that direction. For the 1-year exposure, the ingestion pathway dominates. Because more crops are grown in the southwest, the highest impacts were estimated for this direction despite any differences in meteorological conditions such as stability frequency and wind speed and direction.

J.3.14.18 Comments: 89-003
89-007

Comment: The results reported in the DEIS errata sheets are not physically possible. The predicted doses for the explosion scenario for the proposed MOX facility would seem to require more plutonium to be ingested than would be released in the postulated accident. To result in the number of latent cancer fatalities attributed to the ingestion pathway, the calculations strongly suggest that the offsite population would be required to ingest contaminated food containing almost twice the amount of plutonium postulated by the Nuclear Regulatory Commission to have been released by this accident. In addition, DOE's experience indicates that the realistic fraction of released contamination to be inhaled or ingested is several orders of magnitude less than these numbers indicate.

Response: The results reported in the errata sheets are physically possible. The claims of excessive conservatism are exaggerated in the comment. The internal dose conversion factors (DCFs) for ingestion and inhalation used by GENII and the DCFs in Federal Guidance Report 11 for ingestion and inhalation, are based on International Commission on

Radiological Protection (ICRP) Reports 30 and 48. The “worst case” solubility library as defined in GENII documentation (results in maximum dose) in GENII was used in the EIS accident analysis. If the entire amount of radioactive material released for the MOX explosion event (as reported in Table E.13 in the errata sheets) was assumed to be ingested, a 30,000 person-Sv dose would be expected using the worst case solubility values from Federal Guidance Report (FGR) 11 for each radionuclide. The dose reported in Table 4.14 of the EIS, 2,700 person-Sv, is 9% of the 30,000 person-Sv. Therefore, more plutonium is released than ingested.

Similarly, for inhalation, if all radioactive material released from the explosion was inhaled, a population dose of 3,650,000 person-Sv would result. Thus, the estimated dose in Table 4.14 of 910 person-Sv is only 0.025% of that expected if all of the material was inhaled, not 0.23% as suggested in the comment.

Much of the plutonium might settle to the ground prior to reaching 20 miles from the release point. However, under 95th percentile meteorological conditions, the contaminant plume will be more narrow and concentrated, resulting in higher concentrations downwind than for other conditions.

Finally, ingestion doses are routinely a small fraction of inhalation doses if the crop density ratio to population density is low in the areas considered or if direct deposition on crops is not considered. Neither condition applies to the analysis performed for this EIS.

J.3.14.19 Comment: 98-008

Comment: The original DEIS included significant errors in the calculation of latent cancer fatalities if there were an explosion at the proposed MOX facility – estimating nearly 400 deaths; the new calculations result in less fatalities, but we still consider 100 deaths to be significant and important enough to warrant denying approval.

Response: The calculation of 100 latent cancer fatalities (LCFs) involved the ingestion of all food crops that were assumed to be contaminated immediately prior to harvest. Text was added to Section 4.3.5.2 of the FEIS to explain the reasons for including the food pathway in the collective population 1-year exposure impacts. Impacts for the collective population 1-year exposure without ingestion have also been added to the impacts presented in Section 4.3.5.2.

One reason for inclusion of the ingestion dose was for perspective if interdiction of crops was not implemented. Because the Nuclear Regulatory Commission does expect interdiction to occur if potential crop contamination results from an accidental release, the primary focus is on the short-term exposures, which do not include ingestion, presented in Section 4.3.5.2 and in Table 2.1 in Section 2.4 of the EIS. The maximum short-term collective population exposure, assuming the accident occurs, results in approximately 3 LCFs. This estimate is the result of using conservative assumptions and represents small doses to all individuals in a large population. Moreover, the LCF estimate is a consequence of an accident with a very low probability.

J.3.14.20 Comments: 86-054
86-055
89-004

Comment: The use of the GENII computer code to calculate Chi/Q values in the DEIS for a single specific direction, without consideration of any other directions, will not produce a site-representative 95th percentile Chi/Q. Despite statements that population impacts in the DEIS are based on meteorological conditions at the 95th percentile, they may actually be based on conditions at the 99 to 99.5th percentile, leading to overly conservative collective dose impacts.

Response: The collective dose results from GENII are not overly conservative. For accident analyses, the Nuclear Regulatory Commission (NRC) accepts the maximum sector air concentration value or the overall site 95th percentile value, whichever is larger (Regulatory Guide 1.145). For this EIS, staff used the maximum sector value rather than the overall site 95th percentile value as discussed in the comment. The maximum sector air concentration value is determined by evaluating the impact in each of the 16 sectors. Using the guidance of Regulatory Guide 1.145, the 99.5th percentile value would be determined and the largest value for the 16 sectors selected. Because of the conservative nature of the assumptions used in the accident analysis, the maximum sector results were determined using the 95th percentile concentration values using GENII rather than the 99.5th percentile values. Use of the 99.5th percentile values would have resulted in larger estimated exposures that would have been overly conservative. Maximum short-term impacts were found to be to the WNW of the SRS, because that sector has the largest off-site population density. Maximum long-term exposures that included the ingestion pathway were found to be primarily to the SW of the SRS because that sector contains the the largest amount of crops in the area. Thus, accident impacts were assessed for all directions from the SRS. For each case, the impacts reported were for the sector with the largest impacts as suggested by NRC guidance.

J.3.14.21 Comment: 105-015

Comment: Plutonium is not the same as uranium. No mention in this DEIS is made for control of humidity, despite plutonium being much more reactive in a humid environment. Plutonium metal is also a concern in the Pit Disassembly and Conversion Facility (PDCF). From 6-1.3 of the Plutonium Handbook, "When a container is opened spontaneous ignition may then occur, usually resulting in destruction of the container and the scattering of metallic oxide (Pu) through the glove box train and the exhaust system." The DEIS mentions no precautions to prevent this.

Response: Spontaneous ignition of plutonium (and alloys) requires plutonium to be in the form of metal turnings or powder that have higher surface areas than monolithic pieces (such as the plutonium pits). Spontaneous ignition is a result of the plutonium metal reacting with oxygen and/or water in the air to form an oxide. Neither the PDCF or the proposed MOX facility is expected to handle metal plutonium in powder form. The plutonium pits that the PDCF is expected to receive are in a bulk metal form. The proposed

MOX facility will handle plutonium in the oxide form that does not have the potential for spontaneous ignition.

J.3.14.22 Comment: 116-015

Comment: For airborne releases of radiation, in an accident, the maximally exposed individual (MEI) is at the north Savannah River Site (SRS) boundary. Yet the 1 year maximum dose is at the SSW boundary. It is not apparent why this is the case. For most of the year there are no prevailing winds at the SRS. It appears there is no real "safe" direction to evacuate to in the event of an accident.

Response: For accident releases, the MEI is located to the north-west of the proposed facilities. As discussed in Section 4.3.5.2 of the EIS, the MEI is a hypothetical person who is assumed to be located at the SRS and could receive the highest possible dose of radiation or of a hazardous chemical from a given event or process. Because the site boundary is closest to the proposed MOX facility on the north-west side of the SRS, as shown in Appendix E (Table E.11 in the DEIS), the MEI is located to the north-west. The maximum dose to the SSW is a 1-year collective population dose. It considers several pathways of exposure including direct radiation, inhalation and ingestion. The SSW sector has the highest crop production. As discussed in Section 4.3.5.2 of the EIS, the 1-year exposure estimate assumes that all the contaminated crops are eaten. For this sector, more crops are produced than could be eaten by the people living there. Therefore, it is assumed that the crops are eaten by others, and the exposure to those people is included in the 1-year exposure estimate for the SSW sector.

As discussed in Section 4.3.5 of the EIS, impacts from accidents would depend on the wind direction and speed following a hypothetical accident. Figure 3.5 presents the annual wind rose for the SRS. The prevailing wind directions are W to S and NNE to ENE. The least prevalent wind direction is to the N and NW. The SRS emergency response plan takes into account the prevailing wind direction at the time of an accident.

J.3.14.23 Comment: 86-122

Comment: The GENII code is not an appropriate model for estimating accident impacts to the collective public. A number of conservative assumptions compounded lead to excessively conservative results. Of major concern are 1) the use of the plume centerline air concentrations for the entire sector being analyzed which results in unrealistically high impacts, and 2) the modeling of crop harvest immediately following an accidental release leads to excessive impacts from the food ingestion pathway.

Response: The comment specifically references text in Section E.2.1.3 in Appendix E. However, the discussion in Section E.2.1.3 discusses the use of the GENII code for normal operations, not accident conditions. It is the same code used by DCS in their MOX ER for assessing the risks from normal operations. The statements made in the comment do not apply to the use of GENII for normal operations. A discussion on the appropriateness of using GENII for accident analyses is presented in the response to Comment J.3.14.16.

J.3.14.24 Comment: 86-124

Comment: Table E.12 indicates that the Nuclear Regulatory Commission (NRC) used a leak path factor of 0.01 for the internal fire and explosion events (See Section J.2.1.3 of the EIS). DCS used a leak path factor of 0.0001 for these events. DCS is currently discussing with the NRC safety analysis staff the appropriate leak path factor to use. If the NRC staff ultimately agrees to a leak path factor of 0.0001, DCS assumes the EIS staff will reevaluate the accident scenarios with this new leak path factor.

Response: The NRC has accepted the leak path factor of 0.0001 for the MOX internal fire and explosion events. The input data presented in Section E.2.2.1 in Appendix E and the accident impacts as presented in Section 4.3.5.2 have been revised to incorporate the change.

J.3.14.25 Comment: 97-011

Comment: The basis for uranium dioxide release estimates in Table 4.16 of the DEIS needs to be explained. The Nuclear Regulatory Commission (NRC) staff's Safety Evaluation Report of April 2002 identified this as an open issue and implied higher potential concentrations.

Response: In Section 8.1.2.3.3 of the April 2003 draft SER, the NRC staff evaluated the DCS's proposal for safe storage of uranium dioxide and found it acceptable. The NRC reviewed the risk of this event, and, as shown in Table 4.16 of the EIS, considers this a low risk event.

J.3.15 Air Quality

J.3.15.1 Comments: 8-003 89-010
86-021 89-011
86-031

Comment: The proposed MOX facility will result in exceeding the air quality limits at the Savannah River Site (SRS). The legality of the SRS exceeding the $PM_{2.5}$ standard was questioned. Also, in Table 2.1, it should be made clear that the $PM_{2.5}$ is a 24-hour limit and should not be compared to the annual standard.

The definition of 'vicinity of SRS' and the resulting selection of South Carolina Department of Health and Environmental Control (SCDHEC) monitoring stations to characterize the existing ambient air quality in Table 3.3 appears arbitrary and cannot support subsequent statements regarding air quality compliance. Data in Table 3.3 suggest that local air quality is not in compliance with the 24-hour and annual standards for PM_{10} and $PM_{2.5}$. Most of these noncompliant data are from the Cayce monitor located over 40 miles from the proposed MOX facility which is classified as "commercial, urban-city center." In contrast PM_{10} monitors near the SRS boundary in more rural Jackson and Barnwell locations report

PM_{10} values in compliance. Table 3.3 also lists a value of 71 micrograms per cubic meter from a rural monitor in Colleton County over 60 miles from SRS. This value was the absolute maximum for 2001, but the 98th percentile value should be used to evaluate compliance which was 27 micrograms per cubic meter for this monitor. Data for annual $PM_{2.5}$ in Table 3.3 is again from Cayce and exceeds the standard. In contrast, the Colleton monitor saw an annual average below the $PM_{2.5}$ standard.

As part of the discussion of environmental consequences in Chapter 4, Tables 4.6 and 4.8 use a more reasonable set of data for the existing 'background' air quality except for the $PM_{2.5}$ annual average. Again, the Cayce data are used to support the unwarranted conclusion (page 4-1, lines 28-31, and page 4-18, lines 30-32 of the DEIS) that 'measured values in the vicinity of SRS already exceed the annual standard.' This conclusion is repeated several times in Section 4.7.

The DEIS should be revised throughout to present conclusions regarding $PM_{2.5}$ that are based on more representative data. In addition, Tables 3.3 and Tables 4.6 and 4.8 and pages 3-22, 3-23, 4-11, 4-16 through 4-22, 4-89, and 4-90 should be revised to present consistent and more representative information where possible.

Response: The air quality data presented in Chapters 3 and 4 of the EIS are used for different purposes. Chapter 3 presents measured data chosen to establish the baseline the air quality conditions in the area around the SRS site. The data in Chapter 4 are chosen to estimate the background levels for use in modeling impacts of the proposed action. The data provided in the air quality section is not intended to demonstrate compliance with air quality standards. The air quality impacts assessment compares modeled air concentrations of air pollutants with EPA and SCDHEC standards as a measure of the magnitude of the potential impact. Under NEPA regulations, it is generally recognized that comparison with regulatory standards is not sufficient to demonstrate the absence of adverse impacts, because many criteria are considered in establishing regulations. In addition, a direct comparison of measured levels of the criteria pollutants with those specified in the standards do not necessarily constitute standards violations.

The data in Chapter 3 presents air concentrations from monitoring stations around the region. To reduce any problems associated with the choice of monitoring stations from the surrounding counties, Chapter 3 and Table 3.3 of the FEIS have been changed to use monitoring stations within 80 km (50 mi) of the proposed MOX facility site. This change eliminates the Cayce and Irmo sites from those presented in the DEIS. To provide a more comprehensive picture of air quality, both the minimum and maximum measured concentrations have been presented in Table 3.3.

As the comment noted, Table 3.3 might be interpreted as indicating that there are standard violations. As discussed above, the data provided in the air quality section is not intended to demonstrate compliance with air quality standards. The concentrations presented in Table 3.3 have been changed to be more in line with that of the corresponding standard. (For example, the 24-hr $PM_{2.5}$ maximum and minimum are now 98th percentile values.) In addition, attainment of the annual $PM_{2.5}$ standard requires a 3-year average of annual values. The $PM_{2.5}$ standard has not yet been implemented and official determination of compliance with this standard has not been made. Construction and operation of the proposed facilities would increase $PM_{2.5}$ levels by small amounts (<0.1% of the standard value).

Except for $PM_{2.5}$, all the background values used in Chapter 4, came from SCDHEC's modeling summary for the SRS. As the comment noted, the Cayce monitor is not an appropriate choice for $PM_{2.5}$ background for use in the impact analysis in Chapter 4. A closer look at the Cayce monitor showed that it is a source-oriented, special-purpose monitor and hence not appropriate for presenting a general picture of air quality or for picking a background. $PM_{2.5}$ background levels were reassessed using monitors designated by the state as background sites. New values were chosen as the maximum concentrations measured in 2001 at the two rural background sites within 80 km (50 mi) of the MOX facility site. These values are 13.6 $\mu g/m^3$ annual average and 27 $\mu g/m^3$ 24-hr 98th percentile value. Tables 4.6 and 4.8 and the associated discussion in the FEIS have been updated using these values.

J.3.15.2 Comment: 47-004

Comment: The DEIS indicates that air flow is in a northeasterly direction. However, air flow data, from air quality monitoring systems, was gathered from the northwestern section of the Savannah River Site (SRS). It was questioned whether this was appropriate because the air would not be affected by the proposed MOX facility.

Response: The SRS has an air quality monitoring system that is used to verify air effluents are acceptable. This air quality monitoring system gathers data from all around the SRS. The data referred to in the comment is used for a different purpose than air quality monitoring. The purpose of the wind data is to characterize the air flow in the vicinity of the proposed MOX facility site. For modeling purposes, air flow data from the closest available meteorological station is typically used for assessment purposes. Given the proximity of H-Area to the proposed MOX facility site and the absence of significant terrain features, data from the H-Area meteorological station is considered adequate to characterize winds at the proposed site.

J.3.15.3 Comment: 86-042

Comment: In Section 4.3.2.2, page 4-23, line 9 of the DEIS, the discussion omits NO_2. The sentence should read: ". . .increments for SO_2, PM_{10} and NO_2."

Response: The text in the FEIS has been changed as suggested.

J.3.15.4 Comments: 19-007
56-004

Comment: Concern was expressed that the weather data used in the DEIS only covers a five year period. It was felt that this short period of time would not take into account some special South Carolina background. For example, it would not take into account effects of hurricanes such as Hurricane Hugo. It was suggested that the EIS consider a more expansive data set to cover weather patterns that have occurred in the Savannah River Site area and in South Carolina.

Response: Five years of data are frequently used to provide an overall picture of wind speed and direction. EIS Figure 3.5 presents such data. Five years of data are also suggested by the U.S. Environmental Protection Agency as the basis for dispersion modeling. Thus, the data set used is deemed adequate.

The time period for presenting extreme events such as hurricanes is longer because such events occur infrequently . Section 3.4.1 of the DEIS discussed tropical storms and hurricanes using data from 1700 to 1989. This has been supplemented with data for 17 storms from 1886 to the present.

J.3.15.5 Comments: 53-009
53-012

Comment: It was questioned whether the DEIS evaluated air quality impacts using actual air emission data from existing Savannah River Site (SRS) facilities or air emissions based on permit limits for those facilities. The consolidated incinerator facility is not currently operating. When this facility is operational, air emissions will be higher than reported in the DEIS. The DEIS should include emissions from the consolidated incinerator facility.

Response: As noted in Section 4.3.2, the air quality analysis adds the incremental impacts caused by the proposed MOX facility to the impacts of other sources. The impacts of other sources were taken into account by adding a maximum impact due to SRS sources and a background concentration representing the impact of non-SRS sources. The SRS maxima (See table 4.8) assume that all permitted sources, including the Consolidated Incineration Facility, operate at their permitted levels.

J.3.15.6 Comment: 86-126

Comment: In Section F.2.2, page F-7, line 11 of the DEIS, the sentence should be revised to read: "Engine-specific emission factors were not available for criteria pollutants."

Response: Vendor factors were provided by DCS for the emergency generators. The text in the FEIS has been revised to reflect that vendor factors were used.

J.3.15.7 Comment: 107-001

Comment: The DEIS states that transuranic (TRU) and low-level radioactive wastes (LLW) will be generated during operation of the proposed facility. Exhausts from the proposed facility will be treated to remove radioactive materials before the exhaust is discharged to the atmosphere. Please provide further information in the FEIS regarding frequency and duration of air quality monitoring measures and monitoring of the facility's emissions to the atmosphere.

Response: DCS discusses air effluent monitoring in Section 10.2.1 of the Construction Authorization Request. DCS notes that airborne releases are controlled by the building and glovebox ventilation systems, process effluent offgas system, and stack high-efficiency particulate air (HEPA) filters. DCS states that two redundant continuous air monitors and two fixed airborne particulate samplers will monitor the stack effluents. In its later application for a license to possess and use special nuclear material, DCS has committed to providing (1) a description of the sampling, collection, and analysis procedures; (2) a description of the proposed action levels and actions to be taken when action levels are exceeded; and (3) a description of the recording and reporting procedures. As discussed in Chapter 10 of the draft safety evaluation report for construction, the NRC has found this acceptable for purposes of the construction authorization.

J.3.16 Hydrology

J.3.16.1 Comments: 7-004 43-001 99-003
10-018 98-007 101-003

Comment: Currently, the Savannah River Site (SRS) requires enormous amounts of surface and ground water, in the tens of billions of gallons, just to support currently established operations. The DEIS does not clearly account for how much ground and surface waters will be used additionally by the proposed MOX facility versus the proposed no-action alternatives, including immobilization. Concern was expressed about maintaining the aquifers beneath the SRS.

The DEIS states that groundwater beneath the site is listed as a Class II drinking source by the Environmental Protection Agency, meaning it has potential for existing and future drinking water needs. It later states that contamination is present beneath the entire site. This should be clarified in the DEIS.

Response: Water use for the proposed action at the SRS is discussed in Section 4.3.3. Construction of the MOX building, the Pit Disassembly and Conversion Facility (PDCF), and the Waste Solidification Building (WSB) would require 139 million L/yr (37 million gallons/yr); operation of the MOX building would require 9.1 million L/yr (2.4 million gal/yr), the PDCF would require 48 million L/yr (12.7 million gal/yr), and the WSB would require 19 million L/yr (5 million gal./yr). These volumes are much less (about 0.1% and 0.05%, respectively) of the total water use at the SRS mentioned in Table 4.2. All of this water would be obtained from wells; no surface water would be used (Sections 4.3.1.3.2 and 4.3.2.3.2).

Although the percentage of water needed for constructing and operating the proposed MOX facility is small compared to total water use at the SRS, actual impacts to the groundwater system were more conservatively evaluated for this EIS by comparing the predicted water use to total water use for the A-Area loop and the groundwater capacity for the A-Area loop wells. The evaluations made in this EIS were made using these values because groundwater for constructing and operating the MOX facility would be obtained from a combination of wells in the F Area and A-Area (i.e., the A-Area loop).

Groundwater beneath the SRS is classified as Class II waters (i.e., a current and potential source of drinking water). However, about 10% of the water beneath the site is known to be contaminated. No direct releases of contaminants to the aquifer would occur during construction or operation of the MOX facility (Section 4.3.3.2.1). No accident scenarios have been identified that would directly or indirectly release plutonium to the groundwater. Thus, no changes to groundwater quality would be expected as the result of allowing the proposed MOX facility to operate.

J.3.16.2 Comment: 27-003

Comment: Discharge information, including permitted and streamflow discharges, should be described with the same units of measure as those for stream discharge. The use of standard units of measure reduces confusion and facilitates comparison of values. For example, using the same unit of measure to describe the magnitude of the Savannah River Site (SRS) contribution to total streamflow in the two paragraphs above lines 39 and 40 on page 3-9 of the DEIS would facilitate comparison. A standard unit of measure format should be used throughout the document, such as describing discharge in millions of gallons per day (MGD), cubic feet per second (cfs), or cubic meters per day (m^3/s). Options include either following the standard unit of measure with equivalent measures in alternate units in parentheses in the text, or adding an appendix with conversion tables, comparative table, or equations to facilitate reader comparison between and among units of measure. The standard unit of measure format should be consistently applied for linear distances, area, volume, and discharges.

Response: In EIS Section 3.3.1, discharge for the National Pollutant Discharge Elimination System (NPDES) permits has been changed to the same units as those used for reporting flows in Upper Three Runs Creek. Permitted outfall F2, therefore, is 0.0048 m^3/s (0.17 cfs) and permitted outfall F5 has a flow of 0.0013 m^3/s (0.046 cfs).

J.3.16.3 Comment: 27-005

Comment: The description of aquifers in Section 3.3.2 of the DEIS should be expanded to include aquifer properties, such as lithology, horizontal and vertical transmissivity, and storage. This information would allow estimating the extent and timing of potential groundwater contamination that could travel and impact nearby rural or municipal groundwater users.

Response: For the proposed action, there would be no discharges to groundwater during construction or operation of the proposed MOX facility, Pit Disassembly and Conversion Facility, and Waste Solidification Building, and there have been no accident scenarios postulated that would release plutonium to the groundwater system. Because there would be no direct discharges to groundwater, there would be no impacts to nearby municipal or rural groundwater users. Indirect impacts to groundwater could occur during construction and operation activities. These indirect impacts would be derived from surface spills and subsequent mobilization by precipitation and infiltration of treated wastewater that would be released to nearby surface water under appropriate surface water discharge guidelines. The impacts of these releases are expected to be small, based on adherence to best management practices and prescribed surface release guidelines. Because there would be no direct impacts to groundwater, and because indirect impacts would be small, including detailed information on aquifer properties, such as lithology, horizontal and vertical transmissivity, and storage, is deemed not to be necessary for this EIS. See Comment J.3.16.6 for more information on aquifer properties and groundwater contamination.

J.3.16.4 Comment: 27-006

Comment: The description of groundwater flow in F-Area provided in Section 3.3.2 of the DEIS is incomplete. As written, the description is inadequate for estimating the likelihood of potential contamination of underlying aquifers from the surface. Groundwater flows from areas of recharge to areas of discharge; the report describes lateral flow direction and identifies discharge areas but does not mention recharge areas or recharge rates. If the F-Area is located on a groundwater divide and the top of the aquifer begins as close as 3 feet below land surface as described elsewhere in this section, it is probable that the proposed MOX facility, the Pit Disassembly and Conversion Facility (PDCF), and the Waste Solidification Building (WSB) are located in a recharge area.

Surface contamination or spills occurring in a recharge area can easily be introduced into a shallow aquifer, as indicated by the existence of contaminated groundwater from past operations in F-Area (pages 3-11 through 3-13 of the DEIS). This section should be expanded to provide information about recharge rates and location of recharge areas in F-Area.

Response: Text has been added to Section 3.3.2 that states that F-Area is in a region of groundwater recharge from precipitation. Text has also been added to state that the average recharge to the Upper Three Runs Aquifer is 35.6 cm (14 inches) per year.

Text in Section 3.3.2 has been changed to give more local analysis of the depth to groundwater at the location of the proposed MOX facility. Assuming 12.2 meters (40 ft) for excavation, the shallowest depth to groundwater would be about 11 meters (36 ft). For these conditions, surficial spills would have little possibility for adversely affecting the underlying groundwater, as discussed in Sections 4.4.3.3.2.1 and 4.3.3.2.2.

J.3.16.5 Comment: 27-007

Comment: The discussions in Section 3.3.2 of the DEIS indicate that the Upper Three Runs Creek Aquifer is divided into two zones by the Tan Clay Confining Unit of the Dry Branch Formation. The two zones and the Tan Clay Confining Unit, however, are not depicted in Figure 3.4, "Underground Aquifers at the SRS." Without this information, it is not possible to visualize and understand the groundwater-flow system that underlies the proposed MOX facility. Specifically, it is not clear how the two aquifer zones and the Tan Clay Confining Unit within the Upper Three Runs Aquifer relate to the land-surface topography (outcrop areas), the Gordon Confining Unit, the Gordon Aquifer, and the Steed Pond Aquifer. Figure 3.4 should be redrawn or modified to reflect the text.

Additionally, the discussion regarding the occurrence of a water table in the lower aquifer zone beneath the Tan Clay Confining Unit is confusing. It raises the question whether there is a water table in the upper aquifer zone. Subsection 3.3.2 should be rewritten to eliminate the vague and incomplete description of the groundwater system underlying the proposed MOX facility in F-Area.

The text appears to refer to the Upper Three Runs Creek Aquifer and the Upper Three Runs Aquifer interchangeably. This is confusing and should be clarified. If the two names refer to a single geologic unit, then only one term should be used throughout the DEIS for consistency.

Response: Figure 3.4 is a generalized diagram of the groundwater system for the entire Savannah River Site (NW to SE transect). The figure is provided for general, not specific, information. The width of the figure, as shown at the top, is 70 miles. At this scale, F-Area and the location of the proposed MOX facility are not readily distinguishable and accurately splitting the Upper Three Runs Aquifer into two zones is not possible.

The text in EIS Section 3.3.2 discusses groundwater conditions beneath the location for the proposed MOX facility. The text states that the water table occurs in the lower aquifer unit beneath the Tan Clay. This occurs because, as stated in the text, the topography drops off sharply to the deeply incised Upper Three Runs Creek to the north (approximately 36.3 meters (120 ft) of incision) where the Upper Three Runs Aquifer discharges.

All references to "Upper Three Runs Creek Aquifer" were replaced with "Upper Three Runs Aquifer" as suggested in the comment.

J.3.16.6 Comment: 27-008

Comment: Section 3.3.2, page 3-13 of the DEIS indicates that groundwater in the Upper Three Runs Aquifer beneath the proposed MOX facility is contaminated with various heavy industrial and nuclear contaminants. Moreover, recent sampling indicates that groundwater contamination is absent above the Tan Clay Confining Unit but is present in the lower aquifer zone beneath the confining unit. The discussion and analysis, as currently written, are inadequate for an assessment of the potential for additional contamination at the site relative to the contamination that already exists there, the spatial distribution of contaminated zones in the underlying aquifer, and the potential direction of groundwater movement and contribution to base flow in tributaries to the Savanna River near the F-Area.

We recommend improving the discussion to support this assessment. An adequate discussion should (1) explain why the upper aquifer zone is not contaminated, (2) identify the locations of the wells recently sampled for groundwater contamination at the MOX site, (3) identify the locations of sources that may have contaminated the lower aquifer zone, and (4) explain how the topography and surficial geology of the MOX site relates to the outcrops of the upper and lower aquifer zones.

Response: As discussed in Section 3.3.2, the direction of groundwater flow in the Upper Three Runs Aquifer is primarily to the north toward Upper Three Runs Creek, where it discharges. Contamination does not occur above the Tan Clay layer in this area because the groundwater table lies below the clay (the topography drops off sharply toward Upper Three Runs Creek as stated in the text, and the lower aquifer unit is near or outcrops at the base level of the creek). For clarity, reference to the Tan Clay confining layer was deleted.

A description of the existing groundwater contamination is also provided in Section 3.3.2. Contaminants of concern include gross alpha and beta activity, tritium, uranium, and trichloroethylene (TCE). These results are based on sampling 9 wells in the proposed location for the MOX facility. Text was added to Section 3.3.2 to state that 9 wells evenly distributed across the site were included in the sampling. Their specific locations, however, are not crucial to the argument presented.

New text was also added to state that the contaminant plume appears to originate inside the F-Area fence and is related to F-Area nuclear operations and waste management practices at the Old F-Area Seepage Basin (OFASB).

Additional details on hydrogeological properties, such as lithology, horizontal and vertical transmissivity, storage coefficient, effective porosity, and contaminant-specific distribution coefficients needed to perform independent assessments for contaminant transport are not included in this EIS because there would be no direct discharges to groundwater during construction or operation of the proposed MOX facility and there have been no accident scenarios postulated that would release plutonium to the groundwater system. Indirect releases to groundwater derived from surface spills and subsequent mobilization by precipitation could occur during construction and operation of the MOX facility. The impacts of these spills are expected to be small based on adherence to best management practices.

J.3.16.7 Comment: 27-010

Comment: Without further information in Section 4.3 about groundwater recharge and flow paths, there is insufficient information to determine whether all or any contaminants in a hypothetical spill would be captured by base flow contributed to the Upper Three Runs Creek, or whether some could pass in groundwater that flows under the creek and continues downgradient. The DEIS should provide sufficient information to distinguish between these possibilities. The DEIS should also provide information on the ultimate fate of a hypothetical spill that is wholly or partly intercepted by the creek. We suggest that the DEIS provide information on processes that affect the transport and fate of these potential contaminants in the environment, for example, some forms of plutonium would be likely to sorb onto clay particles in subsurface materials or streambed sediments rather than travel with the water.

Response: The average recharge rate from precipitation for the Upper Three Runs Aquifer in the vicinity of the proposed MOX facility is 35.6 cm (14 inches) per year (WSRC 1997). This information was added to Section 3.3.2.

As discussed in Section 3.3.2, groundwater in the vicinity of the proposed MOX facility flows to the north toward the deeply incised Upper Three Runs Creek, where it discharges. On the basis of site topography, it is unlikely that water would underpass the Upper Three Runs Creek to any great extent because groundwater north of the creek is expected to flow to the south and discharge to the creek. Because the possibility of underpass is very unlikely, no additional text is required.

Because no accidents have been identified that would release plutonium to the groundwater and no direct or indirect releases of plutonium are planned, no additional discussion on its fate and transport following discharge to surface water is required.

Other surficial spills (e.g., oil) would have very little adverse impact on groundwater and even less impact on surface water following mixing and dilution and adherence to good engineering practices that would limit its initial mobilization and transport. Because the concentrations in groundwater derived from a typical industrial surficial spill would be very small and highly localized, there is no need to discuss the fate and transport of such material in tertiary receiving waters.

J.3.16.8 Comment: 43-005

Comment: The groundwater geology in this area is susceptible to variable conditions that are site-specific and cannot be accurately predicted. The consequences for those factors need to be taken into account in evaluating risk.

Response: Groundwater hydrology for the SRS and the F-Area are described in Section 3.3.2. Although groundwater hydraulic parameters are variable at the Savannah River Site and in the vicinity of F-Area, impacts of construction and operation on groundwater can be predicted with sufficient accuracy to ensure human and environmental safety (Sections 4.3.3.2.1 and 4.3.3.2.2) because there would be no direct releases to the groundwater. For such a situation, there would be no direct impacts. Indirect impacts to groundwater quality could also occur due to surficial spills. While precise pathlines and concentrations are difficult to predict accurately, their impacts are expected to be small based on adherence to best management practices that would limit the quantity of contaminants reaching the groundwater system.

J.3.16.9 Comment: 86-027

Comment: The MOX ER Rev 2 discusses more recent subsurface analyses presented in WSRC 2002, *Work Task Authorization 06: Summary of Groundwater Quality of the Mixed Oxide Fuel Fabrication Facility Site*. A copy of this document was provided to the NRC with the references for the MOX ER Revision I & 2. The DEIS does not appear to account for this information. It is suggested that the last two sentences on page 3-12, lines 36-40 of the DEIS be deleted, and "Contaminated groundwater also exists beneath the Old F-Area Seepage Basin (OFASB)" be inserted at the beginning of the next paragraph.

Response: The text in Section 3.3.2 was changed to state that the source of groundwater contamination is from various heavy industrial and nuclear operations over the past 50 years in the F-Area. The contaminants plume appears to originate inside F Area and extend beneath the proposed MOX facility site with movement in a fan-like direction of groundwater flow under the proposed MOX facility site. Text was also added to state that contaminated groundwater also exists beneath the Old F-Area Seepage Basin.

J.3.16.10 Comment: 86-028

Comment: It is suggested that the text on page 3-12, lines 40-45 of the DEIS be changed to read: "The OFASB is located about 180 m (600 ft) north of F-Area, immediately adjacent to the western boundary of the MOX site. The OFASB has been remediated by filling the basin with clean soil, capping, and stabilizing the contaminated soil within the basin with grout (WSRC 1997a). Groundwater contaminants of concern at the OFASB include iodine-129, nitrate, strontium-90, tritium, and total uranium. Contaminants of interest include lead, radium-226, and radium-228. A small component of the contaminant plume from OFASB flows beneath the westernmost corner of the proposed MOX site. Groundwater is monitored on a regular basis with 15 wells. Contaminant fate and transport models predict that the aquifer is expected to return to an uncontaminated state (i.e., a condition in which no maximum contaminant levels are exceeded) within 2 to 115 years, depending on the specific contaminant."

Response: The text in Section 3.3.2 was revised as suggested in the comment.

J.3.16.11 Comment: 86-029

Comment: It is suggested that the first sentence on page 3-13, lines 1-5 of the DEIS be deleted. Change the next sentence to read: "The results of recent sampling in the compliance wells for the OFASB indicated that concentrations of several target constituents were above drinking water standards in several wells."

Response: The text in Section 3.3.2 was revised as suggested in the comment.

J.3.16.12 Comment: 86-030

Comment: It is suggested that the paragraph on page 3-13, lines 6-8 of the DEIS be appended with the following text: "There is, however, some uncertainty about whether these exceedances are related entirely to OFASB, to upgradient F-Area facilities, or to both."

Append to this paragraph the following text: "There is, however, some uncertainty about whether these exceedances are related entirely to OFASB, to upgradient F-Area facilities, or to both."

Insert a new paragraph: "The results of recent groundwater sampling at the proposed MOX facility site indicate that shallow groundwater (i.e., groundwater in the Upper Three Runs Aquifer) is contaminated. Gross alpha and beta activity, tritium, uranium, and trichloroethylene exceeded maximum contaminant levels for drinking water. Contamination is present beneath the entire MOX site, but is greatest beneath the western edge of the site. The contaminant plume appears to originate inside the F-Area fence and was and is related to F-Area nuclear operations and waste management practices at OFASB."

Make the following text the final paragraph of this section: "Groundwater in the Upper Three Runs Aquifer beneath the MOX site is contaminated with various heavy industrial and nuclear contaminants. The proposed construction activities will take place at least 9 m. (30 ft.) above the zone of contaminated groundwater."

Response: The text in Section 3.3.2 was changed as suggested in the comment.

J.3.16.13 Comment: 93-012

Comment: Page 4-18 of the DEIS states that water would be used to limit the amount of fugitive dust.. This water will however interact with any radionuclides or other contamination in the soil and contribute to the already acknowledged plume of contamination under the site (page 4-7). No characterization of this plume is provided. How will it be possible to determine in the future whether the proposed MOX facility has contributed to this problem unless the current analysis includes a detailed characterization of what is currently in the soil, in the vadose zone, in the groundwater, in the plume, and the direction and speed of this plume's movement.

Response: The newly added discussion on soil quality (Section 3.2.3) indicates that metal and radionuclide concentrations for near surface soils are well below the limits required by applicable regulations. Adding water to limit fugitive dust during construction would therefore have a small impact on groundwater resources.

As discussed in Section 3.3.2, a plume of contamination exists beneath the proposed location of the proposed MOX facility. This plume is moving north toward Upper Three Runs Creek where it discharges to surface water. Contaminants within the plume include iodine-129, nitrate, radium-226, radium-228, strontium-90, tritium, uranium (total), and lead.

Groundwater velocities in the Upper Three Runs Aquifer are on the order of several hundred feet per year. Due to sorption along the flow paths, however, contaminant velocities could be substantially less, depending on the degree to which they are sorbed to the surrounding material (contaminant-specific distribution coefficients). Because the proposed MOX facility would not discharge any contaminants directly into the Upper Three Runs Aquifer, it was determined that providing additional details on contaminant-specific velocities in the Upper Three Runs Aquifer was not required.

Surface spills could still lead to groundwater contamination. However, it is expected that the impacts of such spills would be small, based on adherence to best management practices.

J.3.16.14 Comment: 43-001

Comment: Concern was expressed about the quantity of surface and groundwater being used by the Savannah River Site (SRS). DEIS page 4-6 shows the annual usage and wastewater discharge for the sites of continued plutonium storage. The reported values for the SRS are 127,000 million liters from surface water and 13,247 million liters from groundwater. The discharge of liquid effluents is 700,000 million liters.

Response: As shown in Table 4.2, annual water use and wastewater discharges for the SRS is 140,247 million L/yr and 700 million L/yr, respectively. This table lists the total quantity of water used by the seven sites (Hanford, INEEL, Pantex, SRS, LLNL, LANL, and RFETS) at which continued plutonium storage is possible. Because the volumes of water are total quantities, they represent use from all ongoing activities at the sites. In all cases, the amount of water required exceeds the volume of water discharged. This difference occurs because water can be consumptively used by operations at the various sites that consume water, not just activities associated with continued storage of surplus plutonium. Because the water volumes listed in Table 4.2 are totals for all operations, they do not represent projected water use for constructing or operating the proposed MOX facility.

J.3.16.15 Comment: 86-099

Comment: The South Carolina Department of Health and Environmental Control (SCDHEC) informed DCS that a 401 Water Quality Certification is only required if a 404 Permit is issued by the Corps of Engineers. SCDHEC does not anticipate any requirement for a 401 Water Quality Certification for the proposed MOX facility.

Response: The text in the Protection of Water Resources section of Table 6.1 in the FEIS has been revised to indicate that the SCDHEC has notified DCS that a State Water Quality Certification in accordance with SC regulation R.61-101 is not required.

J.3.17 Waste Management

J.3.17.1 Comment: 86-045

Comment: The unit used in the DEIS on page 4-27, line 6 should be as follows: 47,000 yd^3 per year (9.5 million gallons per year or 36,000 m^3 per year).

Response: The values in question have been corrected. The value should have been 47,000 yd^3/year as noted. This waste volume is converted to 36 million L/yr (9.5 million gal/yr) for consistency.

J.3.17.2 Comment: 86-048

Comment: The footnotes for Table 4.10 (h) and Table 4.11 (i) should be deleted. Nonhazardous liquid waste (sanitary sewage) is not stored and is released to site streams after treatment.

Response: The footnotes have been deleted.

J.3.17.3 Comments: 67-001 108-001
92-005 115-004
93-016

Comment: The DEIS analysis of the large volume of liquid radioactive wastes to be generated in the MOX program is incomplete. There are already millions of gallons of radioactive nuclear waste stored in this country. Liquid radioactive waste is highly corrosive, and there have been problems with such wastes degrading their containment vessels. The estimates of impacts for the liquid radioactive waste are baseless and therefore not verifiable. The assumption that simply transferring this waste to the Savannah River Site (SRS) and the Department of Energy (DOE) is an end-point when it comes to environmental impacts is specious. For example, stating that the low-level wastes associated with the proposed MOX facility is some percentage of the low-level waste at the SRS implies that the proposed MOX facility is cleaning up the SRS. Any incremental increase to the radioactive burden on the banks of the Savannah River is an unacceptable impact for the future generations. The DEIS should state how much liquid waste is anticipated, how long it will be necessary to store this waste, and what the long-term costs will be for storing this waste.

Response: The discussions of the waste generation and further waste management have been revised to more clearly show which processes are generating what types of wastes, how those wastes will be treated, if necessary, and how those wastes will be disposed of. Specific references have been added to show the source of the values used in the waste management analysis. Text has also been added to discuss the human and environmental impacts from waste management activities.

The highly radioactive slurry (or liquid high alpha waste) that would be produced would be transferred to a proposed facility (i.e., the Waste Storage Building [(WSB]) for further processing. This facility would be newly constructed with containment vessels designed for the types of wastes planned to be generated by the proposed MOX facility and Pit Disassembly and Conversion Facility (PDCF). The liquid waste would not go to the high level waste tanks that have experienced corrosion problems noted in the comment. The processing of the liquid high alpha waste would generate solid transuranic (TRU) waste and solid low level radioactive waste (LLW) as its final waste forms. The TRU waste from the proposed MOX facility would be handled at the SRS like other TRU waste generated from other SRS activities. That is, the TRU waste would be packaged for disposal at the Waste Isolation Pilot Plant (WIPP) consistent with the national policy for this particular type of TRU waste in this country. Solid LLW is disposed of on-site [see revisions to the environmental report] at the E-area waste vaults or off-site at an approved facility. Liquid LLW would be treated and discharged to Upper Three Runs per permit. Environmental impacts associated with existing waste management activities are presented in the *Final Waste Management Programmatic Environmental Impact Statement for Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Waste* (DOE 1997a). Because the waste generated from the proposed action would be managed by the SRS within its existing facility capacities, the impacts from DOE 1997a are considered acceptable and are considered to include and bound the impacts for managing wastes from the proposed action. Therefore, comparing the capacities is considered a reasonable assessment method for assessing the waste management impacts of the proposed action. The cost for implementing the waste management activities has been included in the budget planned for managing the surplus plutonium.

J.3.17.4	Comments:	10-003	44-003	71-014	96-007
		10-017	66-007	79-002	96-016
		24-006	71-006	90-003	

Comment: Concern was expressed regarding the production of additional radioactive waste at the Savannah River Site (SRS). The SRS is already plagued by enormous quantities of dangerous waste and previous contamination. Waste impacts associated with the proposed action were considered to only make the existing problems worse. The proposed MOX facility will produce waste for which there is no satisfactory solution. Concerns were expressed that transuranic (TRU) waste shipped to the SRS from other Department of Energy sites would delay the treatment of waste generated from the proposed MOX facility. The DEIS should include funds to address waste management.

Response: Existing waste management activities at the SRS are discussed in Section 3.9. Human health risks associated with existing waste management activities are included in the baseline human health risk discussed in Section 3.10. Environmental impacts associated with existing waste management activities are presented in the *Final Waste Management Programmatic Environmental Impact Statement for Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Waste* (DOE 1997a).

Waste generated from the proposed action is evaluated in the FEIS in terms of how it is going to be managed or handled (see Section 4.3.4), and what the impacts might be from transporting them to other locations for disposal (see Section 4.4.1). The cumulative impacts associated with waste management activities are presented in Table 4.26 of the FEIS (DEIS Table 4.25). These evaluations indicate that the SRS has the resources and capacity for handling the additional waste. As discussed in Section 4.3.4 of the EIS and summarized in Table 2.1, the wastes generated by the proposed action are estimated to have a small to moderate impact on the waste management systems of SRS and WIPP.

The human health impacts from wastes are evaluated in terms of whether human exposure to the waste products would occur. Data provided for the proposed facilities indicate that no liquid discharges of waste would occur directly from the proposed MOX facility and the PDCF. Liquid discharges from the WSB would follow the NPDES permit guidelines. Data also indicate that air emissions impacts would be small . The waste streams generated would be disposed of at facilities designed and operated in accordance with Department of Energy (DOE) orders. Thus, disposal of these wastes is assumed to minimize human exposures to the wastes and have small impacts or no impacts on human health.

The DOE has budgeted for the surplus plutonium disposition mission including managing wastes from that mission. The cost of the proposed action discussed in Section 4.6 of the EIS includes costs for waste management activities.

J.3.17.5 Comments: 10-017 61-005
53-007 66-007

Comment: The clarity of the information in the waste management analysis was questioned. The DEIS does not adequately describe and track the various waste streams. A flow diagram would add to the clarity. The units in DEIS are not consistent. The liquid radioactive waste stream should be reported in liters and gallons. The human health effects associated with waste management activities are not addressed in the DEIS.

Response: The discussions of the waste generation and further waste management have been revised to more clearly show which processes are generating what types of wastes, how those wastes will be treated, if necessary, and how those wastes will be disposed. Specific references have been added to show the source of the values used in the waste management analysis. Text has also been added to discuss the human and environmental impacts from waste management activities. As suggested, Figure 4.1 has been added to the FEIS to help in the understanding of the process as to when and what types of wastes are generated and the ultimate disposition of these wastes. The FEIS has been revised to report liquid radioactive waste volumes in gallons and liters. The DEIS presented these volume in cubic meters for ease of comparison between various waste.

J.3.17.6 Comments: 13-006 103-003
97-016 112-003

Comment: The DEIS evaluates a proposal by DCS for the Department of Energy (DOE) to build a special waste building to handle the significant volume of highly radioactive liquid MOX wastes. The DOE has not yet generated any records or budget requests indicating acceptance of the MOX waste plan. The DEIS does not provide assurance that this can and will occur in a reasonable manner due to available and planned capacity, utilization, obligations, priorities, and acceptance criteria. The DEIS must discuss the environmental risks and consequences of DOE failure to implement MOX waste management. The DEIS should produce verifiable projections of waste volumes as well as discuss the environmental risks and consequences of DOE failure to implement MOX waste management.

Response: The DOE has included the construction and operation of the Waste Storage Building (WSB) into their planning for the proposed fabrication of the MOX fuel. The WSB is planned to be constructed and operated by the DOE to process the liquid high alpha waste from the proposed MOX facility. Because the WSB is required to be operational at the same time as the proposed MOX facility in order for the proposed MOX facility to operate, it is not reasonable to evaluate an alternative where this is not the case. See response to comment J.3.17.4 for additional information.

J.3.17.7 Comment: 116-016

Comment: The DEIS should clearly state how the high alpha waste will be treated and whether it would be classified as high-level waste, low-level waste, or mixed waste.

Response: The proposed plan for handling the liquid high alpha waste calls for transferring this waste stream from the proposed MOX facility to the Waste Solidification Building for further processing via a double-walled pipeline. The processing of the liquid high alpha waste would generate solid transuranic waste and low-level waste.

J.3.17.8 Comments: 86-019 86-050
86-047 86-073

Comment: The Savannah River Site (SRS) treatment capacity for nonhazardous liquid waste reported in Tables 4.10, Table 4.11, Section 2.4, and Section 4.3.4.2 of the DEIS is incorrect. The 35% value of the capacity of the Central Sanitary Waste Treatment Facility (CSWTF) was apparently calculated using values in Table 4.11. This is incorrect because treatment of waste from the proposed MOX facility, the Pit Disassembly and Conversion Facility, and the Waste Solidification Building requires much less that 35% of capacity. The correct value is closer to 10% (about half of the nonhazardous liquid waste from these facilities consists of non-process utility waters that will be released directly to permitted National Pollutant Discharge Elimination System (NPDES) outfalls).

The treatment capacity of the CSWTF is provided in the MOX ER on page 4-43 (1.1 M gals/day) or Table 5-6 (273M gal/yr). The permitted capacity is 1.05M gal/dy. The SPD EIS

(Table 3-41) reports CSWTF capacity as 1.45 Mm^3/yr (383 Mgal./yr). It is recommended that 273 Mgal/yr value be used in the DEIS.

Response: The treatment capacity of the CSWTF has been changed to 273 Mgal/yr as suggested by the comment. The percentage in question has been recalculated based on the revised capacities of the CSWTF (from 73Mgal/yr to 273Mgal/yr). The value is now approximately 6%. The MOX ER does not provide a breakdown as to how much of the projected liquid nonhazardous waste is sanitary wastewater as opposed to process wastewater; and therefore, as a conservative approach the evaluation of impact assumed all of the projected volume to go to the CSWTF and calculations were performed accordingly.

J.3.17.9 Comment: 87-002

Comment: The DEIS discusses a number of the liquid waste streams to be dealt with including chloride, americium, and uranium. However, the DEIS does not mention other impurities that exist in some of the plutonium oxide stocks. The DEIS should address how these wastes will be handled.

Response: The impurities mentioned in the comment are present in very low concentrations in the plutonium feedstock. The impurities would be removed as part of the MOX plutonium polishing process and would become part of the liquid high alpha waste stream. The processing of the liquid high alpha waste would generate solid TRU waste and solid low level radioactive waste (LLW) as its final waste forms. These impurities would not affect the classification of these final waste forms or the capability to properly dispose of these waste forms.

J.3.17.10 Comment: 86-009

Comment: In EIS Section 2.2.4.1, page 2-14, the DEIS states that most of the solid waste generated in the Waste Solidification Building (WSB) would be mixed with concrete and poured into approved containers. This is an incorrect statement. The processed liquid wastes will be mixed in the WSB with concrete and poured into containers to produce solid waste. The solid waste will not be mixed with concrete.

Response: The text in Section 2.2.4.1 has been revised as suggested to state that the processed liquid waste will be mixed in the WSB with concrete and poured into containers to produce solid waste.

J.3.17.11 Comment: 114-005

Comment: Hazardous and radioactive wastes are permitted to be burned in the H-Area Consolidated Incinerator Facility (CIF) (Unit ID # H-010). Although South Carolina Department of Health Environmental Control (SCDHEC) has stated that the CIF is not currently in operation, it recently granted DOE-Westinghouse Savannah River Company a new permit to operate the waste incinerator. The DEIS states that some waste will be sent to other facilities at the Savannah River Site (SRS). The CIF is required to comply with 40 CFR 61 Subpart H, "National Emission Standards of Radionuclides Other Than Radon From Department of Energy Facilities." Although radionuclide emission rates from the stacks of the CIF and other sources are measured, the millirem standard for maximum allowable dosage to the public is an ambient standard, not an emission limit. Without ambient measurements, neither DOE nor Westinghouse Savannah River Company can assure that emissions of radionuclides are below 10 millirem per year to any member of the public. Likewise, the DEIS fails to cite any direct ambient measurement as a basis for estimates of radioactive dose to the public.

Response: There are two separate issues: (1) radiation exposure; and (2) the ambient levels of criteria pollutants. In Section 4.3.1.1.2 of the EIS, the exposure of the public maximally exposed individual (MEI) at the Savannah River Site boundary to emissions of radionuclides from the proposed facilities was estimated to be 0.0040 mrem/yr. This exposure is less than 0.1% of the standard under Subpart H. The levels of criteria pollutants have been reanalyzed and updated as discussed in response to Comment J.3.15.1.

J.3.17.12 Comment: 97-014

Comment: The DEIS appears to use single tank or container quantities for a large number of analyses. This does not seem reasonably prudent and conservative given that the facility is still being designed and common mode failures cannot be discounted (e.g., multiple tanks failed by the same event or leaks via common piping and valves). It is recommended that larger inventories (up to and including the site inventory, as necessary) be used for releases of chemicals from fluids.

Response: The assumption that the contents of one container would be released is generally conservative enough to bound potential accident impacts, because in general the estimated spill volume (given in Table E-1) was about the same as the anticipated on-site inventory (given in Table 3-2 of the June 2003 version of the DCS Environmental Report); that is, for most process chemicals, there would only be one storage container at the facility at a given time. The accident analyses also include other conservative assumptions, such as that the releases would occur outdoors. Very stable meteorological conditions, leading to high air concentrations, are also analyzed.

One chemical which will have many containers present on the site is depleted uranium oxide. Many drums of depleted uranium dioxide (UO_2) will be in warehouse storage. The accident assessment for uranium dioxide conservatively assumed partial release of material from 200 drums during a fire.

J.3.17.13 Comment: 86-043

Comment: The DEIS incorrectly describes the treatment of nonhazardous wastewater. Nonhazardous wastewaters, except for traditional sanitary wastewater, will either be sent to an appropriate permitted treatment facility at the Savannah River Site, or, in the case of runoff and uncontaminated heating, ventilation, and air conditioning (HVAC) condensate, be discharged directly to a permitted National Pollutant Discharge Elimination System (NPDES) outfall. Sanitary wastewater will be sent to the Westinghouse Savannah River Company (WSRC) Central Sanitary Waste Treatment Facility.

Response: The text in Section 4.3.3.1.2 and Section 5.2.2 was changed to more accurately describe the treatment of nonhazardous wastewater.

J.3.18 Deactivation and Decommissioning

J.3.18.1 Comment: 86-062

Comment: Because the impacts of decommissioning the proposed MOX facility were included in the MOX Environmental Report, Rev. 1 & 2, and responses to two request for additional information (RAI) questions (July 12, 2001), it is suggested to delete the phrase "Although impacts of decommissioning the facilities were not included in the ER (DCS 2002a)..." on line 1-3, page 4-48 of the DEIS.

Response: The text in Section 4.3.6.1 of the FEIS referring to the ER has been revised to indicate that since the scoping process identified decommissioning as a significant issue, the potential impacts of decommissioning the facilities is presented in the EIS.

J.3.18.2 Comments: 7-002
89-012

Comment: It was questioned what would happen when the proposed MOX facility was useless or not functional and how damage would be compensated. The DEIS should be revised to indicate that the proposed MOX facility will not be decommissioned under its Nuclear Regulatory Commission (NRC) license. Further, any analyses or discussions relative to decommissioning, such as license termination and regulatory requirements, should be revised as necessary to reflect the appropriate end state for the operating license.

Response: It is true that final disposition of the facility will be within the purview of the Department of Energy (DOE), and the end state of the facility would not be determined until the end of the operational period. However, for the sake of this impact analysis, decommissioning for ultimate release for unrestricted use is assumed. This assumption is made to bound potential impacts arising from the possible end uses of the facilities. For the purpose of analysis, the appropriate NRC license termination and regulatory requirements are assumed to apply. Furthermore, NRC regulations require NRC licensed facilities to be decommissioned. To date, the applicant has not requested nor been granted an exemption from this regulation.

J.3.18.3 Comment: 86-064

Comment: Although DCS is the licensee, the current contract calls for deactivation of the facility and return to Department of Energy (DOE) for decommissioning or reuse. It is improper to include the costs associated with borrowing funds to finance the project since DOE is a government agency.

Response: Section 4.3.6.3.2 of the FEIS has been changed to reflect the information provided in the comment.

J.3.18.4 Comment: 86-063

Comment: There appears to be an inconsistency in the decommissioning waste section and the costs section. Although the section on waste management indicates that the quantities and classification of waste types cannot be determined at this time, the costs are, nevertheless, based on "...the volumes and types of waste generated during the decommissioning of those buildings... ."

Response: Although there is considerable uncertainty surrounding the waste types and volumes that would be found in a MOX facility at the end of operations, the analysis was able to estimate the direct decommissioning costs based on the costs of dealing with broadly similar facilities in Colorado. These estimates are not based on projections of waste types and volumes in a proposed MOX facility as is suggested in the comment.

J.3.19 Environmental Justice

J.3.19.1 Comment: 94-002

Comment: The Nuclear Regulatory Commission's (NRC's) evaluation of environmental impacts in licensing actions is not consistent with the terms of Executive Order 12898. By letter dated February 10, 2003, the Commission stated that it intended to reconsider its policy concerning the application of Executive Order 12898.

Response: The NRC has published its "Final Policy Statement on the Treatment of Environmental Justice Matters in NRC Regulatory and Licensing Actions" on August 4, 2004 (69 FR 52040). The analysis in the EIS is consistent with the NRC's Final Policy Statement and is based on NRC's current guidance.

J.3.19.2 Comment: 22-002

Comment: It was questioned about whether the Nuclear Regulatory Commission did an environmental justice analysis of the area of "ethnic low-income groups" around Lake Norman.

Response: The analysis of environmental justice impacts of the use of MOX fuel in commercial reactors is beyond the scope of the EIS, which analyzes the construction and operation of the proposed MOX facility.

J.3.19.3 Comments:

28-001	64-007	79-003	88-003
28-002	70-001	81-001	93-017
39-004	78-003	82-004	96-011

Comment: It was stated that environmental justice impacts should be included in the EIS. The entire environmental justice section needs to be reviewed again, due in part to NRC-acknowledged incorrect accident consequences. Concern was expressed regarding potential impacts to environmental justice communities, which were viewed as unacceptably high. It was suggested that the license should be denied based on the results of the environmental justice analysis.

Response: A discussion of the potential environmental justice impacts is provided in Section 4.3.7 of the EIS. Estimates of latent cancer fatalities in the population as a whole in the event of an accident have been revised since the DEIS was published (see Section J.2.2.1). Accordingly, the analysis of potential accidents and their impact on low-income and minority populations has also been revised in the FEIS. With respect to low-income and minority populations around the SRS, the impacts from an accident at the proposed MOX facility are not considered to be high and adverse. The impact analysis for potential accidents at the Pit Disassembly and Conversion Facility and the Waste Solidification Building indicate the potential for high and adverse impacts.

J.3.19.4 Comments:

9-001	35-002	35-006	93-017	96-026
9-002	35-003	64-007	96-013	96-034
9-003	35-004	80-002	96-014	96-038
9-005	35-005	84-002	96-015	

Comment: Concern was expressed regarding the appropriateness of proposed mitigation measures associated with potential environmental justice impacts. It was stated that the environmental justice mitigation measures were not adequate and should be stronger and more detailed. Mitigation should be to provide compensation or incentives to environmental justice communities. It was suggested that a health care center be built so that people who suspect that they are adversely affected can receive medical treatment. It was felt that the applicant should be made to meet and work with the environmental justice community. It was stated that some in the environmental justice community lack understanding of the proposed action. These communities should be educated and should be involved in developing any environmental justice mitigation actions.

Response: As discussed in Sections J.2.2.1 and J.2.2.2, the accident results have been revised based on errors found in the DEIS and resolution of issues identified during NRC's safety review. As such, the environmental justice section has been revised to reflect these changes. For environmental justice impacts from the proposed action, the FEIS concludes that although low-income and minority populations may, depending on wind direction, be disproportionately impacted, that those impacts are not considered to be high or adverse for the proposed MOX facility. The impact analysis for potential accidents at the Pit Disassembly and Conversion Facility and the Waste Solidification Building indicates the potential for high and adverse impacts. Mitigation measures have been suggested to reduce these potential impacts.

In the event of an accident, general emergency response measures would occur at the Savannah River Site to protect the surrounding public. These are outlined in the response to Comment J.3.19.10.

J.3.19.5 Comments: 86-004 86-089
86-065 89-009
86-088

Comment: The accidents impacts presented in the DEIS that could cause a potential environmental justice impact are prevented by design safety systems; and therefore, should not be considered in the EIS. In addition, although these accidents may have significant consequences, the likelihood of such accidents are at very low frequencies, and hence they have minimal risk. The projection of an environmental justice impact and inclusion of these mitigative action requirements are inappropriate and inconsistent with the goal of the National Environmental Policy Act to provide the public with meaningful environmental analyses, and should be removed from the DEIS.

The DEIS provides no justification why DCS should provide local agencies or groups representing environmental justice groups with "public information " on existing soil or groundwater contamination monitoring, or the nature, extent, or likelihood of surface releases. Providing such information is not mitigation action related to the proposed MOX facility, which has yet to be constructed. Similarly, the DEIS does not provide a justification why DCS should take the unprecedented initiative to create a spatial database for use by local authorities. In the event of any incident at the Savannah River Site, the authorities would alert all potentially affected communities, not just minority communities. For the Nuclear Regulatory Commission (NRC) to proscribe mitigative actions is beyond the statutory authority of NRC.

Although the DEIS states that the guidance in NUREG-1748 was followed, the DEIS, by using a 50-mile radius for environmental justice impacts does not follow the guidance of NUREG-1748, which proscribes a radius of 4 miles. Additionally the DEIS is directly contrary to specific guidance provided by NRC to DCS in the 11 Dec. 2000 letter from M. Galloway to R. Ihde. This guidance was that the 50-mile radius in NUREG-1718 was incorrect and DCS should follow the Office of Nuclear Material Safety and Safeguards (NMSS) Policy and Procedures letter proscribing a 4-mile radius. The DEIS should conform to NRC guidance and only analyze environmental justice impacts within a 4-mile radius of the proposed MOX Facility. If the FEIS will contain a larger area for environmental justice analyses in an effort to be overly conservative, the DEIS should acknowledge this, but not tie environmental justice mitigation to overly conservative analyses.

Response: Comments regarding accidents and the bases of the accident analysis are provided in Section J.3.14. In summary, the EIS attempted to provide a comprehensive, bounding analysis for all potential events up to and including design basis accidents. The EIS provides a conservative estimate of accident impacts and an independent review of previous accident analyses performed for the proposed MOX facility, the Pit Disassembly and Conversion Facility, and the Waste Solidification Building. The accident impacts presented in this EIS are conservative in nature, but not unreasonably.

The DEIS concluded that there was not an environmental justice concern for construction and operation of the proposed MOX facility. The DEIS further stated that there was a potential environmental justice concern, if an accident producing significant contamination occurred. The environmental justice section (Section 4.3.7.3) states that the risk to any population, including low-income and minority communities, is considered to be low. NRC proposed mitigation measures to reduce the potential impacts to low-income and minority communities. The mitigation measures proposed in the DEIS were based on the accident results published in the DEIS.

As discussed in Section J.2.2.1 and J.2.2, the accident results have been revised based on errors found in the DEIS and resolution of issues identified during NRC's safety review. As such, the environmental justice section has been revised to reflect these changes. Under 40 CFR 1500.2 (f), federal agencies shall to the fullest extent possible use all practical measures to avoid or minimize any possible adverse effects of their actions on the quality of the human environment. Mitigation measures were proposed in the DEIS consistent with the level of potential impact.

Although NRC guidance provides for the analysis of environmental justice impacts within a 4-mile radius of nuclear materials facilities, the guidance does allow for consideration of larger areas, as deemed appropriate. As discussed in the response to Comment J.3.6.1, the geographic area, over which impacts are assessed, varies depending on the type of resource. For human health risk, a radius of 50 miles was selected as appropriate to consider health impacts from the proposed MOX facility. Given these considerations, and the concern over environmental justice issues at the scoping meetings, it was decided to take a conservative approach to measuring the potential impacts of an accident on low income and minority populations by using a 80 km (50 mile) radius.

J.3.19.6 Comments: 31-001 64-005
35-006 96-002

Comment: Concern was expressed regarding the level of detail in the environmental justice analysis. It was stated that the environmental justice analysis is inadequate and needed additional details and explanation. It was requested that the EIS provide a table showing where low-income and minority people would die at the census block level. It was stated that this would add to the transparency of the document.

The data contained in the DEIS does not support the conclusion that there is an environmental justice concern. An independent analysis was provided by a commenter using a probabilistic approach and wind direction and probability (Figure 3.5), population by sector (Table E.8), and areas with disproportionate minority or low income population concentrations (Figures 4.1 and 4.2). For each sector, the number of low income and minority people were compared with the total the number of people. The commenter's analysis concluded that, if offsite health impacts result from windborne contamination, then there is no disproportionate impact on low income and minority populations.

Response: The environmental justice analysis was performed in accordance with Nuclear Regulatory Commission (NRC) guidelines (NUREG-1748). The analysis method is multi-step and consists of first determining if a site has a potential environmental justice concern based on demographics of low-income and minority populations. Next, the determination is made whether the impacts disproportionately impact low-income or minority populations. In cases where the environmental justice population is located next to the site, the impacts or potential for impacts will likely be disproportionate. In other cases, specific behavior of environmental justice populations, such as a greater portion of their diet consisting of crops grown at home, may result in a disproportionate impact. Finally, if it is determined that there is a disproportionate impact, the determination is made whether the impact to low-income or minority populations is "high and adverse." Additional text has been added to Section 4.3.6 to clarify the analysis method.

Sufficient data is provided in Figures 4.1 and 4.2 of the FEIS to establish the general distribution of the minority and low income population within a 50-mile radius of the proposed facility. Specific information on health impacts on minority or low income populations within any given block group cannot be provided as the actual distribution of population within the block group is not taken into account in the analysis. Entire block groups are simply classified according to the relevant minority and low income population concentration thresholds.

The analysis provided by the commenter is not consistent with NRC methodology. Disproportionate impacts are based on whether impacts are greater for environmental justice populations or if they experience impacts that non-environmental justice populations do not experience. Disproportionate impacts do not simply rely on the proportion of the total population that is potentially minority or low income in the area covered by the plume as a whole, as the commenter suggests.

J.3.19.7 Comments: 72-007
115-003

Comment: Concern was expressed that the environmental justice analysis shows that existing and past activities at the Savannah River Site (SRS) have impacted low income and minority communities surrounding the site.

Response: The DEIS concluded that there would not be an environmental justice concern for construction and normal operations of the proposed action. The DEIS further stated that there was a potential environmental justice concern, if an accident producing significant contamination occurred. The analysis does not imply that existing operations at SRS have caused environmental justice impacts. As discussed in Section 3.10, the human health risks for the surrounding community for existing SRS activities is very low. One could conclude that the impacts of existing SRS activities do not pose a high adverse impact; and therefore, there have been no environmental justice impacts from existing activities.

J.3.19.8 Comment: 72-010

Comment: The evaluation in environmental justice does not consider the long-term impacts of the waste from the proposed MOX facility. Although the NRC does not regulate waste management activities at the Savannah River Site (SRS), the impact from these activities will impact of these very same environmental justice communities.

Response: At the end of operations at the MOX facility, all wastes produced by the proposed facility would become the responsibility of the Department of Energy and would be managed in accordance with guidelines and procedures for all other waste materials at the SRS. EISs already completed by the DOE indicate that there are no significant human health impacts of waste management operations. Therefore, no environmental justice impacts would be associated with the management of the proposed MOX facility wastes produced during the operating period or decommissioning period. Text has been added to Section 4.3.7.3 of the FEIS to clarify this issue.

J.3.19.9 Comments: 10-015
82-002
84-002

Comment: There seem to be numerous contradictions within the report of what will and what will not be studied in terms of environmental justice. For instance, environmental justice impacts apparently will not be studied along MOX transportation routes but elsewhere in the document it states that transportation will be studied in terms of environmental justice. Impacts to less fortunate communities were viewed to occur from transportation activities. It was stated that the EIS should consider the environmental justice impacts of the transportation.

Response: The DEIS stated in Section 5.2.12 that mitigation measures would include relevant risks associated with MOX-related transportation programs. However, as noted in the scoping summary report (Appendix I), environmental justice impacts along transportation routes were not included in the DEIS due to uncertainties surrounding the transportation routes that would be used, and the timing and quantity of MOX shipments. The statements in Section 5.2.1.2 of the DEIS have been deleted to address this contradiction, and text has been added to Section 4.3.7.1 of the FEIS to clarify the basis for not considering environmental justice impacts along transportation routes.

J.3.19.10 Comments: 77-005
96-030

Comment: The mitigation measures suggested are insufficient to achieve environmental justice for the low-income populations in the area surrounding the Savannah River Site (SRS). The mitigation measures should be revised to include: (1) warning sirens in the area of the facility, (2) free health care for those with health risks elevated due to the operation of the facility; and (3) an economic benefit for those who reside near the proposed MOX facility to offset the economic and health disadvantages of living in the area. It was suggested that the Nuclear Regulatory Commission (NRC) recommend that DCS work with potentially impacted communities.

Response: The NRC does not believe that normal operations of the proposed MOX facility increases health risks to the offsite public that warrants mitigation. In the case of an accident, warning sirens at the proposed MOX facility and the SRS boundary would be sounded as one means of alerting nearby residents. DCS and the SRS would follow established emergency procedures to inform local and state officials of the nature and extent of an accident and assist with appropriate actions to protect human health and safety.

J.3.19.11 Comment: 96-005

Comment: The mitigation measures section addressing the disproportionate impact to minority communities is totally unacceptable. The proposed mitigation measures place an unfair burden on communities and local government. Education will not address impacts described in the DEIS. Local governments and citizens should not bear the responsibility of emergency preparedness and associated costs.

Response: A reanalysis of impacts from accidents involving the MOX facility, the Pit Disassembly and Conversion Facility and the Waste Solidification Building to low income and minority populations has been conducted. Mitigation measures were revised to address the results of the new accident analysis and are reported in Chapter 5 of the EIS. The Nuclear Regulatory Commission does not intend for local communities to bear the full cost associated with emergency preparedness in the event of a severe accident affecting the local population. The DOE Emergency Preparedness Plan for the Savannah River Site would be implemented in case of an accident resulting in offsite releases of radioactive or chemical materials.

J.3.20 Transportation

J.3.20.1 Comments: 29-001
85-001

Comment: The transport of spent fuel and unused nuclear weapons pits to and from the proposed MOX facility was of concern. This presents a desirable target for terrorists. Many local communities do have sufficient law enforcement and National Guard to meet these challenges while many do not. It was suggested that costs for the law enforcement and National Guard to protect the MOX materials was an unfunded federal mandate. The Nuclear Regulatory Commission should address this unfunded federal mandate.

Response: The unfunded federal mandate comment raises issues that are outside the scope of this EIS. The shipments would be treated as other shipments of special nuclear materials under the protection of the U.S. Department of Energy Office of Transportation Safeguards as discussed in Section C.2.3 of Appendix C in the EIS. The nuclear weapons pits and MOX fuel would be shipped via the SafeGuards Transporter (SGT). The SGT is a structurally reinforced vehicle operated by armed federal officers and travels with armed escort vehicles.

J.3.20.2 Comment: 29-002

Comment: Although transportation casks have been looked at in regulation and testing for many years, the form of the spent fuel and the nuclear weapons pits have taken a back seat. The spent fuel has often failed in use and presents a peculiar problem in transportation and decanting. The design of the transportation casks often does not address the failures and the type of failures of the spent fuel. Any assumption that the fuel will be in a form which does not complicate accidents and handling may be flawed and needs to be addressed.

Response: The U.S. Nuclear Regulatory Commission (NRC) has requirements in its regulations in 10 CFR Part 71 that address the form of the radioactive fuel. The cask, also referred to as packaging, must be able to protect the contents from being released to the public and also must keep the dose to the public under specified limits for both routine and accident conditions of transport. The NRC has conducted a number of risk studies concerning the responses of spent fuel casks subjected to accident and severe accident conditions. The expected response of casts to these conditions can be found in such reports as *Shipping Container Response to Severe Highway and Railway Accident Conditions* (NUREG/CR-4829) published in 1987 and *Reexamination of Spent Fuel Shipment Risk Estimates* (NUREG/CR-6672) published in 2000. The NRC is currently working on the Package Performance Study which is a new risk study in the planning stage. This research program proposes to test the full scale transport casks under conditions that would exceed regulatory requirements. This type of information, including that used for plutonium metal, was incorporated into the transportation risk analysis in this EIS.

J.3.20.3 Comment: 86-067

Comment: The impacts resulting from shipping 50 metric tons of surplus plutonium to the Savannah River Site were covered in the DOE's Surplus Plutonium Disposition (SPD) EIS. The Nuclear Regulatory Commission should have simply deferred to that analysis instead of reanalyzing impacts already evaluated by another federal agency.

Response: The transportation risks for shipping the 50 metric tons (55 tons) of surplus plutonium were not presented separately from other transportation actions in the DOE's SPD EIS, making it impossible to extract the impacts directly associated with the plutonium shipments. In addition, decisions regarding the source of the plutonium, such as the Rocky Flats Environmental Technology Site (RFETS) shipments, were made after publication of the SPD EIS. Thus, the re-analysis of impacts associated with the shipments of plutonium provided more detailed information specific to the proposed action.

J.3.20.4 Comment: 86-068

Comment: The value for transuranic (TRU) waste on page 4-63, line 22 of the DEIS appears to be a great deal higher than experience.

Response: The detailed design information on the internal configuration of the TRUPACT-II containers, as it pertains to the Waste Solidification Building TRU waste shipments, is not yet available. Therefore, a conservative assumption was made to use the highest estimated dose rate for shipments expected to go to the Waste Isolation Pilot Plant (WIPP) as provided in the WIPP transportation studies. As referenced on line 23 of page 4-63 and line 20 on page C-21 in Appendix C, the 0.040 mSv/h dose rate for TRU waste shipments was taken from DOE's *Waste Isolation Pilot Plant Disposal Final Supplemental Environmental Impact Statement* (DOE/EIS-026-S-2).

J.3.20.5 Comment: 86-100

Comment: On page C-6, lines 37-38 of the DEIS, perhaps it would be better to state "The model allows the user to evaluate transportation risk, considering differences in the mode of transport and package used. The user selects parameters to represent the probability of an accident occurring and consequences of a spectrum of accident severities."

Response: The text in Section C.1.3.1 was revised in the FEIS to clarify that the model takes into account the mode of transportation and the type of packaging through selection of the appropriate accident probabilities and release fractions, respectively.

J.3.20.6 Comment: 86-102

Comment: A clarification should be made on page C-12, line 36 of the DEIS. The MOX ER specifies a 55-gallon Industrial Type 1 drum for the shipment of uranium dioxide (UO_2). The DEIS specifies a 30-gallon Type A drum size.

Response: The text has been revised in the FEIS to indicate that the uranium dioxide does not require Type A packaging and is expected to be shipped in industrial packaging. Text has been revised to indicate the use of a 55-gallon drum for uranium dioxide shipments.

J.3.20.7 Comment: 86-103

Comment: Shipment routes were of concern in Section C.2.1.1 of the DEIS. It is important to clarify that none of the shipments would meet highway route controlled quantity (HRCQ) requirements. The uranium hexafluoride (UF_6) and uranium dioxide (UO_2) won't meet HRCQ requirements because of the material hazards; the plutonium metal and MOX will be handled securely by DOE's Office of Secure Transportation (OST), and the transuranic (TRU) waste will follow Waste Isolation Pilot Plant (WIPP)-prescribed routes.

Response: The plutonium metal and MOX fuel meet HRCQ requirements whether or not they are handled by DOE's OST. Routing of a HRCQ of material is determined according to 49 CFR 397.101, "Requirements for motor carriers and drivers." Text has been added in the FEIS to clarify that the TRU waste shipments will follow the designated WIPP routes.

J.3.20.8 Comment: 86-105

Comment: It is suggested to provide a reference for how the number of shipments of plutonium metal to the Pit Disassembly and Conversion Facility (PDCF) was determined, since it differs from that used in the Surplus Plutonium Disposition EIS in Table C.2.

Response: The number of shipments was determined by the amount of plutonium metal shipped from Pantex and Hanford to the PDCF and the amount of plutonium metal in each shipment. As discussed in Section 4.4.1.1, 21.3 metric tons (23.4 tons) and 5.4 metric tons (5.9 tons) of plutonium metal was assumed to be shipped from Pantex and Hanford, respectively. The amount of plutonium metal in each shipment was determined from Table 4 in Didlake (1998) that listed 33 MT of plutonium pits and metal destined for the PDCF in 530 loads. Using the amounts to be shipped (21.3 and 5.4 metric tons) and the amount per shipment (33 metric tons divided by 530 shipments) the number of shipments were estimated to be 343 and 87 from Pantex and Hanford, respectively.

J.3.20.9 Comment: 86-110

Comment: The assumption that stops of Safeguards Transporter (SGT) shipments of both the fresh, unirradiated MOX fuel and the plutonium metal along the route would have the same duration and public exposure as spent fuel truck shipments is overly conservative.

Response: As discussed in Section 4.4.1.1 of the EIS a surrogate commercial nuclear power plant at a Midwestern location was chosen for assessing the transportation risks of the fresh, unirradiated MOX fuel. This conservative assumption was made to bound the impacts for use of the MOX fuel by any power plant in the eastern to Midwestern portion of the United States. In this case, rest stops would be needed over the 1,300-mile journey.

There is no reason to assume that the stop times used are specific to spent fuel shipments because truck maintenance and crew rest conditions would be similar.

The MOX ER assumed no stops for the MOX fresh, unirradiated fuel shipments because these shipments were assumed to be between the Savannah River Site and the McGuire and Catawba nuclear plants. These shipment distances are both on the order of 200 miles which is easily traversed without the need for refueling or rest for the crew.

J.3.20.10 Comment: 86-111

Comment: On page C-23, line 20 of the DEIS, units on this risk factor, based on the subsequent text, should be "latent fatalities-km/person."

Response: For a population density of 1 person/km^2, as mentioned in the text, the factor is as written. When used to determine risks at other population densities the full set of units must be used: 8.36E-10 latent fatalities/km per person/km^2 which reduces to the form suggested in the comment.

J.3.20.11 Comment: 89-051

Comment: The values in the accompanying paragraph do not agree with the values presented in Table 4.20 of the DEIS. This inconsistency should be reconciled.

Response: The text was revised to present the proper values as listed in Table 4.21 of the FEIS (DEIS Table 4.20).

J.3.20.12 Comments: 24-001
71-002

Comment: The U.S. portion of the proposal involves shipment of plutonium from dismantled nuclear weapons sites in western states, some likely via Interstates 40 and 26 en route to South Carolina. The greatest transportation risk would be an accident in which plutonium metal, which rapidly oxidizes when it comes into contact with air, would vaporize or burn and disperse its deadly particles contaminating the air our citizens inhale, the water upon which we depend and the soil upon which we grow crops and upon which animals feed.

Response: The staff notes that the commenter assumes that an accident would cause a release of a cask's contents to the environment. The Nuclear Regulatory Commission (NRC) regulations require that the transport release of a cask be designed to withstand a sequence of four hypothetical accident conditions including drop, puncture, fire and submersion and still be able to perform its safety functions of containment and shielding. Such design requirements make it very unlikely that an accident would result in the release of the shipped material to the environment. The commenter should note, however, that the plutonium that will be shipped will not be in powder form, and thus if in the unlikely event that it were released to the environment, it would neither be easily inhaled nor would it be easily vaporized or burned.

J.3.20.13 Comment: 86-101

Comment: In Section C.1.3.1, page C-7, lines 1-10 of the DEIS, the use of the ingestion pathway resulting from the consumption of contaminated food is highly speculative. Public policy and emergency response experiences from Three Mile Island in 1979 and Chernobyl in 1986 indicate that, essentially all food (whether contaminated or not) was destroyed, making the ingestion scenario not "reasonably foreseeable."

Response: The ingestion of contaminated food is a potential exposure pathway for transportation accidents as recognized by its incorporation into the RADTRAN transportation risk code originally developed for the NRC when it produced NUREG-0170 in 1977, *Final Environmental Impact Statement on the Transportation of Radioactive Materials by Air and Other Modes*. Since that time, radiological transportation risk assessments have routinely included the ingestion pathway as a potential source of exposure (e.g., see *A Resource Handbook on DOE Transportation Risk Assessment*, DOE/EM/NTP/HB-01). One reason for this trend in conducting radiological transportation risk assessments is concern by the public that appropriate actions to protect the public would not be carried out and the desire to know what would happen in the absence of these actions (e.g., intervention or interdiction of contaminated crops).

The ingestion of contaminated food is not highly speculative. The Nuclear Regulatory Commission recognizes that some interdiction would likely occur following a significant accident, even if contamination levels were below the protective action guides. Such a response occurred after Three Mile Island where no crop contamination was found. On the other hand, some members of the public were found to return illegally to contaminated areas near Chernobyl to live for various reasons (e.g., attachment to ancestral home/high sense of displacement) that could easily result in the consumption of contaminated, locally grown food. Thus, the inclusion of the ingestion pathway provides upper bound estimates of the impacts of potential significant accidents.

J.3.20.14 Comment: 86-108

Comment: Plutonium isotopic distribution is the same for plutonium metal, MOX fuel, and transuranic (TRU) waste. The Curie content should be linear with mass of plutonium in each stream. This should be reflected in Table C.3.

Response: The numerical values for the activity of plutonium in the MOX fuel and TRU waste shipments were taken directly from the DCS references noted in Table C.3 without any type of conversion. These values were preliminary estimates and are still subject to small changes. No further action will be taken at this time.

J.3.20.15 Comment: 116-009

Comment: It was questioned whether the Nuclear Regulatory Commission considered both fatal and non-fatal truck accidents. Also, it was questioned why the "neutral weather" conditions and not the "worst case" weather conditions were considered in an transport accident. Excluding the transportation risks on-site at the Savannah River Site was also questioned.

Response: As discussed in Appendix C, Section C.1.1 of the EIS, both fatal and non-fatal truck accidents were considered when assessing impacts from potential radioactive releases. The vehicle-related fatalities reported were the direct result of physical trauma related to potential accidents. As discussed in Appendix C, Section C.2.4.3, neutral weather conditions were used for the transportation risk assessment because the exact time and location of an accident cannot be known ahead of time and neutral weather conditions prevail for more than 50% of the time in the United States where shipments may occur. Because the shipment distances on-site are much shorter than the off-site routes, low on-site speed limits, and the sparse population density, the transportation risks on-site at the Savannah River Site for the material considered in the EIS are not significant compared to the transportation risks presented in the EIS.

J.3.20.16 Comment: 114-012

Comment: Emergency response to rail or highway accidents must be well-prepared and rapid. Delays in response to accidents which involve the release of radioactive material would expose unknown numbers of people to negative health effects. In 1996, a Department of Energy (DOE) Transport and Safeguards Division Safe Secure Transport (SST) trailer carrying nuclear weapons slid off the road and rolled over in rural Nebraska. Four hours elapsed before DOE headquarters was notified, and it was 20 hours before a Radiological Assistance Program team determined there was no release. A similar delay in response to a plutonium-MOX fuel accident could make effective emergency response dangerous and clean-up impossible.

Response: Any accident scene involving vehicles containing plutonium or MOX fuel is expected to be promptly closed to vehicle traffic. As discussed in Appendix C, Section C.2.3 of the EIS, such shipments would be made using the SafeGuards Transporter (SGT) with armed federal officers on-board as well as in escort vehicles. The SGT and escort vehicles would contain advanced communications equipment and be monitored 24-hours-a-day. Any accident would be identified in real-time and the federal officers at the scene would be able to take appropriate measures to ensure the safety of the public as well as the security of the shipment.

J.3.21 MOX Fuel Use

J.3.21.1 Comments:

2-002	30-003	71-009	92-003
12-004	47-005	72-006	105-007
13-004	65-003	77-002	114-004
24-004	67-002	90-002	114-010

Comment: In general, using MOX fuel in reactors was considered to be experimental and unsafe. Scientists are not in agreement as to the safety of this process. It was stated that the use of MOX fuel in a reactor would result in a smaller safety margin and was difficult to control which could result in serious accidents at a higher likelihood. Reactors were not designed to handle MOX fuel. Specific technical concerns were raised which included the lower delayed neutron fraction with plutonium, the reduced control rod effectiveness with using MOX fuel, a positive moderator temperature coefficient, increased fission gas production, twice the tritium production, lower melting temperature of MOX fuel, and formation of hot spots within a mixed core of MOX fuel and low enriched uranium fuel. It was noted that the first three issues were significant causes of the Chernobyl accident. It was questioned how emergency crews could respond to a reactor accident involving MOX fuel, given that plutonium is hotter than uranium. It was stated that the moderator temperature coefficient of reactivity is an example where European MOX fuel experience does not apply. Concern was expressed that modifications to reactors and increased monitoring would be required if MOX fuel was used in reactors. The reactor use, MOX fuel transportation, and spent fuel disposal impacts should assume the maximum throughput. It was further suggested that the proposed MOX fuel fabrication facility should not be authorized until problems with reactor use are resolved.

Response: All U.S. light water power reactors are designed to produce power from fuel that includes plutonium. By the end of a fuel cycle, light water reactors burning low enriched uranium (LEU) fuel produce a significant percentage of the energy in the reactor core from the fissioning of plutonium that was produced during normal operation from the irradiation of uranium-238. This is reflected in the design basis for the power plants.

Moderator temperature coefficient (MTC) is more strongly influenced by the choice of moderator (which is the same for MOX or LEU fuel) than the differences in the MOX and LEU fuel types considered here. In any event, the delayed neutron fraction, control rod worth, reactor vessel embrittlement, shielding analysis, MTC effects, fuel performance and source terms issues are typical of the issues that will be addressed in the NRC staff's safety review of any future amendment request by a reactor licensee to use MOX fuel. The results of the future site specific safety reviews will be considered, together with any future site specific National Environmental Policy Act (NEPA) evaluations in determining whether to authorize specific reactors to use 40% MOX fuel cores.

In planning for these reviews, the NRC has initiated a research program which includes developing tools to evaluate the neutronic and material behavior of MOX fuel, and to estimate source terms from potential accidents involving MOX fuel. Technical concerns, such as those mentioned in the comments, would be evaluated during the site-specific safety review. Any modifications to the reactor, that would be required to ensure safety, would be determined within the scope of the NRC staff's future reviews of a specific request to use MOX fuel. The NRC believes that analyses performed to date are sufficient to reasonably estimate and bound the impacts of using MOX fuel. Reactor specific issues are beyond the scope of this EIS. However, the NRC staff believes that analyses performed to date are sufficient to reasonably estimate and bound the impacts of using MOX fuel for purposes of making a decision whether to authorize construction of the proposed MOX facility.

As discussed in Section 4.4.3 of the EIS, the impacts of using MOX fuel were tiered from an assessment presented in the DOE's Surplus Plutonium Disposition EIS (Section 4.28 and Appendix K.7 of that document). While weapons grade plutonium MOX fuel has not been used in reactors in the United States on a commercial scale, the impacts of doing so have been estimated assuming MOX fuel replaces about 40 percent of the low-enriched uranium (LEU) fuel. The DOE's analysis of using MOX fuel in reactors concluded that the operational safety would be essentially the same as using LEU fuel. The DOE determined that, depending on the accident, the risk of a latent cancer fatality among the general public associated with a potential accident, could decrease by up to 7% or increase by up to 14%.

J.3.21.2 Comments: 91-002
91-003
98-006

Comment: Water use issues relative to using MOX fuel were raised. Water would be used in the MOX processing to make MOX fuel, but water would also be used at nuclear power plants. Nuclear power plants were considered to be a water-intensive and toxic technology that imposes major long-term social, environmental, and economic costs. For example, the Hatch Plant withdraws 57 million gallons a day from the Altamaha River and returns only 24 million gallons a day. With ever-rising demands for water supply in this rapidly growing state, particularly during extended drought, such water intensive practices are increasingly unjustifiable, imposing avoidable burdens on many other sectors. Water resources are limited and discussions on how this precious resource should be protected are currently being debated in the Southeast. The link between energy and water resources is profound. At the national level, the electric industry follows closely on the heels of irrigation as the largest water user in the U.S. Yet, there is no discussion in the DEIS on the impacts of nuclear power production, which the MOX program will support the possible advancement of, on the region's water supply.

Response: Nuclear reactors use water, regardless of whether they use conventional low-enriched uranium (LEU) fuel or a combination of LEU fuel and MOX fuel. As discussed in Section 4.4.3 of the EIS, the Department of Energy's analysis of using MOX fuel in reactors concluded that, during normal operations, the impacts would be the same as using LEU fuel. Specific water use impacts at any particular reactor are beyond the scope of this EIS.

J.3.22 Cumulative Impacts

J.3.22.1 Comments: 72-008
39-001

Comment: There was concern about the decision to add new radioactive missions to the Savannah River Site (SRS) which has already been weakened by previous and ongoing exposures. It was stated that the SRS has the most radioactivity of any Department of Energy site nationally and that millions of gallons of high level radioactive waste are stored there. It was also stated that the proposed mitigation steps do not address the ongoing routine and repeated exposure. It was felt that the Nuclear Regulatory Commission analysis did not fully express the cumulative and synergistic nature of the situation.

Response: Cumulative radiological dose to the public and SRS workers from normal operations of the proposed facilities, existing SRS operations, past operations, and reasonably foreseeable future actions is presented in Section 4.5.1.1 of the EIS. This analysis indicates that MOX operations would contribute a relatively small incremental dose to the public and to workers and that the number of latent cancer fatalities that would result from cumulative radiological dose is less than one for the public (including the maximally exposed individual) and about 1 for workers.

J.3.22.2 Comment: 89-054

Comment: The DEIS references the Yucca Mountain environmental impact statement for high latent cancer fatalities from "general transportation" when the historical results are low. However, this reference cannot be found. Please verify the numbers used.

Response: The numbers presented in the EIS are correct. Please see page 8-90 of the Yucca Mountain environmental impact statement.

J.3.22.3 Comment: 89-055

Comment: Presuming the MOX shipments in line 16 of Table 4.27 of the DEIS are supposed to be the same as the totals presented in Table 4.20, the numbers for the population dose do not agree. If the information is supposed to be the same, it is suggested that the category be relabeled to more accurately reflect the nature of the information (e.g., All shipments for the MOX program).

Response: The numbers in Table 4.27 in the DEIS (Table 4.28 in the FEIS) were correct. The numbers have been revised in the FEIS to reflect changes made in the TRU waste shipments in ER Revision 5. A footnote has been added for clarity as suggested by the commenter.

J.3.22.4 Comment: 93-013

Comment: It is not correct to assume that the proposed MOX facility and Waste Solidification Building construction are "bounding," since the movement of contaminated particulate off-site and movement of contamination from soil into ground water are both cumulative, and construction of all three facilities will result in one or both of these events. It should be necessary to assess the impacts of all three and look at them cumulatively, even though the Pit Disassembly and Conversion Facility (PDCF) construction may lag behind the other two.

Response: As discussed in Section 5.2.8 of the FEIS, the Nuclear Regulatory Commission is concerned that the spoils pile currently located on the proposed MOX site may be contaminated. Although DCS has conducted initial screening that does not indicate contamination, removal of the spoils pile constitutes a significant earthmoving activity and a potential source of exposure to construction workers. In contrast, significant earthmoving operations are not anticipated for the PDCF and Waste Solidification Building sites. The spoils pile is not considered a significant source of potential contamination to the environment. Construction of the MOX and associated facilities would not be expected to mobilize any contaminated particulates off-site. Dust control measures during construction (Section 5.2.4 of the FEIS) would limit migration of any contaminated particulates. The groundwater beneath the proposed MOX facility site is already contaminated. Past activities at the Savannah River Site do not indicate that the area where the spoils pile soils were excavated is a significant source of existing contamination; and therefore, would not be expected to be a significant source of groundwater contamination.

J.3.22.5 Comment: 86-072

Comment: The "SRS baseline" concentrations summarized in Table 4-23 do not represent regional air quality. They are only representative air monitoring data. The "SRS baseline" data are a hypothetical set of values that are based on modeling maximum potential emissions of Savannah River Site (SRS) sources and are applicable only as a screening level for evaluating and managing Savannah River Site air permits. This section of text must be revised accordingly. In addition, footnotes to the columns "SRS Maximum" in Tables 4-6, 4-8 or the column "SRS Baseline" in Table 4-23 should be modified to state that the listed values are hypothetical levels based on maximum potential (i.e., permitted) emissions from SRS sources and do not necessarily quantify actual air quality conditions.

Response: The text in Section 4.5 of the FEIS has been modified as suggested by the commenter. In addition, the footnotes to Tables 4.6, 4.8, and 4.24 (DEIS Table 4.23) have been modified.

J.3.22.6 Comment: 96-037

Comment: The cumulative impacts should be evaluated with respect to increasing or decreasing existing inequities.

Response: The cumulative impacts associated with the construction and operation of the proposed facilities are presented in Section 4.5 of the EIS. The impact evaluation considered the effects of past, present, and reasonably foreseeable future actions in the Savannah River Site region. High adverse impacts were not identified for any impact category in this cumulative impact analysis. Accident impacts are not considered in the cumulative impact assessment. Additional information regarding risks to low-income and minority communities from accidents can be found in Comment J.3.19.5.

J.3.22.7 Comment: 89-053

Comment: It would be helpful to the reader in Table 4.25 of the DEIS to include capacities of treatment facilities and storage capacities. The table provides no way to judge the significance of these numbers.

Response: Waste treatment and storage capacities have been added to Section 4.5 of the FEIS as suggested.

J.3.23 Cost-Benefit

J.3.23.1	Comments:	5-007	12-003	38-002	76-003
		8-005	30-004	44-004	79-004
		10-004	32-005	45-007	108-002
		10-019	35-001	76-002	

Comment: The project will waste valuable tax dollars. It was questioned whether spending money on upgrading nuclear reactors that would use MOX fuel was money well spent. It was alleged that Duke was receiving a government subsidy (favoring nuclear energy) to produce electricity. Duke would also be allowed to turn around and sell the electricity generated in part from the subsidy, to the citizens of Georgia, South Carolina, and North Carolina. It was argued that the citizens should receive the electricity for free.

There was disagreement about exactly who was bearing the costs of the proposed action and who was receiving the benefits. It was stated that the citizens of Georgia and South Carolina bear the environmental impacts, but others received the benefit of the electricity. Another point of view was expressed that the nation was bearing the financial costs of the proposed action, while the local communities were receiving the economic benefit. Likewise, others indicated the nation was bearing the financial costs of the proposed action, so that a small number of shareholders in the nuclear industry could receive a large benefit.

Response: There are both costs and benefits resulting from the proposed action to design, construct, and operate a MOX Fuel Fabrication Facility. The benefits are experienced at both the national and regional level. At the national level, the benefits include improving security by reducing the risk of plutonium falling into the hands of terrorists. In addition, processing plutonium into MOX fuel benefits the environment by reducing the risk of contamination and it reduces the risk to human health and safety at the current storage sites. When presented with the cost of maintaining storage of plutonium, processing the plutonium into MOX fuel results in a cost savings to the federal government. At the regional level, the benefits include a boost to the local economy and employment opportunities associated with the construction and operation of the MOX facility.

As noted in the comments, benefits are also experienced in the private sector. After determining that, to comply with the United States-Russia Agreement, excess plutonium should be disposed of by making MOX fuel, the Department of Energy concluded that the most cost effective means of implementing the program was to hire a contractor. The contractor selected, DCS, was chosen from a series of competitive bids from qualified companies and is being compensated according to the costs it will incur in constructing and operating the proposed facility. Reactors irradiating MOX fuel will not receive the fuel for free, as alleged in the comments. Rather, the reactors will purchase fuel from the Department of Energy (DOE) at a set rate.

There are also costs at the national and regional level. The national costs are primarily the cost of constructing and operating the proposed MOX facility. The overall cost of the program is approximately $4.1 billion (2003 dollars). However, the DOE will receive a monetary credit for the fuel sent to commercial reactors that would be used to generate electricity. The fuel credits (or money paid by the reactors for fuel use) amount to $1.0 billion over the life of the project. Thus, the overall cost of the project is reduced from approximately $4.1 billion to $3.1 billion. The regional costs include potential impacts that an accident at the proposed facilities would produce. Additionally, routine operations of the proposed facilities would produce an annual latent cancer risk of about 1 in 250 million for the maximally exposed individual of the public. The environmental impacts, under normal conditions, are considered to be small; therefore, they do not constitute a significant regional cost.

For a full discussion of costs and benefits, see Section 4.6 of the EIS.

J.3.23.2 Comment: 48-004

Comment: The cost information presented in the DEIS is very confusing and vague. The cost of the MOX program is estimated to be $3.8 billion. However, the cost was not broken down into research and development, construction cost, operation cost. It was suggested that the cost should be clearly stated. The DEIS did elude to a discussion on the decommissioning cost which gives a range. The fact the Department of Energy is trying to get $415 million in fiscal year 2004 is going to draw some attention and requesting $650 million for the overall program is going to get some scrutiny.

Response: Additional breakdown on the components of the costs can be found in *Report to Congress: Disposition of Surplus Defense Plutonium at Savannah River Site*, produced by the National Nuclear Security Administration (NNSA 2002), which provides more detail on project cost. Decommissioning costs were estimated using data from a number of studies of other large-scale nuclear fuel-cycle facilities. Details on how these estimates were made can be found in Section 4.3.6.3 of the EIS.

J.3.23.3 Comment: 89-056

Comment: The DEIS states that the benefits to national security are substantial but not quantifiable. The costs associated with continued storage of this material are quantifiable; avoiding these costs should be mentioned as a benefit in Section 4.6.1.

Response: Section 4.6.1 of the FEIS has been changed to reflect this comment.

J.3.23.4 Comment: 89-057

Comment: Section 4.6.3.2 of the DEIS discusses regional benefits in terms of money entering the local economy for labor associated with the construction and operation of the proposed facilities, and the multiplier effect this money has on the regional economy. The same is true for the national economy but no mention is made of these effects in this section.

Response: Because of the preliminary nature of the data needed to calculate national impacts, no quantitative estimate of the impacts of construction and operation of the proposed MOX facility on the national economy was included in the EIS. The text in Section 4.6.1 of the FEIS has been changed to provide a qualitative discussion of the national economic benefits of the proposed action to clarify the issue.

J.3.23.5 Comment: 89-059

Comment: The DEIS references the costs of continued storage (i.e., no-action alternative) from the Department of Energy's Surplus Plutonium Disposition EIS. However, according to the MOX ER, the National Nuclear Security Administration (NNSA 2002) estimated the costs associated with continued storage to be approximately $246 million per year. One of the national benefits associated with this program should be the avoided safeguard and storage costs. If the no-action alternative were to store the plutonium for 50 years, the estimated storage costs would exceed $12 billion while the cost of disposition is estimated to be $3.85 billion as discussed in Section 4.6.2.

Response: Estimates of the avoided cost of continued storage have been added to Section 4.6.2 in the FEIS to reflect this comment.

J.3.23.6 Comment: 89-060

Comment: In the DEIS, it was mentioned that the Surplus Plutonium Disposition (SPD) EIS was used as a reference for data pertaining to the proposed MOX facility. However, it is not clear where the data is taken from in the SPD EIS. For the proposed MOX facility, employment estimates would most likely have come from the MOX ER since this included more recent information.

Response: The SPD EIS was used to establish the relationship between direct (on-site) and indirect (off-site) employment for the construction and operation of a MOX facility. This was because the MOX ER only calculated direct employment impacts, with a qualitative description provided for the indirect socioeconomic impacts of the facility. As data on both direct and indirect impacts of a MOX facility at the Savannah River Site were provided in the SPD EIS, these data were used in this EIS to calculate indirect impacts. Text has been added to Section 4.6.3.2 of the FEIS to clarify the issue.

J.3.23.7 Comment: 105-011

Comment: On page 4-83, line 30 & 31, the DEIS states that, "Therefore, continued storage would result in higher annual impacts." This statement appears incorrect considering the activities of storing the plutonium in hardened bunkers without touching or processing it when compared to all the plutonium transportation, processing, reactor use and removal to Yucca Mountain associated with the proposed action.

Response: The impacts for the no-action alternative (i.e., continued storage of surplus plutonium at existing DOE sites) were previously evaluated by the Department of Energy (DOE) in the Surplus Plutonium Disposition (SPD) EIS. As discussed in Section 4.2.1 of the EIS, the impacts in this EIS for the no-action alternative are essentially the same as those evaluated by DOE. Some of the impacts for the no-action alternative presented in this EIS represent impacts for the entire DOE site at which the surplus plutonium is currently stored. Text has been added to Sections 4.2.1 and 4.6.2 of the FEIS to clarify this point.

J.3.23.8 Comments: 87-006
89-058

Comment: The 2002 cost estimates do not reflect the costs of additional process time needed for the 34 metric tons (37.5 tons) of plutonium compared to the 25.6 metric tons (28.2 tons) the cost of handling additional purification of untreated plutonium from the immobilization facility, and the cost of the additional waste streams from the proposed facility. The discount rate used to normalize the costs in 2001 dollars was not specified in the cost estimate report.

Response: The NRC used cost estimates provided in the 2002 National Nuclear Security Administration report which does reflect the costs associated with processing 34 metric tons of plutonium, including the removal of impurities and treatment and disposition of associated wastes. No information is presented in the report on the discount rate used to normalize the costs in 2001 dollars.

J.3.23.9 Comment: 66-004

Comment: The DEIS states that any impacts associated with the transportation of fresh, unirradiated MOX fuel, including impacts on property values, will be minimal. The cost associated with changes in property values does not appear to be well addressed in the DEIS.

Response: The cost impacts of the transportation of MOX fuel, such as impacts on property values, were not considered in the DEIS due to uncertainty surrounding the transportation routes that would be used, and the timing and quantity of MOX shipments. Text has been added to Section 4.6.3 of the FEIS to clarify the basis for not considering impacts along transportation routes.

J.3.23.10 Comment: 43-004

Comment: The treatment of time line effects of costs and benefits in the DEIS was questioned. Typical cost benefit analysis reduces the impact of future costs in proportion to their distance away from the present time. It was suggested that environmental resources will be worth more in the future, not less. If one considers the worth of environmental resources in the present by applying a discount method, the worth of the environmental resources would be very much reduced in value compared to what they are likely to actually be worth in that future time. The DEIS needs to consider alternative methods for evaluating costs and benefits.

Response: Cost benefit analysis typically uses a positive discount rate in order to include the effects of time in the valuation of the overall costs and benefits of a project. This means that the valuation of future costs and benefits would be larger the further away from the present time these impacts occur. An estimation of the present value of all costs and benefits is then made to establish the value of all future costs and benefits back in time by expressing them in terms of their monetary value in the current year. As the measurable impacts on the environment and human health during construction and normal operation of the proposed MOX facility would be small, an estimation of the present value of these impacts was not undertaken for the EIS. Annual monetary costs of facility construction and operation are expressed in constant 2003 dollars, which takes into account the projected impacts of inflation on total life-cycle project cost.

J.3.23.11 Comments: 53-001
58-004
66-002

Comment: The EIS does not include an analysis of the economic impacts of accidents. This would include costs associated with victim health recovery, costs to farmers from interdiction of crops, and the costs of cleaning up contaminated lands.

Response: Human health risks associated with accidents are discussed in Section 4.3.5 of the EIS. The socioeconomic impacts of accidents associated with the proposed MOX facility were not estimated in the EIS, because accidents are not expected to have a significant economic impact on the communities surrounding SRS. Emergency response activities associated with a release from the facility would be handled by local emergency response and health authorities already prepared for accidents at SRS, with no resulting additional burden on local community financial resources. In the case of the most serious accidents postulated for the proposed facilities, the amount of radioactive material deposited per unit area would be relatively small and would be limited to the area under the plume. Any interdiction of crops as a result of the deposition of radioactive material would be a limited, one-time event, and if it were to occur at all, would only affect a small number of farm communities. Text has been added to Sections 4.6 and Appendix D in the FEIS to clarify the issue.

J.3.24 Mitigation

J.3.24.1 Comments: 86-005 89-064
89-013 89-066
89-063

Comment: The DEIS lists 43 highly specific mitigative actions. Many of these mitigation measures simply duplicate state or federal agency regulations with which DCS is already required to comply. Doing what is required by law or common practice is not mitigation. Mitigation occurs when, if there are significant impacts, an action is taken to lower those impacts to a more acceptable level. The DEIS should be modified to state that DCS will comply with the regulations of the appropriate regulatory agency. The mitigation measures discussed in Chapter 5 and presented in Table 5.1 with the Nuclear Regulatory Commission (NRC) as the proponent are in general excessive relative to the postulated impacts and may not be necessary. Therefore, it was recommended that these proposed mitigation measures be reconsidered. In addition, each mitigation measure should specify who is responsible for taking action or assuring that action is taken. Clarifying language should precede the table, or additional columns should be added to the table, to indicate which entity is responsible for 1) implementation and 2) verification of completion, of the mitigation.

Response: Under 40 CFR 1500.2(f), federal agencies shall to the fullest extent possible use all practicable means consistent with the requirements of the National Environmental Policy Act (NEPA) and other considerations of national policy to avoid or minimize any possible adverse effects of their actions on the quality of the human environment. The Council on Environmental Quality (CEQ) definition of mitigation is provided in EIS Chapter 5. Mitigation includes measures that minimize impacts by limiting the magnitude of the action, measures that rectify the impact of an action, measures that reduce or eliminate the impact over time, and measures that compensate for the impact. In addition, CEQ's 40 most asked questions states that all relevant, reasonable mitigation measures that could improve the project are to be identified, even if they are outside the jurisdiction of the lead agency, and thus would not be committed as part of the Record of Decision. Identifying the full range of mitigation measures serves to alert agencies or officials who can implement these extra measures, and will encourage them to do so. Therefore, the NRC believes it is appropriate to include mitigation measures that are required by the regulations of the other federal agencies.

Text has been added to clarify mitigation measures that are required by laws and regulations, those that are suggested by DCS as good practices, and those that are suggested by the NRC. Generally, it is the position of the NRC that the applicant is responsible for assuring that all necessary mitigation measures are fully implemented and completed.

The NRC staff has reviewed the mitigation measures and has concluded that no additional mitigation measures are required beyond the regulatory requirements and those measures identified by DCS.

J.3.24.2 Comment: 86-074

Comment: In Table 5-1 of the DEIS, grading the site to a uniform elevation is an inherent aspect of the MOX facility design (the grading would be the same regardless of the MOX facility location). Consequently, the grading is incorrectly identified as a "mitigation."

Response: The Nuclear Regulatory Commission disagrees with the comment. If the site was not graded, extensive erosion is possible because of the relatively steep topography. Grading minimizes the potential for erosion and is thus a mitigation activity.

J.3.24.3 Comments: 86-075
86-076
86-077

Comment: DCS's MOX ER (page 7-13, Table 7-I) specifically notes that a Stormwater Pollution Prevention Plan will be developed for the proposed MOX facility, which is more comprehensive and responsive to South Caroline Department of Health and Environmental Control (SCDHEC) enabling regulations. The DEIS states that a Sediment Control Plan and Spill Prevention Control and Countermeasures Plan would be developed prior to construction. A Spill Prevention Control and Countermeasures Plan would be developed prior to operating the proposed MOX facility. The correct title for the plan that would limit sediment in the surface waters and control spills during construction is the Stormwater Pollution Prevention Plan. The mitigative action identified by the DEIS should be limited to implementation of a Stormwater Pollution Prevention Plan in compliance with SCDHEC regulations.

Response: The Nuclear Regulatory Commission staff reviewed the elements of the Stormwater Pollution Prevention Plan and concluded that it would be sufficient to mitigate potential spills during construction. A Stormwater Pollution Prevention Plan is required by the South Carolina Department of Health and Environmental Control prior to construction. The Plan would minimize and avoid soil and surface water contamination from spills or other accidental released during construction. The text in Chapter 5 of the FEIS has been revised to delete reference to the Sediment Control Plan. Text has also been added to state that appropriate mitigation measures during construction would be chosen at the time of the spill event or release in conjunction with the Stormwater Pollution Prevention Plan.

J.3.24.4 Comment: 86-090

Comment: Section 5.2.2, page 5-7, lines 18-27 of the DEIS speculates what resources might be impacted if any MOX structures extended into groundwater. The fact is that the structures do not extend to groundwater. Speculation about what might happen if the structures should extend to groundwater should be removed from the DEIS.

Response: The text in Section 5.2.1 (DEIS Section 5.2.2) was revised to include sand filters as an example of structures that could impact groundwater.

J.3.24.5 Comment: 86-078

Comment: The South Carolina Department of Health and Environmental Control (SCDHEC) does not specify requirements for reduction of fugitive construction dust. As noted in the MOX ER, DCS will have a Construction Emissions Control Plan which will implement a number of different good engineering practices to reduce fugitive dust emissions. The MOX ER does not identify specific actions or emissions reductions. The mitigative action specified in the DEIS Table 5-1 and ES-1 should be limited to compliance with appropriate SCDHEC air quality regulations.

Response: The text in Section 5.2.4 and Table 5.1 has been revised to state that DCS will have a Construction Emissions Control Plan which will implement a number of good engineering practices to reduce fugitive dust emissions.

J.3.24.6 Comment: 86-079

Comment: The statement in Table 5-1, page 5-2, lines 46-49 of the DEIS was questioned. The MOX ER identifies that the concrete batch plant will be subject to the provisions of a South Carolina Department of Health and Environmental Control (SCDHEC) air quality permit. The concrete batch plant will meet the conditions of that permit. The mitigative action specified in the DEIS should be limited to compliance with appropriate SCDHEC air quality regulations.

Response: The cementation process would be part of the operation of the Waste Solidification Building (WSB), not the construction of the WSB as indicated in the comment. The text in Section 5.2.4 and Table 5.1 has been corrected to note that the reduction would occur during operation of the WSB.

J.3.24.7 Comments: 86-085
86-097

Comment: The mitigation actions associated with National Historic Preservation Act (NHPA) activities were questioned. Information provided by DCS to the Nuclear Regulatory Commission (NRC) on December 12, 2002, demonstrated that the State Historic Preservation Office (SHPO) has agreed that all mitigation action is complete. No monitoring is required. Inadvertent discoveries will be handled in accordance with Federal Law and the

Savannah River Site Programmatic Memorandum of Agreement (PMOA). Because the NRC and the Department of Energy (DOE) have designated the DOE as the lead agency for mitigation under the NHPA, NRC specified mitigation actions are not appropriate. The mitigative action specified in the DEIS should be limited to compliance with DOE PMOA policies for archaeological management of construction activities.

Response: The NRC agrees with the comment that the DOE is responsible for compliance with the PMOA for archaeological management during construction. However, past experience at construction sites suggests that the mitigation actions identified by the NRC in the EIS (e.g., periodic monitoring, awareness training) are potential means to ensure nearby archaeological sites would not be adversely affected either indirectly from erosion or directly from disturbance by the workforce. The comment correctly states that the letter from the SHPO indicates mitigative action is complete for the two eligible archaeological sites; however, the letter from the DOE to which the SHPO is responding, indicated that some monitoring would occur during construction. The text has been revised in EIS Section 5.2.9 to reference both letters (Long 2002 and Gould 2002) and to specify that the monitoring would focus on the removal of fill on the site areas. A similar text change on monitoring the removal of fill has been made to Table 5.1, in addition to deleting the NRC as a proponent for the monitoring of the two eligible sites.

J.3.24.8 Comment: 10-014

Comment: The DEIS states that "issues related to general emergency preparedness of communities are outside the scope of this EIS." The DEIS also mentions that "consequences on human health would be mitigated by following SRS emergency procedures." It was requested that a copy of the Savannah River Site (SRS) emergency procedures be provided to citizens in Savannah and other communities throughout the Savannah River corridor. Concerns was expressed that the SRS emergency procedures would not be protective of the public.

Response: The DOE is responsible for the SRS emergency response plan, and it is not a publically available document. SRS coordinates its emergency preparedness with local and State agencies, including conducting drill and community education.

J.3.24.9 Comment: 89-065

Comment: The DEIS Section 5.2.2, page 5-8, lines 7-9 should be reworded as follows for clarity: "Direct impacts to groundwater could occur if there were a failure in the underground pipeline carrying the liquid high-alpha activity waste stream from the proposed MOX facility's ... ."

Response: The text in Section 5.2.1 of the FEIS (DEIS Section 5.2.2) has been modified as suggested by the commenter.

J.3.24.10 Comment: 89-067

Comment: In Section 5.2, the DEIS states that DCS shall add appropriate revisions of the Savannah River Site (SRS) Emergency Response Plan for chemicals identified as presenting moderate or high risks to workers. It is not clear that this measure is within the jurisdiction of the Nuclear Regulatory Commission.

Response: Upgrading of the SRS Emergency Response Plan to include chemicals posing moderate or high risks to workers is a mitigation action that is appropriate for protection of DCS and SRS employees from an accidental release. DCS has committed to establishing a protocol with the Department of Energy — to be submitted by DCS as part of any request for a license to possess and use special nuclear material — to integrate DCS's emergency plans with the existing SRS emergency preparedness program. Because this is a commitment made by DCS, relating to the proposed MOX facility, the Nuclear Regulatory Commission does have regulatory authority to enforce this commitment.

J.3.24.11 Comments: 86-080
86-093

Comment: Section 5.2.3 of the DEIS discusses mitigation measures for ecological resources. The MOX ER 4.6 describes the ecological habitat and the habitat surveys conducted prior to construction activities. MOX ER Appendix A, pages A-25 and A-26 provides letters of negative declaration from the U.S. Fish and Wildlife Service that the MOX facility construction and operation will not affect resources under the jurisdiction of the U.S. Fish and Wildlife Service. All necessary ecological surveys are complete. No sensitive species or nests of migratory species are present. These precautionary and mitigative actions presented in the DEIS are misleading and unnecessary.

Response: The U.S. Fish and Wildlife Service has raised no objections and has stated that the proposed action will have no effect on resources under its jurisdiction (letter dated June 20, 2001, from L. Duncan [U.S. Fish and Wildlife Service] to A.B. Gould [DOE]). The mitigation commitment described in the DEIS for surveys of plants and nests of migratory birds, sensitive species, and habitats has been deleted.

J.3.24.12 Comments: 86-081
86-083

Comment: Statements in Section 5.2.1 and Table 5-1 of the DEIS that measures shall be taken to protect trees not selected for removal, that any trees or other landscape features accidentally scarred or damaged should be replaced and that environmental supervisors shall be present during vegetation clearing to ensure that impacts are held to a minimum are misleading.

As noted in DEIS 3.6.1 (pg.3-34) the Savannah River Site (SRS) forests are managed by the U.S. Forest Service. The removal of trees and protection of trees not designated for removal will be under the direction of the U.S. Forest Service. The mitigative action specified in the DEIS should be limited to compliance with appropriate U.S. Forest Service regulations.

Response: Section 3.6.1 of the EIS states that the forests on the SRS are managed for timber production and that the U.S. Forest Service harvests the trees. However, DCS should still take action at the construction site to prevent the workforce from removing vegetation in excess of that needed for construction clearing.

J.3.24.13 Comment: 86-082

Comment: The statement in Section 5.2.1 and Table 5-1 of the DEIS that "The loss of the existing storm-water basin near the southern boundary of the proposed site would be compensated for by construction of a new basin that would provide more viable aquatic habitat" is misleading. As noted in Attachment 14a of the letter from P. Hastings to the Nuclear Regulatory Commission Document Control Desk, the U.S. Army Corps of Engineers concluded that the existing storm-water basin is not part of the waters of the United States. Consequently, it is not appropriate to specify any mitigative action.

Response: The staff agrees with the commenter that compensation for loss of the existing stormwater basin is not an appropriate mitigative action. This action was addressed in Section H.3.1.2 of the EIS simply to point out the small impacts that would occur to aquatic ecological resources from construction. The mitigation measure to compensate for loss of the stormwater basin has been deleted from the FEIS.

J.3.24.14 Comment: 86-084

Comment: The statement in Section 5.2.1 and Table 5-1 of the DEIS that "Reclamation plans shall be developed for laydown areas and other construction areas that will not be occupied by structures, parking lots, or roads. Reclamation will include removal of all temporary construction features, stabilization of soils, and reseeding with appropriate plant species" is misleading. Property beyond the 41-acre proposed MOX facility site is managed under the DOE jurisdiction for the Savannah River Site. Land reclamation will be in accordance with DOE directives. The mitigative action specified in the DEIS should be limited to compliance with appropriate DOE policies for reclamation of construction areas.

Response: The mitigation measure described in Table 5-1 and in Section 5.2.3 of the FEIS (DEIS Section 5.2.1) has been revised to state that site restoration (e.g., stabilization of soils and revegetation) shall be done in compliance with appropriate DOE policies for reclamation of construction areas.

J.3.24.15 Comment: 86-092

Comment: The statement in Section 5.2.3, page 5-8 of the DEIS that "For example, a portion of the construction activities for the proposed MOX facility would take place on a former spoils pile used for previous F-Ares construction" is incorrect. The proposed MOX facility will not be constructed on a former spoils pile; the spoils pile will be removed prior to construction.

Response: The text in Section 5.2.3 of the FEIS has been modified to indicate that a portion of the proposed MOX facility site had been previously used for storage of spoils, rather than implying that construction would occur on the spoils pile.

J.3.24.16 Comment: 86-086

Comment: The October 29, 2002, correspondence from DCS to the Nuclear Regulatory Commission responding to requests for additional information included the results of the Plutonium Project Pre-construction Environmental Report, including the results of soil analyses at the proposed MOX facility site. The DEIS should have included the results of this report which confirm the previous DCS conclusion in the MOX ER that there are no significant concentrations of radioisotopes or chemicals in the soil that would be hazardous to construction workers health. Consequently, the mitigative action is misleading and unnecessary.

Response: Text has been added to section 4.3.1 of the FEIS to summarize the results of the Preconstruction report. Although no significant contamination was detected, further sampling may be necessary because the study did not include samples to the depth that will be required for building foundations in the area of the spoils pile, and also did not include testing for some chemical contaminants of potential concern. Therefore, the potential mitigation action has been retained.

J.3.24.17 Comment: 86-096

Comment: The word "on-site" should be removed from page 5-11, line 23-24 of the DEIS. Treatment can occur "off-site" as well.

Response: The text in Section 5.2.7 of the FEIS was revised and the referenced word was removed.

J.3.24.18 Comment: 86-098

Comment: The proposed MOX facility stack height is incorrect on page 5-14, line 7 of the DEIS. The revised MOX ER increased the height of the structure to 120 feet.

Response: The text in Section 5.2.10 of the FEIS has been revised to state that the height of the tallest structure would be 120 ft (37 m) above the existing grade.

J.3.24.19 Comment: 27-001

Comment: In Section 2.2.4.2.3, the DEIS does not provide information regarding monitoring buried and exposed pipes for leaks that could result in discharge of liquid waste to ground water. Monitoring/detection, response, and enforcement protocols related to pipe integrity and leaks should be included in the DEIS.

Response: Staff evaluated the impacts of an accidental release from liquid waste pipes in Section 4.3.5.4 of the EIS. As described in this section, pipes carrying stripped uranium and high alpha activity wastes would be double-walled stainless steel pipes designed to withstand natural phenomena hazards, and for which the Savannah River Site Spill Prevention Control and Countermeasures Plan applies. The text has been revised in the FEIS to include the ability of the transfer lines to withstand external man-made hazards. The text has also been revised to include the applicant's commitment to monitoring of the annular space inside the pipes for leaks, as described in the Construction Authorization Request.

J.3.24.20 Comment: 97-002

Comment: The DEIS indicates the proposed action (to build and operate the proposed MOX facility) has some impacts but concludes that the impacts are acceptable regardless of the severity of the impact. This comes across as a non-sequitur. The DEIS should be extremely firm in its conclusions on the requirement of adequate safety and protection, as this is the primary mission of the Nuclear Regulatory Commission (NRC). For example, the DEIS should explicitly acknowledge which mitigation measures are required by the NRC, with clear and objective criteria. In addition, the proposed MOX facility has not been fully designed. However, the DEIS is not clear if reasonable conservatism has been incorporated into the analyses due to the lack of design information or if ALARA (As Low As Reasonably Achievable) considerations are included.

Response: The impacts presented in the EIS are intended not to underestimate the potential impacts of the proposed action. As discussed in responses to comments in the human health risk sections (J.3.12 and J.3.13), conservatism is used in selecting models and parameters used to estimate the impacts. In this way, the EIS should bound the actual impacts and account for future design changes that may occur. Text has been added to Chapter 5 (Mitigation) of the FEIS to clarify which mitigation measures are proposed by the NRC and which mitigation measures would be required as part of any construction authorization approval or operating license issuance.

J.3.24.21 Comment: 10-024

Comment: Many of the mitigation procedures that are identified in the draft EIS seem lacking in their ability to protect workers and surrounding communities.

Response: The discussion of mitigation measures in Chapter 5 of the FEIS has been revised. Text has been added to clarify which mitigation measures are required by laws and regulations, which are suggested by DCS as good practices, and which are recommendations by the Nuclear Regulatory Commission. As suggested by the commenter, a discussion of mitigation measures for the proposed action, including the connected actions, has been added to more completely describe how workers and the public would be protected if the proposed action is taken.

J.3.24.22 Comment: 86-087

Comment: Hydrazine emissions from the proposed MOX facility will be subject to South Carolina Department of Health and Environmental Control (SCDHEC) regulations. The mitigative action specified in Table 5.1 in the DEIS should be limited to compliance with SCDHEC air quality regulations.

Regarding potential accidents, the offgas treatment system (or any ventilation system at the proposed MOX facility) is not required to be credited to reduce the hydrazine concentration in air after a spill because calculations indicate that releases that originate indoors (inside the reagent building or the MOX Building) do not result in concentrations that exceed any temporary emergency exposure limits (TEELs) for the site worker or public. There appear to be errors in the DEIS hydrazine airborne concentration calculation that leads to this conclusion (see comments on Appendix E.1) and furthermore, crediting the release as an indoor release, which reduces the air speed across the surface of the spilled solution, provides sufficient reduction in the airborne concentration to result in acceptable consequences without mitigation by any offgas treatment system.

Response: The text in Table 5.1 and Section 5.2.8 of the FEIS has been revised to state that DCS would limit operational hydrazine emissions to levels that do not cause exceedance of the SCDHEC standard. With respect to accidental releases, the NRC conservatively assumed that the accident would occur during chemical delivery, and that the container contents would be spilled on an outdoor concrete surface (See EIS Section 4.3.5.3). Therefore, modeled downwind air concentrations were not reduced by a factor assuming indoor release. Chemical accidents are also discussed in Comments J.3.12.9, J.3.12.21, J.3.12.22, and J.3.12.25.

J.3.24.23 Comment: 86-091

Comment: Section 5.2.2, page 5-7, lines 45-46 of the DEIS states, "Operation of a sand filter would not directly impact groundwater because the filter would be covered to prevent infiltration and it would have a concrete wall and bottom." Because the proposed action does not include a sand filter this statement is irrelevant.

Response: The NRC disagrees with the comment. Sand filters are being considered as an option for controlling air emissions from the proposed MOX facility, as part of the NRC's NEPA evaluation; the discussion presented in Section 5.2.1 of the EIS is therefore relevant.

J.3.25 Unavoidable Impacts

J.3.25.1 Comment: 89-061

Comment: DEIS Section 4.7.1 reads as a summary of potential unavoidable impacts, many of which are then dismissed if mitigation or good engineering practices are implemented. It is recommended that the discussion be limited to only those areas where unavoidable adverse impacts are certain to occur.

Response: Mitigation measures and good engineering practices identified in Section 4.7.1 of the DEIS were included to provide the reader with a sense of the magnitude of the unavoidable impacts. The NRC agrees that with appropriate mitigation some impacts can be reduced, but also believes that some impacts cannot be avoided entirely even with good engineering practices or other mitigation measures. This section of the FEIS has been revised to eliminate mitigation actions if unavoidable impacts no longer occur, based on revised impact conclusions presented in earlier sections of Chapter 4.

J.3.26 Geology and Soils

J.3.26.1 Comment: 89-031

Comment: In Section 3.2, page 3-1 of the DEIS, the statement that "prime farmland is protected by the U.S. Department of Agriculture" is an oversimplification and technically inaccurate. Although it is a moot point at the Savannah River Site, the Farmland Protection Policy Act offers no absolute protection to important farmlands (i.e., prime, unique, or other statewide or locally important farmlands). It was suggested that the text be changed to: "Certain soils are classified by the U.S. Department of Agriculture, Natural Resources Conservation Service as prime farmland or other important farmlands. The Farmland Protection Policy Act (7 U.S.C. 4201 et seq.) and its implementing regulations (7 CFR 658) requires Federal agencies as part of the NEPA process to consider the extent to which Federal projects and programs contribute to the unnecessary conversion of important farmlands to nonagricultural uses."

Response: The text in Section 3.2 of the FEIS has been revised as suggested in the comment.

J.3.26.2 Comment: 89-032

Comment: In Section 3.2.2, page 3-4 of the DEIS, a citation should be provided for the estimated peak ground acceleration produced at the Savannah River Site from the Charleston earthquake. If the citation for the information in the preceding paragraph is USGS 2001, then this citation should be included at the end of the paragraph.

Response: The citation is DCS Environmental Report (DCS 2002). This citation was added to the text in Section 3.2.2 of the FEIS.

J.3.26.3 Comment: 89-033

Comment: In Section 3.2.2, page 3-5 of the DEIS, the sentence referencing the Uniform Building Code (UBC) should be deleted, as this Code was rendered obsolete with regard to seismic design provisions with publication of the International Building Code (IBC) in 2000. The IBC replaces all national model building codes previously is use. Instead of seismic zone designations, the IBC's seismic design provisions are based on the USGS' National Earthquake Hazard Reduction Program maps that depict maximum considered earthquake ground motions for the United States based on spectral response acceleration.

Response: The text in Section 3.2.2 of the FEIS has been revised as suggested in the comment.

J.3.27 Cultural Resources

J.3.27.1 Comment: 89-038

Comment: It was requested that in Section 3.7.1, the general location of site 38AK546/547 (as done for sites 38AK757, 38AK330, and 38AK548) be provided.

Response: The text in Section 3.7.1 of the FEIS has been revised to state the location of 38AK546/547 relative to the proposed MOX facility.

J.3.27.2 Comment: 86-022

Comment: To confirm Table 2.1, text should be added on page 2-34, lines 5-7 stating that mitigation measures are being planned by DCS, in conjunction with the State Historic Preservation Office, and the Savannah River Site cultural resources staff to mitigate any potential impacts to archaeological sites before construction.

Response: Data recovery obligations for Sites 38AK546/547 and 38AK757 have been completed. The text in the FEIS has been revised accordingly.

J.3.28 Ecology

J.3.28.1 Comments: 85-005
91-004

Comment: An area of concern about the Georgia coastal ecosystem was expressed. It was stated that 90 percent of the fish originate in this ecosystem and that the marshes in the costal area are dying. In addition, these marshes are a vital habitat for a diverse variety of species that compose the food web for marine ecosystems. It was stated that the marshes alone should warrant further study before proceeding with this expansion. It was also felt that processing nuclear fuels seriously threatens these vital resources and could contaminate groundwater, yet assessments such as this DEIS undervalues these risks and their potential irreversibility.

Response: Section 3.9 of the EIS discusses current waste management at the Savannah River Site; Sections 4.3.3.1.2 and 4.3.3.2.2 address potential impacts of the proposed action on surface water and ground water, respectively; and Section 4.3.4.2 discusses waste disposal impacts associated with the proposed action. No wastes would be discharged to groundwater. Only effluents from low-level waste and nonhazardous liquid waste treatment would be eventually discharged to surface waters. The effluents of treatment facilities are tested before release to ensure that discharges are consistent with waste discharge limitations (e.g., radionuclide contaminants are removed before discharge). Therefore, no nuclear wastes associated with the proposed action would contaminate the Savannah River or its associated marsh habitats. This issue is also discussed in Comment J.3.29.1.

J.3.28.2 Comment: 86-127

Comment: In Section H.3.14 of the DEIS, it is suggested that the text be changed to reflect that the transmission line area has been surveyed, that no smooth coneflowers were observed, and that the U.S. Fish and Wildlife Service (USFWS) concurs that the proposed action will not affect resources under their jurisdiction.

Response: The text of Section H.3.1.4 of the FEIS has been changed to reflect that the transmission line area has been surveyed, that no smooth coneflowers were observed, and that the USFWS concurs that the proposed action will not affect resources under their jurisdiction. The letter response from Duncan (USFWS) to Gould (DOE) has also been added to the reference list for Appendix H.

J.3.28.3 Comment: 89-035

Comment: The bat species Myotis lucifugus and Myotis austroriparius are discussed Section 5.5.4 of the DEIS but are not included in the companion list of protected species presented in Appendix A, Table A.1. Please reconcile this inconsistency. Also, to be consistent with the balance of the Ecology discussion, the common name of these two species of bats should be presented in the text, followed by the Latin name in parentheses.

Response: The sentences pertaining to the bat species have been deleted from Section 3.5.4 of the FEIS to avoid confusion or inconsistencies with Appendix A, Table A.1. Neither bat species has been reported for Aiken or Barnwell counties.

J.3.28.4 Comment: 89-036

Comment: In Section 3.5.4 of the DEIS, the common ground dove, loggerhead shrike, and American sandburrowing mayfly are presented in this discussion of protected species but are not included in the companion list of protected species presented in Appendix A, Table A.1. This inconsistency should be reconciled.

Response: The text of Section 3.5.4 of the FEIS has been modified to avoid confusion or inconsistencies with Appendix A, Table A.1. As the common ground dove is not currently listed by the State of South Carolina, mention of it in Section 3.5.4 has been deleted. Similarly, the loggerhead shrike is not reported for Aiken or Barnwell counties. Thus, mention of it has also been deleted. A text addition has been made that states that the American burrowing mayfly is not currently listed by either the U.S. Fish and Wildlife Service or the State of South Carolina.

J.3.28.5 Comment: 89-037

Comment: In Section 3.5.4 of the DEIS, the majority of plant species discussed here are either not listed in Appendix A, Table A.1 or are listed under a different common name. This inconsistency should be reconciled.

Response: The text of Section 3.5.4 of the FEIS pertaining to plant species has been modified to make it consistent with Appendix A, Table A.1. This entailed either editing the common and/or scientific names of the plants or deleting the names of those species that are not listed for the counties of concern.

J.3.28.6 Comment: 89-026

Comment: The statement on page 2-30 of the DEIS, "No wetlands or endangered/threatened species would be impacted" is too broad and not entirely consistent with what is presented in Appendix H, pages H-7 through H-9. Based on what is presented, it is difficult to state that no impacts would occur. Rather, it appears that it would be more appropriate for lines 23 and 24 of page 2-30 to state that negligible impacts to wetlands, aquatic habitat, and threatened/endangered species would be expected.

Response: The text in Table 2.1 of the FEIS on impacts to threatened species and wetlands has been revised to be consistent with the discussion of impacts presented in Appendix H.

J.3.28.7 Comment: 89-029

Comment: It is suggested that Table 2.1, lines 23-27 and the text in Section 2.4, lines 2-4 be revised to have similar wording.

Response: The text in Section 2.4 and Table 2.1 of the FEIS has been revised to state that impacts to endangered or threatened species, wetlands, aquatic and terrestrial habitats (including woodlands) would be small.

J.3.29 Socioeconomics

J.3.29.1 Comments: 43-002
91-005

Comment: The impacts resulting from the loss of fresh water, or contamination of fresh water, could have devastating adverse impacts on public health and the remaining ecosystem functions in the lower reaches of Georgia's five coastal rivers and the vast estuaries and nature-based economy they support. This includes some 40,000 jobs in coastal Georgia alone, about one out of five jobs in coastal Georgia, generating more than $1 billion a year in revenue annually. Risks such as those linked to nuclear fuel processing, storage, handling, transport, use, and conversion to electricity (each of which pose serious threats to these resources and the businesses they support should) be included in the DEIS. These impacts should be evaluated in the DEIS.

Response: The socioeconomic impacts of postulated accidents of the proposed facilities on water and fish resources, and subsequently the economies of communities surrounding the Savannah River Site (SRS), were not estimated in the EIS because it is expected that such impacts, if any, would be small. In evaluation of postulated accidents, with potential damage to crops under the plume in the event of an airborne release and subsequent damage to water resources from the associated runoff, it was found that the amount of radioactive material deposited per unit area would be relatively small. Dilution of runoff would occur fairly rapidly in the affected rivers and streams and would not cause any significant risk to the economies of the communities downstream of the location of the proposed facility.

Text has been added to Sections 4.6 and Appendix D in the FEIS to clarify the issue.

The water resource impacts of the proposed action are discussed in Section 4.3.3 of the EIS. Water would be used during construction and operation. However, this water would come from deeper groundwater aquifers and would not significantly affect water flow in the Savannah River. There would also be no direct discharges into surface water during construction and discharges from the WSB during operation would have small impacts on surface water quality. Indirect discharges to the Savannah River would occur from treating liquid waste from the proposed MOX facility. However, treating this waste is not anticipated to significantly change the quantity or quality of the discharges for existing SRS waste processing facilities. Because the impact to water resources is expected to be small, alternatives to the proposed use of surface water to receive treated effluent are not required. Mitigation measures to further minimize any possible impact on water resources are discussed in Section 5.2.1 of the EIS. This issue is also discussed in Comment J.3.28.1.

This page is being withheld pursuant to 10 CFR 2.390(a).

This page is being withheld pursuant to 10 CFR 2.390(a).

J.3.30.10 Comment: 89-024

Comment: Revise page 2-25, line 36 of the DEIS to read ". . .was manufactured at the DOE's Los Alamos National Laboratory (LANL) and at the Bochvar Institute in Moscow, Russia."

Response: The text in Section 2.3.5 of the FEIS has been modified to include the Bochvar Institute.

J.3.30.11 Comment: 89-025

Comment: In the Waste Management, Construction Section of Table 2.1 (page 2-29, lines 12-14 of the DEIS) both the liquid and solid wastes need to be labeled as "nonhazardous waste" as done on lines 32 and 34.

Response: The text was revised to include nonhazardous liquid and nonhazardous solid in the Construction Waste portion of Table 2.1 of the FEIS.

J.3.30.12 Comment: 89-028

Comment: In the infrastructure, normal operations section of Table 2.1 (page 2-31, line 21 of the DEIS), the percent of electric power capacity for operation (38.5%) does not agree with the percentage presented in Section H.6.2 (p. H-13, line 6), 36.4%.

Response: The percentage of electric power capacity in Table 2.1 of the FEIS was revised to read "36.4%."

J.3.30.13 Comment: 89-027

Comment: In Section 2.4, page 2-30 of the DEIS, the woodland habitat loss description under the proposed action column is awkward. Suggest it be reworded for clarity as follows: "Up to 14.7 ha (36.4 ac) of woodlands would be cleared for the proposed facilities. This would represent <1% of the annual timber harvest at SRS."

Response: The suggested text revision has been made to Table 2.1 of the FEIS under the heading of "Habitat Loss."

J.3.30.14 Comment: 89-048

Comment: In Table 4.13, the sixth column should be "Number of LCFs," not "Chance of LCF."

Response: The heading for the sixth column in Table 4.13 of the FEIS has been corrected to read "Fatalities (LCFs)."

J.3.30.15 Comment: 89-069

Comment: In Appendix F, page F-11, line 10 of the DEIS, "1900" should be "1990."

Response: Text in the FEIS has been changed as suggested.

J.3.30.16 Comment: 86-008

Comment: On page 2-13, line 42 of the DEIS, it is suggested to change to whenever "practical" rather than whenever "possible."

Response: Section 2.2.3.3.3 of the FEIS has been revised to indicate that the Savannah River Site is compacting solid waste whenever practical.

J.3.30.17 Comments: 86-010
86-015

Comment: On page 2-14, line 46 of the DEIS change "permitted" to "suitable." Department of Energy low-level radioactive waste sites are neither permitted nor licensed nor do they need to be.

Response: The text in Section 2.2.4.1 of the FEIS has been revised to indicate that low-level radioactive waste would be sent to a suitable disposal site.

J.3.30.18 Comments: 86-011
86-012
86-014

Comment: DEIS should not specify design details such as tank sizes. Otherwise, design evolution might mandate DEIS revisions. Where necessary, bounding conditions can be specified for impact projections; but these should be restricted to the discussions where they are needed and not simply cast about in general descriptions of the facility.

Response: The text in Section 2.2.4 of the FEIS has been revised to eliminate numerical values on design capacity for tanks or containers, and waste volumes produced by processing materials from the proposed MOX facility. Values on volumes of chemicals that could be released during an accident are reported in Chapter 4 of the EIS in order to provide the reader with a bounding estimate on the magnitude of impacts.

J.3.30.19 Comment: 86-018

Comment: In the chemical accident section of Table 2.1 (page 2-27, lines 52-53 of the DEIS), the Nuclear Regulatory Commission should consider deleting reference to impact from chemical spills on the general public. The DEIS contains no scenario of a release from the MOX Facility, the Pit Disassembly and Conversion Facility, or the Waste Solidification Building that results in any effect beyond the Savannah River Site boundary.

Response: The commenter is correct. The reference to the general public has been deleted from that section of Table 2.1.

J.3.30.20 Comment: 86-020

Comment: In the land use, accident section of Table 2.1 (page 2-31, lines 49-50 of the DEIS), the use of the term "severe accident" is inappropriate. In 10 CFR Part 70 (see NUREG-1718), the appropriate terms are "likely, unlikely, high unlikely, and credible." Text should be changed to say "highly unlikely" (see DEIS page 2-37 which notes that a severe accident is highly unlikely).

Response: The phrase "severe accident" has been replaced with the phrase "highly unlikely" in this section of Table 2.1.

J.3.30.21 Comment: 86-013

Comment: Section 2.2.4.2.1, page 2-15 of the DEIS states that the acid bottoms collected in the evaporator would be neutralized with sodium hydroxide in a neutralization tank. After neutralization, the waste would be pumped to two 110-L (30-gal) cement head tanks. The acidic bottoms will be collected in a bottoms tank where the solution will be sampled to determine concentrations. Based on this sample, the solution would be metered to one of three cement head tanks where neutralization would occur prior to transfer to the mixer. It is suggested that the text be revised to state the following, "After collection, the waste would be pumped into small batch cement head tanks to be neutralized."

Response: The text in Section 2.2.4.2.1 of the FEIS has been revised to indicate that after the acid bottoms collected in the evaporator were neutralized the material would be mixed with cement and poured into approved containers.

J.3.30.22 Comment: 86-061

Comment: On page 4-47, line 16-17 of the DEIS, after "unrestricted use" add "or restricted use."

Response: The text in the FEIS has been changed to indicate that the property would be released for unrestricted use or restricted used, under certain conditions.

J.3.30.23 Comment: 86-121

Comment: Table E.6 in the DEIS needs a reference.

Response: A reference has been added to Table E.6 in Appendix E, Section E.2.1.2 of the FEIS.

J.3.30.24 Comment: 86-070

Comment: In Section 4.4.2, page 4-67, line 20-21 of the DEIS, the citation for the environmental assessment for the conversion facility in Wilmington, NC, is incorrect.

Response: The commenter is correct that NUREG -0170 (NRC 1977) is not the appropriate reference. The new reference for the environmental assessment GE fuel fabrication facility in Wilmington, NC, will be added to the text in Section 4.4.2 of the FEIS.

J.3.30.25 Comment: 86-071

Comment: Inclusion of impacts from converting uranium hexafluoride to uranium dioxide and impacts from transporting spent MOX fuel to the geologic repository was questioned. If the Nuclear Regulatory Commission (NRC) feels compelled to retain these impacts, the DEIS should note that these impacts replace similar avoided impacts from the conversion and disposal of low enriched uranium fuel and that the net impact is zero.

Response: Conversion of uranium hexafluoride to uranium dioxide at the Global Nuclear Fuel-Americas, LLC Facility in Wilmington, North Carolina, is considered a connected action that is required for the surplus plutonium conversion process at the Savannah River Site.

The transport of spent MOX fuel to a geologic repository described in Section 4.4 would not occur without production of MOX fuel. A brief discussion of impacts from transporting spent MOX fuel thus seems appropriate. The NRC cannot conclude that the transportation impacts presented in Section 4.4 of the EIS "replace similar avoided impacts from conversion and disposal of low enriched uranium fuel and the net impact is zero" as stated in the comment.

J.3.30.26 Comment: 86-032

Comment: Line 13 on page 3-41 of the DEIS should be corrected to note 24-hour shifts rather than 12-hour shifts.

Response: The text in Section 3.8.5 of the FEIS was changed as suggested in the comment.

J.3.30.27 Comment: 86-094

Comment: In line 3 on page 5-11 of the DEIS, the word "recycling" should be deleted.

Response: The word "recycling" was deleted from the FEIS text as suggested by the commenter.

J.3.30.28 Comment: 86-095

Comment: It is suggested that line 18, page 5-11 of the DEIS be reworded to "A new tank would be constructed within the WSB so that the high-alpha-activity waste can be neutralized before being solidified to a TRU waste form."

Response: The text in Section 5.2.7 of the FEIS has been revised and the text referenced in the comment has been deleted.

J.3.30.29 Comment: 89-040

Comment: The text on page 3-58, line 38 of the DEIS states that housing units are expected to reach 35,400 in 2001. However, this is not consistent with Table 3.16 on page 3-60, which states this estimate is for 2002.

Response: Data shown are for 2002. The text in the FEIS has been changed to reflect the comment.

J.3.30.30 Comment: 89-041

Comment: On page 3-59, lines 33 and 35 of the DEIS refer to housing units in the "county" when it should be housing units in the "ROI."

Response: The data shown are for the region of influence (ROI). The FEIS has been changed to reflect the comment.

J.3.30.31 Comment: 89-042

Comment: In Table 3.16, the 2002 column of the table does not have a source footnoted (as do the 1990 and 2000 columns).

Response: A source has been added to the column showing the 2002 data.

J.3.30.32 Comment: 89-043

Comment: State Route 781 is not shown in either Figure 3.1 or 3.8, as indicated in the text. Also, the text refers to State Routes (SRs), while the Figure 3.8 refers to "SC."

Response: State Route 781 has been added to Figure 3.8, and the text and figure in the FEIS have been made consistent with each other.

J.3.30.33 Comment: 89-068

Comment: A reference should be provided for U.S. Census Bureau data used in calculations in Appendix D, as well as for the sources provided in the appendix tables.

Response: The relevant references have been added to Appendix D in the FEIS.

J.3.30.34 Comment: 89-070

Comment: The text on page H-15, lines 7 and 8 of the DEIS states that four additional local public service employees would be required, while Table H.1 (p H-14) shows five additional employees. Please reconcile this inconsistency.

Response: The text in the FEIS has been changed to reflect the comment; the correct number is five.

J.3.30.35 Comment: 86-104

Comment: On page C-10, line 19 of the DEIS an editorial change should be "0 to 139."

Response: The text in Appendix C, Section C.2.1.2 of the FEIS has been corrected to reflect this editorial change.

J.3.30.36 Comment: 86-106

Comment: In Table C.2, the per package quantities are not accurate. These may be more accurate for a "per shipment" amount.

Response: These are per shipment quantities as noted in Section C.2.3 of the EIS. A footnote will be added to the table in the FEIS for clarification.

J.3.30.37 Comment: 86-107

Comment: Page C-14 should be corrected to note that Transportation Safeguards Division (TSD) is now called the Office of Secure Transportation, and the DOE Albuquerque Office is now a National Nuclear Security Administration (NNSA) Service Center.

Response: The text in Section C.2.3 has been changed in the FEIS.

J.3.30.38 Comment: 86-109

Comment: There was concern about the footnote used in Table C.5. The footnote is misleading as this footnote currently is used for the Type A packages as well as Type B. Type A packages are not used for plutonium metal shipments. The intent is to differentiate between the Type B release fractions used for the plutonium metal shipments and those used for the fresh, unirradiated MOX fuel shipments (Footnote "c").

Response: The footnotes in Table C.5 have been changed in the FEIS.

J.3.30.39 Comment: 89-052

Comment: On page 4-66, line 12 of the DEIS, it may be more clear to use the phrase "from the PDCF" after "recovered HEU" so that it is not confused with waste uranium from the proposed MOX facility.

Response: The text in Section 4.4.1.3 has been changed in the FEIS.

J.3.30.40 Comment: 89-062

Comment: In Section 4.7.1, page 4-94 of the DEIS, the statement regarding proportionate increase in amount of transuranic (TRU) waste (9%) is inconsistent with Section 4.5.1.2 (24%).

Response: The text in Section 4.5.1.1 has been revised in the FEIS. The TRU waste generated would constitute 26% and 13% of the treatment and storage capacities respectively.

J.3.30.41 Comments: 86-049
89-047

Comment: It is recommend that line 2 on page 4-29 of the DEIS be reworded to say the process will produce a solid TRU waste "suitable" for disposal at WIPP. The use of the word "similar" implies some differences and issues.

Response: The word "similar" has been changed in the FEIS to "suitable" as suggested.

J.3.30.42 Comment: 86-044

Comment: On page 4-26, lines 37-40 of the DEIS the lists of hazardous "liquid" wastes contains examples that are not liquids (i.e. batteries).

Response: The text has been revised to delete the word "liquid."

J.3.30.43 Comment: 27-002

Comment: Fourmile Branch appears to flow southwesterly in Figures 3.2 and 3.3, not southeasterly as described in the text. This apparent discrepancy should be checked and corrected, if warranted.

Response: Section 3.3.1 was revised to state that Fourmile Branch flows southwesterly.

J.3.30.44 Comment: 27-004

Comment: The first sentence in Section 3.2.2 of the DEIS reads, "Several underground aquifers occur... ." The word "underground" is redundant and should be deleted; all aquifers are below ground.

Response: The word "underground" has been deleted.

J.3.30.45 Comment: 86-023

Comment: The typographical error on page 3-7, lines 23-24 of the DEIS should be corrected to "Beaufort-Jasper."

Response: The typographical error for the Water Authority name in Section 3.3.1 was changed to read "Beaufort-Jasper Water Authority."

J.3.30.46 Comment: 86-024

Comment: In Section 3.3.1, the DEIS refers to the S-Area sewage treatment plant. With the opening of the Central Sanitary Waste Treatment Facility, the S-Area plant, and all other area treatment plants at the Savannah River Site were closed.

Response: The text in Section 3.3.1 was changed to indicate that discharge is received from the Central Sanitary Waste Treatment Facility rather than the S-Area sewage treatment plant.

J.3.30.47 Comment: 86-025

Comment: In Section 3.3.2, page 3-11, line 3 of the DEIS delete the word "Creek." The aquifer is the Upper Three Runs Aquifer.

Response: The name of the aquifer has been corrected.

J.3.30.48 Comment: 86-026

Comment: It is suggested that "waste management facilities" be added to the lists for facilities that could possibly contaminate groundwater on Section 3.3.2, page 3-12, lines 27-29 of the DEIS.

Response: The text in Section 3.3.2 has been revised as suggested in the comment.

J.3.30.49 Comment: 86-034

Comment: On page 3-7, line 24 of the DEIS the correct spelling is Hardeevile (South Carolina), not Hardeville.

Response: The typographical error has been corrected.

APPENDIX K:

COMMENTER AND COMMENT DOCUMENT INDEX

APPENDIX K:

COMMENTER AND COMMENT DOCUMENT INDEX

K.1. Index by Comment Document Number

Comment Document Number	Accession Number[a]	Commenter
0001	ml030660494	Mark Hogue
0002		Leah R. Karpen
0003	ml030940262	Pamela J. O'Brien
0004	ml031210403	Jody Lanier
0005	same	Jody Lanier
0006	ml031210406	William D. Hooker, Sr.
0007	ml031210491	Whitney Erin Lamb
0008	ml031210487	Andre Entermann
0009		Vernell Cutter, Center for Environmental Justice
0010	ml031210428	Sara Barczak, Southern Alliance for Clean Energy
0011	ml031210434	Edwin S. Presnell, Augusta Metro Chamber of Commerce
0012		Scott Justice
0013	ml031210485	Glenn Carroll
0014	ml031210479	Ernest S. Chaput, Economic Development Partnership of Aiken and Edgefield Counties
0015	ml031210451	Adele Kushner, Action for a Clean Environment
0016	ml031210483	Gresham Barrett, Congressman, 3rd District of South Carolina
0017	ml031210450	C. David Cowfer, Savannah River Site Retiree Association
0018	ml031210439	Donald A. Orth
0019	ml031210436	Mary T. Kelly, League of Women Voters of South Carolina
0020	ml031130034	Susan Cain Giusto
0021	ml030920471	Roy G. Hurni
0022	ml031130031	Linda Odom
0023	ml031210453	James E. Smith, Jr., State Representative, House of Representatives, State of SC
0024	ml031080139	Lewis Patrie, Western N.C. Physicians for Social Responsibility
0025	ml031040250	William J. Mottel
0026	ml031130021	Camille Price, Augusta Tomorrow, Inc.
0027	ml031600204	Gregory Hogue, Department of the Interior
0028		Tom Clements
0029		Marvin I. Lewis
0030		Scott Justice

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0031	ml031200073	Ernest S. Chaput
0032		Kellie Gasink, Green Party
0033		Whitney Erin Lamb
0034		Kirk Cobb
0035		Vernell Cutter, Center for Environmental Justice
0036		Kelli Pearson
0037		Cheryl Jay
0038		Carol Cain
0039		Ellen O'Leary
0040		Bobbie Paul
0041		Victor Mereski
0042		Chester Dunham
0043		David Kyler, Center for a Sustainable Coast
0044		Sara Barczak, Southern Alliance for Clean Energy
0045		Jody Lanier
0046		Andre Entermann
0047		Peggy Roche, Carolina Peace Resource Center
0048		Tom Clements, Green Peace International
0049		Bill Robinson, Allendale County Council
0050		Mal McKibben, Citizens for Nuclear Technology Awareness
0051		Thomas Williams, Barnwell County Council
0052		William Hooker, Savannah River Group of the Sierra Club
0053		Don Moniak, Blue Ridge Environmental Defense League
0054		Ed Presnell, Augusta Metro Chamber of Commerce
0055		David Walker, Aiken Branch of the NAACP
0056		Mary Kelly, League of Women Voters of South Carolina
0057		Charles Weiss, Greater Aiken Chamber of Commerce
0058		Carolyn Betsy Rivard
0059		Brendolyn Jenkins, Imani Group
0060		David Cowfer, Savannah River Site Retiree Association
0061		Glenn Carroll, Georgians Against Nuclear Energy
0062		Ed Arnold, Physicians for Social Responsibility
0063		Ernest Chaput
0064		Robert Guild, South Carolina Chapter of the Sierra Club
0065		Darrell Watson
0066		Jen Kato, Georgia Chapter of the Sierra Club
0067		Tom Howell

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0068		Adele Kushner, Action for a Clean Environment
0069		Joanne Steele
0070		Charles Utley
0071		Lew Patrie, Western N.C. Physicians for Social Responsibility
0072		Mary Olson, Nuclear Information and Resource Service
0073		Lou Zeller, Blue Ridge Environmental Defense League
0074		Peter Sipp
0075		James E. Smith, State House of Representatives, South Carolina
0076		Gregg Jocoy, York County South Carolina Greens
0077		Judy Aulette, Charlotte Area Green Party
0078	ml031140007	Amanda Voss
0079	ml031130043	Linda Ewald
0080	ml031140009	Betsy Rivard, Women's Action for New Directions
0081	ml031140008	Berta R. Laney, Women's Action for New Directions
0082	ml031320272	Chris Miller
0083	ml031340393	Joan O. King
0084	ml031350217	Lauren Sorkin
0085	ml031400071	Adrienne Valentino
0086	ml031400084	Peter S. Hastings, Duke Cogema Stone & Webster
0087	ml031400069	Allison Macfarlane
0088	ml031420049	Soumya Ganapathy
0089	ml031400037	Edward J. Siskin, U.S. Department of Energy, National Nuclear Security Administration
0090	ml031400090	Rachel Western
0091	ml031400092	David Kyler, Center for a Sustainable Coast
0092	ml031400086	Glenn Carroll, Georgians Against Nuclear Energy
0093	ml031420683	Mary Olson, Nuclear Information and Resource Service
0094		Ralph L. Andersen, Nuclear Energy Institute
0095	ml031400083	Thomas R. Mott
0096	ml031400327	Mildred McClain, Citizens for Environmental Justice
0097	ml031420029	Alexander P. Murray
0098	ml031420055	Sara Barczak, Southern Alliance for Clean Energy
0099	ml031430074	Bev Baker
0100	ml031420021	Meira Warshauer
0101	ml031420042	Judy Ponder
0102	ml031420036	Bart Patton
0103		Terri Jagger Bline
0103		Emily B. Calhoun

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0103		Faye McKay-Clegg
0103		Eleanor L. Richardson
0103		Marguerite Sweet
0104		Petition (Don"t brand the Southeast "Plutonium Alley"! We Don't waste plutonium fuel)
0105	ml031400076	Robert B. Mills
0106	ml031400079	Diane F. Matesic
0107	ml031420017	Heinz J. Mueller, U.S. Environmental Protection Agency, Region 4
0108	ml031420019	Carolyn Cain
0109	ml031420011	Jennifer Zanck
0110	ml031420014	Mai Dang
0111	ml031480058	Ruth Thomas, Environmentalists, Inc.
0112	ml031600242	Ruth Sanford
0113	ml031620072	Dell Isham, South Carolina Chapter of the Sierra Club
0114		Louis Zeller, Blue Ridge Environmental Defense League
0115		Mary Olson, Nuclear Information and Resource Service
0116	ml031780008	Peter James Atherton

[a] A blank indicates no accession number available.

K.2. Index by Commenter/Organization

Commenter Name/Organization	Accession Number[a]	Comment Document Number
Action for a Clean Environment (Adele Kushner)	ml031210451	0015
Action for a Clean Environment (Adele Kushner)		0068
Allendale County Council (Bill Robinson)		0049
Andersen, Ralph L. (Nuclear Energy Institute)		0094
Arnold, Ed (Physicians for Social Responsibility)		0062
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Augusta Metro Chamber of Commerce (Edwin S. Presnell)	ml031210434	0011
Augusta Metro Chamber of Commerce (Ed Presnell)		0054
Augusta Tomorrow, Inc. (Camille Price)	ml031130021	0026
Aulette, Judy (Charlotte Area Green Party)		0077
Baker, Bev	ml031430074	0099
Barczak Sara (Southern Alliance for Clean Energy)	ml031210428	0010
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61-002	J.3.4.5	NEPA Process	
61-003	J.3.5.1	Licensing Process	
61-004	J.3.7.5	Scope - DOE Policy	
61-005	J.3.17.5	Waste Management	
61-006	J.3.4.2	NEPA Process	

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61-007	J.3.11.2	Alternatives - Immobilization	
61-008	J.3.7.2	Scope - DOE Policy	
62-001	J.3.4.5	NEPA Process	Ed Arnold
62-002	J.3.14.12	Accidents	
62-003	J.3.4.5	NEPA Process	
62-003	J.3.8.1	Scope - Safety Evaluation Report	
63-001	J.3.2	General Support	Ernest S. Chaput
63-002	J.3.10.7	Alternatives	
63-003	J.3.14.8	Accidents	
63-004	J.3.6.3	Scope - General	
64-001	J.3.1.3	General Opposition	Robert Guild
64-002	J.3.11.2	Alternatives - Immobilization	
64-003	J.3.4.2	NEPA Process	
64-004	J.3.6.9	Scoep - General	
64-005	J.3.19.6	Environmental Justice	
64-006	J.3.14.1	Accidents	
64-006	J.3.14.16	Accidents	
64-007	J.3.19.3	Environmental Justice	
64-007	J.3.19.4	Environmental Justice	
65-001	J.3.9.2	Scope - Terrorism	Darrell Watson
65-002	J.3.9.1	Scope - Terrorism	
65-003	J.3.21.1	MOX Fuel Use	
65-004	J.3.8.3	Scope - Safety Evaluation Report	
66-001	J.3.1.2	General Opposition	Jen Kato
66-002	J.3.23.11	Cost Benefit	
66-003	J.3.12.6	Human Health Risk	
66-004	J.3.23.9	Cost Benefit	
66-005	J.3.12.3	Human Health Risk	
66-006	J.3.4.4	NEPA Process	
66-006	J.3.4.5	NEPA Process	
66-007	J.3.17.4	Waste Management	
66-007	J.3.17.5	Waste Management	
66-008	J.3.9.1	Scope - Terrorism	
67-001	J.3.17.3	Waste Management	Tom Howell
67-002	J.3.21.1	MOX Fuel Use	
67-003	J.3.8.4	Scope - Safety Evaluation Report	
68-001	J.3.11.2	Alternatives - Immobilization	Adele Kushner
68-002	J.3.9.1	Scope - Terrorism	

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68-002	J.3.9.2	Scope - Terrorism	
69-001	J.3.1.6	General Opposition	Joanne Steele
69-002	J.3.11.1	Alternatives - Immobilization	
70-001	J.3.19.3	Environmental Justice	Charles Utley
71-001	J.3.13.6	Human Health - Radiological Risk	Lewis Patrie
71-002	J.3.20.12	Transportation	
71-003	J.3.9.2	Scope - Terrorism	
71-004	J.3.1.6	General Opposition	
71-005	J.3.13.5	Human Health - Radiological Risk	
71-006	J.3.17.4	Waste Management	
71-007	J.3.13.5	Human Health - Radiological Risk	
71-008	J.3.13.1	Human Health - Radiological Risk	
71-009	J.3.6.9	Scope - General	
71-009	J.3.21.1	MOX Fuel Use	
71-010	J.3.9.1	Scope - Terrorism	
71-011	J.3.7.8	Scope - DOE Policy	
71-012	J.3.9.1	Scope - Terrorism	
71-012	J.3.9.2	Scope - Terrorism	
71-013	J.3.11.2	Alternatives - Immobilization	
71-014	J.3.17.4	Waste Management	
71-015	J.3.7.6	Scope - DOE Policy	
72-001	J.3.10.3	Alternatives	Mary Olson
72-002	J.3.10.1	Alternatives	
72-003	J.3.3.1	Purpose and Need	
72-004	J.3.7.8	Scope - DOE Policy	
72-005	J.3.10.3	Alternatives	
72-006	J.3.21.1	MOX Fuel Use	
72-007	J.3.19.7	Environmental Justice	
72-008	J.3.22.1	Cumulative Impacts	
72-009	J.3.13.6	Human Health - Radiological Risk	
72-010	J.3.19.8	Environmental justice	
72-011	J.3.7.6	Scope - DOE Policy	
72-012	J.3.7.6	Scope - DOE Policy	
72-013	J.3.11.3	Alternatives - Immobilization	
72-014	J.3.6.2	Scope - General	
72-015	J.3.10.1	Alternatives	
73-001	J.3.13.7	Human Health - Radiological Risk	Lou Zeller
73-002	J.3.10.1	Alternatives	

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73-003	J.3.08.3	Scope - Safety Evaluation Report	
73-004	J.3.13.8	Human Health - Radiological Risk	
73-005	J.3.10.8	Alternatives	
74-001	J.3.8.2	Scope - Safety Evaluation Report	Peter Sipp
74-002	J.3.10.3	Alternatives	
75-001	J.3.4.5	NEPA Process	James E. Smith
76-001	J.3.5.3	Licensing Process	Gregg Jocoy
76-002	J.3.23.1	Cost Benefit	
76-003	J.3.23.1	Cost Benefit	
77-001	J.3.6.2	Scope - General	Judy Aulette
77-002	J.3.21.1	MOX Fuel Use	
77-003	J.3.6.10	Scope - General	
77-004	J.3.7.6	DOE Policy	
77-005	J.3.19.10	Environmental Justice	
77-006	J.3.9.1	Scope - Terrorism	
77-007	J.3.6.4	Scope - General	
77-008	J.3.4.1	NEPA Process	
77-009	J.3.1.6	General Opposition	
78-001	J.3.11.2	Alternatives - Immobilization	Amanda Voss
78-002	J.3.5.1	Licensing Process	
78-003	J.3.19.3	Environmental Justice	
79-001	J.3.1.1	General Opposition	Linda Ewald
79-002	J.3.17.4	Waste Management	
79-003	J.3.19.3	Environmental Justice	
79-004	J.3.23.1	Cost Benefit	
80-001	J.3.5.1	Licensing Process	Betsy Rivard
80-002	J.3.19.4	Environmental Justice	
80-003	J.3.11.2	Alternatives - Immobilization	
81-001	J.3.19.3	Environmental Justice	Berta R. Laney
81-002	J.3.11.2	Alternatives - Immobilization	
81-003	J.3.5.1	Licensing Process	
82-001	J.3.9.1	Scope - Terrorism	Chris Miller
82-002	J.3.19.9	Environmental Justice	
82-003	J.3.8.2	Scope - Safety Evaluation Report	
82-004	J.3.19.3	Environmental Justice	
82-005	J.3.10.5	Alternatives	
82-006	J.3.7.1	Scope - DOE Policy	
83-001	J.3.1.1	General Opposition	Joan O. King

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84-001	J.3.1.6	General Opposition	Lauren Sorkin
84-002	J.3.19.4	Environmental Justice	
84-002	J.3.19.9	Environmental Justice	
84-003	J.3.10.5	Alternatives	
85-001	J.3.20.1	Transportation	Adrienne Valentino
85-002	J.3.1.4	General Opposition	
85-003	J.3.12.17	Human Health Risk	
85-004	J.3.9.1	Scope -Terrorism	
85-005	J.3.28.1	Ecology	
86-001	J.3.2	General Support	Peter S. Hastings
86-002	J.3.11.4	Alternatives - Immobilization	
86-003	J.3.14.8	Accidents	
86-003	J.3.14.16	Accidents	
86-004	J.3.19.5	Environmental Justice	
86-005	J.3.24.1	Mitigation	
86-006	J.3.30.4	Editorial	
86-007	J.3.6.7	Scope - General	
86-008	J.3.30.16	Editorial	
86-009	J.3.17.10	Waste Management	
86-010	J.3.30.17	Editorial	
86-011	J.3.30.18	Editorial	
86-012	J.3.30.18	Editorial	
86-013	J.3.30.21	Editorial	
86-014	J.3.30.18	Editorial	
86-015	J.3.30.17	Editorial	
86-016	J.3.10.9	Alternatives	
86-017	J.3.10.10	Alternatives	
86-018	J.3.30.19	Editorial	
86-019	J.3.17.8	Waste Management	
86-020	J.3.30.20	Editorial	
86-021	J.3.15.1	Air Quality	
86-022	J.3.27.2	Cultural Resources	
86-023	J.3.30.45	Editorial	
86-024	J.3.30.46	Editorial	
86-025	J.3.30.47	Editorial	
86-026	J.3.30.48	Hydrology	
86-027	J.3.16.9	Hydrology	
86-028	J.3.16.10	Hydrology	

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86-029	J.3.16.11	Hydrology	
86-030	J.3.16.12	Hydrology	
86-031	J.3.15.1	Air Quality	
86-032	J.3.30.26	Editorial	
86-033	J.3.12.7	Human Health Risk	
86-034	J.3.12.8	Human Health Risk	
86-035	J.3.13.17	Human Health - Radiological Risk	
86-036	J.3.13.18	Human Health - Radiological Risk	
86-037	J.3.12.9	Human Health Risk	
86-038	J.3.12.10	Human Health Risk	
86-039	J.3.12.18	Human Health Risk	
86-040	J.3.12.9	Human Health Risk	
86-041	J.3.12.9	Human Health Risk	
86-042	J.3.15.3	Air Quality	
86-043	J.3.17.13	Waste Management	
86-044	J.3.30.42	Editorial	
86-045	J.3.17.1	Waste Management	
86-046	J.3.17.1	Waste Management	
86-047	J.3.17.8	Waste Management	
86-048	J.3.17.2	Waste Management	
86-049	J.3.30.41	Editorial	
86-050	J.3.17.8	Waste Management	
86-051	J.3.14.15	Accidents	
86-052	J.3.14.8	Accidents	
86-053	J.3.14.17	Accidents	
86-054	J.3.14.20	Accidents	
86-055	J.3.14.20	Accidents	
86-056	J.3.13.6	Human Health - Radiological Risk	
86-057	J.3.14.18	Accidents	
86-058	J.3.12.24	Human Health Risk	
86-059	J.3.12.25	Human Health Risk	
86-060	J.3.12.19	Human Health Risk	
86-061	J.3.30.22	Editorial	
86-062	J.3.18.1	Decommissioning	
86-063	J.3.18.4	Decommissioning	
86-064	J.3.18.3	Decommissioning	
86-065	J.3.19.5	Environmental Justice	
86-066	J.3.14.9	Accidents	

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86-067	J.3.20.3	Transportation	
86-068	J.3.20.4	Transportation	
86-069	J.3.13.6	Human Health - Radiological Risk	
86-070	J.3.30.24	Editorial	
86-071	J.3.30.25	Editorial	
86-072	J.3.22.5	Cumulative Impacts	
86-073	J.3.17.8	Waste Management	
86-074	J.3.24.2	Mitigation	
86-075	J.3.24.3	Mitigation	
86-076	J.3.24.3	Mitigation	
86-077	J.3.24.3	Mitigation	
86-078	J.3.24.5	Mitigation	
86-079	J.3.24.6	Mitigation	
86-080	J.3.24.11	Mitigation	
86-081	J.3.24.12	Mitigation	
86-082	J.3.24.13	Mitigation	
86-083	J.3.24.12	Mitigation	
86-084	J.3.24.14	Mitigation	
86-085	J.3.24.7	Mitigation	
86-086	J.3.24.16	Mitigation	
86-087	J.3.24.22	Mitigation	
86-088	J.3.19.5	Environmental Justice	
86-089	J.3.19.5	Environmental Justice	
86-090	J.3.24.4	Mitigation	
86-091	J.3.24.23	Mitigation	
86-092	J.3.24.15	Mitigation	
86-093	J.3.24.11	Mitigation	
86-094	J.3.30.27	Editorial	
86-095	J.3.30.28	Editorial	
86-096	J.3.24.17	Mitigation	
86-097	J.3.24.7	Mitigation	
86-098	J.3.24.18	Mitigation	
86-099	J.3.16.15	Hydrology	
86-100	J.3.20.5	Transportation	
86-101	J.3.20.13	Transportation	
86-102	J.3.20.6	Transportation	
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86-105	J.3.20.8	Transportation	
86-106	J.3.30.36	Editorial	
86-107	J.3.30.37	Editorial	
86-108	J.3.20.14	Transportation	
86-109	J.3.30.38	Editorial	
86-110	J.3.20.9	Transportation	
86-111	J.3.20.10	Transportation	
86-112	J.3.13.6	Human Health - Radiological Risk	
86-113	J.3.12.25	Human Health Risk	
86-114	J.3.12.21	Human Health Risk	
86-115	J.3.12.21	Human Health Risk	
86-116	J.3.12.22	Human Health Risk	
86-117	J.3.13.9	Human Health - Radiological Risk	
86-118	J.3.13.10	Human Health - Radiological Risk	
86-119	J.3.13.11	Human Health - Radiological Risk	
86-120	J.3.13.11	Human Health - Radiological Risk	
86-121	J.3.30.23	Editorial	
86-122	J.3.14.23	Accidents	
86-123	J.3.13.19	Human Health - Radiological Risk	
86-124	J.3.14.24	Accidents	
86-125	J.3.13.20	Human Health - Radiological Risk	
86-126	J.3.15.6	Air Quality	
86-127	J.3.28.2	Ecology	
87-001	J.3.7.11	Scope - DOE Policy	Allison Macfarlane
87-002	J.3.17.9	Waste Management	
87-003	J.3.11.2	Alternatives - Immobilization	
87-004	J.3.10.2	Alternatives	
87-005	J.3.11.2	Alternatives - Immobilization	
87-006	J.3.23.8	Cost Benefit	
88-001	J.3.9.1	Terrorism	Soumya Ganapathy
88-002	J.3.8.2	Scope - Safety Evaluation Report	
88-003	J.3.19.3	Environmental justice	
88-004	J.3.10.5	Alternatives	
89-001	J.3.14.9	Accidents	Edward J. Siskin
89-002	J.3.14.17	Accidents	
89-003	J.3.14.18	Accidents	
89-004	J.3.14.20	Accidents	

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89-006	J.3.14.9	Accidents	
89-007	J.3.14.16	Accidents	
89-007	J.3.14.18	Accidents	
89-008	J.3.6.3	Scope - General	
89-009	J.3.19.5	Environmental Justice	
89-010	J.3.15.1	Air Quality	
89-011	J.3.15.1	Air Quality	
89-012	J.3.18.2	Decommissioning	
89-013	J.3.24.1	Mitigation	
89-014	J.3.6.3	Scope - General	
89-015	J.3.30.1	Editorial	
89-016	J.3.30.2	Editorial	
89-017	J.3.30.3	Editorial	
89-018	J.3.30.4	Editorial	
89-019	J.3.30.6	Editorial	
89-020	J.3.30.5	Editorial	
89-021	J.3.30.7	Editorial	
89-022	J.3.30.8	Editorial	
89-023	J.3.30.9	Editorial	
89-024	J.3.30.10	Editorial	
89-025	J.3.30.11	Editorial	
89-026	J.3.28.6	Ecology	
89-027	J.3.30.13	Editorial	
89-028	J.3.30.12	Editorial	
89-029	J.3.28.7	Ecology	
89-030	J.3.30.3	Editorial	
89-031	J.3.26.1	Geology and Soils	
89-032	J.3.26.2	Geology and Soils	
89-033	J.3.26.3	Geology and Soils	
89-034	J.3.30.49	Editorial	
89-035	J.3.28.3	Ecology	
89-036	J.3.28.4	Ecology	
89-037	J.3.2805	Ecology	
89-038	J.3.27.1	Cultural Resources	
89-039	J.3.12.11	Human Health Risk	
89-040	J.3.30.29	Editorial	
89-041	J.3.30.30	Editorial	

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89-042	J.3.30.31	Editorial	
89-043	J.3.30.32	Editorial	
89-044	J.3.13.12	Human Health - Radiological Risk	
89-045	J.3.12.12	Human Health Risk	
89-046	J.3.30.1	Editorial	
89-047	J.3.30.41	Editorial	
89-048	J.3.30.14	Editorial	
89-049	J.3.12.24	Human Health Risk	
89-050	J.3.12.13	Human Health Risk	
89-051	J.3.20.11	Transportation	
89-052	J.3.30.39	Editorial	
89-053	J.3.22.7	Cumulative Impacts	
89-054	J.3.22.2	Cumulative Impacts	
89-055	J.3.22.3	Cumulative Impacts	
89-056	J.3.23.3	Cost Benefit	
89-057	J.3.23.4	Cost Benefit	
89-058	J.3.23.8	Cost Benefit	
89-059	J.3.23.6	Cost Benefit	
89-060	J.3.23.7	Cost Benefit	
89-061	J.3.25.1	Unavoidable Impacts	
89-062	J.3.30.40	Editorial	
89-063	J.3.24.1	Mitigation	
89-064	J.3.24.1	Mitigation	
89-065	J.3.24.9	Mitigation	
89-066	J.3.24.1	Mitigation	
89-067	J.3.24.10	Mitigation	
89-068	J.3.30.33	Editorial	
89-069	J.3.30.15	Editorial	
89-070	J.3.30.34	Editorial	
90-001	J.3.1.6	General Opposition	Rachel Western
90-002	J.3.21.1	MOX Fuel Use	
90-003	J.3.17.4	Waste Management	
91-001	J.3.11.2	Alternatives - Immobilization	David Kyler
91-002	J.3.21.2	MOX Fuel Use	
91-003	J.3.21.2	MOX Fuel Use	
91-004	J.3.28.1	Ecology	
91-005	J.3.29.1	Socioeconomics	
91-006	J.3.9.1	Scope - Terrorism	

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91-006	J.3.9.2	Scope - Terrorism	
91-007	J.3.1.2	General Opposition	
92-001	J.3.5.1	Licensing Process	Glenn Carroll
92-002	J.3.11.2	Alternatives - Immobilization	
92-003	J.3.6.9	Scope - General	
92-003	J.3.21.1	MOX Fuel Use	
92-004	J.3.7.7	Scope - DOE Policy	
92-005	J.3.17.3	Waste Management	
92-006	J.3.13.13	Human Health - Radiological Risk	
93-001	J.3.5.1	Licensing Process	Mary Olson
93-002	J.3.8.4	Scope - Safety Evaluation Report	
93-003	J.3.6.5	Scope - General	
93-004	J.3.11.3	Alternatives - Immobilization	
93-005	J.3.9.1	Scope - Terrorism	
93-006	J.3.7.4	Scope - DOE Policy	
93-007	J.3.10.3	Alternatives	
93-008	J.3.7.2	Scope - DOE Policy	
93-008	J.3.7.6	Scope - DOE Policy	
93-009	J.3.7.5	Scope - DOE Policy	
93-009	J.3.7.6	Scope - DOE Policy	
93-010	J.3.6.9	Scope - General	
93-011	J.3.13.21	Human Health - Radiological Risk	
93-012	J.3.16.3	Hydrology	
93-013	J.3.22.4	Cumulative Impacts	
93-014	J.3.13.6	Human Health - Radiological Risk	
93-015	J.3.8.4	Scope - Safety Evaluation Report	
93-016	J.3.17.3	Waste Management	
93-017	J.3.19.3	Environmental Justice	
93-017	J.3.19.4	Environmental Justice	
93-018	J.3.13.13	Human Health - Radiological Risk	
93-019	J.3.9.2	Scope - Terrorism	
94-001	J.3.13.6	Human Health - Radiological Risk	Ralph L. Anderson
94-001	J.3.14.16	Accidents	
94-001	J.3.14.9	Accidents	
94-002	J.3.19.1	Environmental Justice	
95-001	J.3.4.6	NEPA Process	Thomas R. Mott
95-002	J.3.7.10	Scope - DOE Policy	
95-003	J.3.5.4	Licensing Process	

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96-001	J.3.1.4	General Opposition	Mildred McClain
96-002	J.3.19.6	Environmental Justice	
96-003	J.3.4.7	NEPA Process	
96-004	J.3.4.1	NEPA Process	
96-005	J.3.19.11	Environmental Justice	
96-006	J.3.11.2	Alternatives - Immobilization	
96-007	J.3.17.4	Waste Management	
96-008	J.3.4.4	NEPA Process	
96-008	J.3.4.6	NEPA Process	
96-009	J.3.4.1	NEPA Process	
96-010	J.3.4.2	NEPA Process	
96-011	J.3.19.3	Environmental Justice	
96-012	J.3.8.2	Scope - Safety Evaluation Report	
96-013	J.3.19.4	Environmental justice	
96-014	J.3.19.4	Environmental justice	
96-015	J.3.4.1	NEPA Process	
96-015	J.3.19.4	Environmental Justice	
96-016	J.3.17.4	Waste Management	
96-017	J.3.14.15	Accidents	
96-018	J.3.4.7	NEPA Process	
96-019	J.3.7.7	Scope - DOE Policy	
96-020	J.3.9.1	Scope - Terrorism	
96-021	J.3.8.4	Scope - Safety Evaluation Report	
96-022	J.3.3.2	Editorial	
96-023	J.3.4.2	NEPA Process	
96-023	J.3.4.5	NEPA Process	
96-024	J.3.4.2	NEPA Process	
96-024	J.3.4.5	NEPA Process	
96-025	J.3.8.2	Scope - Safety Evaluation Report	
96-026	J.3.19.4	Environmental Justice	
96-027	J.3.11.2	Alternatives - Immobilization	
96-028	J.3.4.5	NEPA Process	
96-029	J.3.4.7	NEPA Process	
96-030	J.3.19.10	Environmental Justice	
96-031	J.3.4.6	NEPA Process	
96-032	J.3.7.3	Scope - DOE Policy	
96-033	J.3.6.2	Scope - General	
96-034	J.3.19.4	Environmental Justice	

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96-036	J.3.8.2	Scope - Safety Evaluation Report	
96-037	J.3.22.6	Cumulative Impacts	
96-038	J.3.19.4	Environmental justice	
96-039	J.3.1.3	General Opposition	
97-001	J.3.4.2	NEPA Process	Alexander P. Murray
97-001	J.3.4.4	NEPA Process	
97-002	J.3.24.20	Mitigation	
97-003	J.3.8.1	Scope - Safety Evaluation Report	
97-004	J.3.14.14	Accidents	
97-005	J.3.8.1	Scope - Safety Evaluation Report	
97-006	J.3.4.4	NEPA Process	
97-007	J.3.14.15	Accidents	
97-008	J.3.12.20	Human Health Risk	
97-009	J.3.12.14	Human Health Risk	
97-010	J.3.12.23	Human Health Risk	
97-011	J.3.14.25	Accidents	
97-012	J.3.12.15	Human Health Risk	
97-013	J.3.6.6	Scope - General	
97-014	J.3.17.12	Waste Management	
97-015	J.3.14.15	Accidents	
97-016	J.3.17.6	Waste Management	
97-017	J.3.10.8	Alternatives	
97-018	J.3.10.8	Alternatives	
98-001	J.3.1.6	General Opposition	Sara Barczak
98-002	J.3.11.3	Alternatives - Immobilization	
98-003	J.3.7.3	Scope - DOE Policy	
98-003	J.3.7.5	Scope - DOE Policy	
98-004	J.3.7.6	Scope - DOE Policy	
98-005	J.3.7.7	Scope - DOE Policy	
98-006	J.3.21.2	MOX Fuel Use	
98-007	J.3.16.1	Hydrology	
98-008	J.3.14.19	Accidents	
98-009	J.3.6.7	Scope - General	
98-010	J.3.1.6	General Opposition	
99-001	J.3.1.5	General Opposition	Bev Baker
99-002	J.3.8.9	Scope - Safety Evaluation Report	
99-003	J.3.16.1	Hydrology	

Comment[a] Number	Section Number	Section Name	Commenter
100-001	J.3.8.6	Scope - Safety Evaluation Report	Meira Warshauer
101-001	J.3.14.15	Accidents	Judy Ponder
101-002	J.3.13.22	Human Health - Radiological Risk	
101-003	J.3.16.1	Hydrology	
102-001	J.3.14.15	Accidents	Bart Patton
102-002	J.3.13.22	Human Health - Radiological Risk	
103-001	J.3.5.1	Licensing Process	Terri Jagger Bline Emily B. Calhoun Faye McKay-Clegg Eleanor L. Richardson Maruguerite Sweet
103-002	J.3.11.2	Alternatives - Immobilization	Terri Jagger Bline Emily B. Calhoun Faye McKay-Clegg Eleanor L. Richardson Maruguerite Sweet
103-003	J.3.17.6	Waste Management	Terri Jagger Bline Emily B. Calhoun Faye McKay-Clegg Eleanor L. Richardson Maruguerite Sweet
103-004	J.3.9.1	Scope - Terrorism	Terri Jagger Bline Emily B. Calhoun Faye McKay-Clegg Eleanor L. Richardson Maruguerite Sweet
104-001	J.3.1.6	General Opposition	Petition
105-001	J.3.1.3	General Opposition	Robert B. Mills
105-002	J.3.11.5	Alternatives - Immobilization	
105-003	J.3.8.3	Scope - Safety Evaluation Report	
105-003	J.3.8.6	Scope - Safety Evaluation Report	
105-004	J.3.13.7	Human Health - Radiological Risk	
105-005	J.3.8.1	Scope - Safety Evaluation Report	
105-006	J.3.7.10	Scope - DOE Policy	
105-007	J.3.21.1	MOX Fuel Use	
105-008	J.3.11.2	Alternatives - Immobilization	
105-009	J.3.10.1	Alternatives	
105-010	J.3.11.2	Alternatives - Immobilization	

Comment[a] Number	Section Number	Section Name	Commenter
105-011	J.3.23.7	Cost Benefit	
105-012	J.3.11.3	Alternatives - Immobilization	
105-013	J.3.13.23	Human Health - Radiological Risk	
105-014	J.3.1.7	General Opposition	
105-015	J.3.14.21	Accidents	
106-001	J.3.1.7	General Opposition	Diane F. Matesic
107-001	J.3.15.7	Air Quality	Heinz J. Mueller
107-002	J.3.12.16	Human Health - Gen	
108-001	J.3.17.3	Waste Management	Carolyn Cain
108-002	J.3.23.1	Cost Benefit	
108-003	J.3.11.1	Alternatives - Immobilization	
109-001	J.3.1.6	General Opposition	Jennifer Zanck
110-001	J.3.1.6	General Opposition	Mai Dang
111-001	J.3.8.6	Scope - Safety Evaluation Report	Ruth Thomas
112-001	J.3.1.6	General Opposition	Ruth Sanford
112-002	J.3.11.2	Alternatives - Immobilization	
112-003	J.3.17.6	Waste Management	
112-004	J.3.9.1	Scope - Terrorism	
113-001	J.3.8.6	Scope - Safety Evaluation Report	Dell Isham
114-001	J.3.7.5	Scope - DOE Policy	Louis Zeller
114-002	J.3.7.5	Scope - DOE Policy	
114-002	J.3.13.13	Human Health - Radiological Risk	
114-003	J.3.7.7	Scope - DOE Policy	
114-004	J.3.21.1	MOX Fuel Use	
114-005	J.3.17.11	Waste Management	
114-006	J.3.7.4	Scope - DOE Policy	
114-007	J.3.11.3	Alternatives - Immobilization	
114-008	J.3.11.3	Alternatives - Immobilization	
114-009	J.3.9.1	Terrorism	
114-009	J.3.9.2	Terrorism	
114-010	J.3.21.1	MOX Fuel Use	
114-011	J.3.9.2	Scope - Terrorism	
114-012	J.3.20.16	Transportation	
114-013	J.3.9.1	Scope - Terrorism	
115-001	J.3.13.8	Human Health - Radiological Risk	Mary Olson
115-002	J.3.10.8	Alternatives	
115-003	J.3.19.7	Environmental justice	
115-004	J.3.17.3	Waste Management	

Comment[a] Number	Section Number	Section Name	Commenter
116-001	J.3.4.8	NEPA Process	Peter James Atherton
116-002	J.3.9.1	Scope - Terrorism	
116-003	J.3.14.12	Accidents	
116-004	J.3.1.1	General Opposition	
116-005	J.3.5.5	Licensing Process	
116-006	J.3.10.6	Alternatives	
116-007	J.3.14.4	Accidents	
116-008	J.3.14.5	Accidents	
116-009	J.3.20.15	Transportation	
116-010	J.3.8.4	Scope - Safety Evaluation Report	
116-011	J.3.8.2	Scope - Safety Evaluation Report	
116-012	J.3.8.5	Scope - Safety Evaluation Report	
116-013	J.3.10.8	Alternatives	
116-014	J.3.8.7	Scope - Safety Evaluation Report	
116-015	J.3.14.22	Accidents	
116-016	J.3.17.7	Waste Management	
116-017	J.3.13.14	Human Health - Radiological Risk	
116-018	J.3.4.9	NEPA Process	
116-019	J.3.14.6	Accidents	
116-020	J.3.8.8	Scope - Safety Evaluation Report	

[a] Some comments are associated with more than one section.

APPENDIX L:

PUBLIC COMMENT LETTERS AND TRANSCRIPTS

3/28/03 00001

68 FR 9738

(1)

From: Mark Hogue <mark.hogue@srs.gov>
To: <nrcrep@nrc.gov>
Date: Thu, Feb 27, 2003 2:25 PM
Subject: Response from "Comment on NRC Documents"

Below is the result of your feedback form. It was submitted by

Mark Hogue (mark.hogue@srs.gov) on Thursday, February 27, 2003 at 14:23:34

Document_Title: NUREG-1767, Environmental Impact Statement on the Construction and Operation of a Mixed Oxide Fuel Fabrication Facility at the Savannah River Site, South Carolina

Comments: The EIS estimates latent cancer fatalities (LCFs) from radiation exposure in a deterministic fashion without regard to any uncertainty in the estimate. Indeed, the estimate for the result of low doses should at least include the possibility of zero effect.

The estimate of LCFs in the draft EIS has already been the subject of media reports and public concern. This is an important issue that must be resolved.

The LCFs currently calculated should be listed as the UPPPER LIMIT of projected LCFs. This should be clearly flagged as applying to the hypothetical situation that doses from high dose and high dose rate radiation exposure can legitimately be used as a predictor of effects of low doses of radiation. The number of LCFs should be expressed as a range that includes zero effect. 1-1

This opinion is supported by the Health Physics Society position paper, RADIATION RISK IN PERSPECTIVE, of January 1996, reaffirmed March 2001. The Society of Nuclear Medicine and the American College of Nuclear Medicine voted unanimously to support that position.

The potential for positive health benefits from radiation exposure should be included at least as a note to the LCF discussion. There are ample references for the basis of this point.

organization:

address1: 350 Sunderland Rd.

address2:

city: Aiken

state: SC

zip: 29803

country: USA

phone: (803)208-7153

Template = ADM-013

E-RIDS = ADM-03
Add = T. Harris (TEH)
A Lester (ALL)

00002

Leah R. Karpen

Leah R. Karpen
400 Charlotte St #803
Asheville NC
28801

Phone: 828-254-5483
FAX: 828-225-9069
email:

Att: - Tim Harris

Friday, March 14, 2003

Mr.Michael T. Lesar, Chief
Rules and Directives Branch
Division of Administrative Services
Office of Administration; Mail Stop T-6D59
U. S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Lesar:

Proposed MOX Nuclear Facility

As I am not able to attend the public hearing in Charlotte, NC, on March 27, I take this means to advise you of my opinion.

I understand that Duke Cogema Stone & Webster, a contractor of the Department of Energy, is proposing to build a Mixed Oxide (MOX) Fuel facility at the Savannah River site near Aiken, South Carolina. Surplus weapons-grade plutonium would be converted into fuel for use in commercial nuclear power reactors.

First of all, trucking the plutonium from nuclear weapons depots and trucking the MOX fuel to commercial reactors in the Southeast is an open invitation to terrorists and risks the danger of accidents which may not be foreseeable. 2-1

Use of MOX in nuclear reactors is not safe and could result in serious accidents. While some plutonium is split by fusion, new plutonium is being made in the reactor as a waste product. Thus, use of MOX fuel fails as a means of getting rid of plutonium. 2-2

MOX fuel could attack commercial nuclear reactors where they are weakest, as many reactors are aging prematurely and developing cracks. A nuclear accident involving MOX fuel could cause a serious meltdown.

Alternatives to this project must be considered: specifically, immobilization of surplus plutonium, or making off-specification MOX fuel unsuitable for reactors, which would have to go into spent fuel storage facilities. 2-3

I ask that the Nuclear Regulatory Commission not approve this project or the draft Environmental Impact Statement. 2-4

Sincerely yours,
Leah R. Karpen
(Mrs.) Leah R. Karpen

Sent by FAX

00003

RECEIVED 2003 APR -1 PM 4:22 Rules and Directives Branch USNRC

Pamela J. O'Brien
P.O. Box 1667
Tybee Island, GA 31328
(912) 786-9319

March 23, 2003

4/28/03
68 FR 9728
(3)

Mr. Michael T. Lesar
Chief, Rules & Directives Branch Division of Admin. Svcs.
Office of Administration, Mail Stop T-6D59
US Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Lesar,

I am writing in opposition to the plan to convert nuclear weapons into fuel at the Savannah River Site and the associated environmental impact statement. I live down river from the site on beautiful Tybee Island, just outside the City of Savannah, and I have serious concerns about this project.

I am concerned about the lack of a long-term funding commitment and the potential for unstable plutonium to be stored indefinitely at SRS. There are safer and cheaper ways to produce energy. Why experiment with something so hazardous when there are proven, safer alternatives? Delays because of a new, untested process could ultimately cost lives. 3-1

I am also concerned about the potential for a serious accident. As a former member of the Tybee Island City Council, I am concerned not only for my own welfare, but the welfare of those of us living in communities that neighbor the site. 3-2

Please be a good neighbor and do not support this plan. It would be wiser, safer and cheaper to utilize existing approaches for the production of energy.

Sincerely yours,

[signature]

Pamela J. O'Brien
Tybee Island, Georgia

Template = ADM-013

E-RIDS = ADM-03
Add = T. Harris (THE)

3/25/03

00004

618 McLaws Street
Savannah, GA 31405
September 26, 2002

Mr. Mike Lesar, Chief
U.S. Nuclear Regulatory Commission
Rules & Directives Branch
Division of Administrative Services
Office of Administration
Mail Stop T-6D59
Washington, DC 20555

Sir:

Please accept the following as a supplement to the oral comments I gave at the September 18 public meeting in Savannah, GA regarding the proposed MOX fuel fabrication facility at the Department of Energy's Savannah River Site (SRS). Thank you.

I am opposed to the plan to build a MOX fuel fabrication facility at the Savannah River Site. SRS is overburdened with nuclear waste from over fifty years of operation stored in tanks that leak into the ground and water. I particularly recall the tritium leak of December 1991, which shut down Savannah's industrial water supply for about two weeks. It makes no sense to generate new waste laced with plutonium when the existing waste has yet to be cleaned up. Instead, the waste should be made into glass logs and used to immobilize the plutonium so no one will be able to get at it. Despite the Energy Department's decision to cancel the immobilization program, I believe it must remain an option whether you consider it a "no action" alternative or not. In light of the federal budget deficit it makes fiscal sense to spend our tax dollars on the cheaper and less risky immobilization process instead of the more expensive MOX fuel program. I would rather there not be any plutonium at SRS but as long as the Energy Department insists on shipping it to the site I would prefer it be immobilized and not made into MOX fuel. 4-1

I understand that the licensees for the MOX fuel facility plan to use Cogema's MOX fabrication process used in France as the basis for the process they plan to use at SRS. Cogema has had problems both with making and using MOX fuel in France and they should not be using what they know is a flawed process. To do so puts all of us in Savannah, Chatham County and the surrounding area unnecessarily at risk. It also demonstrates a reckless disregard to human life. Therefore you should carefully review their safety record when arriving at your final decision. 4-2

3/25/03

Mr. Mike Lesar
Page 2
September 26, 2002

The proposed MOX fuel facility also represents a terrorist risk to Savannah. Although the Energy Department is using secret truck shipments to bring plutonium to SRS, an operational MOX plant may require some to be brought in by ship through the Georgia Ports Authority terminals, our gateway to the world and one of our mail economic engines. This puts a terrorist target right at our front door. In case of an attack on such shipments or the fabrication plant where and how would we evacuate? During the Hurricane Floyd evacuation it took me five hours to go from Savannah to Pembroke, a distance of about thirty miles. We also had between 24-36 hours advance warning before the storm threatened. There has been no mention of evacuation plans for nuclear emergencies in Savannah news media since the September 11, 2001 terrorist attacks. 4-3
When I called the Chatham County Emergency Management Agency they could not provide any information about nuclear emergencies. Having a tested and certified evacuation plan must be a prerequisite to going forward with the licensing process and it is the responsibility of the licensees and the Energy Department to come up with this plan. The plan also must include areas downwind and downstream of the proposed facility, such as the metropolitan Savannah area. If the licensees and the Energy Department do not come up with such a plan you should summarily deny their license application. 4-4

We in Savannah have had to put up with contamination from SRS for over fifty years. The site should be cleaned up immediately. To not do so AND generate waste that is even more radioactive and toxic on top of that is completely unacceptable. I therefore strongly urge you to deny the application for the proposed MOX fuel fabrication facility. 4-5

Respectfully submitted,

Jody Lanier

Jody Lanier

3/25/03

00005

618 McLaws Street
Savannah, GA 31405
March 25, 2003

Mr. Michael T. Lesar, Chief
U.S. Nuclear Regulatory Commission
Rules & Directives Branch
Division of Administrative Services
Office of Administration
Mail Stop T-6D59
Washington, DC 20555-0001

Re: Comments on Report NUREG 1767, draft

Sir:

I would like to thank the NRC for having this meeting here tonight. At the September 26, 2002 meeting I spoke about my concerns regarding this project, mainly the inclusion of immobilization as a no-action alternative and evacuation plans for Savannah and Chatham County in case of an accident or terrorist attack at the MOX fabrication facility or any shipments of plutonium that may come into the Port of Savannah to support the facility. The report states that if the surplus plutonium were disposed of only by immobilization, Russia would not dispose of its surplus because they believe that we would eventually recover the plutonium and use it to make atomic bombs. To allay their fears we could use the famous Russian proverb: Trust but verify. At the end of the Cold War, monitors from the United States and Russia went to each others' countries to verify that nuclear missiles and other strategic weapons and delivery systems were destroyed. Now, this process could be repeated and supplemented with spy satellites and other surveillance technology to make sure immobilized plutonium is not made into nuclear weapons. With this in mind, I believe that immobilization should still be a viable option for a no-action alternative. 5-1

When I read over the draft EIS I felt like only a nuclear scientist, brain surgeon or an attorney could fully understand it. However, it became clear that one did not need any of those people to see that there was no mention of Savannah at all in the report, except for a few citations noting previous meetings here. This leads me to believe that the Commission does not really care about the opinions of the more than 200,000 people living in Savannah and Chatham County, or for that matter those Georgians and South Carolinians living anywhere downwind and downstream of SRS. 5-2 If that is the case, why is this meeting taking place? The general message seems to be that we, the Commission, are holding this meeting to tell you what we are going to do next but there is nothing you can do about it. Tough luck! 5-3 It also seems to say that DCS does not care about needlessly putting us at risk by proceeding with this project. That really doesn't come as a surprise since they apparently have no qualms about putting the people of their hometown, Charlotte, North Carolina, and the greater Metrolina region at risk with their plan to use the MOX fuel at Duke's Catawba and McGuire nuclear power plants.

3/25/03

Mr. Michael T. Lesar
Page 2
March 25, 2003

I am also concerned that communities downstream of SRS will face this same risk if the reactors at the Southern Company's Plant Vogtle are chosen as the fifth and sixth reactors to use MOX, which would put all of us in double jeopardy.

The section on environmental justice mentions the effects on fishing near SRS. Since waste that is released or leaked into the waterways eventually reaches Savannah and because fish can't tell the difference between bait from a fisherman in Blackville, S.C. and that from one in Chatham County, the effects the MOX facility would have on fishing in our area need to be studied. We already have radiation monitors in place that could be used for this purpose. The EIS also bases its definition of environmental justice on the impacts to areas with predominantly racial minority and/or low-income populations. I believe that the failure of this report to take into account the impacts to downstream communities beyond a fifty-mile radius, regardless of their racial or income demographics, constitutes environmental injustice. The definition of environmental justice must be expanded to include these impacts. Therefore, the final EIS for this project, and for that matter, similar reports about future activities at SRS, need to include these impacts as well. 5-4

The most disturbing part of the report to me is the mention of the Commission's ruling in December 2002 that it is not obligated to consider risks associated with terrorism in any environmental impact statement. In light of the tragedy of September 11, 2001, concluding that the risk of a terrorist attack is 'speculative' is absolutely absurd, irresponsible and unconscionable! With this ruling, the NRC has not only set a dangerous precedent, it has also stuck its head in the sand like an ostrich! What a shame! If the Commission will not consider these risks, who will? Who will protect us? The EIS further states that the wind at SRS mainly blows to the west-northwest and north and that the probability of a substantial leak is very low. I remember the infamous tritium leak of December 1991 that shut down Savannah's industrial water supply for almost two weeks. I would hate to think what would have happened if that had been plutonium-laced waste instead. Besides duct tape and plastic sheeting, does our only defense against an accident or terrorist attack at the MOX facility consist of praying that the wind continues to blow away from us and that SRS will dramatically improve its more than fifty year track record of leaks? If that is the case, we would be in the same predicament as Wile E. Coyote when he opened a miniature umbrella to protect himself from a falling boulder. Also, in light of recent congressional hearings and news reports pertaining to the Indian Point nuclear power plant in New York, if SRS security is anything like that at a commercial nuclear power plant, we would feel as confident as Bill Dana's famous character Jose Jiminez was before he was launched into space. 5-5

3/25/03

Mr. Michael T. Lesar
Page 3
March 25, 2003

The greater metropolitan areas of Augusta and Aiken can have expanded economic opportunities without jeopardizing downstream communities like Savannah. Making a firm commitment to clean up SRS once and for all can accomplish this. That way, Augusta and Aiken get the benefits of more jobs related to SRS and an expanded tax base. At the same time, downstream communities will not have to worry about more toxic and nuclear waste being generated, resulting in a win-win situation for all. 5-6

Since I believe that my concerns have not been adequately addressed in this draft EIS, I am submitting as an attachment a supplement to my oral comments from the previous meeting that was sent in before the prior comment period ended. I still believe that this project will flush our valuable tax dollars down the toilet, especially when one realizes that Duke will essentially be getting free MOX at taxpayer expense. 5-7 Further, it will not reduce the amount of plutonium stored at the site, especially if the Department of Energy decides to build and operate its Modern Pit Facility at SRS. 5-8 As I said back in September, this project is an attempt by the DOE and DCS to shove a giant Pu Pu Platter down our throat, and that when I want a Pu Pu Platter I want it from an honorable Chinese restaurant, not a dishonorable MOX plant. I call on our congressman from Georgia's Twelfth Congressional District, Max Burns, whose home in Screven County is only one county downstream of SRS, as well as Congressman James Clyburn of South Carolina, a member of the Energy and Water Development Subcommittee of the House Appropriations Committee, to intervene and stop this project from proceeding forward. In the meantime, it's time for the NRC to get its head out of the sand and start thinking outside the box. Say NO to MOX. Choose the no-action alternative. 5-9

Respectfully submitted,

Jody Lanier

Jody Lanier

Attachment

CC: U.S. Representative Max Burns
U.S. Representative James Clyburn
U.S. Representative Jack Kingston
U.S. Senator Saxby Chambliss
U.S. Senator Zell Miller
Georgia Governor Sonny Perdue
Georgia State Senator Eric Johnson
Georgia State Senator Regina Thomas
Georgia State Representative Tom Bordeaux

6

USNRC
Attention Mike Lesser
Mail Stop T6D59
Washington, DC
20555

Re: NUREG-1767 Draft Report for Comment Date 3/25/03 Meeting Public Meeting on MOX Environmental Review

Comments and Suggestions are:

1.) Food must be checked example the Hair Analysis of employees of my company clearly show that just being these streams such as Four Mile Creek which had at least 9 different places to enter this stream at no time were the men that worked this stream use protection, sign permits to dig or wade in this stream until 2-22-99.
2.) Congressional Investigation 13033 is at Charlie Norwood's Office 10th District Office
3.) 48.4 tons depleted uranium is located in Steed Pond another area that we worked above and below and in this stream that holds the material. We also broke the 6 beaver pond dams that held this material back. I had to do two-bio assay for Uranium in 1993 and 1994 I was also working for Westinghouse on loan from BSRI in a clean area at that time. Only place I could get the up take was Steed Pond.

Sampling Data at Site # 25 –HP-52 No chemical data identified this was stated by Westinghouse Manager Steve Jahns please read the information I submitted to NRC on 3-25-03. EPA shows it as waste site and Bechtel has it listed as High Risk. Westinghouse committed fraud during the 3 day presentation to NIOSH on 3-20-2000. I did not know about the MOU signed between DHHS and DOE not allowing NIOSH do their jobs per the CFR this MOU was sign in 1996 and good for 5 years.

I would like someone to contact me concerning the fraud that has been committed to me and my employees that work in these high, medium and low risk sites at SRS without knowing it, and working without personal protection.

Thank You,
William D. Hooker Sr. [signature]
William D. Hooker Sr.

00006

NRC FORM 659 (9-2002)

U.S. NUCLEAR REGULATORY COMMISSION

NRC PUBLIC MEETING FEEDBACK

Category 3

Meeting Date: 03/25/2003

Meeting Title: NRC Public Meeting on MOX Environmental Review Coastal Georgia Center

In order to better serve the public, we need to hear from the meeting participants. Please take a few minutes to fill out this feedback form and return it to NRC.

1. How did you hear about this meeting?
   - ☐ NRC Web Page
   - ☐ Radio/TV
   - ☒ NRC Mailing List
   - ☐ Other
   - ☐ Newspaper

	Yes	No (Please explain below)	Somewhat
2. Were you able to find supporting information prior to the meeting?	☒	☐	☐
3. Did the meeting achieve its stated purpose?	☐	☒	☐
4. Has this meeting helped you with your understanding of the topic?	☐	☐	☒
5. Were the meeting starting time, duration, and location reasonably convenient?	☒	☐	☐
6. Were you given sufficient opportunity to ask questions or express your views?	☐	☐	☒
7. Are you satisfied overall with the NRC staff who participated in the meeting?	☒	☐	☐

COMMENTS OR SUGGESTIONS: Thank you for answering these questions.

please review my information so what happened to me, my employees never happens again. Safety and the Health of employees, the general public and my dogs here should be #1 priority at SRS. 6-1

Continue Comments on the reverse.

OPTIONAL

Name: W.D. Hooker Organization: Ga Bowhunter's/SIERRA Club

Telephone No. 706-855-0371 E-Mail WDHooker@HOTMAIL.com ☒ Check here if you would like a member of NRC staff to contact you.

OMB NO. 3150-0197 Expires: 09/30/2003

Public Protection Notification: If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

Please fold on the dotted lines with Business Reply side out, tape the bottom, and mail back to the NRC.

00007

NRC FORM 659 (5-2002)

U.S. NUCLEAR REGULATORY

Category 3

NRC PUBLIC MEETING FEEDBACK

Meeting Date: 03/25/2003

Meeting Title: NRC Public Meeting on MOX Environmental Review Coastal Georgia Center

In order to better serve the public, we need to hear from the meeting participants. Please take a few minutes to fill out this feedback form and return it to NRC.

1. How did you hear about this meeting?
   - ☐ NRC Web Page
   - ☐ NRC Mailing List
   - ☐ Newspaper
   - ☐ Radio/TV
   - ☒ Other andre enfermann

	Yes	No (Please explain below)	Somewhat (Please explain below)
2. Were you able to find supporting information prior to the meeting?	☒	☐	☐
3. Did the meeting achieve its stated purpose?	☐	☒	☐
4. Has this meeting helped you with your understanding of the topic?	☒	☐	☐
5. Were the meeting starting time, duration, and location reasonably convenient?	☐	☒	☐
6. Were you given sufficient opportunity to ask questions or express your views?	☐	☒	☐
7. Are you satisfied overall with the NRC staff who participated in the meeting?	☐	☒	☐

COMMENTS OR SUGGESTIONS:

Thank you for answering these questions.

3. There were too few public representatives. (Elected)
5. The public was not informed. The news! No one reads the paper, or email.
6. One of my questions was unanswered. → How will you include the impact of nuclear bombs on the environment
7. They acted more like a private board to shareholders

7-1

spreading Toxic Chemicals spreads cancer.

Continue Comments on the reverse. ⇨

OPTIONAL

Name: Whitney Lamb   Organization: SCAP

Telephone No. 233-8255   E-Mail: Wlamb20@student.scad.edu

☐ Check here if you would like a member of NRC staff to contact you.

OMB NO. 3150-0197   Expires: 06/30/2003

Public Protection Notification: If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

Please fold on the dotted lines with Business Reply side out, tape the bottom, and mail back to the NRC.

COMMENTS OR SUGGESTIONS: (Continued)

Watch DOE and its Contractors and hold them to CFR, State Laws, FEDERAL LAW and Administrative Orders.

UNITED STATES
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WASHINGTON DC 20555-0001

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NRC FORM 659 (5-2002)

U.S. NUCLEAR REGULATORY COMMISSION

Category 3

NRC PUBLIC MEETING FEEDBACK

Meeting Date: 03/25/2003

Meeting Title: NRC Public Meeting on MOX Environmental Review Coastal Georgia Center

In order to better serve the public, we need to hear from the meeting participants. Please take a few minutes to fill out this feedback form and return it to NRC.

1. How did you hear about this meeting?
   - ☐ NRC Web Page
   - ☐ Radio/TV
   - ☐ NRC Mailing List
   - ☐ Other emailed
   - ☐ Newspaper

	Yes	No (Please explain below)	Somewhat
2. Were you able to find supporting information prior to the meeting?	☐	☒	☐
3. Did the meeting achieve its stated purpose?	☐	☐	☒
4. Has this meeting helped you with your understanding of the topic?	☒	☐	☐
5. Were the meeting starting time, duration, and location reasonably convenient?	☒	☐	☐
6. Were you given sufficient opportunity to ask questions or express your views?	☒	☐	☐
7. Are you satisfied overall with the NRC staff who participated in the meeting?	☐	☒	☐

COMMENTS OR SUGGESTIONS: Thank you for answering these questions.

Dealing with Plutonium is a scary issue and I wish the stuff was never extracted and manufactured. the whole Nuclear idea is absolutely disgusting, but it is definitely something that needs to be dealt with.

I oppose any activity dealing with, manufacturing, processing, and transporting radioactive material + what ever else has to do with the nuclear issue. 8-1

I Live on Earth as a member of the global community and

Continue Comments on the reverse.

OPTIONAL

Name: Andre Entermann

Organization:

Telephone No.:

E-Mail: entertheman@hotmail.com

☐ Check here if you would like a member of NRC staff to contact you.

OMB NO. 3150-0197

Expires: 08/30/2003

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How would you feel if you lived by the plan

COMMENTS OR SUGGESTIONS: (Continued)

What happens when the facility is useless, or not functional? 7-2

How will you make up for the damage?

Risks outweigh Action/product. 7-3

Must notify all people potentially affected by a RISKY ACCIDENT

by the deadline for comments,

Groundwater will be depleted?! 7-4

risky = possible? ARE MINORITIES IMPORTAN

Did not consider impact of product.

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COMMENTS OR SUGGESTIONS: (Continued)

I have a sincere, compassionate feeling towards the environment and posterity.
In the E.I.S. I was frustrated by the abundance of the words significant + insignificant. This is obviously a way to get around the actual explaination.
It's so sad we're even considering dealing with this horrible stuff.
At this point, the feeling I have is the decision has already been made. This is all part of the struggle of truth: I hope MONEY will be put aside and the obvious reality of catastrophe will be realized. 8-2

I noticed during the presentation that there was mention about SRS ~~exceeding the air quality limits by 2.5.~~ By running this MOX facility you will raise the already illegal regulations by .01%?
NO! 8-3

The fact that the majority of the stored "stuff" is in Texas and Colorado should wave a flag of the location of consideration. There would be minimal transport if the site was ~~locally~~ located near storage.
If it had to go some where, of course not in the president's state? Please explain why not! 8-4

Also, the fact that Duke will be receiving the power + selling it to NC + SC is even more absurd! 8-5

Lets hope the wind doesn't blow our way.
The human beings are desperately asking for this nuclear talk to end!

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NRC FORM 659 (3-2002) U.S. NUCLEAR REGULATORY COMMISSION

Category 3

NRC PUBLIC MEETING FEEDBACK

Meeting Date: 03/25/2003 Meeting Title: NRC Public Meeting on MOX Environmental Review Coastal Georgia Center

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1. How did you hear about this meeting?
   - ☐ NRC Web Page ☑ NRC Mailing List ☐ Newspaper
   - ☐ Radio/TV ☐ Other

	Yes	No (Please explain below)	Somewhat
2. Were you able to find supporting information prior to the meeting?	☐	☐	☐
3. Did the meeting achieve its stated purpose?	☐	☐	☐
4. Has this meeting helped you with your understanding of the topic?	☐	☐	☐
5. Were the meeting starting time, duration, and location reasonably convenient?	☐	☐	☐
6. Were you given sufficient opportunity to ask questions or express your views?	☐	☐	☐
7. Are you satisfied overall with the NRC staff who participated in the meeting?	☐	☐	☐

COMMENTS OR SUGGESTIONS: Thank you for answering these questions.

1. The mitigation measures section related to environmental justice must be more detailed. 9-1
2. Duke Cogema must be mandated to meet and work with Environmental Justice stakeholders 9-2
3. Stronger emergency response measures implemented in collabration w/ Environmental Justice communities 9-3
4. Independent research must be done to validate risk assessment associated w/ latent cancer fatalities 9-4

Continue Comments on the reverse.

OPTIONAL

Name ______ Organization ______

Telephone No. ______ E-Mail ______ ☐ Check here if you would like a member of NRC staff to contact you.

OMB NO. 3150-0197 Expires: 06/30/2003

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COMMENTS OR SUGGESTIONS: (Continued)

5. Resources be allocated to Environmental Justice communities to analyze the complex EIS that states that they would be disproportionately impacted under the accident analysis 9-5

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3/25/03

00010

Southern Alliance for
Clean Energy

PUBLIC COMMENTS REGARDING THE DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE MIXED OXIDE FUEL FABRICATION FACILITY FOR THE MARCH 25, 2003 SCOPING MEETING IN SAVANNAH, GA

My name is Sara Barczak and I am the Safe Energy Director for Southern Alliance for Clean Energy, formerly, Georgians for Clean Energy, in our Savannah field office. We are a regional non-profit conservation and energy consumer organization. We have members throughout Georgia and the Southeast and have focused on energy policy, including nuclear concerns, for over 20 years.

From the outset, we would like to state that the current draft Environmental Impact Statement (EIS) now before us leaves much to be desired and we are likely going to resubmit and restate all of our past concerns again. In a sense, it appears that many of the important objections to the plutonium bomb fuel, or "MOX," program have been entirely dismissed by the U.S. Nuclear Regulatory Commission (NRC).

For example, at the scoping meeting here in Savannah last September, many people were concerned about terrorism and wanted to know how terrorism would be addressed in the draft report. On P. I-29 the section on "Impacts from Terrorism" dedicates two sentences to this issue, stating, "Many commenters raised a number of different issues concerning terrorism. The draft EIS will not address terrorism, because these impacts are not considered to be reasonably foreseeable as a result of the proposed action."

That is not acceptable given the repeated concerns that we, along with NRC staff, heard voiced back in September. It is hard to believe that transporting tens of tons of weapons plutonium across the country to one single location, the Department of Energy's massive Savannah River Site nuclear facility that is about 90 miles upstream from Savannah, does not constitute an action that terrorists might want to take advantage of. Isn't plutonium a highly toxic substance with a hazardous radioactive life of 240,000 years and is a key component to modern nuclear weapons—and that one only needs several pound of it to make a bomb? Though in numerous federal agency meetings on various nuclear-related topics, the issue of terrorism is supposedly going to be addressed in separate guidelines and under "top-to-bottom" agency reviews, it is extremely pertinent and vital to address terrorism concerns and security measures in *this* DEIS. 10-1

Plutonium Disposition Program General Concerns

Southern Alliance for Clean Energy would like to make it clear from the outset that we strongly oppose the production of any type of plutonium bomb fuel for a variety of reasons: it is an experimental program that has never been pursued at this scale; poses a risk to workers and the surrounding communities at both the production and reactor sites; will increase the volumes of hazardous, 10-2 10-3 radioactive waste streams at a location already plagued by enormous quantities of dangerous waste and previous contamination; raises complex consumer and rate-payer concerns over government subsidies unfairly favoring a destructive type of energy production over environmentally friendly and safe alternatives; increases the negative health impacts to communities in cases of severe accidents at reactor locations; and blurs the division established between military and civilian nuclear programs. 10-3 cont. 10-4 10-5

We believe that the NRC has only one option that would truly protect the public health: deny the license application request for the MOX fuel fabrication facility (or plutonium fuel factory). We urge that the pursuit of developing a plutonium fuel economy be ceased in all sectors of government and private enterprise, as it will allow plutonium, a dangerous material, to enter civilian commerce and the international marketplace.

We thoroughly disagrees with the NRC staff's preliminary decision in this report that the "overall benefits of the proposed MOX facility outweigh its disadvantages and costs." The NRC states on P. 2-37 four main points of consideration that brought them to this flawed decision:

- The national policy decision between Russia and the US to reduce surplus weapons plutonium;
- The minimal radiological impacts of and risk to human health posed by the construction, operating, and decommissioning of the plutonium fuel factory;
- The minimal environmental impacts the plutonium fuel project would pose; and
- The economic benefit to the local community.

On that same page, the NRC states that the most significant potential impact is if there were a large accident at the proposed fuel factory but narrowly concludes that though the consequences of an accident "would be significant, the likelihood of such an accident occurring would be very low (highly unlikely)." We believe that the "No Action Alternative" the NRC was mandated to study is a better choice overall. 10-6

We will touch upon errors we have found with the four points and will follow up with more detailed written comments prior to the May 14th deadline. Which leads us to formally request an additional extension of the public comment period, beyond the recently adjusted May deadline. This program is a federal action, and given the state of our nation, and the degree to which Congress and the general public is distracted by events unfolding in the world, we find this request reasonable. Additionally, errors in NRC calculations allowed for the initial extension, and since they are not yet clearly understood, and one cannot be sure of what else may be incorrect, it seems to follow that the public should have more time to research and respond. 10-7

Significant Changes in Plutonium Disposition Program

We will first comment on the policy decision to reduce plutonium stockpiles in the US and Russia.

Plutonium Bomb Fuel (MOX) and Nuclear Bomb Factory Overlap

Even though our nation is supposedly engaged in a program being performed under the guise of "disposition" of surplus weapons plutonium in a supposed parallel venture with Russia to reduce our nuclear weapons stockpiles, the Department of Energy's National Nuclear Security Administration issued a press release on May 31, 2002 announcing that it would begin design work for a facility to manufacture plutonium pits, also known as "triggers" for nuclear weapons, a critical component. Rocky Flats—the site in Colorado that is now shipping its plutonium to SRS, had carried out this function up

until 1989 and is now closing. SRS is believed to be the preferred site for this plutonium trigger plant that will cost billions of dollars.

Southern Alliance for Clean Energy is concerned about the overlap or parallels that may occur between the plutonium mixed oxide fuel program (MOX) and the Modern Pit Facility program. At the October 2002 public meeting, DOE staff said that "synergies" would be evaluated in their draft EIS. We believe that the NRC should also give a very close look to the possible use of the same buildings by both programs, the exact amounts and types of waste generated by each and how those wastes will be "dealt with," the thorough tracking of plutonium into and out of both facilities, the possible overlap of contracting partners, etc. All of this information should be made available to the public and should be reviewed prior to issuing a final decision on the MOX plant. 10-8

The NRC should deny the plutonium fuel factory license application request based on the obvious conflict within the national policy on surplus weapons plutonium—what really is our national policy? Is it to bring weapons plutonium to SRS to secure it or to bring it here to help us build new nuclear weapons? There is enough public information available to show there is a major discrepancy. Since many of the decisions in this draft EIS are based on not wanting to conflict with foreign policy agreements, such as the unfortunate cancellation of the cheaper and possibly safer immobilization option, it appears that that in itself is a flawed argument since there is no cohesive policy on what we, the US, intends to do with our plutonium stockpiles. 10-9

We are very concerned about the number of significant changes that have occurred in the plutonium disposition program, such as the cancellation of immobilization and the implementation of long-term plutonium storage at SRS. We again urge the NRC to request that the Department of Energy conduct a Supplemental Environmental Impact Statement immediately, especially before the NRC issues its own final EIS on the plutonium fuel factory. 10-10

Additionally, the DOE's February 2002 *Report to Congress: Disposition of Surplus Defense Plutonium at Savannah River Site*, essentially recommends the need to add at least two additional, unnamed nuclear reactors for plutonium bomb fuel (MOX) use. Our nearby Southern Nuclear Plant Vogtle expressed interest in the plutonium fuel program back in 1996 and we are concerned about the implications of the need for more nuclear reactors. How will the NRC address this need for more nuclear power plants? How will additional reactors be selected? Will the public be involved in this process? 10-11

Radiological Risk

The NRC concluded that there are minimal risks to human health if plutonium fuel is produced at SRS. We will comment on this in more detail in our written comments but wanted to point out that from our perspective this project represents a real and unacceptable risk, especially to workers. The report states that "credible" accidents will be studied in either the EIS or the Safety Evaluation Report. What is the NRC's definition of a "credible" accident? Are there no risks of harm to human health if a "non-credible" accident occurs? 10-12

Why does the NRC choose to use the less-protective health standard of 1 in 10,000 "accepted deaths" rather than the EPA's 1 in 1 million? Has anyone here accepted their death already from events occurring up at SRS? 10-13

Many of the mitigation procedures that are identified in the draft EIS seem lacking in their ability to protect workers and surrounding communities. For instance, the report states that, "issues related to general emergency preparedness of communities are outside the scope of this EIS." That was one of the main concerns raised by Savannah residents in last September's meeting. The report also mentions that, "consequences on human health would be mitigated by following SRS emergency procedures." We formally request a copy of the SRS emergency procedures. Will citizens in Savannah and other communities throughout the Savannah River corridor also receive a copy? Why don't we know what this is? How do we know whether we are going to be protected? 10-14

The entire environmental justice section needs to be reviewed again due in part to NRC-acknowledged incorrect accident consequences. Additionally, there seem to numerous contradictions within the report of what will and what will not be studied in terms of environmental justice. For instance, environmental justice impacts apparently will not be studied along MOX transportation routes but elsewhere in the document it states that transportation will be studied in terms of environmental justice. 10-15

We are concerned about the health of SRS workers at the proposed plutonium fuel factory. We recommended that both sand and HEPA filters be used. In the report, it mentions that only HEPA filters will be used. We again hope that a combination of both can be recommended by the NRC to enhance worker protection. 10-16

Environmental Concerns

The NRC concluded that there are minimal environmental impacts if plutonium fuel is produced at SRS. We disagree and will highlight just two concerns tonight.

Nuclear Waste Concerns

SRS has a severe nuclear waste problem and the plutonium bomb fuel is only going to make it worse. The site currently has the 2nd largest volume of high-level liquid nuclear waste (more than 30 million gallons) and wins the gold medal for having the most amount of radioactivity at any DOE site in the nation. The future is less than encouraging as the DOE projects that 95% of future high-level radioactive waste generation will occur at SRS. The plutonium fuel program is slated to bring more dangerous nuclear waste to this site—in some instances, waste streams that the site currently has no experience with. As the NRC may remember from the September meetings in Savannah, nuclear waste issues are of grave environmental concern locally. The draft report does not do a good job describing and tracking the various waste streams that will be created by the MOX process. We request that a process flow diagram be developed to clearly show what wastes are being generated where and where those resulting wastes will be eventually stored or treated. 10-17

Water Concerns

Water resources are limited and debates on how this precious resource should be protected is under heated debate currently in Georgia and elsewhere. Currently, SRS requires enormous amounts of surface and ground water, in the tens of billions of gallons, *just to support currently established operations*. It was difficult to discern what additional water use will be required and what additional water contamination will be generated by the plutonium fuel factory, over its entire operating life, versus the proposed "no action alternatives," including immobilization? In the report, it does state that groundwater beneath the site is listed as a Class II drinking source by the EPA, meaning it has potential 10-18

Southern Alliance for Clean Energy DEIS MOX FFF Public Meeting Comments Continued

for existing and future drinking water needs. It later states that contamination is present beneath the entire site. Which is it? And regardless, isn't placing any additional burden on this resource considered more than just a minimal impact? 10-18 cont.

Economic Benefit

The NRC stated that the positive economic benefit to the local community was part of their preliminary decision to recommend the plutonium fuel plant. We are gravely concerned that this perceived economic benefit is being unfairly promoted to the expense of others. This is an extremely expensive program that is estimated to cost nearly $4 billion, nearly doubling original estimates. And this is only for the program in the U.S. and does not include ALL the costs. The costs for developing this infrastructure within Russia is also staggering. The U.S. taxpayer is footing this bill. Is it fair for a local community like Aiken, SC to prosper at the expense of others...and that that advantage be used as a reason to recommend the project by the agency mandated to evaluate the merits of the license application? 10-19

How is Duke Cogema Stone & Webster going to benefit economically from this endeavor? Why is this not part of the review process? Are they deemed a local benefactor, or correctly as an international consortium?

How does a city like Savannah benefit from plutonium fuel? How are our lives improved if there is a severe accident or a leak to the surrounding environment?

Additional Concerns for DEIS

Due in large part to the errors in the calculation of latent cancer fatalities if there were an explosion at the MOX facility, we alert the NRC to sincere concerns on credibility in all of their calculations.

We also request that full scoping comments be provided instead of just a summary of scoping comments, as was done for this draft in Appendix I. This allows for the reader to see whether their original question was answered and also whether others asked the same item and received a similar or differing response.

We also suggest that if questions or comments are raised that will be addressed in the Safety Evaluation Report, that those comments be transferred over to the proper contacts within the NRC and that the commenter be placed into the pool of interested participants in the SER process. The division between the EIS and SER is very confusing and needs to be simplified in some way.

We again ask that the environmental and safety records of the individual contractors involved in the international consortium, Duke Cogema Stone & Webster (DCS), be studied thoroughly by the NRC. At a time when the French are not currently America's favorite partner, it is suspect that our government is not concerned with Cogema's (a French government owned company) previous track record in handling commercial plutonium and nuclear waste—we are after all giving them proposing to allow them to handle a highly dangerous material and one sought by numerous rogue nations and terrorists. DCS did not exist before this proposed plutonium fuel project came to light—how do we know they will do it right? 10-20

Southern Alliance for Clean Energy DEIS MOX FFF Public Meeting Comments Continued

Summary

From what has already occurred, it appears that the Department of Energy has decided that SRS will be the centralized, long-term plutonium storage dump, using the plutonium "disposition" plan as justification to bring the plutonium here and that the NRC is doing its part to allow that to unfortunately happen. We should remember that the storage of plutonium at SRS could create one potential source of feed for any new pit plant.

Southern Alliance for Clean Energy believes that the NRC must address the full impacts of the plutonium bomb fuel program—how this scheme is likely contributing to the eventual production of nuclear weapons components at SRS and the use of the site for permanent nuclear waste burial. A full accounting of what and how much plutonium is coming from where and being used for what project when it arrives should be done and made public. 10-21

We suggest that after the NRC has reviewed all of the comments on the draft and does more research, they should deny the license request or at least recommend that the "no action alternative" is more advantageous to health and safety than the MOX program. 10-22

Southern Alliance for Clean Energy believes this controversial nuclear energy program threatens national security. Support of the plutonium fuel program could lead to the development of a plutonium economy that would threaten nuclear non-proliferation goals and would increase already excessive volumes of deadly, highly radioactive nuclear waste at SRS.

Instead, other programs that appear to be more environmentally sound, safer to workers, less expensive, and could prevent the circulation of nuclear weapons materials, such as immobilization of surplus plutonium, should be funded and supported through further research and development. Though not a perfect technology, it is far cheaper than other options and appears to have less risks overall than the currently encouraged technologies. 10-23

Thank you to the staff for holding this meeting in Savannah.

Thank you.

Sara Barczak
Safe Energy Director, Southern Alliance for Clean Energy
3025 Bull Street, Suite 101
Savannah, GA 31405
www.cleanenergy.org
(912) 201-0354

6 of 6

3/26/03

00011

AUGUSTA
METRO CHAMBER OF COMMERCE
AUGUSTA, GEORGIA

March 26, 2003

Rules and Review and Directives Branch
U.S. Nuclear Regulatory Commission
Mail Stop T6-D59
Washington, DC 20555-0001

Dear Sirs,

The Augusta Metro Chamber of Commerce, with member businesses from across our two-state community supports the MOX project. The Chamber has followed the progress of the project since the beginning and with the release of the Nuclear Regulatory Commission's draft environmental impact statement stating minimal environmental impacts; we believe NRC should issue a license for construction and eventually for operation of the MOX facility. Aside from being the right thing to do for the safety of our planet, support of this international effort will have the side effect of great economic benefit for our community. 11-1

We believe any concerns of safety have been answered. The safety of the process and the facility itself has been evaluated for years by many different groups. Every conclusion is the same—the MOX facility can be constructed and operated safely with minimal impacts. The technology has been safely used in Europe for over 35 years.

With the question of safety satisfied, we hope our citizens can now recognize the economic boost the MOX project will have in the regional economy. When focusing on some numbers listed in the Draft EIS for the construction and operation of the MOX facility and its associated facilities, the Pit Disassembly and Storage Facility and the Waste Solidification Building it is easy to see the positive impact on the community.

- In the peak year of construction, 1,820 workers will be required for the proposed action.
- On average, 1000 jobs will be created for the proposed facilities.
- During operations, 1,260 employees will be required each year.
- Income for workers during construction will be $350 million.
- Income during operations will be $610 million.
- The proposed facilities will produce approximately $110 million in tax revenues from state income and sales tax.
- The proposed facilities will produce $1,850 million for the gross regional product.

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P.O. Box 1837
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Augusta, Georgia 30903-1837

3/26/03

The Central Savannah River Area will be proud to be home for the mission to reduce weapons plutonium. This project is one of great importance to the security of the world. That reason alone should be enough to see this MOX succeed. But it also positively impacts the CSRA in more ways than expected. It just shows that by doing the right thing and supporting our country, our citizens will receive benefits they never expected.

The Augusta Metro Chamber supports the licensure of the MOX facility and looks forward to both the global safety and local prosperity that it will create. Working together the Central Savannah River Area and the Department of Energy are making the world a better place.

Yours truly,

Edwin S. Presnell
President

Adrienne Lester - opposition to the utilization of MOX fuel — Page 1

00012

From: justice Richard <wildlifejustice@yahoo.com>
To: <teh@nrc.gov>
Date: 4/16/03 2:55PM
Subject: opposition to the utilization of MOX fuel

I Scott Justice of 400 Exley Rd S. do oppose the transportation and utilization of MOX fuel in the united states. It is now time for our country to realize that the nuclear experiment did not fully work. There are three robvious reasons why MOX fuel is a bad idea. First, the risk of proliferation increases if we begin shipping plutonium rods across country or across the world. Secondly, It will have a hefty price tag for the people of the U.S.. This program looks to me to be an attempt to get the federal govt. and the energy customers to subsidize a facelift for the major energy companies. We have given them enough money. Thirdly, There is a smaller margin for error when it is used in ageing reactors like the ones we have in the U.S. Frozen core reactors like McGuire in Charlotte,NC have thinner walls. The scientist are not in agreement as to how safe this process is. For these reasons I urge the NRC to deny authority for the use of MOX fuel in the U.S. 12-1 12-2 12-3 12-4

Respectfully,Scott Justice

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3/26/03

GLENN CARROLL

00013

Comments on the Nuclear Regulatory Commission (NRC) Draft Environmental Impact Statement (DEIS) for the MOX Application

1. The primary flaw of the NRC's DEIS process is that it splits the MOX application into two parts — construction and operation — but the **operations data is not subject to review.** Environmental aspects of both must be considered. Most alarmingly, the NRC plans to sign off on its environmental review before operational plans are developed to safeguard 34 tons of plutonium during MOX processing. To separate construction and operation, and to not review critical aspects to contain the highly dangerous plutonium, is irresponsible and blatantly wrong (and is being legally challenged by GANE). 13-1

2. The DEIS was published containing large computer errors miscalculating how **high death counts in low-income, minority communities** would be from a severe MOX accident. Although the NRC is preparing new environmental justice data, its public meetings will take place before the public is in possession of accurate data on which to comment. It should be mandatory for the NRC to hold additional meetings subsequent to releasing the correct data ... especially in North Augusta which is in the most highly affected area from the proposed MOX activity at SRS. 13-2

3. The DEIS fails to address the **reasonable alternative to MOX — plutonium immobilization.** Immobilization would effectively achieve the MOX program's stated goal to safeguard weapons-grade plutonium. Continued storage, which the NRC analyzed instead of immobilization, is, conversely, an acknowledged security risk. The immobilization alternative compares favorably with MOX in other ways: large number of jobs provided; effective management for existing waste stocks at SRS; negligible waste stream as compared to MOX; cheaper than MOX. The public demands to see the in-depth comparison between MOX and immobilization which is required to satisfy NEPA. 13-3

4. The DEIS fails to analyze **weaknesses in Catawba and McGuire's ice condenser-type reactors,** currently proposed to use the MOX fuel. The ice condenser design has a thin containment which is more likely to rupture in the case of a severe accident. Additionally, severe accidents are more likely with MOX fuel use. The DEIS must address these reactor-related MOX risks in its analysis. 13-4

5. The DEIS fails to acknowledge the possibility of **insufficient reactors in the MOX program** to keep pace with the proposed MOX production rate. Two or three additional reactors would be required to process the proposed volume of MOX fuel. The DEIS must state the environmental risks from failure to process plutonium to MOX, or conversely, excessive inventory of fresh MOX fuel containing weapons-grade plutonium, an extra security risk. 13-5

6. The DEIS evaluates a proposal by Duke Cogema Stone & Webster (DCS, the applicant) for the Department of Energy (DOE) to build a special waste building to handle the **significant volume of highly radioactive liquid MOX wastes.** DOE has not yet generated any records or budget requests indicating acceptance of the MOX waste plan. The DEIS must discuss the environmental risks and consequences of DOE failure to implement MOX waste management. 13-6

7. Sabotage and terrorism have become increasingly common in recent years. The DEIS must analyze **environmental risks from sabotage, malevolent acts, or terrorist attacks** to: the MOX facility; reactors using MOX; transports of fresh fuel to reactors; or transports of plutonium to SRS. MOX, by involving weapons-grade plutonium, is an intrinsic security risk, and must be considered to have a strong attraction to terrorists. Absence of analysis of this environmental risk hampers efforts of public health authorities to respond to emergencies posed by potential security breaches.

GANE - Georgians Against Nuclear Energy • P.O. BOX 8574 • ATLANTA, GA 31106 • 404-378-4263 • g.a.n.e.@mindspring.com

3/26/03

00014

ECONOMIC DEVELOPMENT PARTNERSHIP
Serving Aiken & Edgefield Counties

Fred E. Humes
Director

Statement for the Record
Draft Environmental Impact Statement
Construction and Operation of a Mixed Oxide Fuel Fabrication Facility at the Savannah River Site, South Carolina
March 26, 2003

Thank you for the opportunity to provide comments on the draft Environmental Impact Statement on the Construction and Operation of a Mixed Oxide Fuel Fabrication Facility at the Savannah River Site, South Carolina. My name is Ernest S. Chaput and I am the manager of special projects for the Economic Development Partnership of Aiken and Edgefield Counties, South Carolina.

Construction and operation of the Mixed Oxide Fuel Fabrication facility is an important part of our nation's international nuclear non-proliferation program. It is important that we do all possible to make surplus United States and Russian nuclear materials unusable for future use in nuclear weapons. We believe that the United States should continue to demonstrate moral leadership by expeditiously preparing to make these materials unsuitable for use in modern nuclear weapons.

We are pleased with the preliminary conclusion of the NRC staff that the overall benefits of the MOX facility outweigh it disadvantages and costs, and that unless safety issues mandate otherwise the action called for is the issuance of the proposed license. We agree that the proposed facility can be operated safely, and urge the NRC to issue the Construction Authorization Request in a timely manner. 14-1

We have reviewed the draft Environmental Impact Statement (DEIS) and offer three comments which result in additional support for your preliminary conclusion:

1. The safety and environmental risks associated with the No Action alternative have been significantly understated. The no action alternative assumes that DOE's surplus plutonium would remain in storage at seven DOE sites. The DEIS does not state the period of storage, and it appears that impacts are near-term and based on maintaining the status quo. We believe current methods of storage are only valid for a limited and finite timeframe; storage without subsequent actions is not realistic for timeframes of 100 years plus. At some time in the future actions will be required to either repackage or disposition stored materials. The no action alternative should assess the incremental added risk resulting from (1) actions to periodically process and repackage materials in long-term storage and (2) actions to eventually remove the materials from storage and preparation for disposition. 14-2

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2. The risk to offsite population in the hypothetical accident analysis is significantly overstated. In analyzing the impact to off-site population from a hypothetical tritium release from the Pit Disassemble and Conversion Facility, the DEIS assumes and calculates a dose by ingestion during the one-year post-accident period. This scenario is simply not possible. An assumption that the South Carolina Department of Health and Environmental Control and the Georgia Environmental Protection Division would ignore contamination of agricultural products for one year is incredulous and an insult to their training, demonstrated performance and professional status. This impossible assumption must be eliminated and the analysis revised. 14-3

3. The DEIS places unwarranted emphasis on impacts associated solely with the Pit Disassembly and Conversion Facility (PDCF). The PDCF facility is not solely required to support the MOX facility. PDCF has a broad capability to support a range of storage and disposition options for surplus nuclear weapon pits. For example, the PDCF prepared the plutonium that was included in the cancelled Plutonium Immobilization Project. There has also been discussion that PDCF may convert surplus weapon components currently being stored as pits to oxide for long-term storage. By coupling the MOX and PDCF facilities in the draft EIS, NRC implies that impacts from the PDCF will not occur if the MOX construction authorization is denied. That is not the case. PDCF and MOX are two separate actions, and the draft EIS should only analyze those combined impacts which result from the unique actions required solely to fabricate MOX fuel. DOE has previously prepared an Environmental Impact Statement for the PDCF facility with a finding that the facility provides adequate protection to the public and environment. NRC should not subject the PDCF facility to NEPA "double jeopardy". 14-4

Thank you for the opportunity to comment on this important document.

3/26/03

00015

Action For a Clean Environment

Adele Kushner, Executive Director
Joanne Steele, Director, Oconee Nuclear Project

TESTIMONY ON THE MOX DRAFT EIS FOR SAVANNAH RIVER SITE
AUGUSTA, GA. 3/26/03
BY ACTION FOR A CLEAN ENVIRONMENT, ALTO GA

People in this country expect to trust their government. After all, it is a democracy. Under other forms of government, people know not to trust official government statements – those governments could be telling lies.

In this case the Nuclear Regulatory Commission is telling us that there is very little danger from exposing people to accidental emissions produced by a MOX plant. Then it turns out that the Draft EIS contained large computer errors, and that there would be far fewer than the estimated 400 deaths in a population living within 50 miles of the plant. And anyhow this was a minority low-income community. And furthermore, the new data will not be available until after the public meetings. But trust us – we are your democratic government. Would we lie to you?

This reminds me of another campaign, also concerning radioactive materials. Years ago the NRC told us that a little bit of radioactivity in our cooking pots, our bicycles, our paper clips, our appliances would not hurt us one bit. The level of radioactivity would be so low it would be "Below Regulatory Concern."

We found out there is no way you could tell how much radioactivity people would be exposed to once they were surrounded by such little bits if the little bits were scattered around randomly.

I once adopted a cat that the owner said was just a little tiny bit pregnant. That cat produced four good sized kittens right on schedule.

It is hard to believe that the Savannah River Site, already the most radioactively polluted Dept. of Energy site, would even be considered for a process that can only produce more radioactive pollution -- especially when there is an alternative.

Would you rather live and work near ancient tanks already leaking radioactive nitric acid, attractive only to saboteurs and terrorists, OR near glass logs in which nuclear waste is immobilized, out of reach for any re-use, providing safe jobs, leaving no mess behind? How about a real comparison of the pros and cons, NRC? Before a decision is made on this DEIS? 15-1

Think about the perils of transporting plutonium across the country, then taking the MOX fuel to reactors, all of which is subject to accidents and the possibility of spreading 15-2

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radioactive stuff in city centers and people's backyards. Think of weapons-grade plutonium out there waiting to be grabbed. 15-2 cont.

A conscientious examination of the facts might produce a decision that would restore some of our trust in our government. That is a conclusion devoutly to be wished.

Adele Kushner, Executive Director
Action for a Clean Environment
Alto GA

3/26/03

00016

From the Office of Congressman Gresham Barrett

Representing the 3rd District of South Carolina

For Immediate Release
March 26, 2003

Contact: Colleen K. Mangone, Press Secretary
Congressman Gresham Barrett
202-225-5301
Colleen.Mangone@mail.house.gov

Washington, DC – Congressman Barrett understands the Savannah River Site is not only important to the 3rd district, but the nation. SRS is an integral part of our nations' national security, as well as the United State's non-proliferation efforts, and for those reasons among others Congressman Barrett continues the tradition established by his predecessor of supporting SRS. 16-1

Congressman Barrett has secured language in House Report 108-37, which accompanies the House Budget Resolution. The language is as follows:

- Mr. Barrett raised the issue of Mixed Oxide Facilities. To be clear on this matter, the budget resolution assumes full funding of the President's $415 million request for the construction of the Department of Energy's [DOE] Mixed Oxide [MOX] Fuel Facility and Pit Disassembly and Conversion Facility [PDCF] for fiscal year 2004. This funding would be used to initiate construction of the MOX Fuel Facility and complete the design of the PDCF at the Savannah River Site.

Congressman Barrett is currently supporting the following language concerning the funding level for the Department of Energy's Defense Environmental Management Program submitted by Congressman Hastings of Washington State.

- Mr. Hastings raised the issue of the Defense Environmental Management. To be clear on this matter, the budget resolution assumes full funding of the President's $7.2 billion request for the Department of Energy's [DOE] Environmental Management Program for Fiscal Year 2004. The funding level provided in the resolution will allow for accelerating the completion of cleanup by decades and save billions of dollars in spending.

In addition, Congressman Barrett has held several meetings with members of the Department of Energy, the Washington Group, and employees of the Savannah River Site these issues. The one message Congressman Barrett continues to hear from each of these groups is just how important it is for SRS to acquire new missions. It is not only an integral part of the districts economy, but more importantly the security of our nation. Congressman Barrett knows that with these new missions SRS can be afforded a great opportunity to help secure our homeland.

3/26/03

00017

<u>SRS Retiree Association Presentation at the March 26, 2003 NRC Public Meeting to Discuss Draft Environmental Impact Statement on Proposed MOX Nuclear Facility</u>

Presentation by: C. David Cowfer
Chairman, Savannah River Site Retiree Association
110 Boxwood Road
Aiken, SC 29803

Hello, my name is Dave Cowfer, and I am the Chairman of the SRS Retiree Association Board of Directors

I have 40 years collective experience in Federal Government and commercial nuclear industries and today, I would like to say that I, as well as the SRS Retiree Association that I represent, strongly support the construction and operation of the MOX facility. I hold a fellow grade membership in the American Society of Mechanical Engineers (ASME), an award I achieved by 30 years participation in non-government Boiler Codes & Standards developing committees. I have interacted with Nuclear Regulatory Commission (NRC) personnel for 30 years as Codes and Standards, and Federal Regulations Owner/User. I continue to interact with NRC personnel on standards developing national committees in my retirement. I am, you would say, very familiar with the NRC regulatory function. 17-1

I believe that the MOX facility can be constructed and operated safely, not-with-standing some concerns about NRC's worst case scenario in the subject EIS.

My understanding from having reviewed the EIS and spoken with some folks whom I believe to be independent from this process is that the evaluation that the NRC performed is not only very conservative, but actually makes assumptions that I believe to be incredible.

- I am concerned about the perception that this kind of evaluation generates in the public eye with respect to the perceived dangers of such a facility. For the NRC to publish a scenario that breaches 1) at least 2 levels or more of containment, 2) site boundary monitors and 3) goes undetected for one year is preposterous. This scenario also disregards MOX Facility equipment engineered safety features and operating procedures mandated by Federal Regulations, enforced by several levels of regulators. I have worked at SRS and I can tell you the redundancy in facility safety basis and operations does not stop with Regulatory minimum requirements. 17-2
- We've seen over the years opponents of nuclear technology overstate the risks associated with this technology.
- The NRC is neither an opponent nor a proponent, but an objective regulator; I would expect the NRC to be even-handed and not overly dramatic in its assessments.
- Even if the NRC acknowledges that the assumptions they have used are conservative, and even if they acknowledge that their evaluation does not give credit for protection that we know will be in place, those kinds of statements can easily get lost in

<u>SRS Retiree Comments on NRC MOX Facility EIS – 3/26/03 Public Meeting - Continued</u>

the cloudiness that gets generated over the numbers that fall out of the conservative evaluations. 17-2 cont.

- I hope that the NRC heeds this concern, and ensures that their final analysis portrays the risks associated with this program in the proper context.

Sincerely,

C. David Cowfer
Chairman, SRS Retiree Board of Directors

3/26/03

March 24, 2003 00018

Comments on the Draft Environmental Statement, NUREG-1767
From Donald A. Orth, March 24, 2003

The Environmental Impact Statement on the Construction and Operation of a Mixed Oxide Fuel Fabrication Facility at the Savannah River Site, NUREG-1767, Draft Report for Comment, lacks sufficient information on design bases to judge the operability of the facilities, general safety, and validity of projected off-site effects of accidents. It is recommended that the DEIS contain a detailed evaluation of the proposed facilities against guidances for radiological facilities, painstakingly established over a period of years, some 25 to 35 years ago. These include design criteria, technical specifications, and ANSI Standards as discussed later. It is true that the proposed facilities are not fuel processing plants and not all parts are to be licensed, but many of the operations are the same as in such plants and should meet the same licensing requirements. Also, the DEIS does not make apparent if there has been a detailed technical review of the designs themselves, rather than just presentation of information from the consortium to be responsible for construction and operation.

To satisfy these points, the Statement should provide evidence that the proposed projects have received an adequate technical review to support stated conditions of routine performance, possible accidents, and their off-site effects. As examples of past reviews of facilities that were to be licensed by NRC, special Subcommittees of the Advisory Committee on Reactor Safeguards were established, with knowledgeable consultants, for the GE Midwest Fuel Reprocessing Plant, the Allied General Barnwell Plant, and the extensive hearings on the Generic Environmental Statement for Mixed Oxide, (GESMO). To aid in the reviews, the ACRS had subcommittees develop both General Design Criteria and Contents of Technical Specifications to provide bases for review of fuel processing plant proposals during the late 1960's and early 1970's. Also, by 1971 the American national Standards Institute had a proposed standard for nuclear fuel reprocessing facilities, N101.5.5-1971, and more detailed guides were developed in following years. Evaluation of the Mixed Oxide Facility and associated operations against the ACRS and ANSI standards would increase confidence that a comprehensive review has been made. 18-1

A specific example of need for technical details is the analysis of criticality in the operations, which is treated only with the statement that a generic accident. is being considered, with no description of what "generic" means. Actual criticalities have varied substantially, Note that information from past incidents involving both plutonium and uranium are pertinent. The majority of incidents have involved solutions and have resulted in both short duration reactions and continuing reactions that finally were extinguished by loss of moderator. Pertinent descriptions of the "generic" incident should include the bounds and bases for the assumed number of total fissions, peak pulse, and duration of the incident. A discussion of the observed differences between solution and solid incidents also should be given. In essence, it should be shown that the design provides criticality controls against all foreseen accidents but also will mitigate consequences in case of the kinds of incidents that have occurred.

The Barnwell licensing action and the GESMO work ~~was~~ were terminated by order of President Carter, but still shows the kind of attention that seems warranted for these new facilities. Note that the former Environmental and Waste Management Subcommittee of the ACRS was split off to become the Advisory Committee on Nuclear Waste, again to provide a technical review of proposed waste operations, including Yucca Mountain. If there is concern that facility details should be held confidential under current world conditions, then appropriate committees still could be established, possibly again under the ACRS, with cleared consultants from the complex or retired community, as before, with still final unclassified reports. 18-1 cont.

3/26/03

00019

LWV
Mary T. Kelly, Ph.D.
Assoc. Director, League of Women Voters of SC
4018 Sandwood Drive, Columbia, SC 29206
803-782-8410

Statement for Nuclear Regulatory Commission Public Meeting
Re the DEIS for the proposed MOX Fabricating Facility at SRS
N. Augusta, SC, March 26, 2003

My name is Mary T. Kelly, representing the League of Women Voters of South Carolina. We appreciate the opportunity to comment on the current Draft EIS for the building of the MOX manufacturing facility.

Our comments and concerns can be summed up as follows:

Failure to hold meetings in a variety of places in South Carolina, but especially in the state capitol, Columbia. This meeting is being held to fulfill requirements of the National Environmental Policy Act, a law that is aimed at including the average citizen stake holder in the process through which major decisions are made. You are proposing to build a factory that is essentially a heavy chemical manufacturing plant with potential for contaminating the air and water with a wide variety of substances only some of which are radioactive. Areas far beyond a fifty or sixty mile radius could be affected. We know that tritium spills have affected communities far down stream and ground water contamination is flowing towards Georgia. 19-1
Meetings in the N. Augusta/Aiken area tend to be dominated by those who see any and every proposal for the Savannah River Site in economic terms alone, a situation that at some other meetings has prevented valid information and concerns from being presented. Yet the experience of Chernobyl proves how far reaching the effects of a major accident can be. Not only are we all in danger but as tax payers, we all have a stake.

The failure of this DEIS to deal with possible terrorist acts or a criticality accident.
The failure of this DEIS to confront such issues is in line with the failure of the Home Land Security administration to acquaint the public with the dangers of such accidents for SRS and for nuclear power plants in this state. There is danger in ignorance. People need to know what they can do to protect themselves, and what to do if they have to evacuate. We are much better prepared for hurricanes. 19-2

Under NEPA a range of other options including no action should be presented. This DEIS offers only the preferred option versus no option. The same should be true for the choice of the F area. 19-3

The wisdom of concentrating so much plutonium at one site. SRS has to be one of the world's most inviting terrorist targets, even without the added plutonium. As the old saying goes, "Never put all your eggs in one basket." Having so much plutonium in one place also increases the prospect of a criticality accident. 19-4, 19-4 cont.

Should we be transporting plutonium and uranium around the country in a time of war and international hostility to the US? Some of that plutonium will be in the form of plutonium oxide powder, a highly reactive and flammable substance. Depleted uranium in the form of gaseous uranium hexafluoride, a nasty substance, will be transported to a processing plant in Wilmington, NC, solidified as uranium dioxide, and then transported to SRS. 19-5

This DEIS estimated 400 deaths in the minority community based on computer modeling and is now coming back to revise that to 50. Although modeling is a valid technique for estimating the unknown, it must be based on realistic choices of variables and not too many of them. The assumptions need to be justified. A lot more information is needed about how you got your numbers. 19-6

It is distressing that a truly valid study of the impact of SRS operations on public health has never been completed. The Dose Reconstruction Project was dropped by the CDC and DOE for lack of funding just as it was beginning to interpret the results of all the data collection. Since DOE proposes further operations at this site, you owe it to the people of South Carolina who have and will be placed at risk to complete this study.

The weather discussion in this DEIS is inadequate and doesn't cover enough years and doesn't take into account some special South Carolina background. Hurricane Hugo showed how hurricanes and the accompanying tornadoes follow river courses. Charlotte, NC was heavily impacted by Hugo, a surprise to people, including me, who had taken refuge there. It came in just north of Charleston and followed the rivers through Sumter and up the Wateree to Charlotte. 19-7

The impact on the health of citizens should cover more than a fifty to sixty mile radius. 19-8

There should be more discussion about the backgrounds of the entities composing DCSW, from the standpoints of their financial status and history and their environmental and safety records. It is extremely troubling that one party to this consortium is COGEMA a French company, owner and operator of sites like La Hague that have bad environmental and safety records. It may not be possible to get adequate information about COGEMA since France is far less open than the US about its nuclear operations. 19-9

If the Russian MOX program does not proceed according to plan - it is reliably reported that it will not - how will the US program be affected? It could well mean that the MOX program will be delayed or aborted and that the surplus plutonium will be stored at SRS with no place to go. 19-10

I appreciate the opportunity to present these views and trust that all the views expressed by the participants at these meetings will be given careful consideration.

Adrienne Lester - MOX project | Page 1

00020

From: Susan Giusto <susangiusto@knology.net>
To: <TEH@nrc.gov>
Date: 3/28/03 6:32AM
Subject: MOX project

Mr. Harris:

I would like to add my name to the list of citizens highly opposed to the MOX project being introduced at SRS. Our mission should be CLEAN-UP, not the increased production of potential nuclear waste to add to the already abundant and dangerous cache we have amassed world wide. 20-1

We don't need this.

Sincerely,
Susan Cain Giusto
Augusta, GA

NRCREP - Response from "Comment on NRC Documents" | Page 1

00021

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2003 MAR 31 AM 11:10
Rules and Directives Branch

2/28/03
68FR 9729
(2)

From: Roy G. Humi <melthur@yahoo.com>
To: <nrcrep@nrc.gov>
Date: Sat, Mar 29, 2003 5:31 PM
Subject: Response from "Comment on NRC Documents"

Below is the result of your feedback form. It was submitted by

Roy G. Humi (melthur@yahoo.com) on Saturday, March 29, 2003 at 17:32:06

Document_Title: Environmental Impact Statement on the Construction and Operation of a Mixed Oxide Fuel Fabrication Facility at the Savannah River Site, South Carolina (NUREG-1767) - Draft Report

Comments: Dear NRC,
Thank you for finally approaching the MOX issue and providing an excellent environmental statement for the Savannah River Site in South Carolina. This issue affects every one of us who live in the United States, as nuclear power is vitally important for our future, and developing MOX technology at the Savannah River Site is an important first step toward closing our nuclear fuel cycle. Burning MOX fuel in our reactors will produce much needed power so that my children and grand-children might hope to have at least as high of a standard of living as I have had, and it also removes plutonium from our weapons stock piles to make our world a little safer. It is unfortunate that so many people do not realize the benefits of this clean, safe source of energy. 21-1
Respectfully,

organization: Private Citizen

address1: 2112 Newton Road

address2:

city: Hampton

state: VA

zip: 23663-1023

country: USA

phone: 757 851-2668

Template = ADM - 013

E-RIDS = ADM-03
Add = T. Harris (TEH)
A. Lester (ACL1)

00022

From: "Linda" <lco@carolina.rr.com>
To: "Tim Harris" <TEH@nrc.gov>
Date: 3/29/03 5:39PM
Subject: Mox project meeting, Charlotte,N.C.March 27,2003

Tim,

I know you are all good Americans just trying to do a good job. I also know you can not allow yourself to get personal with the people whose lives will be affected by your decision. It would be hard not to think about our safety once in a while and harder yet if an accident occurred.

The Gentleman with DOE told me they have no intentions of using fuel from Plutonium as an "alternate fuel." He said it was just a way to get rid of the Plutonium and it cost less money than storage. Another point he made to me was the French have been doing it for years. While it is true, that some of the French Scientist have been Brilliant, and most of them opposed the MOX fuel project in their country. However, the French Government has not proven to have made wise decisions in the past where their citizens are concerned.

The DOE's explanations are not good enough answers for me! As an American and the daughter of a disabled WW 11 Vet and the fiancé of a man ambushed in Viet Nam and now the mother of a 22 year old son, who may have to die for our country, I always trusted my country to protect us. Why do you think that is? Even a monkey learns not to take food from the hand that bites them! After all, my family is part of "The Ethnic Low Income Population" that is deemed expendable.

The NRCs' Environmental Impact Statement publication should have used the facts from real radioactive accidents instead of hypothetical accidents. You would have been surprised to see that these accidents affected generations of Americans not just the generation living when the accident occurred. Of course, The Savannah River Plant says they can't find the records or someone didn't keep them. You know and I know that is a lie! 22-1

In 1973 Radioactive Iodine was accidentally released (430,000. units) from the Savanna River Plant in South Carolina. This was just one of the elements released in that accident. I believe this is what has caused my sister to developed thyroid cancer as a young mother pregnant with her 5th child. There is less than !% of thyroid cancer in this country but in the SRS area it is 100% higher than the nation. That tells me a lot, does it you?

Her daughter, who is a graduate of Cornell and Boston University, was featured in U. S. World News and Report while she was at Cornell; she was also an "All American" and was honored by the Governor of her State for the

selflessness she showed in helping others. My niece had a baby girl born with a defective hart that the doctors all agreed was caused by "chemicals in her environment" that my niece was exposed to. I am happy to say my beautiful little Great Niece, who was named after a warrior because she is such a little fighter and she is only 1, survived her grueling open hart surgery preformed immediately at birth and only God knows what is in store for her down the road. I spent a lot of time crying, praying and begging God to save her. I know you can not imagine the torture her parents went through before the birth and during surgery.

My younger sister has not 1 but 3 forms or rare cancers not related to each other, she was only in her thirtys. I want to go on and on but I will spare you, even though my family has not been spared.You see the accident in 1973, as well as the other accidents, I believe, so far, has affected FOUR (4) generations of my family not just One.

Of course, we will never know the extent of the damage done to our nation by nuclear power plants and there is no reason or excuse to ever risk the lives of more people. You see 1% is way too high of a risk for me to accept! It is to late for my family but not to late for others that will be affected.

I resent the NRC and the DOE referring to our population as the "Ethnic Poor". Is money the measure of a successful and productive Life? I have two uncles who attended Harvard a cousin who attended Oxford and is now learning Japanese at McGill University. Too many of my family attended Ivey League Colleges and are very successful in life to mention here. The point I am making is even though we are considered the "Ethnic Poor" we are not all stupid.

As far as North Carolina's "ethnic low income group" is concerned - Did you look at the area around Lake Norman? Loni Anderson has a house there, as well as many other heads of fortune 500 companies. Do you really want to nuke them? 22-2

The way I see it is my Government has - is and wants to slowly poison part of its citizens and that makes the NRC and DOE no different than Hitler or Saddam to me. Excuse me, there is a difference – the people they killed knew they were being hunted down. Americans have a hard time believing our organizations only see "dollar signs" not the suffering of our population. 22-3

Isn't it ironic that if One Iraqis gets killed in war our government calls it "Tragic!"

When we die, Do you think God is going to ask how much money we made - NO! I do believe, He will ask how many people died and suffered because of the decisions we made in our lives! Please do not put anymore American lives at risk for pain and suffering and even early Death!

May God grant you and the other officials making this decision the Wisdom of Solomon.

Thank you for your time. Please include this as my comment to the MOX Project Meeting.

Linda Odom

1561 Bennington Dr.

Concord, N.C. 28027 704-188-9458

CC: <lco@carolina.rr.com>, "Beverly Evancic" <lking@ida.net>, <MacknShansmom@ctc.net>, "Jill Shelnutt" <bnutshel1@hotmail.com>, "Josie Hernandez" <josie_hernandez@hotmail.com>, <Sklittrell@aol.com>, <coffeyc@lamere.net>, "Susan Morgan" <mustangsue64@hotmail.com>, "TOM COFFEY" <tmc56@hotmail.com>, <Tealady@attbi.com>, <nirs@mindspring.com>, <eric.williamson@augustachronicle.com>, <localnews@charlotteobserver.com>, <Abdrew:b/@/rccc.cc.nc.us>

00023

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2003 APR -2 AM 9: 40

Rules and Directives Branch USNRC

House of Representatives
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Committee:
Judiciary

Minority Leader

March 27, 2003

Via First Class U.S. Mail and Facsimile

Michael T. Lesar, Chief
Rules and Directives Branch
Division of Administrative Services
Office of Administration
Mail Stop T-6D59
United States Nuclear Regulatory Commission
Washington, D.C. 20555

RE: Public Meetings on the proposed new MOX plutonium fuel factory at the Savannah River Site

Dear Mr. Lesar:

I write you today in regards to the Nuclear Regulatory Commission's *Draft Environmental Impact Statement* (EIS) on the impact of building a new MOX plutonium fuel factory at the Savannah River Site. I understand that the NRC has held public meetings to have public input as a part of the official record. I respectfully request the Nuclear Regulatory Commission hold a public meeting in Columbia, South Carolina prior to the end of the comment period at May 14, 2003. 23-1

Additionally, I respectfully request that my name and address be placed on all mailing lists for any further meetings and other public forums regarding a new MOX plutonium fuel factory at the Savannah River Site. Thank you for your valuable time and consideration.

Should you have any questions or concerns, please do not hesitate to contact me.

With kind regards, I remain,

Very truly yours,

James E. Smith, Jr.

JES:cmc

00024

From: Lewis Patrie <patrie.wncpsr@main.nc.us>
To: <TEH@nrc.gov>
Date: 4/3/03 4:25PM
Subject: Regarding DEIS on Proposed MOX Facility

From: Lewis E. Patrie, M.D.
WESTERN N.C. PHYSICIANS FOR SOCIAL RESPONSIBILITY
99 Eastmoor Drive
Asheville, N.C. 28805
March 17, 2003

To: Michael T. Lesser, Chief, Rules and Directives
Mail Stop T6D59
U.S. Nuclear Regulatory Commission,
Washington, DC 20555.

From the perspective of Physicians for Social Responsibility, I wish to cite the dangers and massive costs of the the entire plutonium bomb fuel experiment, the lesser costs and dangers of the option of plutonium immobilization, how such a venture could affect us in North Carolina and an apparent hidden agenda.

Dangers stem from this entire plutonium fuel experiment. The U.S. portion of the proposal involves shipment of plutonium from dismantled nuclear weapons sites in western states, some likely via Interstates 40 and 26 en route to South Carolina. The greatest transportation risk would be an accident in which plutonium metal, which rapidly oxidizes when it comes into contact with air, would vaporize or burn and disperse its deadly particles contaminating the air our citizens inhale, the water upon which we depend and the soil upon which we grow crops and upon which animals feed. 24-1 Inasmuch as your staff have already introduced the subject of terrorism into tonight's discussion, it is appropriate to cite the increased risks that terrorism add to all other concerns about the proposed production and use of plutonium bomb fuel. 24-2

Creating the proposed Mixed Oxides Fuel Fabrication Factory would be counterproductive. Such a facility at Savannah River Site would place workers' health at greater risk from unnecessarily increasing their plutonium exposure. It would greatly increase the radioactive wastes generated at that already highly contaminated bomb building plant. It places populations in nearby areas at increased risks of exposure to plutonium and other byproducts of such a facility as stated above.

Over the decades that SRS has been in operation, there has been ample time to conduct long-term, well-controled, epidemiologic studies of workers and other potentially exposed populations carried out by impartial, qualified scientists. Such studies should have been conducted on populations which might have been exposed through air, water and food ingestion. Such studies should not be prejudiced by prior assumptions, such as extrapolating data derived from the flawed studies of Hiroshima and Nagasaki, which were limited to the survivors of those acute massive exposures. It is difficult to justify the absence of such studies and further how a DEIS can be adequately carried out in the absence of such data. The DEIS would have more validity if risk factors were based more upon such information. Effects of chronic low dose radiation have been reported by scientists such as Drs. Alice Stewart and Dr. Steve Wing (UNC Chapel Hill). Absent the use 24-3 of such epidemiologic data, skepticism is warranted regarding the estimated health risks presented in the DEIS. 24-3 cont.

Inseparable from the proposed MFFF is the fact that once manufactured, plutonium bomb fuel is destined for first use at Duke Energy's McGuire and Catawba nuclear reactors within 20 miles of Charlotte. Plutonium fuel is experimental, in that fuel derived from weapons grade plutonium has never before been used in commercial reactors. These plants are poor choices for an experimental program, because their cooling systems depend on a constant supply of ice; in the event of failure for even a few hours, a serious accident would result. The plants are encased in plate metal rather than the preferred four feet of concrete. Plutonium bomb fuel is inherently more dangerous than currently used uranium fuel, in that it bombards structures within the reactor chamber with more damaging radioactivity and would be more difficult to control, increasing the likelihood of a Chernobyl type disaster. Compared with currently used uranium, should a nuclear catastrophe occur involving a MOX fueled reactor, up to twice the number of cancer deaths would result due to the nature of radioactivity produced. The possibility of terrorism should not be ignored, either to the reactor vessel itself or to the "spent fuel rods" that are stored on site. A worst case scenario could result in the entire Charlotte area becoming a nuclear wasteland for decades to come, with national repercussions and most of the population becoming refugees. 24-4

One more danger comes from vastly increased radioactivity produced through MOX. Promoters deceptively claim its use would rid the world of plutonium, making it unavailable for future nuclear weapons use. As you well know, plutonium will be produced while MOX fuel generates electricity. The proposed parallel tract whereby plutonium is presumably converted into fuel in both the U.S. and Russian reactors would markedly increase the availability of plutonium on a global scale. It would be contrary to our national interests; it would favor further nuclear weapons proliferation. 24-5

Furthermore, MOX would vastly increase amounts of radioactive waste for which no satisfactory solution has yet been discovered. The railway or highway transpiration of increased quantities of radioactive wastes to the proposed Yucca storage facility in Nevada would create new and extensive dangers which further increase the risks to large segments of our population because of the risks of accident or terrorism. Finally, when the Yucca facility would be filled to capacity, there will remain at the Catawba and McGuire sites at least as much high level nuclear wastes as at present. In addition, these sites will continue to be attractive targets to terrorists, due to their proximity to a large population and financial center. 24-6 24-10

Immobilization is the safest and least expensive alternative to converting plutonium into fuel. Originally immobilization was to have been developed along with the MOX program. It would consist of vitrifying plutonium into ceramic pucks, surrounding them with highly radioactive wastes and sealing them in corrosion resistant containers, making plutonium extremely difficult and dangerous to extract, but capable of long term storage. It would substantially reduce the risks of accident and terrorist procurement of this deadliest of all elements. Although it is the best choice for a problem like plutonium, all funds for this alternative have been deleted from the budget and the concept for such an alternative appears to have been placed on an indefinite hold. Failure to consider this option has to be considered abysmal decision. 24-7

There appears to be a hidden agenda connected with the decision to continue with the MFFF despite the risks and uncertainties of proceeding with plans for this facility. The production of quantities of tritium in three of TVA's nuclear reactors which will be processed at Savannah River Site has to have significance. Such quantities of tritium can be used only in the production of nuclear weapons. An MFFF could make plutonium available in sufficient quantity for the production of nuclear weapons. What other explanation could there be than that another objective of the MFFF is connected with the production of large numbers of new nuclear weapons? If valid, this should be acknowledged as part of this DEIS and should be made apparent to the U.S. citizenry upon whose taxes this project would depend. Without a satisfactory explanation of this, the DEIS is incomplete. 24-8

If these premises are correct and we are on the verge of constructing a new massive buildup of nuclear weapons, it will further signal the rest of the world that we have abandoned our prior commitment of moving toward eventually ridding the world of weapons of mass destruction and in fact are encouraging a new worldwide arms race.

For the reasons I have stated, the proposed MFFF should not be approved for construction. 24-9

Lewis E. Patrie, M.D.

00025

Bill Mottel
30 Glenmoor Place
Hilton Head Island, SC 29926
Phone: 689-2787

RECEIVED
2003 MAR -4 PM 2:55
Rules and Directives
2/28/03
68FR 9728
(4)

Comments For NRC on MOX
Draft EIS, 3/24/03

My name is Bill Mottel. I have lived for the past 10 years on Hilton Head Island, which is just a few miles north of Savannah, GA, and the Savannah River. I am now on the Hilton Head Island Town Council and the Lower SC Council of Governments. I had many years of experience on nuclear assignments, first in the U.S. Armed Forces nuclear weapons program and later with DuPont at the Savannah River Plant, where I was the Plant Manager. After retiring as DuPont's Director of Safety and Occupational Health, I served as Chairman of the National Safety Council.

I am mailing this statement to you because a conflict prevents me from attending the public meeting in Savannah on March 24.

I have great confidence that Duke Cogema Stone & Webster, DCS, working Westinghouse and with the Nuclear Regulatory Commission are very well qualified to fulfill this mission, and will do it safely and efficiently. Cogema has a long and distinguished record of manufacturing mixed oxide, MOX, fuel for the more than 30 commercial power plants in Europe that use MOX fuel. And, both Duke Power and Stone & Webster have long histories of excellence in the design, construction, and operation of nuclear facilities. Savannah River Site's record of safety is legendary, and both DOE and SRS will work with DCS to maintain that outstanding safety performance. 25-1

The recent Draft Environmental Impact Statement, which included both the MOX plant and the Pit Disassembly and Conversion Facility, did not contain sufficient detail to allow an independent assessment of their analyses. However, its worse-case incident, which occurred in PDCF, not the MOX plant, seems grossly exaggerated. A fire in a modern plutonium cabinet or glove box would be unlikely to generate either the heat or the releases of plutonium and tritium that was assumed. Any plutonium in such a fire, if it occurred, would not dissipate to the public. Also, I cannot imagine why the assumption was made that the government would not collect the contaminated food to keep it from being eaten. Surely this hypothetical incident scenario is supposed to be at least remotely possible. I do not think that this one is. 25-2

This draft EIS needs significant revision.

W.J. Mottel (signature) — 3/25/03
W.J. Mottel — Date

Template = ADM-013

E-RIDS = ADM-03
Add = T. Harris (TEH)
A. Lester (ACL1)

00026

Augusta Tomorrow, Inc.

Supports

MOX Fuel Fabrication Facility

March 25, 2003

Good evening. My name is Camille Price and I am the Chief Administrative Officer of Augusta Tomorrow, Inc. Since 1982, Augusta Tomorrow, Inc. has worked tirelessly to assist the City of Augusta and private investors in the revitalization of downtown Augusta. Augusta Tomorrow's membership is made up of representatives from private business, banks, local utility companies, the City of Augusta, the City of North Augusta and not-for-profit institutions. We are not developers. We work behind-the-scenes to support projects we see as vital to the redevelopment of a thriving Metropolitan Augusta. In fact our mission is "to serve the community at large by planning, promoting and implementing the revitalization and development of Augusta with particular emphasis in the city center."

The Savannah River Site has been a tremendous asset to the economic development of the City of Augusta and the CSRA region. The economic impact of Savannah River Site is over $3 billion dollars a year. This impact comes not only from the jobs generated, but also from families who purchase homes and commodities that positively impact the entire region's vitality. This economic impact clearly dovetails with Augusta Tomorrow's mission.

1

Augusta Tomorrow has been concerned about Savannah River Site's job loses as the cleanup missions are completed. Losing jobs negatively affects Augusta's economy. We enthusiastically support the Pit Disassembly and Conversion Facility and the Mixed Oxide (MOX) Fuel Fabrication Facility. Not only are these programs designed to reduce the potential for proliferation of nuclear weapons, they will bring jobs to the Savannah River Site and continued economic development to Augusta.

In closing I want to say that because of the Savannah River Site's 50 years of unmatched safety record, we have complete confidence that the new projects will be handled safely and without incidence. Augusta Tomorrow completely supports the MOX Fuel Fabrication Facility. 26-1

Thank you.

2

00027

ER 03/202

April 14, 2003

Michael Lesar
Nuclear Regulatory Commission
MS-T6 D59
Office of Nuclear Materials Safety and Safeguards
Washington, DC 20555-001

RE: Draft Environmental Impact Statement (DEIS) on the Construction and Operation of a Mixed Oxide Fuel Fabrication Facility at Savannah River Site, Columbia, and Richmond Counties, Georgia; Aiken, and Barnwell Counties, South Carolina

Dear Mr. Lesar:

The Department of the Interior has reviewed the subject document. We provide the following comments for your consideration..

GENERAL COMMENTS:

The document is well organized and written. We appreciate the obvious effort that has gone into it. However, our ability to assess groundwater impacts and to develop a sense of possible contaminant plume migration pathways is hindered by the lack of explicit and detailed geo-hydrologic information in some instances. We encourage expansion and enhancement of the relevant data and discussions in the text.

SPECIFIC COMMENTS:

Page 2-16, Section 2 Alternatives, Including the Proposed Action, Subsection 2.2.4.2.3 PDCF Liquid Stream:

No information is provided about monitoring buried and exposed pipes for leaks that could result in discharge of liquid waste to ground water. We suggest that monitoring/detection, response, and enforcement protocols related to pipe integrity and leaks be included in the DEIS. 27-1

Page 3-9, Section 3 Affected Environment, Subsection 3.3 Hydrology, Subsection 3.3.1 Surface Water, paragraph 3, line 24:

Fourmile Branch appears to flow southwesterly in figures 3.2 and 3.3, not southeasterly as described in the text. This apparent discrepancy should be checked and corrected if warranted. 27-2

Page 3-9, Subsection 3.3.1 Surface Water, paragraph 4, lines 39-40:

Discharge information, including permitted and streamflow discharges, should be described with the same units of measure as those for stream discharge. The use of standard units of measure reduces confusion and facilitates comparison of values. For example, using the same unit of measure to describe the magnitude of the Savannah River Site (SRS) contribution to total streamflow in the two paragraphs above lines 39 and 40 would facilitate comparison. A standard unit of measure format should be used throughout the document, such as describing discharge in millions of gallons per day (MGD), cubic feet per second (cfs), or cubic meters per day (m3/s). Options include either following the standard unit of measure with equivalent measures in alternate units in parentheses in the text, or adding an appendix with conversion tables, comparative table, or equations to facilitate reader comparison between and among units of measure. The standard unit of measure format should be consistently applied for linear distances, area, volume, and discharges. 27-3

Page 3-10, Section 3 Affected Environment, Subsection 3.3.2 Ground Water, first sentence, line 8:

The sentence reads, "Several underground aquifers occur..." The word "underground" is redundant and should be deleted; all aquifers are below ground. 27-4

Page 3-10, Subsection 3.3.2 Groundwater, first paragraph, lines 8-23:

The description of aquifers should be expanded to include aquifer properties, such as lithology, horizontal and vertical transmissivity, and storage. This information would allow estimating the extent and timing of potential ground-water contamination that could travel and impact nearby rural or municipal ground-water users. 27-5

Page 3-11, Subsection 3.3.2 Groundwater, first and third paragraphs, lines 1-11 and 23-28, respectively:

The description of ground-water flow in F-Area is incomplete. As written, the description is inadequate for estimating the likelihood of potential contamination of underlying aquifers from the surface. Ground water flows from areas of recharge to areas of discharge; the report describes lateral flow direction and identifies discharge areas but does not mention recharge areas or recharge rates. If the F-Area is located on a ground-water divide and the top of the aquifer begins as close as 3 feet below land surface as described elsewhere in this section, it is probable that the proposed Mixed Oxide Fuel (MOX) facility, the Pit Disassembly and Conversion Facility (PDCF), and the Waste Solidification Building (WSB) are located in a recharge area. 27-6

Surface contamination or spills occurring in a recharge area can easily be introduced into a shallow aquifer, as indicated by the existence of contaminated ground water from past operations in F-Area (pp. 3-11 through 3-13). This section should be expanded to provide information about recharge rates and location of recharge areas in F-Area.

Page 3-11, Subsection 3.2.2 Groundwater, lines 30-34: 27-7

The discussions in this section indicate that the Upper Three Runs Creek Aquifer is divided into two zones by the Tan Clay Confining Unit of the Dry Branch Formation. The two zones and the Tan Clay Confining Unit, however, are not depicted in figure 3.4, "Underground Aquifers at the SRS" (p. 3-10). Without this information, it is not possible to visualize and understand the ground-water-flow system that underlies the proposed MOX facility. Specifically, it is not clear how the two aquifer zones and the Tan Clay Confining Unit within the Upper Three Runs Aquifer relate to the land-surface topography (outcrop areas), the Gordon Confining Unit, the Gordon Aquifer, and the Steed Pond Aquifer. Figure 3.4 should be redrawn or modified to reflect the text. 27-7 cont.

Additionally, the discussion regarding the occurrence of a water table in the lower aquifer zone beneath the Tan Clay Confining Unit is confusing. It raises the questions "Is there a water table in the upper aquifer zone? If not, why?" Subsection 3.3.2 should be rewritten to eliminate the vague and incomplete description of the ground-water system underlying the proposed MOX facility in F-Area.

The text appears to refer to the Upper Three Runs Creek Aquifer and the Upper Three Runs Aquifer interchangeably. This is confusing and should be clarified. If the two names refer to a single geologic unit, then only one term should be used throughout the DEIS for consistency.

Page 3-13, Subsection 3.3.2 Groundwater, lines 8-20:

This section indicates that ground water in the Upper Three Runs Aquifer beneath the proposed MOX facility is contaminated with various heavy industrial and nuclear contaminants. Moreover, recent sampling indicates that ground-water contamination is absent above the Tan Clay Confining Unit but is present in the lower aquifer zone beneath the confining unit. The discussion and analysis, as currently written, are inadequate for an assessment of the potential for additional contamination at the site relative to the contamination that already exists there, the spatial distribution of contaminated zones in the underlying aquifer, and the potential direction of ground-water movement and contribution to base flow in tributaries to the Savanna River near the F-Area. 27-8

We recommend improving the discussion to support this assessment. An adequate discussion should (1) explain why the upper aquifer zone is not contaminated, (2) identify the locations of the wells recently sampled for ground-water contamination at the MOX site, (3) identify the locations of sources that may have contaminated the lower aquifer zone, and (4) explain how the topography and surficial geology of the MOX site relates to the outcrops of the upper and lower aquifer zones.

Page 3-45, Subsection 3.10.1.1 Pathways for Human Exposure to Radiation and Radioactivity, second paragraph, lines 12-21:

An additional pathway not identified in this paragraph is atmospheric particulate matter that has settled on the ground and that can be introduced into ground water by recharging precipitation in a recharge area, or if the deposits are washed into surface water by overland runoff in areas where the surface water is in hydraulic connection with the ground water. We suggest that the 27-9 potential for ground-water contamination from atmospheric particulate matter deposited on the land surface at the MOX or F-Area sites be addressed in the DEIS. 27-9 cont.

Page 4-46, Section 4 Environmental Consequences, Subsection 4.3 Impacts of Proposed Action, Subsection 4.3.5.4 Hydrology, line 1:

Without further information about ground-water recharge and flow paths, there is insufficient information to determine whether all or any contaminants in a hypothetical spill would be captured by base flow contributed to the Upper Three Runs Creek, or whether some could pass in ground water that flows under the creek and continues down- gradient. The DEIS should provide sufficient information to distinguish between these possibilities. The DEIS should also provide information on the ultimate fate of a hypothetical spill that is wholly or partly intercepted by the creek. We suggest that the DEIS provide information on processes that affect the transport and fate of these potential contaminants in the environment, for example, some forms of plutonium would be likely to sorb onto clay particles in subsurface materials or streambed sediments rather than travel with the water. 27-10

If you should have any questions concerning these comments please contact Ms Brenda Johnson, U.S. Geological Survey, 703-648-6832.

Sincerely,

Gregory Hogue
Regional Environmental Officer

cc:
FWS, R4
USGS, Reston
OEPC, WASO

00028

From: "Tom Clements" <tom.clements@wdc.greenpeace.org>
To: <teh@nrc.gov>
Date: 3/16/03 12:11PM
Subject: for official DEIS record

I hereby submit the following news article from the Augusta Chronicle to be included as part of the official comments on MOX draft EIS.

Tom Clements
Greenpeace International

Augusta Chronicle (Augusta, Georgia)
Sunday, March 16, 2003

MOX plant worries residents

Local minister brings experts to area

By Eric Williamson
Staff Writer

AIKEN - Predominant winds from Savannah River Site are to the north, according to a recent government report, and that's what worries the Rev. Brendolyn Jenkins.

It means relatively poor towns such as New Ellenton would be the most affected over time if there were an airborne radioactive release at a mixed-oxide, or MOX, fuel plant proposed at the site. 28-1

But, depending on meteorology and other factors, all the communities within 50 miles of SRS, an area populated primarily by minorities and the poor, could be at risk from a plant accident.

The Rev. Jenkins calls such issues "the new civil rights."

SRS already handles tritium, a radioactive form of hydrogen used in nuclear warheads. If the proposed plant is built, it would take surplus plutonium, some of it from decommissioned warheads that will be disassembled, and blend it into the MOX fuel. The fuel would be shipped to nuclear power plants to be burned for commercial power.

SRS already has plutonium, and the volume it's storing is growing in anticipation of the MOX plant.

A recent report from the Nuclear Regulatory Commission delves into some of the environmental problems that could occur from plant construction and operation. The most dramatic scenario involves human exposure over a year's time to a hypothetical tritium release.

The draft version of the report, called an environmental impact statement, said at least 400 people would eventually die of cancer 28-2 from the exposure.

While that number is expected to be revised downward in the final version of the report, minorities and the poor would still be affected the most. 28-2 cont.

Early exposures might come from inhalation, but long-term exposures would be mostly through ingestion of tainted crops, the report said.

New Ellenton Mayor Jim Sutherland works at SRS, but he said last week he had not received a copy of the environmental report. He also said he was not aware of any disaster plans that address a tritium release, but he said Aiken County's emergency planning officials are prepared for any number of disasters.

The Rev. Jenkins said she initially spoke in favor of the MOX plant at public meetings and still favors the jobs the plant would bring. But she said the new understanding that some classes could be affected more than others needs to be addressed.

"Though they say it's highly unlikely, we live in the land of 'What if?'" she said. "I would like to see the guarantees, if there could be any, and how they would address and eradicate that problem."

The Rev. Jenkins has been making the rounds, inviting community members to attend a meeting to be held Thursday at her church, Second Baptist in Aiken.

Speakers from Westinghouse Savannah River Co., the Energy Department and the Environmental Protection Agency will be present to answer questions from environmental and social justice groups and from the general public, she said.

The government will hold a meeting March 26 at the North Augusta Community Center to take public comments on the environmental impact statement. The Rev Jenkins says she'll be there.

"I don't think we have the ability to stop this project," she said, "but as Christians we're called to be good stewards of the Earth."

Reach Eric Williamson at (803) 279-6895 or eric.williamson@augustachronicle.com.

http://augustachronicle.com/stories/031603/met_237-6513 000.shtml

--From the Sunday, March 16, 2003 printed edition of the Augusta Chronicle

00029

From: Marvin I Lewis <marvlewis@juno.com>
To: <teh@nrc.gov>
Date: 3/26/03 8:40AM
Subject: Please forward these comments.

Mr. Timothy Harris
United States NRC
Dear Mr. Harris,

Please forward these comments to the proper docket.

Re: Draft Environmental Impact Statement on the planned new Mixed Oxide Fuel Fabrication Factory that the USDOE wants to build at SRS, Savannah River Nuclear Site.

I have been looking at the DEIS, which is very long, and comments which are being prepared by other commenters. Nothing that I state herein should be construed as contradiction to other commenters, pro or contra, but evaluated for actual value to the public: e. i. , Do my comments increase the safety of the public if implemented?

There are many considerations which should be addressed in comments and the DEIS: economics, safety to the public, environmental justice, endangered species, etc., ... I shall limit my comments to safety to the public. I do not have time and energy to comment comprehensively.

I have been commenting on NRC regulations since Director Minogue accepted my comments on the transportation of spent fuel, and amended a proposed rule to reflect the dangers that failed zircalloy coating might present in an accident or leak of a transport cask for spent fuel. That is over three decades ago.

This thrust for MOX fuel presents some of the very same problems. Although the DEIS is long, the DEIS does not look at some of the most tendentious problems. The first problem is one that is in the news daily: 'dirty bombs.'

Since the news media asked the question about mixing conventional explosives with high level radioactive wastes into a 'dirty bomb', the NRC seems to have used every maneuver to avoid addressing that concern. The problem of dirty bombs, spent fuel dispersed by conventional explosives, has a thousand and one tentacles. The dirty bomb is low technology. The dirty bomb is cheap, cost-wise. The dirty uses materials that are local to any area with a nuclear reactor or other radioactive source. Transportation of a dirty bomb presents little problems to a terrorist. This litany of dirty bomb weaponizations presents a serious reason that the NRC and the nuclear industry would like to avoid any discussion of dirty bombs.

Since the use of spent fuel and MOX in the nuclear fuel cycle presents a massive increase in the accessibility of dirty bomb-making materials, the time to ignore the dangers of increased accessibility to spent fuel and MOX for dirty bomb making use has passed. The time to face this problem is here.

An actual MOX fabricating factory will need to transport spent fuel and unused bomb pits for all over this Nation and probably other nations. This presents a prize that terrorists will strive to obtain. Many locals do have sufficient law enforcement and National Guard to meet these challenges. Many do not. 29-1

I shall not discuss economics, but protecting radwaste and bomb pit transport to a MOX fabrication facility may be a 'unfunded federal mandate' which is disallowed under present US Congressional budget rules. The NRC should address this unfunded federal mandate in the DEIS. 29-1 cont.

I shall not discuss herein how and why the transport of spent fuel and bomb pits may be attractive terrorist targets as I do not like my comments to serve as a 'cook book' for terrorist activities. There are too many sites on the Internet that do those activities too well.

Although transportation casks have been looked at in regulation and testing for many years, the form of the spent fuel and the bomb pits have taken a back seat. The spent fuel has often failed in use and presents a peculiar problem in transportation and decanting. The design of the transportation casks often do not address the failures and the type of failures of the spent fuel. Any assumption that the fuel will be in a form which does not complicate accidents and handling may be flawed and needs to be addressed. This was the kernel of my comments decades ago on spent fuel casks and is still valid. 29-2

I do not wish to discuss economics, but its greedy head emerges in the discussion of the nuclear fuel cycle. The US economy is reeling for many causes. Can we be sure that there will be financial arrangements sufficient to decontaminate the 4 Duke reactors in the event of a financial collapse? Will these Duke reactors provide enough spent fuel to make MOX fabrication economical if the demand for electricity decreases? I expect that the NRC will address this financial collapse and electricity demand problem in relation to money for decontamination requirements. 29-3

I really believe that a Programmatic DEIS is more appropriate to the MOX problem than several DEIS's which do their best to avoid a overall problem.

Respectfully submitted,

Marvin Lewis
<marvlewis@juno.com>
3133 Fairfield St.
Phila., PA 19136
215 676 1291

CC: <nirs.se@mindspring.com>.

00030

Pentecost, Edwin D.

From: wildlifejustice@yahoo.com
Sent: Tuesday, April 15, 2003 12:24 PM
To: opa2@nrc.gov
Subject: MOX Fuel usage and transport in U.S.

Below is the result of your feedback form. It was submitted by

Richard Justice (wildlifejustice@yahoo.com) on Tuesday, April 15, 2003 at 13:24:11

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comments: To whom it may concern, I Scott Justice of 400 Exley Rd. S., Rincon,Ga 31326, do oppose any effort for the intrests, (private or public) of the United States to utilize, purchase or transport MOX nuclear materials. We must be willing to realize the cost does not out way the good. First, in the age of terrorism, piracy of these goods is a real threat to their transport.. 30-1 Secondly, the margin for error inside a energy producing facility is greatly reduced, especially in frozen core reactors such as Mcguire Nuclear Station in Charlotte,NC. Science is not in agreement about what effect this fuel may have on such a reactor. 30-2 Thirdly, Utilization of these MOX materials would waste money in the necessary retrofit of our nuclear facilities. This may just be a convienient excuse to funnel taxpayers money into the nuclear industry. The time has come for our country to accept that nuclear is not the future and begin investing in what we know makes sense and stop listening to po! we! r companies and their representatives when they talk about sticking more money into their already wet beaks. 30-3 Iwish to be put on record as opposing any effort to utilize MOX Fuel and urge those of authority to act with common sense and not political indefference.
Richard Justice

organization:

address1: 400 exley rd s.

address2:

city: rincon

state: GA

zip: 31326

country:

phone: 912-754-1656

1

00031

Pentecost, Edwin D.

From: Ernest S. Chaput [esandc@prodigy.net]
Sent: Sunday, April 20, 2003 10:50 PM
To: TEH@NRC.gov
Subject: Draft MOX facility EIS - Environmental Justice Analysis

April 10, 2003

Mr. Tim Harris
Division of Waste Management
U. S. Nuclear Regulatory Commission
Washington, DC 20555

SUBJECT: Draft Report for Comment – Environmental Impact Statement on the Construction and Operation of a Mixed Oxide Fuel Fabrication Facility at the Savannah River Site, South Carolina

Dear Mr. Harris:

During NRC's March 26 public meeting on the subject document we had a brief opportunity to discuss the environmental justice section in the Draft EIS. The purpose of this letter is to summarize my questions and solicit your assistance in understanding the material included in the draft EIS.

Section 4.3.7.3.3 (page 4-57) of the draft EIS states "In the unlikely event of a tritium release at the PDCF or an explosion at the MOX facility, the communities most likely affected would be minority or low income, given the demographics within 80 km (50 mi) of the proposed MOX facility." The data contained in the draft EIS does not support that conclusion. To the contrary, I have used your data to perform a summary analysis which finds that minority and low income populations are less likely than other populations to be affected by an accident in the MOX or PCDF facility. I am not stating that an environmental justice concern does or does not exist, rather I contend that the data in the draft EIS does not support your conclusion.

In performing my analysis I considered wind direction and probability (Figure 3.5), population by sector (Table E.8) and areas with disproportionate minority or low income population concentrations (Figures 4.1 and 4.2). I used a probabilistic approach to determine the number of persons in each sector downwind of an SRS accident (wind direction and total sector population). I sorted the sectors as minority-low income or other, and totaled the number of people in each category. My analysis resulted in: 31-1

- 24,900 persons in predominately minority and/or low income sectors downwind of SRS and
- 37,000 persons in sectors which are not predominately minority and/or low income downwind of SRS

If offsite health impacts result from windborne contamination, then there is no disproportionate impact on minority-low income populations. A complete copy of my analysis is attached.

While my analysis is simplistic, it is sufficient to identify the need for a more complete analysis and discussion of this important issue in the EIS. Specifically an analysis of the population in each census block would be helpful, including the effects of distance (dispersion, decay and dilution) from SRS. If your preliminary conclusion is supported, it should be carefully considered in NRC's decision-making. If the preliminary conclusion is not supported, then the discussion should be removed from the final EIS.

Thank you for the opportunity to raise this question and I look forward to your response. Please contact me if you have any questions or comments (telephone 803-648-5402, email esandc@prodigy.net, fax 803-649-5774).

Sincerely

Ernest S. Chaput 31-2

108 Cherry Hills Drive
Aiken, SC 29803

Attachment:

Sector	Wind Probability (%)	Total Population	Predominately Minority or Low-Income Sector (Yes - No)	Impacted E-J Population	Impacted Other Population
S	0.035	20,996	yes	735	
SSW	0.065	17,515	yes	1,138	
SW	0.095	18,010	yes	1,711	
WSW	0.070	25,049	yes	1,753	
W	0.055	55,221	no		3,037
WNW	0.050	309,928	50-50	7,748	7,748
NW	0.050	186,214	no		9,311
NNW	0.060	71,498	no		4290
N	0.070	84,204	no		5,894
NNE	0.070	42,704	no		2,989
NE	0.080	35,409	no		2,833
ENE	0.090	75,949	yes	6,835	
E	0.080	44,386	yes	3,551	
ESE	0.065	13,978	no		909
SE	0.035	33,652	yes	1,178	
SSE	0.030	7,770	yes	233	
Total	1.000	1,042,483		24,883	37,011

Wind Probability – Estimated from Figure 3.5
Total Population by Sector – From Table E-8
Predominately Minority or Low-Income Sector – By examination of Figures 4.1 and 4.2
The WNW sector includes the city of Augusta and Columbia County, GA. This large sector has diverse demographics, but is estimated to be about ½ minority and/or low income and about ½ all other.

Official Transcript of Proceedings

NUCLEAR REGULATORY COMMISSION

Title: Public Meeting on Proposed MOX Facility Draft Environmental Impact Statement

Docket Number: (not applicable)

Location: Savannah, Georgia

Date: Tuesday, March 25, 2003

Work Order No.: NRC-800 Pages 1-137

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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PUBLIC MEETING ON PROPOSED MOX FACILITY

DRAFT ENVIRONMENTAL IMPACT STATEMENT

+ + + + +

TUESDAY,

MARCH 25, 2003

+ + + + +

SAVANNAH, GEORGIA

+ + + + +

The Public Meeting was held in the Conference Room of the Georgia Coastal Center at 7:05 p.m., Francis "Chip" Cameron, Facilitator, presiding.

PRESENT:

FRANCIS (Chip) CAMERON

LAWRENCE KOKAJKO

TIM HARRIS

I-N-D-E-X

I-N-D-E-X

P-R-O-C-E-E-D-I-N-G-S

MR. CAMERON: Okay, good evening, everyone.

(Certain people respond.)

MR. CAMERON: I'd like to welcome you to the Nuclear Regulatory Commission's public meeting tonight. My name is Chip Cameron. I'm the Special Counsel for Public Liaison at the Nuclear Regulatory Commission. And we're going to try not to use a whole lot of acronyms tonight.

UNIDENTIFIED: Thank you.

MR. CAMERON: And if we do, we'll explain them. Everybody's in support of no acronyms.

UNIDENTIFIED: No acronyms.

MR. CAMERON: But one we will use is -- is NRC for Nuclear Regulatory Commission.

And the subject of tonight's meeting is the draft environmental impact statement that the NRC has prepared to help the NRC in its decision-making on the application that we received from -- from DCS to construct a mixed oxide fuel fabrication facility. And it is my pleasure to serve as your facilitator for tonight's meeting. And in that role, I'm going to try to help all of you have a productive meeting tonight.

And I just wanted to cover three items of

meeting process before we get -- get on with the substantive discussions. And the first thing I'd like to talk about is the purpose of the meeting, why is the NRC here tonight. And we have several purposes. One is to clearly explain to all of you what the NRC's process is for evaluating this application that we have for the mixed oxide fuel facility, and also to explain what the findings are in this draft environmental impact statement that we've prepared.

Second purpose is to hear your recommendations, your concerns on this process and the draft environmental impact statement. And a related purpose is to try to give you information tonight so that if you want to submit a written comment to the NRC on this draft environmental impact statement, you'll have more information, be better equipped to do that. And the NRC staff will be explaining how to submit written comments. But just let me emphasize that anything we hear from you tonight will carry the same weight as a -- as a written comment. And, of course, you can speak tonight and also submit a written comment.

And the ultimate goal here is to have your comments tonight, the comments that we get at other public meetings that we're doing, the written comments, to have those comments help us to make our decision on finalizing this draft environmental impact statement, and also in making a decision on the application that we have for -- to construct the mixed oxide fuel facility.

In terms of the format for the meeting, the second item I want to cover, we're going to have some brief NRC presentations, just to give you some -- some background, and then go out to you for questions that you might have, to make sure that you understand the process. And we'll try to answer those clearly. We're also asking for -- for formal comment tonight. Anybody who wants to say any -- anything on the draft EIS, we're going to give you an opportunity to do that. And as I mentioned, we are taking a transcript, so your comments will be -- will be recorded.

We thought that it might be useful -- usually what we do is we have the NRC presentations, and then we have question and answers, and then we just have people comment. And we thought what we'd do is have some comments -- we'd do the question and answer, have some comments, and then go back and have another question and answer session. There may be some things that the NRC hears in the comments that they'll want to clarify for you, there may be

questions that you have. And then we'll go back to the -- to the formal comments.

The third item that I wanted to talk about are ground rules for the meeting. And they're very, very simple. If you have a question, please signal me and I'll bring you this microphone. And please ask us your question or make a comment and tell us who you are and what your affiliation is, if appropriate. And we have a sign-up sheet for people who want to make a comment, make a statement tonight, and that's out in front. And I think everybody's been -- been signing up and indicating whether they want to -- to speak tonight.

I would ask you, in your -- your formal comments, to try to keep it to -- to five minutes. That's a guideline. I think that that is plenty of time. But we do want to make sure that everyone has a chance to speak tonight who wants to talk. So if you keep it to five minutes, then that will allow everybody else in the room to have their -- their opportunity. And we realize that there are a lot of other things, important events going on tonight in the city. And if -- if you need to go early and you do want to talk, can you just indicate -- you'll have some time when the NRC first starts to talk. Could you just indicate on the sheet that you signed in that you want to -- to speak early. And I would just ask for everybody's indulgence to let those people who have to leave early -- I'm going to put them on first, and we'll hear their comments, and then they can -- they can get on with whatever else they need to do.

And I would also ask that only one person at a time speak. That will allow us to -- Melanie is our stenographer. She's taking the transcript. That will allow us to get a -- a clean transcript so that you can recognize who's talking. But more importantly, it will allow us to give our full attention to whomever has the floor at the moment.

And I just want to thank all of you for -- for being here. The NRC has an important decision to make, and this is going to be helpful to us. And we'll try to keep the meeting as informal as possible. We need to do the microphones because we're taking a transcript and -- so that we'll have a record of what was -- what was said. But if you have something to say, if you have questions, please -- please just say that and what's on your mind, and relax, and we'll just try to have a -- a nice, informal discussion and give you some information and get some information from you.

The agenda is pretty -- pretty simple. We're going to have two presentations. One is going to be an overview of NRC responsibilities. And we have Lawrence -- Mr. Lawrence Kokajko, right over here, to do that. And then we're going to go to Mr. Tim Harris, who's right here, who's going to talk about the findings in the draft environmental impact statement.

By way of introduction, Mr. Kokajko is the acting Branch Chief of the Environmental and Performance Assessment Branch in the Division of Waste Management in the NRC's Office of Nuclear Materials, Safeguards, and -- and Safety. He, before that, was the Section Chief of a Risk Task Force that looked at how you factor in risk into NRC decision-making. He's been with the NRC for about 13 years. And he has a Bachelor's in psychology from Memphis State, a Bachelor's in applied science and technology; and also a Master's in education from King State College. And he'll be coming up in a minute.

And Tim Harris, who I think a lot of you already know, is the Project Manager for the environmental review on the construction application. And he has a Bachelor's in civil engineering from the University of Maryland.

We also have other NRC staff here from our regional office, our Office of General Counsel. David Brown is the Project Manager for the safety aspect of the construction authorization application. And I think that if we need to clarify how all that comes together, we -- we will for you. But environmental review, Tim Harris; safety review, Dave Brown.

And with that, I'll just ask Lawrence to -- to lead off for us. Lawrence is going to do his piece, and then Tim will do his. And we'll try to keep it brief. And then we'll go out to you for -- for questions, then.

Lawrence?

MR. KOKAJKO: Thank you, Chip.

Can everyone hear me? Thank you.

Good evening. My name is Lawrence Kokajko, and I am the acting Branch Chief of the Environmental Performance Assessment Branch in the Division of Waste Management. And I'm very pleased to be here this evening, and I'd welcome all of you to -- at this meeting.

We are meeting on the NRC's draft environmental impact statement for the proposed mixed oxide or MOX fuel fabrication facility. And I'd like to thank you for taking the time to participate. And

we do look forward to hearing from you this evening.

This meeting is one of a series of meetings planned to inform the public about the environmental impact statement for the proposed facility, and to solicit public comment. There are three handouts that you may have seen at the door. The first is a set of slides; the second is the agenda, with a facts sheet and a comparison of alternatives; and the third one is a feedback form. And we're very interested in getting feedback on how this meeting went this evening. We would appreciate you answering the questions on the feedback form and either handing it back to an NRC staff person, or you can staple the two together and drop it in the mail. And the postage is prepaid. In fact, I'd like all the NRC people, could you raise your hand one more time so that everyone knows who to give it to.

(Certain NRC staff members respond.)

MR. KOKAJKO: And Adrienne is at the front desk, too.

If you would like a copy of the draft environmental impact statement, we have a limited number here, and you may take one with you. If we run out, we will mail you a copy. Next slide, please.

The presenters tonight will be myself, as well as Tim Harris. Tim is a member of my staff. And we've included our phone numbers and Email addresses. You may contact us if you have any questions after the meeting. Next slide.

The purpose of tonight's meeting is to get your comments on the draft environmental impact statement. Before we hear your comments, we'll provide some information on the NRC's role in the proposed MOX project, and describe the *National Environmental Policy Act* and the EIS process, and how the EIS fits into NRC's decision-making. Tim will give an overview of the draft EIS, and then there will be time to answer questions. Next.

The proposed MOX facility would take surplus weapons plutonium and depleted uranium and make nuclear reactor fuel. Congress, in the *Defense Authorization Act of 1999*, gave NRC a role in the proposed MOX project. Specifically, NRC has licensing authority over the MOX facility, so our role is to make a licensing decision regarding the safe operation of that facility. NRC is an independent government agency, and our mission is to protect the public health and safety, and the environment, in the commercial use of radioactive material. Our role is different than the Department of Energy's.

The Department of Energy's role in this project relates to implementing United States nuclear non-proliferation policy, including the disposition of surplus weapons plutonium. The Department of Energy also has responsibility to design, build and operate two facilities that support the proposed MOX facility. These two facilities are the pit disassembly and conversion facility, and the waste solidification building.

While the pit disassembly and conversion facility and the waste solidification building are considered in NRC's environmental review, it is important to note that NRC does not have the licensing authority over these two support facilities. That responsibility rests with the Department of Energy. NRC only has authority over the proposed MOX facility. Next slide, please.

I'd like to briefly describe the environmental impact statement process. The *National Environmental Policy Act* requires government agency to prepare an environmental impact statement for major federal actions such as the potential licensing of the proposed MOX project. An environmental impact statement presents environmental impacts of a proposed action, along with reasonable alternatives to that proposed action.

Note that the bolded areas are opportunities for public involvement in the process, and we consider this a very important -- very important part of the environmental impact statement process review. NRC's involvement with the MOX project started when DCS, the applicant, submitted an environmental report and request to construct the MOX facility. We published the notice of intent to prepare an EIS in the *Federal Register* in March of 2001.

During the scoping process, the public helped determine what issues would be addressed in the environmental impact statement, and now we have completed the draft environmental impact statement, and we have sent copies to approximately 550 people throughout the nation. We are currently in the comment period for the draft environmental impact statement. This meeting is being transcribed, and comments made here tonight will be included in the official comment record. The last slide shows that -- shows several ways that you can submit comments to us. We will review and consider the public comments, and then finalize the environmental impact statement later this year. Next slide.

As I mentioned earlier, NRC's role is to make a licensing decision regarding the proposed MOX facility. I'd like to take some time to describe the licensing process, and how the EIS we're discussing tonight fits into NRC's decision-making.

There are two decisions that NRC will have to make for the proposed MOX facility. The first is whether to authorize construction of the facility. The second is to -- is to whether to authorize operation of the facility. These decisions are shown in the middle of the slide.

NRC's environmental review is shown at the top portion of the slide, and consists of preparing the final environmental impact statement. The final environmental impact statement will be used by NRC to decide whether to authorize construction, and later whether to issue the license to operate the MOX facility.

NRC's safety review is shown at the bottom portion of the slide. The safety evaluation report for the construction authorization request focuses on safety assessment of the proposed design bases to determine if it meets NRC requirements. NRC's final environmental impact statement and safety evaluation report for construction authorization request will be the basis for making a decision on whether to construct the proposed MOX facility. We anticipate that that decision could be made in the fall of 2003.

DCS plans to submit a license application to operate the proposed MOX facility in October of 2003. The safety evaluation report on the operating application and the FEIS will be the basis for making a decision on whether to allow DCS to operate the proposed MOX facility.

There will be two opportunities for hearing. John Hull, with our Office of General Counsel, is here and can answer questions related to the hearing process.

John?

(Mr. Hull raises his hand.)

MR. KOKAJKO: To summarize, a single environmental impact statement will be used to support the decision to construct and later operate the proposed MOX facility.

Now I would like to turn the presentation over to Mr. Tim Harris of my staff. Tim is the lead -- the lead for the environmental review for the proposed project at the NRC.

Tim?

MR. HARRIS: Thanks, Lawrence.

MS. BARCZAK: Question.

MR. CAMERON: Sara?

MS. BARCZAK: Mr. Harris, do we need -- are we able to ask the -- each presenter, or do you want to wait until...

MR. CAMERON: Let's -- let's wait.

MS. BARCZAK: Okay.

MR. CAMERON: If you can just sort of keep track of your questions.

MS. BARCZAK: That's fine.

MR. CAMERON: Okay, good.

MR. HARRIS: As Lawrence said, my name's Tim Harris, and I'm the environmental review lead for the MOX project. And I guess we've been doing this for almost two years, and I think it's the third trip down here. And it's a pleasure to see so many friendly faces. Thanks for coming back again, and we look forward to your comments.

What I'll do tonight is provide an overview of the draft environmental impact statement. You saw copies outside. It's a relatively thick document. I'm going to try to hit the highlights. If there's things that -- that we don't cover here, they're certainly covered in the document. And if there's something you want to know about, please feel free to ask a question. First off I'll describe the alternatives that were considered, and then also alternatives that were considered but not analyzed in detail. Next slide, Dave.

To understand how we made that distinction between alternatives we considered and alternatives that we analyzed in detail, it's helpful to understand the purpose and need related to the draft environmental impact statement. As we stated in our notice of intent, the purpose and need of the MOX facility that's addressed in this draft environmental impact statement is essentially the same as used by the Department of Energy in its programmatic environmental impact statements.

Specifically, the purpose and needs relates to agreements between the United States and Russia to reduce the threat of nuclear weapons by assuring that those materials are converted into a proliferation resistant form. And also to reduce the risk of plutonium from falling into the hands of terrorists or rogue states.

The draft environmental impact statement evaluates two alternatives in detail. These are the no-action alternative, and the proposed action. The no-action alternative would be continued storage of

surplus weapons plutonium at various DOE sites throughout the nation. The no-action alternative is used in the environmental impact statement as a baseline for decision, as a comparison of different alternatives.

The proposed action includes impacts from the construction, operation, and decommissioning of the proposed MOX facility. And it also includes impacts from connected actions, such as the transportation of surplus weapons plutonium, depleted uranium, and MOX fuel. As Lawrence mentioned, our EIS also includes impacts of two DOE facilities. I think he made the point there that as far as EIS goes, we included the evaluation of those DOE facilities to -- to get the full picture, but it's important to realize that those facilities aren't part of our -- our licensing review.

And again, those facilities are the pit disassembly and conversion facility, which would take plutonium metal and convert it into a powder or oxide form. Waste solidification building would take waste from the pit disassembly and conversion facility, and also the proposed MOX facility.

We also included impacts associated with the potential use of the MOX fuel in the environmental impact statement. For the proposed action, we also evaluated the differences in using a sand filter, as was suggested during scoping, with the use of HEPA filters, as we proposed by -- by the applicant, DCS.

As I said before, the purpose and need is used to determine which alternatives we evaluated in detail and those that were not. In addition to siting and technology options that were evaluated by Duke Cogema Stone & Webster in its environmental report, several other alternatives were raise during scoping, and also during meetings here last fall. Immobilization was initially considered to be a reasonable alternative; however, following the Department of Energy's admitted rod that we -- we talked about last September, DOE believed that an immobilization only approach would not meet the U.S.-Russia agreements; and therefore that alternative did not meet the purpose and need.

Another alternative that was discussed at our meetings last fall was deliberately making off-specification MOX fuel. This alternative involves not removing the impurities that generates a lot of waste. Basically, you leave the impurities in the powder form and make the fuel without removing them. The reason you remove the impurities is that it improves the

neutronics or basically makes the fuel more efficient. But again, you're not removing the impurities in this alternative, and you also wouldn't use the MOX fuel. Instead, the off-specification MOX fuel would be stored at spent fuel pools at existing reactor sites prior to geologic deposit -- prior to disposal at a geologic repository.

The impacts of this alternative are addressed qualitatively in the draft environmental impact statement. To summarize, the monetary costs of this alternative would be about the same as the proposed action. And, as I mentioned, this alternative would generate less waste. However, the benefits would be lower than the proposed action because electricity would not be produced. Therefore, the alternative of producing off-specification MOX fuel was not obviously superior to the proposed action. In addition, this alternative was viewed as not meeting the U.S.-Russia agreements.

For the proposed action and no-action alternative alternatives---next slide, Dave---the impacts associated with the following comprehensive list of technical areas were evaluated. The technical areas on the right are considered to have more significant impact or were issues that were raised during the public meetings. These are discussed in the body of the environmental impact statement in Chapter 4. To allow more time for public comment, as I said, I'll try to focus on the issues on the right. I'm sorry, your left. The issues on the right are discussed in appendices. Excuse me for getting...

Again, the things I'm going to talk about tonight are human health, air quality, hydrology, waste management, environmental justice. In addition, I'll summarize the impacts associated with transportation and potential MOX fuel use, and also summarize the cost-benefit analysis. Next slide.

First I'd like to summarize the impacts associated with the no-action alternative. The impacts for this alternative were previously evaluated by the Department of Energy. And the impacts included in our draft environmental impact statement are essentially a summary of those provided in earlier DOE environmental impact statement. The packet of information that we provided with you has a comparison of comparison tables which shows the no-action alternative and the proposed action. So if you want to look at numerical differences, we provided that in your handout. I won't get into specific numbers here, but you have that information.

The impacts to the public and workers from this no-action alternative---that is, continued storage---were considered to be low. There were no significant air quality or water quality impacts associated with this impact. As you can imagine, if you're just storing the material, you don't get a lot of air-water emissions. Also there was no significant waste management issues or environmental justice issues. Next slide, please.

UNIDENTIFIED: It's currently stored as a metal; right? Or if it's in different forms...

MR. HARRIS: Chip's going to tell you to -- to wait and ask questions. But the answer is it's in various forms.

MR. CAMERON: Yeah. I know there's a lot of detail here, but if you could just try to keep track and then we'll -- we'll get it all out, and that may be more efficient for us. But thank you.

MR. HARRIS: The next series of slides summarize the impacts of the proposed action. The proposed action includes impacts from three facilities, and those are: the proposed MOX facility; the pit disassembly and conversion facility; and the waste solidification building. I've presented the impacts in terms of increase or decrease relative to current conditions at the Savannah River Site. And, again, numerical values are provided in the table that you have as part of your handouts.

There would be no adverse chemical or radiological impacts during construction. From operation of the three facilities, the annual public collective dose would increase by about 11%. And, while that may seem significant, the next slide I'll show you will help put that in perspective. There would also be no significant impacts from chemical exposures during normal operation.

This slide shows the radiation dose from several sources, and also the NRC public dose limit. The average annual natural background, the top line, includes radiation from the earth, and that that comes from space, and is about 360 millirem. And a millirem is just a unit of radiation exposure or dose. The annual NRC public dose limit, the second line, is 100 millirem. To put it in a perspective, if you -- if you got a chest X-ray you'd get about six millirem. So the bottom line is the annual dose to the public from the three facilities, and that's less than one millirem. So even though it's 11% of -- of what's the public (sic) is currently receiving from living next to the Savannah River Site, it's a very small number.

Accidents have the greatest consequences of the impacts that we evaluated in our environmental impact statement. Two conservative scenarios were evaluated for a number of potential accidents. The short-term scenario assumes that people are exposed by inhaling contaminant material in a plume. We also evaluated a long-term scenario, which includes the impacts of the -- of the short-term scenario, but also includes exposures from eating crops that could become contaminated. And this exposure period was assumed to be one year following an accident.

The potential accidents are evaluated in terms of risk. The classical definition of risk, just to, I guess, give a little risk education, is: The risk is the probability of the event, times the consequences, equals risk.

In keeping with NRC's mission to protect public health and safety, we want to insure that the overall risk to the public is maintained to be very small. Therefore, events that have significant consequences, like -- like the ones that are presented in the environmental impact statement, are required to be made highly unlikely through design safety features. These design safety features are the topic of our safety evaluation report. Remember, Lawrence

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had the two slides; one was the environmental piece, one was the safety piece. And those -- those types of safety issues, to make sure that the accidents are highly unlikely, are discussed in that -- that document.

In March we notified a number of stakeholders that we had identified an error in the accident consequences due to a computer code bug. And we felt that it was important to inform stakeholders early in the process. I think actually I found out about it on a Monday afternoon, and we issued a letter on Thursdays. So we felt it was very important to -- to get the information out to you in a timely manner.

During subsequent review we also found an additional error in wind data that DCS had provided in its environmental report. Essentially a problem related to units. They had reported meters per second and the data was actually miles per hour. These errors don't change our conclusions or preliminary recommendations. The numbers presented on the slides and in the comparison tables are updated, and we are in the process of issuing errata sheets. Hopefully those will go out next week. So by attending this meeting you'll -- you'll receive errata sheets. And we're also post that (sic) on the Web and -- and try

to get it out to people. Another thing we did was extend the comment period by 30 days, so comments are due now by May 14th. So we tried to be very proactive in engaging the public in this.

The hypothetical events that caused the highest consequences are a MOX explosion from a hypothetical explosion. And we estimated that this would result in less than 50 latent cancer fatalities for the short-term scenario, and less than 200 latent cancer fatalities for the one-year scenario. The hypothetical tritium fire at the pit disassembly and conversion facility, that number was previously 400. As is stated in the environmental impact statement, the short-term impacts would be less than one latent cancer fatality, but for the one-year scenario we're estimating 100 latent cancer fatalities could be produced if that accident did happen.

These estimates do not credit any intervention actions. That is, it's assumed that the crops become contaminated and the people eat them. Obviously, that may not happen, but we try to be very conservative in our analysis.

The probability of these hypothetical events occurring is still considered to be highly unlikely. And again, through the use of preventative and mitigative features that are part of the safety evaluation that NRC is currently doing. The consequences of these events are significant. However, the overall risk to the public is still considered to be very small because we're considering those to be highly unlikely events. Next slide.

Air quality relates to compliance with the *National Ambient Air Quality Standards for Emissions of Chemicals*. Air quality at the Savannah River Site already exceeds the particulate matter 2.5 or PM 2.5 standard. The proposed action would result in an increase of about .1% during construction, and that's largely due from earth moving activities, and .01% increase during operation.

However, EPA has delayed implementing the PM 2.5 standard. And if and when attainment plans are developed by the State of Georgia and South Carolina, SRS could be required to develop some plans to meet those standards. It's not unlike areas that are non-attainment areas. Say Atlanta is a non-attainment for, say, ozone. And during the winter they burn reformulated gasoline as a mitigated measure. Those type of things could be implemented. Next slide, Dave.

Surface water would not be significantly

affected during construction through the use of sedimentation control features. And there would be no direct operational discharges to surface water. Waste from the MOX facility would be managed by the Savannah River Site, and discharges from existing Savannah River Site waste management facilities are not expected to change significantly as a result of processing the additional MOX waste.

Groundwater would be used during construction and operation. Approximately 37% more groundwater would be used in the "F" area from the proposed action. And there is existing well capacity there, and we don't feel that using this water will create a significant impact either on groundwater quality or its availability.

There would be no significant impact on the current SRS waste management capability from processing waste from the proposed action. Operation of the three facilities would generate about 300% more TRU waste than is currently being generated at SRS. The TRU waste is planned to go to the waste isolation pilot plant in New Mexico for disposal. The volume of TRU waste at the waste isolation pilot plant would be about 3% of the capacity of that facility.

Operation of the three facilities would

increase low level waste by about 32% above what is currently being produced at the Savannah River Site. And non-hazardous solid waste would be about 60%. But, again, the SRS has capacity to handle this waste, and actually the increase is -- is a small percentage of what they can manage. So we don't think that the waste management impacts are significant. Next slide, Dave.

An environmental order -- sorry. Excuse me. An executive order issued by President Clinton in 1994 directed federal agencies to address any disproportionate -- excuse me, disproportionately high or adverse human health impacts to low income and minority populations. Impacts from constructing and operating the three facilities are not high or adverse. Therefore, there would be no environmental justice concern associated with either constructing or operating the proposed MOX facility.

However, due to the prevailing wind directions, there is a potential impact to low income and minority populations in the highly unlikely event that a significant accident would occur. And we've put together mitigation measures to help reduce those impacts to those populations. Again, we think the risk associated with these potential accidents is

small to -- to any population.

Transportation of material was identified during scoping as a significant concern to many stakeholders. I see Kirk is nodding his head over a conversation before the meeting. Transportation analysis includes shipping plutonium from various DOE sites to the Savannah River Site. It also includes shipping depleted uranium from a enrichment (sic) facility to a -- another conversion facility, where it would be processed into an oxide form, and then that depleted uranium oxide would go to the Savannah River Site. Our analysis also includes shipping fresh MOX fuel from the Savannah River Site to a generic Midwest reactor. And the transportation of -- of spent MOX fuel---that is, MOX fuel that has been in the reactor---is also discussed generically.

To summarize, there's not a -- we found that the impacts associated with all this transportation are not significant. There would be less than one latent cancer fatality from routine transport to the public along transportation routes, and also to transportation crews. Hypothetical accidents result -- during transportation would result in insignificant impacts.

The potential impacts associated with

using MOX fuel are also discussed generically in the draft environmental impact statement. The collective dose to members of the public from normal operations would be essentially the same, whether the reactor used conventional, low enriched uranium fuel, or a mixture of low enriched uranium fuel and MOX fuel.

We also looked at design-base accidents and the risks associated with developing a latent cancer fatality between the two types of fuels; that is, low enriched uranium fuel or a mixture of MOX fuel. The risk varied from 6% lower to about 3% greater, depending on the event that was analyzed.

We also looked at various beyond-design basis accidents. And the risk there would vary from about 7% lower to about 14% greater.

We have received an application from Duke Power to place lead test assemblies in either their Catawba or McGuire reactor, and we will do additional site-specific evaluations before any lead test assemblies are placed in a reactor, or before MOX fuel is used in any reactor.

The draft environmental impact statement -- and I'm almost done, so bear with me. The draft environmental impact statement includes a cost benefit analysis of the proposed action. And we've looked at

it both on a national scale and a regional scale. The cost benefit analysis is used by the NRC in determining its preliminary recommendation.

The national cost, the information on the left, would be about $3.85 billion. The national benefits would include the safe use of excess plutonium, and also employment and income. On a regional scale---and, again, the region we looked at is -- is essentially a 15-county area surrounding the Savannah River Site---the proportion national cost within that region would be about $8 million. The regional environmental costs are considered, and the environmental impacts that are presented in the draft environmental impact statement are not considered to be significant. The regional benefits would be about $350 million in income during construction, and $640 million during operation. Next slide, Dave.

In conclusion, the impacts of the proposed action are generally not significant. Accident impacts from the pit disassembly and conversion facility and the MOX facility are significant. However, the probability of these accidents is considered to be highly unlikely. And, again, our regulations and our mission, as far as protecting the public health and safety, requires those accidents to be highly unlikely.

Therefore, the overall risk to the public is considered to be very small. There is a potential environmental justice concern, should an accident occur. And part of the reason we're out here is to hopefully get comments on whether the mitigation measures that we proposed are on target, or whether we should consider other things.

Staff's preliminary recommendation is the proposed MOX facility with appropriate mitigation measures to reduce the potential impacts. Before making any decision, the NRC will consider comments on the draft environmental impact statement. We'll prepare a comment summary document so that you can see how your comment was addressed, and then we'll revise the environmental impact statement as appropriate.

NRC will finalize the EIS and complete its safety evaluation report, and decide whether or not to authorize construction of the MOX facility. When DCS submits an operating license application, NRC will review that application and prepare a second safety evaluation report. NRC will only grant authority to operate the MOX facility if it can be shown to be safe.

The next slide shows ways that you can

submit comments. Again, as I mentioned, we've extended the comment period to May 14th. You can mail comments to Mike Lesser; you can send me an Email; you can also submit comments on the Web; and then you can fax comments to me. And again, all the comments we hear tonight will be part of the official comment record. And I thank you and look forward to hearing your comments.

MR. CAMERON: Okay, thank you, Tim. And thank you all for your patience in sitting through what is a lot of detail, but...

MR. HARRIS: I tried to hit the high points.

MR. CAMERON: ...but I was just going to say Tim tried to hit the high points on it. But -- and if we need to go back to a particular slide for your question, we'll -- we'll do that.

One important issue that I wanted to make sure that people understand, though, is that in addition to the NRC's evaluation -- the environmental evaluation and consideration of public comments in that, before we make a decision on whether to grant or to deny the construction authorization, there's the safety evaluation that has to be completed and combined with the environmental evaluation; is that correct?

MR. HARRIS: Right.

MR. CAMERON: Okay.

MR. HARRIS: And that's -- I think that's an important -- important point.

MR. CAMERON: Okay. Good.

Sara, you had -- probably have a lot of questions. I know you had -- had one.

MS. BARCZAK: I'll only ask one to start with. A clarification, I think, from Lawrence.

What are the remaining chances for us to have public input in this process? I only -- I saw two public comment boxes. But I was hoping he could elaborate on that.

And then secondly---and Dave might answer this---is there any input in the safety evaluation review? So...

MR. HARRIS: I'll try to answer those, and if either -- either gentleman want to...

MS. BARCZAK: Okay.

MR. HARRIS: ...add more, they can.

Essentially, the process that we talked about, the last public involvement is what we're doing right now. So we're out here trying to solicit comments, you know. We've tried to have been very

proactive in getting information out to the public.

I'll try to talk louder. Can you hear me, Chip?

UNIDENTIFIED: We can hear you.

MR. HARRIS: Okay.

MR. CAMERON: Is it -- is it coming through, Melanie, onto the...

COURT REPORTER: Is Tim coming through? Is that what you're asking me?

MR. CAMERON: Yeah.

COURT REPORTER: Go ahead and speak.

MR. HARRIS: Yeah, it sounded -- I guess it's back now.

MR. CAMERON: All right.

MR. HARRIS: Your other comment related to public input during the safety evaluation report. And typically we don't solicit comment on the draft safety evaluation report. But we do have public meetings, trying to keep the public informed. And we're always receptive to comments. But there's no formal process as part of that review.

MS. BARCZAK: Not like this?

MR. HARRIS: Not like this. But again, we do have meetings on the safety evaluation report where the public can attend and ask questions and express views.

MR. CAMERON: And can you -- can you just tell people a little bit more about that? And I don't know if John wanted to talk to that or not, but...

MR. HULL: I just wanted to add something in clarification.

MR. CAMERON: ...unfortunately we need to get you on the microphone.

MR. HULL: On the safety review that's now ongoing, there is a hearing that's also underway, a legal hearing before the Atomic Safety and Licensing Board. And there are two intervener groups which are -- do have several contentions that have been admitted by the board on safety issues. So that's a form of public input, although limited.

MR. CAMERON: Okay. And I guess just to finish that up, when the staff meets with the applicant on the safety evaluation issues, as you said, those meetings are open, but they're usually -- are they usually in -- in NRC headquarters or...

MR. HARRIS: Well, we have them in different places. And we have meetings in -- in North Augusta; also at headquarters.

MR. CAMERON: And if Sara or anybody else wanted to find out when those meetings were going to

be held...

MR. HARRIS: They're noticed on the NRC Web page which I'm sure Sara is very familiar with, at the meeting -- meeting notice section.

MS. BARCZAK: So if we write to you, then that will be included in the official public comment period only tonight?

MR. CAMERON: Let me get you -- I'm sorry, we couldn't hear you, plus we need to get it on the transcript. It's a nuisance, but...

MS. BARCZAK: So if we write to you after this meeting, that will be included in the official public commentary, or it won't be?

MR. HARRIS: Yes, it will. Up through May 14^{th}. You can write to me; you can send me an Email. If you go to the Web, there's a space there for you to submit comments or you can fax them to me. So there's lots of ways to hopefully -- for you to send comments.

MR. CAMERON: Let's -- let's go to Mr. Dunham and then we'll come over. Okay.

COURT REPORTER: Be sure and give your name when you start speaking, please.

MR. CAMERON: Oh, yes, please -- please do that. In fact, let me get yours.

MS. PEARSON: Kelli Pearson.

MR. CAMERON: Okay. Thanks, Kelli.

Mr. Dunham?

MR. DUNHAM: Chester Dunham.

You did say this is the last meeting of its kind? The type of meeting that we're having tonight, you said something...

MR. HARRIS: For the draft environmental impact statement we're -- we're holding two additional meetings later this week. But I don't believe that we're going -- planning to...

MR. CAMERON: Maybe we can get you up there. Because otherwise people are going to have to speak into the microphone so we get it on the transcript.

MR. DUNHAM: The only thing I want to ask at the present time is that, you know, this is real -- this is some serious stuff.

MR. HARRIS: Uh-huh.

MR. DUNHAM: And what I'm saying, when I look around I want to see what you all did so far as getting the information out to the public. You know, I don't see no -- I see one elected official, I think. Alderman Pete McKacus (phonetic), I saw him earlier. Right. He's over there. And I think that's all.

You know, this -- serious as this is, we

should have had all of our elected officials. This -- we shouldn't have had room in this little building right here to hold the people. The seriousness of it, they all should know about what's going on. And that's the question I wanted to ask, so far as what we did so far as getting the communication out, you know, for them to be here speaking, you know, one way or the other.

MR. CAMERON: Okay. Thank you, Mr. Dunham.

Tim?

MR. HARRIS: To -- people like yourself, Mr. Dunham, that attended previous meetings, we mailed you a copy of the environmental impact statement. We also mailed you an invitation to these meetings. We also have an electronic newsletter that's broadcast to hundreds of people. I don't know what the exact number is. But a large number of people get that. We also advertise in the paper. So we -- we tried to do everything we could to get people out.

MR. COBB: It was in the paper last Friday. Unfortunately it told us the wrong day, but it was in the paper. It was in...

MR. CAMERON: We probably should get...

MR. COBB: It says Monday.

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MR. CAMERON: We probably should get that on the transcript. I don't know what's the matter with this microphone. I don't know whether we're going to be able to...

COURT REPORTER: I think if -- if they'll stand up and just speak standing, without the...

MR. CAMERON: Without the mic, you'll be able to get...

COURT REPORTER: ...without the stick, that I'll be able to get them; yes.

MR. COBB: Okay. I'll make a comment...

COURT REPORTER: But I do need your -- I do need your name, though.

MR. COBB: Yes. Kirk Cobb.

And the comment I have is the -- the notification for this meeting was in Friday's *Savannah Morning News*. And -- but it said 7:00 to 10:00 on Monday, and of course that was wrong, it was Tuesday.

MR. HARRIS: Yeah, we advertise in the paper, but that wasn't our advertisement. That was -- that was an article that was done by the paper.

MR. COBB: Right.

MR. HARRIS: And I don't -- I don't believe it was reviewed by us.

MR. COBB: Right. There was a public

notice in the newspaper. And if someone showed up yesterday, then they could have come today. It's better that it wasn't yesterday, it was going to be tonight, you know.

MR. HARRIS: You know, and we also try to outreach, you know, to Sara, who's -- who's very connected to community, to have her help disseminate the word, as well, and solicit, you know, to Sara how -- how can we let people know better.

MR. CAMERON: But let's -- let's go back to Mr. Dunham's point, and maybe there's something we can do about this. I think his concern was to make sure that the elected officials here knew about this meeting. And the meeting is less important than -- than knowing that there is this process going on, that there is a draft environmental impact statement out for review.

Can we talk through various means, talking to Sara, Mr. Dunham, can we get a -- and Councilman, can we get a list of the elected officials in the City of Savannah, and make sure that we send them the fact that this is out for comment, if we haven't done that already?

MR. HARRIS: Well, if they attended meetings, any previous meetings, we mailed it to them.

MR. CAMERON: But I don't think they have.

MR. HARRIS: But if they -- if they haven't, then yeah, if Sara or -- or Chester wants to put...

MR. COBB: If they get the list, we'll make it available.

MR. HARRIS: Yeah, we'll make it available to them.

MR. CAMERON: Okay. So we'll work with you, we'll get it to the local officials so that they have time to look at it and still meet the comment deadline.

UNIDENTIFIED: The public virtually has no idea about this.

UNIDENTIFIED: The people that were impacted have no idea about this.

UNIDENTIFIED: Right. No one knows about this going on now.

MR. CAMERON: Okay.

UNIDENTIFIED: And I luckily got an Email.

MR. CAMERON: All right. Thank you. I think...

UNIDENTIFIED: Next time I'll know. I mean, I'm in the loop now.

MR. CAMERON: Well taken. All right.

Yes, sir. And let's...

MR. MERESKI: Okay, try it without. My name is Victor Mereski, M-E-R-E-S-K-I.

I think part of the reason for the lack of participation here is the general feeling that decisions have already been made and this is just a show for public benefit. And I hope that isn't true, which is one reason I've come to make some comments. But deep-down I believe the decision has been made and my statements will make no difference.

MR. CAMERON: Can we -- I think it's important to...

[Applause.]

MR. CAMERON: ...for the NRC to address that concern.

MR. HARRIS: Yeah. I mean, I think that's why we took the effort to come down here tonight and have the meeting, is to get your comment. If -- if your comments weren't going to make any difference, I could have stayed at home and had dinner with my wife and kids. It's important for us to come down here to spend the time to get the comments. And to answer your first point, no, no decision has been made. This is just one step in the process. Again, the safety evaluation report is still ongoing, and there's a number of significant items that are in discussion between NRC staff and the applicant. So no, the decision has not been made.

MR. CAMERON: And all the record for this, the how we consider the comments on the EIS,...

MR. HARRIS: We'd like...

MR. CAMERON: ...what is being considered in the safety evaluation is there for people to -- to see. In other words, it's a visible process.

MR. HARRIS: Right. If you -- if you submit a comment that relates to an issue that's in the safety evaluation report, staff will get that.

MR. CAMERON: Okay, let's -- let's go right here.

MS. PAUL: I don't want to use that; all right?

MR. CAMERON: Okay.

MS. PAUL: My name is Bobbie Paul. And I would like to address how our comments are received. And I did attend the other meeting. And as people make comments, what is the procedure that you all use to evaluate them? I understand there are lots of scientific, you know, equations and different things you use.

How many people are looking over these

comments? I have a lot of people who want to write literally hundreds of letters, and they ask me a similar question: How will my comments be received? And I don't know what to tell them.

MR. HARRIS: Yeah. We take each comment and, you know, depending on how many specific issues are in that comment letter, it may be one comment, "I'm opposed to the facility," we take that. You know, one comment, "I'm for the facility." We take that. More importantly, the comments relate to, "I don't think you adequately addressed this issue because..." So we take that comment and combine it with other comments and look at the totality of comments within that area and say, "Should we change this? Should we do another analysis?"

MS. PAUL: So the more technical actually -- more technical, the more specific tends to rise to the top?

MR. HARRIS: Yeah. I mean, I have a hard time with -- with what to do with, "I'm opposed to the facility." "I'm for the facility."

MS. PAUL: Right. I understand.

MR. HARRIS: You know, a specific comment on a specific issue, and you may make many of those, you know. "I don't want the facility because I don't think these impacts were adequately addressed."

All those get compiled, and we produce a common response document. So you can go and -- and look at say, "Okay, this was an issue. My comment is reflected in that comment. This is what the NRC did with the comment." So it's a very transparent process.

MS. PAUL: So if we're looking at say the immobilization, for example,...

MR. HARRIS: Right.

MS. PAUL: ...and as I recall during your presentation you said if -- mainly you backed up to the U.S.-Russia...

MR. HARRIS: Right. Didn't meet the purpose and need of the...

MS. PAUL: Right. Can you just succinctly say what -- why?

MR. HARRIS: Why? Because it didn't meet the U.S.-Russia agreements. That the -- the Department of Energy felt that -- an immobilization only approach wouldn't be accepted by the Russians. So because...

MS. PAUL: Because they wouldn't accept them or we couldn't...

MR. HARRIS: Wouldn't accept that

alternative. Because the purpose and need relates to those U.S.-Russia agreements, as well as other things.

MS. PAUL: And that wasn't just a convenient thing so that we didn't need to look at it. Once we hit that portal, it was off the table; is that right?

MR. HARRIS: That was their decision. I mean, people may comment otherwise, and we certainly welcome those comments.

MS. PAUL: And about how many people decide on our comments, look at our comments?

MR. HARRIS: Around 20.

MS. PAUL: Okay. Thank you.

MR. HARRIS: At various levels.

MR. CAMERON: One thing that I think it might be important for people to understand, the issue that was raised just there, is that -- and I'm going to ask Tim or Lawrence or -- or John to perhaps address this, is that the NRC is given -- has been given a specific responsibility by Congress in our legislation to evaluate the safety and environmental impacts of an action. And that's why when someone writes in and they say, "We support it," period, or, "We're against it," period, without anything more, we don't have the authority -- in other words, our mission is not to count how many people were for or how many people are against. That's why, as in your phrase, the technical, and include environmental in there, rise to the top; because they go to our statutory authority and our -- our mission.

MR. HARRIS: And we look at -- look at the comment and look at what we had written and said, "Should we revise this? Should we do something else? Should we modify from the -- from the draft to the final?" So that's how your comments are used.

MS. PAUL: So if there were -- if there were, say, 200,000 people outside that just said they didn't want this, versus a technical thing that...

MR. CAMERON: The 200,000 people who don't want it, the NRC can't do anything about that because we're a creation of the Congress. The 200,000 people who don't want it need to talk to the -- to the legislature.

MS. PAUL: Legislature. Right.

MR. CAMERON: Okay, that's how that -- that works. We only have a specific...

MR. HARRIS: Yeah. Again, our mission is to protect public health and safety.

MR. CAMERON: Okay, we're going to -- we're going to go right here, and then we'll go over

to that young lady. Go ahead.

And let -- Melanie, let me know if you can't hear and we'll try the microphone.

And please give us your name.

MS. GASINK: My name is Kellie Gasink.

I actually had a number of comments, though not lengthy. But I really don't have a question, any more than I feel that -- that you're coming to us with a question. In fact, what I just got through hearing is every last person in Savannah could be opposed to this and that wouldn't impact on you at all. And I think that that's an important thing right there.

There's a very big difference between democracy and pretend democracy. And what we have here is a pretend democracy. And so what that looks like is that we're not able to determine social policy. But, in fact, social policy is what perhaps being decided (sic) by people who don't have to live next to -- to this facility. 32-1

Democracy would mean that if we don't want our children---I have three of them, age 4, 4, and 6---living next to a dangerous nuclear material, I can't choose to not have that be. I can't choose that, and none of you can choose that. So that -- that's a tremendous problem. And if we don't want to have nuclear bombs and weapons near our children for moral, ethical, and other reasons, that's also a choice we can't make.

So I want to start by saying that this is not a democratic procedure. And we're going to have to go from there. But unfortunately the answers don't lie with the people trying to offer us pretend democracy.

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And then I wanted to express my disappointment at this environmental impact statement. And I don't think it addresses the environmental impact on us at all. And if I asked the people in this room, I don't think that they would think that what you've said addresses the environmental impact on this community on having this facility here.

32-2

And I want to say that we don't agree with the increased nuclear contamination or with nuclear waste, and that we vote no, for what it's worth, and that you should tell your superiors that. We don't go with this mess. And -- and so I want to just say that I am with the Green Party of Chatham County, and as such, we're concerned very much with the environment. We're concerned with three aspects of the environment, actually. We're concerned with the physical

environment, we're concerned with the social environment, and we're also concerned with the political environment. And I have concerns in regards for all three.

As far as with the physical environment, there is no way to eliminate -- there's risks. There's no way to make the risk of nuclear accidents---I love this---highly unlikely without getting rid of the facility. There's no way to make the risk of these accidents highly unlikely, other than to not put them next to a city of 135,000 people, which they could do. Most of the place -- places in this country are areas that are more than 90 miles from a large city. And this is what they're not doing.

32-3

They won't address why they won't put this in the desert. Why not? Okay. That's what they should be answering. Not having pretend democracy. We don't need pretend democracy.

Also we're concerned with the social environment. This plan will increase racism in this county. And that's a problem. That's a social problem.

Also there is the issue of the political environment, and this plan will take away political power from us. Because of having nuclear weapons and nuclear materials in our neighborhood, we're actually have less (sic) ability to control anything that goes in our neighborhood. We're able to have less control over our local elected officials because of the interference of the federal government.

So we object to the impact on the environment on the physical, social, and political levels.

MR. CAMERON: Okay. Thank you, Kellie. And I -- I just would encourage all of you, and not just Kellie, but when you do have reasons why you disagree with what is in this draft---and I'd emphasize that---please -- you know, please let us know in writing and please go into detail.

MR. HARRIS: Yeah, the more -- the more specifics you can provide, the better.

MR. CAMERON: Okay. Yes. Do you want to try it without?

MS. LAMB: Yes.

MR. CAMERON: Okay, go ahead. And please give us your name.

MS. LAMB: My name is Whitney Erin Lamb. First of all, I want to second everything that she said. And I want to know why the damage from the product that this place is going to create isn't

included in the risk and with the overall damage of the area?

MR. HARRIS: Can she be more specific, Chip, as far as...

MR. CAMERON: Well, it sounds to me...

MS. LAMB: Bombs make a mess. Why isn't that...

MR. CAMERON: ...sounds to me that...

MS. LAMB: ...going in with the mess of the whole plant. The products.

MR. CAMERON: Is that more specific?

MR. HARRIS: Well, the product of the -- the proposed MOX facility is reactor fuel.

MS. LAMB: Some of the product that goes to creating more damage and...

MR. HARRIS: I think the piece -- the piece that we're looking at is -- only relates to the surplus weapons plutonium being converted to reactor fuel.

MS. LAMB: Right. Let me clarify.

MR. HARRIS: Okay, please.

MS. LAMB: I don't think that everything has been included in a broad enough scale, as far as the people in the area and the environment that is impacted by this one site. I think it branches out 33-1

more than we are talking about.
MR. CAMERON: So you think that like the scope of impacts looked at has to be...
MS. LAMB: Right.
MR. CAMERON: ...broader, and that other types of -- of cost, besides the costs that you saw in those slide -- that slide, additional costs have to be looked at.
MS. LAMB: And what happens when the facility is useless? How will you clean it up?
MR. HARRIS: Yeah, well, we included the environmental impacts associated with cleanup.
MS. LAMB: Can you summarize it?
UNIDENTIFIED: It's insignificant; right?
MR. HARRIS: I -- I don't know if I can get into that -- it's been months since I read that section, but...
MR. CAMERON: But first of all, though...
MR. HARRIS: ...I can try to get you some answer. It was -- it was costly...
MR. CAMERON: Decommissioning impact has been looked at?
MR. HARRIS: Yeah.
MR. CAMERON: Okay.
MR. HARRIS: It shows how much low level

33-1 cont.

waste would be generated, what the cost would be, what the doses to the public would be, what the doses to the workers would be.
MS. LAMB: And how long it was out there?
MR. HARRIS: How -- yeah, right.
MR. CAMERON: Okay, let's -- we're going to go for some questions back here, and then maybe we'll shift gears. And Kellie sort of started us off with a comment. Maybe we'll get some more comments and then come back for questions. But I know there's a number of people who have questions, so let's give it a whirl.
Do you want to try, Kirk, without this?
MR. COBB: I think I can speak loud enough that you can all understand me, and I don't need the microphone; okay? And I'm Kirk Cobb. And I'm a chemical engineer. Lived here in the Savannah area for 24 years. Work in private industry. And I -- I did get a -- I received a copy of your draft. And I didn't read through it all, but I picked out a few interesting points.
And first of all, unlike some of you, the concern I have is that there are 38 metric tons of plutonium in the United States located in these -- they're stored -- this plutonium is stored in the

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places that are shown here. They're Department of Energy facilities; right?

MR. HARRIS: Right.

MR. COBB: Okay. They're all over the country. Most of them -- now, if you look, there's a table on Page 1-9 that shows us how many tons are in what location. There -- in the Pantex site and the Rocky Mountain Flats site, which are in the panhandle of Texas and in what -- and east of Colorado, of the 38 metric tons of plutonium, 33 metric tons, and that's a significant total or significant amount of the total, are in the panhandle of Texas and in Colorado.

MR. HARRIS: Right.

MR. COBB: Why not build -- no. And I do want this other statement. Because some of you will disagree with me. I think it's a very good idea to utilize this -- to tie up this plutonium as -- as fuel rods and use it, dilute it, make it so that it's not an enriched plutonium, so that it's not susceptible to being stolen or -- by -- or hijacked or whatever by terrorists or something. Let's get this stuff out of circulation. And I think it's a good plan to...

And the last time we were here, the plutonium -- I asked the question: How much

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plutonium's going to go in the fuel rods? And the answer was: Oh, about 4 or 5%. So you're like, all right, 94, 95% uranium fuel with 5% plutonium. Terrific. So let's do this program. And I -- I went through some numbers with Dave earlier today. You're going to use about a ton of this stuff in one reactor every 18 months. So you can work out some numbers. I thought it was very interesting. In about 12 years it'll be used up. It'll be tied up in waste fuel, which then can go to a geological deposit. This is good.

My feeling -- my thought, though, is since the majority of the stuff is in the panhandle of Texas and in Colorado, why not build the MOX facility up -- either in Texas, for example, where most of the stuff is located. Twenty-one (21) metric tons is at the Pantex site, which is the panhandle of Texas. Take everything there, do the process there, and there are enough nuclear power plants in Texas. As Dave said, you're probably planning to use these fuel rods in only four reactors. There's -- there are four reactors in Texas. Use -- do the whole thing in Texas, and be done with it.

34-1 cont.

MR. CAMERON: Okay.

MR. COBB: Okay?

MR. CAMERON: Kirk,...

MR. COBB: Those are my thoughts.

MR. CAMERON: Great. And we're supposedly in a question period now, and obviously we're...

UNIDENTIFIED: We're supposed to have already been in the comment period.

MR. COBB: But I thought you were asking for comments.

MR. CAMERON: We're hearing -- we're hearing comments; okay? And we're going to treat -- when we hear a comment, even though it might be phrased like a question, we're going to take that.

MR. COBB: I'm not offering a question.

MR. CAMERON: Okay.

MR. COBB: I'm not asking a question. I'm offering a comment.

MR. CAMERON: Right. And I think that what we need to do is, let's see if there's just straight informational questions that we can clear up, and then let's go to comment period. And I think, Cheryl, we'll put you on first.

MS. JAY: Well, my -- my question is why aren't we following our agenda? We've already -- we're supposed to be in public comments at 8:00, and we're already -- it's already 8:00.

MR. CAMERON: Well, I think that obviously there's a lot of questions; okay?

MS. JAY: Well, that's my question.

MR. CAMERON: And we're trying to be flexible to deal with those questions. Unfortunately, it's far from running a train here, or maybe it is like running a train; we're late. Let's see what informational questions we have, and then we'll go right into comment; okay?

Questions. Now, these are questions. Yes, sir, go ahead.

MR. KYLER: Yeah. I'm Dave Kyler of the Center for a Sustainable Coast.

Two questions. One is: How often have either a construction authorization or operation licensing been denied or revoked by NRC?

MR. HARRIS: It has occurred. More -- more likely what happens is that the applicant and the NRC can't agree to close issues, and the thing just basically dies on the vine. That's what happens more often than not, rather than NRC...

MR. KYLER: Can you say how often that is? Do you have any ballpark...

MR. HARRIS: The NRC has tons of licenses, and I can't speak to how many have been -- how many applications have not been -- I just don't have that knowledge.

MR. CAMERON: If you are interested in specifics, we probably can -- can get you that. But there have been a number of large projects, reactor projects, that have been cancelled because the NRC regulations could not be met.

MR. HARRIS: You know, a recent example is the LES enrichment facility that the applicant withdrew their application.

MR. CAMERON: Second question?

MR. KYLER: Yeah. Accident impacts at MOX facilities are significant, but, according to your assessment, risk is small, you know, with a low probability of occurring. How is that probability determined?

MR. HARRIS: I'm going to let Dave answer that question.

MR. CAMERON: Lawrence, did you have something else that you wanted to say, too? I'm not preempting Dave, but I forgot you had your hand up. You wanted to clarify something.

MR. KOKAJKO: Well, I just wanted to say, you asked about what the NRC has done. The Atomic Safety and Licensing Board just recently made a

partial decision on a private fuel storage initiative in Utah denying their request to build a large centralized interim storage facility. That just came out this month. As a data point, the -- the -- I could not tell you, you know, where we have ceased -- told them to stop operations. I mean, there's a lot of examples. I worked on two projects, two reactor projects, and we maintained them shut down for extended periods of time until they got their safety program back up to where we thought it should be.

MR. CAMERON: Okay. Thank you, Lawrence.

Dave, how is probability -- the probability part of the risk equation determined?

MR. BROWN: Well, the -- the applicant needs to make a case that -- that they're going to show that this accident is highly unlikely, and that they've applied the right kind of equipment and strategies to make that case to the NRC. And then that's what we're reviewing right now.

We've mentioned in our safety evaluation that's ongoing we've got about 66 open items that have been -- many of them have now been closed by getting additional information from the applicant about things like how are they going to reduce the probability of that accident.

MR. CAMERON: Okay. Thank you.

We have a question here, and then we're going to go down here. Yes?

MR. KOKAJKO: Could I make one more comment on that, please.

The facility is required to submit an integrated safety assessment in addition to their safety analysis on how they come -- they think the facility is safe. This is a tool that is used to determine the probabilities of these accident sequences and what they could do to help prevent and mitigate them at the facility. This is required under the Title X *Code of Federal Regulations*, Part 70. And the DCS will have to submit this ISA as part of their application process.

MR. CAMERON: Thank you.

Yes, ma'am?

MS. HARRIS: My name is Maxine Harris.

My question is: If the Savannah River Site is funded by the federal government, what happens if all of this weapons grade plutonium is gathered together at this site and the government, as we know, is headed into deep deficits already, and with the war it's continuing. What happens if the government is no longer able to fund the ongoing process, and this

accumulation of plutonium or MOX are sitting in old, antiquated, leaky tanks? And I understand that there has been an incident of a leak already that caused some problems. What is to prevent -- prevent this situation from happening?

MR. HARRIS: I think we're going to let the -- the gentleman from the Department of Energy -- but I think it's important to note that, you know, the Department of Energy operates the Savannah River Site. The NRC is an independent government agency, and our only role at the Savannah River Site relates to evaluating the safety of the proposed MOX facility. As far as other -- other Savannah River Site activities, we don't have any interaction at all.

I'll let my colleague from the Department of Energy...

MR. CAMERON: I think maybe this is working back here. Let's give it a try.

MR. BROMBERG: My name is Ken Bromberg from the Department of Energy. And I would -- I would make several points in regard to the question.

First of all, with the exception of the Rocky Flats material, all of the plutonium will stay at the respective DOE sites until just in time, when it's ready to be made into MOX fuel. Then it will be brought to South Carolina to be made into MOX fuel, other than Rocky Flats.

Point two, there's legislation that was passed, introduced by now Senator Lindsay Graham that requires that if the material is not made into MOX fuel by 2012, and in each year after that by an amount stipulated in the legislation, the federal government is fined a million dollars a day, up to $100 million a year, for each and every year that that plutonium stays there.

Third of all, none of the plutonium that is going to be made into MOX fuel is in the form of liquid waste. It's all in the form of -- two-thirds of it is in the form of metal and pit form, which is currently stored at the Pantex plant in Texas, and the rest is stabilized and stored as -- in a powdered form in a sealed 3013 container. So none of it is in a liquid form that's going to spill from a high level waste tank.

MR. CAMERON: Thank you very much, Ken.

Let's go down here. This seems to be functioning, but -- it isn't?

UNIDENTIFIED: No, it's not functioning.

MR. CUTTER: Vernell Cutter.

Earlier it was stated that this is not a

give me, that this is still open. Two weeks ago we had the bi-state conference by the Savannah State College, where we were glad that over 135 citizens from around this area participated. But it was stated at that meeting that there is a MOX facility building on location at the Savannah River Site. Is that true?

MR. HARRIS: No, I don't believe that is true. We did send invitations to try to publicly advertise the series of meetings that were had at that conference that you talked about. We talked to Dr. McLean, and also to Renaul, and I can never pronounce her last name, who was gracious enough to, I understand, set those out. And I was happy to hear from Dr. McLean that the conference was a success. But I should clarify that there is no MOX facility at the Savannah River Site. That's still under review.

MR. CUTTER: It was also alluded to earlier -- it was actually stated that our country is now at war and there seems to be some problems with France. Isn't Cogema a French-owned company?

MR. HARRIS: That is correct.

MR. CUTTER: Just wanted to be sure.

If we're talking about MOX fuel, what is the utilization of that fuel? Is it for electricity?

MR. HARRIS: Yes. The reactor fuel would

be -- the current plan is to have the mixed oxide fuel used in a reactor, and that reactor would produce electricity.

MR. CUTTER: Produce electricity for whom?

MR. HARRIS: I assume for Duke -- Duke Power customers.

MR. CUTTER: Duke Power customers, meaning, then, for folk in the Augusta/Aiken, South Carolina area, that would not cheapen their electric bill or their power bill?

MR. HARRIS: Yeah. I don't -- I don't think I can comment on that.

MR. CUTTER: I'm just saying, so you're saying, then, that our government will spend money to do this, build the facility, but then Duke would take the benefit for producing power and charging a customer?

UNIDENTIFIED: Yes.

UNIDENTIFIED: That's right.

MR. HARRIS: Is that correct, Peter? Todd?

MR. KAISH: My name is Todd Kaish. I work for...

UNIDENTIFIED: Speak up.

MR. KAISH: My name is Todd Kaish. I work

with Duke Cogema Stone & Webster. The mission reactors, the Duke reactors are not supplying power to the Aiken and Augusta area. The area -- the area in their service area is North and South Carolina.

UNIDENTIFIED: Not even in Savannah? Not even in Georgia?

MR. CUTTER: So, again, I want to be sure that my question is answered here. You're saying, then, that the residents, citizens of Georgia, South Carolina, will bear the main environmental impact statement effect, but then the utilization of the power will be benefit (sic) by the citizens of North Carolina and South Carolina? 35-1

MR. CAMERON: And I guess that these fuel rods from the MOX facility could go to any number of reactors. But I think your point is coming across, Mr. Cutter. But I think that people, as Tim had indicated in his presentation, would say that the benefits of this program, or the supposed benefits, depending on what you think about it, is to -- to deal with the weapons material. So there's a number of benefits.

But let me go to my colleagues. Let's go to Lawrence to see what his response is. And we really need to -- I'm going to just have a -- go for a couple more questions, and then we're going to start the formal comment, and we'll come back to you for questions. But I think we need to get on.

Lawrence?

MR. KOKAJKO: First, what the Duke plants have -- or will be doing -- first, what the Duke plants will be doing will be putting the fuel in as lead test assemblies. When you put in a new fuel type or a new enrichment of fuel type into a reactor, you just can't, I guess, go buy it and go put it in there. You have to evaluate it because it changes the parameters of the reactor operations design. It may change the accident consequences, as pointed out by Tim in one of his slides.

So what they've agreed to do thus far---and it's by no means certain---is they would like to be able to put this fuel in the -- certain facilities, and then they'll evaluate its performance. So conceivably, the fuel -- let's say if it -- if it worked out, they would then try to be used (sic) in other reactors throughout the nation. So it's not just the -- the North Carolina plants. It could be plants in Iowa, Vermont, Arizona, California, or wherever. It could be anywhere. But the idea is that it's got to be tested first. And so these lead test

assemblies are being done up there. So it's not a matter that they're all of a sudden receiving the benefit from it, to -- to take this fuel up there and use. It's -- it's more of -- it's done under a section in 10 CFR 5059, I think. They have to evaluate it and we have to evaluate it, too.

MR. CUTTER: If I'm hearing you correctly, then, Lawrence...

MR. CAMERON: Thank you.

MR. CUTTER: ...what you're saying, that actually this is a test for a nuclear power plant? You're saying?

MR. KOKAJKO: No, sir. No, MOX facility is not a test.

MR. CUTTER: No, I'm saying the process.

MR. KOKAJKO: To use that fuel -- to use that fuel, in order to insure that it is operating as it's designed, they've agreed to allow those lead test assemblies to be placed in there if they can find out that it's safe to do so, and if we agree with that. And right now we have not agreed with that.

MR. CUTTER: I just want to personally thank you all, because for 13 years I've been coming to these meetings and listening. And I want to thank you all personally, also, because I see now that you all no longer just sit in groups. You do disburse yourself among us, and that you have taken a concerted effort to be genuine in your visitation. So I want to thank you all again. And I'll stop my questions there.

MR. HARRIS: Thank you.

Can I just add one point, Chip?

MR. CAMERON: Yeah, go ahead.

MR. HARRIS: You talked about the -- the local environmental cost. As I talked about in my slide, in the regional -- there is regional economic benefit, also. So it's -- so it's -- you don't get the benefit from, say, the electricity, but there's -- there's dollars that go into the local community, jobs.

MR. CAMERON: But as -- yeah. I think Mr. Cutter's point is there might be a mismatch between impact and -- and cost.

MR. HARRIS: Right.

MR. CAMERON: We're going to go for two more questions, and then we're going to ask Cheryl to lead off the public comment for us.

Can you just tell us your name again, please.

MS. PEARSON: My name is Kelli Pearson. 36-1

And at the risk of sounding like a nimbi, I just want to follow up with Mr. Cobb's question, and wondering if you could give a short explanation of the primary reason we're not considering that area of Texas or Oklahoma or... 36-1 cont.

MR. HARRIS: Yeah, sure. The Department of Energy, as I alluded to, has done two environmental impact statements on the -- the whole program of what to do with surplus weapons plutonium. And in that, they looked at a number of alternatives, which included locating the MOX facility, the pit disassembly and conversion facilities at other locations. Their decision, what they concluded was that the Savannah River Site was the best location for those facilities. So going into our -- our EIS, we took that as a given.

MS. PEARSON: Okay.

MR. HARRIS: And stated that in the very beginning in the notice of intent, that -- that we weren't going to look at locating this facility somewhere else in the country.

MS. PEARSON: Seems like that transport is one of the riskiest parts of the whole process. Is that true?

MR. HARRIS: Well, certainly depending on where the facilities are located, the transport would be more or less.

MR. CAMERON: And these comments like Kirk's and his comment are going to be considered as -- as comments. Even though the NRC has said this is what the scope is, they will be at least considered...

MR. HARRIS: Right.

MR. CAMERON: ...and evaluated.

And let's have one more question right here, and then let's go to some comments.

MR. LANIER: I'm going to try it without the mic.

MR. CAMERON: Okay.

MR. LANIER: My name is Jody Lanier, and I have three questions.

First, referring back to your Slide #6, looks like there will be a -- there's a second comment period when the final EIS is released. Does that mean there'll be another meeting like this here after that?

MR. HARRIS: No, I think what those two boxes were meant to show, Jody, the first box was the meetings that we were having last September that you attended here.

MR. LANIER: Right.

MR. HARRIS: The second box is tonight.

MR. LANIER: This one? Okay.

MR. HARRIS: Yeah. So, as Sara talked about in her comments, unless -- unless events say otherwise, this will be the last...

MR. LANIER: Okay.

MR. HARRIS: ...public outreach.

MR. LANIER: In the future, about notifying the local media, when I got a copy of the notice that you sent me about this meeting I went by the one locally owned radio station in town, WRHK, 105.3, and asked one of the managers there if he could read this on the air sometime. And whether he has or not, I don't know. But for any future meetings here I think that the NRC should notify all of the local stations, radio stations and the TV stations or the companies that own them. Because the only public notification I've seen about this meeting was what the gentleman referred to in the newspaper.

MR. HARRIS: Well, actually we -- we do do that. We issue press releases to notify the press. We -- we actually had an ad---you may not have seen--- but we did have an ad. We paid for an ad in the local paper to do that.

One of the suggestions that Sara had, which we followed up on, was to advertise on the local cable channel, apparently Channel 8 maybe.

MS. BARCZAK: The government channel.

MR. HARRIS: On the government channel. We contacted them and arranged to have the meeting noticed there. So we're trying -- trying to let people know. But if you've got some more suggestions, we're happy to hear them.

MR. CAMERON: And a final question?

MR. LANIER: Yes, a final question. On Page 223 of the report I see here it mentions about why you do not consider immobilization in the statement. Says that, "Since immobilization fails to degrade isotopic composition of plutonium, Russia fears that immobilization would leave open the possibility that it could be used in weapons."

And just for the benefit of those of us here who aren't nuclear scientists, could you explain how using this plutonium in MOX fuel is going to make it so that it can't be used as -- as a weapon, say in case somebody tried to get a hold of it?

MR. KOKAJKO: It essentially changes into different isotopes that cannot be used as weapons.

MR. HARRIS: Yeah, essentially, when you put it in a reactor, there's a lot of neutrons. The neutrons hit the atom and change it into a different

atom.

MR. LANIER: Whereas with immobilization that would not happen?

MR. HARRIS: Right.

MR. LANIER: Okay. Thank you.

MR. CAMERON: Okay. Thank you, Jody. And thank you all for questions. And we'll go back for -- for more questions. But as Cheryl pointed out, we're not on time, and we're going to -- Cheryl, would you like to lead off with a comment for us?

MS. JAY: So you're going to put me on the spot?

MR. CAMERON: That's right.

MS. JAY: Okay, my name is Cheryl Jay. I have lived in Savannah all of my life in the shadow of the bomb factory, as we used to call it. I am a clinical medical laboratory scientist, and I'm also a science teacher.

As a clinical medical laboratory scientist, I would like to comment on the obfuscation that you use in your dose analysis. When you compare human dosage that we receive from natural sources, 37-1 such as radiation from the cosmic universe, from medical exams, from chest X-rays, those are either things that we cannot avoid or things that we choose

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to benefit our health.

We do not choose to increase our dosage of harmful radioactive isotopes to ourselves and our families by the military, industrial, and nuclear complex that is going on at the Savannah River Site. 37-1 cont.

I see this MOX facility as just a continuation of nuclear weapons production at the Savannah River Site. It is a justification for the jobs, for the continuing usage of this material. I resent the fact that you have brought in the aspect of terrorism into this situation. I submit to you that immobilization will do exactly the same thing, and it will also decrease the -- some aspects of terrorism because we will not have as much transportation. In immobilization, the -- this material is still at DOE facilities. All this material is now at DOE facilities. If DOE facilities are not safe, then MOX is not safe, either. So that -- I think that is a total just obfuscation also, trying to cloud the issue and -- behind the flag and the issues that are going on worldwide. 37-2

Also, I -- I submit to you that saying -- also hiding behind this Russian treaty, quote-unquote, that we have is a very misleading statement because we do not follow international nuclear treaties. At the moment our government has pulled us out of serval 37-3

international nuclear treaties, and so saying that, you know, we'll let those poor "Ruskies" down if we do this is -- is just erroneous. And it is -- it is just justification for -- as several people have alluded to, taking the U.S. tax dollars and putting it into -- into something that has not been tried here, that we don't need. 37-3 cont.

We do not need MOX fuel. We do need to get rid of plutonium. I -- I agree with that. But we can do it cheaper, more safely, and with less waste by immobilizing it. 37-4

Thank you.

MR. CAMERON: Okay, thank you.

[Applause.]

MR. CAMERON: Let me ask Carol. Carol Cain. Do you want -- why don't I bring you this microphone. Okay, yeah, because it seems like it's doing better.

MS. CAIN: I'm Carol Cain, C-A-I-N.

Part of my problem with all this is the financial aspects of it. There's so many questions, as far as the nuclear processes. But I'm just wondering about the -- the financial part of it. It's like she said before, we're already at a deficit and they want to build another new building down there at Savannah River Site. And what's going to happen if, 38-1 in the middle of it all, we run out of money? And then it gets back to the other thing about -- it's kind of like we're building this facility for Duke and everybody to turn around and make electricity for then the ratepayers to pay. And it just -- it's like -- it's something like *Alice in Wonderland*, is what I think of all this. It's just -- it just really gets out of hand, when you start talking about it. 38-1 cont. 38-2

And there are many issues to go into, but this is all I'm just going to say right now. And I'll write letters.

MR. CAMERON: Thank you, Carol.

And, Bobbie, did you want to -- did you want to talk now or do you want to...

MS. PAUL: I'll make my comment, because we need to go. Carol just...

MR. CAMERON: Okay. Good. Thank you.

MS. PAUL: Thanks.

I'm Bobbie Paul, and Sara asked me to read an Email that she got today from someone who couldn't come named Ellen O'Leary from Tybee Island, Georgia, because she had to go to the hospital for another test pursuant to her kidney operation.

"I'm a 49-year-old woman born and bred in Savannah. Two weeks ago I had my left kidney removed

for a renal cell carcinoma. I have led an extremely health-conscious life. Unfortunately, environmental pollutants cause most cancers. I don't want to move from my home and family, but I suspect the DOE Savannah River Site in my case.

"SRS has the most radioactivity of any DOE site nationally. There are millions of gallons of high level radioactive waste in faulty storage there. We should not add the potentially dangerous MOX project to this overburdened site. 39-1

"Shipping plutonium, as well as the new MOX fuel, would present further concerns in safety and security. 39-2 The MOX project has already doubled in price in the last few years. Who knows what it would cost us to support the sister program in Russia under questionable safety and security precautions. 39-3

"And finally, the low income community of color surrounding the SRS site is being unjustly burdened with yet another deadly, dangerous project. As a tax-paying citizen, I demand freedom from another unnecessary danger to my life. 39-4

"Signed," or Emailed, "Ellen O'Leary, Tybee Island, Georgia."

I don't live in Savannah, I live in Atlanta. And I went to the MOX hearing in Augusta.

And, you know, after my questions tonight, reading something so highly emotional in such a highly charged, emotional time for all of us, I, too, wanted to take some time to study the three copies I got in the mail---same address---and write my comments down.

I head up a women's peace organization called WAND, Women's Action for New Direction. And it's national. And we have about 16 chapters and I don't -- I don't know how many members. About 500 or 600 just in our Atlanta area.

I just wanted to share a little comment at the end of the last meeting I had with a gentleman in the parking lot. And I was so overwhelmed with all of the technical talk and what was really going on. And I said to the fellow, who was somehow related to the industry, "So what was really going on here tonight?"

And he -- he said, "What do you mean?"

I said, "Well, it just perplexes me. If this stuff is so -- if there's so many steps to go through all of this, and there's so many technicalities, and it's going to cost so much, and so many people are confused, why are we doing it? Why don't we just immobilize it until we can have a better science past a couple of hundred years, at least. Or 100 years."

40-1

And he looked at me, he said, "Are you kidding? Do you -- do you know how much money we've spent on that plutonium?" And it's haunted me. And I don't know when we're going to say enough is enough, and we just take this stuff out of our universe. We can't put it back in the ground. Like the Native Americans once told us, "Never take it out of the ground." But we have. And I think we've got to put profit aside and -- and do things for future generations.

Thank you.

[Applause.]

MR. CAMERON: Thank you, Bobbie.

We're going to go to Victor Mereski, and then Mr. Dunham, and then Mr. Cutter.

MR. MERESKI: Thank you.

My name is Victor Mereski, M-E-R-E-S-K-I. I'm a resident of Savannah for about 35 years (sic).

I'd like to tie into the last comment that was made about the concern of future generations. I really feel that the whole nuclear energy program has lost track of how long this pollution lasts. I believe that all of recorded human history is something like 10,000 years. But this pollution is going to last and be a danger to people, I understand from Sara, about 240,000 years.

And you think of all the disasters that have occurred in the world during the 10,000 year period that we know of, and here we're talking about a period that's 24 times that. And yet they say there's a low accident probability. Why don't I believe the government?

[Laughter.]

MR. MERESKI: Well, in reading over material about the release of nuclear pollution into the air, water, so forth, I remember reading that they were conducting tests of new mothers, testing their milk. I forget the specific component that they were checking for. But they were recording this, I think, in various places in the country.

But in South Carolina the readings kept going up; okay? And when this was pointed out, that, you know, this is a concern, what do they do about it? They stopped the test. You know, this is really taking into consideration finding out what's going on. Stop the test. We have no more rising pollution in mothers' milk because we can't see it anymore. Why aren't those tests being restarted?

I haven't heard anything about the taking into consideration the risk of a terrorist attack

41-1

while this material is being transported. And I wonder what protection there is during the transport of this material, you know, from preplanted land mines, radio controlled stuff like that, that seems to go on all over the world. Why can't it happen here? I think it can.

41-1 cont.

I feel that too much of the material that is presented to us is in a fashion of, well, you can only comment on this specific thing. If it's outside of that, well, it just goes into the wastepaper basket. But the whole nuclear program is ill-considered. I would really like an answer to why they are not testing the mothers' milk in South Carolina, and why they don't start again and see how it compares with their previous tests.

Thank you.

MR. CAMERON: Thank you, Mr. Mereski.

[Applause.]

MR. CAMERON: Let's -- let's go to Mr. Dunham, and then we'll go to Mr. Cutter.

MR. DUNHAM: I guess I wear many hats. But my name is Chester Dunham. I works with the (sic) International Longshoreman's Association, the shipping industry. I'm a longshoreman. I'm also the Safety Director for our union with the International

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Longshoreman's Union right here in Savannah, Georgia. Also the President of the A. Philip Randolph Institute, which is a non-partisan organization to deal with problems and other type of things. It's a national organization, etcetera.

But what I want to talk about tonight is that the representative here from NRC, in your own mission, you -- you did a real good job in doing the presentation to us about the -- the program. I listened carefully and I jotted things down along the line in your slides. When you're talking about the environmental reviews, safety review, the situation about the -- the proposal about the United States and Russia, the storage spaces, impact area, proposed action, impact human health, potential risks vial quality waste management, environmental justice, transportation, all of those things. And you did a very good job. But even with everything that you did, and talking about a minimum risk here and there and all of that, the risk factor is still there. 42-1

You know, it's a situation with these ships that I work on. Sometime a ship may come up the Savannah River that may have one container, and they're dealing with some type of liquid explosive. And what they will do is, they will stop the traffic

in Savannah River. They would -- they would close the traffic down to one vessel. No other movement within that port until that ship reaches destiny and dock, and whatever is on there comes off.

Sometimes some of the ship may come up, and you look at the invoice, and they might -- Coast Guard gets involved, and they say, well, we have a particular container, or one or two containers or something on that ship maybe discharging or -- and what that tells you then, that the Coast Guard will come in, and then they will have labor on those facility (sic), on those boxes or what-have-you, with liquid in it. And what they would tell you, that certain areas, you have to move out of that area because of the danger, explosive, that something happen. In other words, it's another thing that sometime in safety -- going through safety things that they tell you, a situation is -- well, I tell you what. Said if a situation happens where a box or something is on board of a ship, and don't stop and ask questions. That if you see any type of little smoke or any type of thing that's unusual, get off the ship and leave from that area. We'll talk and explain later.

And when you look at that situation, and then think about what's up here, and the danger there, is what puzzle me and what -- you know, and that's my concern. That the situation that we talking about, Iraq, and we're talking about their weapons of mass destruction and all of those things over there. But some of that same stuff is in our -- in our back door.

And the thing that I'm saying, in listening to the expert -- listen, I'm not a scientist or nuclear person or expert or that type -- but listening to them and listening to you all, that it's a danger factor there. And it's the risk is there. And no matter what, the risk is still there. And I'm seeing that what these gentlemans (sic) here, the job that they did tonight, but the bottom line is still -- listen, you all -- and this building should have been packed, as I said. But the bottom line is still dealing with the federal government. It is dealing with politics. It's dealing with elected official. They're going to do a report, a study. But if we don't like what's going on, then it's up to us to speak up. It's up to us to write letters, starting -- I don't care if it local, state, and federal.

Because federal is the last stop. Federal is the key. And if that's what we have to do, we're not satisfied and we think it's a risk, then that's

42-2

what we're going to have to do, get together and write locally, but make sure that we deal with the senators and congressmen, federal people, and do something about the situation.

Thank you very much.

[Applause.]

MR. CAMERON: Thank you, Mr. Dunham.

And let's go to Mr. Cutter now.

MR. CUTTER: Again, good evening to all I haven't had the opportunity of speaking to. Again, thanking our Creator for this opportunity to be able to speak this evening.

As I stand here this evening, I stand here again, Vernell Cutter, with Citizens for Environmental Justice. Have served as convener since that organization was formed.

I was sitting there and I was thinking about how and why our organization formed, when we looked at the Sierra Club and we looked at Green Peace. And folk were talking about save the spotted owl and save the humpbacked whale. But no one was speaking about saving the people of color. Our organization formed because, when we look historically at the disproportionate health risk to people of color, the facilities are built primarily in our

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areas.

And I listened. And I listened to your cost analysis. But I don't see the cost that you can place on a life. I don't see that. You talk about jobs and how that would be a benefit. But then, when I say how people of color are the ones that primarily work with the exposure, and how then they must make a choice between feeding their families and going to a highly contaminated place, I don't see it as being fair. I don't see it as being equitable. I don't see it as being democratic.

35-2

I stand here tonight as an advocate for the health of our people. Health of all people. I listen, and I see how our country now -- our President's asking for 75 billion for the rebuilding of Iraq. How much money is being asked to put a health center there in the Augusta-Aiken, South Carolina area, so as that people who then suspect that they are adversely affected can go and receive medical treatment. I don't see that in your cost analysis.

I stand here tonight as a spokesperson for the disenfranchised, for the folk who do not read or receive Emails, for the folk who just don't understand how to read the newspaper to know if the meeting was yesterday or today. Speak for those who have been

speaking for years and years, and have not been listened to, have not been heard, and who have died and gone on.

I've attended meetings all around this world, and I've listened to the various stories of folk, and I -- and I see how the meetings have changed where it used to be government against people, people against government, and we would chant, "I'm sick of being tired. I'm tired of being sick."

And government would sit there and they would shiver and they would wonder, 'Oh, are they really going to attack us tonight?' And I can see then, you know.

Now we converse about, "How are your families doing? Good to see you. Haven't seen you in two years. Yes, you remember our last meeting." But, you know what, you can have all the scoping meetings you want. But until you get serious and say this is a true EIS, environmental impact statement, and allow people to talk about each section and to be honest about it, then it is not a true democracy. It is simply folk doing a job, and learning how to use the psychology of presenting it better so folk then swallow it better.

I speak, then, for the ancestors who have

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died trying to tell folk to realize that at the end you ask yourself: What have I done for humanity? How have I contributed? It doesn't matter how much money you make. Can't take any of it with you. So, then, again, only what we do for one another will last.

I can go on with comments such as that. But I would like to say some specific recommendations that we would present for you all. First of all, that the mitigation measures section related to the EJ community---environmental justice community---must be more detailed. You can't just give a little portion and say that's going to suffice, but it must be very specific. 35-3

Secondly, that Duke-Cogema must be mandated to meet and work with the environmental justice community. You can't have them then just send the little people there and say, "Okay, we pay you this. You work with the environmental justice community." But if they're going to reap the benefits, they must have a working relationship with the environmental justice community. 35-4

Thirdly, that a stronger emergency response measure be implemented in collaboration with the environmental justice community. You cannot say then, "This is what we'll do," but then these same 35-5

folks who do not receive Emails, these same folk who do not read the newspaper, know exactly what they must do. We're saying it depends on how the wind blows. Well, who knows how the wind blows? 35-5 cont.

Fourthly, that independent researchers must be allowed to validate risk assessment associated with latent cancer fatalities. True enough, it's good for you to tell us, but they always tell you if something happens to you, seek a second opinion. And I'm saying that's the same thing that should be allowed to the environmental justice community.

And lastly, that resources be allocated to the environmental justice community to analyze the complete environmental impact statement, that states that there would be disportionately (sic) impacted under the accident analysis. You say that. Anyone in their right mind, to look at the semantics of that, will say, "What does that mean?" You're saying there's going to be a disproportionately affect (sic)? Well, then, allow the environmental justice community the opportunity to research that and say what that would be. If you've spent so much money so far, then allow it to spend a portion of that, small portion, to let it really be known of the people that it's going to really affect. Thank you. 35-6

[Applause.]

MR. CAMERON: Okay, thank you, Mr. Cutter. And David Kyler.

MR. KYLER: Those are two very tough acts to follow, so I hope I don't put anybody to sleep. Due to the late hour and my needing to drive back to St. Simons. I'm just going to read a portion of my prepared statement, and *ad lib* on a few things that have come up tonight.

First, going to talk about some recommendations that I jotted down after arriving that I don't have in my prepared statement. Some of these track some other comments that have been made.

By the way, I'm Dave Kyler with the Center for a Sustainable Coast. We're a six-year-old non-profit organization supported by memberships and foundations, whose mission is to protect the public interest in issues related to coastal Georgia's growth, economy, and environment.

Further analysis of water use and contamination, and the options and alternatives, needs to be added to this draft impact statement. After looking at this thing -- and, by the way, I have an engineering degree so this should be a lot easier than it is trying to analyze this ponderous statement. On 43-1

Page 4-6 is an "Annual Water Usage and Waste Water Discharge" for the various sites. If you'll look at the SRS line on that chart, water requirements in millions of liters per year. Millions of liters. 127,000 million liters from surface water; 13,247 million liters from groundwater are used. How much is discharged? 700,000 million liters. A little bit of retention of water appears to be taking place there. That was not at all clear from what I read in the statement, nor from what I heard tonight. Which, by the way, looking at the hydrology slide we saw tonight: Surface water, no significant discharges during construction. Operational discharges through existing SRS facilities. No significant change for permitted discharges. Well, folks, there's should be (sic) a very strong concern in this region about water use, not just the quality of the water being discharged. Both are very important. 43-1 cont.

Something like 40,000 jobs in this region, 10,000 jobs in Chatham County, alone, depend upon nature-based businesses, and those depend upon the function of that river. And whether it's in the form of contamination or in the form of diversion and retention of water, that either way or both ways, that could have drastic effect not only on public health, 43-2 but also on the economy of the region. That needs to be much more thoroughly analyzed. And the significance of that chart I referred to in terms of water use needs to be thoroughly tracked and alternatives need to be evaluated. 43-2 cont.

As Mr. Cutter said, evaluation of emergency response capacity needs to be looked at. It's been brought to my attention, from other reading, that many times far more people attempt to evacuate than are necessary to be evacuated. And because of that, evacuation routes are overloaded, and the facilities available that would be adequate if people were properly notified, and only those needing to be evacuated were. But instead, they get all tied up, and the facilities are not sufficient. So both the education of an at-risk population, and the capacity of the facilities needed to evacuate need to be much more thoroughly analyzed. 43-3

I think we also need to test the assumptions, as they always say in cost benefits analysis, of the time -- time line effects of costs and benefits. Typical cost benefit analysis places future -- reduces the impact of future costs in proportion to their distance away from the present time. Well, at the rate we're going it seems to me 43-4

that environmental resources are going to be worth more in the future, not less. And if they're brought back to the present with a discount method, they're going to be very much reduced in value compared to what they are likely to actually be worth in that future time. So alternative methods for evaluating costs and benefits need to be factored in. 43-4 cont.

The groundwater geology in this area is susceptible to variable conditions that are site-specific and cannot be accurately predicted. And the consequences for those factors need to be taken into account in evaluating risk. 43-5

And last in the way of general recommendations, we need to develop a process which the Corps of Engineers is even considering, I guess under pressure from Congress---and if they can do it, certainly NRC can do it---called independent external review. Essentially, what this is saying is that the agencies that are responsible for administering these projects, whether it's the Corps of Engineers or NRC, are so compromised in their function that they become advocates for the projects, rather than being capable of objectively evaluating these projects. And that job needs to be given to a -- for a second opinion, as Mr. Cutter said, to another party that's more capable 43-6 of being both objective and external, and has no entanglements with the project.

A lot of other things I could say. I have some other things in my draft statement. But that's -- that's good enough for now. In essence, we need to know a lot more than we know now before a responsible decision can be made in public interest.

43-6 cont.

[Applause.]

MR. CAMERON: Thanks, Mr. Kyler, for those very specific remarks.

MR. HARRIS: Did you want to let him know he can hand in his public written comments to the...

MR. CAMERON: Sure, if it's -- if it's ready. Yeah.

Mr. Kyler, if your -- if your -- if you have a prepared statement -- if anybody has a prepared statement that you would like us to attach to the transcript, as well, we can do that.

Let's go to -- to Sara. Sara Barczak.

MS. BARCZAK: My name is Sara Barczak. I'm the Safe Energy Director of Southern Alliance for Clean Energy here in our Savannah field office. And, not to brag, but I've actually gone through my draft, and I have ran out of tabs, actually, because there's so much to highlight in here. So let me start my

watch, because you all know that I can talk too much. Before everybody leaves, I just want everybody to know that there are numerous articles on the colorful tri-fold display back there that highlight some of the things that I'm going to touch on here. And I think you all will be interested in them.

We're a regional non-profit. We were formerly Georgians for Clean Energy last time you saw me here in September. We have members throughout the region, and primarily have focused on energy policy for the last 20 years. We'd like to state that the current draft environmental impact statement now before us leaves much to be desired, and that we are likely going to resubmit and restate all of our past concerns again. In a sense, it appears that many of the important objections to the plutonium bomb fuel or MOX program have been entirely dismissed by the U.S. Nuclear Regulatory Commission.

For example, at the scoping meeting here in Savannah, which many of you were at last September, many people were concerned about terrorism---and that came up again tonight---and wanted to know how terrorism would be addressed in the draft report. On Page I-29, in the section on impacts from terrorism, dedicates a whopping two sentences to this issue,

44-1

stating, quote, "Many commentors raised a number of different issues concerning terrorism. The draft EIS will not address terrorism, because these impacts are not considered to be reasonably foreseeable as a result of the proposed action," end quote.

That is not acceptable, given the repeated concerns that we, along with NRC staff, heard voiced back in September. It is hard to believe that transporting tons and tons of weapons plutonium across the country to one single location, the Department of Energy's massive Savannah River Site that's only about 90 miles upstream from us, does not constitute an action that terrorists might want to take advantage of.

Isn't plutonium a highly toxic substance with a hazardous radioactive life of 240,000 years, and is a key component to modern nuclear weapons, and that one only needs several pounds of it to make a bomb? Though in numerous federal agency meetings--- and I've been to them; Department of Energy, Nuclear Regulatory Commission, EPA, etcetera---on various nuclear-related topics the -- the issue of terrorism is supposedly going to be addressed in separate guidelines and under "top-to-bottom," quote, agency reviews. It is extremely pertinent and vital to

44-1 cont.

address terrorism concerns and security measures in this DEIS, in this draft. 44-1 cont.

We have general concerns about the plutonium disposition program which we've all overheard today. We'd like to make it clear from the outset that we oppose the production of any type of plutonium bomb fuel program, and we oppose it for a variety of reasons. It's an experimental program that has never been pursued at this scale. It poses a risk to workers and surrounding communities at both the production and reactor sites. 44-2 It will increase the volumes of hazardous radioactive waste streams at a location that is already plagued by enormous quantities of waste and previous contamination. 44-3

It raises -- and this is where our expertise sort of in the -- the energy policy, it raises complex consumer and ratepayer concerns over government subsidies unfairly favoring a destructive type of energy production over a more environmentally friendly and safe alternatives that do exist. 44-4 It increases the negative health impacts to communities in cases of severe accidents at reactor locations, and it blurs the division established between military and civilian nuclear programs. 44-5

We believe that the NRC has only one

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option that will protect the public health, and that's to deny the application request for this facility. We urge that the pursuit of developing a plutonium fuel economy be ceased in all sectors of government and private enterprise, as it will allow plutonium, which we know is a dangerous material, to enter civilian commerce and the international marketplace.

We thoroughly disagree with the NRC staff's preliminary decision in this report that, quote, "the overall benefits of the proposed MOX facility outweigh its disadvantages and costs," end quote. The NRC states, on Page 2-37---and I would suggest everybody look this up when they leave here---the four main points of consideration that brought them to this---in our opinion---flawed decision. 44-6

1. The national policy decision between Russia and the U.S. to reduce surplus weapons plutonium;

2. The minimal radiological impacts of and risk to human health posed by the construction, operation, and decommissioning of the plutonium fuel factory;

3. The minimal environmental impacts the plutonium fuel project would

pose, and last;

The economic benefit to the local community.

On that same page the NRC states---and we heard it again tonight---that the most significant potential impact is if there were a large accident at the proposed fuel factory. But narrowly concludes that though those occurrences -- though the consequences of an accident would be significant---and this is their quote---"the likelihood of such an accident occurring would be very low or," in parentheses, "highly unlikely." 44-6 cont.

We believe fundamentally that the no-action alternative the NRC was mandated to study is a better choice overall. We'll touch upon errors we have found with these four points in our detailed comments that we'll -- we'll get in before the May 14th deadline.

But that does bring me to formally request an additional extension of the public comment period beyond the recently adjusted May deadline. This program is a federal action, and given the state of our nation and the degree to which Congress and the general public is distracted by events unfolding in the world, we find this request reasonable. And, 44-7

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additionally, errors in the NRC calculations allowed for the initial extension. And since they are not yet clearly understood, then one cannot be sure of what else may be incorrect. It seems to follow that the public should have more time to respond.

44-7 cont.

All right, I've already gone over and I apologize. I'll summarize as fast as I can.

For those people here, I think one of the biggest keys to this whole program is we keep hearing this Russian policy agreement, blah, blah, blah, blah, blah. And that, by the way, came under the Clinton Administration because of Al Gore. So it's not like they were helping us out, either. And it's been now supported by the Bush Administration.

Even though -- and I'm going to get through this. Even though our nation is supposedly engaged in a program being performed under the guise of disposition of surplus weapons plutonium in a supposed parallel venture with Russia to reduce our nuclear weapon stockpiles, the Department of Energy's National Nuclear Security Administration issued a press release on May 31st of 2002 announcing that it would begin design work for a facility to manufacture plutonium pits, also known as triggers, for nuclear weapons, a critical component. Rocky Flats, which

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you've heard about tonight, which is the site in Colorado that is now shipping its plutonium to SRS, had carried out this function up until 1989, and is now closing. SRS is believed to be the preferred site for this plutonium trigger plant that will cost billions of dollars. That press release is back there by that tri-fold display. And it's not my press release, it's the Department of Energy's press release.

We are very concerned about the overlap or parallels that may occur between the plutonium mixed oxide fuel program and the modern pit facility program. At the October 2002 public meeting that Department of Energy had up in North Augusta on the plutonium pit meeting -- or facility, that I went to, DOE's staff said that, quote-unquote, "synergies would be evaluated in their draft EIS." We believe that the NRC should also give a very close look to the possible use of the same -- to the possible use of the same buildings, like the MOX plant, the pit disassembly plant, by both programs, and that the exact amounts and types of waste generated by each, and how those wastes will be dealt with, the thorough tracking of plutonium in and out of the facilities, and the possible overlap of contracting partners. All this

44-8

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information should be made available to the public and should be reviewed prior to the issuance of this final MOX proposal. 44-8 cont.

We think that the NRC should deny the plutonium fuel factory license application request based on the obvious conflict with the national policy on surplus weapons plutonium. What really is our national policy? Is it to bring weapons plutonium to SRS to secure it, or to bring it there to help us build new nuclear weapons? There is enough public information available to show there is a major discrepancy. Since many of the decisions in this draft EIS are based on not wanting to conflict with foreign policy agreements, such as the unfortunate cancellation of the cheaper and possibly safer immobilization option, it appears that, in itself -- in -- that it, in itself, is a flawed argument since there is no cohesive policy on what we, the U.S., intends to do with our surplus plutonium stockpiles. 44-9

We're also very concerned about all the changes which, of course, the NRC didn't make; the Department of Energy made. And we -- we fully feel that the Department of Energy has to go back to the drawing board and do a supplemental environmental impact statement to what we were told, like Mr. Cobb 44-10

when he said why can't it be done in Colorado. Changes have been made to this program---cancelling of immobilization, making SRS an immediate plutonium storage facility---that why can't the NRC say, "Look, we can't grant you your operating license because you need to do some of the regulatory things that all these people are asking about. Like, get them off our back and do your job, Department of Energy." 44-10 cont.

And then I'm -- finishing up here, I've mentioned this at the September meeting, but I want to let everybody here know that in February -- February -- well, February 2002, report to Congress by the Department of Energy called "Disposition of Surplus Defense Plutonium at Savannah River Site," that in it they recommend that we need at least two more additional unnamed nuclear reactors to get this plutonium bomb fuel program going. And our nearby Southern nuclear plant, Vogtle, expressed interest in the plutonium fuel program back in 1996, and we're concerned about the implication for the need for more reactors, and how will the NRC address this need. I didn't see it in this draft impact statement. And I, for one, don't want MOX fuel, period. I don't want it at Plant Vogtle, and I don't want it up at Catawba or McGuire, period. I don't want it. 44-11

I have -- that was blowing that first bullet point, in my opinion, out of the water, on we're doing this because of our agreement with Russia.

I have four more pages, and I'm not -- I can't get to them, on the environmental concerns, on the nuclear waste concerns, on the water concerns, on the economic benefit, and additional concerns. I'm glad somebody already mentioned Cogema, which is a French government owned company, and the concerns we have in there. And I'm just going to state this again. Their track record needs to be investigated. DCS does not have any environmental track record because they didn't exist prior to this program coming into place. So why is it that unfeasible to look at their -- each company separately that made this international consortium, and see are they doing a good job. Because they're not doing a good job in France. And right now we supposedly don't like France. And we're about to give them all our plutonium.

44-12

So, anyway, I will potentially at this point have this on our website so everybody else can read it, because I think it's interesting reading. I do want to thank the NRC staff...

UNIDENTIFIED: Yes.

MS. BARCZAK: ...for being here in Savannah.

[Applause.]

MS. BARCZAK: The Department of Energy doesn't come here, and that's why you get a lot of the questions that you get. And, you know, you have a hard job, but you can still make the right decisions. And the thought in that slide that said this -- this final decision could be issued by this fall of 2003. No way---excuse my language because I'm recorded---in hell should that be allowed. No way. Please allow for an extension, and please go back to the drawing board and really, really look through this. And I will provide the full comments to the recorder that I didn't get to read. Thank you.

[Applause.]

MR. CAMERON: Could we have the representative from the -- the Green Party. Is it -- who is the representative from the Green Party? Kellie?

MS. GASINK: Yes.

MR. CAMERON: All right.

MS. GASINK: My name is Kellie Gasink. I actually wasn't intending to -- to come here to speak on behalf of the Green Party, but I'm happy to do so.

I'm -- I wanted to say that one of the most appalling things I think that I noticed is that the people have discussed it, but that the only newspaper -- only daily newspaper in town has announced this meeting location at the wrong time, the wrong day. And that despite the fact that I'm also grateful that -- that this meeting is happening and is here, I think that we should -- that that shouldn't be a favor to the community. That, in fact, that's the minimum that we should ask. I mean, that's a part of democracy.

And I think that there's a frustration here because the process is not democratic. It's simply not. It's not democratic when we can't make any of these decisions as a community. And when the process is so narrow that we're locked out of it, it's not going to reduce people's frustration about the democracy, that people can simply complain about it. And I'd like to think that we could do more than -- than complain about what's happening.

And as I sit here, you know, tonight, I've learned a great deal more than I knew before I came into the room, and I'm grateful for that. But I would have liked to have known a lot of this stuff long

before, and I wasn't aware of it. And it isn't covered in the -- on television, it isn't covered in the newspaper, it is not information that's made available to us. So I just wanted to say that at the outset.

But we are opposed to the shipping of -- of surplus plutonium to this area. We're opposed to the shipping of depleted uranium. We don't agree that this community should have to suffer increased nuclear contamination or nuclear waste. And also, that when evaluating risk, risk is never something that's in isolation. And the fact that we're forced to discuss it as though it were is silly. 32-4

The question is not whether this plant or this idea or this plan would be safe; it's actually would it be safer to do something else. That is the only question. Nothing is safe. Apparently going outside isn't safe because the sun rays aren't exactly safe. But everything is relative. It's also the case that going out in the sun -- you know, the sunlight and having my children play is a good deal safer than having to worry about whether there's going to be a nuclear disaster. So it's -- so these things are relative. So the fact that we're not able to know why other options other than the Savannah River Site are being eliminated and are not being discussed here. We're supposed to be discussing, in isolation, how we feel about the fact that it's coming here, knowing that we don't have the control over that decision. So that's -- that's not a situation that creates either democracy or safety. Because we all know that when people get together they can, by discussing things together, come up with the safest proposals. But that's when you're in a democratic situation, when the people discussing it can make the decisions about what to do to make things safer. And it just seems to us that we can stay here and talk about things that are really, really important, and we're not the ones making this decision.

And so I'm -- so I basically -- that was, you know, what I wanted to -- to express. And I didn't have any, you know, prepared statements for -- for you all. But the one other and last thing---I'm sorry---that I wanted to say was that also that using this -- creating this -- this fuel that is going to be -- the benefit of which was going to be used by corporations and not the general public is -- is completely repulsive and racist. That -- that one company now in one stage, and there may be other companies in other stages, are going to be getting

32-5

something free and selling it to us, when the benefit should be directly to the public. If this fuel is given to them free, then they should be giving it to us free. The fact that a few people would be benefitting from this, and also, by the way, people who don't even live in this community and have to deal with any of the issues created by the facility, are just astoundingly unacceptable. And, again, that's out of the scope of what the public is able to discuss or impact on.

32-5 cont.

MR. CAMERON: Okay, thank you.

[Applause.]

MR. CAMERON: Jody, would you care to give us your comments and recommendations, please.

MR. LANIER: Good evening. My name is Jody Lanier. I'm here as a private citizen. I'm a lifelong Savannah resident. I have a two-and-a-half page prepared statement I'd like to read. But before I get started, I'd like to say at the last meeting that I really didn't appreciate being cut off too soon in my comments, especially when I was near the end. I timed myself at home saying this. This should be between five and ten minutes. So I know the hour's late, so please bear with me. I hope I don't put you to sleep.

MR. CAMERON: So you're telling me you don't want me to cut you off?

[Laughter.]

MR. LANIER: Well, that would be nice.

Okay. I'd like to thank the NRC for having this meeting here tonight. At the September 26, 2002 meeting, I spoke about my concerns regarding this project. Mainly, the inclusion of immobilization as a no-action alternative, and evacuation plans for Savannah and Chatham County in case of an accident or terrorist attack at the MOX fabrication facility, or any shipments of plutonium that may come into the Port of Savannah to support the facility.

45-1

The report states that if the surplus plutonium were disposed of only by immobilization, Russia would not dispose of its surplus because they believe that we would eventually recover the plutonium and use it to make atomic bombs. To allay their fears, we could use a famous Russian proverb, "Trust, but verify."

At the end of the Cold War, monitors from the United States and Russia went to each other's countries to verify that nuclear missiles and other strategic weapons and delivery systems were destroyed. Now this processes could be repeated and supplemented

45-1 cont.

with spy satellites and other surveillance technology to make sure immobilization plutonium is not made into nuclear weapons. With this in mind, I believe that immobilization should still be a viable option for a no-action alternative.

45-2

When I read over the draft EIS, I felt like only a nuclear scientist, brain surgeon, or attorney could fully understand it. However, it became clear that one did not need any of these -- those people to see that there was no mention of Savannah at all in the report except for a few citations noting previous meetings here. This leads me to believe that the Commission does not really care about the opinions of the more than 200,000 people living in Savannah and Chatham County; or, for that matter, those Georgians and South Carolinians living anywhere downwind and downstream of SRS. If that's the case, why is this meeting taking place?

45-3

The general message seems to be that we, the Commission, are holding this meeting to tell you what we're going to do next, but there's nothing you can do about it. Tough luck.

It also seems to say that DCS does not care about needlessly putting us at risk by proceeding with this project. That really doesn't come as a surprise, since they apparently have no qualms about putting the people of their hometown, Charlotte, North Carolina, and the greater Metrolina region at risk with their plan to use the MOX fuel at Duke's Catawba and McGuire Nuclear Power Plants.

I'm also concerned that communities downstream of SRS will face the same risk if the reactors at the Southern Company's Plant Vogtle are chosen as the fifth and sixth reactors to use MOX, which would put all of us in double jeopardy.

The section on environmental justice mentions the effects on fishing near SRS. Since waste that is released or leaked into the waterways eventually reaches Savannah, and because fish can't tell the difference between bait from a fisherman in Blackville, South Carolina, and that from one in Chatham County, the effects the MOX facility would have on fishing in our area need to be studied. We already have radiation monitors in place that could be used for this purpose.

The EIS also bases its definition of environmental justice on the impacts to areas with predominantly racial minority and/or low income populations. I believe that failure of this report to take into account the impacts to downstream

45-4

communities beyond a 50-mile radius, regardless of their racial or income demographics, constitutes environmental injustice. The definition of environmental justice must be expanded to include these impacts. Therefore, the final EIS for this project and, for that matter, similar reports about future activities at SRS, need to include these impacts, as well.

45-4 cont.

The most disturbing part of the report to me is the mention of the Commission's ruling in December 2002 that it is not obligated to consider risks associated with terrorism in any environmental impact statement. In light of the tragedy of September 11, 2001, concluding that the risk of a terrorist attack is speculative is absolutely absurd, irresponsible, and unconscionable. With this ruling, the NRC has not only set a dangerous precedent, it has also stuck its head in the sand like an ostrich. What a shame. If the Commission will not consider these risks, who will? Who will protect us?

45-5

The EIS further states that the wind at SRS mainly blows to the west-northwest and north, and that the probability of a substantial leak is very low. I remember the infamous tritium leak of December 1991 that shut down Savannah's industrial water supply for almost two weeks. I would hate to think what would have happened if that had been plutonium-laced waste, instead. Besides duct tape and plastic sheeting, is our only defense against an accident or terrorist attack at the MOX facility consist of praying that the wind continues to blow away from us, and that SRS will dramatically improve its more than 50 year track record of leaks? If that is the case, we would be in the same predicament as Wile E. Coyote when he opened a miniature umbrella to protect himself from a falling boulder. Also, in light of recent congressional hearings and news reports containing to the Indian Point Nuclear Power Plant in New York, if SRS security is anything like that at a commercial nuclear power plant, we would feel as confident as Bill Dana's famous character, Jose Jimenez, was before he was launched into space. 45-5 cont.

The greater metropolitan areas of Augusta and Aiken can have expanded economic opportunities without jeopardizing downstream communities like Savannah. Making a firm commitment to clean up SRS once and for all can accomplish this. That way Augusta and Aiken get the benefits of more jobs related to SRS, and an expanded tax base. At the same time, downstream communities will not have to worry 45-6

about more toxic and nuclear waste being generated, resulting in a win-win situation for all. 45-6 cont.

Since I believe that my concerns have not been adequately addressed in this draft EIS, I am submitting, as an attachment, a supplement to my oral comments from the previous meeting that was sent in before the prior comment period ended. I still believe that this project will flush our valuable tax dollars down the toilet. Especially when one realizes that Duke will essentially be getting free MOX at taxpayer expense. 45-7 Further, it will not reduce the amount of plutonium stored at the site, especially if the Department of Energy decides to build and operate its modern pit facility at SRS. 45-8

As I said back in September, this project is an attempt by the DOE and DCS to shove a giant Pu Pu platter down our throat. And that when I want a Pu Pu platter, I want it from an honorable Chinese restaurant, not a dishonorable MOX plant. I call on our congressman from Georgia's 12th Congressional District, Max Burns, whose home in Screven County is only one county downstream of SRS, as well as Congressman James Clyburn of South Carolina, a member of the Energy and Water Development Subcommittee of the House Appropriations Committee, to intervene and 45-9 stop this project from proceeding forward. In the meantime, it's time for the NRC to get its head out of the sand and start thinking outside the box. Say no to MOX. Choose a no-action alternative. 45-9 cont.

[Applause.]

MR. CAMERON: Thank you, Jody.

And I just wanted to alert the audience to something that -- that Jody mentioned, that you may not know of. He referred to a December 2002 Commission decision that essentially, if I have it right, ruled that terrorist concerns did not have to be considered in the environmental impact statement. And I just wanted to tell people that if you're -- if you're interested in seeing that decision, that we could probably get copies of -- of it for you, if you want to see that. But that's what you were referring to; right, Jody?

MR. LANIER: Right.

MR. CAMERON: All right.

Nadia? Nadia Baker?

Okay, how about Andre. Andre Entermann?

MR. ENTERMANN: Right here.

MR. CAMERON: Go ahead, Andre.

MR. ENTERMANN: Hi. My name is Andre Entermann. I just had a couple of comments. I didn't

do much planning or research before I came here, so I'm pretty ignorant for most of these things. But I think it's very, very, very extremely obvious that this is just the most, you know, repulsive, disgusting idea ever. Just the word "nuclear" is just so horrible. Like I can't believe we're actually considering this and getting so technical with it. It's such a simple answer. 46-1

And, let's see. Yeah, like I think -- I think this whole discussion is just a waste of time, as far as just going through this environmental impact statement. It's just -- it's, again, so obvious. 46-2 And the overabundance of the word "significant" and "insignificant," it's just like what does that mean, you know. What's the definition of "significant"? I mean, it doesn't mean anything to me. You know, we use it so freely here and there. 46-3 And it just -- I'm very, very, very concerned for the environment, and I think we're just raping Mother Earth, you know, day-in and day-out. And there's got to be some private advantage in mind in this whole scenario in, you know, the U.S. with this whole space command and putting nuclear weapons in space and trying to dominate the world. And, you know, it's just -- it's crazy, you know.

And I -- and real quick, can I get a vote. Is anyone in here for this site? Like does anyone want to go through with this, like actually get this thing running and make fuel in here? Anybody? You guys?

MR. HARRIS: We're neither for or against.

MR. ENTERMANN: Neutral. Okay.

MR. HARRIS: Our job is just to make sure that -- evaluate the proposal and determine whether it's safe or not.

MR. ENTERMANN: Right.

MR. HARRIS: We're not a proponent or against it.

MR. ENTERMANN: I had a question real quick. Like on the MOX facility, like what's the -- the corporation or like the business that benefits from it, like the -- who's like the business that's running it, kind of?

MR. HARRIS: It's a consortium called Duke Cogema Stone & Webster.

MR. ENTERMANN: So it is Duke. Okay.

MR. HARRIS: DCS. Yeah.

MR. ENTERMANN: Okay.

MR. HARRIS: Sorry. Sorry, Chip.

MR. ENTERMANN: So you -- so the NRC and

-- and the federal government have -- they don't benefit from this really at all, like -- like as far as making sure that the EIS gets out and doesn't prove anything bad?

MR. HARRIS: We have a disclosure. I -- whether the impact is good or bad, we want to disclose it, not -- I mean, our job isn't to only sugar-coat it and set it out there. We...

MR. ENTERMANN: Right, right, right.

MR. HARRIS: ...tried to say this is what we honestly think. You know, we did independent analyses. We didn't just accept what DCS did. We did our own analyses.

MR. ENTERMANN: Yeah. It just seems like so me information, I don't think really anyone can really get through. I mean, the book, in itself, is an environmental impact, you know, all the paper. It's just ridiculous, you know.

[Applause.]

MR. ENTERMANN: It's such a simple thing, it'd be done on one piece of paper, you know. It's just like, God, nuclear. It's nuclear. It's like why would you ever want to risk it. Oh, I -- I just don't understand.

But, let's see if I have anything else.

And that -- yes, so making the MOX fuel, there is waste involved; right?

MR. HARRIS: Oh, yeah.

MR. ENTERMANN: So what happens to the waste? It just gets...

MR. HARRIS: It's going to be transferred to the Savannah River Site where they'll manage it. And depending on what type of waste it is, it goes different places.

MR. ENTERMANN: Goes different places and is swept under the rug, basically? I mean, is that worse off from where it was in the beginning?

MR. HARRIS: No, I mean, it goes to -- to licensed safe disposal facilities.

MR. CAMERON: Andre, you're going to have to, first of all, get closer to the mic for people to -- to hear you. And I guess we're going to have some time for more questions like this after we're done with the -- the speakers. I don't know if we have anybody else.

But do you have any -- do you have any more in the comments?

MR. ENTERMANN: Yeah, one more question. Just a question. I don't have -- so many things on my mind right now, I just don't even know where to start.

But how is this going to benefit mankind in regards to peace and environmental cleanup? Like this whole idea?

MR. HARRIS: Do you want us to respond to that, Chip?

MR. CAMERON: Well, I think that maybe you could just say what you said at the beginning of -- or maybe Lawrence said is what -- what we know of the purpose of this program is.

MR. HARRIS: Yeah. If you look at the purpose, purpose and need is to reduce the threat from weapons -- nuclear weapons. So the whole project is to convert it into a proliferation-resistant form. That is, so people couldn't take it and do -- do bad things with it. So you convert it into a form where that can't happen.

MR. ENTERMANN: All right, I'll have to think about what you said and do research, because I can't really comment on that.

MR. CAMERON: Okay.

MR. HARRIS: It's discussed in the purpose and need, if...

MR. ENTERMANN: Okay.

MR. HARRIS: Probably a couple of pages. Shouldn't be too bad.

MR. ENTERMANN: Yeah. Right, right.

I recently sent out a letter like opposing the plutonium launches in Cape Canaveral, I think, May 2nd, coming up. And I received the same letter back. It's just the environmental impact. It says, "No significant impact." I mean, it's just -- that's what they always tell us. It's just -- it's just a way to get around it, I guess.

MR. CAMERON: Well, I think what -- I think what -- what you need to do is you need to -- to look -- I don't think -- the NRC didn't start with the answer, "No significant environmental impact," and then cook up a rationale to match that. You have to read the -- read the statement. You may disagree with the analysis that's done in the statement. But, by and large, there's an analysis there to look at, an evaluation that led them to that particular conclusion.

And you may disagree with it. And if you do, we want you to tell us about that, because we could be wrong. We could benefit from some things that you tell us about where we didn't consider this, where we had to put more weight on. But...

MR. ENTERMANN: Yeah. It just seems so simple. Such a simple -- I just -- don't mess with

nuclear anything.

MR. CAMERON: All right. Okay, I think...

MR. ENTERMANN: But...

MR. CAMERON: ...let's -- thank you, Andre.

MR. ENTERMANN: ...all right.

[Applause.]

MR. COBB: I made my statement earlier. You don't need me to get back up and say it again; do you?

MR. CAMERON: No, we don't.

MR. COBB: I think I can help this young fellow understand. Outside of this meeting I'll offer a few comments to you.

MR. CAMERON: That would -- thank you. That would be very helpful.

And is there -- we have time for more -- for questions. But did I miss anybody in terms of wanting to -- to make a comment? And I was being facetious. I know that you made your comment.

MR. COBB: One real short, quick question.

MR. CAMERON: Right.

MR. COBB: When plutonium is transported, how many tons can be transported on a truck during one shipment? Do you know? Because I'm sure it's encased and all these stuff. Can you -- I mean, typical truck, can it handle 20 tons? You know, I mean, this is almost like two shipments. Then, of course, it's in lots of...

MR. HARRIS: The number's in the transportation section, Kirk. But...

MR. COBB: Yeah.

MR. HARRIS: ...it's not one that's up here. I'm sorry.

MR. COBB: Okay.

MS. BARCZAK: But it's a lot of shipments. It's not one shipment.

MR. COBB: Right. It's probably hundreds of shipments.

MS. BARCZAK: Yes.

MR. COBB: Right?

MR. HARRIS: If you look back in the appendix in the transportaiton section...

MR. COBB: Okay.

MR. HARRIS: ...it tells you how many shipments.

MR. COBB: That was my question.

MR. HARRIS: I mean, after the meeting I'll -- I'll find the number for you.

MR. CAMERON: And I would -- you know, I

would call attention to -- again, to Sara's organizations and her handouts. But also DCS has some information back there. And one of them is transporting mixed oxide...

MR. COBB: Okay.

MR. CAMERON: ...fuel. So there is -- there is information on this.

Sir?

MR. DUNHAM: How many different ways do they transport -- transport it?

MR. CAMERON: You mean truck, rail, barge?

MR. DUNHAM: Truck, rail, and ships, barges?

MR. CAMERON: Can we get a -- can we get a clarification for Mr. Dunham on that, Tim?

MR. HARRIS: And actually that's a -- that's an answer I -- I hope I know the -- question I know the answer to. I think we only considered truck transprot.

MR. CAMERON: And as far as -- as anybody who is with DCS or -- or Department of Energy, is any other mode of transport being considered besides truck at this point? I see a...

MR. BROMBERG: No, not in -- not in this country.

MR. CAMERON: ...negative. Okay.

MR. BROMBERG: But it's shipped by what's called safe, secure transport, which is a heavily-armed convoy under satellite location at all times. It's what's been used to transport nuclear weapons, nuclear components, or special nuclear material for probably close to 50 years. They've logged an excess of 1.6 million miles without any radiation release. It would be the same thing that would be used to transport both plutonium as well as MOX fuel.

MR. HULL: Chip, I just wanted to add that we had initially, in our -- the scoping summary report we did, which came out, I believe, in August of 2001, we -- we said we were also going to evaluate rail shipmnets. But because of what the gentleman from DOE just said, we decided that we only needed to evaluate the truck transport, because it does have a proven track record.

MR. CAMERON: All right, thank you. Thank you, John.

Sara?

MS. BARCZAK: Sara Barczak.

I just wanted to make the statement that one thing I thought about the user friendliness of the draft environmental impact statement was that in the

Appendix I, which summarized basically almost like all the oral and written comments you guys asked for from the fall 2002 time frame, is that I -- and maybe it's just me, but I would prefer to see the comments.

I mean, I know that like the Department of Energy, when they did their plutonium disposition that got us to this point, it was enormous, but you could actually read through everybody's comments instead of seeing a summary. And perhaps that might touch on some of what Bobbie Paul and others had mentioned.

And I have received phone calls on this. 'Well, how do I know they actually read my comments?' And I'll say, 'Well, look in Appendix I and look under the terrorism and you'll see that, you know, they mentioned commentors, and you were one of those. But I think people like to do a cross-reference to see if they're all getting sort of the same answer. And I would just highly recommend -- I like the summary because it helps give a quick answer right there. But I think for the final, I mean, it's going to make it huge, but I think it's got to be in there so people can see it, all the comments.

MR. CAMERON: Let me clarify, ask you something to make sure we understand your recommendation. Are you saying -- I don't think you're saying that there should be a separate response to each comment letter. You're saying that the comment letters, themselves, should all be contained in an appendix...

MS. BARCZAK: Uh-huh.

MR. CAMERON: ...to the -- to the EIS. Now, all those comment letters are publicly available. But we just don't package them. We'll -- we'll put that up as a recommendation. And we had a number of process recommendations, I mean, things that we were going to do or try to do. And one was -- came from Mr. Dunham, which is at least send this notice that this was going on to the elected officials here. Extend the comment period. There was a comment about the independent, external review that falls in a different category than -- than these two. But I think the -- the fourth one we're hearing now is to include -- either include the comment letters in the draft, or to somehow make that available to people, the verbatim comment letters. All right, I'll put -- I'll put that down.

Was -- let me ask the NRC folks whether there was anything that they heard people say in their comments that we -- we should clarify, in terms of giving them additional information? Is there

anything?

The one thing that I think Mr. Cutter brought up is that Tim's slide on -- on the environmental justice talked about accident impact and mitigating measures. I don't know whether it would be helpful to -- to say a little bit about what those mitigating measures are. I -- you know, I didn't know if it was clear to everybody what -- what was going on. And I think Mr. Cutter may have implied or explicitly said that.

Do you want to say a little more about that?

MR. HARRIS: Sure, Chip.

Chapter 5 of the EIS talks about mitigation measures for all the impacted areas. And it also notes who proposed the mitigation. So you'll see DCS, where DCS said, "We're going to mitigate these impacts by..." say like surface water impacts from construction. They proposed to do sedimentation control. Well, they're required by law to do sedimentation control. But those measures will reduce the impacts. The environmental justice impacts were proposed by NRC, and that's one area that we're very interested. And I appreciate Mr. Cutter's comments on the specificity, and then taking that farther and saying these detailed things should be included. And as you read through the document and engage the community more, if there's other things that come to mind, please -- please submit them.

So, basically, the mitigation measures that NRC proposed for environmental justice would read that: focused information campaigns to provide technical and environmental health information should be directed towards low income and minority groups, or to local agencies and representatives of those groups that could help disseminate the information; additional programs directed at local communities providing emergency response services and other emergency facilities to incorporate additional measures to protect low income and minority populations. And I think Mr. Cutter helped clarify that with saying, you know, we'd like to see a clinic there that -- if people are concerned. That's a great comment. Thank you.

But those were the two big mitigation measures that the NRC proposed, and through the help of -- of your comments, hopefully we'll refine those to -- to make them a better and...

MR. CAMERON: Okay, thank you for providing that additional.

And we'll go to -- to Sara. But is there any -- Dave, Lawrence, anything that you want to add to what you heard Tim...

MR. HARRIS: I don't think there was anything that anybody said that we felt required clarification on our part.

MR. CAMERON: All right.

MS. BARCZAK: Is the NRC -- if this operating license -- or construction license is granted, is the -- like let's say you were just talking about the mitigation procedures that you have recommended on the environmental justice section. Is the NRC going to be the regulatory body that goes through and says, "DCS, you know, you weren't distributing fliers and you weren't doing this and you weren't doing that, and you're in violation," or where do you -- are you the overseeing regulatory body to make sure, even if you give the license the okay, do you then oversee it?

MR. HARRIS: Yeah, typically, the way a lot of these -- these things happen are through -- we issue a license with conditions. You know, it says, "You can do these things." And then it says, "You shall do these things." And it's possible that those mitigation measures could be under a license condition. Certainly we don't feel that there's an environmental justice concern with construction or operation. So it would be doubtful that, if we issued a construction authorization request, that EJ would be directly considered, you know, mitigation, because it wouldn't be timely. But there -- there are probably going to be other mitigation measures relative to construction that would be incorporated in any kind of action the NRC took.

MR. CAMERON: But is the question also if we license this facility, we're also going to...

MR. HARRIS: Right.

MR. CAMERON: ...regulate the facility?

MR. HARRIS: I'm sorry, I -- right.

MR. HULL: We've got an inspection and enforcement program that applies to any licensee.

MR. HARRIS: Right. So our job is to make sure that DCS complies with the conditions of the license that we issue them.

MR. CAMERON: Is there -- there anybody else who hasn't had an opportunity to say anything tonight, that would -- that would like to say anything or ask a question, or are there other -- other questions out there?

(No audible response)

MR. CAMERON: Okay. Well, it always is nice to -- to do a meeting in Savannah, because we always get a lot of really challenging things to think about in trying to do our job. So we just thank you for -- for being here. And the staff will be here. There are people here from the Department of Energy, from Duke Cogema Stone & Webster. I mean, if you have questions, you want to talk, I know we'll be here for a while.

And thank you. Thank you all.

(Whereupon, the hearing was concluded at 10:05 p.m.)

Official Transcript of Proceedings

NUCLEAR REGULATORY COMMISSION

Title: Public Meeting on Proposed MOX Facility Draft Environmental Impact Statement

Docket Number: (not applicable)

Location: Augusta, South Carolina

Date: Wednesday, March 26, 2003

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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PUBLIC MEETING ON PROPOSED MOX FACILITY

DRAFT ENVIRONMENTAL IMPACT STATEMENT

\+ + + + +

WEDNESDAY,

MARCH 26, 2003

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AUGUSTA, SOUTH CAROLINA

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The Public Meeting was held in the North Augusta Community Center, 495 Brookside Avenue North Augusta, South Carolina, at 7:05 p.m., Francis "Chip" Cameron, Facilitator, presiding.

PRESENT:

FRANCIS (Chip) CAMERON

LAWRENCE KOKAJKO

TIM HARRIS

I-N-D-E-X

I-N-D-E-X

P-R-O-C-E-E-D-I-N-G-S

MR CAMERON: Good evening everyone. My name is Chip Cameron. I'm the Special Counsel for Public Liaison at the Nuclear Regulatory Commission. I just wanted to welcome all of you to the Nuclear Regulatory Commission, the NRC's public meeting tonight. And I have to say it's nice to be -- nice for all of us at the NRC to be with all of you in North Augusta. We've had several good meetings here in the past, and we look forward to having a good meeting tonight.

Our subject is the NRC's draft environmental impact statement that the NRC has prepared to help its -- help it make its decision on the evaluation of the application for the construction of the mixed oxide fuel facility. That application is from the consortium of Duke, Cogema, Stone & Webster. And you may be hearing that referred to tonight by its acronym, DCS. We'll try to keep the acronyms down, and explain what they are if we -- we use them. But that's -- that's one you might hear tonight.

And I'm going to help out by serving as the facilitator for tonight's meeting, to try to help all of you have a -- a productive meeting tonight. And I just wanted to go over a few things about the

meeting process before we get into -- to our discussions. One is the purpose, why the NRC is here tonight. We're here, first of all, to clearly explain what the NRC's process is for evaluating this application that we received, and to specifically talk about the findings that are in the draft environmental impact statement that's been prepared.

And most importantly, we want to hear from you, any concerns you have, any recommendations you have about the draft environmental impact statement, the NRC process for evaluating this application. And the ultimate goal is to use the comments that we hear tonight, the written comments that we receive, and comments from some of the other meetings that we're doing, that's going to help us to -- to make our decision on the application and to prepare the final environmental impact statement.

And what you hear tonight from -- from the NRC and from -- from other people in the community may help you to prepare your written comments, if you want to -- to submit any written comments to us. But let me just emphasize that whatever is said tonight, those comments will carry the same weight as written comments. And we are taking a transcript tonight. Melanie is our stenographer. And we will have a written record of what is said tonight. And that will also be available to anyone in the public who wants to see that transcript.

In terms of the format for the meeting, we're going to try to keep it real simple. We have a couple of brief -- two brief NRC presentations to give you some background information, and then we're going to go out for a question-answer period with you, make sure that -- that everybody understands what we're doing. And then we're going to go to you for a -- a comment session. And I don't want to say formal comment, although it is in a sense. We want to try to be as informal as possible tonight and -- and just have some good discussions. But when we get to the comment portion of the meeting, you can either come up to this podium and make your comment, or I'll bring you this -- this talking stick, this cordless mic, and you can -- you can use this to make your comments.

And sometimes it's -- we all know it's -- it's difficult to perhaps separate a question from a comment, or a question might lead into a comment. And so, when we're into question-answer period, it's fine if you sort of segue into a comment, but we really do want to save that question-answer period for -- for informational questions for the -- for the NRC.

And in terms of ground rules, when we're in the question-answer period, if you have a question just signal me and I'll -- I'll bring you the microphone. And please tell us your name and affiliation, if appropriate, so that we'll have that on the transcript. And I would just ask you to try to be concise as possible. I know that's difficult because this is a complex issue. But if you try to do that, then we can make sure that everybody who's here tonight who wants to talk can have an opportunity to speak.

And when we get to the formal comments, we do have a lot of people signed up to talk tonight. So I'd like to keep the individual comments at five minutes; so that if you could try to keep it to five minutes, everybody will benefit from that. And I'll remind you when you're -- when you're getting there, although most people don't take that -- that five minutes. And I would just ask that only one person speak at a time, for obvious reasons, so that we can get a clean transcript, and also so that we can give our full attention to whomever has the floor at that time.

In terms of agenda, we're first going to go to Lawrence Kokajko, who is right here. And

Lawrence is the acting Branch Chief of the Environmental and Performance Assessment Branch at the NRC. It's in our Office of Nuclear Materials, Safety, and Safeguards. And Lawrence's staff had a responsibility for doing the evaluation, the environmental evaluation on this DCS application to construct this facility, and also for doing environmental evaluations on other -- other facilities. And Lawrence has been with the Agency for about 14 years. And before he became the acting Branch Chief, he was chief of a -- a Special Risk Task Group that the Agency had formed to take a look at how to make our processes more -- more risk-informed. And he's been involved in reactors and spent fuel activities at the NRC, also. And Lawrence is just going to give you an overview of what the NRC is, how this environmental evaluation fits into our responsibilities.

And then we're going to go to Mr. Tim Harris, who's right here. And Tim is going to tell us about the findings in the draft environmental impact statement, what the schedule is for completing the environmental impact statement, how you submit comments, important information. And he's the Project Manager on the environmental review on this

application. And he's been with the -- the Agency for about nine years now, and has a civil engineering degree from the University of Maryland. And he's one of Lawrence's staff.

And I should -- before I stop, just to make sure everybody knows, we have Dave Brown here with us. And Dave is the Assistant Project Manager on the safety evaluation on the DCS application. And introducing him allows me to make an important point. The NRC's decision on this application has two major components to it. One is the environmental evaluation that we're here to talk about tonight; and the other is the safety evaluation of the proposed facility. And both of those come together to help the NRC make a decision. So we do have Dave here tonight in case there are questions on any of the safety issues, and perhaps we can explain the difference between those a little bit more in -- in the discussion.

And with that, I just would thank you for -- for being here tonight. And we're going to go to Lawrence Kokajko.

Lawrence?

MR. KOKAJKO: Thank you, Chip.

Can everyone hear me? Can everyone hear me? Let's try the cordless. Does it work now? No?

Okay. It's working; right?

MR. CAMERON: It's working. I think it just isn't quite level.

MR. KOKAJKO: How about now? Excellent.

Good evening. My name is Lawrence Kokajko, and as Chip said, I am the acting Branch Chief for the Environmental and Performance Assessment Branch at the Division of Waste Management in the Office of Nuclear Materials, Safety, and Safeguards at the Nuclear Regulatory Commission. And I'd like to welcome you to this meeting on the NRC's draft environmental impact statement for the proposed mixed oxide or MOX fuel fabrication facility.

I'd like to thank you for taking your time out of your busy schedule to be here this evening. And we do appreciate it. And we do value your input. And we look forward to hearing from you this evening.

This meeting is one of a series of meetings planned to inform the public about the environmental impact statement, or the EIS, for the proposed MOX project, and to solicit public comments. Last night we met in Savannah, and tomorrow night we meet in Charlotte.

There are three handouts that you should have received on the way in. You should have received

a set of slides; an agenda, facts sheet, and comparison of alternatives; and then feedback forms. We would appreciate hearing you responding to the questions on the feedback forms, and either handing it back to an NRC staff person, or you can staple the form together and drop it in the mail. If the NRC people could raise their hand one more time so you could give it to one of us. I think John Hull there, as well. You can drop it in the mail, as well. The form is self -- is addressed, and postage has already been paid.

If you would like a copy of the draft environmental impact statement, we have a limited number here. And if we run out, we will mail you a copy. Next slide. Next slide.

As Chip mentioned, the presenters tonight will be myself, as well as Mr. Tim Harris of my staff. We've included our phone numbers and Email addresses. And please feel to contact us (sic) if you have any questions after this meeting. And we will be hanging around a little bit in case you have some other comments you'd like to talk to us about.

The purpose of tonight's meeting is to get your comments on the draft environmental impact statement. Before we hear your comments, we'll provide some information on the NRC's role on the proposed MOX project, and describe the *National Environmental Policy Act* and the EIS process, and how the EIS fits into the NRC's decision-making process. Tim will give an overview of the draft environmental impact statement, and then there will be time to answer questions. Next.

The proposed MOX facility would take surplus weapons plutonium and depleted uranium and make nuclear reactor fuel. Congress, in the *Defense Authorization Act of 1999*, gave NRC a role in the proposed MOX project. Specifically, NRC has licensing authority over the MOX facility, so our role is to make a licensing decision regarding the safe operation of that facility.

The NRC is an independent government agency, and our mission is to protect the public health and safety, and the environment, in the commercial uses of radioactive material. Our role is different from the Department of Energy's. The Department of Energy's role in this project relates to implementing the United States nuclear non-proliferation policy, including the disposition of surplus weapons plutonium.

The Department of Energy also has a

responsibility to design, build, and operate two facilities that support the proposed MOX facility. These two facilities are the pit disassembly and conversion facility, or the PDCF, and the waste solidification building, or the WSB. While the pit disassembly and conversion facility and the waste solidification building are considered in the NRC's environmental review, it is important to note that the NRC does not have licensing authority over these support facilities. That responsibility rests with the Department of Energy. The NRC only has authority over the proposed MOX project.

I'd like to briefly describe the EIS process. The *National Environmental Policy Act* requires government agencies to prepare an environmental impact statement for major federal actions such as the potential licensing for the proposed MOX project. An environmental impact statement presents an environmental impacts (sic) of a proposed action, along with reasonable alternatives to that proposed action. Note that the bolded areas are opportunities for public involvement in the process, and we consider this a very important part of the EIS process.

The NRC's involvement in the MOX project started when Duke Cogema Stone & Webster, the applicant, submitted an environmental report and requested to construct the MOX facility. We published a notice of intent to prepare an environmental impact statement in the *Federal Register* in March of 2001. During the scoping process, the public helped determine what issues would be addressed in the environmental impact statement. We have now completed the draft environmental impact statement in February of this year, and we sent copies to approximately 550 people in that month.

We are currently in the public comment period for the draft environmental impact statement. This meeting is being transcribed, and comments made here tonight will be included in the official comment record. The last slide will show ways you can comment additional -- submit comments additionally. We will review and consider the public comments and finalize the EIS later this year. Next slide.

As I mentioned earlier, NRC's role is to make a licensing decision regarding the proposed MOX facility. I'd like to take a few minutes to describe the licensing process, and how the environmental impact statement we're discussing tonight fits into NRC's decision-making process. There are two

decisions that the NRC will make for the proposed facility. The first is whether to authorize construction of the facility, and the second is whether to authorize operation of the facility. These decisions are shown in the middle of the slide. The NRC's environmental review is shown at the top portion of the slide, and consists of preparing the final environmental impact statement. The final environmental impact statement will be used by NRC to decide whether to authorize construction, and later whether to issue a license to operate the MOX facility.

The NRC's safety review is shown at the bottom portion of the slide. The safety evaluation report for the construction authorization request focuses on a safety assessment of the proposed design bases to determine if it meets NRC's requirements. NRC's final environmental impact statement and safety evaluation report for the construction authorization request will be the basis for making a decision on whether to construct the proposed MOX facility. We anticipate making that decision later this year.

Duke Cogema Stone & Webster plans to submit a license application to operate the proposed facility in October of 2003. The safety evaluation report on the operating application and the FEIS will be the basis for making a decision on whether to allow them to operate the proposed MOX facility. There will also be two opportunities for hearings. John Hull, with our Office of General Counsel, is here, and he can answer questions related to the hearing process. To summarize, a single environmental impact statement will be used to support a decision to construct and later operate the proposed mixed oxide fuel fabrication facility.

Now I would like to turn this over -- presentation over to Mr. Tim Harris, of my staff. Mr. Harris is the Project Manager and the Lead for the Environmental Review for the MOX project at the NRC. Tim?

MR. CAMERON: And if I could just interject one thing. Tim has a lot of material for you, and he's boiled it down to a minimum. And you're going to have a lot of questions, I know, as he goes through that. But what we'd like to do is to let him get through his presentation, and if you could just note your questions on the view graphs, then we'll -- we'll go back out to you and get those -- those questions.

MR. HARRIS: Thank you, Chip.

Can everybody hear me?

What I'd like to do is discuss the alternatives that we considered in detail in the environmental impact statement; and also those alternatives that we considered, but did not analyze in detail. Then I'll provide a summary of the impacts in they DEIS.

To understand better how we decided which alternatives to consider in detail, and those that we did not, that relates to the purpose and need of the environmental impact statement. As we stated in our notice of intent that Lawrence mentioned, the purpose and need of the MOX facility that's presented in this draft environmental impact statement is essentially the same as used by the Department of Energy in its programmatic EIS's for the surplus plutonium disposition program. Those are: The purpose and needs relate to agreements between Russia and the United States to reduce the threat of nuclear weapons by insuring that those materials are converted into a proliferation-resistant form. It also relates to reducing the risk of plutonium falling into the hands of terrorists or rogue states.

The draft environmental impact statement evaluates two alternatives in detail. These are the no-action alternative and the proposed action. And I'll describe those. The no-action alternative would be continued storage of this surplus plutonium at existing DOE sites. The no-action alternative is used as a baseline to compare alternatives in an environmental impact statement.

The proposed action includes impacts from constructing, operating, and later decommissioning the proposed MOX facility. It also includes impacts associated with other connected actions, such as transporting radioactive materials. As Lawrence mentioned, DEIS also includes impacts associated with the two DOE support facilities that he mentioned, the pit disassembly and conversion facility, and the waste solidification building. DEIS also includes impacts associated with the potential use of MOX fuel. For the proposed action, we also evaluated differences in using a sand filter, which was a topic I think was raised here during scoping, with using a HEPA filter system that was proposed by DCS.

As I said before, the purpose and need determined which alternatives we analyzed in detail, and those that we considered, in discussing the environmental impact statement, but did not analyze in detail. In addition to siting and technology options

evaluated by DCS in its environmental report, several alternatives were raised during scoping, and also at our meetings here last fall.

Immobilization was initially considered as a reasonable alternative. However, following the Department of Energy's amended record of decision for the surplus plutonium disposition program, DOE believed that an immobilization-only approach would not meet the U.S.-Russia agreements. Therefore, it did not meet the purpose and need, and that alternative was not analyzed in detail in the EIS.

Another alternative that was raised at the Charlotte meeting that we had last fall was deliberately making off-specification MOX fuel. And I'll describe what that is. Essentially, the surplus plutonium has impurities in it that, in order to use it in a reactor, need to be removed. This off-specification MOX fuel alternative consists of not removing those impurities. It would also include not burning the fuel or using the fuel in a reactor. Instead, you'd make the MOX fuel off-specification, which had the impurities, and then you would store it at spent fuel pools at existing reactor sites prior to disposal in a geologic repository. Again, we felt that this alternative did not insure that it was going to be proliferation-resistant, and did not meet the purpose and need.

The proposed action and no-action alternative impacts were evaluated for the following comprehensive list of technical areas. The technical areas on the right are considered to be less significant, and those are discussed in appendices. The technical areas on the left are discussed in the body of the report, and these are because these are issues that we felt had more significant impacts or were raised during scoping, and these were issues that were more important to the public. So we provided detailed discussion in the body of the report.

To allow more time for public comment, I'm only going to focus on the impacts on the left. These are human health risk, air quality, hydrology, waste management, and environmental justice. In addition, I'll summarize the impacts associated with transporting radioactive materials related to this project, and also the potential use of MOX fuel. And I'll also provide a summary of the cost benefit analyses.

First, I'd like to summarize the impacts associated with the no-action alternative. The impacts of this alternative were previously evaluated

by the Department of Energy. And the impacts that are presented in their draft environmental impact statement are essentially the same as those in -- in their previous -- DOE's previous environmental impact statements.

We've included in the packet of information that Lawrence mentioned comparison tables, so that if you want to look at numerical differences for any particular resource area, what was the person rem for the no-action alternative compared to the proposed action, you have the numbers in your hands. When I talk about them tonight, I'm just going to summarize them relative to current SRS conditions.

The impacts associated with the no-action alternative to the public and workers are considered to be low, and there would be no significant air quality or water quality impacts associated with this alternative. As you can imagine, storing material in a building doesn't generate a lot of water concerns or air concerns. There was also no significant waste management concerns or environmental justice concerns.

Now I'd like to walk through the technical areas for the proposed action. And again, the proposed action includes the impacts associated with three facilities: the proposed MOX facility; the pit disassembly and conversion facility; and the waste solidification building. There would be no adverse chemical or radiological impacts during construction from operating the three facilities. The annual public collective dose would increase by about 11% above what is currently received at the Savannah River Site. And the following slide will help put that in perspective. While 11% seems like it may be of concern, the numbers are actually quite small. Next slide, Dave.

This slide shows radiation doses from several sources, and also NRC's annual public dose limit. The average annual dose from natural radiation -- natural background includes radiation from the earth, and also from space, and is about 360 millirem. And a millirem is just a measure of radiation dose. The annual public dose limit -- NRC's annual public dose limit is 100 millirem. You would receive about six millirem if you had a chest X-ray. The annual dose to the public from normal operations of the proposed MOX facility, PDCF, and waste solidification building is less than one millirem.

Accidents have the greatest potential consequences of the impacts that we evaluated in the draft environmental impact statement. Two

conservative scenarios were evaluated for a number of potential accidents. These scenarios are the short-term scenario, which assumed that people were exposed by inhaling contaminated material from a plume that would be generated following an accident. We also evaluated a long-term scenario, which includes the impacts of the short-term scenario, as well as impacts associated with eating crops that could become contaminated.

Potential accident impacts are evaluated in terms of risk. The classical definition of "risk" is the probability of an event times the consequences of the event equals the risk. In keeping with NRC's mission to protect public health and safety, we want to insure that the overall risk to the public is very small. Therefore, events that result in significant impacts are required to be made highly unlikely through the use of design safety features. And these design safety features are currently being evaluated as part of the safety evaluation process that Lawrence talked about.

In March we notified a number of stakeholders that we had identified an error in the accident consequences due to a computer code bug. We felt that it was important to inform stakeholders in a timely manner. And, in fact, I think I found out about the -- the error on a Monday after, and by Thursday afternoon we'd issued a letter to about 500 people. So we felt it was very important to provide the public with accurate information.

During our subsequent review, we found an additional error in wind data that was provided by Duke Cogema Stone & Webster. This error essentially doubles the impacts associated with normal operations and potential accidents. These errors, however, do not change NRC's conclusion or preliminary recommendations. The numbers presented on the slide and the numbers in the comparison table which you have, have been updated. We also plan to issue errata sheets to people that were mailed copies of the EIS. By you attending this meeting, you'll get a copy of the errata sheets, and also we'll post those on the web.

Hypothetical events that caused the highest consequences were an explosion event at the proposed MOX facility. This hypothetical accident would be estimated to result in less than 50 latent cancer fatalities for the short-term exposure, and less than 200 latent cancer fatalities for the one-year exposure scenario. The other event was a tritium

fire at the pit disassembly and conversion facility. This event was estimated to result in less than one latent cancer fatality in the short-term, and less than 100 latent cancer fatalities for the one-year exposure scenario. These estimates are conservatively derived, and do not include credit for intervention actions that would be taken to reduce long-term exposure resulting from eating contaminated crops. We didn't -- these numbers assumed that those events wouldn't happen. So -- so we think that these are bounding numbers.

The probability of these hypothetical events occurring is considered to be highly unlikely, as I mentioned before. Part of the safety review is to make sure that the safety processes and features are into the plant to make sure that the accidents are highly unlikely. These consequences of these highly unlikely events are significant. However, we believe that the overall risk to public health and safety is very small.

Air quality relates to compliance with the *National Ambient Air Quality Standards for Emission of Chemical Pollutants*. Air quality at the Savannah River Site already exceeds the particulate matter 2.5 micron or PM 2.5 standard. The proposed action would result in a 0.1% increase during construction, mainly due from earth-moving activities; and a 0.01 increase during operations. However, the Environmental Protection Agency has delayed implementation of this standard. If and when attainment plans are developed by states such as Georgia and South Carolina, the Savannah River Site could be required to reduce PM 2.5 emissions, and this could have some future impact to the MOX facility.

Next I'd like to talk about surface water. Surface water would not be significantly affected during construction through the use of sedimentation control measures. And there would be no direct operational discharges to surface water. Waste from the proposed MOX facility would be managed by the Savannah River Site. Discharges from existing Savannah River Site waste management facilities are not anticipated to change significantly as a result of processing this waste.

Groundwater would be used during construction and operation. Approximately 37% more groundwater would be used in the "F" area in the proposed action. Their existing groundwater wells and existing capacity is present to allow this water to be used, and we don't believe that the use of this water

will create a significant impact on the aquifer or water quality.

There would be no significant impacts on the Savannah River Site waste management capability from processing the proposed waste of the proposed action. Operation of three facilities would generate about 300% more transuranic waste than is currently being generated at the Savannah River Site. This transuranic waste is planned to go to the waste isolation pilot plant in New Mexico for disposal, and the volume of the TRU waste that would be generated would be about 3% of the waste isolation pilot plant disposal capacity. Operation of the three facilities would increase low level waste by about 32%, and non-hazardous waste by about 60%. But again, the current Savannah River Site waste management system can accommodate these waste volumes.

An executive order issued by President Clinton directed federal agencies to address any disproportionally high or adverse human health or environmental effects on low income and minority populations. This is commonly referred to as environmental justice. The impacts from construction and operation of these facilities are not high or adverse. Therefore, there would be no environmental justice concern associated with construction or operation. However, due to the prevailing wind directions, there is a potential impact on low income and minority populations from these highly unlikely events.

The risk associated with these accidents is considered to be small to all populations. However, the NRC felt it was important to include mitigation measures to reduce these potential impacts to low income and minority populations.

Transportation of materials was identified during scoping as an important concern to many stakeholders. The transportation analysis includes the shipment of surplus plutonium from various DOE sites to the Savannah River Site, and also depleted uranium from an existing enrichment facility to a conversion facility where it would be converted to a powder form, and then to the Savannah River Site.

We also provided an analysis of shipping fresh MOX fuel from the Savannah River Site to a generic Midwest reactor. The impacts associated with this transportation would be less than one latent cancer fatality from routine transport to the public along transportation routes, and also to transportation crews. Hypothetical accidents result

in insignificant impacts.

The potential impacts associated with using MOX fuel are discussed in the environmental impact statement on a generic basis. The collective dose to members of the public from normal operations would be essentially the same, whether a reactor used low enriched uranium fuel, or a mixture of the MOX fuel and low enriched uranium fuel.

We also looked at various design-based accidents, and found that the risk associated with developing a latent cancer fatality between low enriched uranium fuel and a mixture of MOX fuel varied from about 6% lower to 3% greater. We also looked at beyond design-basis accidents. The risk there would vary from about 7% lower to about 14% greater.

We have recently received an application from Duke Energy to place lead test assemblies in either the Catawba or McGuire reactor. We will do additional site-specific evaluations before these lead test assemblies are placed in those reactors, and before MOX fuel would be placed in any reactor. That is, the NRC would determine whether it's safe to do that before it's allowed to happen.

The draft environmental impact statement includes a cost benefit analysis on both a national scale and a regional scale. The cost benefit analysis is used by the NRC to determine its preliminary recommendation. On a national scale, the project would cost about $3.85 billion. The national benefits would include safe use of excess weapons plutonium, and also employment and income.

On a regional scale, which includes 15 counties surrounding the Savannah River Site, which would be of interest to you all, the proportion national cost within that region would be about $8 million. The regional environmental costs are considered, and the impacts presented in the draft environmental impact statement conclude that the impacts are not significant. The regional benefits would include $350 million of income during construction, and about $640 million during operation.

In conclusion, the impacts of the proposed action are generally not significant. Accident impacts from the pit disassembly and conversion facility and the MOX facility are significant. However, the probability of such an accident is considered to be highly unlikely. Therefore, the overall risk to the public is considered to be very small. There is a potential environmental justice concern should an accident occur. And, again, NRC has

proposed mitigation measures to reduce those potential impacts.

Staff's preliminary recommendation is the proposed action with appropriate mitigation measures to reduce potential impacts in all areas. Before making any decision, NRC will consider comments here tonight, and decide whether changes need to be made in the environmental report -- I'm sorry, environmental impact statement, and then we'll finalize the environmental impact statement, as Lawrence mentioned. He also mentioned that we're doing a safety evaluation report, and that -- those findings would be completed before NRC makes any decision whether or not to authorize Duke Cogema Stone & Webster to construct the MOX facility.

When DCS submits an operating license application, NRC will review that application, and prepare a second safety evaluation report. NRC will only grant authority to operate the MOX facility if it can be shown to be safe.

The next slide shows ways that you can submit comments. You can either submit them in writing, you can Email them to me. There's also a place on the Web where you can type in comments, or you can fax them to me. Comments are due by May 14th.

And I would ask that when you provide your comments, if you can provide detail that helps us in determining how to -- how to address your comment. You know, a comment that says, "I'm for the proposed MOX facility," "I'm against the MOX facility," are nice. But if you say, "I'm against the MOX facility because I don't like XYZ," that's a much -- much more useful comment to us. Or if you say, "I'm for the proposed MOX facility because it would create jobs in the area."

But that concludes my remarks, Chip, if you...

MR. CAMERON: Oh, great.

MR. HARRIS: Be happy to answer questions.

MR. CAMERON: Great. And thank all of you for your patience. That was a lot of material. And let's go out to people for -- for questions now.

Yes, sir? And if you could just give us your name, please.

MR. MARESKA: Bill Mareska, Augusta, Georgia. To Tim or Lawrence, is the DOE or the NRC prepared to terminate any further action and abandon creating the MOX facility if the Russian and American political agreement on MOX construction falls through? This was the principal reason for choosing MOX over

immobilization. And if those agreements fail, is the NRC or the DOE prepared to terminate the MOX facility construction and revisit immobilization?

Thanks.

MR. HARRIS: That's a good question which maybe will help identify the differences in roles between the Department of Energy and the Nuclear Regulatory Commission.

The Department of Energy, as Lawrence mentioned, has the overall mission to -- for the surplus weapons plutonium. And they talk to Russia and are involved in the agreements. So if something happens between Russia and the U.S. relative to the agreements, those decisions would be made by DOE. NRC is only involved in determining whether or not the proposed MOX facility can be built and operated safely.

MR. CAMERON: And I think that -- that answers...

MR. HARRIS: Does that answer your question?

MR. CAMERON: And if there -- I imagine if there was some type of a change that caused the Department of Energy to reevaluate, then they might withdraw the application or something like that.

MR. HARRIS: Right. But those -- those decisions would be made by others.

MR. CAMERON: Okay. Yes, let's go back here.

Yes, ma'am. And please give us your name.

MS. ROCHE: My name is Peggy Roche. I'm with Carolina Peace Resource Center. And I had several questions.

One thing, I think the man's question needs to be addressed by somebody, because it's my understanding that the Russians have halted their MOX facility plans at the moment, so that we are currently in violation of that agreement. 47-1

Now, another thing is that you mentioned terrorist attacks. What better "come and get me" is there than having 100% of the plutonium in the United States in one single place, instead of spread out throughout the United States? In one single place. And the reason it's not spread out is because every place that you've gone to start a plant, public outcry has kept a license from being issued in the Northeast, the Southwest, the Northwest, the West, and now you're here in the Southeast. 47-2

My other comment is you said that the workers at the facility would not be -- their health

would not be adversely affected. I direct you to Section 5, Page 11 of your DEIS that admits workers who are building the site could have their health adversely affected by, quote, "Exposure to soil or groundwater previously contaminated by radioactivity or chemicals."

Are you admitting the Savannah River Site is currently unsafe before you start stirring up dirt with construction? Could I have an answer to any of my questions, please?

MR. CAMERON: Let -- let's start with the -- the last question about the draft environmental impact statement and worker health. Tim, did you -- did you understand the...

MR. HARRIS: Yeah, I did.

MR. CAMERON: ...trail to that?

MR. HARRIS: Can you still hear me?

The -- the answer is, is that there -- there was a potential concern that since soil that's currently at the MOX site was moved, that there could be some residual contamination. We don't think that's likely. The applicant has done some testing. But we felt that it was important, to insure worker safety, that we had measures in there for testing during construction to make sure that that didn't happen.

And I think the answer to your question of whether or not we think it's unsafe now is: No, we don't think it's unsafe.

MS. ROCHE: (Inaudible)

MR. CAMERON: We need to get you on the -- the microphone; okay? So we'll go back to you right now to see if you have a follow-up.

MR. HARRIS: Chip?

MR. CAMERON: Yeah, go ahead, Tim.

MR. HARRIS: Did we want to have the Department of Energy address...

MR. CAMERON: Let's work -- let's work through these questions. There were three issues that were raised. And one was the one that you answered. And did you have a follow-up on that one?

Before we go to -- I'm going to ask Lawrence Kokajko to tell us a little bit, because we know it is a concern to all of us. Where are potential terrorist issues? Where -- where are those issues considered in the NRC's evaluation of the application, and what is the Commission doing generally in terms of the events after September 11th?

Well, fine. Peggy, when you -- is it Peggy?

Peggy, when you get up, and I know you're

going to make a comment, we want to hear about anything like that. But what we want to do now is want to try to answer any questions that people have; okay?

Okay, go ahead, Lawrence.

MR. KOKAJKO: Okay. First of all, the purpose of the program, as we describe in the purpose and need, is to eliminate surplus weapons plutonium and to get it into a form that is not subject to being diverted to subversive or terrorist needs. And I mentioned that in my opening remarks.

The -- also I'd like to point out, as far as the location in one site, I'm not questioning the policy of the Department of Energy in this case. We were mandated by law to evaluate the fact that they're going to do the proposed MOX facility. I have no authority to question why they do that. I'm now trying to implement that and make sure that it was done safely and in accordance with the law.

In terms of the -- the general question about what the NRC may be doing in response to terrorist...

UNIDENTIFIED: Use the microphone, please.

UNIDENTIFIED: Use the other microphone. That one's not working.

MR. KOKAJKO: It's not working?

MR. CAMERON: Yeah, we're not hearing it out here.

MR. KOKAJKO: Is this one -- is this one working?

MR. CAMERON: Better.

MR. KOKAJKO: In terms of the general -- what is the NRC doing in terms of terrorist activities, the NRC is -- throughout the -- for a lot of commercial uses of radioactive material, are doing vulnerability assessments to insure that the -- we have assessed potential vulnerabilities of diversion and use of whether it's radioactive disbursal devices of dirty bombs or other diversion type activities. We have issued interim compensatory measures to the licensees and applicants as to what they need to be doing. And we have taken an increased security awareness for all commercial licensees and applicants. Beyond that, I cannot go into a lot more detail. But we are aware of the terrorist threat, and we are sensitive to it.

MR. CAMERON: The bottom line is, is that potential terrorist threats are considered in the NRC's evaluation of the application?

MR. KOKAJKO: In the safety evaluation;

yes, sir.

MR. CAMERON: Okay, good. Good.

And Peggy, when -- you'll -- you'll have your -- your chance to speak. But just let me give you -- is there any other question you have?

Okay, go ahead.

MS. ROCHE: Did the Department of Energy tell you to license just one facility in the United States?

MR. HARRIS: It's important to understand that the Department of Energy has the overall lead. But the applicant that we're reviewing is Duke Cogema Stone & Webster. We're responding to one application from them. We don't deal directly with the Department of Energy. Our point of contact is the applicant, who is Duke Cogema Stone & Webster.

MR. CAMERON: So, in other words, we have an application for this facility, and that's why we're reviewing it. And if the program that we're not responsible for develops the need for another application, that would come in to us and we would review that. But we can only review what is in front of us; is that...

MR. HARRIS: That's correct. We don't make the decisions where to put it or who applies.

MR. CAMERON: Okay. Question, Mr. Hooker? Okay. Question?

MR. HOOKER: Did the NRC consider the environmental risk taken with the ratings on these streams that have got a high rate, medium rate, low risk? I mean, did you all get together with the EPA and look at where they match these things?

I'm going to give you a copy of it so you all can look at them. But...

MR. HARRIS: Yeah. What we evaluated...

MR. HOOKER: ...somebody needs to (inaudible).

MR. CAMERON: Okay. And that's why we're here, to find out what we should look at harder. And I think that your concern is -- is some of the streams.

MR. HOOKER: This had input with what you (inaudible).

MR. HARRIS: Okay, we looked at it. In Chapter 3 it evaluates what the current conditions are at the Savannah River Site. And -- but -- but as far as evaluating the impacts from the proposed action, we looked at those areas that would be connected to the proposed action. So -- so if there was a stream that was, you know, on the back 40 that was nowhere near

the MOX facility, wasn't associated with any...

MR. HOOKER: We're talking about Four Mile Creek. That's the one we're talking about.

COURT REPORTER: I'm sorry, we're -- I'm just not getting you.

MR. CAMERON: Yeah, we need to -- we need to get all this on the transcript.

Do you have one more question?

MR. HOOKER: The particular stream I'm talking about is Four Mile Creek.

MR. HARRIS: Yeah, we -- we did look at -- did the water quality associated with Four Mile Creek.

MR. HOOKER: And what did you come up with?

MR. HARRIS: We concluded that the proposed MOX facility would not significantly change the water quality in Four Mile Creek.

MR. CAMERON: And if you have information -- Mr. Hooker, if you have information that would -- that would cause us to -- to reevaluate that, please submit it to us.

Okay, great.

MR. HARRIS: Thank you.

MR. CAMERON: We have some questions out here, and one back there. And I don't know, does anybody in the upper peninsula out there have a question?

UNIDENTIFIED: (Indiscernible)

MR. CAMERON: All right. Okay. Let's -- let's go for some questions, and then at some point we're going to have to go to comment. Because we have -- luckily, we have a whole lot of people who -- who want to comment.

So let me start over here, and we'll go back there and over. And -- and please try to keep this to -- to mainly questions.

Don?

MR. MONIAK: I have a question concerning existing impact.

MR. CAMERON: Don Moniak.

MR. MONIAK: My name is Don Moniak, M-O-N-I-A-K.

Did you evaluate the impact that SRS would have if they were to -- say in their emissions if they were to release as much air pollution as they're permitted to, or did you evaluate what they are releasing? And the same with waste water discharge. Because their permit levels, what they're permitted to release is very different than what they do on an average. And some of the permit levels are very high.

53-12

Then I had one other question regarding the NRC role.

MR. CAMERON: Why don't you -- why don't you put that before us now.

MR. MONIAK: Okay, the other question is, is the Nuclear Regulatory Commission responsible for making sure that the *Atomic Energy Act* is followed? And I'm referring to the provision on foreign ownership, control, and influence of a U.S. nuclear facility. And is the current determination on foreign ownership, control, and influence valid, considering Framatone bought out Duke Engineering a year ago?

Thanks.

MR. HARRIS: The answer to the last question is: Yes, we do enforce the *Atomic Energy Act*. Those issues, ownership issues, are discussed in the safety evaluation report. And Dave could provide some information. But that's -- they're not really germane to the environmental impact statement.

MR. CAMERON: Okay. If we need to get more on that, we'll go to Dave. Can you answer Don's...

MR. HARRIS: Yeah, let me -- let me work -- let me work backwards.

The waste water issues I think we looked

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at because the waste from the proposed MOX facility would go to existing SRS facilities. We looked to see if -- if processing that waste would violate permits.

For the air quality, to be honest, Don, I'm not sure whether we looked at existing emissions. I want to say we did, but -- I see Ed nodding. I think that's the case. We looked at what they are currently emitting, not what they're permitted to emit. But, again, we looked at that in terms of would the MOX facility cause them to be out of compliance with any of their air permits, and we thought the answer was no.

MR. CAMERON: Okay. Great.

We're going to let Dave Brown tell us a little bit. But the reference to Ed is Ed Pentecost, who's back here. Ed, identify yourself. He is one of our expert consultants that is helping with the preparation of the environmental impact statement.

Dave, on the question of Don's on foreign ownership.

MR. BROWN: Well, you know, just to give you some context, we anticipate issuing our draft safety evaluation report next month, in April. And in there I can tell you our draft determination is we've looked at the foreign influence and control

information and we have advised and find there's no -- no issue there.

MR. CAMERON: All right, thank you.

Let's go to this gentleman right here. Please give us your name.

MR. SUTHERLAND: I'm Jim Sutherland. I've got a question. I noticed in the book (indiscernible). Did you all send the EIS to anybody that's on this list? I mean, like sitting (indiscernible) first time I've seen the document, and some of the data in here is not correct (indiscernible).

MR. HARRIS: I'll take that as a comment and hope that you'll provide some -- a written comment showing where the datas are inaccurate and what the datas should be.

MR. SUTHERLAND: My question is...

MR. HARRIS: Whether we contacted...

MR. CAMERON: Yeah, can -- can we -- do we know if we sent a copy of the environmental impact statement to local government officials?

MR. HARRIS: Yeah, we sent it -- we sent it to about 500 people, and I don't remember whether New Ellington was on the -- on that list.

MR. CAMERON: Okay. Let's make sure is

there -- are any local government units that did not get a copy, that people know about, or don't think you got a copy, please give us that address and we'll send them a copy.

MR. HARRIS: Actually, if you let Adrienne know in the back table, she can make that happen and we'll...

MR. CAMERON: And, Adrienne, just wave to us.

All right, that's Adrienne back there. If we can...

MR. HARRIS: But we'll take as an action item, Chip, to make sure that New Ellington gets a copy.

MR. CAMERON: Great. Okay. We'll put that up on the board.

Let's go to Glenn Carroll.

MS. CARROLL: I actually thought he was talking about something else. He didn't get his copy, but do you have corrected data that you'll be getting to us?

MR. HARRIS: Correct.

MS. CARROLL: You put some figures up there tonight which were, you know, not very detailed. But are those final figures?

MR. HARRIS: Yes.

MS. CARROLL: So you do have the final data?

MR. HARRIS: Yeah. Actually, the -- the information that's in your handouts that talks -- the numbers there are corrected numbers. But -- but not...

MS. CARROLL: Are they just not attached to the agenda?

MR. HARRIS: It's attached to the agenda; correct. But not all the numbers that are in the EIS are in there. That's why we're going to issue errata sheets with -- you know, there are several huge tables and other references. So we'll issue errata sheets hopefully next week, so that you'll have those.

MS. CARROLL: Do you plan to hold public meetings following the issuance of the correct data?

MR. HARRIS: I don't think that's currently in the plan. But if you're making a request, we would consider it, as always.

MS. CARROLL: I'm making a request.

MR. HARRIS: Well, thank you.

MR. CAMERON: And I would imagine that the -- that issue might turn on whether the corrected data would lead to or could lead to a different conclusion.

MR. HARRIS: Well, again, as I stated in my remarks, the corrected data does not change the NRC's conclusion, you know. If the impacts associated with operation, even though they're twice as much, are still less than one millirem. The accident consequences changed, but they're still large numbers. So -- so the -- you know, whether the number was 20 or 400, it doesn't change the fact that they're significant. So -- so even though the numbers changed, it doesn't change our -- our conclusions.

MR. CAMERON: Okay. Thank you.

And let's go to this gentleman, and then after that, down here, and we're working our way.

MR. CLEMENTS: My name is Tom Clements.

Just two -- couple issue of questions. As we all know, four reactors have been chosen to do this mission, which are mentioned in the draft EIS. But four reactors are not enough to carry out the irradiation of 34 tons. Where are the other two reactors? Where does that stand? At least two more are needed.

MR. HARRIS: The other two reactors would be selected by either DCS or DOE. What we did in our draft environmental impact statement was evaluated impacts to reactors generically. So that would apply

to whether the reactors near Charlotte ultimately would become part of the program, or whether another reactor in the nation would become. So we looked at it generically so it's not a specific evaluation. And also keep in mind that if and when a reactor requests to use the MOX fuel, that requires an additional site-specific review by the Nuclear Regulatory Commission to determine whether it's safe to use that fuel at that reactor.

MR. CLEMENTS: Also, because you -- you mentioned the -- eliminating the immobilization alternative because of the position of Russia. Has -- and this is -- may be more of a DOE thing. But has the agreement with Russia been changed to dictate to the United States what disposition options we choose? I have a copy of it here and...

MR. HARRIS: I'm not aware that the agreement has changed since...

MR. CLEMENTS: Well, let me just...

MR. HARRIS: ...2001.

MR. CLEMENTS: ...clarify this, and I will make a comment. Because a mythology has been created that we -- Russia is dictating to us that we do MOX. And that is not true. The Article 3 of the agreement says, "Disposition shall be by one of the following 48-1 methods: irradiation, immobilization, or any other method agreed to by the parties in writing. So we appreciate it if you'd correct the document to reflect what is actually in the agreement. It allows immobilization, and the Russians can't dictate to us what we do with the material.

48-1 cont.

MR. CAMERON: Let's get some -- let's get some clarification on that for you from the Department of Energy. And, Ken, if you'd just introduce yourself and...

MR. BROMBERG: My name is Ken Bromberg from the Department of Energy. You are correct, the 2000 agreement with Russia, plutonium (indiscernible) disposition agreement does not dictate. It allows either party to use immobilization and/or MOX.

However, Russia has made it known in negotiations with the U.S. over several years that they would not proceed to dispose of their surplus weapon grade plutonium if the U.S. used MOX -- rather, used immobilization only. The Russians feel that immobilization, to use their words, is another form of storage, because immobilization does not degrade the weapon grade plutonium so it can't be reused in weapons. As a result, the Russians have refused to go ahead and dispose of their plutonium. For that

reason, the U.S. is proceeding, of course, as it is currently.

The other thing is that there have been a number of technical problems with immobilization in terms of the high level waste barrier, with the in-tank precipitation problem, and there are currently additional technical studies that have called into question the can and canister immobilization approach that we have been working on for many years. That's not to say it couldn't be fixed or corrected in the long-term, but right now there are a number of technical problems that MOX does not have.

MR. CAMERON: Thank you very much, Ken.

We've got a couple here, and then we're going to come back here, and then we'll work over that way.

Yes, sir? Please give us your name.

MR. TEESE: Greg Teese from Aiken, South Carolina.

Tim, you stated that the numbers that were in the handout are the correct numbers?

MR. HARRIS: Yes, sir.

MR. TEESE: The numbers in the handout for the radiological accidents for continued storage, the no-action alternative, the dose that it has on the

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handout is 6.6 person rem; the dose that's in the draft environmental impact statement is 6.6 person sieverts. There's a difference of a factor of 100. Which is the correct number?

MR. HARRIS: Without looking at the document, I believe the information -- those numbers didn't change. So whatever's in the draft environmental impact statement is correct. And if -- if, in fact, the handout used the wrong units, I apologize.

MR. TEESE: If the handout used the wrong units for that, on the same line as the proposed action, the explosion event, it's showing 91,000. What is the correct units for 91,000?

MR. HARRIS: I believe that person rem.

MR. TEESE: Not person sievert?

MR. HARRIS: Not person sievert. We -- we had both units, and we decided to convert them to rem since that's what most people understand in -- in the United States.

MR. TEESE: Okay, thank you.

MR. CAMERON: And I guess that the implied comment there is that we should really check these carefully to make sure that it's correct.

MR. HARRIS: Comment received.

MR. HARMON: My name is Harry Harmon.

On your waste management slide you mentioned that the operation of the MOX plant would generate certain percentages, in addition to waste. My question is: Are those numbers for the total site or for "F" area?

MR. HARRIS: I believe those numbers are for the total site. Those are percentages above what are currently being generated by the Savannah River Site.

MR. HARMON: Is that on an annual basis or...

MR. HARRIS: Correct, annual basis.

MR. HARMON: Annual basis. All right.

MR. CAMERON: Thank you very much.

I think we have two questions right here; or one.

Yes, sir?

MR. WALKER: My name is David Walker. I'm from Aiken.

Tim, you keep mentioning mitigating consequences regarding environmental justice. What exactly are those mitigating consequences?

And the second question is: Will the corrected EIS statement from your department be available prior to the May 14 deadline for submitting comments?

MR. HARRIS: Yeah, we hope to get that information out to you next week. Obviously the mail will take a little bit of time to get it to you. But we're also going to post that on the -- on our website. So if you want it quickly, you can access it that way. And yes, it will be available before the May 14 comment period.

Your question was: What are the mitigation measures that are proposed? Is that...

MR. WALKER: Yes.

MR. HARRIS: The Nuclear Regulatory Commission -- there's a number of mitigation measures discussed in the EIS, some of which were proposed by the applicant, DCS, and some of which were proposed by NRC.

These were proposed by the NRC, and they include focused public information campaigns to provide technical and environmental health information directly to low income and minority populations, or to local agencies and representatives for those groups.

Also, additional programs directed at local communities providing emergency response services or other emergency facilities to incorporate

additional measures to protect low income and minority populations. So it's to EDC and also to proved some additional focus on environmental -- I'm sorry, emergency responses.

We received some comments last night from a Mr. Cutter on -- on some specifics, and that's really some of the things that will be helpful to us, is -- is as you review these mitigation measures, if you can provide some more details or additional ways that you think mitigation could happen, we're very receptive to that.

MR. CAMERON: Okay. Follow-up?

MR. WALKER: Follow-up. Will these measures take effect before an accident or after?

MR. HARRIS: They would -- they would happen before the accident. Certainly -- certainly the information can...

MR. CAMERON: You may want to rephrase that.

[Laughter.]

MR. HARRIS: Am I still beating my wife? I don't know.

[Laughter.]

MR. HARRIS: The information campaigns would happen if and when a license was granted, before any hypothetical event happened. So that -- you know, we're not going to wait for an accident to decide, oh, we better go to mitigate it. That mitigation needs to happen before an unlikely event happens.

MR. CAMERON: Okay. Thanks, Tim.

MR. HARRIS: Is that better, Chip?

MR. CAMERON: Sounds better.

MR. HARRIS: And call my wife to see -- see if I'm still beating her.

MR. CAMERON: Okay. Brendolyn, do you have a question?

MS. JENKINS: Good evening. My name is Brendolyn Jenkins and I'm from Aiken, South Carolina.

I want to piggyback for a second on the question that Reverend Walker asked. If it's done before, you said that you would give technical information in a public information campaign. Would those campaigns be held specifically in the impacted community?

MR. HARRIS: I think the answer would be yes. But if -- but if you think that they should be in other areas, you know, we're receptive to that.

MS. JENKINS: Heretofore, until last Thursday, it was the first meeting we've had in our community. So that's pointedly why I asked.

My question is, with the waste management, 300% more TRU waste; 32% more low level; 60% more solid waste. Will new or existing facilities be used to handle that waste? And if it's coming from around the site and not this facility, how, then, does these numbers specifically address MOX?

MR. HARRIS: Those numbers represent the percentage increase that the MOX facility would have relative to what's currently being produced at the Savannah River Site. That is, if you look at the number of cubic meters or volume of waste, say TRU waste that the MOX facility will create annually, and divide that by what the Savannah River Site already does, you get 300%, about. So those numbers relate to that.

Your question also related to whether new facilities would be built. Most of the waste would be processed by existing Savannah River Site facilities. And, as I mentioned, those facilities have the capacity and are permitted to manage that waste. I -- we also talked about the waste solidification building. And that will be a new facility that will process waste from the proposed MOX facility and also the pit disassembly and conversion facility. So that would be new construction.

MS. JENKINS: And did you look at the additional impacts, environmental impacts, on these waste streams?

MR. HARRIS: Yes, ma'am, we did. And as I stated in my presentation, we concluded that the effort of processing the waste from the proposed action would not change significantly the permitted effluents from those waste process facilities at the Savannah River Site.

MS. JENKINS: One last question. On the readjusted or recalculated figures shown, I understand how you made the readjustments and came up with the new conclusions. But what does DOE, NRC, and DCS consider an acceptable death or disease number?

MR. HARRIS: I don't know that we have an -- a definition for that. Certain numbers of latent cancer fatalities that are very small are generally acceptable, but I don't think there's a hard-and-fast number on that.

MR. CAMERON: And I think that Tim used the word "we." You said DOE, DCS, NRC. And I think Tim is just speaking for -- for the NRC at this point. But it's a very pertinent question for the regulatory agency.

Lawrence?

MR. KOKAJKO: We don't consider any death acceptable, first of all. Let -- first, we're talking about latent cancer fatalities, and it's not an actual death. Although we have...

[Laughter.]

MR. KOKAJKO: ...although we have come up with...

[Laughter.]

MR. KOKAJKO: Sir, please.

Although we have come up -- we have done a bounding analysis to see what possible could happen in terms of these hypothetical accidents. The other part of that -- our job is to insure -- assure that they don't happen. That's what the safety review is for. We want to make those things highly unlikely. But the NEPA process asks us to take a look at the broad bounding case, and so we have done that. But we do not -- we don't find any death acceptable. We never have, and we never will.

MR. CAMERON: Okay, thank you.

We're going to go to this side, questions, and then we're going to get started with public comments. And, Jen, I see your hand. We'll go to you before we get public comments.

Gerald?

MR. RUDOLPH: I'm Gerald Rudolph from Columbia. I have a few questions.

One is about memorandum of understandings. Do you -- where can we get a copy of the memorandum of understanding between the Department of Energy and NRC about the security for materials, about the transfer of materials between the -- within the complex commercial process for MOX. And where are we going to find the memorandum of understanding for who is or is not a MOX factory worker, for purposes of this accident analysis? That's the first question.

And you want me to go through all the questions first?

MR. HARRIS: No, please.

I'm going to ask Dave to talk about the MOU. I think as far as -- I didn't quite understand your last question about what was a MOX facility worker. Certainly...

MR. RUDOLPH: Who is -- who is a MOX -- for the benefit of accident analysis, who is or is not a MOX factory worker or a MOX facility worker.

MR. HARRIS: Well, those would be workers that -- that operate within the footprint of the proposed MOX facility.

MR. RUDOLPH: I mean, but some of them may

be working on the DOE when they -- when the material is in the hands of DOE, and when it's transferred to the NRC license facility, are you only considering the -- so there's no memorandum of understanding for identifying...

MR. HARRIS: Well, I think MOX workers would be employed by Duke Cogema Stone & Webster, and other workers at the Savannah River Site are employed by -- by other various DOE contractors.

MR. RUDOLPH: So there's no -- there's no memorandum of understanding for that?

MR. HARRIS: Not that I'm aware of. But I'll let Dave talk about the memorandum of understanding for security of material, if you can.

MR. BROWN: Let me just try to address your question with regard to who's a worker. For Savannah River Site employees who -- who would not be working at the MOX plant, DCS has committed to meeting a certain section of our regulation that says we're going to train those people about the risks at the MOX plant, and we're going to provide both posting -- postings and notices. And if they do that, then our regulations allow that they be treated as workers for the purposes of the safety evaluation. That's their proposal, and that's what we're evaluating as part of the safety review.

MR. RUDOLPH: So that allows you to exclude them from the submission of off-site impact? If they -- other -- if they -- more people -- how does that work? How do you define who's on-site and off-site from the MOX facility?

MR. BROWN: It does -- there is a little bit of a complication. For the purposes of a safety review, when we're looking at potential accidents, we're considering those Savannah River Site employees who are within the site boundary to be workers. When we're looking at normal operation, if the facility is constructed and operating, the question of who's a member of the public and who's a worker really is determined by what does that person do for a living. Are they already working at the Savannah River Site in an occupation where they're exposed to radiation? If they are, then they're workers. If they're not, then they're members of the public. And the NRC's position is: Yes, there can be members of the public on the Savannah River Site, even employees of the plant. And the radiation dose limits for those individuals would be NRC's limits for members of the public.

Is that answer your question (sic)?

MR. RUDOLPH: Perhaps. Not

satisfactorily, though. Let me go to the next question.

MR. BROWN: Okay.

MR. RUDOLPH: You have -- from what I understand, the NRC says that the throughput rate at the factory could -- could (indiscernible) about 10 years or 20 years. What is that -- what is that discussion about? And you showed us a 20-year license period for the operations, but -- but then you used 10 years of operations for the analysis. What -- can you explain?

MR. HARRIS: Yeah. Basically we assumed that the license would be a 20-year period. And that would include they would have to have a license for initial startup and then processing. But the actually throughput we estimated it would take about ten years.

So we looked at things on a annual basis, and the maximum throughput I think was 3.5 metric tons, number comes to mind, on an annual basis. So we look at the impacts annually. So if they didn't produce, if the period of operation was longer than that, the throughput would be less. There's only so much plutonium that's going to be put through the facility.

MR. RUDOLPH: So you're assuming the

impact is the same?

A. We assume that the impacts are bounded by -- assuming a ten-year operation period, with a maximum throughput of 3.5 metric tons.

MR. RUDOLPH: One more question. You say that the -- that the -- the impacts of the -- of 40% MOX or a 100% flow of enriched uranium would be the same; is that -- how do you support that?

MR. HARRIS: There's details in the environmental impact statement. But essentially, the conclusion that was drawn was on a generic basis. The emissions would be about the same from normal operations, whether it used -- the reactor used a mixture of MOX fuel or 100% low enriched uranium.

MR. RUDOLPH: Does it consider the temperature difference between...

MR. HARRIS: That segment's based on effluents that would come out of the plant; not internal safety operations, which would, as I mentioned, would be evaluated on a site-specific basis.

MR. RUDOLPH: So you're assuming that -- that the hotter MOX fuel would have the same parameters or have the same impact, the same...

MR. HARRIS: No, not the same -- not the

same parameters, but the emissions from the reactor would be the same.

MR. RUDOLPH: And is there a study for that, or did you just assume that?

MR. HARRIS: We looked at some information that the Department of Energy had, and the references are provided in the environmental report -- I mean, environmental impact statement, excuse me.

MR. CAMERON: Thank you, Gerald.

Did you have a question, sir?

MR. WATSON: My name's Darrell Watson. I'm from Columbia. Got a couple of questions for you.

First, has a safe, efficient, and successful use of MOX fuel been -- fuel made with weapons grade plutonium ever been accomplished?

MR. HARRIS: Do you want to answer that, Dave?

MR. BROWN: Could you repeat the question, please.

MR. WATSON: Has the safe, efficient, and successful commercial use of MOX fuel made with weapons grade plutonium ever been accomplished?

MR. BROWN: No, there -- there is no history in the United States of using weapons grade MOX fuel in a commercial nuclear power reactor.

MR. WATSON: Is there any record of that being done anywhere in the world?

MR. BROWN: Not except on a test or experimental basis. No, not that I'm aware of.

MR. WATSON: So South Carolina's going to be the first test, so to speak, for the MOX program in the world?

MR. BROWN: The -- the...

MR. WATSON: In this -- in this regards of it being made with weapons grade plutonium.

MR. BROWN: With respect to weapons grade plutonium. And the distinction you're making is important. Because certainly there are countries in the world that do reprocess nuclear fuel, recover the plutonium, and put that back through a mixed oxide fuel plant to put back into reactors. France, of course, being the notable example, and the fact that Cogema is a partner in the consortium that's the applicant for this plant, reflects their experience in this.

MR. WATSON: Okay, that leads to my second question about Cogema. Given that Cogema's part of the consortium to handle the MOX process in the United States and South Carolina, given its bad safety and environmental record, especially in La Hague at the

processing plant in France, why would DOE even bring a licensing consideration with Cogema involved?

MR. HARRIS: We have looked at some of the information that the applicant has provided us, that includes their experience in France, especially with regard to environmental effluents or emissions, if you will.

MR. WATSON: What's the status of Russia's MOX program currently, and does it use weapons grade plutonium like ours?

MR. BROWN: The Russian program, what we're working to here is -- what DOE's plan is, is to maintain parity between the U.S. and the Russian programs. Of course, their program is also about surplus weapons grade plutonium.

MR. WATSON: Okay, I'm -- correct me if I'm wrong, but I thought their program was currently at a stall. They're not processing MOX currently, as we speak.

MR. BROWN: Oh, no, they -- they were -- there is no Russian MOX facility constructed or operating at this time; that's true.

MR. CAMERON: Right. We really need to get going to hear all of your -- your comments. We'll take one question here; we'll go over to Jen; and then we're going to start public commenting.

Yes, sir?

MR. GUILD: My name is Bob, and I have a couple of questions. I think maybe an appropriate observation in response to the environmental justice question, that consequences are high for having significant facilities, whether it be 20 or 2000. But that consequence has to be taken into account of risk of that consequence, which is a probability (indiscernible). How likely is the fact -- assume the accident would happen that would lead to those cancer deaths.

Yet, I find the EIS completely devoid of any effort at putting a number on that probability function, which is a key to your conclusion which is that the risk is acceptable. So you use a very precise number for the number of deaths, and then acknowledge an error and correct that error and create the impression that you know what the consequence would be. Yet I don't see any serious effort at trying to project what the actual probability of that accident in that occurring. And can you enlighten us on why you didn't do that; and if you did do that, didn't express in the EIS what that -- what that chance of a serious accident is at the facility.

MR. HARRIS: Do you want to answer that, Dave? Dave's involved with the safety review, and these really relate to -- because the measures to make those accidents highly unlikely are in the safety report review. So I'll let Dave discuss what they're doing there.

MR. BROWN: In the handout and one of Tim's slides we showed like a fine line of the safety review and the environmental review. One thing you see right away is the safety review extends for a couple of years from now. And so one of the things we're going to be doing, as we go through that licensing review, is trying to get a much better understanding of what the applicant thinks the likelihood of those accidents are. And more importantly, what's the reliability of the equipment that's going to be -- be used to prevent those accidents.

MR. GUILD: I'm sorry to interrupt. But you're going to make the decision now as to whether or not the *National Environmental Policy Act* requirements are met, whether you should authorize going forward with this as a matter of cost benefit. You're telling us you don't know the answer as to the likelihood of that accident occurring?

MR. BROWN: We're -- right now we're going to issue a draft report next month that's our consideration of the likelihoods for a construction authorization. My point is we're going to continue to look at those likelihoods as we continue through looking at their application to possess and use this plutonium in the plant.

MR. CAMERON: Could we get -- could we let Lawrence speak here, because you're raising an important point as to where is the supporting data for the conclusion you've requested.

Lawrence?

MR. KOKAJKO: Yeah, part of it, as -- as I mentioned earlier, the -- is the NEPA process, itself. It said to take a look at...

UNIDENTIFIED: Can't hear you.

MR. KOKAJKO: Some of the -- the problem I know is with the NEPA process, itself. It told us to take a look at the bounding conditions and the parameters of what these consequences are. Our regulations say these accidents will be made highly unlikely. And the DCS has to submit an integrated safety assessment which takes a look at the probabilities of these accidents occurring. And, as Dave pointed out, reliability of equipment,

preventative and mitigating measures that may be used to prevent and preclude these things from occurring, so that we don't ever get into an accident situation where there could be latent cancer fatalities, or even actual deaths.

And, by the way, it includes more than just radiation. It includes anything like chemicals, chemical exposures, and those -- those, as well. As well as physical -- you know, normal physical things like, you know, falling off ladders and stuff like that.

MR. GUILD: I mean, just an observation, not to belabor the point, but good government decision-making, the NEPA requires -- requires you to be explicit now about those very issues. Because I want to know what the risk is of me walking across the street and not getting hit by a car, but I want you to know what the risk is of a serious accident happening at the MOX facility before you decide that you should go forward with licensing this plant.

MR. KOKAJKO: Before we go forward with licensing, we will do that. But for the environmental purpose for this evening, the assessment of the draft environmental impact statement, we've given you what we think are the -- could be the potential consequences. And we know that the regulations are going to require that those accidents be made highly unlikely.

MR. GUILD: All right. The last question. I heard some -- a useful question earlier about license term and the projected expected throughput term, if you will, for the processing of the surplus plutonium. You know, I have a very strong concern that we're going to end up with a MOX fabrication facility that's -- that processed its surplus weapons plutonium, and then is going to be available for commercial mixed oxide fuel production for, you know, the wonderful, long-promised, never realized closed commercial nuclear fuel cycle in this country. And that, like those facilities you mentioned in Europe, we're going to suddenly have commercial mixed oxide fuel promoted with weapons non-proliferation as the foot-in-the-door.

So can you tell us what would be required in order to convert this facility, at the end of its license life, into a facility that does those things that I'm concerned about, and that is becomes a commercial fuel production facility.

MR. CAMERON: And you may -- you may not know, in terms of physical adaptation, what needs to

happen. But I think that the question would be: What would the NRC require in terms of new licenses, etcetera, etcetera, if that ever did happen. And we don't know if that's even feasible.

But, Lawrence, can you shed some light on that? I don't know if you can or not.

MR. KOKAJKO: I'm not sure I can proved a full response to your -- your question. Anything that would be involved in fuel fabrication would be licensed under 10 CFR -- excuse me, Title X, *Code of Federal Regulations, Part 70.* And those regulations do allow that any facility that fabricates and enriches fuel for use in commercial nuclear power plants, that it meet certain safety and environmental standards.

MR. CAMERON: The license would be very specific about what the facility could do.

MR. KOKAJKO: Correct.

MR. CAMERON: And if there was going to be any major change to that, it would be a new license.

But let me see if we can get the Department of Energy to shed some light on this. Ken?

MR. BROMBERG: Very simply -- this is Ken Bromberg again. That facility that's being designed and planted and built at the Savannah River cannot be

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used as a commercial facility. The entire facility, the shielding in it, is designed for the low radiation for weapon grade plutonium. It's entirely impossible to use for reactor fuel grade plutonium.

UNIDENTIFIED: Impossible?

MR. BROMBERG: Yes. Without just completely basically tearing out all the piping in the entire facility, and redesigning and rebuilding it. The facility just can't be used for that purpose.

Furthermore, the facility will be shut down at the end of the approximately ten-year plutonium disposition mission.

MR. CAMERON: Great. Thank you very much, Ken.

Okay, we're going to go to one last question over here, and then we're going to go to hear some more from all of you a bit more formally.

Jen?

MS. KATO: I'm Jen Cooch Kato. I'm with the Sierra Club in Georgia. I have actually three questions that will be answered very quickly.

The first one is an extension of this gentleman's question, and it's very direct and has a very simple answer. And the question is: Was the probability of one used in assessing the human health

impacts of any accident scenario?

MR. BROWN: When you're looking at the consequences of the accident that's summarized, yes, it's a probability of one. In other words, the event was assumed to have occurred. Those are the consequences we've estimated.

MS. KATO: When I -- when I look at the doses and the -- and the (indiscernible), for example, for an explosion, which would undoubtedly involve plutonium, these figures are so miniscule that it seems like what you have done is actually risk-informed calculations. And risk-informed calculations do not assume a probability of one when you actually go out as far as latent cancer fatalities. They have been diluted by the probability of the accident occurring, and then further diluted by the probability of it occurring in a given day.

MR. BROWN: I understand your comment. That is not what we did.

MS. KATO: Okay, thank you.

Second, why not a 20-year windrows instead of a five year, since we're dealing with a possibly 20-year mission?

MR. BROWN: The five-year windrows, I think, reflects a good estimate of the wind conditions at the Savannah River Site. But if you have information about, you know, updated data or something you'd like us to know about, we'd be happy to hear about that.

MS. KATO: Well, the dose reconstruction is looking at a 20-year windrow, so it's available. I know DOE has it.

And my last question is: What is the current NRC plan? This doesn't really have to do with this DEIS, but I'm really curious about it. What's the current NRC plan for continued supervision of the MFFF? And I'd like to feel like the guys in the white hats are out there on a daily basis or a very frequent basis.

MR. CAMERON: And could you just enlighten all of us on that acronym.

MS. KATO: MOX fuel fabrication facility.

MR. HARRIS: Fabrication facility.

Was your -- was your question, Jen, what are we going to do...

MS. KATO: On the provision of ongoing oversight.

MR. HARRIS: Yeah. I think -- I think, if I understand your question---and I know you'll correct me if I didn't get it right---is what are we going to

do in the future. You know, are we going to issue this license and walk away.

MS. KATO: I just want to know what your plan...

MR. HARRIS: The plan would be that, you know, again, we're going to look at the construction decision. We talked about the EIS. We're going to look at the operation. In the event that we do issue a license, we do inspections at the facilities, the current plan is to have an onsite resident there who is there on a daily basis to look at the operation of the facility. So, yeah, we will be there.

MR. CAMERON: If the NRC licenses it, we're going to regulate it; right?

MR. HARRIS: I think if we license it, we are regulating it; right?

MR. CAMERON: And -- you know what I mean.

MR. HARRIS: I know what you mean.

MR. CAMERON: All right. Okay, thank you for those questions.

We're going to go to -- to speakers. We have about 25 people. So I really need to ask you to try to be concise and -- and don't go any longer than five minutes. Of course, we want to stay and hear what everybody has to say. But it would help us all if -- if you could try to keep it in that window.

And the first four speakers, so that you have an idea of when you're coming up here, we're going to go to -- to Bill Robinson, then Camille Price, Mal McKibben, and Thomas Williams.

So, is Mr. Robinson here? Oh, Mr. Robinson. There he is. All right.

MR. ROBINSON: I'm Bill Robinson from Allendale County, Vice Chairman of the county council.

I'm certainly proud to be here to express our support for the MOX fuel facility at SRS. As we went back and looked at our history, Allendale County has always supported our nation's effort to keep us strong and secure. Now, if you go back 50 years ago---and I think we all can remember---now, this country was called upon to develop one of the most devastating weapon known to mankind. And we did it basically, not because we wanted to be the world powerhouse, so to speak; we did it simply because -- to protect this country. And we did it, also, to discourage the misuse of that most powerful weapon by other nations.

Now, as we look today, to me the scenario is the same. We have different players. In fact, we have more players. The technology for weapons of mass destruction is available to any nation. And what's

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scary, weapon grade plutonium, the supply is plentiful. I think Russia looked at it, extended a hand to us to come and help. Again, I think we see our nation's security at risk.

We support the MOX initiative, simply because we feel what we face today is as great as what we faced 50 years ago. I thank you.

49-1 cont.

MR. CAMERON: Thank you very much, Mr. Robinson.

And we're next going to go to Camille. Camille Price.

Is Camille still here?

(No audible response)

MR. CAMERON: Okay. Mr. McKibben. Mal McKibben.

MR. McKIBBEN: Thank you very much.

My name is Mal McKibben, and I'm a native of North Augusta and have an office over in Aiken as Executive Director of Citizens for Nuclear Technology awareness, CNTA.

We are the nation's largest citizen-based pro-nuclear education group with about 2,400 members. We strongly support the pit disassembly and conversion facility and the MOX facility, and we have been encouraging that for a long time.

50-1

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However, when we look at the -- the draft environmental impact statement, we do find quite a number of inadequacies and quite a number of flaws. I'm only going to talk about one of those tonight, but in the written statement I'll address some of the others, which have to do mainly with the lack of sufficient data so that you could analyze it.

The guidance that is given to NRC -- by NRC and DOE to the people who write environmental impact statement and who are required to evaluate accidents says that those accidents should be reasonably foreseeable. Unfortunately, it doesn't tell you what that is. Is that -- is that a once-in-a-million-year frequency for that accident; or is that a once-in-a-billion-year frequency for that accident; or is that once in a trillion? You know, the earth's only a few billion years old, so I'm not quite sure how silly we want to get with that.

But the hypothetical accident in the draft EIS is a fire that takes place in a plutonium glove box in the pit disassembly and conversion facility. There is also one in the MOX plant that I just saw tonight, I guess, for the first time. But it assumes that the fire in that plutonium cabinet or glove box gets out of control; it releases tritium and plutonium

50-2

from its glove box confinement. The tritium and plutonium are soon to be expelled out of the ventilation stack of the building. And some fraction of that, then, gets disbursed and deposited on farmers' products that are intended to be eaten by people and not animals.

And then it further assumes that those products are eaten 100% by people with 100% of that radioactivity still on it. And it goes out for 50 miles. And it contains both a tritium component and a plutonium component, but unfortunately the EIS doesn't give you enough data to figure out how much of each one.

50-2 cont.

The scenario contains a lot of uncertainty. And it is CNTA's opinion, based on what we've looked at so far, that this pathway through the food chain simply is an accident scenario that does not meet the reasonably foreseeable criteria. And I want to talk a little bit about why we think that is so. And also we don't believe that the fluid pathway should be considered or put into the final environmental impact statement for that reason. It is not a viable or reasonably foreseeable incident.

The scenario, as I said, has a lot of unreality. Let me go through some of that reality, just quickly. First of all, the fire -- for the fire to occur is a very unlikely event, for just a little fire to start. During -- just a little history might be of value here. In the 1950s and 1960s, when we were starting up plutonium processing facilities here and in other places around the country, there were, in fact, some fires in plutonium processing facilities. They were small. And they taught us a lesson. They taught us why they happened, and we made changes to the design as well as to the administrative controls, to keep those from ever happening again. And -- and, by golly, it worked. We haven't had anymore since then.

But one other thing that happened that -- that is more important and more relevant to the -- to the DEIS that we're talking about, in 1957, and again in 1969, serious fires occurred in plutonium glove boxes in Rocky Flats in Colorado. Now, these were glove boxes that were connected in a train, one glove box connected to another. And these glove boxes contained a number of combustible materials, including they were made -- some components of them were of wood. And the glove boxes today are designed quite differently. They're made of stainless steel. And the amount of plutonium and the amount of combustibles

50-2 cont.

in a glove box is strictly limited by procedure and requirement.

At Rocky Flats there was no fire suppression system and there were no fire barriers between the glove boxes. Today there are fire barriers and there are fire suppression systems. The Rocky Flats glove box ventilation system pulled air from one end of the train all the way down through, and exhausted on the other end. It spread the fire very quickly from one glove box to another. Today we have each box ventilated separately, and barriers between them.

But not only that, these glove boxes in question, both in the PDCF facility and in the MOX facility, are inerted. There is no air there for combustion to take place.

MR. CAMERON: Mr. McKibben, can you sort of summarize for us.

MR. McKIBBEN: Okay.

MR. CAMERON: We really appreciate your -- your comments, but if you could -- could finish it.

MR. McKIBBEN: All right, I'll rush through it real quick.

MR. CAMERON: All right.

MR. McKIBBEN: Those fires, which were far

50-2 cont.

worse than any fire that we could have today, had an interesting result that is relevant to this draft environmental impact statement. In one of those fires no plutonium left the facility, left the building. In the other one, there was a breach by the fire of the -- of a filter, and there was a small amount that got outside the building, but none of it could be detected more than two miles away. My point there is that because plutonium is not a volatile component, it is very dense, heavier than lead oxide, it does not migrate easily. So it stays put. So, assuming that plutonium is going to be scattered for 50 miles and land on farm products is not reasonably foreseeable.

50-2 cont.

Let me just quickly summarize, then, and close this out. The tritium in this accident would, indeed, go up the stack. It would, indeed, be deposited. But I think the amount that is assumed to have -- to be there and the amount that is assumed to deposit is grossly in excess of what it would be in reality.

But there are a lot of -- several other assumptions here in this that don't come close to reality. One of them is that the -- this only occurs -- or this will occur when the food is ripe and ready to pick. Now, that's interesting. But the tritium,

if it landed any other time, would dissipate and not be in the food. It exchanges with the water vapor in the atmosphere and it evaporates as water. It assumes there's no rain before it's picked, because that would wash it away. It assumes that -- that food, once picked, is not washed by the packing house, by the wholesaler, by the retailer, by the housewife. At least in my house, that probability is zero. It also assumes that the food is eaten immediately, because if you sit it -- leave it sitting around in your refrigerator for a while it will evaporate and go away and there won't be any of it there.

Finally, and most importantly, it assumes that the government would not collect that contaminated food so that people couldn't eat it. Now, what do you think the probability of that is? Bottom line is, this is a hypothetical accident that was not occur, cannot occur, and it shouldn't be included in the draft EIS.

50-2 cont.

Thank you.

MR. CAMERON: Thank you very much, Mr. McKibben. And we'll look forward to your -- your written comments on this.

Is Mr. Williams -- Thomas Williams...

Hi, Mr. Williams.

MR. WILLIAMS: My name is Thomas Williams, and I'm from Barnwell, South Carolina, Chairman of the Barnwell County Council.

The Barnwell County Council has passed a resolution in support of the new MOX facility being built at the Savannah River Site. Some of us have reviewed the Nuclear Regulatory Commission's draft environmental impact statement on the MOX facility, and believe NRC's preliminary conclusion that the facility should be constructed is the right conclusion. We feel strongly that the MOX facility can be constructed and operated safely and efficient. The companies involved are known expert in the nuclear arena (sic) and has many years of experience. In addition, the facility will be regulated by NRC.

51-1

NRC has federal responsibility to insure the nuclear facility is designed and operated safely, with no current or future danger to the public or the environmental. This independent regulatory oversight should give the public confidence.

After almost a year of study and evaluation of the MOX facility, NRC says the benefit of MOX facility outweighs the disadvantage. The biggest benefit is to the world to get surplus weapons grade plutonium out of harm's way, out of circulation.

This facility should be built. There is no major impact to the public or the environment from normal, routine operations. We think moving forward with this program would help insure a safe environment for years to come, and we feel that the construction and operation of this facility at Savannah River Site will truly be a benefit.

51-1 cont.

Thank you.

MR. CAMERON: Okay. Thank you very much, Mr. Williams.

I'm going to -- to assume -- Mr. Mareska? There was someone who signed in to speak, and there was just Sierra Club with that. Was that -- was that you?

MR. MARESKA: That -- that wasn't me.

MR. CAMERON: Was it Mr. Hooker? All right.

We're going to go to -- to Mr. Hooker. And amazing coincidence, Don Moniak is right after Mr. Hooker. And then Richard -- is it Richard Canty? Okay, we'll figure that out.

Mr. Hooker?

MR. HOOKER: Okay. Thank you for letting me speak tonight. Appreciate the opportunity.

First I'd like to have this put on record.

MR. CAMERON: Great. Thank you.

(Mr. Hooker hands certain material to the court reporter.)

MR. HOOKER: I'm William Hooker, Chair of the Savannah River Group of the Sierra Club, representing over 500 citizens of this area. We oppose the MOX fuel fabrication facility, and support immobilizing of plutonium as an alternative. Many aspects of the MFFF make it mostly risky, least cost beneficial option of plutonium management or disposal.

MR. CAMERON: Mr. Hooker, can you just speak up a little bit.

MR. HOOKER: This thing -- I can't see with my bifocals.

MR. CAMERON: Oh, that's one of -- yeah, I know about that.

MR. HOOKER: Due to the high alert level, all shipments to and from SRS have been halted. That the threat of terrorism inspires this action is commended. The highlights -- this highlights the DEIS deficiency is not addressing a terrorist or sabotage set of action scenarios. Dose and risk cost benefit analysis must be evaluated for PDCF, MFFF, WSB, plutonium transport to and from the site, and offsite fuel transport for terrorism sabotage accident 52-1

scenarios. 52-1 cont.

Absence of offsite emergency plan by DCS for any accident scenario -- scenario a severe oversight. Either compounding the effect of the lack of an emergency must be evaluated by the EIS or the emergency plans must be present. 52-2

The environmental impacts and human -- human health risks waste management of the PDCF and MFFF must be specifically evaluated. Latent cancer facilities associated with the proposed WSB and all substantial handling and transport are significantly portions of the real cost of this mission are minimized in the DEIS. This must be corrected. 52-3

With operation data from the PDCF and the MFF not currently subject for review, the range considered for operational life of 10 to 20 years is huge. The arbitrary use of the ten-year figure is RC analysis of a default low-end assumption that doesn't offer conservative estimates necessary to protect human health. A 20-year figure for operating life must be used in estimating dose and risk cost benefit analysis. 52-4

DOE has a very poor history of caring for those American citizens it has exposed outside possible military, and that's questionable. And that's from -- from me. The NRC has the opportunity now to require that -- that proper care be taken to prevent or mitigate any harm or expenses to the stakeholders.

I'm going to give a couple of examples -- examples of fraud committed and covered up of exposure to subcontractors and employees to heavy metals, tritium, by DOE-Savannah River and its contracts to the Savannah River Site is clearly shown in both my congressional investigation I have, and the following information submitted tonight with -- which will show that they are still -- Savannah River Site is still covering up and committing fraud. The information submitted tonight is -- was sent to Dr. J. J. Stucker, who is over the governor's Nuclear Advisory Council in Columbia, South Carolina, certified receipt #7002 0510 0000 0205 2433, which includes an Email concerning USCA reading room material being removed, Freedom of Information Case #VFA-0749, a final replay from DOE letter dated July 30th, 202 (sic), concerning my freedom of information from DOE-Savannah River. Work clearance permit signed on 2/22/1999, at 12:00, by Westinghouse manager not identifying any hazardous material in Four Mile Creek, from -- a reply from GSDL hair analysis from three employees of Georgia

Bowhunters Supply Company, information from ATSDR concerning toxins: antimony 125 and 145, nickel, arsenic, and mercury. The last item is a claim of lien filed under miscellaneous Volume 1107, Page 281, on 1/9/02 in the RMC office, County of Aiken, South Carolina.

The draft report NUREG-1767 clearly shows additional exposure path examples. We trusted Westinghouse and the Department of Energy at the Savannah River Site to tell us what we had been exposed to from 2/10/1992 through 12/31/1999 while working in high, medium, and low risk sites at the Savannah River Site unprotected, and they -- all they could do was laugh and make jokes out of what we had been in while we were working for the U.S. Forestry Service, slash, Savannah River Institute on 3/20, 21, 22, and 2000 -- of the year 2000, during a NIOSH investigation. Lie and coverup is the name of the game at Savannah River Site, and safety and health of the employees or the general public is not the interest. How can we trust the prime contractor and its partners, let alone the U.S. Department of Energy now with anything such as a MOX facility at the Savannah River Site?

I included those three samples from -- for the analysis from the three individuals. And I'd also like to say that I've -- I have eight dogs. Five of them's been on the Savannah River Site; three of them's not. The three that I have at the house, alive; the five that worked on the Savannah River plant is dead. I have -- I have these dogs that used at the Savannah River Site, all these dogs are also dead. And I believe it was from the exposure they received from hunting them in these active waste sites listed on the EPA Drawing GCO-1999, rev. no. Five area Savannah River Site approved 4/6/1999 by Ed Campbell. BSRI environmental -- this is the same units as EPA drawing, except BSRI environmental management has ranked the units -- numbers and units name risk factors as low, medium, and high. These records also show the Unit 29, Hp-52 pond as high risk, and per Westinghouse presentation to NIOSH that was printed by -- was presented by Sandy Human and Steven Johns, both Westinghouse managers, that also committed fraud on 3/20/2000 to NIOSH.

MR. CAMERON: Mr. Hooker, you may want to give us those numbers in -- in writing and just...

MR. HOOKER: They right there.

MR. CAMERON: ...give us your substantive point. But could you try to wrap up for us now?

MR. HOOKER: Right.

MR. CAMERON: Thank you.

MR. HOOKER: I'd like to read the Email, the portion of it, and then I'll -- on top of Notebook Z105 is a sticky notepad that said, "William Hooker." This note was being hauled off as a potential sensitive, along with other 50 boxes. It contained records of spills from 1990 to 19-1 (sic) time frame. The person that wrote me this Email asked me do I have a freedom of information in for such information.

I went back for my freedom of information request that I -- and I got a reply on July 30th, 2002, from DOE. I asked for environment report for 2002, what caused the failures from 1988 -- 1999 exceedance of SCDHEC issued NPDES permit liquid discharge limited as referenced. I asked for August 4th outfall G-10, Four Mile Branch failure, chronic toxity (sic), what causes failure. August 28th, acute toxic, it was unable to determine what causes failure. Seven exceeds as shown on Page 138 of 1991; ten exceeds of '92; ten exceeds of '93; 9 exceeds of '94; 19 exceeds of '95; 14 exceeds of '96; 7 exceedances 1997. And this is their reply.

"The Savannah River Site performed a search for exceedance and full-size map portion of your request and found no responsive documents to your remaining request numbers 2 through 12. Also, regarding these non-existing records, the freedom of information does not require compenpation (sic) or creation of record for purpose of satisfying a request for records. Therefore, SRS does not -- did not locate any responsive documents to your request or what caused the failures."

MR. CAMERON: And, Mr. Hooker, are you...

MR. HOOKER: I'm through.

MR. CAMERON: That's it?

MR. HOOKER: Yeah.

MR. CAMERON: All right.

MR. HOOKER: Yeah, I -- I submitted...

MR. CAMERON: And you've got this for the record? Great. Thank you very much, Mr. Hooker.

[Applause.]

MR. CAMERON: And we're going to -- we're going to go to Don Moniak now, and then we're going to hear from Ed Presnell.

MS. CARROLL: Are you going to explain your crack about the "by coincidence thing"?

MR. MONIAK: Yeah, that was a crack.

MS. CARROLL: What does that mean?

MR. CAMERON: It wasn't a crack. It was just that the next name on the list was Don Moniak.

MS. CARROLL: And you were standing right next to him?

MR. MONIAK: By coincidence.

MR. CAMERON: Yeah. I mean, it's on the list. I mean, you can look at it.

Don, go ahead.

MR. MONIAK: I'll let you go. Just a second.

My name is Don Moniak, and I'm here representing the Blue Ridge Environmental Defense League on behalf of Janet and Lou Zeller, who couldn't make it tonight. Janet had replacement hip surgery this week.

Want to talk first about risk. It's probability times consequences. Consequences are economic and cultural. The stigma attacked -- the stigma attached to the consequences of a radiological accident are difficult to measure, but they have to be addressed. This was raised repeatedly in Texas during the surplus plutonium disposition EIS by people who farm for a living. Accidents that may have no 53-1 measurable human impact can put a farmer out of business because nobody wants his product -- their product. That's fact. There are other consequences that have to be considered. 53-1 cont.

The only consequence that's considered in here is latent cancer fatalities. If that is the only health consequence that is going to be addressed, at least say why other consequences are not being addressed, what you know and what you don't know about the impacts of ionizing radiation. 53-2

There's not much in here about what is the hazard of radiation. We're presenting this chart all the time about what the average natural background is in this country. And Tim was wrong, in that the natural background averages about 290 millirems per year, and it was presented as 360. The 360's including X-rays and things. Not everybody gets X-rays. A Christian Scientist does not get X-rays. Certainly not to my -- I don't get many X-rays. I don't let me dentist X-ray me every time I go in. That is not part of natural background. You need to say what is natural background around here, not what it is at a national level, because around here, at lower elevation, radon levels are low, there's very few basements around here because there are such sandy 53-3

areas. What is it around here? That needs to be addressed in this. And what harm does natural background radiation cause? We know what the benefits are. Without solar radiation we'd be nowhere. Solar radiation, the sun, solar energy is still our number one power source. It just isn't on the grid. It still provides us with almost all of our energy needs, and always has and always will. And when it doesn't, we won't be sitting around here talking about plutonium. 53-3 cont.

What is not in this document is what the radiological impact is. They tell us what the potential radiological dose is, but not what the impact is in terms of concrete measurements, curies or becquerels. Whereas with the chemical hazard we're told concrete numbers. We're told this many tons a year of nitrous oxide or this many tons a year of this or that will be released. But there's no equivalent numbers for radiation impact. So that needs to be put in this. 53-4

The NRC reported annual air pollutants for select non-rad chemicals and elements at Savannah River Site. And for the affected area they chose this very arbitrary figure of one ton per year being released of a chemical. Well, that doesn't have much to do with what the hazard of that chemical is, because at SRS they release quite a bit of mercury into the environment, but they don't get up to one ton very often. More like anywhere from 100 to 600 pounds in the last ten years, which is a lot of mercury.

So what you need to do is, in the affected environment part, is say what kind of impacts are there, not which chemicals are being released at a rate of more than one ton per year. There's an absence of discussion on americium in here, because americium is the radioisotope that has to be separated from plutonium in order to make plutonium MOX fuel. And this poses a risk that's disproportional to plutonium, in general; and there will be a large waste stream of americium contaminated material. I asked: Why not just put all that americium into some smoke detectors and use it like a product, like we're trying to use plutonium to recycle. Tell us why that couldn't be done. What are the hazards of americium? 53-5 53-6

The units in this document are not consistent. You go from cubic meters to gallons, back and forth. I think the liquid radioactive waste stream should be reported in liters and gallons, like it has been all along. 53-7

Sort of like to get along to the changes

that have occurred since January 2000, three years ago, to this facility when the design cost was $56 million. Today the design cost is $171 million. And I'll bet you that it rises higher than that. The size of the facility has increased from 120,000 square feet of hardened space to 366,000 square feet of hardened space. Essentially, they're building a new canyon out there that will replace the capabilities of the existing canyons. That is a huge change from the Department of Energy's analysis. The amount of liquid radioactive waste has increased to about 500 gallons a year, to more than 400,000 gallons per year. And the decision was based to go forward with MOX instead of immobilization on this faulty analysis that occurred. The latent cancer fatalities that DOE said in a worst case accident, which would be an earthquake, it was much less risk of an explosion at a MOX fuel facility back then because it was all dry processing. They said we wouldn't need to do liquid processing. Now it's 200. There's a lot of other changes that have occurred, too. And the Department of Energy was very dishonest in their analysis.

355,000 gallons a year liquid radioactive waste. Yeah, that's not much compared to what Savannah River Site goes through every year. If it was at a Greenfield facility people would be up in arms. It's still a waste stream that is unnecessary if immobilization was implemented. And it's not a low impact. That's a lot of waste that has to be treated at the effluent treatment facility, and what is left from that is going to end up in the steams of the state and the rivers of the country.

The tritium accident, they don't list the number of curries that are postulated to be released in an accident, and don't say what the routine releases will be at the pit disassembly and conversion facility. Three years ago it was about 1000 curies per year tritium being released. That's a drop in the bucket for SRS, because they have released so much tritium over time that an average day at SRS would be an accident at any other sites. Like Lawrence Berkeley, they actually do occurrence reports if they release, like, a millicurie. Here a millicurie is just nothing. 53-8

The non-rad toxins, as I addressed before, SRS currently is permitted to release 253 toxic air pollutants. Approximately 180 of these are permitted only at the consolidated incinerator facility. There's mention of the consolidated incinerator facility in here, but it's not operating right now. 53-9

If it was to operate, the air emissions out there would be much, much higher than as what's been reported. And until the decision is made on that, you need to address that, because then the current impacts at SRS are higher than what is being said. 53-9 cont.

Why MOX? This is a political issue. This is a political decision here. The sole justification for this project is the U.S.-Russian agreement. The NRC did fail to address the status of the agreement. And as we know, as we speak, George Bush is antagonizing Russia by accusing them of providing military aid to Iraq, and Russia is accusing us of many other things. Vladimir Putin is a tyrant. He's just another communist, tyrant, authoritarian, bad person who cannot be trusted. Things are going downhill. And to move forward on this project without -- while pretending that things are just steady and we're getting along with Russia is crazy. Russia's Minatom is described as the last -- as the stronghold of the last regime, the most conservative elements within Russian society. Russian people despise Minatom. 80% of them generally vote against new nuclear projects. Minatom is an autonomous rogue agency that hopes to export plutonium fuel if they get an infrastructure to build it. And their trading 53-10 partners are Iran, Pakistan, generally the ones that are on our export control list. 53-10 cont.

MR. CAMERON: Don, could you sum up for us?

MR. MONIAK: Yes.

The final issue is that I asked about the foreign ownership and control and influence. And this is a French project. This project primarily benefits the French government at this point. Now, whether that's right or wrong is irrelevant. The French -- if anybody is to do the MOX, the best person for it's -- best company for it is Cogema, because we certainly don't want BNFL to do it with their falsified quality assurance data and an inability to get an plant license there.

However, France is now on our enemy list, essentially. We're boycotting French kissing, French fries, everything but French nuclear fuel. And this is controlled by them. I don't know how they arrived at the conclusion that this was not a French-run operation. Chairman Richard Meserve of the Nuclear Regulatory Commission, a year-and-a-half ago, was lobbying Dick Cheney and the Congress to remove foreign ownership and control rules, weaken them and lessen them. This is in a letter he wrote. This is 53-11

before the world started to change. 53-11 cont.

The Atoms for Peace is the biggest casualty of this war in terms of political situation. If the UN is irrelevant, then the IAEA is irrelevant, then the NRC is irrelevant when it comes to this project. Because this project is an international verification and inspection project. It's not all about making power. And if you don't address the non-proliferation impacts and say to the Congress, as an independent agency, things have changed. DOE's analysis might have been okay. Then you're not doing your job. You have a responsibility just as a government employee to do this.

Thank you.

MR. CAMERON: All right. Thank you.

[Applause.]

MR. CAMERON: Ed Presnell.

MR. PRESNELL: Thank you.

My name is Ed Presnell, and I'm the President of the Augusta Metro Chamber of Commerce.

The Augusta Metro Chamber of Commerce, with member businesses from across our two-state community, supports the MOX project. Our chamber has followed the progress of the project since the beginning. And with the release of the Nuclear

Regulatory Commission's draft environmental impact statement stating minimal environmental impacts, we believe NRC should issue a license for construction, and eventually for operation of the MOX facility. Aside from being the right thing to do for the safety of our planet, support of this international effort will have the side effect of great economic benefit for our community.

54-1

We believe any concerns of safety have been answered. The safety of the process and the facility, itself, has been evaluated for years by many different groups. Every conclusion is the same. The MOX facility can be constructed and operated safely with minimal impacts.

With the question of safety satisfied, we now hope that our citizens can now recognize the economic boost the MOX project will have in the regional economy. When focusing on some of the numbers listed in the draft EIS for the construction and operation of the MOX facility and its associated facilities, the pit disassembly and storage facility and the waste solidification building, it's easy to see the positive impact.

For example, in the peak year of construction, 1,820 workers will be required for the

proposed action. On average, 1,000 jobs will be created for the proposed facility. During operations, 1,260 employees will be required each year. Income for workers during construction will be $350 million. Income during operations will be over $600 million. The proposed facilities will produce approximately $110 million in tax revenues from state income and sales tax. And finally, the proposed facilities will produce $1,850 million for gross regional product.

The Central Savannah River Area will be proud to be home for the mission to reduce weapons plutonium. This project is one of great importance to the security of the world. That reason alone should be enough to see this MOX succeed. But it is also positively impacts (sic) the CSRA in more ways than expected. It shows that by doing the right thing and supporting our country, our citizens will receive benefits they never expected.

The Augusto Metro Chamber supports the licensure of the MOX facility, and looks forward to both the global safety and local prosperity that it will create. Working together, the Central Savannah River Area and the Department of Energy are making the world a better place.

Thank you very much.

MR. CAMERON: And thank you, Mr. Presnell.

Is Richard -- is there a Richard Canty?

All right, Reverend Walker. And after Reverend Walker, Mary Kelly.

MR. WALKER: Good evening. My name is David Walker. I am President of the Aiken Branch of the NAACP, and I'm the Regional Coordinator for Region 2 of the NAACP which include the branch in North Augusta, Wagener, Salley, Edgefield, and Saluda.

55-1

I am here tonight to state that the NAACP still fully support the MOX facility at Savannah River Site. After seeing the draft environmental impact statement released by NRC, I've noted a few things. One is that in their report the NRC has stated that they would most likely issue a construction license to DCS. I think that NRC feels that they are doing this because they have some degree of confidence in DCS.

While we continue to support the MOX facility, we are awaiting the corrected EIS statement from NRC to compare that statement with the statement from DOE and from DCS. We feel that our support is necessary because one of the economic impact that it will have in this area. While there are some concerns regarding the environmental justice portion of the EIS statement, we will review all three EIS statements and

submit a written report prior to the deadline.

But we come tonight to say that we unequivocally -- the Aiken Branch NAACP supports the MOX facility. The MOX plant should come to SRS and DOE, and we are expecting DOE, SRS, and DCS to keep its citizen (sic) updated on the plant. Before I take my seat, I am making one request on behalf of the Aiken Branch NAACP. In the past all of these meetings have been held outside of the communities that will be mostly affected should an accident occur.

55-2

I am requesting at this meeting that NRC, DOE, and DCS make a considered effort to hold a meeting in the African American community, the community that will most likely be affected. But at this time we still strongly support the MOX facility.

MR. CAMERON: Okay, thank you, Reverend Walker.

We're going to go next to Mary Kelly. And is there a -- is it Charlie Kleiss?

Okay, Mary Kelly, and then Charlie.

Let's see if we can make sure that this microphone works for you, Mary.

MS. KELLY: Thank you. Short people.

MR. CAMERON: Yeah. See if -- see how that is. Let's see if we can hear you.

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MS. KELLY: Okay. My name is Mary Kelly, and I'm representing the League of Women Voters of South Carolina. Some of what I was going to say is repetitious, but I'm going to repeat anyway because I think it's just so extremely important.

56-1

We question the wisdom of concentrating so much plutonium on one site. SRS has to be the world's most inviting terrorist target, even without the added plutonium. And as the old saying goes, "Never put all your eggs in one basket." Having such -- so much plutonium in one place also increases the prospects of a criticality accident.

We find it difficult to understand how you can justify not including considerations about terrorist acts or criticality accidents in this document. The whole issue of homeland security hasn't been well handled, I -- I think most of us would agree. The public needs to know about the possibilities of such accidents, and be given information that will empower them to do something to help themselves in such an event. There's a great deal of danger in ignorance.

56-2

In addition, should you be transporting plutonium and uranium around the country in a time of war and international hostility to the United States?

56-2 cont.

Some of that plutonium will be in the form of plutonium oxide powder, a highly reactive and flammable substance. Depleted uranium in the form of gaseous uranium hexafluoride, a nasty substance, will be transported probably from Ohio to a processing plant in Wilmington, North Carolina, where it will be solidified as uranium dioxide and then transported back to SRS.

56-3

There should be more discussion about the backgrounds of the entities composing DCSW, Duke Cogema Stone & Webster, from the standpoint of their financial stability and history, and their environmental and safety records. It is extremely troubling that one party to this consortium is Cogema, a French company, owner and operator of sites like La Hague that have bad environmental and safety records. It may not be possible to get adequate information about Cogema, since France is far less open than the United States about its nuclear operations.

Another point on the subject of health effects. It's really distressing that the study that was underway about the -- the Dosimetry construction project proceeded to a certain point. They had collected a lot of data, organized it and so forth, and then the money was not forthcoming to analyze that data. That project should be completed and the information made available to all the people in this community and throughout South Carolina. It is most important.

The other -- another problem that I see in this DEIS is the weather discussion. You only discuss five years. It doesn't take into account some special South Carolina background. On a totally different kind of project in Columbia, we've been fighting against a big developer who wanted to put a development in a flood plane. Well, his information simply didn't go back far enough on the flooding that had taken place in the Columbia area. It took university people and interested people in the community who could remember or who had fathers and grandfathers who could remember the fact that there had been tremendous flooding in the Columbia area along the Congaree River.

56-4

The same thing is true with the possibility of the effects of hurricanes. Now, that all has by dismissed. But those of us who lived through Hurricane Hugo know that what happened there was that the hurricane came in just north of Charleston and followed the water courses up to Columbia; then went up the river, the Wateree River,

to Charlotte. Charlotte was heavily impacted by Hurricane Hugo. You really need to have a more expansive idea of what weather patterns have occurred in this area and in South Carolina.

56-4 cont.

You also seem to only be concerned about the impact on the health of citizens within a 50 to 60 mile radius. Well, if you have a major accident here, it will cover a far, far greater area than 60 miles. When Chernobyl -- the accident at Chernobyl occurred, people in Norway were affected. It just isn't true that you can consider such a limited area.

56-5

Another point has been brought out, and it's been about the Russian MOX program, which is not proceeding according to plan. Another factor involved, according to the *Global Security Newswire* that comes out from the -- well, it's the NTI, and I can't remember what that stands for. But, nevertheless, they're talking about the difficulties of adequately monitoring weapons of mass destruction, including nuclear, in Russia. It just doesn't seem that this program should be going ahead justified by what the Russians are going to do, until the world settles down a little more.

56-6

And I appreciate being able to make these comments, and I hope that will receive -- get to a satisfactory resolution of this whole issue. But there are just these -- some of these very pertinent facts that are like elephants in the garden. They just aren't going to go away, and you really need to pay attention to them.

Thank you.

MR. CAMERON: Okay. Thank you, Mary.

Next we're going to hear from Mr. Charles Weiss, and then we're going to go to Tom Clements.

MR. WEISS: Thank you very much. Good evening. My name is Charlie Weiss, and I am President of the Greater Aiken Chamber of Commerce in Aiken, South Carolina. We represent approximately 730 businesses in the region. It equates also to roughly 30,000 employees who really depend on a sound and stable economy.

I am pleased to see that the NRC has taken into account the substantial economic benefits that the MOX project provide, and the plutonium disposition program in general will offer to our area. I'm also proud to be in a community that has the opportunity to contribute to such an important national mission. SRS and the local community have a long history of such contributions. 57-1

I am here this evening to convey that the

Greater Aiken Chamber supports -- support for the MOX project, for what it can do for our country, and what it will offer to our entire region.

In the draft EIS, the NRC says it does not see any significant health or environmental impacts, and that the risk to public health is, indeed, very small. With tighter, more stringent federal and state regulatory controls, environmental safety should not really even be considered a factor in deciding the location for the MOX project. It is vital we all remember that the economic boom of the '90s cannot be counted on to sustain the quality of life that each one of us have come to enjoy. MOX, ladies and 57-1 cont.
gentlemen, is not a four-letter word. On the contrary, it equates to improved education, parks and recreation, health care, and other very important attributes that contribute to a well-balanced community.

I believe that NRC should make it their final decision to locate the MOX facility at the SRS, and that we, the citizens of the CSRA, should support this program of immense important for the continued safe of continued quality of life (sic) and economic growth.

Thank you for allowing me to speak to you this evening. Very much appreciate it. Thank you.

MR. CAMERON: Thank you, Mr. Weiss.

Let's go to Mr. Tom Clements, now, and then we're going to go to Caroline Rivard.

MR. CLEMENTS: My name is Tom Clements, and I work for Green Peace International based in Washington, D.C., and I represent over two million of our members with offices in about 35 countries worldwide. And I'm a native to this area.

I just want to make some comments on the process. I'm going to submit some written comments about some accident scenarios and other issues, but I just want to hold my comments to a couple more of process and political points.

I found this draft EIS very confusing because it attempts to also present environmental data on two other facilities, in addition to the MOX plant; those being the pit disassembly and conversion facility, and the waste solidification building, which, to my knowledge, DOE has never stated or written publicly that that facility must be built. I've been trying to get answers from DOE about the facility, but so far there has been no response.

I'm also trying to find out if this document is also the environmental impact statement 48-2

for those other two facilities, and I have not heard the question answered here tonight if this document is going to serve as the EIS for two other major facilities that are going to cost a lot of money and could have substantial environmental impact. One of the facilities is covered in this document to a very minor degree. It was also covered in a 1999 EIS on the plutonium disposition program. But the waste solidification building, to my knowledge, DOE has never done any NEPA analysis on its own. I think there are going to be some legal questions raised under NEPA if this document is substantial enough to stand in for two other full environmental impact statements which must be prepared. 48-2 cont.

Also, I can't determine now that there's any legal basis for disposing of 34 metric tons in the MOX program, and that's what this document basically addresses. The department has never shifted the plutonium that's being shipped from Rocky Flats from long-term storage into the MOX program. We've been waiting many, many months for a supplement analysis to come out on that. We feel it should be -- that they should prepare a supplemental EIS. So the program right now only has about 27 metric tons in it. With a wave of the pen, they could transfer the plutonium 48-3 into this MOX program. But we want to know how much plutonium is coming from Rocky Flats, what the impurities are in that plutonium, how some of it's going to be disposed of if it's not going to be disposed of as MOX. Rocky Flats has -- has clarified that some of this is going to go to Whip. But we don't know exactly what's going to happen to the plutonium that's being shipped from Rocky Flats.

48-3 cont.

Just a couple more things, one related to cost. The cost information presented in the document is very confused and vague. They -- it gives a -- an overall cost to the MOX program of $3.8 billion, I believe. But it doesn't break down this cost into research and development, construction cost, operation cost. There's a little discussion on the decommissioning cost which gives a range. But the people who wrote the document need to go back and present very clearly what these costs are, particularly given the budget crisis in this country right now and the poor economy, and that $75 billion was just requested as a down payment on the war in Iraq. The fact the DOE is trying to get $415 million in fiscal year 2004 is going to draw some attention. The budget is going to be very tight. The $650 million requested for the overall program is going to

48-4

get some scrutiny.

48-4 cont.

We also believe that because of the problems in the budget and the problems that have -- some of which have been pointed out with Russia, that this money that's going to building the MOX plant in the United States and Russia could be more efficiently spent in protecting and securing nuclear materials in Russia. There's a dirth of funds going into the program to make sure that all the nuclear materials in Russia are secured, and there's no need to rush into building a MOX plant now---which we're opposed to---in Russia unless the nuclear materials have been secured. And I think that that's going to be something that Congress is going to be watching very closely.

48-5

I'll submit the rest of my comments in writing. Thank you.

MR. CAMERON: Okay, thank you very much, Tom.

Caroline Betsy Rivard, and then we're going to go to Brendolyn Jenkins, and then Dave Cowfer.

MS. RIVARD: Good evening. Two weeks ago tonight I was actually in Hiroshima and I visited the peace museum for the first time. And I was startled to see that on a tableau that's there, part of the museum is a list, half of it's in Japanese and half of it's in English, listing accidents that have happened since the dropping of the bombs on Hiroshima and Nagasaki. And there's only like 21 items listed, and one of the items mentioned SRS, which I was surprised about. And it says that in 28 years -- they have a date on it, 1988. September 30th, 1988. In 28 years, 30 major accidents at the Savannah River nuclear weapons plant in the United States. I'm not sure where they -- what -- you know, what information it says, but it certainly sent a chill up my spine.

I disagree with the DEIS, because the possibility of accidents was not adequately addressed. One of the related documents mentioned in the DEIS is the -- this final EIS from the Yucca Mountain -- the geological repository. And in here they managed to actually consider this terrorist possibility, and in -- it says, "In response to public comments, and to provide further information about accident risk, DOE analyzed an accident scenario in which a large commercial jet aircraft would crash into the repository facilities. 58-1

Now, you know, kind of raised the question in my mind, reading the DEIS, what -- you know, what probability would they have considered a plane

crashing into the Twin Towers, or two plane crashes into the Twin Towers. Is that like highly unlikely? Not predictable? Not considered? But, anyway, it did happen. So just wanted to consider that. It says, "If the accident occurred, the estimated consequences would include a dose of 4.5 rem to the maximally exposed offsite individual and a corresponding likelihood of .0023 that this individual would incur a fatal cancer.

Anyway, my point is that they were able to consider that, and I don't understand why -- their quote is that -- how is it? Will not address -- the EIS will not address impacts of terrorism because these impacts are not considered to be reasonably foreseeable as a result of proposed action -- of the proposed action of delivering 34 metric tons of weapons grade plutonium to the SRS plant and processing it. I -- I think that there's bad reasoning here. Is not the transportation, storage, and processing of 34 metric tons of plutonium reasonably foreseeable -- a reasonably foreseeable target for terrorism? 58-2

And I also disagree with the DEIS because it does not consider the immobilization alternative. And if the -- if the object is the disposition of 58-3 weapons grade plutonium, immobilization needs to be considered. Russia's concerns don't really seem to be an adequate reason to not do it. And I also think that adverse economic effects -- I know that everybody is talking about the wonderful economic effects of building and having this MOX plant. I think we need to consider the adverse economic effects of a significant accident on the community.

58-3 cont.

58-4

Thank you very much.

MR. CAMERON: And thank you, Betsy.

Brendolyn, and then David -- Dave Cowfer.

MS. JENKINS: Good evening. And I thank you for this opportunity to speak regarding the draft EIS.

In an -- in an economy that can be described in my community at best as being depressed, I stand to support the growth and development of the economy of the community. This project can represent future jobs, professions, and careers for the youth of my community. This project can represent economic stability to the CSRA. This project can also represent the continuation of missions at the SRS.

59-1

But, comma, however, although I am in favor of all of these positive aspects, I have grave concern over the environmental impact portion of the

59-2

draft EIS. Although it's been stated that NRC miscalculated their figures, and that an event is highly unlikely and improbable, there may have been a number of inadequacies found that causes even more concern to me about the concreteness of the data, and if it is likely to change again.

59-2 cont.

I'm also deeply concerned because we as a community, a nation, and now an entire world live now in the land of "what if." We never thought that a space shuttle would explode on liftoff, and we certainly never thought that one would disintegrate upon reentry. I never thought, after having lived in New York a number of years, that the magnificent Twin Towers would be felled, or that the icon of national security and defense would be attacked, or even that, on the other Monday evening, we would have an earthquake in Aiken. But we live now in the land of "what if." And although we can talk all day long about wind patterns and wind shifts, we still remain when it settles, it settles, wherever it settles, in a community of disenfranchised, poor, and minority.

One of the youth at a meeting the other evening pointed out to me, when it was talked about the wind shifts and wind patterns, that we also live on a spinning ball called earth. We are called to think critically about putting projects over people, and jobs over lives. I'm deeply disturbed that so much of the time and effort that my organization has spent was challenging the DOE and Westinghouse Savannah River Company about this issue, when both the NRC and Duke-Cogema should have been more forthcoming in their roles that were to be played.

I, as well as many of my members of my community and the four or five members of the SRS Alliance that was present at a meeting for the first time ever in a disenfranchised community in Aiken, we're very appreciative for Tim Harris attending the meeting last week with members of that impacted community that is spoken about in that draft EIS. We are also, however, quite disenchanted, and perhaps even insulted, that Duke-Cogema refused to meet with members of the SRS Alliance or, instead -- or even attend that meeting. But, instead, to go hundreds of miles last evening and be present---although not vocal---in Savannah, and present this evening, when the community that is spoken about in the environmental justice portion is not even the community in the faces of those of you that are present this evening.

So I don't want to be seem as -- seeming

as unpatriotic for the questions that I raise that call us to be critical prophets in a time of "what if." I support the efforts of -- of the community, of this project, and of the SRS. You've been very good corporate neighbors that have empowered and impacted the communities around my community and the families of which I serve. But I also am called to critically think and critically look at any issue and any impact that would adversely affect the people that I serve.

Thank you.

MR. CAMERON: Thank you very much, Brendolyn.

Dave? And the next three speakers are going to be Glenn Carroll, Ed Arnold, and Ernie Chaput.

And this is Mr. Cowfer.

MR. COWFER: Yes, Dave Cowfer. I chair the Savannah River Site Retiree Association. I would like to say, first of all, that I and the association I represent strongly support the MOX facility. 60-1

My background, my 40 years in industry, I've been retired three years now. I have worked three-fourths of that under the jurisdiction or actually the regulation of the NRC, and I'm very confident the NRC will do a job -- a good job, an excellent job on this project, both in the authorization of the construction and operation, and the regulation of the facility once it goes into operation.

I believe that the MOX facility can be constructed and operated safely. But I've got a concern about the EIS I'd like to -- some concerns I'd like to mention. Having reviewed the EIS and talked to some independent -- folks independent of the EIS development, I would like to say or make the concern, certainly, that the EIS is very conservative, and it makes some assumptions that I think are incredible. Particularly, and most particularly, on the worst case scenario.

I'm concerned that a perception of this kind of evaluation generates in the public eye -- that this kind of evaluation generates in the public eye with respect to perceive dangers at the facility are inflated. I think the NRC's postulating an accident that would breach at least two levels or more of containment, site boundary monitors, and go undetected for a year is just not -- not plausible. The scenario disregards the facility engineering safety features and operating procedures mandated by federal regulations that would prevent this sort of scenario

60-2

from even occurring. I've worked at SRS, and I can tell you the redundancy and certainly the safety basis for this facility, like others out there, would -- would bear out the fact that this is not a -- a credible scenario.

Over the years we've seen opponents of nuclear technology overstate the risks associated with the technology, and certainly we know that the NRC is neither a proponent or a proponent, but they're an objective regulator. I would expect the NRC to be even-handed and not overly -- be overly dramatic in the assessments of that facility. Even if they acknowledge that the assumptions they used are conservative, and if they acknowledge that the -- their evaluation does not give credit for protection that we know will be in place to prevent this accident scenario from happening, the statements gets lost in the cloudiness of what's generated in numbers---we've heard a lot of that discussion tonight---that fall out of these conservative evaluations. So I would hope the NRC heeds this concern and would insure that their final analysis portrays the risks associated with this program in a proper context.

60-2 cont.

Thank you.

MR. CAMERON: Thank you very much, Mr.

Cowfer.

Glenn Carroll, and then Ed Arnold and Ernie Chaput.

MS. CARROLL: Hello. My name is Glenn Carroll. I represent Georgians Against Nuclear Energy. We are intervening in opposition to construction authorization for the MOX facility, so we've been studying it pretty hard.

61-1

I'm carrying this image tonight because it's a Native American thunderbird, but it sure looks like a nuclear waste symbol; doesn't it? And I just think -- I put this out here and share it because I really believe that we can finish this business we started. That we can finish with the nuclear genie which we've let out of the bottle.

Oh, could I ask you to put Slide 6 up. Thank you.

One of the things I want to say is we have something in common. This is our plutonium. If you have ever paid federal taxes, you bought this plutonium. You bought this facility, Savannah River Site, and you're buying whatever we do with this plutonium.

I want to celebrate that we are arguing about what to do with weapons grade plutonium. Now,

this is a really good place to be. It's progress.

I request an additional meeting. I didn't quite follow what happened with the revised data you furnished us tonight, but it sounds like we just really could use something -- what you put out next week, and we could really use to review it, and we could really use a public forum to discuss it, because this document is vast, and I really wonder what individual knows everything that's in here. And it's really important. And so I think we really benefit from having a public meeting to hear from each other about it. And I think the minimum is to come to this community, which is going to be the most affected.

61-2

Okay, I'm sorry, this gets tiresome. I say this every time we come out. There's a basic problem with what we're doing with this EIS process. Can I have your walk-around-with-it mic so that I can use the slides?

MR. CAMERON: Are you going to give it back?

MS. CARROLL: Did you hear about that? You weren't here. I was beating up DOE that night.

Okay. What we have here -- where do we have it? Well, it was kind of an interesting layout. Okay, we're not even discussing a license. Let's be clear on that. We're discussing construction authorization. This isn't even defined in NRC regulations, so we're pretty much making it up as we go, which sort of leaves it open to challenge. We'll have to see what happens with that. 61-3

So what you've got here, what we're talking about here is a construction authorization request. We want to consider whether to construct this facility. Now, usually when you consider whether you're going to construct a facility that's up to something like -- Don Moniak said 360,000 square feet, that's going to process is it 27 tons or is it 34 tons? I mean, that's another interesting point. There isn't even officially a mandate to consider that kind of plutonium. It hasn't been put in the MOX program yet; right? Okay, so that's interesting. 61-4

And I heard a man from DOE say something interesting tonight which is, well, you know, the public out here, the people that are litigating this have a record we have to refer to. We have to cite it, you know, and we're beating each other up with our citations out there. But you're saying, "Oh, well, we kind of got the impression, talking to the Russians, that they really don't like immobilization." I mean, put it on paper. We're the public.

And I want to tell you something else. This is our document. This is for us. Now, I love Dave, I love Tim, I love Chip, I like John Hull -- I love John Hull, I like that man over there, Peter. But this is kind of hard to read. Sorry. And I have a basic problem. I mean, one of the main issues GANE is interested in here is the waste issue. And it has been characterized differently in every single one of these really hard to use -- and I want to say this compares very favorably with the SBB EIS, which is like...

MR. HARRIS: Do you like it more or less, Glenn?

MS. CARROLL: I like it more. But, yes, please convert your waste to gallons. It would be helpful if you'd just use the same table that DCS used unless, you know, you need to differ from it. It would just make it a whole lot easier, because it almost looks like maybe something's being hidden on this waste issue, the way the language keeps changing that we're talking about. Okay. 61-5

Trying to figure this out. So we got a construction request. This is what we're talking about. And this EIS is going along with this construction request. Now, you notice this arrow here, this is when this starts. Maybe the layout would be clearer if this box was over here. Okay, now, it says in the EIS that they might give a license, they expect to give a license, unless compelling safety issues would suggest otherwise.

But look at this. We're done. We are done. This starts. And this is the main event. I'm here to tell you. This is where the plutonium is. We are not talking about plutonium in this construction thing. We're planning to add the plutonium to the game here. But we're finalizing this EIS.

Now, there's some promise, but it doesn't look binding enough. That's what bothers us. I mean, you have acknowledged this and you have said, "We'll capture it." But you're not bound to. That bugs us. We have a law. We had a hard time getting this law. You know, this little public law, this *National Environmental Policy Act* that generates a document like this for us.

So here you are, you're finishing the safety analysis. And let me tell you, I think it's pretty good. I actually thought the SER finished here, and it was news to me. Here I am litigating plutonium for four years, and I just figured out that there's going to be an operation SER. I think that's

61-6

really great. But, I'm sorry, your only real solution here, you can either do another EIS or you can extend the EIS. But you cannot construct this facility until you've got this -- until you've got this review and you've done the EIS on it. That's how we're reading NEPA. And so I've clued you in.

61-6 cont.

MR. CAMERON: I wish I could be as dramatic as you are with this thing. And, Glenn, I got to -- you know, if you can just...

MS. CARROLL: Hurry up?

MR. CAMERON: Yeah, because we -- we have a lot of people who want to -- want to speak, too.

MS. CARROLL: Okay, the next thing we'd like to talk about, then, and I'll touch on two topics: immobilization and waste.

Your reason for not reviewing immobilization was not accurate. And I actually think you might have been given a bum steer from the DOE in some conversations I had tonight. But Russia declined to immobilization itself, but accepts the United States immobilizing.

61-8

NEPA requires an affirmative alternative to be analyzed if there's a reasonable one available. And immobilization is reasonable because, unlike storage, it would address the proliferation concerns. And it's positive because, unlike storage,

61-7

it provides jobs. And, unlike storage, and certainly unlike MOX, would not generate waste, and would actually employ waste.

And I hear what you say about the vitrification problems. That vitrification facility, that's DOE's best success story. And I just really believe we can solve that problem with solvent extraction and ion exchange. That's what we'd like. So we really are going to make a case that immobilization should be analyzed, that NEPA requires it.

On the waste, we got a problem with the fact that we haven't heard anything from DOE yet on this waste solidification building. There's no budgets. And so we really think the analysis needs to reflect any possible -- you know, a possible outcome that a MOX facility is up and operating and the waste solidification building -- what...

61-7 cont.

MR. CAMERON: Okay, Glenn, is that -- is that it?

MS. CARROLL: Does it for me.

MR. CAMERON: Thank you very much.

MS. CARROLL: Thank you. Thank you.

MR. CAMERON: Ed Arnold?

MS. CARROLL: We look forward to seeing

you again when you come back.

MR. HARRIS: Okay, thank you, Glenn.

MR. CAMERON: Ed Arnold and Ernie Chaput. And I apologize for obviously running late. And we'll stay and hear everybody. But I apologize for -- for going over.

Ed?

MR. ARNOLD: Thank you for the opportunity to address our understanding, which I have to say is -- is limited and confused.

My name is Ed Arnold, and I'm the Director of the local group of Physicians for Social Responsibility. We have over 500 physician and health care professional members and supporters in Georgia and Alabama. I come here from Atlanta, but we have members in the Augusta area, and downstream we have members in Savannah, as well.

This reiterates something I've said in the past at these meetings. I would hope that -- I was pleased to hear that you considered this a public health document. And I would encourage you to think about your visit to your physician. One thing that we always like to do is have enough time with our physician. And we're being told tonight that we don't really have enough time to discuss this fully. So I

62-1

would urge the NRC to arrange for appropriate public discussion that won't rush us. 62-1 cont.

Full disclosure is something that you want. Your physician wants it from you; you want it from your physician. This is really confusing. I don't feel as though I have full disclosure from this document. This is -- we're trying to understand the risks, and frankly I don't -- I -- I won't say it again.

Let me read something directly from the document that was alluded to a couple of times earlier this evening, just this one example. I'm going to submit more comments in writing, but it's one example.

"The EIS will not address the impacts of terrorism because these impacts are not considered to be reasonably foreseeable as a result of the proposed action."

Well, how about a range of what might be foreseeable. How about a worst case scenario, which I think most public work is -- is required to provide on a statement like that. Now, for me it doesn't cut it. 62-2

We were told tonight something more about some kind of a safety evaluation that will be provided next month. Well, what's the public procedure connected with that? And is it part of this? Is it separate 62-3

from this? Will there be public participation once that's released? Will we have an opportunity to discuss it with you all? I -- these are -- this is a big mystery to me. 62-3 cont.

So as someone who works regularly -- I'm not a physician myself, but I work regularly with public health officials and physicians, this document doesn't look like any medical report I've ever read. And I encourage that you make an attempt to step up the standard.

MR. CAMERON: Thank you very much, Ed.

Mr. Chaput? And then we have two more flights of three, I think. Robert Guild, Peggy Roche, and Darrel Watson, next trio.

MR. CHAPUT: Good evening, and thank you for the opportunity to provide comments on the draft EIS work, the mixed oxide fuel fabrication facility. I'm Earnest Chaput, and I am the Manager of Special Projects for the Economic Development Partnership of Aiken and Edgefield Counties in South Carolina.

Construction and operation of the mixed oxide fuel fabrication facility is an important part of our nation's international non-proliferation programs. It is important we do all possible to make surplus United States and Russia nuclear materials 63-1 unusual for future use in nuclear weapons. We believe the United States should continue to demonstrate moral leadership by expeditiously preparing to make these materials unsuitable for use in modern nuclear weapons. We are pleased that the preliminary conclusion of the NRC staff that the overall benefits of the MOX facility outweighs disadvantages. Unless safety issues mandate otherwise, the action called for is issuance of the proposed license. We agree the proposed facility can be operated safely, and urge the NRC to issue the construction authorization request in a timely manner. 63-1 cont.

We've reviewed the draft EIS, and offer three comments which result in additional support for your primarily conclusion. First, the safety and environmental risks associated with the no-action alternative have been significantly understated. These are comments that we have previously provided to DOE in their -- in their EIS statements on the surplus plutonium disposition. The no-action alternative assumes that DOE's surplus plutonium would remain in storage at seven DOE sites. The DEIS does not state the period of storage, and it appears the impacts that are included therein are near-term and based on maintaining the status quo. We believe current 63-2

methods of storage are only valid for limited and finite lifetimes. Storage without subsequent actions is not realistic for time frames of 100 years plus. At some time in the future, action will be required to either repackage or to disposition the stored materials. The no-action alternative should assess the incremental added risk resulting from actions to periodically reprocess and repackage materials in long-term storage; and secondly, actions to eventually remove the materials from storage and prepare them for disposition. You can't babysit this stuff forever. Something's going to have to be done with it sooner or later. 63-2 cont.

Second comment. The risk to offsite population in the hypothetical accident is significantly overstated. Again, I don't have the benefit of the revised analysis, but my sense, from looking at the numbers, has not significantly changed as far as the -- the assumptions made.

In analyzing the impact to offsite population from a hypothetical tritium release from the PDCF, the draft EIS assumes and calculates a dose by ingestion during a one-year post-accident period. The scenario is simply not possible. An assumption that the South Carolina Department of Health and 63-3

Environmental Control and that the Georgia Environmental Protection Division would ignore contamination -- ignore contamination of agricultural products for one year is incredulous, and it's an insult to their training, demonstrated performance, and professional status. The impossible assumption must be eliminated and the analysis revised. 63-3 cont.

Third, the DEIS places unwarranted emphasis on impacts associated solely with the PDCF facility. And it's also sometimes called connected actions. I think that's what you called it in your -- in your presentations. The PDCF is not necessarily solely required to support the MOX facility. The PDCF has a broad capability support of a variety of storage and disposition options for surplus nuclear weapons pits. For example, the PDCF was to have prepared the plutonium. That was included in the cancelled plutonium immobilization project. There has also been discussion that PDCF may convert surplus weapon plutonium components currently being stored as pits to oxide for long-term storage. By coupling MOX and PDCF facilities in a draft EIS, NRC creates the implication that impacts from PDCF will not occur if the MOX construction authorization is denied. That is not the case. PDCF and MOX are two separate actions. And the 63-4

draft EIS should only analyze -- draft EIS for MOX should only analyze and include the combined accidents which result from the unique requirements associated to fabricate MOX fuel. Disassembly of the pit is not required solely to fabricate MOX fuel, and that's the primary impact that comes out of PDCF.

DOE has previously prepared an environmental impact statement for the PDCF---that was a question that was asked earlier---with a finding that the facility provides adequate protection to the public and the environment. NRC should not subject the PDCF facility to NEPA -- to NEPA double jeopardy. 63-4 cont.

Thank you for the opportunity to provide comments.

MR. CAMERON: Thank you very much, Ernie.

And our next speaker is Mr. Robert Guild. And then we'll go to Peggy Roche and Darrell Watson.

Mr. Guild?

MR. GUILD: Good evening. My name is Robert Guild. I'm from Columbia, South Carolina. I'm an environmental lawyer by training, but I appear as a member of the Executive Committee of the South Carolina Chapter of the Sierra Club to speak in opposition to the proposed licensing of the MOX fuel fabrication facility and allied facilities included in 64-1 this draft environmental impact statement. 64-1 cont.

The South Carolina Sierra Club has over 5,000 members in South Carolina. As you know, we're a national conservation organization with over 100 years of history of advocating for the protection of our environment. Our governing body, the executive committee, passed by unanimous resolution last year a statement opposing the mixed oxide fuel fabrication facility as an element in the management of our surplus weapons plutonium, and alternatively supported the pursuit of the now apparently abandoned immobilization program as the prudent and preferable alternative to more safely and appropriately manage this surplus weapons material.

We are supportive of the objective of managing this weapons material and converting it into a non-weapons accessible form, but believe the environmentally preferable as well as the security preferable alternative of immobilization is inappropriately not properly assessed in this draft environmental impact statement. 64-2

My view, NEPA does not -- simply does not permit the Nuclear Regulatory Commission to assume the unavailability of immobilization as is apparently done in order to avoid assessing the cost of the

immobilization alternative. I won't repeat the I think eloquent observations, quoting from the actual language of the Russian-United States plutonium disposition agreement, which obviously is contrary to the representations made by the authors of this DEIS with respect to the binding character of the -- of the MOX alternative. But, suffice it to say, that regardless, NEPA requires you to assess the costs of that alternative.

DOE, even if they are the decision-maker, deserves, and the American public demands a full assessment by the Nuclear Regulatory Commission of the environmental costs and benefits of this action, as well as available alternatives. It's fine for you to say that an alternative has been rejected by your sister agency. It's simply not adequate for you to fail to assess that alternative so that the public will understand that it is environmentally preferable. And we urge you to do that. 64-2 cont.

Several other comments. We like to echo, without repeating, the written comments submitted by the Nuclear Information Resource Service which submitted some useful comments on procedural issues, particularly with respect to the what appear to be segmentation problems with regard to the way the NRC 64-3 cont.

has chosen to evaluate this particular action; that is, failing to evaluate the necessary connected action such as the effects of accident sequences at the McGuire and Catawba reactors which will be using the MOX fuel.

64-3 cont.

It simply seems incredible to say that you used a generic reactor and assumed the consequences of accidents in generic reactors, when I reviewed studies that indicate that because of the proximity of the high population concentration of Charlotte, North Carolina, to the reactors, out of all in the country that we've chosen to use as the MOX fuel facilities. Early cancer fatalities from -- from -- early fatalities and latent cancer fatalities from beyond design-based accidents at those very reactors exceeded virtually every other reactor site in the country because of the population concentration at Charlotte. And why you haven't acknowledged that in this -- in this review is beyond me.

64-4

Let me touch briefly on a couple of points. We believe fundamentally at the Sierra Club that the Savannah River Site should be required to honor its commitment to the people of South Carolina to focus principally on its environmental restoration mission. In conducting the 50-year mission of weapons

production at the Savannah River Site, we had turned the Savannah River Site into literally a national sacrifice area. The number of -- of Super Fund sites, the number of high level and low level rad waste contamination sites are legion at the facility. The most optimistic version of DOE's views say it'll be until the year 2025 before we clean up the ground water contamination at a number of these sites. And yet this action contemplates a renewed waste production mission at this facility before we have completed a satisfactory plan for environmental restoration of the damage we've already done. That is simply unacceptable.

With respect to environmental justice, the NRC has appropriately complied with the executive order by at least analyzing the disproportionate impacts that the credible accident scenarios at this proposed facility will have on communities of color and of low income. That really reflects the dynamic that really has been at work at the Savannah River Site from its inception; and that is that the people in this area of South Carolina represent the path of least resistance with respect to doing what no one else in the country finds environmentally acceptable. Is it a surprise that Rocky Flats and its neighbors no longer will tolerate being responsible for managing weapons plutonium, and instead are sending it to the Savannah River Site in South Carolina?

So you've acknowledged the fact that if there is an accident, disproportionate numbers of African Americans and poor people will die. But you've been glib in characterizing the numbers which you claim to be precise about in other regards. And I would strongly urge you, in your DEIS at Section 4.3.7.3.3, to not simply give us a map at in grainy terms shows where those concentrations of predominantly African American, low income populations are. But to give us an actual table, as you do in some of the other places when the data supports your action, and tell us how many black people and poor people will die in that accident scenario that you assume. Tell us where they live. Tell us which census blocks they live in, because you know that data. That's the data source that generated the maps. Let's give us the numbers so that the public can transparently see what cost they're being asked to bear. 64-5

And finally, as I tried to suggest in a question, it's simply unacceptable for you to tell us in this document, which purports to assess the costs 64-6

and benefits of a proposed major federal action, and assures us that risks are small and acceptable, that you refuse to put a number on the probability of the accident scenarios that you say will not happen. You just refuse to tell us what that number is. 64-6 cont.

Now, I know EPA, when it says we're going to release dioxin into the environment from an incinerator, will tell you that the chances of a death from cancer are, you know, 1 in 100,000 or 1 in 1,000,000. And they'll make an explicit judgement that it's acceptable to expose the population to that level of risk. We should expect no less of the Nuclear Regulatory Commission when they tell us that the risk of an accident at this facility is acceptable, without giving us a value that represents that acceptable risk.

And the last point I'd like to make with regard to environmental justice impacts is you acknowledge that more black people and poor people are going to be down wind, essentially, from that plume, from that accident location in the plume exposure pathway. And yet you fail to acknowledge what seems obvious to me, and that is poor people are largely going to be far more dependent on subsistence agriculture and dairy product consumption, the 64-7 dominant ingestion pathways that you assume in your cancer risk scenarios, without telling us that in the EIS. I mean, the fact of the matter is it's very likely that poor people will be the ones who will continue to consume the vegetables that they're growing in their garden or the dairy products that come from the cow that eats the grass that's exposed to the deposition of contaminants in the accident. And you should be explicit about what those enhanced risks are exposed -- that are -- that those -- that those populations, communities of color and low income, are -- are exposed to. One moment, I'll wrap up. 64-7

That's all. Thank you very much.

MR. CAMERON: Thank you. Thank you very much.

Our next speaker is -- is Peggy still -- Peggy? There's Peggy. And is it -- is it...

MS. ROCHE: Peggy Roche.

MR. CAMERON: ...Roche? All right.

MS. ROCHE: Thank you for allowing me to speak tonight. I'm down to just a few remarks. So one thing I'd like to address is the hearing process, itself. We ask for more hearings to be held so we wouldn't run this late. We'd ask for them to be -- I 47-3

mean, this is a lovely area with friendly people, but it's not the most centrally located area in the state. We'd ask for them to be held in Columbia and Charleston and other places around the state. And I think that it would be very advantageous. You would get a lot more input from the public. And that is supposedly what you're wanting. 47-3 cont.

One point that I want to make, and one of the charts in your EIS, it's on the East Coast, the air flows in a northeasterly direction. But on one of the charts---and I'm sorry, I don't have the page number but it is in there---all the air quality monitoring systems are located in the northwestern section of the Savannah River Site. So you would be gathering data from air not affected by the MOX facility. 47-4

Then I also made some -- on a couple of your charts I did your calculations with your formula for the latent cancer fatalities, and I won't -- in the interest of time, and I know other people are wanting to speak. I won't go by them line-by-line. But the numbers were mathematically astronomical in the difference between short-term and the one-year-later.

And I want to make mention of the fact

that a MOX fuel processing facility is actually a plutonium breeding facility. That when you -- when you are -- you're actually increasing the amount of plutonium you eventually end up with. Because as uranium that it's mixed with is irradiated by the plutonium, the irradiation of the mixture converts the uranium into plutonium; therefore giving you plutonium that you -- more plutonium than you started out with.

Recently there was a tremendous public and official outcry about moving six tons of plutonium into the State of South Carolina. Now you're talking about move 34 metric tons into the state, which is approximately 75,000 pounds of plutonium. Put some perspective on that, the bomb that was dropped on Nagasaki had approximately 20 pounds of plutonium. With today's refinery numbers, it would take less than 20 pounds to get more bomb for the buck. And we're talking about 75,000 pounds of plutonium being located in one site here in South Carolina, when it took less than 20 pounds to drop that bomb on Nagasaki.

I think more attention needs to be addressed to if there was an accident, how would you deal with it. Talked about a remote way. I don't understand how that would work if you had an explosion or you had a fire. Whatever remote facility was in -- 47-5

you know, remote control, whatever, was in the facility, it's going to be fried when they had the -- and with plutonium being, you know, much hotter than uranium, it would be much worse than the Chernobyl incident. And the people that went in to shut down that reactor at Chernobyl knew that they would be incinerating themselves when they went in to do it. And so it would be -- it would not be possible to go into a MOX facility physically and do it. You'd be incinerated before you could get to it to shut down the reactor. 47-5 cont.

And any equipment that you had in there at the reactor, the reactor would be so hot that it would be -- we don't have anything that's capable of shutting it down. It would be incinerated. If there's an explosion or fire, then the reactor got so hot that it needed to be shut down, any equipment that we could put in there would be so hot that it wouldn't work. So I would like, you know, to have that issue addressed.

And the other thing is -- my last point is the language, the way the language is worded in this really bothers me. "Workers would be monitored as appropriate..." As appropriate to whom? "...to insure the radioactive doses are maintained at levels as low as reasonably achievable. What is "reasonably achievable"? You know, a scientists idea of what is reasonably achievable? To me that leaves a lot of human beings as collateral damage.

Thank you.

MR. CAMERON: Thank you, Peggy.

And I know it's -- it's late. And perhaps we can answer some questions after we're done.

Did you want to say something quickly in summary, Mr. Robinson?

MR. ROBINSON: No, no, no, no.

MR. CAMERON: Okay. All right. Thank you very much.

Darrell Watson?

MR. WATSON: I just have a few quick comments. A lot of what I'm going to talk about has already been said, so I'm going to keep it short.

I've got four main issues with this. Number one is the transportation of the plutonium. According to your diagram here, 95% -- this is -- this is going to be Section 1-8, Figure 1.3. 95% of the surplus weapons grade plutonium in this country is located west of the Mississippi River. Now, to bring in 95% of the plutonium in this country all the way pretty much across the country to South Carolina I 65-1

think is a very, very bad idea, exposing that much plutonium to possible interception by exactly the entities you want to protect this plutonium from apparently in your MOX program, and that's terrorists and rogue states. I think that really needs to be considered. That's 34 metric tons of plutonium. That's almost 75,000 pounds to move across the country to our backyard, as it is. 65-1 cont.

Number two, I think terrorism really needs to be addressed in the draft EIA (sic). I think nowadays that's definitely to be something that you -- you'd be completely irresponsible not to include. That's a facet of our everyday life now, and that needs to be addressed. It's no excuse for not -- that not being addressed. 65-2

Third topic is, this is an experimental process. This has been done nowhere in the world. South Carolina is the test bed for this project. This has not been done in Russia, this has not been done in France. This has been done nowhere except in labs and experimental settings and controlled settings. So we're going to find out firsthand the consequences of possible side effects of this. 65-3

Also the very last comment I have is I'm fully opposed to Cogema being involved in this 65-4 project, given their track record in France. Let's see. Matter of fact, they have just a bad track record, especially at La Hague or La Hague (pronouncing), I guess is how you pronounce it, in France. To me it proves that they are an irresponsible company and they should not be involved in this project in any shape or form if this project does go forward. I think that needs to be addressed. There needs to be more transparency in the histories of the countries that are involved in this project. 65-4 cont.

And that's -- that's all I have. Thank you.

MR. CAMERON: Okay, thank you, Darrell.

We have four speakers, and if I -- I think I've gotten everybody. But if there's someone who I don't have on my list, please tell me. We're going to start with Jen Kato, then we have Tom Howell, Adele Kushner, and Joanne Steele. And I'm sorry if I mispronounced any names.

Jen Kato?

MS. KATO: I hope I didn't write my notes in the same invisible ink that I wrote my name on that list with.

MR. CAMERON: I hope not, either.

MS. KATO: Anyway, I'm Jen Kato, and I'm

a local. I'm with the Georgia Chapter Sierra Club. I represent the Executive Committee of the Georgia Chapter of the Sierra Club. And we represent 14,000 people in the State of Georgia; 45% Republican, 55% Democrat. And we have grave concerns about the MOX fuel fabrication facility. We would like to see this entire process canned, and would be more likely to support the immobilization alternative, although we'd just have to see what the figures were that would come out of that. 66-1

The cost benefit analysis does not include the cost of any accident scenarios for victim health recovery or clean up to public property. This must be corrected. The estimated public collective offsite health impacts for accidentally scenarios are only considered for one year after an accident, and only for the standard man. 66-2 Any accident would not likely create a uniform offsite dispersion among the population limited to a 160 pound man with effects stopping at one year. The very use -- well, the use of FRG-13 does not consider gender, race, or age differences in response to radiation exposure, and the radiation involved is hazardous for 240,000 years plus, and their effects are cumulative. The DEIS must be corrected to reflect these concerns. 66-3 Further, an

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actual accident may cascade into several of the scenarios illustrated in the EIS, compounding health effects. And this must also be considered in the EIS.

And some sections in the back, human health risk states statistically no fatalities during normal operations will occur. Yet, according to your own figures, 50 people -- and these figures I -- I contest, but I don't have all of the -- I don't have all the information to corroborate them. But yet you say 50 people will die by latent cancer fatalities. And they -- these will only be standard men, of course, during the 20-year operating period. 66-3 cont.

Also any impact -- you state any impacts associated with the transportation of fresh MOX fuel, including impacts on property values, will be minimal. Did someone even do an Internet search on this topic? It doesn't seem like it was very seriously addressed at all in the EIS, whatsoever, as a cost. And it will be a cost.

This, as well as transport of plutonium, will affect populations throughout Georgia, including property values. This must be just seriously looked at and evaluated in the EIS. 66-4

The DEIS has -- has insufficient detail regarding how these calculations were arrived at. This has been brought up by several 66-5

people. And I think Tim has done a great job trying to help me arrive at one portion of the calculation at the region of influence. This prevents corroboration of human health impacts figures which are important to a lot of people. For this reason, and because of the inclusion of the WSB and the PDCF, it makes a document very, very deficient and suspect, and we need to have additional and corrected data to evaluate this EIS and offer comments on it. 66-5 cont.

The distribution of this additional data must be followed by a lengthened public comment period and public meetings. 66-6

Let me see. Not -- not going to invisible ink.

Well, right now Savannah River Site is actually courting TRU waste from other sites which it hopes to process -- characterize, process, and package. The TRU waste generated by your mission will just accumulate there behind all that other, waiting to go to Whip. And right now there's a WIR (phonetic) lawsuit against -- that's halting tank closer at Savannah River Site. And when you're looking at 133,000 gallons of high level aqueous waste and what it -- actually 355,000 gallons of low level waste per year. If something like WIR persists, this -- this waste will also accumulate. And in general, the human health facts, the human health impacts have not been 66-7 evaluated with regard to waste in the EIS. And especially not in consideration of the variability of the handling of the waste at Savannah River Site. 66-7 cont.

I have sought to give comments that were not given by other people before, but I do want to stress that I am in -- we are -- the Sierra Club is in complete accord with very large concerns about terrorist activities and that they have not been evaluated at all with regard to any accident scenarios, latent cancer fatalities, costs in the EIS. This is a tremendous oversight. We need another EIS, 66-8

we need another -- we need to lengthen comment period, and we need more meetings.

Thank you very much.

MR. CAMERON: Thank you, Jen.

Mr. Howell?

MR. HOWELL: My name is Tom Howell. I'm from Columbia.

I'm concerned about several issues. There are already millions of gallons of radioactive nuclear waste stored in this country. I understand that radioactive liquid waste is highly corrosive, and there have been problems with such wastes degrading their containment vessels. Liquid waste is projected to be produced when plutonium is polished in the MOX 67-1

process. Do we know how much liquid waste is anticipated? Do we know how long it will be necessary to store this waste? Do we know what the long-term costs will be for storing this waste? 67-1 cont.

I understand that U.S. reactors are not designed to handle MOX. I'm concerned about how U.S. reactors will be modified to handle MOX, and how those reactors will be monitored. Will there be independent auditing of such a monitoring system? If there might be problems with the reactors that use MOX, does it make sense to build a MOX processing facility? Shouldn't problems with the reactors be solved before a MOX processing facility is approved? 67-2

I am also concerned about how the MOX will be safeguarded to prevent theft or loss at all points in its processing, use, and storage. Radioactive material has gone astray in the past. Is there an inventory system capable of tracking all the plutonium involved? If so, is this inventory system capable of tracking the other radioactive materials involved, including all waste? Will there be independent auditing of such an inventory system? 67-3

Thank you.

MR. CAMERON: Thank you, Mr. Howell.

We have Adele Kushner.

MS. KUSHNER: Thank you. My name is Adele Kushner. I represent Action for a Clean Environment, which is based in Northeast Georgia. We have a few representatives here. And this is very short, and you've all been very patient.

People in this country expect to trust their government. After all, it is a democracy. Under other forms of government people know not to trust official government statements. Those governments could be telling lies.

In this case, the Nuclear Regulatory Commission is telling us that there is very little danger from exposing people to accidentally emissions produced by a MOX plant. Then it turns out that the draft EIS contains large computer errors, and that there would be far fewer than the estimated 400 deaths in a population living within 50 miles of the plant. And, anyhow, this was a minority, low-income community. And furthermore, the new data will not be available until after the public meetings. But trust us. We are your democratic government. Would we lie to you?

This reminds me of another campaign also concerning radioactive materials. Years ago the NRC told us that a little bit of radioactivity in our

cooking pots, our bicycles, our paperclips, our appliances would not hurt us one bit. The level of radioactivity would be so low, it would be, quote, "below regulatory concern," end quote. We found out there is no way you could tell how much radioactivity people would be exposed to once they were surrounded by such little bits, if the little bits were scattered around randomly. I once adopted a cat that the owner said was just a little tiny bit pregnant. That cat produced four good-sized kittens right on schedule.

It is hard to believe that the Savannah River Site, already the most radioactively polluted Department of Energy site, would even be considered for a process that can only produce more radioactive pollution. Especially when there is an alternative. Would you rather live and work near ancient tanks already leaking radioactive nitric acid attractive only to saboteurs and terrorists, or near glass logs in which nuclear waste is immobilized, out of reach for any reuse, providing safe jobs, leaving no mess behind? How about a real comparison of the pros and cons, NRC, before a decision is made on this DEIS. 68-1

Think about the perils of transporting plutonium across the country, then taking the MOX fuel to reactors, all of which subject to accidents and the 68-2 possibility of spreading radioactive stuff in city centers and people's backyards. Think of a weapons grade plutonium out there waiting to be grabbed. A conscientious examination of the facts might produce a decision that would restore some of our trust in our government. That is a conclusion devoutly to be wished.

Thank you for your patient.

MR. CAMERON: Thank you for those comments, Adele.

And is it Joanne -- is it Steed?

MS. STEELE: Steele.

MR. CAMERON: Steele. Sorry. I can't read writing.

MS. STEELE: I probably didn't write it well.

I'm also a member of Action for a Clean Environment in Northeast Georgia -- in Northeast Georgia. And I work on looking after some of the activities going on at the Oconee Nuclear Power plant which is also a Duke Energy facility. And what -- the phenomenon that is going on is that so many old plants that were only designed to go for 30 years of licensing, or 40 years, are now being relicensed for another 20 years. And they weren't -- really weren't

68-2 cont.

designed to go that long. And there've been problems, and there's been repairs of this part and that part of these plants.

So they've got old vessels starting to get new tops on them. And -- and the ways of monitoring these -- these facilities weren't -- weren't designed to look at 60 years of use, and surely weren't designed to look at MOX fuel being used in them. And so the whole MOX program is -- is dangerous to me. It just doesn't make sense. And when you consider that nuclear energy only provides 20% of the energy that we have in our country, and we're going to all of these risks of the unknown with this dangerous fuel, MOX fuel, and the whole development of MOX fuel is questionable, it just doesn't make any sense to me.

69-1

I'm a mother and I'm a grandmother, and I'm ashamed that our generation is -- and the generation before me is looking at this type of electricity production and the dangers of -- that it -- inherent dangers that it has, that it's leaving to my children and my grandchildren and to their children. And I'm just totally opposed to this. I think we have -- immobilization seems like the best of the worst situations that we've got with nuclear energy and messing with this stuff to begin with. And

69-2

so I'm opposed to the MOX fuel facility. I'm in better support of the immobilization plan. But I just think this is very irresponsible behavior for the past 50 years, and it's time for it to stop. 69-2 cont.

MR. CAMERON: Thank you, Joanne.

And real quickly, we have Mr. Charles Utley who is just going to share a brief moment with us.

MR. UTLEY: Good evening. I'm Charles Utley, and I'm from the (indiscernible) Improvement Committee. Also I work with (indiscernible) and with Reverend Jenkins out of Aiken.

I just -- I wanted to just say briefly that let us not forget those communities that are impacted, and that is those communities in -- and we've talked about them being socially, economically deprived. But -- and we talk about wind shifts. And -- and all of us know how the wind blows because that even the Bible tells you that, so if you're a good Bible student you would know which way it's going to blow. 70-1

However, I want to remind you that, irregardless of race, creed, or color, there's -- if there's a fallout, it doesn't care about any of the above. But what I do want you to -- not as an NRC or

regulatory commission, I don't want you to take what President Bush has said about affirmative action and apply it to these neighborhoods. And no matter -- I know Georgia and South Carolina are at the bottom of our scholastic aptitude tests. But these are human beings that we're talking about.

Thank you very much.

MR. CAMERON: Thank you, Mr. Utley.

There's at least one thing I think -- thank you all for your patience and your comments. I think the NRC got some great, very thoughtful, specific comments tonight.

One thing that we probably should just emphasize again, and I'm going to ask Lawrence to do that for us, is -- is that, even though terrorism isn't part of the EIS, can you tell us how that is factored in in our evaluation, and just close the meeting out for us, Lawrence?

MR. KOKAJKO: Okay. I'd like to -- to make several comments before I get to that, Chip.

First of all, we are not going to forget environmental justice. We are not going to forget it, and we will look into that.

A couple of comments. Fuel is accounted for, by the way, under a materials control and accountability program. And there is monitoring at the facilities. And that's also part of our regulations.

MR. CAMERON: If you could just make sure you get that on the mic. I think it's -- it may be hard to hear you.

MR. KOKAJKO: Also the use of MOX fuel is generally considered acceptable. However, before they can even put a lead test assembly in, it has to be evaluated by both the licensee, who wants to do it, as well as us. And unless found to be acceptable by them and they submit that application to us for our approval, it does not happen.

Finally, there was two more items. One is the draft environmental impact statement for the -- is for MOX only. It is not for the PDCF or the WSB. That would have to be done separately. That would be another EIS. DOE would have to do another environmental report for that, and that would not -- since that is not regulated by the NRC, that would be under their authority.

And finally, the security concerns. I'd like to point out that security concerns are going to be considered in the safety review of the proposed facility. The safety review will consider all aspects

of safeguards, security, terrorist threats, vulnerability assessments. And that will be a determination made by the fuel cycle -- Fuel Cycle Safety and Safeguards Division at the NRC. And I think that's about it, Chip.

I would like to point out that Adrienne Lester, is she -- Adrienne. This meeting, by the way, would not have happened if it wasn't for the work of Adrienne Lester. She put on a dynamite effort to get everything and all the meeting rooms and the space here, and I'd like to -- to make a public acknowledgment for her help for the last month or so.

(Applause.)

MR. KOKAJKO: With that in mind, I have no further comments, Chip.

MR. CAMERON: I think we're -- we're adjourned, and thank you.

(Whereupon, the hearing was concluded at 10:50 p.m.)

Official Transcript of Proceedings

NUCLEAR REGULATORY COMMISSION

Title: Public Meeting on Proposed MOX Facility Draft Environmental Impact Statement

Docket Number: (not applicable)

Location: Charlotte, North Carolina

Date: Thursday, March 27, 2003

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

+ + + + +

PUBLIC MEETING ON PROPOSED MOX FACILITY

DRAFT ENVIRONMENTAL IMPACT STATEMENT

+ + + + +

THURSDAY

MARCH 27, 2003

+ + + + +

CHARLOTTE, NORTH CAROLINA

+ + + + +

The Public Meeting was held in the Charlotte-Mecklenberg Government Center, 600 East Fourth Street, at 7:05 p.m., Francis "Chip" Cameron, Facilitator, presiding.

PRESENT:

FRANCIS (Chip) CAMERON

LAWRENCE KOKAJKO

TIM HARRIS

I-N-D-E-X

I-N-D-E-X

P-R-O-C-E-E-D-I-N-G-S

MR. CAMERON: Okay. Good evening, everyone. My name is Chip Cameron. I'm the Special Counsel for Public Liaison at the Nuclear Regulatory Commission, and I welcome you all to the NRC---that's one acronym we'll be using tonight for Nuclear Regulatory Commission---I want to welcome you to the NRC's public meeting tonight.

And our topic is the draft environmental impact statement that the NRC has prepared to assist. the NRC in evaluating the application that we've received from a consortium, Duke Cogema Stone & Webster, better known as DCS; an application to construct a mixed oxide fuel fabrication facility. And it's my pleasure to serve as your facilitator for tonight's meeting. And in that role, I'm going to try to help all of you to have a -- a productive meeting tonight.

And before we get into the substance of the discussion tonight, I usually like to go over some -- some items about the meeting process, why we're here tonight, what the format and ground rules are for the meeting, and to just briefly talk about the agenda.

The agenda does not have a lot of moving

parts, so it's a simple agenda tonight. And in terms of the purpose, one purpose is we want to make sure that we clearly explain what the NRC's process is for evaluating the DCS application, and to also talk about the findings in the draft environmental impact statement, and to answer any questions you have about the process or the findings.

Second purpose and most important purpose is to hear any comments that you might have on the draft environmental impact statement. And it may be that the information you hear tonight from the NRC or any of the other people in the audience will help you to prepare any written comments that you might want to submit on this draft environmental impact statement. And the NRC staff will be explaining in a few minutes what that process is for submitting written comments. But I just wanted to emphasize, anything that you say tonight will carry the same weight as a written comment. We are transcribing the meeting, and your comments tonight will be essentially in writing because they will be on a transcript. It'll be a written transcript. And we will make that available to whomever wants to have that -- that transcript. The ultimate goal is to use the comments that we hear tonight, in the other public meetings, and the written comments, to -- to illuminate our decision-making on this application.

In terms of format, we're going to have a couple of brief NRC presentations to give you background; question and answers from you. I know you'll have questions, and hopefully we'll have answers, good answers. And the second part of the meeting is to give any of you who wish to do so an opportunity to come up to the podium and give us some -- some formal comments. And I think we -- we have a nice turnout tonight, but I don't think that we'll have to worry too much about length of time speaking, but I would like you to hold it to ten minutes, at the most. We were in North Augusta last night. We had a lot of people. And I think we got out of there at 11:00. And, although that's -- that's okay with us, we want to hear everybody, in fairness to all of you we would like to make sure that the meeting ends at the time that we had promised it would end. So try to be concise, if you can.

And in terms of ground rules, if you have a question, when we get to the question and answer, just signal me and I'm going to bring you -- we don't have our usual talking stick, we have -- I don't know what you would call this, but...

UNIDENTIFIED: A lapel.

MR. CAMERON: A lapel mic. Thank you, Mary. A lapel mic. I will bring this to you and get your question, and the NRC staff will answer it.

When we go to the formal comments, I would just ask you to come up here to the podium. And we want to make sure everybody gets a chance to speak. And I would ask that only one person speak at a time so that we can get a clean transcript and, more importantly, pay attention to whomever has the floor at the time.

We do want to keep it informal and have a discussion with you, so I would just say relax and speak what's on your mind tonight. We have people here from different parts of the -- the NRC. In addition to the NRC staff who are in charge of evaluating this application, we have people from our Office of General Counsel, from our regional office. And after the meeting is over, take advantage of talking to them about any pertinent questions you might have.

I wanted to -- to ask Adrienne Lester, who is -- did all to logistical arrangements for these meetings, to just come up and tell us about any logistical details that you think people should know about.

Adrienne?

MS. LESTER: Good evening. I would like to you thank you all for coming out tonight. And I just want to briefly go over the information that you picked out -- picked up out on the desk out there. The first thing is the agenda. And behind that you have a facts sheet which just tells you what the NRC is, what it does, and also gives you some information on the MOX facility. And behind that is a very important sheet, because it has where you can send your comments to, which are due back by May 14th. And the additional sheets behind that are just a representation of the posters back there. So you can just take that home with you and look over that.

The next sheet you should have picked up would be the slides that Lawrence and Tim are going to present tonight. And lastly is the public feedback form. And you can just mail that back to us, because the postage is already on there, or either you can give it back to me tonight.

So thank you. And we hope to hear from you very soon.

MR. CAMERON: Okay. Thank you very much, Adrienne.

Our two NRC presentations are -- first we're going to go to Mr. Lawrence Kokajko, who is right here. And he is the acting Branch Chief of the Environmental and Performance Assessment Branch at the NRC. It's in our Office of Nuclear Materials, Safety, and -- and Safeguards. And Lawrence's staff is responsible for evaluating the environmental aspects of this -- this application. And before he assumed this acting Branch Chief position, he was the -- the Section Chief of something called the Risk Task Group at the agency, which was looking at how risk should be factored into NRC decision-making. He's been involved in the reactor world, the spent fuel world at the NRC, so he has a wide breadth of -- of knowledge that he brings to his present position. And were -- were you a licensed reactor operator?

MR. KOKAJKO: A senior licensed.

MR. CAMERON: Senior licensed reactor operator. And Lawrence is going to give you the broad overview on this project, and then we're going to go to Mr. Tim Harris, who is right here. Tim is the Project Manager for the environmental review on the construction authorization application. He's been with the agency for about nine years now. And his expertise is in civil engineering, I believe. And Tim is going to walk you through -- walk us through the findings in the draft environmental impact statement. Those are the two presentations.

We also have Dave Brown, right here. Now, Dave is the Assistant Project Manager on the safety evaluation on this construction authorization. And he's here to answer any questions on the -- the safety side of the evaluation. So it's very important to understand that the NRC's review of this application has an environmental component and it has a safety component. And, although our focus is on the environmental tonight, we do know that you're interested or might have comments on the safety side, so Dave is with us to -- to help us out with that.

And with that, I'll turn it over to -- to Lawrence.

MR. KOKAJKO: Good evening. My name is Lawrence Kokajko. I'm the acting Branch Chief for the Environmental and Performance Assessment Branch in the Division of Waste Management in the Office of Nuclear Materials, Safety, and Safeguards at the Nuclear Regulatory Commission. And I'd like to welcome you to this meeting on the NRC's draft environmental impact statement for the proposed mixed oxide or MOX fuel fabrication facility.

I'd like to thank you for taking your time out of your busy day and evening to be here this evening, and we look forward to hearing from you. This meeting is one of a series of meetings---in fact, this is the third one this week---which are designed to inform the public about the draft environmental impact statement for the proposed facility, and to solicit public comment.

As Adrienne said, there are several handouts. One is a set of slides, the agenda, facts sheet, and comparison of alternatives, as well as the feedback forms. And we are especially interested in getting the feedback forms from you as well, this evening, besides your comments on the draft environmental impact statement. We would use this information to try to improve these meetings in the future. And you may either hand it back to an NRC staff member. And, once again, could I have the NRC staff members raise their hand. You can give -- give it to one of those people and we will take it back, or you can mail it in the -- back to us. And it's already self-addressed, and postage has been paid. Also, if you'd like a copy of the draft environmental impact statement you may obtain one here. We have a limited number available. And if we run out, we will mail you a copy. Next slide.

Tonight there will be two presenters, myself and Tim Harris of my staff. And we've included our phone numbers and Email addresses. And please feel free to contact us if you have any questions after the meetings.

As I indicated, the purpose of tonight's meeting is to get your comments on the draft environmental impact statement. Before we hear your comments, we'll provide some information on NRC's role in the proposed project, and describe the *National Environmental Policy Act* and the EIS process, and how the EIS fits into the NRC's decision-making. Tim will give an overview of the draft environmental impact statement, and there will be time to answer some questions before we begin to take your comments.

The proposed MOX facility would take surplus weapons plutonium and depleted uranium and make nuclear reactor fuel. Congress, in the *Defense Authorization Act of 1999*, gave NRC a role in the proposed MOX project. Specifically, the NRC has the licensing authority over the MOX facility, so our role is to make a licensing decision regarding the safe operation of that facility.

The NRC is an independent government

agency, and our mission is to protect the public health and safety, and the environment, in the commercial uses of radioactive material. Our role is different than the Department of Energy's. The Department of Energy's role in this project relates to implementing the United States nuclear non-proliferation policy, including the disposition of surplus weapons plutonium.

The Department of Energy also has a responsibility to design, build, and operate two facilities that support the proposed MOX facility. And these two facilities are the pit disassembly and conversion facility, also known as the PDCF, and the waste solidification building, or the WSB. While the pit disassembly and conversion facility and the waste solidification building are considered in NRC's environmental review, it is important to note that these -- that the NRC does not have regulatory licensing authority over these two support facilities. That responsibility rests with the Department of Energy. The NRC only has authority over the proposed MOX facility.

I'd like to briefly describe the environmental impact statement process. The *National Environmental Policy Act* requires government agencies to prepare an environmental impact statement for proposed major federal actions such as the potential licensing of the proposed MOX project. An environmental impact statement presents environmental impacts (sic) of the proposed action, along with reasonable alternatives to that proposed action. Note that the bolded areas are opportunities for public involvement in the process, and we consider this a very important part of the EIS.

NRC's involvement with the MOX project started when Duke Cogema Stone & Webster, or DCS, the applicant, submitted an environmental report and requested to construct the MOX facility. We published a notice of intent to prepare an EIS in the *Federal Register* in March of 2001. During the scoping process, the public helped determine what issues would be addressed in the environmental impact statement. We have completed the draft environmental impact statement, and we sent copies to approximately 550 people in February.

We are currently in the public comment period for the draft environmental impact statement. This meeting is being transcribed, and comments made here tonight will be included in the official comment record. And the last slide that Tim will show this

evening will show you ways you can submit public comments. We will review and consider the public comments and finalize the environmental impact statement.

As I mentioned earlier, NRC's role is to make a licensing decision regarding the proposed MOX facility. I'd like to take some time to describe the licensing process just briefly, and how the EIS we're discussing tonight fits into NRC's decision-making process. First, there are two decisions that the NRC will have to make for the proposed MOX project. The first decision is whether to authorize construction of the facility, and the second is whether to authorize operation of the facility. These decisions are shown in the middle of the slide. The NRC's environmental review is shown at the top portion of the slide, and consists of preparing the final environmental impact statement. The final environmental impact statement will be used by NRC to decide whether to authorize construction, and later whether to issue a license to operate the MOX facility.

And I need to point out that the environmental impact statement does not cover everything that would normally be covered in the safety review. For example, response to terrorists activities, which is a security and safeguards matter, is -- would be considered in the safety review, not the environmental impact statement. It is not that it's not going to be considered, it's just that the forum for that will be in the safety review and not in the environmental impact statement.

The NRC's safety review is shown at the bottom portion of the slide. The safety evaluation report for the construction authorization request focuses on a safety assessment of the proposed design bases to determine if it meets NRC's requirements. NRC's final environmental impact statement and safety evaluation report for the construction authorization request will be the basis for making a decision on whether to construct the proposed MOX facility. And we anticipate making that decision later this year.

Duke Cogema Stone & Webster plans to submit a license application to operate the proposed facility around October of 2003. The safety evaluation report on the operating application and the final environmental impact statement will form the basis for making a decision on whether to allow DCS to operate the proposed MOX facility.

I also want to point out that there will be at least -- there will be another opportunity for

hearing on the operation of the facility. John Hull, with our Office of General Counsel, is here this evening, and he can answer questions related to the hearing process.

To summarize, a single environmental impact statement will be used to support the decision to construct and later operate the proposed MOX facility. And let me also stress, once again, the environmental impact statement has a separate mission than the safety review. And the safety review will be -- will be used to determine if it meets the regulatory requirements as outlined in Title X, *Code of Federal Regulations*, Part 70.

Now, I would like to turn the presentation over to Mr. Tim Harris of my staff. Mr. Harris it lead for the environmental review for the MOX project at the NRC.

Tim?

MR. CAMERON: And Tim is going to cover a lot of material for you. And let's let him get through that material and go for questions. So if you could mark any questions that you have on your -- your view graphs, then -- so that we make sure and get them.

Tim?

MR. HARRIS: Thanks, Chip. Thanks, Lawrence.

The document we sent out is a culmination of approximately two years of effort. And I would like to provide an overview of that document. It's quite lengthy, so I'm going to try to focus the discussion on several issues. And if one of the issues we don't talk about is important to you, please ask a question and we can provide some additional detail.

I'll describe the alternatives that we analyzed in detail, and also alternatives that we considered but did not analyze in detail. And then, as I stated, I'll go through a summary of the alternatives we did analyze in detail.

To understand how we did, that---that is, which alternatives we analyzed in detail and those that we just considered but did not do a detailed analysis of---it's very useful and helpful to understand the purpose and need associated with the environmental impact statement. As we stated in the notice of intent that Lawrence noted was published back in March of 2001, the purpose and need for the MOX facility relates to a larger surplus plutonium disposition program that, as Lawrence mentioned, is

administered by the Department of Energy. So the purpose and need for this, our draft environmental impact statement, is essentially the same as used by the Department of Energy in its programmatic EIS's for the surplus weapons plutonium disposition program.

The purpose and need relates to agreements between the United States and Russia to reduce the threat of nuclear weapons by insuring that those materials are converted into proliferation-resistant form. And also to reduce the risk that that plutonium might fall into the hands of terrorists or rogue states.

The draft environmental impact statement evaluates two alternatives in detail. These are the proposed action and the no-action scenarios. The no-action alternative would be continued storage of surplus weapons plutonium at existing Department of Energy sites. The no-action alternative is used as a comparison -- as a baseline for comparing different alternatives.

The proposed action includes impacts from constructing, operating, and later decommissioning the proposed MOX facility. And it also considered impacts of other connected actions that are things that are closely related to the operation of the MOX facility.

These would be transportation of various nuclear materials, feed stocks, fresh fuel, spent fuel. And also, as Lawrence mentioned, DEIS includes impacts associated with those two DOE support facilities. And again, those were the pit disassembly and conversion facility and the waste solidification building.

The pit disassembly and conversion facility would take weapons material in a classified form, declassify the form, and convert it from a metal into a plutonium powder. That powder would go to the MOX facility where it would be mixed with depleted uranium in order to make reactor fuel. The waste solidification building would take waste from the proposed MOX facility and the pit disassembly and conversion facility and process that waste. The impacts associated with the proposed action also includes the potential use of MOX fuel in reactors.

For the proposed action, we also evaluated differences in using a sand filter versus HEPA filters. The idea of using sand filters was raised at a scoping meeting in North Augusta.

As I said before, the purpose and need is used to determine which alternatives we considered to be reasonable and were analyzed in detail, and those that were not. In addition to siting and technology

options that were evaluated by DCS in its environmental report, several alternatives were raised during scoping, and also at public meetings that we had last fall.

Immobilization was initially considered to be a reasonable alternative. However, following DOE's -- excuse me, the Department of Energy's amended record of decision, DOE believed that an immobilization-only approach would not meet the U.S.-Russia agreements. Therefore, it did not meet the purpose and need, and we did not analyze that alternative in detail.

Deliberately making off-specification MOX fuel was also raised during meetings we had last fall. This alternative involves not removing impurities that are in the -- the weapons plutonium that would make it less useful to use in the reactor fuel. They have to remove the impurities in order to make it useful in a reactor. This alternative would not remove those impurities, so you wouldn't get the waste associated with the removal, and also they would make the fuel, but it would not be used in a reactor. Instead, the off-specification MOX fuel, under this alternative, would be stored at spent fuel pools at existing reactor sites prior to disposal in a geologic repository.

The impacts of this alternative are addressed qualitatively in the draft environmental impact statement. The monetary costs of the off-specification MOX alternative would be about the same as the proposed action. That is, you would still build the facility. Those costs would still be there. However, the off-specification MOX fuel alternative would generate less waste than the proposed action. However, the benefits would be lower because you would not produce electricity. Therefore, the off-specification MOX fuel alternative was not obviously superior to the proposed action. And also, this alternative did not fulfill the U.S.-Russia agreements.

For the proposed action and no-action alternatives, the impacts associated with the following list were evaluated. In order to allow time for public comment, I won't go through the -- the exhaustive list. I'll focus on the impacts on the left, which are human health, air quality, hydrology, waste management, and environmental justice. I'll also talk about the impacts associated with transportation and potential MOX fuel use. And I'll also summarize the cost benefit analysis discussed in

the EIS.

First, I'd like to summarize the impacts associated with the no-action alternative. The impacts of this alternatives (sic) were previously evaluated by the Department of Energy, as I mentioned, the programmatic EIS's that they did. They evaluated the impacts of continued storage. And the impacts that are included in our draft environmental impact statement are essentially the same as DOE had previously evaluated.

The information packet that Adrienne mentioned includes tables which shows numerical differences. So if you want to compare the differences for a particular resource area, like how much groundwater would be used or what the air quality impacts would be, you have that information in your handouts. I'll just summarize those quickly.

The impacts to the public and workers from this no-action alternative---that is, continued storage---are considered to be low. There would be no significant water quality or air quality impacts associated with this alternative. As you can imagine, if you're storing material in a warehouse or other type of facility, you're not going to generate a lot of air emissions or -- or water impacts. Also, there would be no significant waste management impacts or environmental justice concerns.

The next series of slides summarize impacts associated with the proposed action. And again, the proposed action includes the impacts from three facilities: the proposed MOX facility; the pit disassembly and conversion facility; and also the waste solidification building. I've presented the impacts on the slides in terms of increase or decrease relative to current conditions at the Savannah River Site. And again, if you want to see the actual numerical numbers, those are on the handouts. There would be no adverse chemical or radiological impacts during construction. From operating these three facilities, the annual public collective dose would increase by about 11%. But as I'll show in the next slide, we'll put that in perspective. There would also be no significant chemical exposures during normal operations. Thanks.

This slide shows the radiation dose from several sources, and also, importantly, NRC's annual public dose limit. The average annual dose from natural background is about 360 millirem. And a millirem is just a unit of radiation exposure, to kind of give you a benchmark. If you looked at the -- the

important thing to note is NRC's annual public dose limit, which is 100 millirem. And if you -- if you provide context, if you got a chest X-ray you'd receive about six millirem. The annual dose to the public from normal operations of the three facilities would be less than one millirem. So that, while the increase is 11%, it's still less than one millirem.

Accidents have the greatest potential consequences of the impacts that we evaluated. Two conservative scenarios were evaluated in the draft environmental impact statement for a number of potential accidents. The short-term scenario assumes that people would be exposed by inhaling contaminant material from a plume that would be generated following the accident. We have also evaluated a long-term scenario. And these would include the impacts from the short-term scenario, as well as potential impacts from eating crops that could become contaminated.

The potential accident impacts are evaluated in terms of risk. The classical definition of "risk" is you take the probability of an event times the consequences equals the risk. In keeping with NRC's mission to protect public health and safety, we want to insure that the resulting overall risk to the public from an accident is very small. Therefore, events that could have significant consequences are required to be made highly unlikely through design safety features. And I think Lawrence touched on that. With the safety evaluation report is where those safety features are addressed. The safety features are not defined in the EIS. Those are covered in a separate document.

In March we notified a number of stakeholders that we had identified an error in the accident consequences that was due to a computer code bug. And we felt it was very important to get that information out to the public in a timely manner. I think I got a phone call on Monday afternoon notifying me of the error, and by Thursday we had sent out a letter to over 500 people notifying them that, hey, we think there's an error. We think the numbers are going to change. We'll provide more information.

During our review, we also found an additional error, and that was related to wind data that Duke Cogema Stone & Webster had provided in its environmental report. This error would essentially double the impacts associated with normal operations and potential accidents. However, we reviewed the impacts associated with these errors and determined

that they did not change NRC's conclusion or preliminary recommendations. That is, if you double a number that was significantly less than one millirem, that number's still going to be less than one millirem from normal operations, and we didn't consider that to be significant. If you looked at the accident impacts, if you double, say, 10 and get 20, 10 is significant, 20 is significant. That didn't change our conclusions that potential accidents have significant consequences.

We also promised in the letter that we sent out in March that we would provide you additional information. And hopefully we'll have those errata sheets prepared next week. And those will be mailed out. We're also going to post those on the Web site.

Hypothetical events caused the highest -- that caused the highest consequences were an explosion event at the proposed MOX facility. For the one-year scenario that I talked about, this would have an estimated result of less than 50 latent cancer fatalities. And then, for the long-term scenario, we estimated less than 200 latent cancer fatalities. And again, these numbers are one significant figure. So the -- the actual impact that was calculated numerically was less, but we reported 200 to be significantly accurate. These estimates for the long-term impacts do not credit any interventions that might be taken to reduce long-term exposures from eating contaminated crops. That is, it's assumed that the crops are contaminated shortly before harvest, that the people harvest the crops, eat the crops. So intervention that would follow an accident, such as not allowing people to eat crops and other things, are not credited in our analysis.

The probability -- getting back to risk, the probability of these hypothetical events is considered to be highly unlikely through preventative and mitigative features that are being developed in the safety review. The consequences of these highly unlikely events are significant; however, the overall risk---that is, consequences times probability---we believe is very small to members of the public.

I'll walk through these rather quickly. Air quality relates to compliance with national ambient air quality standards for chemical pollutants. Air quality at the Savannah River Site already exceeds one proposed standard, which is the particulate matter 2.5 micron or PM 2.5 standard. The proposed action would increase the PM 2.5 by about 0.1% during construction, and that's primarily from earth-moving

activities; and 0.01% increase from normal operations. Now, as I mentioned, this is a -- a proposed standard. EPA has delayed implementing the PM 2.5 standard. And if and when attainment plans are developed by the State of Georgia and South Carolina, SRS could be required to reduce PM 2.5 emissions or develop measures to -- to mitigate those.

Surface water would not have a significant effect -- or surface water would not be significantly affected during construction through the use of sedimentation control measures. And there would be no direct discharges during operation. Waste from the proposed MOX facility would be managed by existing Savannah River Site facilities. And discharges from those facilities are not anticipated to change significantly as a result of processing this waste. Groundwater would be used during construction and operation, and the figures are shown there. But existing well capacity exists to allow this water to be used. And it would not have a significant impact on the aquifer.

There would be no significant impact on the Savannah River Site waste management capability from processing the waste from the proposed action. Operation of the three facilities would generate about

300% more transuranic waste than is currently being generated at the Savannah River Site. This TRU waste is planned to be disposed of in New Mexico at the Waste Isolation Pilot Plant. And the volume of the TRU waste that would be generated would be about 3% of the Waste Isolation Pilot Plant disposal capacity. Operation of the three facilities would increase low level waste by about 32%, and non-hazardous solid waste by about 60% above what is currently being generated at the Savannah River Site. But, again, the current Savannah River Site waste infrastructure can accommodate these waste volumes.

In an executive order issued by President Clinton in 1994, it directed federal agencies to address any disproportionate or high adverse human health impacts to low income and minority populations. And this is commonly referred to as environmental justice. The impacts from construction and operation from the three facilities are not high or adverse; therefore, there would be no environmental justice concern associated with operating the facility or constructing the facility. However, due to prevailing wind directions, we believe that there is a potential impact to low income and minority populations in the highly unlikely event that an accident might occur.

The risk associated with that accident, as I mentioned, is considered to be very small to all populations. NRC felt it was important to include mitigation measures to help mitigate those potential impacts to low income and minority populations. And those are addressed in Chapter 5.

Transportation of material was raised during scoping as an important issue to many stakeholders. And the transportation analysis is -- the transportation analysis includes shipping the surplus weapons material from the various DOE sites to the Savannah River Site, and also includes shipping depleted uranium from an enrichment facility where it would be converted to a powder form and then go to the Savannah River Site. The analysis also includes shipping of fresh MOX fuel to a generic Midwest reactor. Transport of spent MOX fuel is also discussed generically in the EIS.

To summarize the impacts, there would be less than one latent cancer fatality from routine transportation to members of the public living along transportation routes, and also to transportation crews. The hypothetical accidents that were evaluated did not result in significant impacts.

The potential impacts of -- associated

with using MOX fuel are also discussed generically in the draft environmental impact statement. The collective dose to members of the public from normal operations would be about the same, whether you used conventional, low enriched uranium fuel, or a mixture of MOX fuel and low enriched uranium fuel.

We also looked at various design-based accidents, and found that the risk of developing a latent cancer fatality, comparing the two fuel types, ranged from about 6% lower to 3% greater. And we also looked at beyond design-based accidents, and found that the risk was about 7% lower to 14% greater. And, again, it depended on the actual scenario event tree that was looked at, which is why in some cases the impacts were actually lower.

We have received an application from Duke Power to place lead test assemblies in either the Catawba or McGuire plants. We will do additional site-specific evaluations before these lead test assemblies are placed in a reactor. That is, we will determine whether or not they can be safe -- that can be safely done. And also, before MOX -- we'll do additional analysis before MOX fuel is placed in any reactor.

The draft environmental impact statement

includes a cost benefit analysis of the proposed action on both a national and regional scale. The cost benefit was used in helping determine staff's preliminary recommendation. The national cost would be about $3.85 billion, and the national benefits would be the safe use of excess weapons plutonium, and also employment and income. The regional numbers include a 15-county area surrounding the Savannah River Site. And those numbers are provided for your review.

In conclusion, the impacts of the proposed action are generally not significant. Accident impacts from the pit disassembly and conversion facility and the proposed MOX facility are significant. However, the probability of such an accident is considered to be highly unlikely. And again, that's -- part of our job is to make sure that those accidents are highly unlikely. Therefore, the overall risk to the public is considered to be very small. There is a potential environmental justice concern should these accidents occur. And we've provided mitigation measures to do that. Also, we've been engaging communities around the Savannah River Site to help refine those mitigation measures.

Staff's preliminary recommendation is the proposed action, again with appropriate mitigation measures to reduce potential impacts in all areas. Before making any decision, NRC will consider comments on the draft environmental impact statement, and we'll prepare a comment summary document, and we'll revise the environmental impact statement as appropriate. That is, comments that you make in writing and here tonight we will review and determine whether or not the analyses need to -- need to be changed, whether we need to consider additional information. And that will be documented in the final environmental impact statement.

When DCS submits an operating license application, NRC will review that application and prepare a second safety evaluation report. NRC will only grant authority to operate that facility if it can be shown to be safe.

The last slide shows ways that you can submit comments, and these are either by mail to Mike Lesser, you can Email me, you can provide comments directly through the Web, or you can fax me. And again, I think our phone numbers are up there if you -- if you have questions. We really want to hear your comments.

And with that, I'll conclude my

presentations and hope that that was succinct enough, Chip, for a document that was two inches.

MR. CAMERON: Very, very good, Tim. Thank you. Good summary. A lot of material there.

Let's go out to you for -- for any questions that you might have about the presentation. And I'm going to go back here, and then I'll come up front. And if you could just, again, give us your name and affiliation, if appropriate.

MS. ODOM: Okay. My name is Linda Odom. I have no affiliation other than I'm from the Savannah River plant area.

I wanted to ask you, all the accidents, potential hazards that you have used are hypothetical. Why not look at the actual accidents, like I said to you earlier? When you were talking about the radioactive millirem that people are exposed to, in 1973 the accident from the Savannah River plant, it was estimated that the average person in the way received over 300 millirems of radiation. Now, how -- if that happens here, hypothetically, how would that affect people for the next 30 years?

And also, if just 20 pounds of -- of -- excuse me, 14 pounds of plutonium can cause a bomb destruction as big as Nagasaki, how big of an accident

MR. HARRIS: I guess I can't tell you what the impacts would be because I'd need a calculator, and there's a lot of things involved. The EIS does tell you, if you know how many millirem you were exposed to, you can convert that to a risk of developing cancer. And if you have questions on how to do that, give me a call and I'll walk you through the steps. But I'm not sure I want to get into calculating impacts from an accident at a Department of Energy site that happened years ago.

MR. CAMERON: Okay.

MR. HARRIS: That's kind of outside our -- our...

MR. CAMERON: But we do, in the -- in the draft EIS, as you point out, you -- we do discuss the long-term impacts of the hypothetical?

MR. HARRIS: Impacts associated with -- that are hypothetical, associated with the proposed action, which is -- which is constructing the MOX facility.

MR. CAMERON: Okay. Thank you.

Mary?

MS. OLSON: I actually wrote down three different types of questions, but I'll do them one at a time, and you can come back to me again after the

first one. Okay.

I want to appreciate that you did look at the plutonium and uranium transport portion of this program, because clearly, to do MOX at Savannah River Site you have to move plutonium. I am curious, though, because the last time somebody told me that transportation impacts were not significant, they were using a population to make that determination that never occurred to me, which was the entire U.S. population. So I -- I'd like you to remind me, anyway, what the base of your compare -- you know, your group is to be able to say significant or not significant.

MR. HARRIS: I believe that the group was just people directly next to transportation corridors. The -- as determining whether or not the public was significantly impacted. The computer code that's used to do those estimates, you plot out your route, and then it has population data along that route, and it uses formulas and -- to determine, sum up all the exposures along that route.1

MR. CAMERON: So there were...

MR. HARRIS: And that's -- it's not the entire nation. It's people directly next to the transportation corridors.

MR. CAMERON: But there -- there were specific routes that were...

MR. HARRIS: No, there were not specific routes.

MR. CAMERON: Okay.

MR. HARRIS: Living in the new age that we are with terrorism and security, the routes are not plotted. What we did provide in the EIS is the stuff would come from here to here, but we didn't tell you what roads it was going to go on.

MS. OLSON: Just a word to the wise. There's currently pending in -- I've forgotten which federal court, a case questioning whether there is an environmental justice issue around the Yucca Mountain shipments. So I guess at this point, since you find no significant impact to anybody, this program doesn't have to worry about that. But should those numbers change, it's fairly evident to the casual observation that, for the most part, low income and minority people are the ones living near those transportation routes, no matter which one they are.

MR. HARRIS: Right. Let me -- let me check, but I think we looked at that, Mary. I want to say we did. I'll get you the answer, but I think we looked at that. Again, it's a two-inch thick document

and I can't remember every word in there, but -- but I'll get you an answer.

MR. CAMERON: Do you want to ask your other questions now, or do you want me to come back?

MS. OLSON: That's it.

MR. CAMERON: I'll go to others, then I'll come back for -- for that.

Peter?

And that was Mary Olson.

And Peter, if you could just give us your name, and then we'll go to...

MR. SIPP: Sure. My name is Peter Sipp, Asheville, North Carolina. And I have two questions.

First of all, is -- you didn't talk about the Parallex Project on -- on the one page there, alternatives considered but not analyzed in detail. Would you tell me what the Parallex Project is?

MR. HARRIS: Sure. The Parallex Project is a Department of Energy-Canadian project which is an experimental project to use MOX fuel in Canadian CANDO reactors. I think the quantity associated is 35 pounds. It's a very small amount compared to 34 -- 34 metric tons.

MS. OLSON: It's a test.

MR. HARRIS: It's a test. It's an

experiment. So that's what that relates to. And it's just -- the description, Peter, is in Chapter 2. It goes into a little bit more detail.

MR. CAMERON: Peter, why don't you ask your -- excuse me, Mary, let me squeeze past.

Peter, why don't you ask your second question, and then we'll go...

MR. SIPP: Yeah. Yeah, sure.

The other question is, Linda asked about how much plutonium is going to be -- you may be answered it, but I didn't quite hear it.

MR. HARRIS: How -- how much plutonium is going to be used?

MR. SIPP: Well, I don't -- what -- what was that question, Linda?

MS. ODOM: You said that it would be regulated, the amounts that would be used. It would be a safe amount. Actually, you said it would be safe. Well, just 14 pounds from -- according to the scientist at MIT University, he said 14 pounds of plutonium, if there is an accident, a human error, that 14 pounds would cause destruction like a bomb at Nagasaki. And that's where I got that information. So how much -- I mean, 14 pounds is a really small amount to me.

MR. HARRIS: But the idea that Dave tried to say is that they use safe amounts in discrete locations. The throughput of the facility annually is about 3.5 metric tons. So 3.5 metric tons would go through the facility in any given year during normal operations. But, again, that -- the amount of plutonium would be in a number of different locations in order to make sure that it was safe.

MR. CAMERON: Okay, let's go to Dr. Patrie. Could you just introduce yourself.

DR. PATRIE: I'm Dr. Lew Patrie, L-E-W, P-A-T-R-I-E, from Asheville. I'm with the Western North Carolina Physicians for Social Responsibility.

I would like to find out -- follow up on Mary's question with regard to the denominator used for the population at risk in the case of an accident. I wonder if you could tell us the magnitude. If it wasn't the total population of the United States, if it was of a population of people along -- within a certain distance of transportation routes, what -- what is that magnitude of denominator of population?

MR. HARRIS: Can we do this, Chip? Dave is going to go over and find the number in the EIS. I'm sorry, I -- I don't have that up here.

DR. PATRIE: Another question, and that

is: What assumptions were you making when you calculated the risks of morbidity and/or mortality from acute or long-term exposure for the...

MR. HARRIS: We're talking about transportation?

DR. PATRIE: On any of the risks. Are we -- are you using the base -- assumptions based on studies that were extrapolated from world -- from the Nagasaki and Hiroshima experience?

MR. HARRIS: Yeah, we -- I think you're asking about the conversion factor to convert from exposure to latent cancer fatalities. Is that what you're asking about?

DR. PATRIE: Yes, or latent...

MR. HARRIS: The number that we used was in *Federal Guidance Report 13* which is issued by the Environmental Protection Agency.

DR. PATRIE: And do you know where they came from?

MR. HARRIS: They came from -- I'll let Dave answer that, since he's a certified health physicist.

MR. BROWN: That is -- as I understand, that is the most...

MR. HARRIS: Use your mic right there,

Dave.

MR. BROWN: I don't...

That number reflects the more recent recommendations of the ICRP. The kind of data...

DR. PATRIE: I don't -- I don't know that acronym.

MR. BROWN: Oh, I'm sorry. The International Commission on Radiological Protection. Which forms the basis for many of NRC's radiation standards, protective guides.

DR. PATRIE: Do you think those standards are primarily derived from data that was extrapolated from the bomb -- bomb experience in Japan in 1945, or do you think they have modified those, considering the studies that were carried out by people like Dr. Alice Stewart and Dr. Steve Wing, who happens to be from North Carolina?

MR. BROWN: I don't know the answer to your question about the latter part. I do know that the Hiroshima and Nagasaki bombs do form a basis for our current understanding of the risk of radiation. I'm not familiar with the latter two studies.

DR. PATRIE: I understand that they have been used as sort of sacrosanct data basis for calculating risks, even though there's other data that 71-1 suggests a low level radiation over a long period of time, and some other kinds of radiation, may not follow those premises.

MR. CAMERON: And I -- I think that perhaps we -- I think we could say, Dr. Patrie, that there -- ICRP and other organizations are continually looking at -- at new data. But whether they're looking at data from people like Wing or Stewart is -- is something that we don't know. But perhaps we could...

MR. HARRIS: Well, I...

MR. CAMERON: ...it's simple to get Dr. Patrie some information on that.

MR. HARRIS: ...I think you -- I think you can go to the EPA Web site and pull up a copy of *Federal Guidance Report 13* and look at the basis. And also I think that was a quasi-comment, Chip, that, you know, if there's a different basis or additional information that would be used to develop -- estimate latent cancer fatalities, that could be a comment.

MR. CAMERON: Good. And that's a good reminder, Tim, is that as we're asking questions here, there may be comments by implication or explicitly, and we will evaluate the transcript to make sure that we -- we capture all those, too.

Yes, sir?

MR. TROZZI: My name is David Trozzi, and I have no affiliation at this point.

I had a question concerning travel safety. And I'll try to -- try to make this as simple as I can. What protocols surround transportation, number one?

And to qualify that, is -- do -- does DOE and EPA have a mocked -- a mocked plan? In other words, if an accident happened, what do they do? And let me -- let me qualify this a little more in a time period. Years ago I worked at IBM as a safety auditor and with the haz com team. And in 1989, at the Fishkill, New York plant, we had mocked up if we were bombed, so to speak. Because it was -- it was a semi-conductive facility that used quite a bit of lethal elements or chemicals.

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And during this presentation that we -- that we did, it actually showed where the site was bombed, and what to do for it and what to do with it and how to stop that proactively. Again, this is back in 1989. And I understand this program came up in '95 when Clinton was in the -- when Clinton was in office; is that correct? So I don't know...

MR. HARRIS: '93. But yes.

MR. TROZZI: Okay. I don't know if terrorism, at that point and at that time, really was looked at as it is now. So I'm -- I'll stop right there and let you answer those questions.

MR. HARRIS: Just to make sure, you're asking one question? Okay.

MR. TROZZI: All right. Yeah. Yes.

MR. HARRIS: Okay. The answer is that the NRC is currently looking at design threats and -- the word -- the word just left me, Lawrence.

MR. KOKAJKO: The NRC takes its responsibility toward safe transport very seriously.

UNIDENTIFIED: Could you get closer to the microphone.

MR. KOKAJKO: Certainly.

The NRC takes its responsibility for safe transport very seriously, and I know the Department of Energy does, too. There are route controls and approvals, there -- many shipments are monitored by satellite and they're tracked, many have armed escorts. These shipments would qualify for those types of activities. Route approvals are not released prior to shipments. States typically are made aware and -- so that they're -- in case of -- as a shipment is rolling down the -- the highway, so that the state

governments are -- can provide certain protective features, if necessary.

And, okay, the -- the other piece I want to tell you is the NRC is also looking at interim compensatory measures for transportation, as well as other aspects of the regulatory program, to insure that they are responsive to the terrorist threat. And we're also doing vulnerability assessments on certain things that are -- that we regulate, to insure that we understand the vulnerability, so that we can protect against it. And the interim compensatory measures are one step in how we're trying to handle that.

MR. CAMERON: I believe -- do you have a follow-up, Mr. Trozzi? And I think Dave has some information for you.

Here, other questions? And, Mary, I'm not forgetting. I'm going to come back.

Yes, sir?

MR. KEISLER: My name's Bill Keisler. I'm a resident of Lexington County, South Carolina, and been active in the nuclear industry for many years, including some standards of (indiscernible) engineering (indiscernible) consulting work.

There are a couple of things. Go back to Slide #6 with the process of the environmental impact statement and the safety review.

MR. HARRIS: Dave, go back to Slide 6.

Go ahead. I'm...

MR. KEISLER: Okay. It's not clear to me. You have public comment up here with the EIS. Is there no public comment and review for the safety review?

MR. HARRIS: That's correct. Public comment is typically not a part of the safety evaluation. Again, that -- those -- the safety evaluation focuses on compliance with NRC regulations.

MR. KEISLER: Okay. Because you said -- or whoever had this slide, maybe (indiscernible) said that terrorism or whatever would be covered under the safety review and not the environmental impact, and yet the environmental impact speaks to accident analyses, in trying to keep that to a minimum.

I was a senior consultant for the Davis-Besse Nuclear Facility in the late '80s following the June '85 event. We all know that there has been a serious problem with the discovery last year of their -- the regulatory failure to that, and there are open issues that cover a broad breadth of culture internal to the NRC. Also throughout the licensee. It's too lengthy now, but there is some relevance, particularly

out of the Chicago office as relates to Paducah, Kentucky; Portsmouth, Ohio; the inspectors, same ones overseeing that didn't find a hole in a reactor vessel.

I spent 23 years on (indiscernible) boiler and pressure vessel (indiscernible), and the initial chairman of the replacement's working group, subgroup on repairs and replacements, a number of things. It is impossible to get to a hole in a reactor vessel that's leaking. And we all know that. But to conclude (indiscernible) implemented.

What we're saying here is -- but I don't know how -- and there's some things still emerging. I will assure you of that. That haven't seen the light of day yet. But it does have a relevance to this, and it was covered in the safety review with no public comment. How does the public make a comment to bring that to bear?

MR. KOKAJKO: Okay, I understand your question.

First of all, there -- I'd like to say three things. There are a number of public meetings that have occurred between the NRC and DCS over this process. And those are open, public meetings. And many times those meetings -- people have been --

public members can observe them. And typically you may have the opportunity to comment at them, and particularly if you talk to the person who is in charge of the meeting. They will allow people to speak if you want to say something.

Second thing is, there is, as I mentioned, an opportunity for hearing in this. This is a formal, adjudicatory process that -- that may occur if you have a contention. It can be admitted and it will have a hearing on it. So that is a very formalized process and a very legal process that they have to go through if a hearing is requested. I would ask John Hull to perhaps comment on that after I finish.

The latter piece, the safety oversight, NRC does not abdicate its responsibility for safety oversight. I can't speak to the Davis-Besse incident. I haven't been in nuclear reactor regulation in some time, so I don't exactly know. But I do know that there has been a rather scathing report on lessons learned from the Davis-Besse event within the NRC. That is available, I believe. And we've taken ourselves, you know, to the cleaners, so to speak, trying to solve the problems that may have led to that.

In this case, the MOX case, I think we

plan to have a resident inspector onsite for the MOX facility. It will be inspected in our post-licensing, and it will be monitored as we would any other fuel fabrication facility.

MR. CAMERON: And before we see if John wants to add anything, I guess one question for -- for you, Lawrence, is if anybody wants to find out about the meetings between the applicant and the NRC on the safety side, how would they do that, and are there minutes of those meetings that are publicly available if anybody wanted to tune into the safety side?

MR. KOKAJKO: Okay, first of all, the -- the meetings are posted on the NRC Web site. And, in fact, those all -- most public meetings are open to the public. There are some that are not, primarily when they deal with privacy act information, or perhaps when they deal with safeguards and security matters. But you can look on the Web site to see what meetings are there.

I believe, also, the Davis-Besse incident, in itself, has its own subpage on the NRC Web site, so you can go to the Davis-Besse to find out more about that.

MR. CAMERON: And minutes of the -- are there minutes taken that are publicly available?

MR. KOKAJKO: Typically...

MR. KEISLER: I'm well aware of that process.

MR. CAMERON: Okay.

MR. KEISLER: I've been involved in that process (indiscernible).

MR. CAMERON: Okay, we've got to get you on the -- the record.

MR. KOKAJKO: Let me finish that, because some other people may not know.

We do take -- we do have a meeting summary after each public meeting. Many meetings are transcribed, but I would say most probably are not transcribed. But at least a meeting summary is generated and is publicly available.

MR. CAMERON: Okay. And just -- you know, we -- we know that you may know a lot of that -- that part about it. But for other people's edification -- and we do have David Ayres here from our regional office, the inspection specialist. And why don't you tell us a little bit in regard to one question, David.

MR. AYRES: Okay, I'm David Ayres. I'm the Chief of the Fuel Facility Inspection Branch in Region 2.

MR. CAMERON: It's not obvious, yeah. I

think that that's -- so people...

MR. AYRES: And as was mentioned here just a minute ago, we do plan to have a resident inspector there at the site. If the construction authorization is approved, we would have a resident there from the beginning of construction all the way through startup and -- and beyond. Our plans are to have at least one resident there at all times.

And we are going to have fairly extensive region-based inspection program that will include virtually all of the aspects of the safety evaluation report that will come out, such that all of the -- all the commitments and requirements that are in the approved construction authorization that come out of the safety evaluation report would be inspected. So we were going to cover all the bases we possibly could.

MR. CAMERON: Okay, thank you very much, David.

Let's -- before we go back over to Mary, is there any other -- any questions over here?

Okay, Catherine, if you could just introduce yourself to us.

MS. MITCHELL: I'm Catherine Mitchell, and I'm here -- I'm not representing any organization.

But my question is: Since this program was initially started as a joint program between the United States and the Russian government to dispose of surplus materials from dismantled nuclear warheads, what plans are in place in the event of -- and certainly, in light of current events, of deteriorating relations with the Russian government? How would that affect the ongoing plan for this particular program?

MR. CAMERON: Okay, thank you, Catherine.

MR. HARRIS: Those issues, Catherine, really relate to the Department of Energy who has the overall mission for implementing the agreements with Russia and the overall surplus weapons -- weapons -- surplus weapons plutonium -- the program. Sorry.

As it relates to us, likely what would happen would be, if -- if things did deteriorate. The applicant, DCS, would withdraw their application.

MR. CAMERON: Okay, let's -- let's go back to Mary, and then we'll go to -- to Gregg.

Mary, you have another question; correct? All right.

MS. OLSON: I am Mary Olson, the Southeast Office Director for Nuclear Information and Resource Service.

I was really struck, I was really pleased, I must say, that you did give a qualitative review of the off-spec MOX plan that was put forward by Frank Von Hippel and Alice (indiscernible) and others as a way to kind of go down the middle path. I didn't agree with a lot of your analyses, but one of the things that struck me the most is this invocation of DOE's statement that the Russians might not like something that doesn't degrade the plutonium from its current isotopic distribution. And it really bothered me so much, that I had the horrifying experience of a new idea at this late date in the game.

But there's reactor grade plutonium lying around in large quantities. I mean, there may not be that much in the U.S., but West Valley operated for a while, and I'm sure there's other degraded plutonium around. We could probably even buy it at a pretty good price from European countries that really don't want to use MOX because it's so expensive. So why not just mix it. Instead of MOX it, let's mix it, and then do any of the other things we might do that wouldn't have the reactor risks associated with it, which I think you way underplayed in your cost benefit on the off-spec MOX, and DOE underplays on the immobilization decision. So, anyway, I'm now 72-1

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advocating mix rather than MOX.

MR. CAMERON: And I think we -- we treat that as a -- as a comment.

MR. HARRIS: As a comment, but let me just make sure I understand, Mary. You're talking about mixing the surplus weapons grade plutonium with reactor grade plutonium and making reactor fuel?

MS. OLSON: No.

MR. HARRIS: Or you're saying mix -- oh, I'm sorry. I got you. Mixing surplus plutonium, reactor plutonium, making off-specification mixed fuel, and storing that and disposing of it. That...

MS. OLSON: What I'm suggesting is isotopic degradation through mixing rather than irradiation.

MR. HARRIS: Okay, got you.

MS. OLSON: It might take a large quantity of reactor grade plutonium, which is why I'm suggesting that other countries might have to be vendors of this stuff. But it could be done. It would isotopically degrade the weapons grade classification. And then you would not have all the reactor-related risks, which I believe you are still underplaying in your analysis.

MR. HARRIS: Okay, that -- thank you,

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Mary.

MR. CAMERON: Let's go over here to -- to Gregg Jocoy. If you'd introduce yourself to us.

MR. JOCOY: Sure. Thank you, Chip.

I'm Gregg Jocoy. I'm here representing the York County South Carolina Green Party.

One question that I have. You talked about these resident inspectors. Now, we've all heard on the radio people -- reports that a listeria outbreak has happened in a meat packing plant and 12 people have died and 40 billion pounds of meat have been recalled and so on like this. They have U.S. DA resident inspectors, as well. How long do NRC resident inspectors stay at any one particular plant, and what steps does the NRC take to assure that the resident inspectors don't develop an unhealthy relationship with the people that they're supposed to be watching?

MR. CAMERON: We're going to go to David for that one.

David? I think you have a sense of...

MR. AYRES: Right.

Right now the time frame for resident inspectors at the sites is a maximum of seven years. And they are, you know, extensively trained in not fraternizing with the licensee, that kind of thing. I've known several personally, resident inspectors who lament about having to, you know, be kind of stand-offish in the community because they can't really interact with a lot of the people that we meet because of their status as an NRC resident inspector.

Now, I'm not that familiar with the residents at the reactor sites because I really deal with just the fuel facilities. But that's -- that's the way we've done.

MR. CAMERON: Thank you very much, David.

MR. JOCOY: Have any of the resident...

MR. CAMERON: Gregg, we better get you on the transcript. We'll give you a follow-up here.

MR. JOCOY: Thank you.

Have any of the resident inspectors at any of the power plants that have faced challenges like Besse -- I've got my state legislator on my mind. I want to call it Bessie Moody.

Have any of the resident inspectors at any of the power plants that have experienced difficulties lost their job as a result of dropping the ball and not noticing problems they should have noticed in advance, or have they been kept on? And, in fact, have people who have been resident inspectors been

hired by the companies that they were inspecting?

MR. CAMERON: David, do you have any -- any information on that?

MR. AYRES: I really don't know about the residents at the reactor sites, whether or not anybody's been let go or whatever. I do know in the fuel facility arena there have been a couple of times where the resident inspectors, after their five to seven years time was up, that they didn't want to move, so they got a job with the licensee. So that has happened.

MR. CAMERON: Okay, thank you.

Lou, did you have a question before?

MR. ZELLER: In your presentation here, Tim, you talked about impacts on public health in your investigation. And largely the discussion is about cancer effects from ionizing radiation. Are you familiar with some of the work of Dr. John Gothman that (indiscernible) on some of the plutonium weapons in the early days before he turned to medicine, produced a report several years ago which point to ionizing radiation in the form of X-rays as a major component of ischemic heart disease, wholly and separate from cancer. And what we have found is that, for example, in Barnwell County, alone, there's a 15% 73-1 elevated level of ischemic heart disease above the average of the whole State of South Carolina.

MR. CAMERON: Was that considered?

MR. HARRIS: I think -- I think the answer is your observation was correct, that we only considered latent cancer fatalities as an impact. And I don't know if you want to add more to that, Dave, as far as -- I'm not familiar with the work of Dr. Goth (sic).

MR. BROWN: I'm a little bit familiar with Dr. Gothman's work. At this time his conclusions are not part of NRC's bases for assessing risk from radiation. I would be interested in the specifics of the information you have about Barnwell County, if you could give us a citation, that sort of thing.

MR. CAMERON: And it would be appropriate if Mr. Zeller wanted to submit the information on Dr. Gothman's work for us to -- to look at.

MR. ZELLER: We've got it.

MR. CAMERON: Okay, that's -- that's good.

Before I -- and we'll -- we'll take a couple more questions and then go to comment, and then we can come back, if we have time, for questions. I know Linda has one, and Mary. And I just want to make sure that -- is there anybody else who wanted to ask

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a question that we haven't heard from at this point?

(No audible response)

MR. CAMERON: Okay. Well, let's -- let's go to -- Mary, you have one other question?

MS. OLSON: I think I'll fold it into a comment.

MR. CAMERON: Okay, good.

Well, let's go to -- we'll go to Linda, and then we'll -- we'll go over here, and then we'll get started with the formal comment. All right.

MS. ODOM: Tim, can I ask about something I read in this book that I was concerned about?

MR. HARRIS: Yeah, that -- that's...

MS. ODOM: At Wilmington, North Carolina, at a GEE plant, I was reading by the conversion of uranium hexafluoride and uranium dioxide.

MR. HARRIS: Correct.

MS. ODOM: And it said they are changing their process of converting that to -- from a wet process to a dry process. I want to know have they done that.

And also it says discharges are permitted, are -- they're monitored to insure compliance with permit requirements. I tried to find what the permit requirements would be, like how much of a discharge can they release into the environment.

And I -- can I say one thing about the Russians? By Talli Khizhnyak, he was the head of -- I'm sorry. I can spell it. K-H-I-Z-H-N-Y-A-K, who is head of the Russian nuclear agency, said it will never happen, the MOX project with the United States. And that we are paying their scientists, which I spoke to the DOE, who was kind enough to talk to me earlier. They -- we are still paying their scientists, but I understand why; to keep from the plutonium getting in terrorist hands, or Iraq, or -- which is probably a good thing. But he does say that will never happen.

MR. CAMERON: Okay, this is Section 4 point...

MR. HARRIS: No, I -- I got it, Chip.

MR. CAMERON: ...4 point -- for other people, though, 4.4.2. And I'm glad you know that, too. That's...

MR. HARRIS: You mean not everybody is familiar with the document as I am, Chip?

MS. ODOM: I read it.

MR. HARRIS: Thank you.

I think Dave's going to confirm that, in fact, they have gone over to the dry process. That's my understanding.

MR. BROWN: I'm going to ask Dave Ayres to confirm that.

MR. HARRIS: Oh.

MR. CAMERON: Let me bring this to you, David.

MR. HARRIS: But -- but it -- but, Linda, it's also important to note that we looked at both processes.

MR. AYRES: Yes, the facility at Wilmington converted over to a dry process two or three years ago. I was the inspector during the time of the conversion over to the dry process, and it has happened. The (indiscernible) detail I believe are in Part 20 either (indiscernible) in their license application. And if you need some more information, I'll get my project manager to send you some information on it.

MR. CAMERON: Great.

Okay, let's go for a final question, and then we'll...

MR. HARRIS: Can we thank David for coming? Thank you, David.

MR. CAMERON: Okay, here we are.

MR. KEISLER: This is Bill Keisler again. In July of 2000 there was one of these meetings in

Columbia, South Carolina. I attended that one. And I don't think there was a transcript made of that, at that meeting. But I asked a question there and it's never been answered. It was supposed to have been and it never has.

There's an umbrella of protection for the public that is never breached, ever, under the *Atomic Energy Act*. And yet, when we look now at the NRC-DOE interface, or even state -- State of South Carolina, I believe it indicates there's 199 licenses they have. There are issues in the State of South Carolina, violations of the *Atomic Energy Act* under 10 CFR 150, issuing licenses. There was one with an issue of a DOE contract for plutonium in a city in violation of that, who was allowed to continue to operate for seven years.

This is a unique situation now where geographically NRC has a facility inside a whole DOE boundary, 350 square miles. How is the hierarchy of authority, in the event of an accident or event, in that situation who holds that? Typically, with the way the *Atomic Energy Act* is written, it appears, with the *Energy Reorganization Act of '74* and the DOE which was in '78, that the DOE exemptions from the NRC -- NRC authority are predicated on certain conditions.

That that would fail the umbrella means, and it would instantaneously (indiscernible) the NRC.

How -- in this integration of regulatory authorities, what is the hierarchal protocol for accident events?

MR. KOKAJKO: Okay, I am -- by the way, I'm familiar with certain licensing things that we do regulate DOE on. For example, the -- the Independent Spent Fuel Storage Installation at the Idaho National Environmental and Engineering Laboratory which is storing the old Fort St. Berin spent fuel. We also regulate them and their storage of the Independent Spent Fuel Storage Installation at Fort St. Berin. So that fuel is in two different locations.

This is very comparable to the situation at Idaho where there is a small regulated area that we control within the overall site complex at the DOE, at the -- at the Idaho lab. In that case, DOE had to meet all our regulatory requirements for whether meeting the safety specifications to emergency planning, everything that -- that they would normally have to do. And, in fact, we ended up imposing upon them more stringent requirements in some areas for that facility and within the DOE complex.

And in this case, we would do the same

thing. The MOX facility would be regulated according to our safety standards. It would have to meet our standards in terms of emergency planning, procedure, control, configuration control, and a whole host of other things. And we would have that authority over them, whether it was through licensing, inspection, or enforcement. So that is -- that is allowed by the *Atomic Energy Act*, the *Energy Reorganization Act*. It is very well understood that once they submit to our licensing program that is what the rules of the game are.

MR. CAMERON: And that cannot be delegated, under the *Atomic Energy Act*, to an agreement spec.

MR. KOKAJKO: No, that cannot be delegated to an agreement spec.

MR. CAMERON: And, Dave, do you have some things to add on that? And you have a mic there, too.

MR. BROWN: I thought I would have. We did have a question last night, I believe. There is a question about, for example, there are many areas that Lawrence outlined. One is radiation safety standards, you know, which ones apply. And we think we've laid that out pretty clearly for DCS, the applicant, with respect to how to treat workers who

would be in the Savannah River Site area who are not employees of DCS and that sort of thing. So that issue, I think, has been resolved.

MR. CAMERON: Okay, thank you. And if we do have time to follow up on any of this, we will. But I think we should get on with the -- hearing from -- from all of you in terms of what your comments are. We're going to go to Mr. Lou Zeller first. Lou, if you could come up and talk to us.

MR. ZELLER: Okay, thank you. My name is Lou Zeller, and I'm on the staff of the Blue Ridge Environmental Defense League. And I appreciate the opportunity to speak tonight.

Many of you know my co-worker and my wife of going on seven years, Janet. She had hip surgery this week. She'd love to be here tonight. But she came home from the hospital today and she's recovering quite nicely. So I do want to get into my comments, though, tonight about this facility.

I do have to agree with -- with Linda, in that this may seem like a collective whistling past the graveyard, in that the international tensions and the problems between the United States government and the Russian government and the French government at this time could ultimately scotch this project. The international agreements required for it to keep moving forward, the parity requirements explicit in the agreement may ultimately cause this project to come to a grinding halt.

73-2

The $309 million increase in fiscal year 2004 budget appropriation for the plutonium fuel factory alone could be much better spent in some other area. So, the long and short of my comments is tonight that the no-action alternative would save us a great deal of money, and get us back on the right track on how to deal with dismantling weapons of mass destruction here in the United States.

73-3

One of the problems that we have identified with regards to safety lapses, false promises, environmental violations, and public health hazards, and illegal activities, have to do with one of the partners of DCS, the "C," which stands for Cogema over the last two decades. The record reveals a company which ignores or flouts the law, and which is oblivious to the dangers to public health and safety caused by its operations in Europe and in North America.

Cogema is a French company. It is a lead partner in DCS, and the sole provider of experience and techniques regarding the reprocessing of

73-3 cont.

commercial plutonium into fuel. However, weapons grade plutonium has never been reprocessed into commercial nuclear fuel.

While I won't indulge in French bashing, as is -- seems to be the -- the rage these days, at least on some of the talk radio stations, the problems of dealing with a French company which is outside of United States law is a problem for the Nuclear Regulatory Commission. So you do have to deal with that. Cogema's flagship in -- in Europe is its giant reprocessing facility at La Hague on the north coast of France. During reprocessing, toxic and radiological chemicals are released into the air and the water at that facility. A recent report released by the European Parliament found that the combined discharges from La Hague---and the nearby Sellafield Plant in the United Kingdom---reprocessing sites correspond in contamination to a large-scale nuclear accident every year.

Cogema has consistently ignored international treaties that safeguard the seas from contamination, and Cogema has chosen to disregard findings of extreme contamination and health effects resulting from its own reprocessing activities, and has refused to abate its discharges as requested by the European governments, and as mandated by international laws and treaties.

The U.S. Nuclear Regulatory Commission simply cannot and must not repeat the failures of the U.S. Department of Energy in this matter. Cogema's track record must be considered by the Commission before issue a license for construction of a plutonium fuel factory. This is entirely proper and permitted under the *National Environmental Policy Act*.

We hereby request that, as a function of its environmental review of the mixed oxide fuel fabrication facility, the plutonium factory, that the Nuclear Regulatory Commission investigate the track records of Cogema, as well as Stone & Webster and Duke Energy. I might point out to a -- a quote which comes out of the *Augusta Chronicle* regarding Cogema and the failure of the Nuclear Regulatory Commission thus far to do this very thing. In July 14, 2000, *Augusta Chronicle* article, Nuclear Regulatory Commission's Melanie Galloway said that, quote, "Whatever their record, good, bad, or indifferent, it isn't going to affect our decisions," end quote. This assumption that Cogema, Inc., will abide by United States law---that's the American affiliate of Cogema---leaves much to be desired.

73-3 cont.

Two other points which I would like to cover in my time tonight have to do with the contamination from such a facility. We have been commenting and investigating and doing research in the State of South Carolina offices with regards to the *Clean Air Act* permit which was recently issued for the Savannah River Site. Now, there are 1,500 emission sources, air emission sources located within that -- the Savannah River Site reservation emitting a great many radio nuclides, as well as hazardous air pollutants. The national emission standards for radio nuclides, other than radon, from the Department of Energy facilities states that emissions of radio nuclides to the air shall not exceed that which would cause any member of the public to receive a dose of ten millirems per year. Emission measurements from the stacks are stipulated in the existing Title V permit.

But the millirem standard for the maximum allowable dose to the public is an ambient standard, not an emission limit. The permit fails -- the existing permit fails to require any direct measurement of radioactive dose to the public, and cannot be enforced as a practical matter. This is a serious problem for many of the radio nuclide-emitting

73-4

73-4 cont.

facilities, including the proposed plutonium fuel factory.

One other point I'd like to go into here tonight is the fact that it is very difficult to estimate the emissions because of the problems with the HEPA filters, the paper filters, the high efficiency so-called filters which are an unreliable means of controlling radio nuclide emissions. We have been in touch with Dr. Peter Richards, who is a former member of the Centers for Disease Control Advisory Panel at the Idaho National Engineering Laboratory. Dr. Richards has outlined the problems with alpha emitters like plutonium which creeped through four HEPA filters in sequence, the problems with alpha migration, reintrainment of particles, and alpha recoil, which is a DOE term for the ability of alpha emitters, like plutonium, to creep through these filters.

The bottom line here is no one knows how much plutonium comes out of the last filter. The Nuclear Regulatory Commission needs to get to the bottom of the plutonium releases for this factory before moving forward. Once again, thank you for the opportunity to speak here tonight. And we will be submitting written comments before the comment

73-5

73-5 cont.

deadline.

Thank you.

MR. CAMERON: Thank you very much, Lou.

Let's go to Dr. -- Dr. Lew Patrie. And I apologize if I'm mispronouncing your name, Dr. Patrie.

DR. PATRIE: That's -- that's perfectly all right, Chip. Everybody else does.

Appreciate the presentation and the opportunity, very studied reports, so many people here tonight. I want to just say that from the perspective of Physicians for Social Responsibility, I wish to cite the dangers and massive costs of the entire plutonium bomb fuel experiment, the lesser costs and dangers of the option of plutonium immobilization, and how such a venture could affect us in North Carolina and the general area, and an apparent hidden agenda.

71-2 cont.

Dangers stem from this entire plutonium fuel experiment. The U.S. portion of the proposal involves shipment of plutonium from dismantled nuclear weapons sites in Western states, some likely by way of Interstates 40 and 26 en route to South Carolina. The greatest transportation risk would be an accident in which plutonium metal, which rapidly oxidizes when it comes into contact with air, would vaporize or burn and disburse its deadly particles, contaminating the

71-2 cont. air, our citizens inhale, the water upon which we depend, and the soil upon which we grow crops and upon which animals feed.

71-3 Inasmuch as you've already brought up the subject of terrorism in regard to a presumed reduction of MOX fuel and supposedly reducing the risk of being taken over and used by terrorists, I would also like to say the increased risks of -- the risks of terrorism on the highway create additional concerns.

Is there some reason this is making this clicking noise?

MR. CAMERON: I was going to make a joke that sometimes a raccoon gets under the podium.

DR. PATRIE: I don't know if I had a glottic click in my throat or something. But, anyway, I am sorry if it's disturbing folks.

MR. CAMERON: Don't worry.

DR. PATRIE: 71-4 Creating the proposed MOX, mixed oxide fuel fabrication factory, would be counterproductive. 71-5 Such a facility at Savannah River Site would place workers' health at greater risk from unnecessarily increasing their plutonium exposure. 71-6 It would greatly increase the radioactive waste generated that are already highly contaminated -- at the highly contaminated bomb-building plant. 71-7 It places

71-7 cont. populations in nearby areas at increased risks of exposure to plutonium and other byproducts of such a facility as stated.

71-8 I think that there has to be some consideration of the risks that are presented by the experts for reasons I've already stated in my question. I would feel better about it if there were some carefully carried out, long-term epidemiological studies by impartial, qualified scientists of workers and other potentially exposed people, populations. These should have been conducted on populations which have been exposed through air, water, or food ingestion over the many decades of the nuclear industry. Such scientists should not have their mind sets prejudiced by assumptions that were made as a result of extrapolating the data gathered from Hiroshima and Nagasaki experiences, which are pretty well limited to high levels of acute radiation. I fail to understand why such studies haven't been carried out and publicized; and further, how a DEIS can be adequately carried out without the results of such studies.

71-9 Inseparable from the proposed MFFF is the fact that once manufactured, plutonium bomb fuel is destined for use at Duke Energy's McGuire and Catawba reactors within 20 miles of downtown Charlotte. Plutonium fuel is experimental, in that the fuel derived from weapons grade plutonium has never before been used in commercial reactors. These plants are poor choices for an experimental program because their cooling systems depend on constant supplies of ice. In the event of failure for even a few hours, there is a risk of a severe accident. Plants are encased in weaker metal plates than the preferred thicker amounts of concrete. Plutonium bomb fuel is inherently more dangerous than currently used uranium fuel, in that it bombards structures within the reactor chamber with more damaging radioactivity, and would be more difficult to control, increasing the likelihood of a Chernobyl-type disaster. Compared with currently used uranium, should a nuclear catastrophe occur in a MOX fuel reactor, up to twice the number of cancer deaths would result due to the nature of radioactivity produced. 71-9 cont.

The possibility of terrorism should not be ignored, either to the reactor vessel, itself, or to the spent fuel rods that are stored onsite. A worst case scenario would result in the entire Charlotte area becoming a nuclear wasteland for decades to come, with national repercussions, and most of the 71-10

population becoming refugees. More and more danger comes from vastly increased radioactivity produced through MOX. 71-10 cont.

Promoters deceptively claim it would rid the world of plutonium, making it unavailable for future nuclear weapons use. As you well know, plutonium will be produced while MOX fuel generates electricity. The proposed parallel tract whereby plutonium is presumably converted into fuel in both the U.S. and Russia reactors would markedly increase the availability of plutonium on a global scale. It would work contrary to our national interest. It would favor further nuclear weapons proliferation. 71-11

Furthermore, MOX would vastly increase amounts of a radioactive waste for which no satisfactory solution has yet been discovered. 71-14

The railway or highway transportation of increased quantities of radioactive waste to proposed Yucca storage facility in Nevada would create new and extensive dangers which would further increase the risk to large segments of our population because of the risks of terrorism. Finally, when the Yucca facility would be filled to capacity, there would remain at Catawba and McGuire sites almost as much high level nuclear waste as is at present. In addition, these sites will continue to be attractive targets to terrorists due to their 71-12 proximity to a large population and financial center. Immobilization is the safest and least expensive alternative to converting plutonium into fuel. Even though this has been discarded as an option, ongoing immobilization was to have been developed along with the MOX program. It would consist of vitrifying plutonium, and made into a safer material for indefinite storage. It would substantially reduce the risks of accidents and terrorist procurement of this deadliest of all elements. Although it is the best choice for a problem like plutonium that we know of today, all funds for this alternative have been deleted from the budget, and the concept of such an alternative appears to have been placed on an indefinite hold. Failure to consider this option has to be considered an abysmal decision. There appears to be a hidden agenda with the decision to continue with the MFFF, despite the risks and uncertainties of proceeding with plans for this facility. The production of quantities of tritium in three of TVA's nuclear reactors which will be processed at Savannah River Site has to have significance. Such quantities of tritium can be used only in the production of nuclear weapons, and MFFF could make plutonium available in sufficient quantities for the production

71-12 cont.

71-13

71-15

of nuclear weapons. What other explanation could there be that another objective of the MFFF is in conjunction with the production of large numbers of new nuclear weapons. If this premise is valid, this should be acknowledged as part of the DEIS, and should be made apparent to the U.S. citizenry upon whose taxes this project would depend. Without a satisfactory explanation of this, the DEIS is complete. If these premises are correct and we're planning to create a new massive buildup of nuclear weapons, it will create a massive increase in the world's supply of weapons of mass destruction, and stimulate even greater risks of nuclear weapons proliferation. For the reasons I have stated, the proposed MFF should not be approved for construction.

Thank you.

MR. CAMERON: Okay, thank you very much, Doctor. And I hope that you will submit those written comments to us.

DR. PATRIE: I will expand on them and submit them later.

MR. CAMERON: Okay, great. Thank you.

Let's go to -- to Mary Olson. That's -- and then we'll -- we'll go to Peter Sipp.

Mary?

71-15 cont.

MR. JOCOY: Chip, are we going to be able to hear from people whose name -- whose faces we don't recognize? I think there are some other people on the list who wanted to speak.

MR. CAMERON: Oh, yeah, we're going through the list of people who signed up to talk, Gregg. So we'll hear them and we'll know who they are. And this is Mary Olson.

MS. OLSON: I don't mind coming later if somebody needs to leave.

MR. CAMERON: I think we're fine. I don't think we have any problems with that, so go ahead, Mary.

MS. OLSON: My name is Mary Olson. I'm the Director of the Southeast Office of Nuclear Information and Resource Service. We are a national, and now international organization in our affiliation with the World Information Service on Energy, and have 15 offices on four continents.

The office in the Southeast has been primarily focused on the MOX issue, and I want to thank the NRC for coming to Charlotte, and I want to also give the information that a number of people I know, in addition to Janet Zeller, are here in spirit because of other health situations and competing

events. So I want to emphasize that we appreciate this meeting's being held.

It's a little bit unusual for me to do a written statement. I usually like to just talk. But I do have a written statement tonight that I am going to embroider a little bit.

That being said, I'm deeply moved and having some difficulty standing here today while people are dying over the question of weapons of mass destruction, as well as power and control of resources. These matters are what ultimately we are talking about here.

The Nuclear Regulatory Commission has prepared a detailed analysis of the proposed -- proposal by DCS on behalf of their client, the Department of Energy, to build a factory to make plutonium fuel using plutonium from weapons of mass destruction that are being dismantled. NIRS is disappointed that NRC has issued a tentative approval for this project to go forward. We support the no-action alternative. 72-2

This approval is, however, based on a rather desultory dismissal of any other alternative. We are asked many times, in the introduction to the draft environmental impact statement, to concur that 72-3 making MOX will, in fact, prevent plutonium from being used for mass destruction. We are asked to take the Department of Energy's word for it that the Russians will only accept U.S. MOX fuel production to stay in the program, and that NRC, even considering in detail the environmental consequences of any other option, would violate this consummate agreement. 72-3 cont.

Nuclear Information and Resource Service rejects the idea that making plutonium fuel from weapons grade plutonium will safeguard it from use in weapons of mass destruction. In fact, we believe that placing this material into commerce will vastly increase the risk that weapons grade material will be diverted, both in this country and in Russia.

Further, since the inception of this program, the U.S. DOE has stated that the weapons grade MOX fuel would be irradiated in other countries, in addition to Russia. First Ukraine was named; later, simply, quote, "Russia trading partners" were added to the list. In case people have failed to notice, many of the countries which the current administration in the U.S. labels "evil" or "rogue" nations are on the list of those who could potentially receive this material. 72-4

If Russia supposedly will not accept any

alternative that would not degrade the isotopic composition of the plutonium, why would the United States accept a program that would -- could send weapons grade MOX fuel to countries like Iran, Syria, and potentially some day Iraq. And I'm sorry I don't have the full list of trading partners, but I'm sure it's available in the public record. 72-4 cont.

A very simple alternative was never considered by the DOE, and only recently considered by myself, which is to mix---M-I-X---mix weapons grade plutonium with reactor grade plutonium that could be purchased from any number of countries that have a huge plutonium, quote, "waste burden" that will be using it as problematic, expensive, deadly MOX fuel. There's a number of European nations with such inventories, not to mention Japan.

This mixed plutonium would then be isotopically degraded, and could be considered for a number of alternatives to MOX, none of which I am specifically advocating, but none of which would carry the risks associated with reactor use. 72-5

Instead, the U.S. Department of Energy, with lots of help from the U.S. Nuclear Regulatory Commission, is going forward with a program that places Charlotte at unprecedented risk. Plutonium 72-6

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fuel generates more radioactive activity and more deadly radionuclides than uranium fuel. In the event of an accident, or, heaven forbid, a retaliatory attack against our government or our corporations, the health consequences would up to double in proportion to the MOX fuel in the reactor core. And I will have to spend time with the current document to look at the estimates that are given there.

72-6

But that could happen on Lake Norman or Lake Wiley. We all now agree it could happen. The question is will it happen, and when will it happen. We can only hope that Duke Energy, in its international dealings, is making friends. And this is simply the tip of the iceberg.

72-7

I want to appreciate that NRC has faithfully analyzed the environmental justice impacts of the proposed factory. At the same time I am deeply disappointed. The analysis that shows that low income and minority people are disproportionately impacted by the proposed plutonium fuel factory also shows that these same people are and have been disproportionately impacted by the current and previous missions of the Savannah River Site.

72-8

There is no recognition that the decision to add new radioactive missions to this site will impact a region already weakened by previous and

72-8 cont.

ongoing exposures.

Not only is the cumulative and synergistic nature of this situation not fully expressed in the NRC analysis, but the proposed mitigation steps do not address this ongoing routine and repeated exposure.

72-9

And I will insert here that the work of Dr. Alice Stewart, mentioned earlier, found that the Hiroshima and Nagasaki studies are deeply flawed, because only the survivors of an extremely traumatic and fatal set of experiences are analyzed, and many of those who were assumed to be outside the area walked into the center to find their loved ones, or try to find their loved ones, the day of and the day after the actual blast. And so that data has been reanalyzed by Dr. Stewart to show that, indeed, the young and the old are at much higher risk for radiation.

A millirem is not a millirem, it depends on who got the millirem as to what the dose risk is. And I will also add my other comment here, that the EPA has begun to adopt a separate set of evaluation standards for childhood cancers, and I think the NRC should follow suit and not use the standard man.

72-10

Nor does the evaluation in environmental justice consider the long-term impacts of the waste from the MOX fuel factory, since the wastes are conveniently put into a shell game and moved over the NRC regulatory boundary, but not over the boundary of impact of these very same people.

This is another case of the powerful and the wealthy or the better informed dumping on those with less power or fewer resources, and less information. I have to admit that I have a part in this situation. In the years that DOE was considering where to put the MOX factory, I had working associations with people at the alternate sites under consideration in the West. There was a strong fight from people in Washington, Idaho, and Texas. Nuclear Information and Resource Service opposes a MOX factory anywhere, but we erred in not working more proactively in the Southeast to prevent the siting at the Savannah River Site. And I want to point out, while I'm in this room tonight, that it's rather convenient that the MOX factory, its potential for accidents and the environmental justice dimensions of those accident consequences, are far from Charlotte and Duke's headquarters.

Nonetheless, I do not believe that if we had placed our limited resources in the Southeast at that time, it would have been sufficient, since the decision to put the MOX factory at SRS was a *fete a*

72-10 cont.

compli. The Savannah River Site is where DOE has always processed the bulk of the plutonium it generated. Now the MOX factory has been used as the camel's nose under the tent or the cover story for the Department of Energy's long-term plan to return to making new nuclear weapons. This is no longer swords into plowshares.

72-11

As such, the U.S. MOX program has become a magnet for other plutonium missions. We must turn again to the environmental justice concerns and admit that there will be even more elevated risks of accidents if the modern pitt factory is sited at SRS. There will also be more risk of accidents at the pit disassembly and conversion facility if it is processing twice or greater amounts of plutonium. There will also be more ongoing exposures to the workers and the public. All of this is a direct consequence of DOE siting the pit conversion and plutonium polishing at SRS, ostensibly for, quote, "peaceful MOX."

72-12

The second cover story for these new pits is that it is simply refurbishment of the existing U.S. nuclear arsenal that is there for deterence. This statement is no longer credible. First, the current administration has declared deterrents a thing of the past and stated its decision to use nuclear weapons preemptively. Secondly, the Oak Ridge Y12 factory has not -- has not only been updated, it has been redesigned to make new nuclear weapons assemblies for small, usable mini-nukes. Third, the production levels of tritium in TVA reactors, as approved by the U.S. NRC, indicate an intention to fuel as many as 60,000 weapons. This astronomical number might seem ludicrous since the current U.S. arsenal has the potential to destroy every population center on earth several times over. On the other hand, the stated U.S. intention to weaponize near space would require a number of weapons on this order. I can only imagine the payoff that Duke Energy must have negotiated to posture disarmament while providing the cover for the most massive arms deployment in the history of the world.

We are asked by NRC to believe that the rejection of any alternatives to MOX is to keep the Russians at the table. Get real. This table has nothing to do with the Russians, except to put them and all other nations in the servile position that they will share once the U.S. has control of near space and can target any site on earth from space. Surgically, of course.

When it comes to the local aspects of all this, it is important to note, for those in this room who live in the Charlotte area, it is entirely possible that the brief consideration given by the NRC in this DEIS to the environmental and health impacts of the reactor use of MOX fuel may be the only environmental impact statement analysis we ever see. This document affirms that other environmental reviews will be conducted for any license amendment to use MOX. This assertion, we hope, means that there will be an environmental impact statement on the upcoming MOX fuel test, or LTA, not mentioned at all in the current report, and also when Duke applies for a license amendment for each of the reactors to begin using MOX fuel, if this program gets to that point.

72-18

There is no basis for confidence in these environmental impact statements (sic) will, however, ever be written, or that the public will have the opportunity to be involved in these decisions. I am being charitable here, since clearly we have been effectively shut out of this one by the assertion that the Russians can dictate the terms of our program. Duke has four license amendment applications for the 20-year extension of the operating licenses of Catawba and McGuire pending. Duke avoided any consideration of their participation in the MOX fuel program in these applications. When Nuclear Information and Resource Service and the Blue Ridge Environmental Defense League brought MOX into the license renewal process, the Atomic Safety Licensing Board first accepted us -- the contentions. But then the ASLB was overridden by the five NRC commissioners on Duke's appeal. Therefore, MOX use is not reflected in the NRC's supplemental EIS for the Duke reactors' license renewal at this time.

The MOX fuel test or lead test assembly program will likely be given only an internal environmental assessment, and finding of no significant impact. NIRS will challenge this amendment in an effort to broaden public participation in the decision to put people in this community at higher risk, not to mention those along the transport routes to and from Europe, and the potential for malicious diversion in transit. Nonetheless, it will be a miracle if we win a full EIS for the test fuel. The U.S. NRC could act in good faith by ordering that an EIS on the test fuel be prepared because the unique nature of this program and the fact that the overall risk environment has changed since the last time such a matter was considered for significance of impact,

which I believe would be the transport across Michigan, which was so heavily opposed by the local population, but nonetheless pursued by DOE.

As for the reactor license amendments to use MOX fuel, we similarly hope that the NRC will require that a full EIS be done for each of the reactors. We are not assured of this, however. In 1991, when then NRC Chairman Meserve was asked directly at a meeting whether the use of MOX fuel would trigger a full EIS he said no. Certainly this was an opinion, and an opinion that NIRS, and we believe the residents of Charlotte and the region, do not agree with. And we hope that the new chair will reverse this point of view.

This brings me, finally, to the concerns I raised in 1996 when then U.S. Secretary of Energy Hazel O'Leary announced the plutonium surplus disposition program in a public press conference. That day I was privileged to ask the Secretary a question that was featured later that evening on the *Leher News Hour*. My question started by pointing out that it is likely that MOX fuel use would increase the amount of plutonium in the so-called low level waste from the operations of nuclear power reactors. My question was: What would the impact of that additional plutonium be on the newly proposed, so-called low level radioactive waste dumps? The Secretary assured me that day, and the viewing public that night, that there would be many analyses performed under the *National Environmental Policy Act* before the decision to make MOX fuel would be finalized.

The Department of Energy did not analyze the impact of MOX fuel use on reactor waste in any depth, let alone any other affiliated nuclear service such as nuclear laundries, component repair, decontamination services, or decommissioning. We were told that the NRC would do this. Today we are reviewing a draft environmental impact statement that devotes, perhaps appropriately, only a fraction of its volume to the reactor use -- to the reactor use of the fuel the factory would produce. But is not the reason for the production of the fuel its use? Is it not justified, the whole program, because of production of electricity? The NRC should have done a programmatic EIS that would encompass the impacts of from what is known from all phases of this program. Instead, there are all these cracks. And, barring NRC decision to close them, my questions will continue to fall through, right along with the victims. It is -- is it

72-14

not the reason to not produce this fuel to avoid the potentially catastrophic impacts that it could wreak on this very location and a wide radius around here?

72-14 cont.

Once again, the federal government is proceeding with decisions made long ago behind closed doors, and now engaged in a masquerade where their own employees are told it is their job to play by the rules that will, in the end, inevitably deliver the right decision, no matter how thin the stated justification. In the end, that thin veil reveals beneath the players who are paid to play this game, Duke Cogema Stone & Webster, civil servants we like very much, doing their job. But who is really paying them? Who is paying them?

Us. You and me. Our tax dollars. I'm almost done. In the end it is left to the victims to fight for their rights. It is not too late to stop this mess. And I call upon all those who want to help to join forces with all the other potential victims here in Georgia, in South Carolina, to support the organizations that are intervening in these licensing proceedings, and ultimately into federal court, if that's where we have to go. Your time and your money are needed. It is sad that we must first pay these folks---it is tax season. Just remember some of your money goes to DOE and then to DCS and then to NRC. That's how these guys get paid. And then also pay to stop them. But that is the way it is when the so-called protector of the U.S. public health and safety sells out to Minatom and DOE. I sound completely resigned, but I do believe in miracles. NRC, it's not too late to change your mind. We support the no-action alternative, including not transporting plutonium at this time, particularly when this country is at war.

NIRS will be submitting written comments. We appreciate this opportunity to speak tonight.

MR. CAMERON: Okay, thank you, Mary.

[Applause.]

MR. CAMERON: Let me go to Peter Sipp, and then we're going to go to Gregg Jocoy.

MR. JOCOY: Do you know (indiscernible)?

MR. CAMERON: I don't -- I don't know. But we're calling all the people who -- who signed up. There's another person after you; okay?

MR. SIPP: Thank you, Tim, and everyone from the NRC, for coming today. And thanks for putting all the work you put into this book. Just didn't happen in five minutes.

And you are right about the minorities

being affected. Because I lived in Georgia for 21 years and I know the area quite well. I can't agree with the numbers part. I know you made a mistake and then you -- and then you changed it. I still can't agree with it. I worked at the SRS in the "K" area for six months, and there's a whole lot of folks over there that would be affected if something was to happen at the -- at this new -- these new places.

72-1:

And then your mitigation plan isn't -- isn't good enough. Sorry, but on Page 515 it -- it doesn't say anywhere where you'll have a meeting, how many meetings you'll have. And you ought to say, "We're actually going to have an actual evacuation. We're going to practice," to give -- to give the locals -- like in school, when we went to school we'd have fire drills where we'd leave our classroom and we'd go down to the other hall and we'd wait or whatever. We -- that's -- that ought to be part of it.

74-1

Back to the part about being real familiar with the Georgia and South Carolina area, there's a whole lot of two-lane roads and they would get clogged by people trying to get away. If there was a real accident and everybody was trying to get away, there'd be -- there wouldn't be -- people couldn't get away.

And with Augusta there's nearly a million people. And they call it the Central Savannah River Area. There's nearly a million people there. There just -- there wouldn't be enough people to get away safely.

And for you Cogema employees, you people from France, I want you to know I'm very proud of your president, President Chirac. He wanted to take care of the Iraq situation with inspections and the President over here wanted to give the Turkey -- Turkish people $26 billion so that our folks could go there and our supplies could go there. $26 billion could buy a whole lot of inspectors for a very long time, and wouldn't anybody gotten hurt like -- like they are right today, people being maimed and cut up. So the best toast in the world is French toast, and the best fries in the world are French fries. My -- Mary's and my daughter is engaged to a Frenchman. I take my hat off to the French people. I can't do that for -- for the administration over here trying to beat up on everybody. Doesn't work well. It's not -- people don't accept that.

And just like it doesn't work to -- to force all the -- all the smiling faces at the PR meetings that supposedly are going to be had in the minority communities, all those smiling faces, that

74-1 cont.

ain't going to be good enough to get people away when there's a -- when there's a mess, when people got to get away. All them smiling faces, that's not going to be good enough. You need to actually have evacuations and have people try to get away so they can get used to it, what roads they should go on.

And -- and then there's another small comment. When people say "the environmental," well, that's almost right. It's our environment. Takes up the same amount of space in a -- in a paragraph. "Our," rather -- "our," O-U-R, is three letters, just like T-H-E. Whereas "the" implies separation, "our" implies ownership. Can't live here without clean air and clean water. We just can't do it.

So I thank you, everyone in the NRC, and you all have a tough job. I don't think I'd want to be there. But, so thanks for the chance to talk. And I think it'd be worthwhile to consider mixing the -- the bomb grade plutonium with the other, like Mary was saying. So if you all would consider that, that'd be a good -- good option, also. There's still time.

74-2

MR. CAMERON: Okay, thank you. Thank you, Peter.

Our next speaker is -- is Gregg Jocoy.

MR. JOCOY: Thank you, Chip. I'll be

first presenting a statement on behalf of James E. Smith, Jr., who is a member of the South Carolina State House of Representatives, minority leader representing the Democratic Party in the South Carolina State House of Representatives. It's addressed to Michael Lesar, and it says, "Dear Mr. Lesar," is that pronounced right? Lesar, Lesar (pronouncing).

MR. CAMERON: Lesar.

MR. JOCOY: Lesar. Okay.

"I write you today in regards to the Nuclear Regulatory Commission's draft environmental impact statement on the impact of building a new MOX plutonium fuel factory at the Savannah River Site. I understand that the NRC has held public hearings to have public input as part of the official record. I respectfully request the Nuclear Regulatory Commission hold a public meeting in Columbia, South Carolina, prior to the end of the comment period at May 14th, 2003.

"Additionally, I respectfully request that my name and address be placed on all mailing lists for any further meetings and any -- and other public forums regarding a new MOX

plutonium fuel factory at the Savannah River Site. Thank you for your valuable time and consideration. Should you have any questions or concerns, please do not hesitate to contact me.

"With kind regards, I remain,

"Very truly yours, James E. Smith, Jr."

MR. CAMERON: Gregg, can we attach that to the transcript?

MR. JOCOY: Please. It includes the fax cover sheet.

MR. CAMERON: Okay, thank you very much.

MR. JOCOY: I had been anticipating two to three minutes, so I trimmed my -- my presentation down. But apparently I've got more than two or three minutes, so fortunately I brought the longer version with me, too.

75-1

This is a...

MR. CAMERON: Well, don't get too -- don't get too carried away.

[Laughter.]

MR. JOCOY: Three pages versus two.

This is a statement of the York County South Carolina Greens. The Nuclear Regulatory Commission has issued a draft report for comment. The

York County South Carolina Greens offer this comment on the environmental impact statement on the construction and operation of the mixed oxide fuel fabrication facility at the Savannah River Site.

The Nuclear Regulatory Commission has stated at public hearings on record that they are a regulatory agency, alone, and plays no role in the promotion of nuclear energy. Were the nuclear industry examined with a careful eye, we are certain that none of the justifications for nuclear energy would stand scrutiny.

76-1

The environmental impact statement addresses the question of cost versus benefits throughout. Because of this dynamic, it is impossible to believe that the Nuclear Regulatory Commission does not behave as a promoter of nuclear energy. The convergence of systems in the production of plutonium fuel and plutonium triggers for nuclear weapons lays bear the hydra nature of nuclear energy. Nuclear weapons cannot exist without nuclear power. The plutonium fuel program is nothing more than an attempt to prop up the nuclear energy industry, advance the production of new nuclear weapons which may well violate any number of international treaties the U.S. subscribes to, and line the pockets of those anytime-

76-1 cont.

patriots who benefit from the promotion of war and misery. Were this an agency which had at its heart dedicated to regulating nuclear energy, it would be out of business within a few dozen years. Over that sort of time frame, almost all the difficulties we face from nuclear power will be manageable, providing that the NRC acts in the public interest and shuts down each and every operational power plant as unsafe.

76-2

Instead, the NRC continues to offer a fig leaf to the nuclear industry, all the while deceiving the public as to who gets the benefits and who takes the risks.

The simple, naked truth is that those who benefit from plutonium fuel programs can be counted in the hundreds, while those accepting the risks number in the millions. The top shareholders who will get the financial benefit of this program and the top managers at the companies involved will get a huge windfall from this program. New multi-million dollar homes, top-of-the-line college education, and world travel will be funded by this program, all for a very few. These are the ones getting the benefit from this proposal.

Who takes the risks? These people and more? Perhaps. And certainly so in the case of some of the top managers of the companies in question.

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However, the stockholders who ownership stake (sic) entitles them to profits from the effort are unlikely to live anywhere close to the places where risks are the highest. A stockholder who lives in France, Japan, Saudi Arabia, the Bahamas, or any other tax haven, nor one who lives in the swankiest places in the United States is at substantial risk. In short, the rich folks will, by and large, take no direct risk to personal well-being, and millions of average people will be close enough to the action to pay the costs. The risk benefit analysis is unusable, for it assumes that benefits flowing to a tiny portion of shareholders are enough to justify the risks borne by millions of others, almost all of whom will have no chance to get a portion of the benefits.

Recently, Fred Rogers died. During a radio appearance before he passed, he took a call from a fellow who had heard him speak at his university's graduation ceremony. During that speech he asked the audience to think about the teachers who had brought them to the point that they could graduate from college. He gave them one minute. That's a long time.

I ask us now to take a minute of silence to remember. Remember the children you have raised,

the parents who raised you. Think about grandchildren, born and as yet unborn. Think about your loves, your friends, your co-workers. Consider the serious nature of the risks you are considering exposing them to, and think about plutonium fuel with them in mind. Think seven generations down the road, about where we are, how we got here, and how we can get out of this mess. One minute to think. Concentrate on those we love the most, who love us the most.

(Momentary pause.)

76-3

MR. JOCOY: Thank you.

MR. CAMERON: Okay, thank you, Gregg.

We have another speaker, and someone from the Charlotte Green Party. I'm sorry I didn't, you know, have your name on the list.

DR. AULETTE: I wrote it down.

MR. CAMERON: Well, why don't you come up and introduce us.

DR. AULETTE: Hello. My name is Dr. Judy Aulette, and I'm a member of the Charlotte Area Green Party. I'm here to present our organizations reactions to DEIS.

The Charlotte Area Green Party would like to thank the NRC for this opportunity to speak about the mixed oxide fuel factory proposed for the Savannah River nuclear site. At first glance, the draft environmental impact statement appears exhaustive, even to the point of being overwhelming. However, there is no overall assessment of the risk which would accumulate from all of the processes involved in the MOX production, in its transport, and in its use as a fuel. Information is presented in such a fragmented manner that it is very difficult to see the whole picture. No average citizen can be expected to glean from the statement the information necessary for a decision on whether or not to support the plans of -- of Duke Cogema Stone for a MOX factory at the Savannah River Site. 77-1

In addition to there being no overall assessment of risk for humans and the environment, there are several additional issues we wish to mention. First of all, there is no environmental impact information on MOX use in the specific reactors which will eventually burn this fuel. These reactors will have to be modified for MOX. The effects that these modifications may have on performance of equipment at these reactors has not been considered in this DEIS. 77-2

Second, there is no consideration given to 77-3

the environmental impact of the lead test assembly program which will impact the Charlotte area as part of the preparation for the use of MOX. These impacts include not only the dangers of putting experimental fuel into a nuclear reactor core, but also the transport of the plutonium and fresh MOX fuel. 77-3

Third, there is not yet an environmental impact statement on the new plutonium pit factory in South Carolina that seems to be part of the whole deal. Such a report may not be an assigned duty of the NRC, but it is a study that is necessary for a complete assessment of risk of this ever-expanding plan. 77-4

Fourth, although we were glad to see that the required environmental justice policy is being implemented, we do not believe the mitigation measures suggested are sufficient to achieve environmental justice for the low income populations in the area surrounding the SRS. At least these three additional efforts should be made.

First, we believe there need to be warning sirens in the area of the facility; second, there should be free health care for those with health risks elevated due to the operation of the facility; three, some economic benefit should be provided for those who 77-5 reside near the MOX facility to offset the economic and health disadvantages of living in the area. However, we want to be clear that these efforts do not justify exposing any population to the hazards of MOX production.

Fifth, there is no mention of possible security problems at the facilities manufacturing and handling MOX. There's now an undeniably higher risk of domestic terrorism than ever before, and these facilities would be prime terrorist targets. And I know a lot of other people who articulated this very well tonight, but I just thought it was worth mentioning because I think it -- it is a serious issue. 77-6

Sixth, someone, whether it is DOE or the NRC, needs to do an environmental impact study of waste management in the manufacture and use of MOX. This is a particularly glaring omission of relevant facts. 77-7

Although the Charlotte Area Green Party appreciates the time and effort of the NRC in hosting these hearings, it is our fear that the NRC is just going through the motions of pretending to listen to public comments, when the decision to build and use the facilities is already being taken for granted by 77-8

77-5 cont.

the companies involved. Why, for example, has Duke Energy already stated its commitment to the use of MOX fuel? It appears they do not intend to pay attention to the concerns of the public. 77-8 cont.

In closing, we would like to urge the NRC not to approve the construction of the MOX factory at the Savannah River nuclear site. The NRC's draft environmental impact statement has failed to convince us that this enterprise involves an acceptable level of risk either to humans or to the natural environment.

Thank you.

MR. CAMERON: Thank you, Doctor, for those specific recommendations, too. We appreciated that.

That's the last speaker that we -- we have. And I want to go out to you again to see if there's any last questions. But I thought that I'd ask Lawrence Kokajko if there's anything that he heard that he might want to clarify for us. 77-9

MR. KOKAJKO: Thank you very much. I appreciate you all coming out. We did hear some new comments this evening that we have not heard in the previous two meetings, and we do appreciate them. And we also hear some of the same concerns, too, that we've heard at both of the previous meetings, as well.

I'd like to -- to provide a few clarifications. One is the -- to use the MOX fuel in the reactors does require license amendment. And that is handled by the Office of Nuclear Reactor Regulation. And as -- as you may know, for an amendment to the operating license there is some type of environmental assessment done, as well as an opportunity for hearing. I do not know the full status of that, but I know the licensee has to do a review, and I know we have to do a review, and we have to approve it. The project manager for that, I believe his name is Robert Martin. And if you would like to contact him to get the details on that amendment...

UNIDENTIFIED: I speak with him regularly.

MR. KOKAJKO: Okay. I -- I do not, so -- but I do know that those things are done in the normal Part 50 process.

Also, you mentioned about EPA and NRC, about the child doses. There is a -- in the federal government, a -- something called ISCORS, Interagency Steering Committee on Radiation Safety. That is being -- that is one of the topics that they do discuss, and the NRC and the EPA are working together to come up with something in that regard. I do not know the

details of that, but I do know that that committee does exist and those things are occurring.

MS. OLSON: NRC's participating in that?

MR. KOKAJKO: In ISCORS; yes, ma'am.

MS. OLSON: Well, I know in ISCORS, but is it...

MR. CAMERON: Let's -- let's make sure we get this on the record. I apologize for the awkwardness of not being able to just have a simple conversation, but we do need to get it on the record.

MS. OLSON: I appreciate that you're telling people about ISCORS. I am aware of ISCORS. But I was not aware that NRC was participating in a consideration of a new way to set standards that would consider children in a different way than the standard man. So this is news to me. And let me understand that you are saying that NRC is proactively seeking to participate in this?

MR. KOKAJKO: The -- what I can tell you is that we are aware of it and we're following the work. I cannot tell you that we have -- we have made a -- reached an agreement with the EPA or anyone else as far as what the outcome will be. But I do know that that work is -- is ongoing. That's -- that's what I'm trying to tell you.

One of the things that also was brought up about Cogema, in particular. But the Duke Cogema Stone & Webster consortium would be under our oversight. If Cogema, to the extent that their involvement in this activity, once it is licensed, they would be within our regulatory reach. So Cogema does not exist as this French entity that is beyond our control. Because they've submitted themselves in this consortium, and if this activity does get licensed, that company, DCS, would be within our regulatory reach.

And the final thing I want to say is that there has been no approval, tentative or otherwise, that has been made regarding the construction or operation of this facility. DCS can take no action as a result of the draft environmental impact statement or even the final environmental impact statement. That decision is based upon -- both the decision to -- to construct and operate the facility can only be made after the safety evaluation is complete, the safety evaluation reports are prepared, and any conclusion of any adjudication, as a result of a hearing request, has been made. So there has been no decision reached anywhere in this process yet.

What we're saying in today (sic) is that

there is a -- for the environmental review, the tentative conclusion is that we feel we understand the environmental impacts, and we feel we understand it enough that we wanted to come out and solicit public comments. That's why it's a draft. That's why the Congress, in its wisdom, said you will have two processes here. You're going to go out with a draft first and get -- seek other comments, and then you come out with a final. And that's why we're here this evening. So I'd like to make sure that we understand no decision has been reached on the -- the proposed MOX facility.

MR. CAMERON: Okay, thank you.

Is there anybody who has not had a chance to ask a question or anything, that you've been listening to a lot of us who's -- anybody else who wants to ask a question or say anything?

Let me see if there's anybody else first, and then we'll go over there. Anybody? All right.

MR. KEISLER: This is Bill Keisler again, in regards to environmental justice. This included this environmental impact statement, but there was a paper given or a speech given I believe in Australia July 2000 by one of the commissioners, stated that the -- being an independent agency, the NRC was not bound by executive order for the application of environmental justice standards.

MR. HARRIS: I was at that meeting with Commissioner Dicus, and I don't believe she made that statement. I think the point...

MR. KEISLER: Well, it was on the Web site (indiscernible).

MR. HARRIS: ...I think the point she was trying to make was that environmental justice could be viewed in a broader sense.

MR. KEISLER: She stated that it did not -- that they -- the NRC tried to accommodate it where they could, but was not bound by that executive order.

MR. CAMERON: Maybe I could...

MR. KOKAJKO: Let me -- let me...

MR. CAMERON: Go ahead, Lawrence, you -- you can clarify this.

MR. KOKAJKO: Okay, yeah, I -- I think I know the answer to this.

There is -- we're under a federal system of government. Once again, the Congress, in its wisdom, when it set up the Commission, it -- we are -- exist as an independent executive agency. And we do not follow under the executive branch, as say the Department of Energy or the Department of Commerce,

where they have to follow the presidential orders.

What we do is, we evaluate them to see what may be applied to us, and then, you know, we may take it, we may not. The Securities and Exchange Commission also does the same thing. That they, as an independent agency, they can try to be independent of the executive branch as necessary.

The interesting thing is the NRC has said we would take the executive order on environmental justice and we would apply it. And we have, in fact, done so. Environmental justice is a very big concern. We are -- in fact, I know that our environmental review group, of which Tim and Adrienne and Stacy are involved in, take environmental justice very seriously. And, in fact, I would say that environmental justice has been one of the -- the stronger comments and themes throughout each of these meetings, particularly the first two meetings that we had on the draft environmental impact statement.

So the answer is we are following the environmental justice. I believe we did write -- we did write back to the executive branch and we said we would follow it to the degree that it applied to our environmental impact statements.

MR. CAMERON: And -- and, in fact, the NRC

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00078

WOMEN'S ACTION FOR NEW DIRECTIONS
484 Cherokee Avenue, SE, Suite 201, Atlanta, GA 30312
Phone: 404-524-5999
Fax: 404-524-7593
wandatlanta@mindspring.com

Atlanta
4/28/03
68FR9728
(11)

RECEIVED
[illegible] 2:34
Rules and Directives
Branch

ML0314 0007

April 16, 2003

Dear Mr. Closer:

As a U.S. citizen of Georgia and a member of Women's Action for New Directions I would like to commend you & the U.S. government for understanding the importance of dealing with plutonium so that it is not used to make weapons.

However, I have grave concerns about the DEIS process. First, I am deeply concerned that DEIS has not addressed the reasonable alternative to MOX - plutonium immobilization. Immobilization would meet the goal of safeguarding weapons-grade plutonium, and it would provide a large number of jobs, less waste, and it would be cheaper! 78-1

Also, the DEIS process fails to address operational plans & licensing. The environmental impacts of operation must be considered before the DEIS process is completed. 78-2

E-RIDS = ADM-03
Add: M Harris (TEH)
A Lester (ACL1)
Template = ADM-013

Most importantly, the DEIS finds from 50-200 people in low-income, minority communities will die from an explosion at a MOX factory. As an environmental & racial justice issue, this risk is unacceptably high. 78-3

Please address the following deficiencies in the final EIS:

1. MOX vs. Plutonium Immobilization (which provides more jobs & is safer!)

2. Failure to subject operations data to review in EIS process

3. The unacceptably high risk of 50-200 deaths in an explosion at a MOX plant.

As someone living close to the S.R.S, the above must be addressed in the EIS process to ensure support for any program dealing with weapons grade plutonium by the local community.

Thank-you,

Amanda Vose
Atlanta, GA

ML 03113 0043

April 11, 2003

2/28/03
68FR 9728
(10)

Linda Ewald
949 Ponder Rd.
Knoxville, TN
37923

00079

Michael T. Lesar, Chief
Rules + Directives Branch, Division of
Administratives Services, Office of Administration
Mail Stop T-6D59
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Lesar,

I am writing to express opposition to production of mixed-oxide (mox) fuel from surplus weapons plutonium at the Savannah River Site nuclear facility. 79-1

This is experimental program has never been pursued at this scale. It poses a serious threat to public safety and health and will increase the volume of hazardous, radioactive waste streams at a location already plagued by dangerous waste contamination. 79-2

An accident could have severe consequences in nearby communities which are primarily minority and low-income. 79-3

This proposal also raises complex consumer and rate-payer concerns over government subsidies unfairly favoring a destructive type of energy production over environmentally safe alternatives. 79-4

Please reconsider conclusions made in the Draft Environmental Impact statement released in late February.

Sincerely,
Linda Ewald.

Template = ADM-013

E-RIDS = ADM-03
Add = T. Harris (TEH)
A. Lester (ALL2)

RECEIVED
2003 APR 21 AM 10:54
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ML031140009

4/08/03
68FR 9728
(13)

Michael T. Lesar
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Lesar,

I am writing concerning the DEIS for the MOX application. I am concerned that the DEIS is being finalized before the MOX operations license is submitted for NRC review. The operation of the MOX facility must be subject to review during this same period in the NEPA process governing the EIS. Not reviewing critical aspects of containing the highly dangerous plutonium is irresponsible and blatantly wrong. Separating the construction and the operation of this planned facility in the review process makes no sense. 80-1

Although it is laudable that there is discussion of the environmental justice impacts of the MOX facility in the DEIS, no deaths are acceptable for a plant designed to safe guard plutonium. The mitigation described for this disproportionate impact on low income and minority people is not adequate. There are not even any sirens in the area. Why not provide health care to the communities most impacted by this facility? 80-2

The DEIS does not address the reasonable alternative to MOX – plutonium immobilization. NEPA requires presentation and analysis of a choice of alternatives! This alternative, which would also provide jobs, is cheaper than MOX, has a much smaller waste stream, and could provide effective management for existing waste stocks at SRS. 80-3

Sincerely,

Betsy Rivard
3388 Valley Circle, NW
Atlanta, GA 30305

Template = ADM-013

E-RIDS = ADM-03
Add = T. Harris (TEH)
A. Lester (ACL1)

00081

WOMEN'S ACTION FOR NEW DIRECTIONS
Atlanta
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ML031140008

April 16, 2003

Mr. Michael T. Lesar
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

3/28/03
68 FR 9728
(12)

Dear Mr. Lesar,

Women's Action for New Direction has been studying the problems of plutonium during MOX processing. I have become very concerned that the Draft Environmental Impact Statement for the MOX project estimates 50 to 200 latent cancer fatalities from an explosion at the MOX facility. This catastrophe would be hardest on the poor minority communities living near the Savannah River Site. 81-1

An attractive alternative to MOX immobilization should be analyzed and compared to MOX. 81-2

I am most concerned that the EIS process would terminate before the NRC reviews the MOX operating license. 81-3

Please address these deficiencies in the final EIS. We feel the magnitude of this process should be made clear to the public - now -

Sincerely,

Berta Laney

Template = ADM-013

E-RIDS = ADM-03
Call = T. Harris (TEH)
A. Lester (ACL1)

Adrienne Lester - Re:NUREG 1767 | Page 1

00082

From: Chris Miller <csmsav@bellsouth.net>
To: <teh@nrc.gov>
Date: 5/5/03 12:35AM
Subject: Re:NUREG 1767

Michael T. Lesar, Chief, Rules & Directives Branch,
Division of Administrative Services,
Office of Administration,
Mail Stop T-6D59,
U.S. Nuclear Regulatory Commission,
Washington, DC 20555.

Mr. Lesar,

As a Savannah resident and a US citizen who is concerned about the health, safety and security impacts of Federal programs, I am deeply troubled by the DOE's proposed MOX facility at the Savannah river site.

I have read the recently released EIS and I am strongly opposed this proposal until the following issues can be reasonably addressed:

* Shouldn't terrorism be addressed in the report? (P. I-29) 82-1

* Shouldn't environmental justice impacts along transportation routes be evaluated? (more important than studying "visual impacts" - P. I-26) 82-2

* Shouldn't emergency preparedness in dealing with accident impacts in nearby communities be studied? (P. I-29) 82-3

* Should any deaths be considered "acceptable"? Why are some communities unfairly burdened with higher risks? (P. 4-57) 82-4

* Why aren't safer and cheaper options being studied? (P. 2-23) 82-5

* Shouldn't it be clearly stated what is really going to be done with surplus weapons plutonium stockpiles before the NRC approves the MOX facility? 82-6

Chris Miller
314 E. 65th St
Savannah, GA
912-351-0649

MAY-06-03 TUE 01:40 PM JOHN KING 7068783459 P.01

00083

ATTENTION: TIM HARRIS

May 6, 2003
304 Manor Drive
Sautee, GA 30571

Michael T. Lesar, Chief Rules & Directives Branch
Division of Administrative Services
Office of Administration Mail Stop T - 6D59
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Lesar,

Please consider my opposition to a MOX facility at the Savanna River Site and any use of Mox fuel in our nations nuclear reactors.

I have followed nuclear issues for a number of years, have attended DOE risk assessment workshops, and been a speaker at forums along with NRC spokespersons. In other words, I have done my homework. I am also a Duke Energy stockholder.

I don't want another nuclear production facility on Georgia's borders. I don't want more nuclear waste....in any form....stored anywhere in the country. I don't want a company in which I have a financial interest to be involved in this risky and experimental program.

The only really proper roll for the Nuclear Regulatory Commission at this time is security and clean up. Mox helps neither. 83-1

Sincerely,

Joan O. King

Joan O. King

Adrienne Lester - Mime.822 Page 1

00084

Received: from igate.nrc.gov
by nrcgwia.nrc.gov; Wed, 07 May 2003 22:13:31 -0400
Received: from imo-r02.mx.aol.com (imo-r02.mx.aol.com [152.163.225.98])
by smtp-gateway ESMTPos id h4829IOD007262
for <teh@nrc.gov>; Wed, 7 May 2003 22:09:18 -0400 (EDT)
Received: from LALALAND18@aol.com
by imo-r02.mx.aol.com (mail_out_v34.22.) id f.127.28e23ef2 (15865)
for <teh@nrc.gov>; Wed, 7 May 2003 22:13:22 -0400 (EDT)
Received: from aol.com (mow-m31.webmail.aol.com [64.12.137.8]) by air-id06.mx.aol.com (v93.12) with ESMTP id MAILINID64-3df93eb9bd411cb; Wed, 07 May 2003 22:13:22 2000
Date: Wed, 07 May 2003 22:13:21 -0400
From: LALALAND18@aol.com
To: teh@nrc.gov
Subject: Plutonium and MOX Fuel
MIME-Version: 1.0
Message-ID: <4B62AEC4.33F65E95.0ACAED16@aol.com>
X-Mailer: Atlas Mailer 2.0
Content-Type: text/plain; charset=iso-8859-1
Content-Transfer-Encoding: 8bit

In response to the review being done of these military tools, I would like to register my outrage and disgust at the preparedness of the govenment to continue to disregard years of advancement in protecting the public health and natural environment. The testing and transport of these fuels continues to unfairly burden less fortunate communities. How will this be reconciled? The current plans do not allow for accident protection to these communities. Also cheaper and safter methods of acheiving the same ends have not thoroughly enough been explored. I hope a future review would consider other options that would less negatively impact our environment. 84-1 84-2 84-3

Lauren Sorkin
10 Pinkham Road
Medford, MA
02155

(732)-690-6221

00085

From: Valentino, Adrienne [Adrienne.Valentino@us.gambro.com]
Sent: Tuesday, May 13, 2003 8:38 AM
To: 'teh@nrc.gov'
Subject: Plutonium concern

Dear Mr. Harris,

I am a citizen of Savannah and very concerned about the shipment of weapons-grade plutonium to the Savannah River Site. It is my understanding that this nuclear site already has a long history of poor compliance w/ previous regulations concerning proper containment of hazardous materials. Now the NRC is considering expanding this facility?????? 85-1 85-2

I am concerned for the safety and health of all the individuals in this area. These safety issues have not been given the attention and study they deserve. I do not feel your organization has given us conclusive evidence that this site is "safe" for the community that lives around its' borders currently, much less that the people will be safe when this facility is expanded. Where are the health records of the surrounding communities now, before this expansion? 85-3

Throughout the country, individuals are concerned about a terrorist assault. How will this site be protected from a terrorist threat after the expansion when it is already highly vulnerable to this type of an assault? 85-4

Another major concern is the effects of these materials into our ecosystem. Nuclear waste is already seeping under the Savannah river and likely soon into our water system. Our precious marshes are dying. This is where 90% of the fish in the sea originate. Do you not realize that destroying a highly sensitive ecosystem like this will have profound effects on the entire world? Does this not justify a little further reasearch? 85-5

There are too many unanswered questions. When I have written previous letters, my concerns were not addressed nor even responded to. Please consider our concern for our community and our environment. Destroying coastal GA may mean little to the majority of the country, but our marshes alone should warrant further study before proceeding w/ this expansion. 85-6

Thank you for you time,
Adrienne Valentino

1

DUKE COGEMA
STONE & WEBSTER

Mr. Michael T. Lesar, Chief
Rules & Directives Branch
Division of Administrative Services
Office of Administration, Mail Stop T-6D59
U.S. Nuclear Regulatory Commission
Washington, D.C 20555-0001

13 May 2003
DCS-NRC-000133
Response Required: *No*

SUBJECT: Docket Number 070-03098
Duke Cogema Stone and Webster
Mixed Oxide Fuel Fabrication Facility
Comments on *Draft Environmental Impact Statement on the Construction and Operation of a Mixed Oxide Fuel Fabrication Facility at the Savannah River Site, South Carolina*

On 14 February 2003, the Nuclear Regulatory Commission (NRC) issued the *Draft Environmental Impact Statement on the Construction and Operation of a Mixed Oxide Fuel Fabrication Facility at the Savannah River Site, South Carolina* (Draft EIS). In the 28 February 2003 Federal Register notice, comments were requested by 14 April 2003. In a 6 March 2003 letter to stakeholders, Mr. Lawrence Kokajko, Acting Chief, Environmental and Performance Assessment Branch, stated that the comment period was extended 30 days to 14 May 2003. Duke COGEMA Stone and Webster (DCS) submits the attached table of comments on the Draft EIS. DCS would like to highlight the following comments because we believe they represent significant issues.

1. DCS agrees with the Draft EIS conclusion that the recommended action is to proceed with the licensing of the Mixed Oxide Fuel Fabrication Facility. 86-1

2. DCS also agrees with the Draft EIS position to not evaluate immobilization as an alternative. The Department of Energy, as the federal agency charged with developing the surplus plutonium disposition strategy, has already eliminated immobilization as a viable alternative. 86-2

3. The bounding accident for the Mixed Oxide Fuel Fabrication Facility--an explosion in an aqueous polishing cell--was not properly characterized. The discussion provided in Section 4.3.5.2 and Table 4.12 fails to explain that the accident is prevented. *See Draft Safety Evaluation Report on the Construction Authorization Request for the Mixed Oxide Fuel Fabrication Facility* ("Draft SER") Table 10.1-3, footnote b. The Draft EIS should clearly state that an explosion in an aqueous polishing cell is provided for illustrative purposes because, pursuant to NRC's own regulations, the design safety features, will prevent such an 86-3

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accident. The Draft EIS further fosters a misimpression on the public by postulating that, once this hypothetical accident occurs, neither DCS, the Department Of Energy, NRC, nor the States of South Carolina or Georgia would take any intervention to protect the public by removing contaminated food or soil. *See* Draft EIS page 4-36, lines 8-18. In fact, the document further assumes that contaminated food is distributed outside the immediate vicinity of the Savannah River Site. *See* Draft EIS page 4-41 lines 25-38. These assumptions are inconsistent with the NRC guidance to use "reasonably foreseeable" accident evaluations that are coordinated with the Draft SER. 86-3 cont.

4. In addition to being unreasonably conservative, the Draft EIS projects a potential environmental justice impact for an accident that is prevented by the designed safety systems. The Draft EIS proceeds to impose mitigative actions (*see* Draft EIS, pages 5-5, lines 18-40 and 5-6, lines 1-11) for this hypothetical accident that is prevented. The projection of an environmental justice impact and inclusion of these mitigative action requirements are inappropriate and inconsistent with the goal of NEPA to provide the public with meaningful environmental analyses, and should be removed from the Draft EIS. 86-4

5. The Draft EIS, on pages xxi through xxiv and pages 5-2 through 5-6, lists 43 highly specific mitigative actions, such as, "…the use of straw bales or siltation fences adjacent to areas disturbed during construction…" Many of these mitigation measures simply duplicate state or other federal agency regulations with which DCS is already required to comply. For example, DCS is required to comply with OSHA regulations regarding workplace exposure to chemicals and South Carolina permit requirements for air emissions from the concrete batch plant. The Draft EIS should be modified to state that DCS will comply with the regulations of the appropriate regulatory agency. 86-5

If you have any questions please contact me at 704-373-7820 or Mary Birch at 704-382-1401.

Sincerely,

/s/

Peter S. Hastings, P.E.
Manager, Licensing and Safety Analysis

Attachment: DCS Comments on *Draft Environmental Impact Statement on the Construction and Operation of a Mixed Oxide Fuel Fabrication Facility at the Savannah River Site, South Carolina*

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1	1.1.2	1-3 / 11-15	Although the DOE has prepared previous EISs that cover impacts of the proposed MOX facility on a programmatic level, those EISs are not considered sufficient to meet NRC needs under NEPA, because DCS has since submitted additional site-specific information, and the proposed MOX facility design has been revised since the DOE's EISs were issued.		Suggest rewording the statement to say that NRC has prepared this DEIS to incorporate additional site specific information and design detail and satisfy the requirements of 10 CFR Part 51 without the judgmental assessment that the DOE SPD EIS is "not considered sufficient."	86-6
2	1.4.1	1-12/ 11-14	A number of commenters requested that the SPD EIS prepared by the DOE be supplemented and many of the decisions already made by the DOE be revisited. Because the scope of this DEIS is limited to the licensing action now under review by the NRC, which is specific to the proposed MOX facility, issues pertaining to decisions already made by the DOE are addressed by referencing the appropriate DOE analysis.		The statement in the DEIS is misleading. Although NRC indicated that they would rely on the appropriate DOE analyses, the NRC recalculated accident analyses described in the DOE SPD EIS using extremely conservative models and assumptions resulting in significantly different impacts than in the DOE SPD EIS.	86-7
3	2.2.3.3.3	2-13/ 42	Wherever possible, the solid wastes would be compacted by the SRS to reduce volume and disposal costs. (Emphasis added)		Currently, SRS is compacting solid waste whenever "practical" rather than "possible."	86-8
4	2.2.4.1	2-14 / 32	Most of the solid waste generated in the WSB would be mixed with concrete and poured into approved containers.	ER Appendix G, G-1.2, Waste Processing	This is an incorrect statement. The **processed liquid wastes** will be mixed in the WSB with concrete and poured into containers to produce solid waste. The solid waste will not be mixed with concrete.	86-9
5	2.2.4.1	2-14/ 46	The LLW form would be sent to E-Area (SRS) or to another permitted disposal site.		Change "permitted" to "suitable". DOE LLW sites are neither permitted nor licensed nor do they need to be.	88-10
6	2.2.4.2.1	2-15 / 31-34	The WSB receipt tanks would be sized to hold three transfers (six weeks capacity in two 11,400-L [3,000-gal] tanks).	ER Appendix G, Table G-7	DEIS should not specify design details such as tank sizes. Otherwise, design evolution might mandate DEIS revisions. Where necessary, bounding conditions can be specified for impact projections; but these should be restricted to the discussions where they are needed and not simply cast about in general descriptions of the facility.	86-11
7	2.2.4.2.1	2-15 / 40-42	After neutralization, the waste would be pumped to two 110-L (30-gal) cement head tanks. One tank would receive material while the other tank is being pumped to the cement mixer. A metering pump would inject controlled amounts of the waste stream from the 110-L (30-gal) head tank to a cement mixer to be continuously mixed with supplied dry		DEIS should not specify design details such as tank sizes. Otherwise, design evolution might mandate DEIS revisions. Where necessary, bounding conditions can be specified for impact projections; but these should be restricted to the discussions where they are needed and not simply cast about in general	86-12

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			cement powder.		descriptions of the facility.	
8	2.2.4.2.1	2-15 / 39-44	The acidic bottoms collected in the evaporator would be neutralized with sodium hydroxide in a neutralization tank. After neutralization, the waste would be pumped to two 110-L (30-gal) cement head tanks.	ER Appendix G	The acidic bottoms will be collected in a bottoms tank where the solution will be sampled to determine concentrations. Based on this sample, the solution would be metered to one of three cement head tanks where neutralization would occur prior to transfer to the mixer. Suggest the following, "After collection, the waste would be pumped into small batch cement head tanks to be neutralized."	86-13
9	2.2.4.2.3	2-16 / 42	in two 5,700-L (1,500-gal) tanks	ER Appendix G, Table G-7	DEIS should not specify design details such as tank sizes. Otherwise, design evolution might mandate DEIS revisions. Where necessary, bounding conditions can be specified for impact projections; but these should be restricted to the discussions where they are needed and not simply cast about in general descriptions of the facility.	86-14
10	2.2.4.3	2-17 / 41	LLW would be disposed of either at the E-Area at SRS or at another permitted disposal site.		Change "permitted" to "suitable". DOE LLW sites are neither permitted nor licensed nor need they be.	86-15
12	2.2.5	2-18/29	Large fans or blowers are used to circulate the air through the sand filter media.		This sentence may lead the reader to think that SRS has a "re-circulating" system. SRS uses a "once through" system. The blowers are used to <u>draw</u> air through the sand filter media.	88-16
13	2.2.5	2-19/2 & 3	The facility is designed into numerous fire zones, in part to limit the exposure of individual banks of HEPA filters to failure.		Should read: "The facility is <u>divided</u> into numerous fire zones, <u>to limit the amount of combustibles involved in a single fire which reduces the amount of soot reaching individual banks of HEPA filters and assures that the HEPA filters will not fail due to excessive plugging.</u>"	86-17
14	2.4, Table 2-1	2-27/ 49-54	Large spills of nitrogen tetroxide, hydrazine hydrate, hydroxylamine nitrate or nitric acid could have adverse impact on SRS workers or general public and would require rapid emergency response actions.		NRC should consider deleting reference to impact from chemical spills on the general public. The DEIS contains no scenario of a release from the MOX Facility (or PDCF or WSB) that results in any effect beyond the SRS boundary (see p. E-15).	86-18
15	2.4	2-29 / 39 Table 2.1	Nonhazardous liquid waste would be 35% of SRS treatment capacity		The 35% value is apparently calculated by NRC from table 4.11, page 4-30, line 12. This is incorrect because treatment of waste from MFFF, PDCF, and WSB requires much less than 35% of capacity. The correct value is closer to 10% (about half of the	86-19

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					'nonhazardous liquid waste' from these facilities consists of non-process utility waters that will be released directly to permitted NPDES outfalls). See comments related to Section 4.3.4.1 and 4.3.4.2 Tables 4.10 and 4.11	86-19 cont.
16	2.4, Table 2-1	2-31/ 47-50	Impacts to off-site land use in the immediate vicinity of SRS could occur in the unlikely event of a severe accident		This is an inappropriate use of the term "severe accident" In 10 CFR Part 70 (see NUREG-1718), the appropriate terms are "likely, unlikely, high unlikely, and credible." Text should be changed to say "highly unlikely" (see DEIS p. 2-37 which notes that a severe accident is highly unlikely).	86-20
17	2.4, Table 2.1	2-33/ 47 2-35/ 32	PM2.5 standard level = 65 ug/m^3 PM2.5 levels exceed the annual standard of 15 ug/m^3.		Clarify that 65 ug/m^3 is a 24 hour limit.	86-21
18	2.4	2-34 / 6-8	Measures are being planned by DCS in conjunction with SCHPO to mitigate any potential impacts to historic sites before construction	Information provided in ER Section 4.8.2	These actions are complete and correctly noted in DEIS Table 2.1 lines 1-7. The fact that they are complete needs to be noted in the text on page 2-34.	86-22
19	3.3.1	3-7/ 23-24	The closest downstream water intake to the SRS is that of the Beauford-Jasper Water Authority at Hardeville, South Carolina, about 130 river miles downstream of the SRS (WSRC 2000a).		Typographical error, should be "Beaufort-Jasper".	88-23
20	3.3.1	3-9/ 16-19	It receives water from groundwater aquifer discharges and permitted discharges from several areas at the SRS, including F-Area, S-Area, the S-Area sewage treatment plant, and treated industrial wastewater from the Chemical Waste Treatment Facility steam condensate.		DEIS refers to the S-Area sewage treatment plant. With the opening of the Central Sanitary Waste Treatment Facility, the S-Area plant, and all other area treatment plants at SRS were closed.	86-24
21	3.3.2	3-11 / 3	Groundwater in the Upper Three Runs Creek Aquifer, …		Delete the word "Creek"; the aquifer is the Upper Three Runs Aquifer.	86-25
22	3.3.2	3-12 / 27-29	The sources of the detected groundwater contamination included burial grounds, canyon buildings, seepage basins, and saltstone disposal facilities (WSRC 2000c).		Change to read "The sources of the detected groundwater contamination include burial grounds, waste management facilities, canyon buildings, seepage basins, and saltstone disposal facilities (WSRC 2000c)."	86-26
23	3.3.2	3-12 / 36-40	In addition, a subsurface plume of tritium and strontium contamination has recently been found in F-Area. This plume is believed to originate from the Old F-Area Seepage Basin (OFASB). The OFASB is located about 180 m (600 ft) north	ER 4.3.3.3, "The source of groundwater contamination is from various heavy industrial and nuclear operations over the past 50 years in the F-Area. The contaminants plume appears to originate inside F Area and extend	The MFFF ER Rev 2 discusses more recent subsurface analyses presented in WSRC 2002, *Work Task Authorization 06: Summary of Groundwater Quality at the Mixed Oxide Fuel Fabrication Facility Site*. A	86-27

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			of F-Area.	beneath the MFFF site with movement in a fan-like direction of groundwater flow under the MFFF site."	copy of this document was provided to NRC with the references for the MFFF ER Revision 1&2. The DEIS does not appear to account for this information. Please consider the following which accounts for the additional information. Remove the last two sentences "In addition … (OFASB)." The source of this plume is not believed to be the OFASB. Insert the following sentence at the beginning of the next paragraph: "Contaminated groundwater also exists beneath the Old F-Area Seepage Basin (OFASB)."	86-27 cont.
24	3.3.2	3-12 / 40-45	The OFASB is located about 180 m (600 ft) north of F-Area. Other contaminants of concern at the OFASB include iodine-129, nitrate, uranium-234, and uranium-238. The site has been remediated by filling the basin with clean soil, capping, and stabilizing the contaminated soil within the basin with in-situ grout (WSRC 1997a). Groundwater monitoring is performed on a regular basis with 15 monitor wells. The aquifer is expected to return to an uncontaminated state within a period of 2 to 115 years, depending on the specific contaminant.		Change to read: "The OFASB is located about 180 m (600 ft) north of F-Area, immediately adjacent to the western boundary of the MOX site. The OFASB has been remediated by filling the basin with clean soil, capping, and stabilizing the contaminated soil within the basin with grout (WSRC 1997a). Groundwater contaminants of concern at the OFASB include iodine-129, nitrate, strontium-90, tritium, and total uranium. Contaminants of interest include lead, radium-226, and radium-228. A small component of the contaminant plume from OFASB flows beneath the westernmost corner of the proposed MOX site. Groundwater is monitored on a regular basis with 15 wells. Contaminant fate and transport models predict that the aquifer is expected to return to an uncontaminated state (i.e., a condition in which no maximum contaminant levels are exceeded) within 2 to 115 years, depending on the specific contaminant."	86-28
25	3.3.2	3-13 / 1-5	The predicted fate and transport of shallow groundwater contaminants near the OFASB were examined as part of the *Groundwater Mixing Zone Application for the Old F-Area Seepage Basin* (WSRC 1997a). The results of sampling in the compliance wells for the OFASB indicated that		Delete the first sentence "The predicted fate …(WSRC 1997a)." Change the next sentence to read: "The results of recent sampling in the compliance wells for the OFASB indicated that concentrations of several target constituents were above drinking water	86-29

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			concentrations of several target constituents were above drinking water standards in several wells.		standards in several wells."	86-29 cont.
26	3.3.2	3-13 / 6-8			The MFFF ER Rev 1&2 discusses more recent subsurface analyses presented in WSRC 2002, *Work Task Authorization 06: Summary of Groundwater Quality at the Mixed Oxide Fuel Fabrication Facility Site*. A copy of this document was provided to NRC with the references for the MFFF ER Rev 1&2. The DEIS does not appear to account to this information. Please consider the following which accounts for the additional information. Append to this paragraph the following text: "There is, however, some uncertainty about whether these exceedances are related entirely to OFASB, to upgradient F-Area facilities, or to both." Insert a new paragraph: "The results of recent groundwater sampling at the proposed MOX facility site indicate that shallow groundwater (i.e., groundwater in the Upper Three Runs Aquifer) is contaminated. Gross alpha and beta activity, tritium, uranium, and trichloroethylene exceeded maximum contaminante levels for drinking water. Contamination is present beneath the entire MOX site, but is greatest beneath the western edge of the site. The contaminant plume appears to originate inside the F-Area fence and was and is related to F-Area nuclear operations and waste management practices at OFASB." Make the following text the final paragraph of this section: "Groundwater in the Upper Three Runs Aquifer beneath the MOX site is contaminated with various heavy industrial and nuclear contaminants. The proposed construction activities will take place at least 9 m. (30 ft.) above the zone of contaminated	86-30

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					groundwater."
27	3.4.13	3-18 / 35 and 3-22 Table 3.3, also 4.3.2, Table 4.6 and corresponding discussion; Table 4.8 and corresponding discussion; as well as Section 4.5.1, page 4-75 and Section 4.7, Table 4-29, with discussion on page 4-90.	A list of the ambient standards and the highest ambient concentrations at the air quality monitoring stations in the vicinity of the SRS is shown in Table 3.3.		The definition of 'vicinity of SRS' and resulting selection of SCDHEC air monitoring stations to characterize existing ambient air quality for the SRS and adjacent counties appears arbitrary. As a result, the air monitoring data that is presented in Table 3.3 has questionable representativeness and cannot support subsequent unequivocal statements regarding air quality compliance. In particular, air monitoring data for particulate matter (PM_{10} and $PM_{2.5}$) reported in Table 3.3 suggest that local air quality is in noncompliance with ambient standards for both the 24-hour and annual averaging periods in each pollutant category. Most of these noncompliant data are attributed to the Cayce, Lexington County, SC monitoring site. This monitor is located near downtown Columbia, SC (over 40 miles from the SRS and MFFF sites) with a setting classified by SCDHEC as 'commercial, urban-city center'. Furthermore, monitoring summaries on the SCDHEC web site show that this monitor consistently reports the highest PM measurements of any monitor in the State. In contrast, PM_{10} monitors near the SRS boundary in the more rural Jackson and Barnwell locations report results for 2001 that are less than one half the values observed at Cayce. For the $PM_{2.5}$ 24-hour category, Table 3.3 lists a value of 71 micrograms per cubic meter from a rural monitor in Colleton County, approximately 60 miles southeast of SRS. A further inspection of the data from Colleton shows this value was the absolute maximum recorded in the year 2001; however, the 98th percentile value (the value that should be used to evaluate compliance with the air standard) for this monitor was 27 micrograms per cubic meter. The 24-hour standard is 65 micrograms per cubic meter. Data given in Table 3.3 for the annual $PM_{2.5}$ category (21.5 micrograms per cubic meter) again is from the Cayce monitor. In contrast, the Colleton monitor gave an

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					annual average of 12.7 micrograms per cubic meter for 2001 which is below the $PM_{2.5}$ standard of 15 micrograms per cubic meter. As part of the discussion of environmental consequences in Chapter 4 of the DEIS, tables 4.6 and 4.8 use a more reasonable set of data for the existing 'background' air quality, except for the $PM_{2.5}$ annual average. Again, the Cayce monitoring data is used (21.5 micrograms per cubic meter) to support the unwarranted conclusion (page 4-11 lines 28-31 and page 4-18 lines 30-32) that 'measured values in the vicinity of SRS already exceed the annual standard'. This conclusion also is repeated in several instances in Section 4.7. The DEIS should be revised throughout to present conclusions regarding $PM_{2.5}$ that are based on more representative data. In addition, Table 3.3 and Tables 4.6 and 4.8 should be revised to present consistent information where possible.	86-31 cont.
28	3.8.5	3-41/ 13	…using 12-hour shifts…		Minor point, but the site uses 24-hour shifts.	86-32
29	3.10.4.2	3-54/ 27-31 3-55 Table 3.11	To assess the potential for adverse human health impacts from ongoing SRS operations, the reported maximum ambient concentration estimates were also compared with health risk-based air concentrations developed by the EPA's Office of Air Quality Planning and Standards (OAQPS) (Smith et al. 1999). The modeled maximum ambient concentrations of several toxic pollutants exceeded or approached the health risk-based concentrations (see Table 3.11).		The DEIS uses data completely out of context to reach erroneous conclusions on several points. The data presented in Table 3.11 for 'SRS maximum modeled ambient concentration' and 'SCDHEC standard' are maximum 24-hour averages; i.e., the maximum value that occurred at the SRS boundary over a single 24-hour period for a one-year period of analysis. Conversely, the EPA risk guideline levels assume a long term exposure. Since the wind does not blow in the same direction all through the year the long term (e.g., annual) average concentration for a pollutant will be **much** less than the maximum 24-hour average. Common extrapolation algorithms suggest that an annual average would be at least 1/100th the 24 hour average. Actual SRS modeling results (see DEIS table 4.8, for example) indicate a much greater ratio; however, applying a conservative factor of 0.01 to the 24-hour values results in adjusted concentrations that	86-33

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	4.3.1.2.2	4-13 / 16-22	As discussed in Section 3.10.4.2 and Table 3.11, although SRS sitewide hydrazine emissions do not result in exceedance of the ambient level specified in the South Carolina Department of Health and Environmental Control (SCDHEC) standard, the existing emissions may result in exceedance of federal EPA health-risk-based air guideline concentrations.		are all less than the EPA's 10^{-4} risk concentration levels listed in the table. Furthermore, as noted on page 3-54, line 33, the basis of the modeled 24-hour values are already quite conservative with the use of maximum potential, rather than actual emissions. Table 3.11 and accompanying text should be revised to indicate clearly the context of the information that is being presented (i.e., averaging period) and to remove any implication that SRS air toxic emissions pose unacceptable risk to the public, or that (implicitly) the SCDHEC standards to not adequately protect public health. The DEIS is wrong to state (page 3-54, lines 24-25) that any of the modeled-estimated concentrations (24-hour) from the 1998 submittal to SCDHEC exceeds ambient standards. The SCDHEC Air Pollution Control Regulation 61-62.5, Standard 8, states that model estimated concentrations for pollutants with a zero standard are to be rounded to the hundredths decimal place. By applying this guidance to the four pollutants for which the SRS allegedly exceeds the standard (see Table 3.11), the maximum site boundary concentration becomes 0.00. These pollutants, therefore, meet the SCDHEC standard of 0.00 in each case.	86-33 cont.
30	3.10.4.2	3-54/ 34-36	However, emissions of the pollutants listed in Table 3.11 may require further investigation by the SRS to determine that ambient levels are not of concern with respect to human health impacts.		Suggestions by NRC that DOE take any actions for emissions not regulated by NRC are beyond the statutory scope of NRC and should be deleted from the DEIS.	86-34
31	4.3.1.1.1	4-8/ 1-2	Soil would be further sampled for radioactive contamination before excavation begins at the site.	Letter from P. Hastings (DCS) to Cheryl Trottier (NRC), 29 October 2002, Responses to the Request for Additional Information on the Environmental Report, Revisions 1&2, DCS-NRC-000116; Attachment 26, Plutonium Project Pre-construction Environmental Report	The 29 October 2002 correspondence from DCS to NRC responding to requests for additional information included the results of the "further sampling" referred to in the DEIS. The DEIS should have included the results of this report which confirm the previous DCS conclusion that there are no significant concentrations of radioisotopes or chemicals in the soil, that would be hazardous to construction worker health.	86-35

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32	4.3.1.1.2	4-8 / 42 E-16 / 40	… the MEI dose … was estimated from inhalation exposure. Facility workers may also receive an internal dose.		Internal exposures result from breaches of containment and should be included in accident impacts, not normal operations.	86-36
33	4.3.1.2.1	4-11/ 42-45	Exposure to hazardous materials used during construction (e.g., paints, solvents) could be kept to a minimum by following good engineering practices, such as ensuring good ventilation and cleaning up small chemical spills as soon as they occur.		Exposure to hazardous materials used during construction will be minimized by following applicable OSHA regulations and precautions. No additional mitigations are necessary. Rather, the DEIS should state that exposure to hazardous materials used during construction will be minimized by following applicable OSHA regulations and precautions.	86-37
34	4.3.1.2.1	4-12/ 3-6	At this time, however, available data are insufficient to determine whether subsurface soil contamination is present in the proposed construction area. Groundwater contamination exists below the site of the proposed facilities. However, the soils overlying the aquifer are not expected to be contaminated.	Letter from P. Hastings (DCS) to Cheryl Trottier (NRC), 29 October 2002, Responses to the Request for Additional Information on the Environmental Report, Revisions 1&2, DCS-NRC-000116; Attachment 26, Plutonium Project Pre-construction Environmental Report	This statement is incorrect, The 29 October 2002 correspondence from DCS to NRC responding to requests for additional information included the results of the "further sampling" referred to in the DEIS. The DEIS should have included the results of this report which confirm the previous DCS conclusion that there are no significant concentrations of radioisotopes or chemicals in the soil, that would be hazardous to construction workers health.	86-38
35	4.3.1.2.2	4-12/ 19-21	During operations, the proposed MOX facility would use about 30 chemicals for processing, mostly for aqueous polishing to remove impurities from the plutonium (DCS 2002a; Table 3-2); the chemicals would include dodecane, hydrazine, hydrogen peroxide, hydroxyl amine nitrate, nitric acid, nitrogen, nitrogen tetroxide, and tributyl phosphate.		DEIS list is missing oxalic acid, sodium hydroxide, and sodium carbonate all of which were listed in MFFF ER Table 3-2.	88-39
36	4.3.1.2.2	4-12/ 36-37	However, the workplace environment would be monitored to ensure that airborne chemical concentrations were below applicable occupation exposure limits.		Exposure to hazardous chemicals used during operations will be minimized by following applicable OSHA regulations and precautions. No additional mitigations are necessary. Rather, the DEIS should state that exposure to hazardous materials used during operations will be minimized by following applicable OSHA regulations and precautions.	86-40
37	4.3.1.2.2	4-13/ 20-22	During permitting of the proposed MOX facility, demonstration that operational hydrazine emissions would be limited to very low levels that would not cause adverse health impacts to members of the public or SRS employees would		Hydrazine emissions from the MFFF will be subject to South Carolina Department of Health and Environmental Control regulations. No additional mitigations are necessary, DCS will comply with	86-41

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			be conducted.		SCDHEC air quality regulations.	
38	4.3.2.	4-23 / 9	…increments for SO2 and PM10.		NO_2 is omitted from the discussion. The sentence should read: "…increments for SO_2, PM_{10}, and NO_2."	86-42
39	4.3.3.1.2 and 5.2.2	4-25 / 13-14 and 5-7 / 33-35	Nonhazardous wastewater would be treated if necessary and discharged to the F Area process sewer system that connects to the SRS Effluent Treatment Facility	ER pg 3-18, "The uncontaminated HVAC condensate is discharged to the stormwater system in accordance with SCDHEC standard stormwater permit conditions. The remaining nonhazardous wastewater is discharged to the SRS F-Area sanitary sewer system that connects to the CSWTF."	Nonhazardous wastewaters, except for traditional sanitary wastewater, will either be sent to an appropriate permitted treatment facility at SRS, or, in the case of runoff and uncontaminated HVAC condensate, be discharged directly to a permitted NPDES outfall. Sanitary wastewater will be sent to the WSRC Central Sanitary Waste Treatment Facility.	86-43
40	4.3.4.1	4-26 / 37-40	Hazardous (liquid) wastes that would be generated would be similar to those expected during the construction of any industrial facility. Examples of these wastes include liquids (such as motor oil), batteries, and other machinery-related products, cleaning products, and other chemicals (such as insecticides and pesticides).		Not all examples listed (i.e. batteries) are liquid.	86-44
41	4.3.4.1	4-27 / 6	Liquid nonhazardous waste from MOX = 178 m^3/yr (47,000 gal/yr)	ER Table 5-6 Liquid nonhazardous waste from MOX = 47,000 yd^3/yr	There appears to be an error in the unit used in the DEIS. The correct value is 47,000 yd^3/yr (9.5 million gallons/yr or 36,000 m^3/yr).	86-45
42	4.3.4.1 and 4.3.4.2	4-28 / 12 Table 4.10	MOX nonhazardous construction waste = 178 m^3/yr	ER Table 5-6 Liquid nonhazardous waste from MOX = 47,000 yd^3/yr	See comment regarding section 4.3.4.1, p. 4-27, line 6. Correct volume is 36,000 m^3/yr.	88-46
43		4-28 / 12 Table 4.10 4-30/ 12 Table 4.11	SRS treatment capacity for nonhazardous liquid waste = 276,000 m3/yr. (73 Mgal/yr)		Value is wrong. SRS treatment capacity (CSWTF) is provided in the ER on page 4-43 (1.1M gals/day) or Table 5-6, p. 5-80, 1.35M cu. yds/yr (273M gal/yr). Permitted capacity is 1.05M gal/dy. SPD EIS Table 3-41 reports CSWTF capacity as 1.45 Mm3/yr (383 Mgal./yr). Recommend use of 273 Mgal/yr value from Table 5-6.	86-47
44		4-28/ 12 Table 4.10 4-30 / 12 Table 4.11	Storage and disposal of nonhazardous liquid waste are shown as NA with footnote h in Table 4.10 and footnote i in Table 4.11		Delete footnote. Nonhazardous liquid waste (sanitary sewage) is not stored and is released to site streams after treatment. No footnote needed.	86-48
45	4.3.4.2	4-29 / 2	. . .to produce a solid TRU waste matrix similar to that accepted for disposal at WIPP		The solid TRU waste form will be certified to comply with the WIPP Waste Acceptance Criteria. The use of the word "similar" implies some differences and issues. Recommend rewording to say the process will produce a solid TRU waste "suitable" for disposal at	86-49

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					WIPP.	
46	4.3.4.2	4-31 / 19	Wastes of this type are estimated to be about 35% of the capacity of the Central Sanitary Wastewater Treatment Facility		The 35% value is apparently calculated by NRC from table 4.11, page 4-30, line 12. This is incorrect because treatment of waste from MFFF, PDCF, and WSB requires much less than 35% of capacity. The correct value is closer to 10% (about half of the 'nonhazardous liquid waste' from these facilities consists of non-process utility waters that will be released directly to permitted NPDES outfalls). See comments related to Section 4.3.4.1 and 4.3.4.2 Tables 4.10 and 4.11.	86-50
47	4.3.5.1.1 4.3.5.2	4-32/ 36-40 4-36/ 10-18	The events for which accident consequences were evaluated in this DEIS are internal fire, explosion, load handling event, criticality, and chemical releases. The methods employed to analyze accident consequences were based on conservative assumptions and were intended to provide a comprehensive, bounding analysis for all potential events up to and including design basis accidents. The scoping process identified concerns about the impacts from accidents, and **commenters requested that the worst-case impacts be presented.** Whether an individual would be exposed to contaminated soil and food would depend upon the specific protective actions that the applicant and government agencies might take following the accident. If protective actions were taken, the component of dose attributable to exposure to contaminated soil and consumption of contaminated food would be effectively mitigated. However, the actions that would be taken cannot be predicted at this time, so both the early phase and unmitigated intermediate and late phase consequences (corresponding to one year of exposure to the contaminated environment) are provided in this DEIS.	a) The U.S. Supreme Court ruled in *Robertson v. Methow Valley*, 490 U.S. 332 (1989), that NEPA does not require a worst-case analysis. The Court also acknowledged that the CEQ expressly withdrew the requirement to perform a worst-case analysis from its regulations. Similarly, in denying the admission of contentions relating to the inclusion of the environmental impacts of a terrorist attack, the Commission confirmed that the spirit of NEPA is <u>not</u> to require inclusion of speculative events. b) *Environmental Review Guidance for Licensing Actions Associated with NMSS Programs* (Draft NUREG-1748), pg 77-78, states, "The following information should be included in the EIS: ... Comparison of the offsite dose consequences and resulting health effects for reasonably foreseeable (i.e. credible) accidents as calculated by the applicant... " c) MFFF ER Rev 2, pg 5-42 states, "The MFFF processes are designed to preclude explosions through the use of reliable engineering features and administrative controls. ... Thus, explosions at the MFFF resulting in a radioactive material release are remote and speculative and need not be considered under NEPA. ... Although explosion events resulting in a radioactive material release at the MFFF are remote and speculative events, a hypothetical explosion event	The bounding accident for the Mixed Oxide Fuel Fabrication Facility, an explosion in an aqueous polishing cell, was not properly characterized. The discussion provided in Section 4.3.5.2 and Table 4.12 fails to explain that the accident is prevented through the use of PSSCs. Additionally, both NUREG-1748 and the DEIS [pg 4-32] limit accident evaluations to "reasonably foreseeable (credible) accident" and design basis accidents. The DEIS statements on page 4-36, lines 10-18 imply that, in response to a comment, the NRC Staff has selected a "worst case" accident. This is contrary to the Commission, which in its Order CLI-02-25, specifically notes that the "rule of reason" excludes "worst case scenarios." Furthermore, because the Staff could not predict the mitigative actions that would be taken, the Staff assumed that no mitigative actions would be taken. This is in direct conflict with NEPA's "rule of reason." The inclusion of a worst-case impact, even though requested by commenters, is contrary to the Staff's own guidance document, NEPA case law, and the Commission Order. The FEIS should clearly identify that the accidents discussed are "highly unlikely" accidents which are prevented. MFFF, as a facility within SRS, would implement the SRS emergency response procedures, the DEIS should assume that	86-51

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				is evaluated." d) NRC Order CLI-02-25, pg 10-11 states, "Grappling with this concept, various courts have described it as a 'rule of reason,' or 'rule of reasonableness,' which excludes 'remote and speculative' impacts or 'worst case' scenarios."	DCS, DOE, and regulators such as NRC and the States would notify the public of such a release and warn the public not to consume garden crops (both of which are reasonable foreseeable mitigative actions). The DEIS should provide more reasonable consequence projections based on DOE and other regulator intervention.	
48	4.3.5.2	4-33, 39 & 40 Table 4.14 & 4.15			Population and MEI ingestion dose from Tritium release seems high. Suggest revisiting assumptions that were input into model to ensure proper application of methods. The inclusion of an unmitigated food consumption pathway following an accident is more conservative than necessary. Interdiction is established in SRS site emergency response procedures and therefore calculation of ingestion doses is not appropriate.	86-52
49	4.3.5.2	4-36/ 20-22	Population doses were calculated for up to a distance of 80 km (50 mi) from the release point for 10 downwind distances and 16 wind directions. Radiation doses were calculated for the following receptors for accident conditions:	Letter from Dr. William Glaze (EPA Science Advisory Board) to Christine Todd Whitman (EPA Administrator), Review of ORIA's Use and Adaptation of The GENII Version 2 Environmental Radiation Dosimetry System, EPA-SAB-RAC-ADV-01-002 "The RAC found the environmental transport modeling capabilities for air and surface water releases of radionuclides to be adequate for screening purposes but not necessarily appropriate for detailed analysis or emergency situations. ... The conservative nature of the code may lead to excessively conservative dose estimates (i.e., higher than more realistic assumptions might produce), resulting in unnecessarily costly controls and unnecessary expenditures in site cleanup operations. The RAC strongly encourages ORIA to provide more realistic bounds on their dose and risk estimates. ... [T]he straight-line Gaussian and Lagrangian-puff models were designed for "well-behaved" pollution transport from chimney "stacks" and do not apply to more critical scenarios involving fires, explosions and accidental or terrorist aerial releases of contaminants, which the EPA may be called	The DEIS's accident consequences do not provide members of the public with realistic exposure scenarios because the NRC Staff did not use an appropriate model to evaluate dispersion of a highly unlikely MOX explosion event. The NRC used the GENII code to model this accident; the ER used the NRC's MACCS2 code. The EPA Science Advisory Board in their evaluation of the GENII model for EPA use noted that, "The conservative nature of the code may lead to excessively conservative dose estimates (i.e., higher than more realistic assumptions might produce), resulting in unnecessarily costly controls and unnecessary expenditures in site cleanup operations." On page 10 of their report, the SAB specifically notes that, "... the straight-line Gaussian and Lagrangian-puff models were designed for 'well-behaved' pollution transport from chimney 'stacks' and <u>do not apply to more critical scenarios involving fires, explosions</u> and accidental or terrorist aerial releases of contaminants, which the EPA may be called on to evaluate. (emphasis added)" The NRC Staff used the GENII model for exactly the types of accidents that the SAB	86-53

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				on to evaluate."	specifically noted the model should not be used. The GENII code makes a number of simplifying assumptions to make the calculation easier. While the GENII estimates would clearly bound the potential impacts, actual impacts from accidental releases would likely be orders of magnitude lower for both the short-term and 1-year doses. For example, • The GENII code evaluates the dose along the centerline of the plume and assumes that all individuals receive that dose. For the cases evaluated in the DEIS, the accident plumes would be narrow and not expose most of the downwind population to air concentrations nearly as high as the centerline of the plume. This assumption alone could result in collective dose consequences approximately a factor of 7 greater than those produced by MACCS2 depending on the plume characteristics. The principal author of the GENII code indicated that the GENII algorithms for acute releases were designed primarily for evaluating doses to nearby individuals. The July 2002 DOE guidance "Recommendations for Analyzing Accidents under NEPA", (Sect. 3.1 Scenario Development, Conservatisms, page 7) indicates that using estimates of plume centerline concentrations may be appropriate for evaluating impacts to maximally exposed individuals, but would not be appropriate for evaluating population impacts (would overestimate impacts); sector-averaged plume concentrations would yield more realistic results for population impacts. The GENII code does not calculate the lateral dispersion of the plume and overlay that with detailed food production distributions. • Similarly, the GENII code simply predicts the

86-53 cont.

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					concentrations at the centerline of the plume and assumes food produced is exposed to air concentrations equal to those on the centerline of the plume for the entire plume passage. This simplification results in over prediction of the air contamination level that plants and animals might be exposed to by at least an order of magnitude. • The code does not realistically model the time-dependent harvesting of contaminated food. Instead, the model assumes that all food grown in the sector is harvested instantaneously just after the plume passes. This assumption may be defensible for some crops, but is extremely over-conservative for crops and animal products. An entire year's supply of milk or eggs (or meat or poultry) is not collected in one day. The animals re-equilibrate with air nearly as quickly as the plants. Even allowing for weekends and holidays, the assumption of 100% harvest is probably conservative by a factor of about 200 (it would be close to 365 if harvest was really continuous). • The time-dependent consumption of contaminated food is not realistically modeled. Each of these factors is multiplicative. Collectively, the simplifying modeling assumptions result in an over prediction of ingestion doses by several orders of magnitude. Since it is not possible to fulfill the basic NEPA responsibility of informing the public of the reasonably foreseeable environmental impacts of the proposed action with the GENII code, other codes developed specifically for modeling accident consequence should be used. DCS strongly recommends that a well-established accident consequence code with a strong

86-53 cont.

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					QA record, such as NRC's MACCS2, be used.
50	4.3.5.2	4-39/19-22	Table 4.14 under the sub-title "Proposed MOX Facility," the dose consequences and "Chance of LCF" for all accident events		The use of the GENII computer code to calculate the collective dose (person-Sv) in the DEIS for a single specific direction, without consideration of any other directions will not produce a site-representative 95th percentile collective dose. For the specific direction selected by the NRC (i.e., the most populated direction), the collective dose appears to be a factor of approximately 20 to 40 greater than the 95th percentile collective dose established from MACCS2 (or a factor of 40 to 80 greater when correcting the error in Table E.7, see comment below). This difference results in a factor of 40 to 80 increase in the reported dose consequences, which DCS believes is not representative of a 95th percentile result. In fact, the collective dose calculated by GENII in this one direction (WNW) is expected to result in a value greater than the 99.5th percentile collective dose produced by MACCS2. This is a result of several differences in these codes: • GENII assesses the consequences to a single direction thereby not producing a site-representative collective dose. The collective dose cited in the DEIS, which is based on the most populous direction, is approximately 4 times greater than a weighted average of the 95th percentile results produced for each direction around the MFFF (as produced by GENII). • The decoupling of the sequential hourly meteorological data measurements by GENII, which uses joint frequency data instead, may allow for unfavorable meteorological conditions to occur for unrealistic durations (i.e., conditions which may occur several times a year, but not several hours in a row, and that produce unfavorable collective doses may be considered to 86-54

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					occur within a single analysis period by GENII). Hence, the collective dose results from GENII are considered overly conservative and not representative of a 95th percentile result for accidents involving the proposed MOX facility.	86-54 cont.
51	4.3.5.2	4-40/17-20	Table 4.15 under the sub-title "Proposed MOX Facility," the dose consequences and "Chance of LCF" for all accident events		The use of the GENII computer code to calculate X/Q values in the DEIS for a single specific direction, without consideration of any other directions will not produce a site-representative 95th X/Q. For the specific direction selected by the NRC (i.e., the direction with the nearest boundary to the MFFF), the X/Q appears to be a factor of approximately 4.5 greater than the 95th X/Q established from MACCS2. This difference results in a factor of 4.5 increase in the reported dose consequences which DCS believes is not representative of a 95th percentile result. In fact, the X/Q calculated by GENII in this one direction (NW) results in a value greater than the 99.5th X/Q calculated by MACCS2. This is likely a result of two differences in these codes: • The aforementioned difference in establishing a site-representative X/Q (i.e., a result based on an analysis of a single direction vs. a result considering values from all directions). • The decoupling of the sequential hourly meteorological data measurements by GENII, which uses joint frequency data instead, that may allow for unfavorable meteorological conditions to occur for unrealistic durations (i.e., conditions which may occur several times a year, but not several hours in a row, and that produce large X/Q's may be considered to occur within a single analysis period by GENII).	86-55

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					Consideration of these differences, leads DCS to believe that the results from GENII are overly conservative and not representative of a 95[th] percentile result.	86-55 cont.
52	4.3.5.2	4-38 through 4-40 Tables 4.13 through 4.15	Footnote. Latent cancer fatalities are calculated by multiplying dose by the FGR 13 health risk conversion factor of 0.06 fatal cancer per person-Sv ($6x10^{-4}$ fatal cancers per person-rem)(Eckerman et al. 1999)	*Cancer Risk Coefficients for Environmental Exposure to Radionuclides*, pg iv, "The dose coefficients given in Federal Guidance Report No. 11 and Report No. 12 continue to be recommended for determining conformance with radiation protection guidance for Federal agencies issued by the President and will be updated in the future as warranted. ... Although the application of these [Federal Guidance Report No 13] risk coefficients for ... Envvironmental Impact Statements ... is encouraged to promote consistency in risk assessments, such use is discretionary. ... Also the coefficients are based on radiation risk models developed for the application to either low acute doses or low dose rated and should not be applied to accident cases involving high doses and dose rates in either prospective or retrospective analyses " MFFF ER – Appendix E, E.2.1, last sentence: The health risk conversion factors (expected health effects per dose absorbed) were taken from the *1990 Recommendations of the International Commission on Radiological Protection* (ICRP 1991). Section E.4 states: "Radiation doses to populations…were multiplied by the ICRP-60 (ICRP 1991) conversion factors and the estimated number of shipments to produce risk estimates in units of LCFs. The ICRP-60 health risk conversion factors are 0.0005 and 0.0004 fatal cancer cases per person-rem for members of the public and workers, respectively.	The Draft EIS does not explain why it relies on EPA Federal Guidance Report 13, rather than international standards such as the ICRP for cancer risk conversion factors. Federal Guidance Report 13 clearly states that the conversion factors in Federal Guidance Report 12 still continue to be recommended for radiation protection. The EPA Federal Guidance Report 13 relies on new studies that have not yet been incorporated into the international standards. This results in an order of magnitude higher risk (10^{-4}) than the studies presented in international standards (e.g. ICRP documents) (10^{-5}). Use of the EPA data, with the other unrealistically and overly conservative assumptions, paints an unrealistic potential impact from the proposed action.	86-56
53	4.3.5.2	4-41/ 13-15	An estimated collective dose of 400 person-Sv (40,000 person- rem) was projected to be received by a population of approximately 309,900 persons extending out to 80 km (50 mi) to the **west-northwest** of the proposed MOX facility.		The meteorological conditions for the MFFF hypothetical explosion involves winds directed to the west-northwest. The meteorological conditions for the PDCF hypothetical tritium release involves winds	86-57

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		4-41/ 24-25	The largest 1-year collective population dose was estimated to be 6,100 person-Sv (610,000 person-rem) from a hypothetical tritium release from the PDCF. This impact was calculated for winds blowing **toward the southwest**, where 18,010 people reside.		directed to the southwest. It is not intuitively obvious why both accident evaluations do not have the same meteorological conditions.	86-57 cont.
54	4.3.5.3	4-45/8	Table 4.16 under the sub-title "Proposed MOX Facility," hydrazine hydrate TEEL values		The TEEL values given for hydrazine hydrate are the TEEL values for hydrazine hydrate, aqueous solutions. DCS used the TEEL values for hydrazine monohydrate. The TEEL values for hydrazine monohydrate are: TEEL-1 0.0075 mg/m^3 TEEL-2 0.06 mg/m^3 TEEL-3 50 mg/m^3	86-58
55	4.3.5.3	4-45/9-18	Table 4.16 under the sub-title "Proposed MOX Facility," the modeled concentrations and distances to reach the TEEL limits for: Hydrazine / sodium hydroxide Hydrazine / hydroxylamine nitrate Hydrogen peroxide Hydroxylamine nitrate Nitric acid		The DEIS appears to contain an erroneous calculation of solute mole fraction and vapor pressure for the listed chemicals (see comment on Appendix E below), which has resulted in significantly larger estimates of the modeled airborne concentrations and distances to reach the TEEL limits.	86-59
56	4.3.5.3	4-45/19	Table 4.16 under the sub-title "Proposed MOX Facility," the maximum storage amount per container for nitrogen tetroxide		This table presents a larger volume of nitrogen tetroxide (i.e. 240 gallons or 912 liters) in a storage/transportation cylinder than is planned to be used at the MFFF. DCS intends to use a storage/transportation cylinder containing 2000 lbm (907 kg) of nitrogen tetroxide. This corresponds to 630 liters of nitrogen tetroxide.	86-60
57	4.3.6.1	4-47/ 16-18	Decommissioning involves the removal of the facility safely from service and reduction of residual radioactivity to a level that permits release of the property for unrestricted use.		After "unrestricted use" add "or restricted use."	86-61
58	4.3.6.1	4-48/ 1-8	Although impacts of decommissioning the facilities were not included in the ER (DCS 2002a), the scoping process did identify decommissioning as a significant issue; therefore, the potential impacts of decommissioning the facilities are	Sections 5.3.4, Projected Environmental Impacts of Deactivation, and 5.3.5, Projected Environmental Impacts of Decommissioning.	The impacts of decommissioning the MFFF were included in the MFFF Environmental Report, Rev. 1 &2, and responses to two RAI questions (July 12, 2001).	86-62

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			presented below.			
59	4.3.6.3.2	4-51/32-36 and 4-52/11-13	The section on waste management indicates that the quantities and classification of waste types cannot be determined at this time, but the costs are based on "...the volumes and types of waste generated during the decommissioning of those buildings..."	5.3.5, Projected Environmental Impacts of Decommissioning.	There appears to be an inconsistency in the decommissioning waste section and the costs section. Although the section on waste management indicates that the quantities and classification of waste types cannot be determined at this time, the costs are, nevertheless, based on "...the volumes and types of waste generated during the decommissioning of those buildings..."	86-63
60	4.3.6.3.2	4-52/17-18	...and costs associated with borrowing funds to finance the project.	RAI Question 50, July 12, 2001, stated that the projected costs did not include site security, residue and fuel deactivation and removal, environmental programs, or overhead management and financial activities.	Although DCS is the licensee, the current contract calls for deactivation of the facility and return to DOE for decommissioning or reuse. It is improper to include the costs associated with borrowing funds to finance the project since DOE is a government agency.	86-64
61	4.3.7.1	4-53/ 27-36	The analysis was based on guidelines for environmental justice analyses described in *Environmental Review Guidance for Licensing Actions Associated with NMSS Programs* (NRC 2001). An 80-km (50-mi)-diameter buffer zone around F-Area at the SRS was used as the basis for the analysis so as to include potential adverse human health or socioeconomic impacts related to the construction and operation at the SRS that might occur at greater distances than have been used in other analyses. On the basis of information received during scoping meetings at the site, a larger area was also used to address the concern that any accidental releases to the environment would also have the potential to affect fishing resources that might be used for subsistence by low-income and minority population groups some distance downstream of the site (see Appendix I).	a) *Environmental Review Guidance for Licensing Actions Associated with NMSS Programs* (Draft NUREG-1748), Appendic B states, "Guidelines for determining the area for assessment are provided in the following discussion. If the facility is located within the city limits, a radius of approximately 0.6 miles (1 square mile) from the center of the site is probably sufficient for evaluation purposes; however, if the facility itself covers this much area, use a radius that would be equivalent to approximately 0.6 miles from the site. If the facility is located outside the city limits or in a rural area, a radius of approximately 4 miles[footnote 3] (50 square miles) should be used. [footnote 3 - Because of the nature of NMSS facilities a 50 mile radius is not automatically required as is the case for NRR facilities.] b) Letter from M. Galloway (NRC) to R. Ihde (DCS), 11 Dec. 2000, states, "The SRP states that the description of the affected environment should include '[s]ocioeconomic information, including that for low income and minority populations within a 50-mile radius.' This dimension is incorrect. DCS should follow the Nuclear Materials Safety and Safeguards Policy and Procedures letter 1-50, Rev 2, which states,	Although the DEIS states that the guidance in NUREG-1748 was followed, the DEIS, by using a 50-mile radius for environmental justice impacts does not follow the guidance of NUREG-1748, which proscribes a radius of 4 miles. Additionally the DEIS is directly contrary to specific guidance provided by NRC to DCS in the 11 Dec. 2000 letter from M. Galloway to R. Ihde. This guidance was that the 50-mile radius in NUREG-1718 was incorrect and DCS should follow the NMSS Policy and Procedures letter proscribing a 4-mile radius. The DEIS should conform to NRC guidance and only analyze EJ impacts within a 4-mile radius of the proposed MOX Facility. If the Final EIS will contain a larger area for EJ analyses in an effort to be overly conservative, the DEIS should acknowledge this, but not tie EJ mitigation to overly conservative analyses. In other words, if no EJ mitigation measures would have been imposed had the Draft EIS adhered to the applicable Staff EJ guidance, then the fact that a more conservative EJ assessment was performed should not be the basis for imposing such measures.	86-65

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				'…if the facility is located outside the city limits or in a rural area, a 4-mile radius (50 square miles) should be used.'"		86-65 cont.
62	4.3.7.3.3	4-57/ 42-45	In the unlikely event of a tritium release at the PDCF or an explosion at the proposed MOX facility, the communities most likely affected would be minority or low income, given the demographics within 80 km (50 mi) of the proposed MOX facility.		As established in our comments to DEIS 4.3.5.2, the accident scenario relied upon to justify the conclusion that there are disproportionate impacts to low-income or minority populations is flawed. NRC should validate the accident scenario using an appropriate model and proper "reasonably foreseeable" assumptions before asserting that there are any impacts to low-income or minority populations.	86-66
63	4.4.1.1	4-61/ 32-end	Assessment of the transport of plutonium pit material considered shipments from existing storage sites to the SRS. Of the 34 MT (37.5 tons) of plutonium expected to be processed into MOX fuel, 7.3 MT (8.0 tons) would be initially available at the SRS site. Under a separate action (DOE 2002a), approximately 6 MT (6.6 tons) of surplus plutonium is to be shipped from RFETS to SRS (Roberson 2002), which currently has 1.3 MT (1.4 tons) (DOE 1996a). The proposed action would therefore require the shipment of another 26.7 MT (29.4 tons) of plutonium, approximately 21.3 MT (23.4 tons) of which is expected to come from the Pantex Plant in Texas. This DEIS analyses the transportation impacts of the Pantex shipments and the remaining 5.4 MT (5.9 tons) of plutonium whose origins are not yet determined. However, the remaining plutonium would come from storage at other DOE sites. For the purposes of this DEIS, the analysis assumed that the remaining 5.4 MT (5.9 tons) of plutonium would come from the Hanford Site, the plutonium storage site farthest from the SRS. Thus, the actual transportation impacts are expected to be lower than those presented here because some plutonium from closer storage sites is expected to be used.		The impacts resulting from shipping 50 metric tons of surplus plutonium to the SRS were covered in the DOE's SPD EIS. NRC should have simply deferred to that analysis instead of reanalyzing impacts already evaluated by another federal agency.	86-67
64	4.4.1.2.1	4-63/ 22	0.040 mSv/h for TRU waste		Value for TRU appears to be a great deal higher than experience.	86-8
65	4.4.1.2.1	4-64, Table	Footnote "d": Latent cancer fatalities are calculated by	*Cancer Risk Coefficients for Environmental Exposure*	The Draft EIS does not explain why it relies on EPA	86-69

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		4.20, Lines 39-40	multiplying dose by the FGR 13 health risk conversion factor of 0.06 fatal cancer per person-Sv (6x10-4 fatal cancers per person-rem)(Eckerman et al. 1999)	*to Radionuclides*, pg iv, "The dose coefficients given in Federal Guidance Report No. 11 and Report No. 12 continue to be recommended for determining conformance with radiation protection guidance for Federal agencies issued by the President and will be updated in the future as warranted. ... Although the application of these [Federal Guidance Report No 13] risk coefficients for ... Environmental Impact Statements ... is encouraged to promote consistency in risk assessments, such use is discretionary. ... Also the coefficients are based on radiation risk models developed for the application to either low acute doses or low dose rated and should not be applied to accident cases involving high doses and dose rates in either prospective or retrospective analyses " MFFF ER – Appendix E, E.2.1, last sentence: The health risk conversion factors (expected health effects per dose absorbed) were taken from the *1990 Recommendations of the International Commission on Radiological Protection* (ICRP 1991). Section E.4 states: "Radiation doses to populations...were multiplied by the ICRP-60 (ICRP 1991) conversion factors and the estimated number of shipments to produce risk estimates in units of LCFs. The ICRP-60 health risk conversion factors are 0.0005 and 0.0004 fatal cancer cases per person-rem for members of the public and workers, respectively.	Federal Guidance Report 13, rather than international standards for cancer risk. Federal Guidance Report 13 clearly states that the conversion factors in Federal Guidance Report 12 still continue to be recommended for radiation protection. The EPA Federal Guidance Report 13 relies on new studies that have not yet been incorporated into the international standards. This results in an order of magnitude higher risk (10^{-4}) than the studies presented in international standards (e.g. ICRP documents) (10^{-5}). Use of the EPA data, with the other unrealistically and overly conservative assumptions, paints an unrealistic potential impact from the proposed action.	86-69 cont.
66	4.4.2	4-67, Lines 20-21	The impacts of the general conversion process are described in the environmental assessment for the last license renewal of that facility (NRC 1977).		Incorrect reference cited – NRC 1977 (NUREG-0170) is the FEIS for all commercial types of radioactive material shipments —not specific for the GE conversion facility in Wilmington, NC.	86-70
67	4.4.2	4-67, Lines 16-37	Conversion of Uranium Hexaflouride to Uranium Dioxide		Why does this impact need to be discussed since the MOX fuel will be replacing an equal quantity of low-enriched uranium fuel that would also undergo this conversion process. Comment is also relevant for the impacts of spent MOX fuel to the geologic repository	86-71

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					(replacing a like quantity of low-enriched uranium fuel). If the NRC Staff feels compelled to retain these impacts, the DEIS should note that these impacts replace similar avoided impacts from the conversion and disposal or low enriched uranium fuel and that the net impact is zero.	86-71 cont.
68	4.5.1	4-70 / 42-44. Tables 4-6, 4-8, and 4-23.	Impacts to air quality resulting from operations of new facilities and roads would result in changes to regional air quality as represented by the SRS baseline in Table 4.23.		The 'SRS baseline' concentrations summarized in Table 4-23 <u>do not</u> represent regional air quality – only representative air monitoring data or regional modeling studies can characterize regional conditions. The 'SRS baseline' data are a hypothetical set of values that are based on modeling maximum potential emissions of SRS sources and are applicable only as a screening level for evaluating and managing Savannah River Site air permits. This section of text must be revised accordingly. In addition, footnotes to the columns 'SRS Maximum' in Tables 4-6, 4-8 or the column 'SRS Baseline' in Table 4-23 should be modified to state that the listed values are hypothetical levels based on maximum potential (i.e., permitted) emissions from SRS sources and do not necessarily quantify actual air quality conditions.	86-72
69	4.7.1	4-92 / 29 4-92 / 36	The nonhazardous liquid waste generated would represent less [than] about 35% of the SRS capacity Nonhazardous liquid waste generated by facility operations are estimated to be about 35% . . .		The 35% value is apparently calculated by NRC from Table 4.11, page 4-30, line 12. This is incorrect because treatment of waste from MFFF, PDCF, and WSB requires much less than 35% of capacity. The correct value is closer to 10% (about half of the 'nonhazardous liquid waste' from these facilities consists of non-process utility waters that will be released directly to permitted NPDES outfalls). See also comments related to Section 4.3.4.1 and 4.3.4.2 Tables 4.10 and 4.11.	86-73
70	5.2.1 – Table 5-1	5-2/ 13-14	Soils on-site will be graded or moved to create a uniform elevation that would reduce soil erosion. DCS	40 CFR 1508.20 "Mitigation" includes: (a) Avoiding the impact altogether by not taking a certain action or parts of an action. (b) Minimizing impacts by limiting the degree or	Grading the site to a uniform elevation is an inherent aspect of the MFFF design (the grading would be the same regardless of the MFFF location). Consequently, the grading is incorrectly identified as a "mitigation."	86-74

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				magnitude of the action and its implementation. (c) Rectifying the impact by repairing, rehabilitating, or restoring the affected environment. (d) Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action. (e) Compensating for the impact by replacing or providing substitute resources or environments		86-74
71	5.2.1 – Table 5-1	5-2/ 19-21	Accidental spills during construction shall be promptly cleaned up as required by DCS's Spill Prevention Control and Countermeasures Plan.		MFFF ER page 7-13, Table 7-1 specifically notes that a Spill Prevention Control and Countermeasures Plan is not required for the MFFF. DCS indicated in ER Section 7.2.1.2 that prior to operations a Spill Prevention Control and Countermeasures Plan will be developed. DCS did not commit to a Spill Prevention Control and Countermeasures Plan during construction, and it is inappropriate to levy this as a mitigation requirement when the SCDHED regulation clearly does not require it.	86-75
72	5.2.1 – Table 5-1	5-2/ 23-24	A Sediment Control Plan will be developed prior to disturbance of areas exceeding 2 ha (5 acres).		MFFF ER page 7-13, Table 7-1 specifically notes that a Stormwater Pollution Prevention Plan will be developed for the MFFF not a Sediment Control Plan. The DEIS should correctly identify the mitigative action as the implementation of the Stormwater Pollution Prevention Plan in compliance with SCDHEC regulations.	86-76
73	5.2.1 – Table 5-1	5-2/ 31-34	Good engineering practices, such as the use of straw bales or siltation fences adjacent to areas disturbed during construction, will be used to control sediment and limit runoff to Upper Three Runs Creek.		MFFF ER page 7-13, Table 7-1 specifically notes that a Stormwater Pollution Prevention Plan will be developed for the MFFF, which is more comprehensive and responsive to SCDHEC enabling regulations. Details of this comprehensive plan are contained in ER Section 7.2.1.2 paragraphs 5 and 6. DCS has not stated which specific controls will be part of the Stormwater Pollution Prevention Plan. The mitigtive action identified by the DEIS should be limited to implementation of a Stormwater Pollution Prevention Plan in compliance with SCDHEC regulations.	86-77
74	5.2.1 –	5-2/ 43-45	Dust suppression measures such as watering will be used	MFFF ER 7.2.1.1 states, "...a Construction Emissions	The South Carolina Department of Health and	86-78

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	Table 5-1		during construction to reduce fugitive dust emissions by at least 50%.	Control Plan will be developed to provide assurance that fugitive dust emissions will be effectively managed and minimized throughout MFFF construction."	Environmental Control does not specify requirements for reduction of fugitive construction dust. As noted in the MFFF ER, DCS will have a Construction Emissions Control Plan which will implement a number of different good engineering practices to reduce fugitive dust emissions. The MFFF ER does not identify specific actions or emissions reductions. The mitigative action specified in the DEIS should be limited to compliance with appropriate SCDHEC air quality regulations.	86-78 cont.
75	5.2.1 – Table 5-1	5-2/ 46-49	Particulate emissions from the silo hopper and concrete mixer used during the cementation process to construct the WSB shall be reduced by 90%.		The MFFF ER identifies that the concrete batch plant will be subject to the provisions of a South Carolina Department of Health and Environmental Control air quality permit. The concrete batch plant will meet the conditions of that permit. The mitigative action specified in the DEIS should be limited to compliance with appropriate SCDHEC air quality regulations.	86-79
76	5.2.1 – Table 5-1	5-3/ 1-12	Prior to construction, sites will be surveyed for plants and nests of migratory birds. To ensure compliance with the Migratory Bird Treaty Act and to provide additional protection for other bird species of concern (e.g., raptors), the following steps should be taken: (1) obtain a list from the Department of the Interior of migratory birds protected by the Act; (2) determine if protected migratory birds or their nests exist in the areas to be cleared for the proposed action; and (3) if protected birds or their nests or eggs are present, consult with the Department of the Interior for the appropriate precautions to be taken. This consultation should be undertaken as far in advance of construction as practicable. Consultation and coordination with state and federal natural resource and wildlife agencies shall be conducted prior to any site disturbances to ensure that all potential sensitive species (including candidate and listed species) are protected to the maximum extent possible.		The MFFF ER 4.6 describes the ecological habitat and the habitat surveys conducted prior to construction activities. MFFF ER Appendix A, pages A-25 and A-26 provides letters of negative declaration from the U.S. Fish and Wildlife Service that the MFFF construction and operation will not affect resources under the jurisdiction of the U.S. Fish and Wildlife Service. All necessary ecological surveys are complete. No sensitive species or nests of migratory species are present. These precautionary and mitigative actions presented in the DEIS are misleading and unnecessary.	86-80
77	5.2.1 – Table 5-1	5-3/ 20-21	Environmental supervisors shall be present during vegetation clearing to ensure that impacts are held to a minimum.		As noted in DEIS 3.6.1 (pg.3-34) the SRS forests are managed by the U.S. Forest Service. The removal of	86-81

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					trees and protection of trees not designated for removal will be under the direction of the U.S. Forest Service. The mitigative action specified in the DEIS should be limited to compliance with appropriate U.S. Forest Service regulations.	86-81 cont.
78	5.2.1 – Table 5-1	5-3/ 29-32	The loss of the existing storm-water basin near the southern boundary of the proposed site would be compensated for by construction of a new basin that would provide more viable aquatic habitat.	Letter from P. Hastings (DCS) to Document Control Desk (NRC), 29 October 2002, DCS-NRC-000116, Responses to the Request for Additional Information on the Environmental Report 1&2, Attachment 14a, letter from D Osteen (SRS) to F. Veal (USA C of E), Waters of the United States Walkdown on July 16, 2002	As noted in Attachment 14a of the letter from P. Hastings to the NRC Document Control Desk, the U.S. Army Corps of Engineers concluded that the existing storm-water basin is not part of the waters of the United States. Consequently, it is not appropriate to specify any mitigative action.	86-82
79	5.2.1 – Table 5-1	5-3/ 34-36	Measures shall be taken to protect trees not selected for removal. Any trees or other landscape features accidentally scarred or damaged should be replaced.		As noted in DEIS 3.6.1 (pg.3-34) the SRS forests are managed by the U.S. Forest Service. The removal of trees and protection of trees not designated for removal will be under the direction of the U.S. Forest Service. The mitigative action specified in the DEIS should be limited to compliance with U.S. Forest Service regulations.	86-83
80	5.2.1 – Table 5-1	5-3/ 38-42	Reclamation plans shall be developed for laydown areas and other construction areas that will not be occupied by structures, parking lots, or roads. Reclamation will include removal of all temporary construction features, stabilization of soils, and reseeding with appropriate plant species.		Property beyond the 41-acre MFFF site is managed under the DOE jurisdiction for the SRS. Land reclamation will be in accordance with DOE directives. The mitigative action specified in the DEIS should be limited to compliance with appropriate DOE policies for reclamation of construction areas.	86-84
81	5.2.1 – Table 5-1	5-4/ 7-12	• Monitoring of ground-disturbing construction activities will be conducted for the two directly affected eligible archaeological sites to complete obligations set forth in the data recovery plan for sites. • Awareness training will be conducted for workers so they do not disturb eligible archaeological sites. • Restrictions will be established regarding where heavy machinery is allowed. • Periodic monitoring of nearby eligible archaeological sites will be conducted to check for possible erosion. • Additional mitigation measures, such as avoidance agreements, will be determined in consultation with the SCSHPO.	Letter from D.Nulton (DOE) to C. Abrams (NRC), 25 Sep 2001, Designation of Department of Energy as the Lead Agency for Mitigation at National Historic Preservation Act Eligible Site Within the Proposed Location of the Mixed Oxide Fuel Fabrication Facility	Because NRC and DOE have designated DOE as the lead agency for mitigation under the NHPA, NRC specified mitigation actions are not appropriate. The mitigative action specified in the DEIS should be limited to compliance with DOE PMOA policies for archaeological management of construction activities.	86-85
82	5.2.1 –	5-4/ 34-39	Construction workers will be protected from inadvertent	Letter from P. Hastings (DCS) to Cheryl Trottier	The 29 October 2002 correspondence from DCS to	86-86

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	Table 5-1 5.2.8	 5-11/40-43	chemical and radiological exposures by soil testing and analysis prior to excavation to ascertain that levels of inorganic and/or organic chemicals in soils would not present a health hazard during construction activities. During construction, workers could be adversely affected by exposure to soil or groundwater previously contaminated by radioactivity or chemicals. Impacts from contaminated soil would be mitigated by conducting further sampling of the soil for radioactive contamination before excavation begins at the site.	(NRC), 29 October 2002, Responses to the Request for Additional Information on the Environmental Report, Revisions 1&2, DCS-NRC-000116; Attachment 26, Plutonium Project Pre-Construction Environmental Report	NRC responding to requests for additional information included the results of the Plutonium Project Pre-construction Environmental Report, including the results of soil analyses at the MFFF site. The DEIS should have included the results of this report which confirm the previous DCS conclusion in the MFFF ER that there are no significant concentrations of radioisotopes or chemicals in the soil that would be hazardous to construction workers health. Consequently, the mitigative action is misleading and unnecessary.	86-86 cont.
83	5.2.1 – Table 5-1	5-5/ 1-5	During licensing of the proposed MOX facility, DCS should demonstrate that the offgas treatment system will limit hydrazine to very low levels that would not cause adverse health impacts to members of the public or SRS employees.	.	Hydrazine emissions from the MFFF will be subject to South Carolina Department of Health and Environmental Control regulations. The mitigative action specified in the DEIS should be limited to compliance with SCDHEC air quality regulations. Regarding potential accidents, the offgas treatment system (or any ventilation system at the MFFF) is not required to be credited to reduce the hydrazine concentration in air after a spill because calculations indicate that releases that originate indoors (inside the reagent building or the MOX Building) do not result in concentrations that exceed any TEEL limits for the site worker or public. There appear to be errors in the DEIS hydrazine airborne concentration calculation that leads to this conclusion (see comments on Appendix E.1) and furthermore, crediting the release as an indoor release, which reduces the air speed across the surface of the spilled solution, provides sufficient reduction in the airborne concentration to result in acceptable consequences without mitigation by any offgas treatment system.	86-87
84	5.2.1 – Table 5-1	5-5/ 18-40 5-6/ 1-11	• DCS should work closely with SRS to implement procedures to protect low-income and minority groups in the event of an accidental chemical or radiological release from		As established in our comments to DEIS 4.3.5.2, the accident scenario relied upon to justify the conclusion that there are disproportionate impacts to low-income	86-88

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			the proposed MOX facility that impacts areas beyond the SRS boundary. • DCS should conduct focused public information campaigns to provide important information to low-income and minority groups/communities. Included in these campaigns would be descriptions of existing monitoring programs, and information on the nature, extent, and likelihood of any airborne release from the facility. The campaigns would also include a description of the relevant risks associated with the proposed MOX facility and MOX fuel transportation programs. These campaigns should include information on sheltering and other protection strategies that may be needed, including detailed descriptions of any evacuation procedures that may be required. • DCS should provide public information to local agencies and groups representing low-income or minority groups on existing soil or groundwater contamination monitoring programs and the nature, extent, and likelihood of surface release. Key information would include the extent of any likely damage to drinking water supplies and subsistence resources, and the relevant preventative measures that may be taken. • Meet with local communities providing emergency response services and other emergency facilities to discuss additional measures to ensure that the low-income and minority population in their jurisdictions are located and fully prepared in the event that sheltering or evacuation procedures are required. In addition to public information campaigns targeting low-income and minority groups, this would include the development of spatial databases providing information on the location of lowincome and minority populations, local resources available to emergency response agencies, and any evacuation routes that might be required.		or minority populations is flawed. Furthermore, the projection of potential impacts from a highly unlikely accident scenario that is prevented by the design requirements resulting from the safety regulations in 10 CFR Part 70 does not provide a reasonable basis for the proscribed mitigative actions and runs counter to the Commission guidance to use "reasonably foreseeable" events. As a separate matter, the DEIS provides no justification why DCS should provide local agencies or groups representing EJ groups with "public information" on existing soil or groundwater contamination monitoring, or the nature, extent, or likelihood of surface releases. Providing such information is not a mitigation action related to the MOX Facility, which has yet to be constructed. Similarly, the DEIS does not provide a justification why DCS should take the unprecedented initiative to create a spatial database for use by local authorities. In the event of any incident at SRS, the authorities would alert all potentially affected communities, not just minority communities.	86-88 cont.
85	5.2.1 – Table 5-1	5-5/ 35-40	DCS should provide public information to local agencies and groups representing low-income or minority groups on existing soil or groundwater contamination monitoring programs and the nature, extent, and likelihood of surface release. Key		For NRC to proscribe mitigative actions for existing soil or groundwater contamination is beyond the statutory authority of NRC. The DEIS has not identified a pathway involving soil or water contamination resulting from MFFF operations that	86-89

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			information would include the extent of any likely damage to drinking water supplies and subsistence resources, and the relevant preventative measures that may be taken.		would result in disproportionate impacts to low-income or minority groups. As established in our comments to DEIS 4.3.5.2, the accident scenario relied upon to justify the conclusion that there are disproportionate impacts to low-income or minority populations is flawed. Furthermore, the projection of potential impacts from a non-credible accident scenario that is prevented by the design requirements resulting from the safety regulations in 10 CFR Part 70 does not provide a basis for the proscribed mitigative actions.	86-89 cont.
86	5.2.2	5-7/ 18-27	However, construction could directly impact groundwater quality if any of the buildings or structures extended below the surface of the groundwater. This direct impact would be mitigated by selecting a site in which the groundwater is deeper than any of the anticipated construction, as is the case for the proposed site.		This entire paragraph hinges on the speculation of what resources might be impacted if any MFFF structures extended into groundwater. The fact is that the structures do not extend to groundwater. Speculation of what might happen if the structures should extend to groundwater should be removed from the DEIS.	86-90
87	5.2.2	5-7/ 45-46	Operation of a sand filter would not directly impact groundwater because the filter would be covered to prevent infiltration and it would have a concrete wall and bottom.		Because the proposed action does not include a sand filter this statement is irrelevant.	86-91
88	5.2.3	5-8/ 23-25	For example, a portion of the construction activities for the proposed MOX facility would take place on a former spoils pile used for previous F-Area construction,		The statement is incorrect. The MFFF will not be constructed on a former spoils pile; the spoils pile will be removed prior to construction.	86-92
89	5.2.3	5-8/ 35-44	Prior to construction, the proposed facility sites would be surveyed for nests of migratory birds in accordance with the Migratory Bird Treaty Act, and preconstruction surveys and consultations with the U.S. Fish and Wildlife Service and the South Carolina Department of Natural Resources would be conducted to ensure that impacts on any sensitive animal and plant species (e.g., the smooth coneflower) living in or near F-Area or rights-of-way would be insignificant. Some possible mitigative measures include avoiding species and their habitats entirely or just during critical time (e.g., during breeding season) or relocating sensitive species away from areas likely to be disturbed. These mitigation strategies would be coordinated with appropriate state and federal regulatory	ER, Appendix A, pg A-26, Letter from L. Duncan (USFWS) to A. Gould (DOE-SR), *Informal Consultation Under Section 7 of the Endangered Species Act for the Surplus Plutonium Disposition-Mixed Oxide Fuel Fabrication Facility*, 20 June 2001.	The MFFF ER 4.6 describes the ecological habitat and the habitat surveys conducted prior to construction activities. MFFF ER Appendix A, pages A-25 and A-26 provides letters of negative declaration from the U.S. Fish and Wildlife Service that the MFFF construction and operation will not affect resources under the jurisdiction of the U.S. Fish and Wildlife Service. All necessary ecological surveys are complete. No sensitive species or nests of migratory species are present. These precautionary and mitigative actions presented in the DEIS are misleading and unnecessary.	86-93

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			agencies as part of the consultation process.			
90	5.2.7	5-11 / 3	... permitted commercial recycling , treatment, or disposal facility.		Eliminate "recycling".	86-94
91	5.2.7	5-11 / 18	A new tank would be constructed at the WSB so that the high-alpha-activity waste could be neutralized before being transferred to the F-Area HLW tank Farm		Reword: A new tank would be constructed within the WSB so that the high-alpha-activity waste can be neutralized before being solidified to a TRU waste form.	86-95
92	5.2.7	5-11 / 23-24	... SRS facilities for on-site treatment and disposal.		Remove "on-site". Treatment can occur "off-site" as well.	86-96
93	5.2.9	5-13 / 16	Impacts of construction to two prehistoric archaeological sites have been mitigated in part through data recovery as described . . .Monitoring of these site during construction activities is also part of the mitigation strategy.	Letter from P.S. Hastings (DCS) to Document Control Desk (NRC), 12 December 2002, (DCS-NRC-000122) provided NRC with a copy of the letter from C.C. Long (SHPO) to A.B. Gould (DOE), "...our office concurs with the Department of Energy's determination that field obligations have been met for data recovery investigations at 38AK546 and 38AK757. The excavations exceeded the requirements of approved data recovery plans."	Information provided by DCS to NRC on 12 December 2002 demonstrated that the SHPO has agreed that all mitigation action is complete. No monitoring is required. Inadvertent discoveries will be handled in accordance with Federal Law and the SRS PMOA. The NRC mitigation is inappropriate.	86-97
94	5.2.10	5-14 / 7	The tallest new structure would be a stack that is less than 30 m (100 ft) above the existing grade.	ER section 5.1.7, page 5-7. "the tallest new structure is an exhaust stack which is located on top of the MFFF building. The stack is 120 ft (37 m) above the existing grade.	Note that the revised ER increased the height of the structure to 120 feet.	86-98
96	6/ Table 6.1	6-6/ 40-48	*State Water Quality Certification* certifying that the applicable state water quality standards will not be violated as a result of discharges to navigable waters by an activity authorized by a federal license. DCS has initiated consultation with the SCDHEC regarding a determination of whether an NRC license requires a 401 Water Qualification Certification in accordance with SCDHEC regulations 61-101 (DCS 2003).		SCDHEC informed DCS that a 401 Water Quality Certification is only required if a 404 Permit is issued by the Corps of Engineers. SCDHEC does not anticipate any requirement for a 401 Water Quality Certification for the MFFF.	86-99
98	C.1.3.1	C-6/ 37-38	The model takes into account the mode of transportation and the type of packaging.		Perhaps it would be better to state "The model allows the user to evaluate transportation risk, considering differences in the mode of transport and package used. The user selects parameters to represent the probability	86-100

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					of an accident occurring and consequences of a spectrum of accident severities."	86-100 cont.
99	C.1.3.1	C-7/ 1-10	The calculation of the collective population dose following the release and dispersal of radioactive material includes the following exposure pathways: • External exposure to the passing radioactive cloud • External exposure to contaminated ground, • Internal exposure from inhalation of airborne contaminants, and • Internal exposure from the ingestion of contaminated food.		The use of the ingestion pathway resulting from the consumption of contaminated food is highly speculative. Public policy and emergency response experiences from TMI in 1979 and Chernobyl in 1986 indicate that, essentially all food, whether contaminated or not was destroyed making the ingestion scenario not "reasonably foreseeable."	86-101
101	C.2	C-12/ 36	Depleted UF6 and UO2 shipments would use Type A packaging.		The MFFF ER specifies a 55-gallon Industrial Type 1 drum for the shipment of UO2. The DEIS specifies a 30-gallon Type A drum size.	86-102
102	C.2.1.1	C-9	However, the final determination of the route is left to the discretion of the carrier, such as for shipments of depleted UF 6 and UO2, unless the shipment contains a "highway route controlled quantity" (HRCQ) of radioactive material as defined in 49 CFR 173.403 (*Definitions*), such as the plutonium metal or the MOX fuel.		It is important to clarify that none of the shipments would meet HRCQ requirements. The UF6 and UO2 won't because of the material hazards; the Pu metal and MOX will be handled securely by DOE's OST, and the TRU waste will follow WIPP-prescribed routes.	86-103
103	C.2.1.2	C-10/ 19	0 to 39		Should be "0 to 139"	86-104
104	Appendix C, C.2.3	C-14, Table C.2, lines 7- 9	"Number of shipments" for Pu metal from Pantex and Hanford to PDCF – 343 and 87, respectively	SPD EIS – Appendix L, Table L-1 gives 530 shipments of the pits from Pantex to the PDCF.	Provide reference for how the number of shipments of Pu metal to PDCF was determined, since it differs from that used in the SPD EIS.	86-105
105	C.2.3	C-14/Table C.2	124 (273)		These are not accurate (per package) quantities. Please note that these may be more accurate for a "per shipment" amount.	86-106
106	C.2.3	C-14/ 26-29			Need to update. TSD is now called the Office of Secure Transportation, and the DOE AL is now an NNSA Service Center.	86-107
107	C.2.3	C-15 Table C.3	Curies related to various Pu isotopes in Pu metal, MOX fuel, and TRU waste		Pu isotopic distribution is the same for Pu metal, MOX fuel, and TRU waste. Curie content should be linear with mass of Pu in each stream. In Table C.3 it is not.	86-108
108	Appendix C,	C-19, Table	Footnote "b" for Type A and Type B Release fraction		Footnote is misleading as this footnote currently is	86-109

DCS Review of NRC *Draft Environmental Impact Statement on the Construction and Operation of a Mixed Oxide Fuel Fabrication Facility at the Savannah River Site, South Carolina*

Comment Number	DEIS Section	Page / Line	DEIS Statement or Text	Source Document & Statement or ER Text	Comment & Basis	
	C.2.4.2	C.5, line 7 & 19	columns. Footnote "b" currently gives: *Source*: NRC (1977b), used for Pu metal shipments.		used for the Type A packages as well as Type B. Type A packages are not used for Pu metal shipments. The intent is to differentiate between the Type B release fractions used for the Pu metal shipments and those used for the fresh MOX fuel shipments (Footnote "c").	86-109 cont.
109	Appendix C, C.2.5 and C.3	C-22, Table C.7, Line 9 And C-24, Table C.8, lines 45-46	Stop Time (h/km) parameter used as RADTRAN input of 0.011 for all shipments (RADTRAN default value)	MFFF ER, Appendix E, Table E-4 footnote: It has been assumed that no stops would be required for MOX fresh fuel shipments by SGT.	Assumption that stops with the same duration and public exposure as spent fuel truck shipments would occur for SGT shipments of both the fresh MOX fuel and the Pu metal is overly conservative.	86-110
110	C.2.7	C-23/ 20	Thus, in this assessment, a value of 8.36 × 10-10 latent fatalities/km for truck transport was used.		Units on this risk factor, based on the subsequent text, should be "latent fatalities-km/person", taking into account the "latent fatalities/km" divided by "persons/km**2."	86-111
111	Appendix C, C.3	C-24, Table C.8, lines 45-46	Footnote "d": Latent cancer fatalities are calculated by multiplying dose by the FGR 13 health risk conversion factor of 0.06 fatal cancer per person-Sv (6x10-4 fatal cancers per person-rem)(Eckerman et al. 1999)	*Cancer Risk Coefficients for Environmental Exposure to Radionuclides*, pg iv, "The dose coefficients given in Federal Guidance Report No. 11 and Report No. 12 continue to be recommended for determining conformance with radiation protection guidance for Federal agencies issued by the President and will be updated in the future as warranted. ... Although the application of these [Federal Guidance Report No 13] risk coefficients for ... Environmental Impact Statements ... is encouraged to promote consistency in risk assessments, such use is discretionary. ... Also the coefficients are based on radiation risk models developed for the application to either low acute doses or low dose rates and should not be applied to accident cases involving high doses and dose rates in either prospective or retrospective analyses" MFFF ER – Appendix E, E.2.1, last sentence: The health risk conversion factors (expected health effects per dose absorbed) were taken from the *1990 Recommendations of the International Commission on Radiological Protection* (ICRP 1991).	The Draft EIS does not explain why it relies on EPA Federal Guidance Report 13, rather than international standards for cancer risk. Federal Guidance Report 13 clearly states that the conversion factors in Federal Guidance Report 12 still continue to be recommended for radiation protection. The EPA Federal Guidance Report 13 relies on new studies that have not yet been incorporated into the international standards. This results in an order of magnitude higher risk (10^{-4}) than the studies presented in international standards (e.g. ICRP documents) (10^{-5}). Use of the EPA data, with the other unrealistically and overly conservative assumptions, paints an unrealistic potential impact from the proposed action.	86-112
112	E.1	E-5/38-42	Raoult's Law was used to make additional adjustments to		The calculations of mole fractions in Table E-1 are	

DCS Review of NRC *Draft Environmental Impact Statement on the Construction and Operation of a Mixed Oxide Fuel Fabrication Facility at the Savannah River Site, South Carolina*

Comment Number	DEIS Section	Page / Line	DEIS Statement or Text	Source Document & Statement or ER Text	Comment & Basis	
		E-7/4-16	spill vapor pressures to account for dilute solutions (such a solution lowers the vapor pressure of the solvent below that of the solute in proportion to the mole fraction of the solute). Table E.1 gives the computed mole fractions used in the analysis, along with the assumed spill volumes and the given chemical inventories and concentrations.		incorrect, which leads to errors in the modeled airborne concentrations and distances to reach TEEL limits in Table 4.16. It appears there are also errors in the calculation of the moles of solvent in a solution, total moles of solution, mass of solvent in a solution, and the total spill mass, some of which may have led to the error in the mole fractions.	86-113 cont.
113	E.1	E-6/12	Table E.1		The solution molecular weight (94 g/mole) and the solution density (2.13 kg/l) for hydrazine / sodium hydroxide appear to be incorrect.	86-114
114	E.1	E-6/13	Table E.1		The solution density for hydrazine / hydroxylamine nitrate (1.54 kg/l) appears to be incorrect.	86-115
115	E.1	E-11/9-35 E-12/1-27 E-14/5-30	Table E.3 Table E.4		Evaporation rates and vapor pressures of evaporating chemicals appear to be incorrectly calculated for chemicals where mole fractions were used to calculate the vapor pressures, which in turn were used to calculate the evaporation rates. See previous comments on Table E.1.	86-116
116	E.2.1.2	E-17 / 32	To obtain conservative estimates of potential exposure and doses, the SRS employees were assumed to be exposed to radiation from airborne emissions without any shielding by buildings or other structures.		If factors of 0.5 and 0.7 from US NRC 1.109 were used as stated on the next page, shielding was taken into account.	86-117
117	E.2.1.2	E-18 / 37	On an annual basis, the total time of external exposure to the plume and contaminated soil for all SRS employees was assumed to be 0.5 year (NRC 1977).		This is an incorrect interpretation of the 0.5 factor in US NRC 1.109. The 0.5 accounts for shielding while the individual is present. The individual is present approximately 23% of the time (2000/365/24) and this factor is further reduced by the 0.5.	86-118
118	E.2.1.2	E-18 / 45	On an annual basis, the total time of annual external exposure to the plume and contaminated soil for the MEI was assumed to be 0.7 year. For the inhalation pathway, an exposure time of 1 year was assumed (NRC 1977).		This is an incorrect interpretation of the 0.7 factor in US NRC 1.109. The 0.7 accounts for shielding while the individual is present. The individual is present approximately 23% of the time (2000/365/24) and this factor is further reduced by the 0.7 factor.	86-119
119	E.2.1.2	E-18 / 45	On an annual basis, the total time of annual external exposure to the plume and contaminated soil for the MEI was assumed to be 0.7 year. For the inhalation pathway, an exposure time of 1 year was assumed (NRC 1977).		The individual is present approximately 23% of the time (2000/365/24) Exposure time should be 0.23 years and not 1 year for workers.	86-120
120	E.2.1.2	E-19 / 2 Table E.6			Table needs a reference.	86-121

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Comment Number	DEIS Section	Page / Line	DEIS Statement or Text	Source Document & Statement or ER Text	Comment & Basis
121	E.2.1.3	E-19/ 28	The GENII code was used to assess radiation exposures of members of the public outside the SRS boundaries.	Letter from Dr. William Glaze (EPA Science Advisory Board) to Christine Todd Whitman (EPA Administrator), Review of ORIA's Use and Adaptation of The GENII Version 2 Environmental Radiation Dosimetry System, EPA-SAB-RAC-ADV-01-002 "The RAC found the environmental transport modeling capabilities for air and surface water releases of radionuclides to be adequate for screening purposes but not necessarily appropriate for detailed analysis or emergency situations. ... The conservative nature of the code may lead to excessively conservative dose estimates (i.e., higher than more realistic assumptions might produce), resulting unnecessarily costly controls and unnecessary expenditures in site cleanup operations. The RAC strongly encourages ORIA to provide more realistic bounds on their dose and risk estimates. ... However, the straight-line Gaussian and Lagrangian-puff models were designed for "well-behaved" pollution transport from chimney "stacks" and do not apply to more critical scenarios involving fires, explosions and accidental or terrorist aerial releases of contaminants, which the EPA may be called on to evaluate."	The DEIS's accident consequences do not provide members of the public with realistic exposure scenarios because the NRC Staff did not use an appropriate model to evaluate dispersion of a highly unlikely MOX explosion event. The NRC used the GENII code to model this accident; the ER used the NRC's MACCS2 code. The EPA Science Advisory Board in their evaluation of the GENII model noted that, "The conservative nature of the code may lead to excessively conservative dose estimates (i.e., higher than more realistic assumptions might produce), resulting unnecessarily costly controls and unnecessary expenditures in site cleanup operations." On page 10 of their report, the SAB specifically notes that, "... the straight-line Gaussian and Lagrangian-puff models were designed for 'well-behaved' pollution transport from chimney 'stacks' and do not apply to more critical scenarios involving fires, explosions and accidental or terrorist aerial releases of contaminants, which the EPA may be called on to evaluate. (emphasis added)" The NRC Staff used the GENII model for exactly the types of accidents that the SAB specifically noted the model should not be used. The GENII code makes a number of simplifying assumptions to make the calculation easier. While the GENII estimates would clearly bound the potential impacts, actual impacts from accidental releases would likely be orders of magnitude lower for both the short-term and 1-year doses. For example, • The GENII code evaluates the dose along the centerline of the plume and assumes that all individuals receive that dose. For the cases evaluated in the DEIS, the accident plumes would be narrow and not expose most of the downwind population to air concentrations nearly as high as the centerline of the plume. This assumption alone

86-122

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					could result in collective dose consequences approximately a factor of 7 greater than those produced by MACCS2 depending on the plume characteristics. The principal author of the GENII code indicated that the GENII algorithms for acute releases were designed primarily for evaluating doses to nearby individuals. The July 2002 DOE guidance "Recommendations for Analyzing Accidents under NEPA", (Sect. 3.1 Scenario Development, Conservatisms, page 7) indicates that using estimates of plume centerline concentrations may be appropriate for evaluating impacts to maximally exposed individuals, but would not be appropriate for evaluating population impacts (would overestimate impacts); sector-averaged plume concentrations would yield more realistic results for population impacts. The GENII code does not calculate the lateral dispersion of the plume and overlay that with detailed food production distributions. • Similarly, the GENII code simply predicts the concentrations at the centerline of the plume and assumes food produced is exposed to air concentrations equal to those on the centerline of the plume for the entire plume passage. This simplification results in over prediction of the air contamination level that plants and animals might be exposed to by at least an order of magnitude. • The code does not realistically model the time-dependent harvesting of contaminated food. Instead, the model assumes that all food grown in the sector is harvested instantaneously just after the plume passes. This assumption may be defensible for some crops, but is extremely over-conservative for crops and animal products. An entire year's supply of milk or eggs (or meat or poultry) is not

86-122 cont.

DCS Review of NRC *Draft Environmental Impact Statement on the Construction and Operation of a Mixed Oxide Fuel Fabrication Facility at the Savannah River Site, South Carolina*

Comment Number	DEIS Section	Page / Line	DEIS Statement or Text	Source Document & Statement or ER Text	Comment & Basis
					collected in one day. The animals re-equilibrate with air nearly as quickly as the plants. Even allowing for weekends and holidays, the assumption of 100% harvest is probably conservative by a factor of about 200 (it would be close to 365 if harvest was really continuous). • The time-dependent consumption of contaminated food is not realistically modeled. Each of these factors is multiplicative. Collectively, the simplifying modeling assumptions result in an over prediction of ingestion doses by several orders of magnitude. Since it is not possible to fulfill the basic NEPA responsibility of informing the public of the reasonably foreseeable environmental impacts of the proposed action with the GENII code, other codes developed specifically for modeling accident consequence should be used. DCS strongly recommends that a well-established accident consequence code with a strong QA record, such as NRC's MACCS2, be used.
122	E.2.2	E-23 / 11-13 Table E.9	Ingestion parameters for root vegetables, fruit, and grain		Each line repeats the same number (276 kg/yr for the MEI and 163 kg/yr for the population) when this should be the total for all three.

Vegetable	Average consumption (kg/yr)	Maximum Consumption (kg/yr)
Fresh Vegetables	66	92
Fruits	60	120
Grains	37	64
Total	163	276

86-122 cont.

86-123

DCS Review of NRC *Draft Environmental Impact Statement on the Construction and Operation of a Mixed Oxide Fuel Fabrication Facility at the Savannah River Site, South Carolina*

Comment Number	DEIS Section	Page / Line	DEIS Statement or Text	Source Document & Statement or ER Text	Comment & Basis	
123	E.2.2.1	E-28/ Table E.13	**Table E.12. Source terms for detailed accident analyses** Hypothetical accident event / Quantity of plutonium at risk (kg) / Damage ratio / Respirable release fraction / Leak path factor Internal fire / 84 (polished) / 1 / 0.0008 / 0.01 Load handling / 254 (polished) / 1 / 0.0008 / 0.0001 Explosion / 76 (unpolished) / 1 / 0.01 / 0.01 Criticality / 41.6 (unpolished) / 1 / 0.0005[a] / 0.0001[b]		Table E.12 indicates that NRC used a leak path factor of 0.01 for the internal fire and explosion events. DCS used a leak path factor of 0.0001 for these events. DCS is currently discussing with the NRC safety analysis staff the appropriate leak path factor to use. If the NRC staff ultimately agrees to a leak path factor of 0.0001, DCS assumes the EIS staff will reevaluate the accident scenarios with this new leak path factor.	86-124
124	E.2.2	E-29 / 11-15 Table E.13	Curies of Uranium isotopes released for WSB accidents	ER Table D-7 lists source terms for isotopes released.	Does not include U-238, 99% of uranium inventory.	86-125
125	F.2.2	F-7/11	Engine-specific emission factors were available for criteria pollutants.		Sentence should read: "...factors were NOT available for..."	86-126
126	H.3.1.4	H-9 / 13 – 16	The transmission line Right of Way provides suitable habitat for the smooth coneflower. Thus the ROW would need to be surveyed before clearing . . .	ER, Appendix A, pg A-26, Letter from L. Duncan (USFWS) to A. Gould (DOE-SR), *Informal Consultation Under Section 7 of the Endangered Species Act for the Surplus Plutonium Disposition-Mixed Oxide Fuel Fabrication Facility*, 20 June 2001.	The ecological survey is complete and conclusive and did not reveal any populations of the smooth purple coneflower within the designated survey area. It was acknowledged by the US Fish & Wildlife Service in June 2001 that, "...We concur with your determination that the proposed action will have no effect on resources under the jurisdiction of the USFWS..."	86-127

00087

From: Allison Macfarlane [allisonm@MIT.EDU]
Sent: Tuesday, May 13, 2003 9:14 PM
To: Mary Olson; Frank von Hippel; melson@Princeton.EDU; jmkang55@hotmail.com
Cc: teh@nrc.gov
Subject: NRC DEIS comments

Dear Colleagues,

Here are my comments on the NRC's draft EIS for the MOX fuel fabrication facility, for your information. You will note that on page 2-24, they mention our report on Storage MOX explicitly.

with best regards,

Allison

Comments on NRC's "Environmental Impact Statement on the Construction and Operation of a Mixed Oxide Fuel Fabrication Facility at the Savannah River Site, South Carolina" NUREG-1767, February 2003

Allison Macfarlane

Senior Research Associate

Security Studies Program

MIT

Cambridge, MA 02139

There are a number of unresolved, significant issues in the NRC's draft environmental impact statement on the construction of a MOX fuel fabrication facility (MOX FFF) at the Savannah River site, in South Carolina (hereafter DEIS). I outline them below.

(1) Cart Before the Horse.

The most alarming problem is the NRC's endorsement of a cart-before-the-horse plan. The entire point of a new environmental impact statement was to address the changes wrought by DOE's decision to use only MOX to disposition plutonium, instead of the hybrid immobilization and MOX plan. These 87-1

changes will result in an expansion of a process at the MOX FFF called the "aqueous polishing" process. This process is simply a version of that used to reprocess spent nuclear fuel, including the PUREX process. New radioactive waste streams will result from "aqueous polishing", and these will require further processing at a facility to be constructed called the Waste Solidification Building (WSB). Herein lies the problem: the WSB is part of the Pit Disassembly and Conversion Facility (PDCF), which will be constructed *after* the MOX FFF is operational!

In fact, DOE has changed the design of the MOX FFF, which was originally to include equipment to solidify radioactive liquid waste, but now, according to DOE's Supplement Analysis and Amended Record of Decision of April 2003, this equipment is to be located in the WSB.

DOE's current schedule, laid out in its February 15, 2002 Report to Congress, call for construction of a MOX FFF from 2004-2007, once licensed by the NRC, with operations beginning in 2007. The PDCF will be constructed from 2006-2009, with startup in 2009. What does DOE plan to do with the waste streams generated by "aqueous polishing" in the MOX FFF in the interim? 87-1 Cont.

Furthermore, exactly which plutonium stocks will the DOE process at the MOX FFF until the PDCF is complete? Clearly DOE cannot use plutonium metal until the PDCF is completed. My understanding of the remaining plutonium stocks (25 MT being pure metal) is that of the available weapons grade plutonium to be processed (6.5 MT according to DOE's SA and ROD 2003) is all of the impure variety. These impure stocks, therefore, will require "aqueous polishing", which will create waste streams. *The NRC's DEIS does not address the issue of what will happen to these waste streams in the interim.*

I would suggest that the NRC in its EIS carefully address the scheduling issues with regards to the treatment of radioactive waste. In its DEIS, the NRC acknowledges the existence of "connected actions" in that the PDCF must exist first to handle the waste streams generated by the MOX FFF, the subject of the DEIS. I would argue that acknowledgement of these connections is simply not enough to license a facility whose operation without the PDCF will produce potentially large safety impacts to humans and the environment, especially since the DOE has explicitly stated that the required facility will not operate until years after the MOX FFF is planned to begin operations.

(2) Waste Streams.

In its account of liquid wastes, the NRC details a number of the waste streams to be dealt with including chloride, americium, and uranium. NRC does not mention other impurities that exist in some of the plutonium oxide stocks. They are listed below. How will these wastes be dealt with?

Impurities in Plutonium Feedstock for MOX FFF 87-2

ImpurityConcentrationAm-241<200 ppm to ~15 wt%Depleted U<200 ppm to >70 wt%Enriched UTrace to >99 wt%NpHighly variableThHighly variableAl, C, Ca, Cl, Cr, Fe, F, Ga, K, Mg, Mo, Na, Si, Ta, W, and Zn<100 ppm to ~90 wt%Other potential impurities and forms of impurities: MgF2, CaF2, NaCl, KCl, MgCl2, ZnCl2, CaCl2, Co, Ni, Hf, Nb, B, P. The salts can be driven off through heating (they are volatile).

(3) Alternatives Considered But Not Analyzed in Detail.

(a) Immobilization

NRC discounts consideration of immobilization as a path for disposing of plutonium because of the DOE decision to cancel the immobilization plant. Though part of DOE may no longer require immobilization facilities for dispositioning some weapons-grade plutonium, the fact remains that DOE currently has no plans for the remaining10.5 MT of plutonium, both weapons- and reactor-grade, from the original 17 MT that was to be sent to an immobilization facility. Even if DOE transfers "ownership" of this plutonium from one subdepartment (materials disposition) to another (environmental management), it is quite possible that an immobilization facility will be necessary to dispose of this material that the government declared excess to military needs. It seems short-sighted, then, to completely discount immobilization as a "reasonable" alternative. 87-3

A smaller point: on page 2-23, lines 20-21, in the DEIS, NRC states that it "solicited views" on whether immobilization should be considered. Whose views did it consider?

(b) Off-Spec MOX Fuel

First, as one of the "principal proponents" of this approach, I must point out that the off-spec MOX alternative is simply a variant of immobilization. NRC seems to stumble on to that fact near the end of their discussion of this issue. I am flattered, thought, that they have given this option a reasonable amount of consideration, but I have a number of comments on this section.

First, on page 2-24, lines 5-6, there is no need for a country like the United States to limit its radiation barrier for the off-spec MOX to spent fuel. Most reactors do not have facilities to separate fuel pins from assemblies, which would be required by countries that do not have large quantities of high-level waste waiting to be vitrified. Instead of using spent fuel, one could adopt a variant of the can-in-canister approach planned for the immobilization facility. One could emplace the pellets of off-spec MOX into high-level waste glass, for instance. NRC should not limit itself to such narrow analysis. 87-4

The analysis in lines 23-32 all applies to immobilization in general, of course.

Inlines 43-46 on page 2-24, continued on page 2-25 (lines 1-2)NRC makes a specious argument. It should be omitted from this analysis. Yes, Am-241 would not be removed from the impure plutonium in immobilization. But the MOX fuel method does not eliminate it from the planet - it just puts it into a different waste stream. Am-241 will still poses a hazard. Moreover, there will be *very little* Am-241 in the plutonium because it will be weapons-grade plutonium, not reactor-grade plutonium – at least for that covered by the Bilateral Plutonium Disposition Agreement. 87-5

Lines 4-8 on page 2-25 report yet another specious argument. By *DOE's own analysis*, the immobilization method (via can-in-canister) would be much cheaper than the MOX-only plan they are currently following. In its 2001 cost estimate (the last time DOE compared MOX and immobilization

costs), the MOX FFF was projected at $2.5 billion versus $1.5 billion for the immobilization facility (planned for 50 MT of plutonium through-put). That's a savings of $1 billion, even given the "fuel credit." 87-5 Cont.

In its February 2002 Report to Congress, DOE asserts its 2002 plutonium disposition budget projections are $2 billion less than its 2001 estimates. The reduction is due, they claim, to the elimination of the immobilization program, the streamlined design of the PDCF, and the shorter operating lifetimes of both the MOX FFF and the PDCF. The total cost of the disposition program in 2001 was estimated to be $6.2 billion versus $3.8 billion in the 2002 estimate. Removing the immobilization facility from the 2001 numbers reduced the difference between the 2001 and 2002 budgets by $1 billion. The remaining $1 billion difference between the 2001 and 2002 cost estimates is from the PDCF, whose capital costs have been inexplicably halved. Though additional modifications will be required of the MOX FFF, the costs presented in the congressional report do not reflect that. They also do not reflect the capital cost of dealing with the additional waste streams created by plutonium purification. Furthermore, the 2002 cost estimates do not reflect the additional operating time needed to (1) handle more material through the MOX FFF (34 MT versus 25.6 MT), (2) purify the surplus plutonium streams that would previously have remained untreated in the immobilization program, and (3) to handle the additional wastes generated from purifying the contaminated plutonium. 87-6

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00088

May 14, 2003

Michael T. Lesar

Chief, Rules & Directives Branch

Division of Administrative Services

Office of Administration

U.S. Nuclear Regulatory Commission

Washington, DC 20555

Plutonium Bomb Fuel is a Threat

Dear Sir:

I am concerned about the MOX fuel program for the following reasons: 87-1

1. Shouldn't terrorism be addressed in the report? (P. 1-29)

2. Shouldn't emergency preparedness in dealing with impacts from an accident in nearby communities be studied? (P. 1-29) 87-2

3. Should any deaths be considered "acceptable"? Why are some communities unfairly burdened with higher risks? (P. 4-57) 87-3

4. Shouldn't we study safer and cheaper options? (P. 2-23) 87-4

Please consider these points before making your decisions. As these decisions will affect generations to come.

Sincerely,

Soumya Ganapathy

14 Thackery Place

Savannah GA 31405

00089

Department of Energy
National Nuclear Security Administration
Washington, DC 20585

May 14, 2003

Mr. Michael T. Lesar, Chief
Rules Review and Directives Branch
U.S. Nuclear Regulatory Commission
Mail Stop T6-D59
Washington, D.C 20555-0001

Subject: Comments on NUREG-1767, Draft *Environmental Impact Statement on the Construction and Operation of a Mixed Oxide Fuel Fabrication Facility at the Savannah River Site, South Carolina*

Dear Mr. Lesar:

Attached are the Department of Energy's (DOE) comments on the Nuclear Regulatory Commission's (NRC's) Draft *Environmental Impact Statement on the Construction and Operation of a Mixed Oxide Fuel Fabrication Facility at the Savannah River Site, South Carolina* (DEIS), NUREG-1767. DOE's greatest concern with the DEIS is that the consequences reported for postulated accidents at the Mixed Oxide (MOX) facility and the Pit Disassembly and Conversion Facility (PDCF) are unrealistically high and, if accurate, would raise environmental justice issues that could require the implementation of unnecessary mitigative actions. DOE believes this potentially erroneous result is caused by a number of factors, in particular the code used for accident analysis and the multiplicative effects of using overly conservative assumptions for each analytical parameter. DOE's concerns in a number of areas related to the accident analyses in the DEIS are summarized below and discussed in greater detail in Attachment 1. 89-1

- *The use of the GENII v. 1485 ("GENII") code for evaluating accident scenarios for the MOX facility and PDCF is not appropriate.* The GENII code was developed for modeling small, routine releases of radionuclides to confirm that these releases remain below regulatory limits. Although the GENII code does have an acute release component, the simplifying assumptions in the code produce highly unrealistic results when applied to the short-term, puff-type release characteristic of accidents.[1,2] The accident analysis community generally uses codes such as MAACS2, a code developed under NRC sponsorship, that is designed to realistically, but conservatively, estimate both the short-and long-term 89-2

[1] EPA's Science Advisory Board, in a published review of the GENII code, found the environmental transport modeling capabilities for air and surface water to be adequate for screening purposes but not necessarily appropriate for detailed analysis or for emergency situations. Among the Board's conclusions is that the conservative nature of the GENII code may lead to excessively conservative dose estimates, i.e., estimates higher than more realistic assumptions might produce, and that could, in turn, result in unnecessarily costly controls.

[2] The lead author of the GENII code also indicated in an e-mail message of February 26, 2003 to Doug Outlaw of SAIC (DOE Contractor), that there is a potential for obtaining erroneous results while using the GENII code for accident analysis.

impacts of large accidental releases of radionuclides. Moreover, MACCS2 has been used extensively for accident analysis for both NRC-licensed and DOE facilities. It is validated and is widely accepted as the code of choice. 89-2 Cont.

- *The results reported in the DEIS errata sheets are not physically possible.* The predicted doses for the explosion scenario for the MOX facility would seem to require more plutonium to be ingested than would be released in the postulated accident. To result in the number of latent cancer fatalities attributed to the ingestion pathway, the calculations strongly suggest that the offsite population would be required to ingest contaminated food containing almost twice the amount of plutonium postulated by the NRC to have been released by this accident. 89-3

- *Despite statements that population impacts in the DEIS are based on meteorological conditions at the 95th percentile, they may actually be based on conditions at the 99th to 99.5th percentile.* DOE's attempts to duplicate the DEIS calculations indicate that what is reported in the DEIS appears to be actually 99 to 99.5 percent meteorology. Using the overly-conservative GENII code, reanalysis with 95 percent overall meteorology indicates that for plutonium releases, population doses due to inhalation could actually be 6 times lower than indicated in the errata sheets; and for ingestion 44 times lower. Likewise, for tritium releases, population doses due to inhalation could actually be 6 times lower than indicated in the errata sheets, and for ingestion, 4 times lower. 89-4

- *The plutonium source term is far greater than would be expected for a reasonably foreseeable, credible event (i.e., the evaluated bounding accidents are beyond design basis).* The multiple conservative bounding assumptions used are additive and result in significant overestimation, by orders of magnitude, of the explosion source term. 89-5

- *DOE believes that the NRC's DEIS is inconsistent with the NUREG-1748, Environmental Review Guidance for Licensing Actions Associated with NMSS Programs (September 2001), to consider the potential impacts of reasonably foreseeable, not worst case, accidents.* By evaluating worst case accidents instead of reasonably foreseeable accidents, and further, by compounding conservative assumptions for each input parameter in the analysis, NRC is inadvertently presenting the public and the decision makers with an unrealistic picture of the potential consequences of operation of the MOX facility and PDCF. The potentially erroneous results may engender ill-founded safety concerns among the public, especially local residents, by suggesting unrealistically high accident consequences. Further, the consequences presented in the DEIS and its errata sheets indicate the need for mitigation measures to relieve potential environmental justice issues. These measures, which but for the potentially erroneous accident results may be unnecessary, would be costly to implement and unduly burdensome to both the applicant and the public. 89-6

In addition to providing more details about the DEIS accident analyses, the following issues are discussed in Attachment 1:

- Reanalysis of the PDCF
- Identification of Environmental Justice issues
- Use of non-representative air quality monitoring stations
- Treatment of decontamination and decommissioning in the DEIS
- Identification of excessive mitigation measures
- Discussion of the waste solidification building

Attachment 2 contains specific textual comments for your consideration. Please contact Hitesh Nigam of my staff if you have any questions or wish to discuss any of our comments. He may be reached by telephone at (202) 586-0750, or via e-mail at Hitesh.Nigam@nnsa.doe.gov.

Sincerely,

Edward J. Siskin
Assistant Deputy Administrator for
Fissile Material Disposition

Attachments

cc: Tim Harris, NRC
Mary Birch, DCS

ATTACHMENT 1

Department of Energy's Major Comments

I. Accident Analysis

The Department of Energy (DOE) is concerned about the methodology used by the Nuclear Regulatory Commission (NRC) for the accident analyses for both the Mixed Oxide Fuel Fabrication Facility (MOX facility) and the Pit Disassembly and Conversion Facility (PDCF). DOE is concerned not only with the code used to evaluate the potential effects of postulated accidents, but also with the manner in which NRC's code of choice may have been implemented. The results reported in the Draft *Environmental Impact Statement on the Construction and Operation of a Mixed Oxide Fuel Fabrication Facility at the Savannah River Site* (DEIS), NUREG-1767, are higher than would be predicted with accident consequence models using the DEIS source terms and assumptions. In addition, the results are higher than those reported in the *Surplus Plutonium Disposition Environmental Impact Statement* (SPD EIS), the *Mixed Oxide Fuel Fabrication Facility Environmental Report*, and the MOX Construction Authorization Request. DOE has reanalyzed the accidents using NRC's inputs with consequence models designed specifically for accident analysis and the results contained in the DEIS do not appear to be realistic and moreover may not be physically possible. DOE's basic concerns about the accident analysis methodology are as follows: 89-7

- *The use of the GENII v. 1485 ("GENII) code for evaluating accidents at the MOX facility and PDCF is not appropriate.* NRC used the GENII code to evaluate accidents for the DEIS. Although the GENII code does have an acute release component, the code was developed for modeling small, routine releases of radionuclides from DOE facilities to confirm that the releases remain below regulatory limits. Because routine releases from DOE facilities are very small, a number of simplifications were included in the code to make it easier to use and less time-consuming to run, and still be able to demonstrate that potential impacts are well below regulatory limits. These bounding, simplifying assumptions, such as use of plume centerline doses to represent the doses from the entire plume, lack of plume depletion, and "instantaneous" harvesting of crops followed by consumption of an entire year's production, while acceptable for estimation of annual doses from routine releases, appear to be unrealistic when applied to the short-term, puff-type release characteristic of accidents described in the DEIS[1]. 89-2 Cont.

  Furthermore, the Radiation Safety Information Computational Center issued a notice in March 2003 that there is a potential for obtaining erroneous results using the GENII code for accident analyses. This notice was issued based on information provided by the lead author of the GENII code who identified the concern while reviewing DEIS accident analyses.

[1] The lead author of the GENII code also indicated in an e-mail message of February 26, 2003, to Doug Outlaw of SAIC (DOE Contractor), that there is a potential for obtaining erroneous results while using the GENII code for accident analysis.

The accident analysis community generally uses codes such as MAACS2, a code developed under NRC sponsorship, that is designed to realistically, but conservatively, estimate the short- and long-term impacts of large accident releases of radionuclides. MACCS2 has been used extensively for accident analysis for both NRC-licensed and DOE facilities. It is validated and is widely accepted as the code of choice. DOE analysis using the MAACS2 code for the explosion at the MOX facility results in less than 1 latent cancer fatality (LCF), as compared to 200 LCF reported in the DEIS for collective off site public one-year exposure. (WSMS-TR-03-0011, May 2003)

In addition, at the Savannah River Site (SRS), DOE has been using a computer model, UFOTRI, developed by the German national laboratory Karlsruhe to assess radiological consequences due to postulated accidental releases of tritium from nuclear facilities. The UFOTRI model was selected for use at SRS after evaluation of a number of codes to determine which code best predicted the results of environmental sampling in the vicinity of SRS. This model was used to evaluate the postulated tritium release from the PDCF, and the results were compared with the DEIS. The DEIS errata sheets estimated a collective off site public one-year exposure that results in approximately 100 LCFs, whereas the UFOTRI model results in approximately 1 LCF. (WSMS-TR-03-0011, May 2003)

Moreover, the Radiation Advisory Committee (RAC) of EPA's Science Advisory Board, in a review of the GENII v.2 requested by the EPA's Office of Radiation and Indoor Air (ORIA) (EPA-SAB-ADV-01-002, June 2001), found the environmental transport modeling capabilities for air and surface water releases of radionuclides to be adequate for screening purposes but not necessarily appropriate for detailed analysis or for emergency situations, and came to similar conclusions with respect to the modeling of exposures to tritium, among other radionuclides.[2] The report states that the more complex environmental radionuclide transport modeling inputs required for catastrophic events (e.g., fires, explosions, accidents and terrorist acts) involve "near-field" physics not captured by the generalized GENII module. Comments in the transmittal letter include: 89-2 Cont.

- *The need for the dose and risk estimates to be as unbiased as possible. The high level of conservatism apparently built into the GENII code is not sufficiently transparent to the user, who must be able to decide explicitly on the level of conservatism appropriate for the particular application.*

- *The conservative nature of the code may lead to excessively conservative does estimates (i.e., higher than more realistic assumptions might produce), resulting in unnecessarily costly controls and unnecessary expenditures in site cleamup operations.*

[2] This review was conducted on draft Version 2 of the GENII code, which is an update of Version 1.485 used for the DEIS analyses. The analytical model in Version 2 is similar to Version 1.485. Therefore, EPA's comments about the technical aspects of the code are also applicable to Version 1.485.

ORIA was strongly encouraged in the latter comment to provide more realistic bounds on their dose and risk estimates than available by using GENII.

- *The results reported in the DEIS errata sheets are not physically possible.* DOE's analysis indicates that the predicted doses for the explosion scenario for the MOX facility require more plutonium to be ingested than is postulated to be released. DOE has performed calculations that start with the doses and LCFs reported in the DEIS errata sheets, and worked backwards to calculate the source terms necessary to achieve these results.

  The DEIS errata sheets report that for the MOX facility explosion scenario, the highest initial population impacts, 50 LCFs due to inhalation of plutonium, would occur if the wind transported the initial plume to the populated west-northwest sector. The DEIS also reports that if the plume instead traveled to the southwest, one-year doses due to the consumption of contaminated agricultural products would be maximized. The DEIS errata sheets indicate that, absent mitigative actions (e.g., crop interdiction), there would be 200 LCFs from initial plume passage towards the southwest where there is substantial farming activity. DOE analyses using the NRC modeling assumptions indicate that for this case, more than 95 percent of the dose would be received from ingestion of contaminated foodstuffs. However, DOE's experience in performing similar accident analyses strongly shows that ingestion doses are routinely a small fraction of inhalation doses.

  DOE used EPA Federal Guidance Report-13 dose conversion factors (also used in the DEIS) to estimate the amount of plutonium that would have to be ingested to result in the reported population doses. These calculations demonstrate that the offsite population would be required to ingest contaminated food containing almost twice the amount of plutonium postulated by the NRC to have been released by this accident to result in the number of LCFs attributed to the ingestion pathway. It would seem to be unreasonable to assume that a population ingests more plutonium than is released. 89-3 Cont.

  Similarly, inhalation dose conversion factors were used to estimate the amount of plutonium that would have to be inhaled to result in the population doses reported in the DEIS. For 50 LCFs to result from the initial plume passage, the downwind offsite population to the west-northwest (more than 5 miles away) would have to inhale approximately 0.23 percent of the total amount of plutonium released in the accident. It is usually not possible for the downwind population to inhale such a high fraction of the material released in the accident. More that 96 percent of the people in the west-northwest sector reside farther than 20 miles from the MOX facility. Most of the plutonium would settle to the ground well before reaching the highly populated areas.

  Similarly, for the tritium release from PDCF, the DEIS results imply that about 0.04 percent of the total tritium released would have to be inhaled if the initial plume passes to the west-northwest and 0.51 percent of the total tritium release would have to be ingested by the consumption of contaminated food over the next year if the plume travels to the southwest. As with the plutonium accident cases, DOE's experience indicates that

the realistic fraction to be inhaled or ingested to be several orders of magnitude less than these numbers indicate.

In addition, DOE believes that this consequence modeling appears to be overly conservative and unrealistic, thus, misleading. Due to the natural effects of dilution with the transport of radioactive materials, the actual fraction of the plutonium or tritium released that could be realistically inhaled is typically much smaller that the reported results would indicate. The amount that could realistically be ingested would be even smaller. 89-3 Cont.

- *The DEIS indicates that the analyses use meteorology at the 95th percentile, but it may actually be 99th to 99.5th percentile.* Page E-31 of the DEIS indicates that impacts are based on 95 percent meteorology, which the DEIS defines as "weather conditions that produce impacts that are not exceeded 95 percent of the time." Attempts to duplicate the DEIS calculations appear to indicate that what is reported is actually 95 percent meteorology in the worst sector rather than 95% overall as stated in the DEIS. Based on a Monte Carlo simulation using the results of GENII with the addendum meteorology, the consequences reported in the addendum actually correspond to 99 to 99.5 percent meteorology. The reported results therefore correspond to weather conditions that produce impacts that are not exceeded 99 percent or more of the time. The resulting effects are significant. Reanalysis using GENII with true 95 percent overall meteorology (rather than 95 percent in the worst sector), indicates that for plutonium releases, population doses due to inhalation are 6 times lower than indicated in the errata sheets; and for ingestion 44 times lower. Likewise, for tritium releases, population doses due to inhalation are 6 times lower than indicated in the errata sheets, and for ingestion 4 times lower. 89-4 Cont.

- *The plutonium source term appears to be far greater than would be expected for a reasonably foreseeable, credible event (i.e., the evaluated bounding accidents are beyond design basis).* The assumed parameters for the plutonium source terms, material at risk, damage ratios, respirable release fractions, and leak path factor listed in Table E.12 of the DEIS are clearly bounding but also so overly conservative as not to be realistic. Each is based on a bounding, worst-case type accident for that category without consideration of the design of specific systems. As such, they may be more appropriate for determining performance factors and license conditions for safety systems, such as the building confinement systems. However, values for *reasonably foreseeable* accidents specified by National Environmental Policy Act (NEPA) regulations would require a more reasoned view of the performance of safety systems. For example, each of the MOX facility accidents identified would be "design-basis" type accidents for which the safety systems, including mitigation systems such as building confinement and filtration systems, would be expected to continue to perform their minimum safety function. For example, in the case of the explosion scenario, it would appear beyond the rule of reason to assume, as the DEIS analysis does: 89-5 Cont.

  - That all the plutonium is involved in the accident. Because the material at risk is in three separate tanks within a cell, only a fraction of total plutonium would be involved in the event. Therefore, it is very unlikely that all the material would be subject to the full explosive forces that would support the assumed airborne release factor and respirable fraction. The release is therefore unlikely to involve more than one-third of the plutonium in the cell, since there are three separate tanks within the cell.

- The upper limit of possible airborne release fractions and respirable fractions for explosions without considering the design of the processes and potential energies that might be involved. Many types of events would have much lower values for the product of the airborne release fractions and the respirable fractions, or involve a smaller fraction of the inventory. (DOE-HDBK-3010-94 [Mishima] and NUREG/CR-6410 [NRC Accident Analysis Handbook] provide more guidance on this subject.)

- That the building confinement system suffers a major breach without a strong technical basis to demonstrate that this breach might be reasonably foreseeable. This accident is a design basis accident and the building confinement system, including HEPA filters, would not be substantially impaired. The conditional probability that the building confinement system would also be substantially impaired is very low. The typical historical recommendation for safety analysis is 99.9 percent efficiency for the first HEPA filter and 99.8 percent for the second. This implies that a leak path factor of as low as 2×10^{-6} could be considered reasonable, as opposed to the leak path factor of 1×10^{-2} used in the DEIS (Elder 1986; NUREG/CR-6410, Section F2.1.3, 1998). 89-5 Cont.

Collectively, these multiple conservative bounding assumptions are additive and DOE believes that they result in significant overestimation, by orders of magnitude, of the explosion source term.

- *DOE believes that the NRC's DEIS is inconsistent with NUREG-1748, Environmental Review Guidance for Licensing Actions Associated with NMSS Programs (September 2001), to consider the potential impacts of reasonably foreseeable, not worst case, accidents.* NUREG-1748 specifies in several locations (Sections 5.4, 5.4.12.2.2, 6.4, and 6.4.12.2.2) that (quoting specifically from Section 5.4, Environmental Impacts),

> *This section summarizes the known and potential impacts of the proposed action and each alternative. These impacts should consider normal operational events as well as reasonably foreseeable accidents (e.g. ... credible consequence events for Part 70 licensees).*

89-6 Cont.

By evaluating worst case accidents instead of reasonably foreseeable accidents, and further, by compounding conservative assumptions for multiple input parameter in the analysis, NRC is inadvertently presenting the public and the decision makers with an overly conservative and, we believe, unrealistic picture of the potential consequences of operation of the MOX facility and PDCF. This makes it difficult to make an informed decision, and does not, as required by NEPA, allow a reasoned comparison between reasonable alternatives. Even though the DEIS properly explains that the probability of either of these accidents is so remote that the risk to the public is negligible, it would

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seem inappropriate to present such unrealistic consequences. If unchanged, these results are likely to engender ill-founded safety concerns among the public, especially local residents, by suggesting unrealistically high accident consequences. Further, the consequences presented in the DEIS and its errata sheets indicate the need for mitigation measures to relieve potential environmental justice issues. These measures, which but for the questionable accident results may not be necessary, would be costly to implement, and would be unduly burdensome to both the applicant and the public. 89-6 Cont.

II. Reanalysis of the Pit Disassembly and Conversion Facility

DOE believes that the NRC should not have reanalyzed the PDCF at all, since as the NRC points out in the DEIS (page 1-12, lines 12 through 15):

> *Because the scope of this DEIS is limited to the licensing action now under review by the NRC, which is specific to the proposed MOX facility, issues pertaining to decisions already made by the DOE are addressed by referencing the appropriate DOE analysis.* 89-8

NRC was informed by DCS that the most recent information available for the PDCF is that which is found in the SPD EIS. Absent new information, NRC seems bound by its own admission to accept and reference DOE's analysis of the PDCF. As existing DOE analyses pertain to issues covered in the DEIS, NRC should incorporate, either by reference or by reprinting, the information already on the record. DOE completed a thorough analysis of the potential impacts of construction and operation of the PDCF at the SRS in the SPD EIS. This accident analysis should be incorporated into the DEIS without reevaluation.

III. Environmental Justice

Because the DEIS accident analysis predicts significant consequences (albeit with a very low frequency, hence minimal risk) from postulated facility accidents, NRC has indicated that these potential impacts would disproportionately affect minority and low-income populations residing in the vicinity of SRS, and has required DCS to implement programs and procedures to protect these groups, conduct focused public information campaigns, and implement other mitigative actions. DOE believes that no mitigative measures are required, and that those identified in Table 5.1 (pages 5-5 and 5-6) should be deleted, because our reanalysis of the accident impacts (as mentioned above) appears to be negligible. 89-9

IV. Air Quality Monitoring Stations Not Representative

The DEIS should use the most representative ambient monitoring data and reach conclusions regarding exceedence of ambient standards using a methodology consistent with those standards. Instead, the affected environment section of the DEIS presents ambient air quality data from a number of monitors in Georgia and South Carolina, not necessarily close to or representative of the SRS area, and records the highest measured values for each of the parameters. In some cases the monitors are representative of urban locations rather than the more rural location around SRS, while data from monitors in counties adjacent to SRS are not presented. While it may be reasonable to assume that when the highest monitored value at a representative monitoring 89-10

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station is well under an ambient standard the ambient standard is met, it is not reasonable to presume that an ambient standard is not met based on unrepresentative monitoring data or data averaged inconsistently with that standard. This error in reasoning is most notable for $PM_{2.5}$, for which background $PM_{2.5}$ levels are not available from the South Carolina Department of Health and Environmental Control (SCDHEC). Compliance with the $PM_{2.5}$ standard should be evaluated by using the most representative monitored values, and consistent with the ambient standard, i.e., for 24-hour standard use the 3-year average of the 98th percentile values should be used; for the annual standard, the 3-year average of the annual average values should be used.

Therefore, the ambient air quality monitoring data presented in DEIS Table 3.3 should be replaced with data that are more representative of the SRS area, and the conclusions based on these data revised accordingly (pages 3-22, 3-23, 4-11, 4-16 through 4-22, 4-89 and 4-90). Table 3.3 presents data from a number of monitors including urban monitors that are not representative of the more rural conditions around SRS, the area for which air quality impacts are being assessed. For example, the Cayce monitor in Lexington, SC, used for PM_{10} and the annual $PM_{2.5}$, is an urban monitor. But the Colleton, SC monitor, may be more representative of the area around SRS since it is a suburban or rural monitor. The Cayce monitor is located near downtown Columbia, SC with a setting classified by SCDHEC as "commercial, urban-city center." 89-10 Cont.

Air monitoring data for particulate matter (PM_{10} and $PM_{2.5}$) reported in Table 3.3 suggest that local air quality is in noncompliance with ambient standards for both the 24-hour and annual averaging periods in each pollutant category. Most of these data are attributed to the Cayce, Lexington County, SC monitoring site. In contrast, PM_{10} monitors near the SRS boundary in Jackson and Barnwell report results for 2001 that are about half or less of the values observed at Cayce. For the $PM_{2.5}$ 24-hour standard, Table 3.3 reports a value of 71 g/m^3 from Colleton County. A further inspection of the data from Colleton County shows this value was the absolute maximum recorded in the year 2001; however, the 98th percentile value (the value that should be used to evaluate compliance with the air standard) for this monitor was 27 g/m^3. The 24-hour standard is 65 g/m^3. Table 3.3 cites data from the Cayce monitor for the annual $PM_{2.5}$ category (21.5 g/m^3). In contrast, the annual average for the Colleton County monitor was 12.7 g/m^3 for 2001, below the $PM_{2.5}$ standard of 15 g/m^3. 89-11

As part of the discussion of environmental consequences in Chapter 4 of the DEIS, Tables 4.6 and 4.8 use a more reasonable set of data for the existing 'background' air quality, except for the $PM_{2.5}$ annual average. Again, the Cayce monitoring data (21.5 $\mu g/m^3$) is used to support the unwarranted conclusion (page 4-11, lines 28-31 and page 4-18, lines 30-32) that "measured levels of $PM_{2.5}$ in the vicinity of the SRS already exceed the annual standard." This conclusion is also repeated several more times in Section 4.7. The DEIS should be revised throughout to present conclusions regarding $PM_{2.5}$ that are based on more representative data. In addition, Tables 3.3, 4.6 and 4.8 should be revised to present consistent information where possible.

V. Decontamination and Decommissioning

The DEIS discusses decommissioning of the MOX facility on pages 1-4, line 38; 1-7, line 2; 4-47 through 4-52 (Section 4.3.6); 5-6, line 34; 5-8, line 1; 5-9, line 15; 5-10, line 31; 5-11, line 32; 5-13, line 5. The current contract calls for DCS to deactivate the facility and return it to 89-12

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DOE for decommissioning or reuse. As a result, final disposition of the facility will be within the purview of DOE. The DEIS should be revised to indicate that the MOX facility will not be decommissioned under its NRC license. Further, any analyses or discussions relative to decommissioning, such as license termination and regulatory requirements should be revised as necessary to reflect the appropriate end state for the operating license. 89-12 Cont.

VI. Excessive Mitigation Measures

DOE believes that the mitigation measures discussed in Chapter 5 and presented in Table 5.1 with NRC as the proponent are in general excessive relative to the postulated impacts. DCS has proposed to implement a number of mitigation measures to address those resource areas that could potentially be impacted more than is desirable. However, in aggregate, the mitigation measures ascribed to NRC are excessive and may not be necessary. Therefore, DOE recommends that these proposed mitigation measures be reconsidered. 89-13

VII. Discussion of the Waste Solidification Building

The DEIS discusses the waste solidification building as if it were a third major facility, equal in stature to the MOX facility or PDCF. This occurs, for example, on page 1-7, lines 33–40: *Two new DOE facilities (the PDCF and the Waste Solidification Building [WSB]) are needed to support the proposed MOX facility.* In fact, the waste solidification building is part of the PDCF complex, and should be discussed as such. Both the MOX facility and the PDCF, although spoken of as a single "facility," comprise a major production building and several smaller associated buildings. Similar wastes from the pit disassembly and conversion and MOX fuel fabrication processes that would have been processed separately in each of these facilities will now be processed in the waste solidification building, thereby reducing the amount of space and equipment needed for both the MOX facility and the PDCF. The DEIS should be revised so as to not give the impression that the waste solidification building is a major, stand-alone facility. 89-14

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ATTACHMENT 2

Department of Energy's Specific Comments

Review of NUREG-1767

Draft Environmental Impact Statement on the Construction and Operation of a Mixed Oxide Fuel Fabrication Facility at the Savannah River Site, South Carolina

DEIS Section	Page/Line	Comment	
ES 1.2.1	Page xvii, line 29 Page 1-4, line 24	The DEIS is inconsistent regarding the designed maximum throughput of the MOX facility. The MOX facility is designed to process 3.5 MT of plutonium per year, not 3.5 MT of plutonium oxide, as stated several places in the DEIS including those identified in this comment.	89-15
ES	Page xvii, line 35	Please update the DEIS to reflect that the General Electric facility in Wilmington is now called Global Nuclear Fuel-Americas, LLC.	89-16
ES	Page xx, line 9	"distrusted" should be "distrusts."	89-17
1.1.2	Page 1-3, lines 11–15	Suggest rewriting the statement "although the DOE has prepared previous EISs that cover impacts of the proposed MOX facility on a programmatic level, those EISs are not considered sufficient to meet NRC needs under NEPA, because DCS has since submitted additional site-specific information, and the proposed MOX facility design has been revised since the DOE's EISs were issued." to remove the judgmental determination that the DOE EIS is "not considered sufficient to meet NRC's needs under NEPA." Suggest stating instead (and more appropriately) that NRC has prepared the DEIS to incorporate additional site-specific information and design detail, and to satisfy the requirements of 10 CFR 51.	89-18
1.2.2	Page 1-9, line 1	The first sentence as written could imply that fresh fuel is different from unirradiated fuel. Suggest changing the sentence to read "fresh, unirradiated," or edit it another way so that it doesn't say "fresh or unirradiated."	89-19
1.2.2	Page 1-9, Note c to Table 1.1	This table indicates that there is 0.1 MT at LLNL, and the table note indicates that the LLNL total may increase to 1.7 MT of Pu because some RFETS material was shipped to LLNL. The table note references DOE 1996. DOE 1999 indicates that there will be approximately 1.7 MT of Pu from LLNL, including processing/recovery of the RFETS material (footnote 7, pg 1-2).	89-20

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DEIS Section	Page/Line	Comment	
2.2.2	Pages 2-3–2-5	This section is taken nearly verbatim from DOE 1999, and no citation is provided. However, footnote 1 on page 2-2 indicates that "except as noted, the descriptions provided in this section are based on information from DCS (2000, 2001, and 2002)." PDCF information used in preparation of this DEIS was taken from DOE 1999, and is not provided in DCS documents. This section should be properly attributed.	89-21
2.2.4.2	Page 2-15, line 10	It would be useful to include a diagram of the WSB processes in this section.	89-22
2.2.5	Page 2-19, lines 2–3	The correct terminology is fire ***areas*** not fire ***zones***. Please correct.	89-23
2.3.5	Page 2-25, line 36	Revise as follows: "…was manufactured at the DOE's Los Alamos National Laboratory (LANL) *and at the Bochvar Institute in Moscow, Russia.*"	89-24
2.4	Page 2-29, lines 12–14	Need to label these as "nonhazardous waste" as done on lines 32 and 34.	89-25
2.4	Page 2-30, lines 23 and 24	The statement "No wetlands or endangered/threatened species would be impacted" is too broad and not entirely consistent with what is presented in Appendix H, pages H-7 through H-9. Based on what is presented, it is difficult to state that no impacts would occur. Rather, it appears that it would be more appropriate for lines 23 and 24 of page 2-30 to state "*Negligible* impacts to wetlands, aquatic habitat, and threatened/endangered species would be expected." Specifically, that discussion does identify certain potential impacts: **For aquatic habitat** - "Construction of the facilities would eliminate a small storm-water basin...This basin is shallow with little vegetation...providing minimal value to wildlife (H-8/20-22)...Indirect aquatic impacts could occur if unprotected soils eroded into the unnamed tributary of Upper Three Runs Creek..."(H-8/27) **For wetlands** - "Negligible direct impacts...to wetlands would occur from facility construction. Indirect impacts could occur if unprotected soils eroded into wetlands adjacent to the construction site and adversely affected hydrological and ecological conditions there." (H-8/39-41) **For protected species** - "Indirect impacts could occur to listed wildlife species from disturbance...Also, clearing would eliminate habitat that could provide support to some of the species." (H-9/5-7)	89-26
2.4	Page 2-30, lines 26 and 27	The woodland habitat loss description under the proposed action column is awkward. Suggest it be reworded for clarity as follows: "*Up to* 14.7 ha (36.4 ac) of woodlands would be *cleared for the proposed facilities. This would represent* <1 % of the annual timber harvest at SRS."	89-27

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DEIS Section	Page/Line	Comment	
2.4	Page 2-31, line 21	Percent of electric power capacity for operation (38.5%) does not agree with the percentage presented in section H.6.2 (p. H-13/ 6), 36.4%.	89-28
2.4	Page 2-34, lines 2–4	The statement "No impacts would occur to endangered or threatened species, wetlands, or aquatic or terrestrial habitats at the SRS and the F-Area vicinity" needs to be corrected to reflect the two previous comments for page 2-30, lines 23–24 and 26–27. In addition, the loss of 14.7 ha (36.4 ac) of woodland habitat should probably be characterized as a "minor," rather than "negligible," impact.	89-29
2.4	Page 2-34, line 19	"distrusted" should be "distrusts."	89-30
3.2	Page 3-1, line 32	The statement that "Prime farmland is protected by the U.S. Department of Agriculture" is an oversimplification and technically inaccurate. Although it is a moot point at SRS, the Farmland Protection Policy Act offers no absolute protection to important farmlands (i.e., prime, unique, or other statewide or locally important farmlands). Suggest restating as follows: "Certain soils are classified by the U.S. Department of Agriculture, Natural Resources Conservation Service as prime farmland or other important farmlands. The Farmland Protection Policy Act (7 U.S.C. 4201 et seq.) and its implementing regulations (7 CFR 658) requires Federal agencies as part of the NEPA process to consider the extent to which Federal projects and programs contribute to the unnecessary conversion of important farmlands to nonagricultural uses."	89-31
3.2.2	Page 3-4, line 22	Suggest providing a citation for the estimated PGA produced at SRS from the Charleston earthquake. If the citation for the information in the preceding paragraph is USGS 2001, then this citation should be included at the end of the paragraph.	89-32
3.2.2	Page 3-5, line 1	The sentence referencing the UBC should be deleted, as this Code was rendered obsolete with regard to seismic design provisions with publication of the *International Building Code* in 2000. The IBC replaces all national model building codes previously is use. Instead of seismic zone designations, the IBC's seismic design provisions are based on the USGS' National Earthquake Hazard Reduction Program maps that depict maximum considered earthquake ground motions for the United States based on spectral response acceleration.	89-33
3.3.1	Page 3-7, line 24	The correct spelling is ***Hardeeville*** (South Carolina), not ***Hardeville***.	89-34
3.5.4	Page 3-33, line 18	The bat species *Myotis lucifugus* and *Myotis austroriparius* are discussed in this section but are not included in the companion list of protected species presented in Appendix A, Table A.1. Please reconcile this inconsistency. Also, to be consistent with the balance of the Ecology discussion, the	89-35

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DEIS Section	Page/Line	Comment	
		common name of these two species of bats should be presented in the text, followed by the Latin name in parentheses.	
3.5.4	Page 3-33, lines 20–27	The common ground dove, loggerhead shrike, and American sandburrowing mayfly are presented in this discussion of protected species but are not included in the companion list of protected species presented in Appendix A, Table A.1. Please reconcile this inconsistency.	89-36
3.54	Page 3-33, line 40 and Page 3-34, line 9	The majority of plant species discussed here are either not listed in Appendix A, Table A.1, or are listed under a different common name. Please reconcile this inconsistency.	89-37
3.7.1	Page 3-37, lines 1–3	Provide general location of site 38AK546/547 (as done for sites 38AK757, 38AK330, and 38AK548).	89-38
3.10.5	Page 3-56, lines 1–8	The DEIS states that a rate of 3.3 fatalities/1000 FTEs and 4.6 injuries/100 FTEs is used based on Bureau of Labor Statistics/National Safety Council data. National safety statistics are not appropriate to represent baseline risks for estimating SRS operations. There have been no fatalities for over 200,000 FTEs of operations or construction since 1989. The lost workday injury rate for SRS operations during the past 6 years (1997–2002) has averaged 0.38 cases per 200,000 hours (100 FTEs), less than 10% of the value cited in the DEIS.	89-39
3.11.4	Page 3-58, line 38	Text states housing units are expected to reach 35,400 in 2001. However, this is not consistent with Table 3.16 on page 3-60, which states this estimate is for 2002.	89-40
3.11.4	Page 3-59, lines 33 and 35	These two sentences refer to housing units in the "county" when it should be housing units in the "ROI."	89-42
3.11.4	Page 3-60	The 2002 column of the table does not have a source footnoted (as do the 1990 and 2000 columns).	89-43
3.11.6	Page 3-61, line 18	State Route 781 is not shown in either Figure 3.1 or 3.8, as indicated in the text. Also, the text refers to State Routes (SRs), while the Figure 3.8 refers to "SC."	89-44
4.3.1.1.1	Page 4-8, line 37	The number of facility workers at MOX FFF should be stated as done for the PDCF and WSB.	89-45
4.3.1.2.2	Page 4-13, line 15	Mixing and blanketing are not the same. A blanket of nitrogen above the hydrazine does not mix with the liquid hydrazine that is forwarded to the process.	89-46
4.3.1.2.2	Page 4-13, line 24	The reference should be to plutonium oxide, not just plutonium	89-46
4.3.4.2	Page 4-29, line 2	The text states: "*....produce a solid TRU waste matrix similar to that accepted for disposal at WIPP.*" The waste will need to be acceptable for disposal at WIPP, i.e., meet WIPP waste acceptance criteria, not be similar to that accepted. The EIS should state that the waste will be acceptable for disposal at WIPP.	89-47
4.3.5.2	Page 4-38, Table 4.13	It appears that the heading for the sixth column should be "Number of LCFs," not "Chance of LCF."	89-48

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DEIS Section	Page/Line	Comment	
4.3.5.3	Page 4-45, Table 4.16, line 8	Hydrazine hydrate –This material has been identified as hydrazine monohydrate (Chemical Consequences for Potential Chemical Hazard Events DCS01-KKJ-DS-CAL-H-35604-B, Table 6-8), for which TEELs-1, -2, and -3 are 0.0075, 0.06, and 50 mg/m^3, respectively.	89-49
4.3.5.3	Page 4-45, Table 4.16, line 29	It is not appropriate to assume in the DEIS that 240 gal of chlorine would be stored at the PDCF since the SPD EIS indicates that the quantities of hazardous chemicals are generally small, and does not indicate that chlorine is an exception to that statement. The SPD EIS, Table E-7 indicates that chlorine will be used in the pit conversion facility, and the discussion of the accident analysis on Page K-7 indicates that "On an industrial scale, the quantities of hazardous chemicals are generally small – No substantial hazardous chemical releases are expected."	89-50
4.4.1.2.1	Page 4-63, lines 31+	The values in the paragraph don't agree with the values presented in Table 4.20. Please reconcile the inconsistency.	89-51
4.4.1.3	Page 4-66, line 12	Suggest that the phrase "from the PDCF" be added after "recovered HEU" (so as not to confuse it with waste U from the MFFF).	89-52
4.5.1.1	Page 4-79, lines 13–14	The table provides no way to judge the significance of these numbers – the portion of the total cumulative impact attributable to the MOX action isn't really pertinent to judging whether the totals are significant – it would be helpful to reader to include capacities of treatment facilities.	89-53
4.5.1.2	Page 4-82, line 13	It does not seem reasonable to assume such high LCFs from 'general transportation' when the historical results are so low. The DEIS references the Yucca Mountain EIS for these numbers, but we have been unable to find them in the referenced EIS. Please verify the numbers used.	89-54
4.5.2	Page 4-82, line 16	Presuming the MOX shipments in line 16 of Table 4.27 are supposed to be the same as the totals presented in Table 4.20, the numbers for the population dose do not agree. If the information is supposed to be the same, it is suggested that the category be relabeled to more accurately reflect the nature of the information (e.g., All shipments for the MOX program).	89-55
4.6.1	Page 4-82, line 32	The sentence states that the benefits to national security are substantial but not quantifiable. The costs associated with continued storage of this material are quantifiable; avoiding these costs should be mentioned as a benefit here. Also, see comment Page 4-83, line 23 for adding these avoided costs to Section 4.6.2.	89-56
4.6.2	Page 4-83	Section 4.6.3.2 discusses regional benefits in terms of money entering the local economy for labor associated with the construction and operation of the proposed facilities, and the multiplier effect this money has on the regional economy. The same is true for the national economy but no mention is made of these effects in this section.	89-57
4.6.2	Page 4-83	The discount rate used to normalize the costs to 2001 dollars should be specified in the DEIS.	89-58

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DEIS Section	Page/Line	Comment	
4.6.2	Page 4-83, line 23	The statement is made that the costs and benefits of continued storage of plutonium are discussed in the SPD EIS. Monetary costs were not included in the SPD EIS. However, according to the MOX ER, NNSA 2002 estimated the costs associated with continued storage to be approximately $246 million/year for as long as the material continued to be stored. One of the national benefits associated with this program should be these avoided safeguard and storage costs. If the no action alternative were to store the plutonium for 50 years, the estimated storage costs would exceed $12 billion while the cost of disposition is estimated to be $3.85 billion as discussed in this section.	89-59
4.6.3.2	Page 4-87, line 36	It is not clear from the reference where in the SPD EIS the data that is being referred to came from. For the MOX facility, employment estimates would most likely have come from the MOX ER since this included more recent information.	89-60
4.7.1	Pages 4-89–4-94	This section reads as a summary of potential unavoidable impacts, many of which are then dismissed if mitigation or good engineering practices implemented. Recommend that discussion be limited to only those areas where unavoidable adverse impacts are certain to occur.	89-61
4.7.1	Page 4-94, lines 10 and 11	Statement regarding proportionate increase in amount of TRU waste (9%) is inconsistent with Section 4.5.1.2 (24%) – see previous comment on page 4-76, line 23.	89-62
5.2	Pages 5-2–5-6, Table 5.1	The table identifies the proponent of each mitigation measure but does not specify who is responsible for taking action or assuring that action is taken. Clarifying language should precede the table, or additional columns should be added to the table, to indicate which entity is responsible for 1) implementation and 2) verification of completion, of the mitigation.	89-63
5.2	Page 5-4, lines 21-22	Not consistent with Section 5.2.7. Table 5-1 says that no mitigation measures are required but Section 5.2.7 describes mitigation measures for each waste type.	89-64
5.2.2	Page 5-8, lines 7–9	Suggest rewording as follows for clarity: "Direct impacts to groundwater could occur if there were a failure in the underground pipeline carrying the liquid high-alpha activity waste stream from the proposed MOX facility's …"	89-65
5.2.7	Pages 5-10, 5-11	Text states: *"Impacts of hazardous wastes would be mitigated by managing them in accordance with the hazardous waste management practices in place at the SRS."* This is not the proper use of the term "mitigated." Doing what is required by law or common practice is not mitigation. Mitigation occurs when, if there are significant impacts, an action is taken to lower those impacts to a more acceptable level. By this definition, (as described in Table 5-1) no mitigation measures are required for waste management.	89-66

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DEIS Section	Page/Line	Comment	
5.2	Page 5-5, lines 6–10 (bullet 2)	It is not clear that this measure is within the jurisdiction of the NRC.	89-67
Appendix D.3	Page D-7, line 26	A reference should be provided for U.S. Census Bureau data used in calculations in Appendix D, as well as for the sources provided in the appendix tables.	89-68
Appendix F	Page F-11, line 10	Typo? Should "1900" be "1990?"	89-69
Appendix H.7.1	Page H-15, lines 7 and 8	The text states that four additional local public service employees would be required, while Table H.1 (p H-14) shows five additional employees. Please reconcile this inconsistency.	89-70

00090

From: Rachel Western [rachelw@foe.co.uk]
Sent: Wednesday, May 14, 2003 10:59 AM
To: teh@nrc.gov
Subject: MOX

Dear Mr Harris,

I would like to object to the MOX proposal and provide some brief comments for the MOX Construction Draft EIS. 90-1

Plutonium should be treated to minimise the risk that it presents and seen in this light the MOX option is counter-productive.

Nuclear reactors present an intrinsic risk of accident and the use of plutonium in the fuel only serves to increase this risk. 90-2

In addition the processing of plutonium through the manufacture of MOX fuel is very messy and creates plutonium contaminated wastes that are problematic to handle, as well as causing radiation risks. 90-3

Yours sincerely,

Dr Rachel Western BA(Oxon) PhD
Nuclear Researcher
Friends of the Earth England, Wales and Northern Ireland
26-28 Underwood St
London
N1 7JQ

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00091

May 14, 2003

Chief, Rules Review and Directives Branch
U.S. Nuclear Regulatory Commission
Mail Stop T6-D59
Washington, DC 20555-0001

Comments on Environmental Impact Statement for MOX Facility at SRS

Dear Sir:

The limited alternatives presented and evaluated in the Draft EIS result in misleading conclusions, and are structured in an artificially truncated way. As set forth in the DEIS, the only two alternatives are the MOX processing 'project' and the no-project alternative, in which enormous amount of water would be required to store plutonium at the SRS site. By failing to include a third alternative, namely stabilization of plutonium in a ceramic medium, known as "immobilization," the approach reduces the assessment to an undesirable choice between two fundamentally flawed options. Structuring the assessment in this way is little more than a veiled leap from preconceived notions to foregone conclusions. The lengthy technical analysis of MOX in the DEIS clouds the essence of more elementary questions, which are both unasked and unanswered, or if addressed, done so in an incomplete way. 91-1

- According to the DEIS, MOX processing would use far less water in the process itself. But by producing radioactive fuel for continued production of electricity at nuclear power plants, the project would extend use of water-intensive and toxic technology that imposes major long-term social, environmental, and economic costs. 91-2
- Furthermore, nuclear power plants consume huge volumes of water in cooling processes. Nearby Plant Hatch on the Altamaha River withdraws 57 million gallons a day and returns only 24 million gallons a day. The difference, 33 million gallons daily, is not returned to the river, presumably due to losses to steam. With ever-rising demands for water supply in this rapidly growing state, particularly during extended drought, such water-intensive practices are increasingly unjustifiable, imposing avoidable burdens on many other sectors. 91-3
- Fresh water flow in Georgia's five coastal rivers is essential to highly productive inter-tidal estuaries. Though Georgia's Atlantic coastline is relatively small (~ 100 miles), one-third of the remaining tidal marshes on the nation's eastern seaboard are within this state. Relative to our shoreline, Georgia has six times the area of tidal marsh compared the average ratio in the Atlantic states. These marshes are vital habitat for a diverse variety of species that compose the food web for marine ecosystems, so much so that the National Marine Fisheries Service designated Georgia's estuaries as Essential Fish Habitat under federal law. Biologists estimate that at least 75% of marine species depend on this ecosystem. Processing nuclear fuels seriously threatens these vital resources, yet assessments such as this DEIS undervalue these risks and their potential irreversibility. 91-4
- Further loss of fresh water, or contamination of it, could have devastating adverse impacts on remaining ecosystem functions in the lower reaches of Georgia's five coastal rivers and the vast estuaries and nature-based economy they support. The latter includes some 40,000 jobs in coastal Georgia alone, about one out of five jobs here, generating more than $1 billion a year in revenue annually. Risks such as those linked to nuclear fuel processing, storage, handlings, transport, use, and conversion to electricity, each of which pose serious threats to these resources and the businesses they support. 91-5
- Further, nuclear fuel itself presents an elevated risk due to terrorism, as well as the 'conventional' risks of transport, handling, and storage, each of which introduce unjustifiable threats to largely unwitting third parties (namely, the public). While the DEIS acknowledges the potential for risk, the basis for concluding that this risk is acceptable is derived from highly subjective assessment of the probability of accidental or subversive (terrorist) events that could cause major threats to public health and the natural environment, both short-term and long-term. Even if it is assumed that assessment of accident probability is reasonably accurate, recent simulations of terrorist attacks strongly suggest that conventional methods for defending nuclear facilities are inadequate, and therefore it is reasonable to conclude that risk assessment strategies are woefully insufficient as a basis for making decisions such as those inherent to the proposed MOX facility. 91-6

For the above reasons, the Center for a Sustainable Coast opposes the proposed MOX facility at SRS, in large part because we believe that the DEIS is flawed in both its assumptions and in various critical aspects of analysis. Unless assessment of plutonium immobilization is considered as a legitimate alternative to the project, we feel strongly that the whole approach is fundamentally flawed and fiscally irresponsible. With this finding, we conclude that the MOX facility assessment to date in the DEIS is unacceptable, and certainly insufficient to support a decision having such enormous federal financing burdens and long-term implications for the public welfare. 91-7

Sincerely,

David Kyler, Executive Director

Cc:
Senator Saxby Chambliss
Senator Zell Miller
Congressman Jack Kingston
Congressman Max Burns
Congressman Nathan Deal
Congressman Charlie Norwood
Congressman John Lewis
Congressman James Clyburn
Congressman Sanford Bishop, Jr.
Governor Sonny Perdue
Governor Mark Sanford

CENTER FOR A SUSTAINABLE COAST
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00092

From: Glenn Carroll [atom.girl@mindspring.com]
Sent: Wednesday, May 14, 2003 3:09 PM
To: Tim Harris
Subject: GANE Comments on Draft MOX EIS

Hi Tim,

I'm faxing you GANE's comments on the MOX EIS and embedding the text below.

Glenn

--

Glenn Carroll
Coordinator
GANE - Georgians Against Nuclear Energy
P.O. Box 8574
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May 14, 2003

Michael T. Lesar, Chief
Rules and Directives Branch
Division of Administrative Services
Office of Administration
Mail Stop T-6D59
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Lesar,

GANE's comments on the Nuclear Regulatory Commission Draft Environmental Impact Statement (DEIS) for MOX follow:

1. The most profound flaw of the NRC's DEIS process is that it splits the MOX application into two parts ‹ construction and operation ‹ but the operations data is not subject to review. Environmental aspects of both must be considered. Most alarmingly, the NRC plans to sign off on its environmental review before operational plans are developed to safeguard 34 tons of plutonium during MOX processing. To separate construction and operation, and to not review critical design aspects of the basic program premise to contain the highly dangerous plutonium, is irresponsible and blatantly wrong. 92-1

2. The DEIS fails to address the reasonable alternative to MOX ‹ plutonium immobilization. Immobilization would effectively achieve the MOX program's stated goal to safeguard weapons-grade plutonium. Continued storage, which the NRC analyzed instead of immobilization, is, conversely, an acknowledged security risk. The immobilization alternative compares favorably with MOX in other ways: large number of jobs provided; effective management for existing waste stocks at SRS; negligible waste stream as compared to MOX; cheaper than MOX. The public demands to see the in-depth comparison between MOX and immobilization which is required to satisfy the National Environmental Policy Act (NEPA). 92-2

3. The DEIS fails to analyze weaknesses in Catawba and McGuire's ice condenser-type reactors, currently proposed to use the MOX fuel. The ice condenser design has a thin containment which is more likely to rupture in the case of a severe accident. Additionally, severe accidents are more likely with MOX fuel use. The DEIS must address these reactor-related MOX risks in its analysis. 92-3

4. The DEIS fails to acknowledge the possibility of insufficient reactors in the MOX program to keep pace with the proposed MOX production rate. Two or three additional reactors would be required to process the proposed volume of MOX fuel. The DEIS must state the environmental risks from failure to 92-4

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process plutonium to MOX, or conversely, excessive inventory of fresh MOX fuel containing weapons-grade plutonium, an extra security risk. 92-4 Cont.

5. The DEIS analysis of the large volume of liquid radioactive wastes to be generated in the MOX program is incomplete. The NRC's estimates are baseless and therefore not verifiable. The public must be shown how the NRC arrives at its waste estimates. 92-5

6. The DEIS assumes a 10-year MOX program but DCS plans to apply for a 20-year license. The DEIS must analyze MOX production over 20-year duration 92-6

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00093

Nuclear Information and Resource Service

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May 13, 2003

Michael T. Lesar, Chief Rules and Directives Branch
Division of Administrative Services
Office of Administration
Mail Stop T-6D59
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Comments of Nuclear Information and Resource Service (NIRS) on the Nuclear Regulatory Commission (NRC) Draft Environmental Impact Statement (DEIS) for the MOX Construction Authorization Request

Comments are not in order of importance.

A. NIRS agrees with Georgians Against Nuclear Energy on the wrong-headed and contradictory process that NRC has offered DCS and DOE in the two-part license, but one-part NEPA (National Environmental Policy Act) process. We submit their text verbatim:

> 1. The most profound flaw of the NRC's DEIS process is that it splits the MOX application into two parts ‹ construction and operation ‹ but the operations data is not subject to review. Environmental aspects of both must be considered. Most alarmingly, the NRC plans to sign off on its environmental review before operational plans are developed to safeguard 34 tons of plutonium during MOX processing. To separate construction and operation, and to not review critical design aspects of the basic program premise to contain the highly dangerous plutonium, is irresponsible and blatantly wrong (and is being legally challenged by GANE). 93-1

We add to this the point of view that the DEIS assumes throughout the analysis that the new MOX factory will not be subject to any of the problems seen at other plutonium handling facilities in the United States, with no apparent justification for this assumption.

At Rocky Flats where this same plutonium was handled to make the plutonium pits that will be disassembled and converted to MOX at SRS there was significant problems with materials accounting. Indeed, plutonium scrap was so concentrated in some parts of the facility (via 93-2

airborne an other vectors) that spontaneous plutonium combustion occurred. Since NRC gives no basis for their assumption that this sort of event will not happen at the new MOX Fuel Factory (MFF) we find it impossible to accept the idea that the current document can encompass all the environmental impacts of the MOX factory. 93-2 Cont.

B. We further reflect in reading this document that it will provide a substrate for any future MOX fuel factory that NRC might license. As such, it is important to note that the plutonium under consideration is from dismantled warheads that were once from reprocessed irradiated fuel. The current proposal is not representative of any other MOX fuel factory that might be licensed in the future under Part 70 where waste reprocessing would be an integral part of the proposal and need to be considered. In this case, the Pit Disassembly and Conversion radiation doses and other impacts must be considered a part of the current process. 93-3

C. NIRS also finds that the entire NEPA and plutonium disposition process are flawed by the specious claim that MOX is the only alternative that would meet the specious Russian demand that the plutonium be isotopically degraded. This claim must be seen as specious since the agreements signed in the 1990's allow for immobilization of plutonium as an acceptable mode of disposition without qualification. Secondly, any isotopic degradation is will only persist for a relatively short time in the long time that plutonium will have to be safeguarded. The fact is that as time goes on a higher and higher percentage of plutonium will meet the definition of "weapon grade" which is: less than 7 % plutonium 240 with its 14.4 year half life. In little more than 140 years of any isotopic "degradation" the stuff will be weapons grade again! 93-4

The proposal to reduce nuclear dangers by doubling the humanicidal properties of a nuclear reactor completely abrogates the legal responsibility of the NRC to protect public health, safety and the environment. The fact that NRC finds the risks associated with plutonium transport, processing, fuel fabrication and fuel use to be "acceptable" suggests that once again NRC is dismissing real danger in favor of reliance on computer simulation. In an era when we are told by major media sources that US reactor diagrams were found in alleged terrorist caves in Afghanistan leads this organization to ask NRC which bed it is hiding under. 93-5

NIRS humbly suggests to NRC that should reply to DCS and DOE that the Precautionary Principle dictates that no further nuclear activities should be undertaken at the Savannah River site due to the fact that it already meets or exceeds safety limits on a number of important parameters, and all federal activity should be devoted to clean-up, restoration, mitigation, free health and preventative care. 93-6

D. MIX not MOX – NRC could further point out to DOE that it could facilitate the isotopic degradation with no reactor use and also reduce a proliferation threat by acquiring reactor grade plutonium from other countries and mix US and Russian surplus plutonium with these stocks. At that point it would be possible to immobilize or make off-spec MOX with this plutonium. Irradiated fuel could be used as the radiation barrier for this waste form. 93-7

E. NRC's DEIS does not problem solve. Instead it invokes a mandate from the State Department about what is diplomatic with the Russians. This means that environmental protection in the United States is being dictated by Moscow. This is not acceptable. If the plutonium disposition 93-8 process had been conducted "above boards" and in an open mariner, instead of in secret meetings of US and Russian technocrats at Harvard hosted by John Holdren, there might have been some hope of a real solution. These secret meetings may have prevented the matter from being elevated to the level of concern it deserved within both the Clinton and Putin Administrations. Had this plutonium received the attention it deserved, it might have served as a real initiation into substantial nuclear disarmament. Instead this process has been used by the same career technocrats in the US as a cover for their real objective: a return to nuclear weapons production. 93-8 Cont.

On what basis does NRC assume that there WILL be ANY surplus plutonium?

If MOX is, instead the waste management method for new nuclear weapons production should not the NEPA process include both these actions? 93-9

If production of new, usable nuclear weapons is the real outcome of the plutonium processing at the PCDF and the waste solidification building also serves this process, is it not necessary under NEPA to consider the environmental impacts of USING the usable nuclear weapons?

F. At this point in time it is somewhat likely that the current DEIS may be the only EIS for MOX use in reactors, unless the NRC is forced to do an environmental impact statement for the use of MOX in Duke reactors by intervenors. As such, the reference reactor approach is completely unacceptable. For one thing, the Duke reactors were already under a signed DOE / DCS contract at the time that the CAR was submitted to NRC. There is no basis for not considering the specifics of the Duke reactors, including the unique features and lack of features in the Ice Condenser design.

Further, it is vital that the intersection of reactor aging and MOX use be fully analyzed, including the environmental impacts of large component replacement post MOX use.

Thermal impacts of MOX must also be assessed, and should be done so in the context of the Duke reactors specifically since persistent drought has already jeopardized the capacity of Lake Wylie to cool Catawba 1 & 2. MOX fuel may boost the thermal requirements of the reactor and thermal discharges to Lake Wylie high enough to puncture this envelope, causing Catawba to be taken off-line until Catawba River water levels rise and Lake Wylie water temperatures fall. 93-10

NIRS protests the fact that NRC has decided to exclude nuclear security issues from the NEPA process for the MFF and other nuclear licensing decisions. From our perspective, this is evidence that the NRC assumes that the decision to license is "yes" unless someone can stop them, and then systematically colludes with industry to remove all handles that might constitute a means to stop them. In other words there is no external decision-making. The United States is a Nuclear State and there is no recourse except in the courts, where NRC is unfairly given the advantage of large staffs, large federal budgets and the high ground of being the "accredited technical expert."

These are only some of NIRS concerns about the environmental impacts of nuclear reactor use of MOX fuel. We offer them as examples of the types of issues that cannot be addressed in a generic analysis, but which must be addressed. We sincerely hope that NRC will do a full environmental impact statement on the use of MOX in Catawaba 1 & 2 and McGuire 1 & 2 and any other nuclear power stations that apply to use this fuel elsewhere or in the future. 93-10 Cont.

G. It is not acceptable to sign off on the environmental impacts of construction of the MFF without a more detailed explication of the impact of bull dozer activity on this contaminated site. The movement of soil that is contaminated will have an impact not only on workers, but also those off site as particulate in lofted into the atmosphere. NRC states on page 4-8 of the DEIS that any doses to workers from such contamination would be assessed. By whom? Why no assessment of off-site folks? 93-11

NRC also states that water would be used to limit the amount of fugitive dust (page 4-18). This water will however interact with any radionuclides or other contamination in the soil and contribute to the already acknowledged plume of contamination under the site (page 4-7). No characterization of this plume is provided. How will it be possible to determine in the future whether or not the MFF has contributed to this problem unless the current analysis includes a detailed characterization of what is currently in the soil, in the vadose zone, in the ground water, in the plume, and the direction and speed of this plume's movement. 93-12

Further, since the movement of contaminated particulate off-site and movement of contamination from soil into ground water are both cumulative, and construction of all three facilities will result in one or both of these events, it is not correct to assume that MFF and WSB construction are "bounding." It is necessary to assess the impacts of all three and look at them cumulatively, even though the PCDF construction may lag behind the other two. 93-13

H. NRC fails to consider radiological impacts on children, elders, women and anyone else who is not the "Standard Man." This is inexcusable in the 21st century. What percentage of NRC employees have had difficulty conceiving a child? How many NRC parents have children with cancer? The general public is having an epidemic. Shame on NRC for not considering these factors when moving to approve a facility that is inherently a hazard to public health and safety. 93-14

I. It is not clear which entity is responsible for plutonium security. 93-15

J. NIRS agrees with GANE's analysis of NRC's nonsensically disappearing waste inventory:

> 5. (GANE) The DEIS analysis of the large volume of liquid radioactive wastes to be generated in the MOX program is incomplete. The NRC's estimates are baseless and therefore not verifiable. The public must be shown how the NRC arrives at its waste estimates.

Further, the assumption that simply transferring this waste to SRS and the Department of Energy is an end-point when it comes to environmental impact is specious. For instance, stating that the MFF associated "low-level" wastes is some percentage of the SRS "low-level" waste implies to the unschooled reader that in fact MFF is cleaning up SRS. ANY incremental addition to the radioactive burden on the banks of the Savannah River is an unacceptable impact for the future generations that will, hopefully persist during the interminable period of hazard that plutonium 93-16 poses. The claim that this program will reduce nuclear dangers does not apply to the workers and the people of the area surrounding Savannah River Site. 93-16 Cont.

K. Environmental Justice and Mitigation. The very fact that NRC has found that there will be a disproportionate impact from an accident – and we believe from routine operations at Savannah River Site as well -- on low income and minority populations is a reason to deny DCS and DOE the privilege of poisoning or irradiating one more person of any color or any income!

The very fact that mitigation is being offered is admission that there is an adverse environmental impact. We do not care how many people NRC projects will suffer from an accident since we question NRC's basis for calculating radiological impact. The fact that one individual is projected to die and that mitigation is being suggested is the reason to deny this license.

In terms of mitigation, NRC falls short of anything that could possibly off-set the destructive impact of plutonium jobs and potential accidents on the present and future of these communities.

This writer finds it somewhat puzzling that page 7-18 gives as part of the glossary the following definition:

> **mitigation:** a series of actions implemented to ensure that projected impacts will result in no net loss of habitat value or wildlife populations. The purpose of mitigative actions is to avoid, minimize, rectify or otherwise compensate for any adverse environmental impact.

If we construe the words "habitat value" to mean the homes and public areas of the communities that would be most impacted by operations and accidents at the MFF, then clearly we can see that the best mitigation is to avoid the hazard and the risk. Deny the license. 93-17

It is not possible to rectify or compensate for loss of functioning health, loss of life, loss of ability to procreate, loss of healthy normal children. The only cure is prevention.

That NRC staff are advocating an information campaign is not only not enough, it is mildly offensive. We are going to let them threaten your home with the leftovers of weapons of mass destruction, but all we are going to offer you is the information that you should use some of the money you need for your children's shoes and education or your own prescriptions for duct tape! This is not acceptable. Nor is it plausible. This program is projected to last 1 – 2 decades. Will the information officers go out and re-instruct people periodically. Remind them that they are in the path of such danger, paid for by their own hard earned tax dollars? We think not. What about the environmental impact of cutting down all those trees for that one-time "mitigation" with its glossy pictures? THIS is supposed to "rectify" the deaths that would come from a plutonium accident? Not good enough!

We in no way suggest that the following are mitigations – but any dangerous operation should at the very least provide clean water for everyone in the area – there is currently tritium in the rain that falls within 25 miles of SRS, and there will be more due to the new programs that have been sited there, in part due to the MOX program.

The folks who are being disproportionately placed at risk and who are already daily subjected to hazard from living near SRS should have free health care, including education about ways to reduce the inventory of radioactivity and other "badies" that their bodies are exposed to thanks to living near SRS.

There should be sirens that sound when any event occurs at SRS that warrants either sheltering or evacuation and the sound of the siren should signal which action is recommended.

There should be funding for summer programs for children to leave the area for months when they are out of school and this should favor low income and minority individuals. They should be sent to places, such as there are, where the food and water are less likely to contain radioactivity. 93-17 Cont.

All of these things should be done now. None of them justify further nuclear production at Savannah River Site.

This writer challenges NRC to at the very least define the term "mitigation" in terms of the human populations they claim to be considering. If, however this is all the agency sees fit to do in the face of admitting that the MFF has the potential to sever families and lives in irreparable and immitigable ways, this will be one more example for the public of just how devalued our safety and health are when compared to the billions of dollars that Duke, COGEMA, Stone and DOE will see, not to mention the money NRC will get to "regulate" this killer. Prevention is the only cure. Now is the time to end this proposal and save the tax dollars so they can still be used to address the plutonium problem in a safer way.

L. NIRS affirms the following points made by GANE:

> 6. The DEIS assumes a 10-year MOX program but DCS plans to apply for a 20-year license. The DEIS must analyze MOX production over 20-year duration. 93-18
>
> 7. Sabotage and terrorism have become increasingly common in recent years. The DEIS must analyze environmental risks from sabotage, malevolent acts, or terrorist attacks to: the MOX facility; reactors using MOX; transports of fresh fuel to reactors; or transports of plutonium to SRS. MOX, by involving weapons-grade plutonium, is an intrinsic security risk, and must be considered to have a strong attraction to terrorists. Absence of analysis of this environmental risk hampers efforts of public health authorities to respond to emergencies posed by potential security breaches. 93-19

Respectfully Submitted (via e-mail 05-14-03, hard copy in the mail)

----signed-----

Mary Fox Olson
Director, Southeast Office

00094

NUCLEAR ENERGY INSTITUTE

Ralph L. Andersen
CHIEF HEALTH PHYSICIST
PLANT SUPPORT
NUCLEAR GENERATION DIVISION

May 14, 2003

Mr. Michael T. Lesar, Chief
Rules & Directives Branch
Division of Administrative Services
Office of Administration, Mail Stop T-6D59
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

SUBJECT: U.S. NRC Request for Public Comments on the *Draft Environmental Impact Statement on the Construction and Operation of a Mixed Oxide Fuel Fabrication Facility at the Savannah River Site, South Carolina* (68 Fed. Reg. 9728, February 28, 2003)

Dear Mr. Lesar:

This letter provides comments of the Nuclear Energy Institute (NEI) on the subject Draft Environmental Impact Statement (DEIS). These comments are focused on the DEIS analysis of radiological consequences for postulated accidents and its application in regard to the Nuclear Regulatory Commission (NRC) policy on environmental justice.

The DEIS does not provide an assessment of reasonably foreseeable impacts as required by the National Environmental policy act. The DEIS only provides a bounding analysis of accident consequences and associated potential impacts. NRC implies that the analysis represents a "worst-case" assessment, which is contrary to NEPA requirements. 94-1

The bounding analysis provided in the DEIS is unnecessarily conservative, employs unreasonable assumptions, and applies inconsistent and inappropriate methodology.

Mr. Michael T. Lesar, Chief
May 14, 2003
Page 2

1. The analysis utilizes the GENII computer code, rather than the MACCS2 code that was used in the applicant's environmental statement (ES) and is consistently utilized by the NRC in other accident consequence analyses. The NRC does not offer a rationale for the selection and use of this atypical model in this application. This is of particular concern because the GENII model has been found to be not appropriate for application to accident analysis, specifically in regard to the types of accidents, releases, and population dose assessments considered in the DEIS.[1]

2. The DEIS accident consequence analysis consistently employs the most conservative assumptions, in some cases to the extent that the assumptions are not reasonable. For example, the assumption is made that following a postulated accident and radiological release, no protective actions would be taken by authorities over the next year to quarantine contaminated food supplies. 94-1 cont.

3. In calculating latent cancer fatalities that hypothetically might occur as a result of the analyzed accident consequences, the DEIS multiplies the collective radiation doses (determined using ICRP 26/30 dose methodology) by the Federal Guidance Report (FGR) 13 health risk conversion factor (roughly determined using ICRP 60 dose methodology). The two dose methodologies are not compatible. Further, the NRC provides no rationale for the *ad hoc* use of the FGR 13 health risk conversion factor that is not consistent with the scientific basis underlying current NRC guidance and regulation.

Finally, the DEIS inappropriately applies these results under the rubric of environmental justice. As NEI brought to the Commission's attention in a letter dated December 20, 2002, the NRC's evaluation of environmental impacts in licensing actions are not consistent with the terms of Executive Order 12898. By letter dated February 10, 2003, the Commission advised NEI that it intended to reconsider its policy concerning the application of Executive Order 12898. 94-2

In summary, we are concerned that the DEIS approach to assessing environmental impacts sets an undesirable and inappropriate precedent that does not conform to NEPA requirements or NRC policy.

[1] See, for example, the Review of the ORIA's Use and Adaptation of the GENII Version 2 Environmental Radiation System by the EPA Science Advisory Board, EPA-SAB-RAC-ADV-01-002, dated June 26, 2001.

Mr. Michael T. Lesar, Chief
May 14, 2003
Page 3

We would like to discuss our comments and generic concerns with NRC staff responsible for conducting environmental impact assessments. In that regard, please contact me at (202) 739-8111.

Sincerely,

Ralph L. Andersen

00095

From: Tom Mott [wspartners@earthlink.net]
Sent: Wednesday, May 14, 2003 7:51 PM
To: teh@nrc.gov
Subject: Comments about the MOX proposal at Savannah River Site

(Note: I would appreciate it if this note could be forwarded by the NRC to the appropriate official(s) in the Department of Energy, inasmuch as some of the issues are more logically in their sphere)

Today is the due date for registering concerns with the NRC over the controversial, dangerous plutonium bomb fuel (MOX) experiment that is slated for our upstream neighbor, the Dept. of Energy's Savannah River Site nuclear facility.

I have attended meetings in Savannah where NRC's role was discussed, and their impact statement drafts reviewed. Throughout, I have had these reactions: (1) The NRC representatives seemed eager to get community input and were sincere in their attempts to deal with questions and concerns; (2) The meetings were sparsely attended and not particularly well covered in the local media; (3) A good many of the issues raised by citizens were essentially outside the purview of the NRC --- these related to the wisdom of the selection of Savannah River Site (which comes with a legacy of nightmarish environmental and public safety problems), and the even larger issue of why this is a good public policy proposal at all, no matter where it is done.

I will defer to others having stronger technical backgrounds to challenge the environment impact work done by the NRC. Frankly, as well intentioned as the review meetings were, a great deal of the content in the report proper is hard for a layman to form impressions about. But people whose judgement and expertise I trust are not satisfied the research is adequate 95-1
--- and there seems enough uncertainty (and changed direction) about what the actual process, parameters, and scope will be, that the NRC analysis might need to be redone as future decisions unfold if the report is to be fully responsive to the proposed actions.

Frankly, I believe public hearings would have been more useful if conducted by the DOE and those private consortiums working with the DOE on the plutonium conversion proposals. In such a venue, the frustrated concerned citizens (and most were definitely that) could have presented the questions that are in their hearts and at the heart of the matter. It seemed like were debating the cart, and not being able to evaluate the horse pulling it.

Important questions the NRC is not in a position to answer include: Why is this process a good idea? --- and, what are the alternatives and why did this emerge as the preferred one? Further, are we being targeted for this development because there are some political and/or socioeconomic and demographic characteristics of our area? Why is it that one of the collaborators in this is a French company with a very shaky record on environmental matters in Europe -- couldn't we do better that that? And, 95-2
finally: why would anyone be so presumptuous and have such blinders on as to choose the Savannah River Site for this work without simultaneously addressing the question of why that particular site has been neglected in terms of cleaning up the mess we already have there?

IF it is to be that we will have a MOX plant at Savannah River Site, like it or not (and right now I have no reason to feel I should like it), then is this not the time to hold "feet to the fire" about making that facility "squeaky clean" in all respects. The NRC can say, with some justification, "that's not what we are charged to study and rule on." But that doesn't change the fact that we have a radioactive time bomb as our neighbor, and we don't see any urgency about addressing THAT very very nasty fact. 95-3

I urge the NRC to use its influence on others in policy-making roles to look carefully at what is being proposed, and redirect it in a way that addresses the legitimate concerns, and indeed fears, of those of us living downstream from the Savannah River nuclear site. Thank you.

Sincerely,

1

Thomas R. Mott
522 E. Bryan St.
Savannah, GA 31401-2803

00096

To: The Nuclear Regulatory Commission
From: Citizens For Environmental Justice
Date: May 14, 2003

Re: Report No. NUREG-1767

Comments to the Nuclear Regulatory Commission on the Draft Environmental Impact Statement on the Construction and Operation of a Mixed Oxide Fuel Fabrication Facility at the Savannah River Site South Carolina.

This letter represents a collective response by African American communities and residents living in South Carolina and Georgia to the Draft Report for Comment Environmental Impact Statement on Proposed MOX Nuclear Facility issued February 2003. The comments, concerns and recommendations were gathered at four community meetings held in Aiken and Blackville, South Carolina and Augusta and Savannah, Georgia. Citizens For Environmental Justice (CFEJ) is serving as the lead organization working with these Environmental Justice communities in providing formal public comment to the Nuclear Regulatory Commission (NRC) and Department of Energy (DOE). The enclosed letter was sent to Secretary of Energy, Mr. Spencer Abraham on April 3, 2003. We have not received a response to date.

We, the environmental justice communities do not support the construction and operation of a MOX facility at Savannah River Site (SRS). We believe this mission is highly inappropriate, particularly because of the current legacy of waste at SRS. 96-1

Comments

- While we certainly applaud the inclusion of the Environmental Justice Analysis contained in the Draft Environmental Impact Statement (DEIS), we feel it is inadequate and did not provide sufficient details and explanation. 96-2

2

- We are appalled at the mistakes published in the DEIS and feel it was unfair to ask communities to respond to inaccurate data. The new information regarding the number of latent cancers that could be expected has still not reached our communities and no mechanism has been provided to make comment on this new information. 96-3

- According to the Executive Order 12898 on Environmental Justice extra measures must be taken to inform Environmental Justice Communities of proposed Federal actions. Although there were public meetings held, there was no outreach made to disadvantaged or vulunerble communities. 96-4

- The mitigation measures section addressing the disproportionate impact to minority communities is totally unacceptable. The proposal measures place yet another unfair burden on communities and local government. Education will not address impacts described in the Draft Environmental Impact Statement. Local governments and citizens should not bear the responsibility of emergency preparedness and associated costs. 96-5

- The Draft EIS does not provide opportunity for stakeholders to comment on immobilization as a viable and cost effective option 96-6

- Operation of the MOX facility at SRS will in our opinion generate more and new radioactive waste – and enough waste is being handled at the site already 96-7

- The length and complexity of language and science in the DEIS precludes many residents and Environmental Justice stakeholders from reading and commenting on the document. The comment period is too short and resources must be given to communities to develop their capacity to respond to such documents 96-8

- There is a clear violation of the National Environmental Policy Act (NEPA) requirements 96-9

- Because of the Native American's position on the final repository issue, debate must continue that includes all communities, particularly those on transportation routes 96-10

Major Concerns

- Potential health impacts to the Environmental Justice community as a result of an accident 96-11

- Lack of Emergency Preparedness of local government, health, fire and police departments 96-12

- Environmental Justice communities lack of understanding of the proposed actions 96-13

- Lack of respect for Environmental Justice communities involvement and input 96-14

- Lack of Duke Cogema Stone and Webster's willingness to meet with Environmental Justice stakeholders for dialogue and collaborative problem solving 96-15

- Generation of new radioactive waste by the MOX facility and funds to address this waste management 96-16

- Computer errors miscalculating the number of deaths in low income, African American communities as a result of a severe MOX accident 96-17

- No public announcement on how communities will comment on new data that has been corrected – N. Augusta in South Carolina and Augusta in Georgia should have every opportunity to make comment because they will be highly affected by the proposed MOX activity | 96-18
- The environmental risks associated with insufficient reactors in the MOX program to keep up with the proposed MOX production rate | 96-19
- Adding to SRS materials that are attractive as targets for sabotage or attack | 96-20
- Security risk of weapons grade plutonium at SRS | 96-21
- Another plutonium mission for SRS: a new plutonium pit dissembly facility | 96-22

Recommendations

1. Place a moratorium on the proposed MOX activity until environmental justice stakeholders can be integrated into the decision making process | 96-23
2. NRC must insure that the input from environmental justice communities is heard, considered and factored in the final record of decision | 96-24
3. Resources must be provided by Duke Cogema, Stone and Webster to local communities infrastructure for emergency preparation | 96-25
4. Duke Cogema, Stone and Webster must work collaboratively with environmental justice communities in planning and implementing mitigation strategies. New mitigation measures must be developed with the involvement of communities and integrated into the EIS | 96-26
5. Immobilization must be presented to potentially impacted communities as a possible option for plutonium disposition | 96-27
6. Improved and enhanced communication with environmental communities must be instituted | 96-28
7. Documents must not be published for comment by the public with incorrect calculations – when this occurs the process for commenting must be extended | 96-29
8. Duke Cogema, Stone and Webster must be made to work with potentially impacted communities | 96-30
9. Provide a "community user friendly" document that clearly tells people what is proposed, why and potential real impacts on the environment, health, economy and ecology of the operation of the MOX facility | 96-31
10. DOE must conduct a supplemental Environmental Impact Statement (EIS) on the immobilization option | 96-32
11. A programmatic EIS must be conducted that considers and addresses all parts of the MOX program of activity which includes the current EIS on the MOX fuel facility, supplemental EIS for the license renewal for the 4 Duke nuclear power reactors, Lead Test Assembly, MOX use in reactors and new plutonium processing | 96-33
12. The disproportionate impact on minority and disadvantaged communities must be addressed and mitigated | 96-34
13. There must be no acceptance of any number of potential deaths | 96-35
14. DCS must provide an off site emergency plan for a critical accident in the MOX facility | 96-36

Supplemental Recommendations

- Encourage authors and agencies developing the EIS to refer to the NEPA for opportunities to implement comprehensive review and analysis of all new policy proposals, rule revisions, permit applications and construction projects
- Improve NRC's (and other developers of the EIS) capacity to analyze and address environmental justice issues
- Establish better environmental justice guidelines for analysis and mitigation measures (involve the community in the development process)
- Ensure that NRC and its staff understand that "meaningful involvement" of all people (including Environmental Justice advocates and communities) in government processes is at the very center of addressing many of the issues brought forth by the environmental justice community
- Address the cumulative impacts of the proposed actions. The cumulative impacts should be evaluated with respect to increasing or decreasing existing inequities | 96-37

If in planning for an environment action, NRC and DOE find that such action will place an unequitable burden on groups, individuals or communities, and further find that they are unable to avoid placing such a burden, then consideration should be given to providing compensation or incentives

Environmental Justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. | 96-38

This proposed federal action must ensure the Environmental Justice in minority and low income communities as it relates to the MOX Fuel Fabrication Facility at SRS. | 96-38 cont.

In conclusion, we the members of the environmental justice communities in the South Carolina and Georgia call for a reversal of the Department of Energy's decision to construct and operate a MOX facility at Savannah River Site. Questions from community meetings are available upon request. | 96-39

Working for Environmental Justice,

Dr. Mildred McClain
Executive Director

Enclosures: Letter to DOE Secretary
Community Questions

April 3, 2003

Mr. Spencer Abraham, Secretary
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585

Dear Secretary Abraham:

This is a letter to formally call your attention to a grave concern of African American residents living near the Savannah River Site. On Monday, March 3, 2003 we received the Environmental Impact Statement on the Construction and Operation of a Mixed Oxide Fuel Fabrication Facility at the Savannah River Site, South Carolina. In the Environmental Impact Statement (EIS) an environmental justice analysis was conducted and the results are quite disturbing. The findings report that if an accident or explosion occurred the greatest impact would be to minority communities because of their geographical proximity to the site. The EIS states under Section 4.3.7.3.3 Accidents:

"A tritium release at the proposed PDCF facility has the potential for causing up to 400 latent cancer fatalities in the area surrounding SRS. However, it is highly unlikely that such an accident would occur. There, the risk to any population, including low-income and minority communities, is considered to be low. In the unlikely event of a tritium release at the PDCF or an explosion at the proposed MOX facility, the communities most likely affected would be minority and low income, given the demographics within 80 km (50 mi) of the proposed MOX facility." (Pg. 4-57)

The Mitigation Measures Section we feel is very weak, lacks sufficient details, and puts an unfair burden on minority communities to prepare themselves for any emergency or accident. (Section 5 Pg.5-6)

This raises several major concerns because of the already existing vulnerabilities within this population. Current DOE policy and the Executive Order 12989 on Environmental Justice require that measures be put in place to address any disproportionate impact relating to communities of color.

Our major concerns fall into five categories:

1) Emergency response preparedness for communities and local officials (with community involvement)
2) Information dissemination
3) Monitoring
4) Long term strategic planning to address potential impacts in collaboration with communities
5) Role of Duke/Cogema relating to community involvement and preparedness

We are asking for your assistance in having our concerns addressed. We want our communities involved in all the contractor's activities including planning and training related to insuring the safety and protection of the health of our people.

Working for Environmental Justice,

Dr. Mildred McClain
Executive Director

00097

24305 Clematis Drive,
Gaithersburg, MD 20882,
May 13th, 2003.

Tim Harris,
TWFN 7F-21,
U.S. Nuclear Regulatory Commission,
Washington, DC 20555-0001,
Telephone: (301) 415-6613,
E-mail: TEH@nrc.gov.

Subject: Comments on the Draft Report, Environmental Impact Statement on the Construction and Operation of a Mixed Oxide Fuel Fabrication Facility (MFFF) at the Savannah River Site, South Carolina, NUREG-1767, dated February 2003.

Dear Mr. Harris,

Thank-you for the opportunity to read and comment on the subject Draft Environmental Impact Statement (DEIS). I have read the DEIS and associated public documents, such as the NRC staff Draft Safety Evaluation Report (DSER - April 2002), with great interest. Personally, I am impartial towards the proposed action in the DEIS - I am neither for nor against the construction of the proposed facility (MFFF). From the information in the DEIS and DSER, I understand that the proposed MFFF is part of a national strategy and international agreements related to the disposition of excess plutonium. Thus, I conclude it is very important that this disposition is performed correctly, with appropriate NRC regulatory oversight and reasonable assurances of safety. Consequently, I have taken the time to briefly review the DEIS and provide you with feedback that I hope your agency will consider and use to improve the DEIS and safety at the proposed facility.

As noted under Item 5 below, the DEIS is one of several documents in the MOX review at the NRC, and a revised DSER is due out shortly. I recommend that the DEIS comment period is extended to allow the public to compare the DEIS and revised DSER together, and comment appropriately. 97-1

I have the following overall comments and recommendations on the DEIS:

1. **Adequate Assurances of Safety:** I am concerned about adequate safety and protection of the workers, the public, and the environment. As written, the DEIS indicates the proposed action (to build and operate the MFFF) has some impacts - it pushes the proverbial "envelope" in a number of areas - but the conclusion of acceptability is the same. This comes across as a non-sequitur. The DEIS should be extremely firm in its conclusions on the requirement of adequate safety and protection, as this is the primary mission of the Nuclear Regulatory Commission (NRC). For example, Table ES-1 of the DEIS should explicitly acknowledge which mitigation measures are required by the NRC, 97-2

with clear and objective criteria. The DEIS should explain how DCS can add revisions to the SRS Emergency Response Plan (DCS does not run the SRS) to address NRC concerns, and the process by which NRC would review and approve a plan that is essentially outside its regulatory jurisdiction (radiological safety at the SRS is regulated by the U.S. Department of Energy [DOE]). Also, per the DSER, the plant is not yet designed. However, as the DEIS is written, it is not clear if reasonable conservatism has been incorporated into the analyses due to the lack of design information or if ALARA (As Low As Reasonably Achievable) considerations are included. 97-2 cont.

2. **Inadequate Mitigation or Prevention of Impacts and Events:** The DEIS indicates there are a large number of potential hazards and potential events at the proposed facility, particularly from chemicals. However, the DEIS appears to focus on programmatic and administrative controls for many of these hazards and concerns, with mitigation by evacuation or other worker actions. Some of the potential events would seem to have the capability of producing numerous serious injuries and/or fatalities with relatively high likelihoods. This appears to be less than adequate and potentially inconsistent with NRC regulations, which, for example, endorse passive controls as preferred to active controls, and engineered controls as preferred to administrative controls. In addition, the DEIS does not appear to emphasize actual mitigation and/or prevention of the hazardous phenomena itself. 97-3 Also, there is a brief discussion on sand and HEPA filters that reaches a conclusion of no difference - but the conclusion does not seem to be supported by the discussion, which implies better performance from sand filters, particularly during accidents. It is recommended that approaches more consistent with NRC and nuclear industry practices in these areas, with reasonable mitigation, prevention, and/or conservatism, are endorsed by the DEIS. 97-18

3. **Uncertainty and Sensitivity:** The analyses in the DEIS do not appear to address uncertainties - including uncertainties in design, uncertainties and inaccuracies in models, uncertainties in input parameters, and excluded or overlooked effects. In addition, the sensitivity of the results to changes in assumptions and parameters is unclear. It is recommended that uncertainty and sensitivity are addressed and included in the DEIS. 97-4

4. **NRC Risk Goals:** The NRC has risk goals and metrics regarding the safety of regulated facilities. The DEIS does not indicate if the proposed facility meets these risk goals. It is recommended that the DEIS does include such a risk comparison and indicate if they are met or indicate the requirements the NRC will impose on the proposed facility in order to meet these goals. 97-5

5. **Congruence and Compatibility of the DEIS with Other MOX Documents:** There are several other documents on the MOX program, including the MOX DSER and public meeting summaries. There appear to be some disconnects between the DEIS and the licensing documents, such as the applicant's Construction Authorization Request (CAR) and the revised CAR, and the NRC licensing documents (e.g., the DSER). I understand that a revised DSER will be issued shortly to the public by the NRC. It is important that this revised DSER, other licensing documents, and the DEIS are consistent. The public should be given the opportunity to compare the DEIS and the revised DSER together, 97-6

and comment on both. Consequently, the DEIS should be compared to the planned revised DSER and the public should be allowed a 30-day or so overlapping period for comparing the documents.

6. **Quality Assurance and Control (QA/QC):** The NRC letter of March 6, 2003 on this DEIS identified a concern with one of the computer codes used in the analyses. This concern was caught and corrected. However, it is not clear if the DEIS and supporting information have been adequately reviewed for other potential errors. Also, it is not clear if the assumptions and bases used for the calculations and conclusions, such as material at risk, release fractions, applicable computer codes and requirements etc., have been adequately reviewed for applicability, appropriateness, and validity. Such QA/QC should be explicitly done and/or acknowledged, using NRC guidance and requirements on QA/QC (including software quality) and such industry standards as NQA-1.. 97-7

In addition, I have the following specific comments from my brief review:

7. **Use of TEELs:** Section 4.3.5.3 on page 4-42 et seq discusses the potential effects from chemical releases and accidents. The DEIS uses temporary emergency exposure limits (TEELs) which are adopted by the DOE Subcommittee on Consequence Assessment and Protective Action (SCAPA). These are not values used in NRC regulations or regulatory guidance and are explicitly identified as not to be used when values exist from regulatory agencies, such as AEGLs, IDLHs, and NIOSH/OSHA ceiling values. TEEL values also change frequently. The use of TEELs may underestimate potential concerns and required mitigative or preventative methods. It is recommended that more conservative and regulator-endorsed values are used. This may involve a methodology to select the lowest values from AEGLs, IDLHs, MAGs, and NIOSH/OSHA. 97-8

8. **Ambient Temperatures:** A temperature of 25.8 C (78.5 F) is stated as an average. This is not a reasonable average nor does it provide any margin. Temperatures in excess of this would be anticipated to occur many times each year (i.e., an anticipated, annual event). Usually the SRS area experiences at least once every year a heat wave with temperatures of around 100 F or more. There is another NRC licensed facility in the area that uses 106 F as the design basis for maximum ambient temperature (i.e., in the shade). In addition, solar heating effects on the structure (the Reagent Storage Building is a metal structure), other buildings and storage areas, and during deliveries could push local ambient temperatures in excess of 120 F. Thus, the assumed average temperature does not address anticipated conditions that occur annually nor do they provide any margin or conservatism. A higher temperature should be used for vapor pressures and release calculations. 97-9

9. **Process Temperatures:** The chemicals are used in processes within the facility. Process temperatures will likely exceed ambient temperatures considerably. For example, solvent extraction processes routinely can exceed 50 C, while evaporators can exceed 100 C. These higher temperatures should be used as appropriate for modeling the evaporation of process spills and may necessitate the use of other models (e.g., flashing and bulk convection) for estimating release rates. 97-10

10. **Uranium Dioxide:** The basis for uranium dioxide release estimates in Table 4.16 of the DEIS needs to be explained. The NRC staff's DSER of April 2002 identified this as an open issue and implied higher potential concentrations. 97-11

11. **Nitrogen Tetroxide (Nitrogen Tetraoxide):** This is a chemical that requires great care during handling and use, as found out from the space and missile programs. It boils at near ambient conditions and significantly dissociates into nitrogen dioxide at temperatures slightly above ambient, which greatly increases the effect of releases. It can also cause common mode failures. In the space/missile programs, it is usually cooled below its boiling point during storage and a large water quench is maintained ready for use - are these features planned for this facility, and, if not, is that acceptable? In addition, the tetraoxide would be pressurized with instrument air (say, 50-100 psig) in the proposed facility - has this been accounted for in the analyses? The DEIS indicates an estimated concentration of 1,600 mg/m³ at 100 meters - this is a potentially lethal concentration and would likely result in large numbers of serious injuries and fatalities if the release occurred at the proposed facility, and could negatively impact adequate safeguarding of nuclear materials. The DEIS does not discuss adequate mitigation and/or prevention of such events. The DEIS should acknowledge and address these concerns. 97-12

12. **Consideration of Likelihoods versus Averages:** The DEIS appears to use averages. Frequencies and likelihoods do not appear to be incorporated. This DEIS pertains to a proposed facility that would be licensed under 10 CFR 70, which includes consequence and likelihood bins (e.g., see the CAR and DSER). The DEIS should explicitly consider consequences and likelihoods. 97-13

13. **Inventories and Quantities of Materials Released:** The DEIS appears to use single tank or container quantities for a large number of analyses. This does not seem reasonably prudent and conservative given that the facility is still being designed and common mode failures cannot be discounted (e.g., multiple tanks failed by the same event or leaks via common piping and valves). It is recommended that larger inventories (up to and including the site inventory, as necessary) are used for releases of chemicals from fluids. 97-14

14. **Use of Computer Codes:** It is not clear if the computer codes are endorsed by NRC regulations and/or guidance, and if they meet NRC QA requirements, including verification and validation for the specific site and application. This should be explicitly verified, stated, and referenced. 97-15

15. **Waste Management:** The DEIS discusses waste management in a top-level manner. Most of the waste will be transported to the DOE/SRS and dispositioned using existing or planned facilities. The DEIS does not provide assurance that this can and will occur in a reasonable manner due to available and planned capacity, utilization, obligations, priorities, and acceptance criteria. It is recommended that such assurance is provided, particularly for planned facilities that do not currently exist and do not appear to have 97-16

sufficient design information, acceptance criteria, or programmatic commitment published for public review.

16. **HEPA and Sand Filters:** The DEIS briefly discusses the relative attributes of sand and HEPA filters (e.g., Section 4.3.8). This section concludes the use of sand filters would not clearly result in lower net environmental impacts as compared to the use of HEPA filters at the proposed facility. This seems counter-intuitive and may include potential reliance on administrative controls. However, the preceding text mentions periodic HEPA filter replacement and damage to the HEPA filters during potential accidents (fires and explosions) that would increase or potentially significantly increase the impacts from HEPA filter use. In contrast, sand filters would maintain their efficiency during these accident scenarios. The text further states that DCS is committed to making explosions highly unlikely and to mitigate potential effects of fires, thus allowing the HEPA filters to continue functioning. Fundamentally, is a commitment good enough or should actual controls be discussed? It is recommended that more references and supporting information are included in this section as to what the DCS measures actually are, as it is currently insufficient to support the DEIS conclusion, appears inconsistent with DOE practices and experiences at SRS (most of the SRS facilities have sand filters), and, given the DOE Rocky Flats experience, appears less than adequate. Also, the text mentions that neither HEPA nor sand filters mitigate chemicals. The text should note, however, that HEPA filters are impacted by chemical emissions and releases that lead to premature and unanticipated failures (part of the DOE Rocky Flats experience). Sand filters are essentially unaffected by chemical releases and continue to function. The DEIS should include this type of discussion and the measures that DCS is using to protect the HEPAs from chemical events. 97-17

Once again, I thank-you for the opportunity to comment on this DEIS.

Sincerely,

Alex Murray

Alexander P. Murray,
Engineer and Private Citizen.

00098

Southern Alliance for
Clean Energy

Michael T. Lesar
Chief, Rules & Directives Branch
Division of Administrative Services, Office of Administration
Mail Stop T-6D59
U.S. Nuclear Regulatory Commission
Washington, DC 20555

May 14, 2003

RE: NUREG-1767, Draft Environmental Impact Statement of the Mixed Oxide Fuel Fabrication Facility at the Savannah River Site Nuclear Facility

Mr. Lesar:

These comments are in addition to oral comments presented by Southern Alliance for Clean Energy (SACE) at the Savannah, GA public meeting on March 25, 2003. The oral comments were also submitted in hard copy form since the 5-minute speaking allotment was not sufficient to cover what we had prepared. If those comments have not been entered to the record in their entirety, we have attached them again to this document.

We are disappointed that an additional extension to the public comment period was not granted, as we had formally requested in our oral comments. SACE again requests an extension. We are also concerned that many of the important objections to the plutonium bomb fuel, or mixed-oxide fuel "MOX," program have been entirely dismissed by the U.S. Nuclear Regulatory Commission (NRC).

Plutonium Disposition Program General Concerns

Southern Alliance for Clean Energy believes that the NRC has only one option that would truly protect the public health: deny the license application request for the MOX fuel fabrication facility (or plutonium fuel factory) at the Department of Energy's Savannah River Site nuclear facility (SRS). We urge that the pursuit of developing a plutonium fuel economy be ceased in all sectors of government and private enterprise, as it will allow plutonium, a dangerous material, to enter civilian commerce and the international marketplace. 98-1

We thoroughly disagree with the NRC staff's preliminary decision in this report that the "overall benefits of the proposed MOX facility outweigh its disadvantages and costs." The NRC states on P. 2-37 four main points of consideration that brought them to this flawed decision and we will again touch upon several of them.

Significant Changes in Plutonium Disposition Program

At the public meeting in Savannah this March, the audience was told that "the national policy decision between Russia and the US to reduce surplus weapons plutonium" was a leading reason for the NRC staff's initial support of this plutonium bomb fuel program. This was used as a reason why the immobilization alternative, which is generally preferred as a cheaper, safer option that will result in less nuclear waste and potentially less impacts to the community, was not considered as an option to study 98-2 by the NRC. Yet, in the Department of Energy's Amended Record of Decision regarding the Surplus Plutonium Disposition Program that was released on April 17, 2003 [6450-01-P], *AFTER the public meetings on the plutonium fuel factory were OVER*, they state that the cancellation of the immobilization program was due to "budget constraints" – not conflicts with Russian/US policy. 98-2 cont.

The DOE statement goes on to say that the "program will dispose of 34 metric tons (MT) of surplus plutonium, including approximately 6.5 MT of the 17 MT of surplus plutonium originally intended for immobilization." This leaves us logically wondering, what will happen to the rest of the plutonium? Apparently it is destined for SRS but for what purpose and what assurances can the NRC provide that those many extra tons of plutonium will be safely stored, given that there are currently only plans to refurbish existing, old nuclear reactors to store one of the most highly sought after materials for use in modern nuclear weapons, a material with a hazardous radioactive life of over 240,000 years? We urge the NRC to demand that the DOE do a thorough supplemental environmental impact statement of this major change in policy BEFORE the NRC issues a final EIS on the plutonium fuel factory. The 13-page amended record of decision by the DOE is insufficient and the NRC deems to be obligated to protect the public interest, not another federal agency, nor domestic and foreign contractors. 98-3

Attached is a brochure from a recent event in Savannah, where staff from SRS addressed business leaders on various future missions, including the "Modern Pit Facility," which is essentially a new nuclear bomb factory. SRS is believed to be the preferred site for this plutonium trigger plant that will cost billions of dollars. Yet budgetary constraints within DOE were cited for canceling immobilization? The draft EIS on this new bomb –making facility is scheduled to be due out within the next month. Given this pursuit of a mission in complete contrast to our nation's supposed "disposition" of surplus weapons plutonium in a supposed parallel venture with Russia to reduce our nuclear weapons stockpiles, we question why the NRC cannot state the conflict within national policy and request that the issue be resolved prior to issuing a determination on the MOX plant? Also, the "unaccounted" plutonium that is coming to SRS but will not be used for MOX could very easily become feed material for the new Modern Pit Facility. The NRC needs to take this into account. SACE also requests the NRC to delay issuing a decision until the Modern Pit Facility draft EIS is issued and commented on—there is likely to be much overlap in the programs, along with several policy conflicts. 98-4

SACE still has not received answers to our concerns raised over the DOE's February 2002 *Report to Congress: Disposition of Surplus Defense Plutonium at Savannah River Site*, that essentially recommends the need to add at least two additional, unnamed nuclear reactors for plutonium bomb fuel (MOX) use. Our nearby Southern Nuclear Plant Vogtle expressed interest in the plutonium fuel program back in 1996 and we are concerned about the implications of the need for more nuclear reactors. How will the NRC address this need for more nuclear power plants in the final EIS for the MOX fuel facility? 98-5

Water Concerns

The NRC concluded that there are minimal environmental impacts if plutonium fuel is produced at SRS. We disagree and will highlight our water concerns, which were raised in our oral comments. Water resources are limited and debates on how this precious resource should be protected is under heated debate currently in the Southeast. The link between energy and water resources is profound. At the national level, the electric industry follows closely on the heels of irrigation as the largest water user in the U.S. Yet, there is no discussion in the draft EIS on the impacts of nuclear power production, which the MOX program will support the possible advancement of, on the region's water supply. 98-6

Nor does the draft EIS clearly account for how much ground and surface waters will be used additionally by the MOX plant. Currently, SRS requires enormous amounts of surface and ground water, in the tens of billions of gallons, *just to support currently established operations*. The draft EIS was nearly impossible to decipher what the rates of consumption (actual water loss) are now on site for various operations and in the future, for the MOX plant. This accounting needs to occur before deciding that water impacts by the proposed facilities are "negligible." 98-7

Accidents

The original draft included significant errors in the calculation of latent cancer fatalities if there were an explosion at the MOX facility—estimating nearly 400 deaths; the new calculations result in less fatalities, but we still consider 100 deaths to be significant and important enough to warrant denying approval. 98-8

Summary

Southern Alliance for Clean Energy believes that the NRC must address the full impacts of the plutonium bomb fuel program—how this scheme is likely contributing to the eventual production of nuclear weapons components at SRS and the use of the site for permanent nuclear waste burial. A full accounting of what and how much plutonium is coming from where and being used for what project when it arrives should be done and made public. 98-9

We have included copies of petitions SACE recently collected and would like to at least alert people to the fact that many people do not want this project and though they may not be capable of making formal, written comments, that their opposition should be noticed and considered. Though the NRC staff said that general comments and claims of basic opposition are not helpful to them, we believe that these names are helpful to policy makers, who ultimately have the power to make a positive difference by working to protect the region, and these very citizens, from further exploitation.

We suggest that after the NRC has reviewed all of the comments on the draft and does more research, they should deny the license request or at least recommend that the "no action alternative" is more advantageous to health and safety than the MOX program. Instead, other programs that appear to be more environmentally sound, safer to workers, less expensive, and could prevent the circulation of nuclear weapons materials, such as immobilization of surplus plutonium, should be funded and supported through further research and development. Though not a perfect technology, it is far cheaper than other options and appears to have less risks overall than the currently encouraged technologies. 98-10

Sincerely,

Sara Barczak
Safe Energy Director, Southern Alliance for Clean Energy
3025 Bull Street, Suite 101
Savannah, GA 31405
(912) 201-0354

cc: U.S. NRC Commissioners, Governor Sonny Perdue, Governor Mark Sanford, U.S. Senator Zell Miller, U.S. Senator Saxby Chambliss, U.S. Rep. Max Burns, U.S. Rep. Jack Kingston, U.S. Rep. Sanford Bishop, Jr., U.S. Rep. James C. Clyburn, GA Senator Regina Thomas, GA Rep. Nan Orrock

00099

From: Bev Baker [cosmicbluedolphin@yahoo.com]
Sent: Friday, May 16, 2003 4:02 PM
To: teh@nrc.gov
Subject: Just Please Read the Most Important EMail of your Life Just SAY YES TO READING MY EMAIL

May, 2003

Dear NRC:

Just say yes to life and solar and wind energy.!!!!

Just say no to Mox and all things nuclear...In fact..I think we should also ban microwave ovens and all nuclear weapons and power plants while we are at it.... 99-1

I am the great-great granddaughter of a Cherokee Indian....She married one of the first European settlers of the North Georgia Mountains...So in respect for Native American tradition Let us Love Mother Earth and Father Sky. One of the primary ways we can Love and Respect Mother Earth and Father Sky is to develop solar wind and geothermal technologies...It can be done....Visit Hopland California at the Solar Energy Center and the geothermal energy produced naturally for the town of Pagosa Springs Colorado. Also, if some men and women have to fight, lets go back to the days of the bow and arrow and tomahawk...At least the entire sacred environment wont be wiped out when the world gets a testerone surge every now and then......

Also, every action we take as an individual or as a government must be done so that present and future generations of people, plants, animals and also inanimate objects will have their health and environment protected. Lets look out for the Seventh Generation as Chief Seattle would want us to do...

We still have yet to do clean up of all the stuff produced during the Cold War and World War II and Vietnam.....So lets not produce any more of this toxic stuff...seems the best way to handle stuff is absolute containment (Environmentalists, Inc c/o Ruth Thomas of Columbia SC and Blue Ridge Environmental Defense League www.bredl.org have the documents about this..its so dangerous for this stuff from Rocky Flats and possible elsewhere to be travelling down our highways...the new Trail of Tears?)

I will forward these documents on containment and dangers of nuke transportation on to you as soon as I am able....I am on vacation in Southwestern United States and this is first day I have had access to computer....Spending nights in Apache National Forests in Central Arizona near Mt Baldy...

Also, what on earth do we want a French Company like Duke COGEMA and Stone Webster dealing with our most dangerous stuff? A little bit of common sense would be much appreciated. 99-2 One of the largest and most beautiful aquifers in North America is located around SRS and that part of Georgia and South Carolina....So lets not produce anymore toxic stuff there...clean up in accord with recommendations from NRDC and IEER and NCI and Physicians for Social Responsibility is what is needed. That will provide plenty of jobs in a positive way. 99-3

I am trying to make this short and sweet as possible....I will send more stuff I have to you as soon as I

regroup and reorganize...I am on vacation so I dont want to think about anything nuclear....Also the uranium and coal mining is devastating the health and environment of the Navajo and Hopi Nations. So this is where the devastating cycle of nuclear industry begins in beautiful Southwest...hope to the great Dine and sacred Hopis, the People of Peace.

Solar and Wind are the Answer My Friend...Please visit Solar Energy Center in Hopland California ASAP.....

Love and Peace and Solar is Clean and Forever

Bev Baker,
Earth Hugger Extraordaire
65 Heritage Drive Condo 5
Cleveland, GA 30528
email: cosmicbluedolphin@yahoo.com

00100

From: Meira Warshauer [meira28@sc.rr.com]
Sent: Friday, May 16, 2003 7:06 PM
To: teh@nrc.gov
Subject: MOX Construction Draft EIS comments

Dear Tim,
I hope you are still accepting comments re the MOX Construction Draft EIS.

The EIS does not sufficiently address the need for absolute containment of plutonium throughout the process and how that will be achieved.

Respectfully submitted,

Meira M. Warshauer
3526 Boundbrook Lane
Columbia, SC 29206

1

May. 14 2003 03:58PM P1

00101

TO: Mr. Lawrence E. Kokaijko, Acting Chief — May 12, 2003
Env. and Performance Assessment Branch
Division of Waste Management
Office of Nuclear Material Safety and Safeguards
Attention: Tim Harris

Gentlemen:

With 2 computer errors admitted so early in the project how can I possibly feel safe with MOX fuel energy at all? These mistakes may seem insignificant, but, what if a more serious error had occurred and lives were in jeopardy? 101-1

This entire idea of MOX fuel is too risky, and I am afraid of it. You need to figure out how to neutralize the spent substance in a safe way, and not experiment with nuclear materials.

The fact that "cumulative collective dose to workers at the SRS would increase approximately 11% as a result of MOX, PDCJ and WSB facility operations" is significant, 101-2 not to mention the groundwater contamination increase. 101-3

Sorry, but this project is entirely ludicrous. Go back to the drawing board.

Sincerely,
Judy Ponder
214 Charlie Mountain Road
Clayton GA 30525
706/782-2380

May. 14 2003 03:35PM P1

00102

U.S.NUCLEAR REGULATORY COMMISSION 5/14/03
Mr. Lawrence E. Kokajko , Acting Chief
Mr. Tim Harris 301/415-6613

Dear Sirs:

As members of the OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS, you must be shocked at the 2 computer errors in need of correction, and how these 2 errors ripple through the many pages of the document accompanying your letter of April 8, 2003. A computer error when MOX is in full manufacture would be disastrous, deadly, and perhaps even irreversible where nuclear fission is involved. You must not approve any further progress twoard the MOX fuel program until such time as the spent fuel rods can be safely neutralized.

The fact that an 11% increase in the cumulative and collective dose to workers at SRS as a result of MOX, PDCH and WSB facility operations, is alarming. 11% is huge!. You must stop thes kinds of projects now, before it's too late.

Sincerely,

Bart Patton
214 Charlie Mountain Drive
Clayton GA 30525
706/782-2380

05/14/2003 16:42 4045247593 WAND PAGE 01

00103

Michael T. Lesar
Chief, Rules & Directives Branch
Division of Administrative Services, Office of Administration
Mail Stop T-6D59, U.S. Nuclear Regulatory Commission
Washington, DC 20555

Re: NUREG 1767

Dear Mr. Lesar,

I am writing in response to the Nuclear Regulatory Commission's Draft Environmental Impact Statement (DEIS) on the proposed plutonium fuel factory (MOX) at the Department of Energy's Savannah River Site nuclear facility. There are several areas in which I think the DEIS is inadequate:

The DEIS only addresses the construction of the MOX facility and not the operation of the facility. Environmental aspects of both must be considered. 103-1

The DEIS must address the reasonable alternative to MOX-plutonium immobilization. Immobilization would effectively achieve the MOX program's stated goal to safeguard weapons-grad plutonium. The DEIS only provided continued storage, as an alternative to the construction of the MOX factory for disposition of the plutonium This would be an unacceptable security risk. Like the MOX factory, immobilization would also provide a large number of jobs. Its waste stream is negligible compared to MOX, and it is cheaper than MOX. The DEIS should have addressed ALL alternatives, including immobilization. 103-2

The DEIS should produce verifiable projections of waste volumes as well as discuss the environmental risks and consequences of DOE failure to implement MOX waste management. 103-3

The issue of a possible terrorist attack on the proposed MOX factory was not at all adequately addressed. We know that since September 11, 2001, what used to be unlikely incidents are more likely than ever. The environmental and public health impacts of an attack on this facility are unacceptable to the people of the Southeast. 103-4

Please address these problems with the DEIS.

Sincerely,

(Signature) 5-13-2003 (Date)

Terri Faeger Blunve
(Print Name)

416 Nelson Ferry Rd Decatur GA 30030
(Address)

05/14/2003 16:42 4045247593 WAND PAGE 02

Michael T. Lesar
Chief, Rules & Directives Branch
Division of Administrative Services, Office of Administration
Mail Stop T-6D59, U.S. Nuclear Regulatory Commission
Washington, DC 20555

Re: NUREG 1767

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The DEIS should produce verifiable projections of waste volumes as well as discuss the environmental risks and consequences of DOE failure to implement MOX waste management.

The issue of a possible terrorist attack on the proposed MOX factory was not at all adequately addressed. We know that since September 11, 2001, what used to be unlikely incidents are more likely than ever. The environmental and public health impacts of an attack on this facility are unacceptable to the people of the Southeast.

Please address these problems with the DEIS.

Sincerely,

[signature] 5/13/03
(Signature) (Date)
Marguerite Sweet
(Print Name)
320 Elizabeth St [illegible] GA 30307
(Address)

05/14/2003 16:42 4045247593 WAND PAGE 03

109 Fawn Run
Alto, GA 30510
May 8, 2003

Michael T. Lesar, Chief
Rules & Directives Branch
Div. of Administrative Services, Off. of Administration
Mail Stop T-6D59 U.S. Nuclear Regulatory Commission
Washington, DC 20555

Re: NUREG 1767

Dear Mr. Lesar:

I'm writing in response to the NRC's Draft Environmental Impact Statement on the proposed plutonium fuel factory (MOX) at the Dept. of Energy's Savannah River Site nuclear facility.

The DEIS addresses only the construction of the MOX facility and not the operation of the facility. Environmental aspects of both should be considered.

The DEIS must address the reasonable alternative to MOX-plutonium immobilization. Immobilization would effectively achieve the MOX program's stated goal to safeguard weapons-grade plutonium. The DEIS provided only continued storage as an alternative to construction of the MOX factory for disposition of the plutonium. This would be a security risk. Like the MOX factory, immobilization would also provide a large number of jobs. Its waste stream would be negligible compared to MOX, and it would be cheaper than MOX. The DEIS should consider ALL alternatives, including immobilization.

The DEIS should produce verifiable projections of waste volumes as well as discuss the environmental risks and consequences of DOE failure to implement MOX waste management.

The issue of a possible terrorist attack on the proposed MOX FACTORY was not adequately addressed. We know that, since the attack on the World Trade Center, what used to be unlikely incidents are real possibilities. The environmental and public health effects of an attack on this facility are unacceptable to the people of the Southeast.

Please address these problems with the DEIS.

Sincerely,
Emily B. Calhoun
Emily B. Calhoun

05/14/2003 16:42 4045247593 WAND PAGE 04

Michael T. Lesar
Chief, Rules & Directives Branch
Division of Administrative Services, Office of Administration
Mail Stop T-6D59, U.S. Nuclear Regulatory Commission
Washington, DC 20555

Re: NUREG 1767

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The DEIS should produce verifiable projections of waste volumes as well as discuss the environmental risks and consequences of DOE failure to implement MOX waste management.

The issue of a possible terrorist attack on the proposed MOX factory was not at all adequately addressed. We know that since September 11, 2001, what used to be unlikely incidents are more likely than ever. The environmental and public health impacts of an attack on this facility are unacceptable to the people of the Southeast.

Please address these problems with the DEIS.

Sincerely,

Eleanor S. Richardson
755 Park Lane
Decatur, Ga. 30032

05/14/2003 16:42 4045247593 WAND PAGE 05
05/07/2003 17:33 4043259152 FOREIGN (:E EVAL PAGE 01

Michael T. Lesar
Chief, Rules & Directives Branch
Division of Administrative Services, Office of Administration
Mail Stop T-6D59, U.S. Nuclear Regulatory Commission
Washington, DC 20555

Re: NUREG 1767

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Please address these problems with the DEIS.

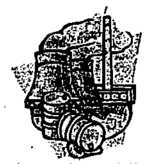
Sincerely,

Faye McKay-Clegg
1324 Weatherstone Way
Atlanta GA 30324

May 14 03 04:43p SHLE 912-201-0354 p.12

00104

DON'T brand the Southeast "PLUTONIUM ALLEY"! We don't want plutonium fuel!



Chairman Richard Meserve
United States Nuclear Regulatory Commission
Washington, D.C. 2055

Dear Chairman Meserve:

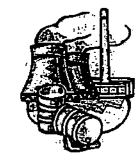
The proposed plutonium bomb fuel factory puts our nation, and especially this region at great risk. From the transport of plutonium across the country to the need to safely secure it upon arrival, we are also burdened with an unacceptable scheme that will increase contamination at the already extremely polluted Savannah River Nuclear Site. This proposal, also known as "MOX," is not safe, affordable, or sustainable. We again urge the Nuclear Regulatory Commission to deny the license request. 104-1

Sincerely,

Name	Address	Zip Code
Rowland Whitlow	419 Woodland St Nashville TN	37206 [illegible]@AOL.com
Adele Kushner	3 [illegible] Circle [illegible] GA	3510 [illegible]
Dr Linda Trout	382 Montford Asheville NC	28804
Vijaya Chapdia	44 Pinnacle point Asheville NC	28805
Ryan Alker	235 S Limestone Lexington, Ky	40508
Zivanna El'AnAnel	120 Elm Dr Asheville NC	28805
Amanda [illegible]	909 [illegible] Chattanooga TN	37409
Dave Jacobs	POB 7664 Asheville NC	28802
Ruth Clark	266 Merrimon Av. Asheville NC	28801
Anna Gaffney	1140 White Bluff Rd (3) Savannah, GA	31419
Cristina Negrea	704 E 44th St Savannah GA	31405
Jane Mills	114 [illegible] Dr. Ga	31406
Ernestine Daugherty	4604 Springhill Rd Sav Ga	31404
Ann P. Colwell	1907 Broad St. Sav. GA.	3140[illegible]
Harriet C. Gaudry	Bacon Park Dr., Sav. GA.	31406

May 14 03 04:43p SHLE 912-201-0354 p.13

DON'T brand the Southeast "PLUTONIUM ALLEY"! We DON'T want plutonium fuel!



United States Nuclear Regulatory Commission
Honorable Commissioners
Washington, D.C. 2055
Re: NUREG-1767

Dear Commissioners:

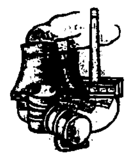
The proposed plutonium bomb fuel factory puts our nation, and especially this region, at great risk. From the transport of plutonium across the country to the need to safely secure it upon arrival, we are also burdened with an unacceptable scheme that will increase nuclear waste at the already extremely polluted Savannah River Site nuclear facility. This proposal, also known as "MOX," is not safe, affordable, or sustainable. We urge the Nuclear Regulatory Commission to deny the license request in order to protect our communities.

Sincerely,

Name	Address	Zip Code
[illegible] Jackson	1406 East 53rd st	Sav GA 31404
[illegible] M Hall	313 W. Hall St. Apt B	31401 Savannah GA
Jeremy Ballard	509 East Duffy	Savannah Georgia 31401
Zephren Turner	217 E 37th St	31401 Savannah GA
[illegible]	126 E. Liberty St	31401 Savannah GA
Adam Jacobs	225 E. Taylor St. Apt. C	Sav, GA 31401
Zachary Laub	415 E. Jones St.	31401
[illegible]	410 Kentucky Ave.	Savannah GA. 31404
[illegible] Cooper	103 Decker Dr.	Greenwood SC 29646
[illegible]	60X [illegible]	Sav GA 31410
[illegible]	60X [illegible]	[illegible] GA 31410
[illegible]	60X Park W.	Sav GA 31410
[illegible]	521 E. Park Ave	31401
[illegible]	711 E 40th	31401

DON'T brand the Southeast "PLUTONIUM ALLEY"! We DON'T want plutonium fuel!

United States Nuclear Regulatory Commission
Honorable Commissioners
Washington, D.C. 2055
Re: NUREG-1767



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Sincerely,

Name	Address	Zip Code
ELLEN AXLEN	104 MONTGOMERY ST. #1 Savannah GA	31401
[illegible]	600 Waters Ave #15 Sav. GA	31406
Louis Claus.	655 E Henry St " "	31401
[illegible]	[illegible] Claxton Ga	30525
[illegible]	2310 [illegible]	[illegible] Mi 48[illegible]
[illegible]	105 [illegible] Sav. GA	31410
[illegible]	3 [illegible] Sav Ga	31410
[illegible]	324 [illegible] Apt B10 Baxley GA	31405
[illegible]	720 [illegible] Ave Sav. GA	31401
ROBERT [illegible]	341 [illegible] BLVD [illegible] GA	31302
[illegible] Schell	14 Bright St Tybee Island, GA	31328
[illegible]	[illegible] Sav. GA	31410
[illegible]	[illegible]	[illegible]

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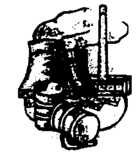
United States Nuclear Regulatory Commission
Honorable Commissioners
Washington, D.C. 2055
Re: NUREG-1767



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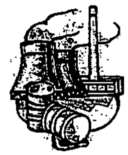
Sincerely,

Name	Address	Zip Code
E. VICTOR MERESKI	1132 MERIDIAN DRIVE SAV, GA	31406
RANA BISHARA	317 [illegible] Ave	31401
Whitney Erin Lamb	408 W. Duffy St. Sav. GA	31401
[illegible]	227 [illegible] Atl.	30307
Kelli [illegible]	723 E Maupas Ave	31401
Heather Flagle	2008 Whitaker St.	31401
Katie Vosler	524 B E. 31st SAV GA	31401
[illegible]	[illegible] St. Helena, SC	29920
CHARLES E. POWELL	P.O. Box 1804 TYBEE ISLAND GA.	31328
Melinda Powell	PO Box 1804 Tybee Island GA	31328
LORE J CORBUS	723 East Henry St. Savannah, GA	31401
Gregory A [illegible]	723 East Henry St Savannah, GA	31401
Kelli [illegible]	549 E [illegible] St, Sav. GA	31401

DON'T brand the Southeast "PLUTONIUM ALLEY"! We DON'T want plutonium fuel!



United States Nuclear Regulatory Commission
Honorable Commissioners
Washington, D.C. 2055
Re: NUREG-1767

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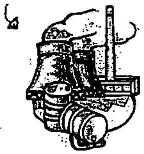
Sincerely,

Name	Address	Zip Code
Tom Holl[illegible]	309 E. Henry St. Savannah, GA	31401
[illegible]	306 E. Henry St. Sav. GA	31401
[illegible]	102 S. Mulberry St Statesboro, GA	30458
Clay Bea[illegible]	77 W 5[illegible] St Savannah, GA	31405
Gary Smith	408 E 66th St Sav GA	31405
Scott Justice	400 Exley Rd. Rincon	31326
D.G. Bowen	POB 1002, Smyrna GA	31402-1002
Pamela Mundy	102 E Liberty St #705 Sav GA	31401
Kane Berg	606 E Park Lane Savannah GA	31401
Mr. James Styron	415 Hummingbird Ln Springfield GA	31329

DON'T brand the Southeast "PLUTONIUM ALLEY"! We DON'T want plutonium fuel!



United States Nuclear Regulatory Commission
Honorable Commissioners
Washington, D.C. 2055
Re: NUREG-1767

Dear Commissioners:

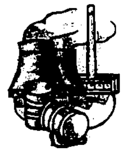
The proposed plutonium bomb fuel factory puts our nation, and especially this region, at great risk. From the transport of plutonium across the country to the need to safely secure it upon arrival, we are also burdened with an unacceptable scheme that will increase nuclear waste at the already extremely polluted Savannah River Site nuclear facility. This proposal, also known as "MOX," is not safe, affordable, or sustainable. We urge the Nuclear Regulatory Commission to deny the license request in order to protect our communities.

Sincerely,

Name	Address	Zip Code
Laurie Faubus	8 Lightenstone Ct Sav GA	31411
Whitey Lomb	408 W. Duffy Sav Ga	31401
Tracy Conche	203 W 40th Sav	31401
Melvin Williams	936 Trafford Ln Sav	31410
Andrea Murrell	418 E. 51st St Sav GA	31405
Randy Lewandowski	108 E. 51st St Savannah GA	31405
ALT KREBS	418 E. Jones St "	31401
Joni Sayo-Giusti	222 E. Gwinnett Sav	31401
[illegible]	15 E. Jones St Sav GA	31401
[illegible]	508 E 58th Sav	31405
Brian Kiser	201 W. Oglethorpe #203 Sav	31401
Shaun Brooks	311 W. Waldburg Sav	31401
Veronica [illegible]	416 E. Gwinnett Sav	31401
Kenny Willis	16 East 39th Sav	31401
Alex Spinney	110½ W Duffy St Sav GA	31401

May 14 03 04:46p SRCE 912-201-0354 p.18

DON'T brand the Southeast "PLUTONIUM ALLEY"! We DON'T want plutonium fuel!



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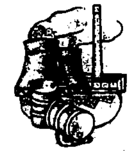
Sincerely,

Name	Address	Zip Code
Cynthia Plaschke	385 Lakeside Dr Rosal IL	60172
Kathryn Grillo	275 W Ridgewood Ave Ridgewood NJ	07450
Paul Schwartzkopf	201 W Oglethorpe Ave Rm 638	31401
Andre Enterman	111 Barclay St. SAV, GA	31419
Stephanie Ware	1321 Jefferson St	31401
Brendon Brulas	3910 Fauquier Ave Richmond VA	23227
Jude Compton	129 Gordon SAV GA	31401
Rebecca Salzman	201 West O-Houston	31401
Kelly Williams	617 E. 40th St. Savh, GA.	31401
[illegible]	520 W. Park Ave Sav. GA	31407
Barbara Harrison	6 W Back St	Sav GA 31419
Meghan Mayfield	1513 E. 54th St. Sav-GA	31404
A. [illegible]	111 E. Gwinnett Sav. GA	31401
Joshua [illegible]	PO BOX 1446 Brunswick GA	31521
Koa Lani Porch	"	"
Eric Woodruff	"	"

May 14 03 04:46p SRCE 912-201-0354 p.19

DON'T brand the Southeast "PLUTONIUM ALLEY"! We DON'T want plutonium fuel!



United States Nuclear Regulatory Commission
Honorable Commissioners
Washington, D.C. 2055
Re: NUREG-1767

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Sincerely,

Name	Address	Zip Code
Alex Sharry	10½ W. Duffy St	31401
Abby Schomaker	17 B West Duffy st.	31401
Tiffany Johnson	409 B E. Waldburg St	31401
David Zaleski	515 E. Harris St.	31401
H.M. Aldridge	PO Box 9622 CLT NC	28299
[redacted]		
A.M.J. Sarabia	109 E. Park Ave. Apt C	31401
Bridget Yinger	440 Bull	31401

positive feedback loop occurs leading to rapid reactor disassembly. The literature also says that reactor grade plutonium, due to Pu-240, is less of a concern. Thus, this is an instance where European MOX fuel experience doesn't apply. I request that the NRC reveal its' analysis of this important safety concern in the final EIS, with, if possible, prompt and delayed coefficients, graphed, formulas and explanations and countermeasures.

While few citizens might understand such an analysis, it is important to us to know for sure that you have looked at this very carefully. To further underscore my concern on this point, I must take us back to the Chernobyl accident, at 1:23 AM on April 26, 1986.

Grigori Medvedev in his book, "The Truth About Chernobyl", 1989, page 59, "...the RBMK reactor, which has a positive reactivity void coefficient of 2 beta and a positive reactivity temperature coefficient..." and page 70, "However...3 factors inimical to the reactor core all came together at the same time." Those three were the positive void coefficient which caused an increase in power when water became steam creating voids, a positive reactivity temperature coefficient, and the tips of the control rods which when the scram button was pushed actually added reactivity to the core momentarily. In addition, Medvedev mentions that the core was near the end of its burnup, which meant that the concentration of plutonium had reached its maximum amount, adding to the positive coefficients.

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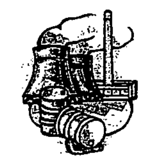
9

May 14 03 04:47p SHLE 912-201-0354 p.21

DON'T brand the Southeast "PLUTONIUM ALLEY"! We DON'T want plutonium fuel!



United States Nuclear Regulatory Commission
Honorable Commissioners
Washington, D.C. 2055
Re: NUREG-1767

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Sincerely,

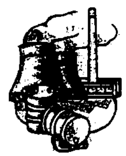
Name	Address	Zip Code
Martie Kaufman	Bloomingdale, GA	31302
Jim Eddys	Tybee Island GA	31328
[illegible]	Savannah, GA	31405
Michelle Hewell	(Hapeville) Savannah GA	31405

6

Mar 17 03 04:47p SNEC 912-201-0354 p.22

DON'T brand the Southeast "PLUTONIUM ALLEY"! We DON'T want plutonium fuel!

United States Nuclear Regulatory Commission
Honorable Commissioners
Washington, D.C. 2055
Re: NUREG-1767



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Sincerely,

Name	Address	Zip Code
Anns Bliss	538 E 65th St	1135
Andrew Schroeder	637 Suncrest Blvd.	31410
S. Bove	304 Manor Dr	31406
Nicole Giannattasio	231 E. 52nd St.	31405

00105

3/18/03
68 FR 9728
(38)

RECEIVED
9 May 2003
2003 MAY 13 AM 8:56
Rules and Directives

Dear Nuclear Regulatory Commissioners,

Concerning: NUREG 1767, MOX Fuel Fabrication Facility, PDCF and WSP.

I formally request that you deny the construction and operating license for the mixed oxide fuel fabrication facility and its' supporting facilities, that has been requested by the Duke-Cogema-Stone & Webster Consortium. I request this action for the following five enumerated reasons which can be summarized as Cost, Safety, Speed, Nuclear Proliferation and NEPA Intellectual Honesty. 105-1

Reason # 1. Cost. If there is a cheaper disposition method, should you not choose it? American taxpayers want to know why:

Immobilization $ 2.1 Billion

MOX Fuel $ 3.8 Billion (after fuel rebates)

DOE admitted to greater cost certainty in the immobilization plan, because it was a simpler and more straightforward plan.

MOX Plan $ 3.8 Billion approx. / 100 Million U.S. Taxpayers approx. = $ 38. Per taxpayer

By the above calculations, the average taxpayer will shell out an average approximate thirty-eight dollars for the MOX fuel program. If you Nuclear Regulatory Commissioners went into a store and bought an item for $ 38., would you not examine that item to make sure you were getting your moneys worth? Of course you would. 105-2

Actually (page 2-25, line 8 of the DEIS) the cost is $ 48. Per taxpayer with a mail in rebate from DCS coming later. Actually that $ 4.8 Billion is just an estimate, which is way too low. DOE has never brought in any project for less that twice the initial estimate. The REAL REASON immobilization was killed; DCS and DOE needed to set

Template = ADM-013

E-RIDS = ADM-03
Call = T. Harris (TEH)
H. Lester (ADL1)

the book on Uncle Sam's wallet. Immobilization provided Uncle Sam a means of slipping that book if costs went stratospheric. So immobilization was killed off, for the laughable reason that they couldn't afford it (page 1-2, line 22).

Ultimately it all comes down to money. Russia is blamed for killing immobilization, which is unfair because they just want the money. The lack of isotopic degradation is not credible because the plutonium could have been mixed with a.) spent nuclear fuel, b.) reactor grade plutonium, c.) mixed nuclear waste, or d.) all of the above, and the result would have been immobilization with isotopic degradation and a radioactive proliferation resistant barrier. What is the difference if we end up with plutonium in glass (or ceramic) logs or in spent fuel rods? Billions $. Nobody cares about the poor U.S. taxpayer. Please note that the cost-benefit analysis totally ignores those taxpayers!

The Russians would have accepted immobilization if we had stuck to our convictions. Instead we offered them a choice: $ 2 Billion for immobilization or $ 5 Billion for MOX fuel. The Russians don't care about U.S. taxpayers, they chose the choice with the more money. They aren't stupid.

There is a cost versus safety trade-off. The $ 4.8 Billion estimate is the minimum estimated to accomplish the task. For $ 10 Billion we could have gotten robotic glove-boxes instead of manual and three foot thick concrete walls throughout instead of the metal shacks described on page 2-7, line 40. Cost is a safety issue. More money can buy better equipment, facilities and personnel. More money can also strongly motivate greed.

Nuclear Regulatory Commissioners, presumably well paid enough to be above this greed, should say NO right now. This MOX plan will end up costing not less than $ 20 Billion (my estimate) by the time decommissioning is completed, and that assumes no

105-2 cont.

2

major accidents. Please save U.S. taxpayers those billions and many sleepless nights worrying about loose plutonium processing, and reject the license now. 105-2 cont.

Reason # 2. Safety. On page 2-36, line 39, NRC staff say, "...unless safety issues mandate otherwise," they recommend approval for the license. Please understand how difficult it is to say something is unsafe when plans are still changing (sand filters, silver recycling, etc.), much of the information needed to prove the unsafeness is classified and unavailable, and the facility is a one of a kind with no precedent for guidance.

You probably already know this, but repetition can't hurt. Blair and Thompson induced cancer in beagle dogs with plutonium inhalers, to estimate what the toxicity of plutonium really is. At .049 micrograms per gram of lung tissue, the smallest amount tested, all the dogs got cancer and died.

.049 micrograms = 20 million lethal doses per gram = 600 million lethal doses/ounce

The exact number could be argued, but really the true toxicity is not known because we've never done controlled tests on humans. Very small amounts, when inhaled, are lethal, which is an honest description of what we know. Safety in dealing with this stuff is imperative! 105-3

NRC staff recommends approving the license unless it can be proven that the proposed action is not safe. I ask, can you prove it will be safe? This is not the first plant in the U.S. to try to make plutonium fuel. There have been four others, and that track record does not give me any confidence that it can be done safely by anyone at any price.

Karen Silkwood worked at the Kerr-McGee plant near Cimarron, Oklahoma. Shall we rehash those events? Plutonium was found in her refrigerator at her home. Gloves in the glove boxes were tearing. Detectors were turned off because they kept going off.

3

Nuclear Fuel Services in West Valley, New York operated from 1966 to 1975. It reprocessed 625 tons of spent fuel to make plutonium fuel. There were leaks and spills, including into Cattaraugus Creek, which threatened Buffalo's water supply. The laundry room was a mess, with numerous incidents and even the employee lunchroom had contamination (11 June 1968). The owners cut and ran, leaving a mess of nuclear waste behind for the taxpayers to clean up.

There was also the Midwest Fuel Recovery Plant near Morris, Illinois that never opened due to cost overruns. Then there was the Allied General Nuclear Services plant at the Savannah River Site (called Agnes). After $ 300 million spent, it fell apart after Jimmy Carter ordered a halt to U.S. reprocessing.

The U.S. nuclear industry has tried reprocessing and plutonium fuel, and their track record is not encouraging. So, instead of using one of the U.S. experiences as a comparable example, DCS uses the MELOX plant near Marcoule, France (page E-16, line 30). Neither LaHague nor Sellafield can be used, because their track records are terrible too. The record of these facilities is awful, yet DCS claims a ridiculously small chance of accident and/or contamination to workers and public. A real and true assessment of the risk from this proposed project would include every facility worldwide that has processed plutonium, instead of the cherry-picked best.

The radiation exposure pathways fail to identify the Homer Simpson pathway (page 3-46 & 47). In the TV show The Simpson's, Homer works at the local nuclear facility. The show opens with his apparently working with some lime-green radioactive material in a glove box. The end of shift whistle blows and Homer drops what he is doing and yells "Yoo-Hoo". The radioactive chunk bounces out of the glove box and lands on

105-3 cont.

4

Homers' back/shoulder. Homer is next seen driving home with the glowing radioactive chunk on his back/shoulder. He brushes off his shoulder knocking the material out of his car window, where it bounces and lands on Bart Simpson skateboard as he rides home from school. What happens to it next is unclear. What is clear, is that workers with radioactive materials on their shoes, clothing, hair or skin can take it with them when they leave work, thus contaminating bars, restaurants, stores, cars and homes.

The Homer Simpson pathway is the dominant means of public exposure during routine operations. I therefore must insist that showers be specified in both MOX FFF and PDCF as they are not mentioned in the DEIS (page 2-4, lines 6-11 and 2-7, lines 1&2). This is a standard safety precaution. Why is it not mentioned in the DEIS?

As I already mentioned, plutonium was found in Karen Silkwood's refrigerator. Please specify that the necessary precautions are being taken to prevent a public relation disaster reoccurrence.

105-3 cont.

Cancer is not the only risk from radiation and plutonium. (page 3-51, line 36) Birth defects and mental retardation (genetic damages) are more prevalent than cancer, but because they occur in the children of the workers they are often overlooked. Please correct this oversight.

105-4

The radiation from plutonium is rather low due to long half life (24,600 years) and it being primarily an alpha emitter. Thus, when we compare radiation from plutonium with expected latent cancer fatalities (pages 4-7 to 4-11) we end up with .00002 annual LCF at the MOX FFF (page 4-10, line 45). However, a lethal dose to your lung is about a millionth of an ounce, which is a speck of dust floating around in the air so small you can't see it. Considering that you are planning to process 38 tons, which must be:

105-5

5

a.) weighed b.) inspected c.) hydrated d.) nitrided e.) oxidated f.) welded (caution!) g.) Leak-tested h.) weighed again i.) dissolved in nitric acid with silver catalyst j.) electrified k.) organic solvent separated l.) nitric acid washed m.) hydroxylamine nitrated n.) hydrazine nitrated o.) uranium separation stripping column p.) nitrous fumed in columns q.) reacted with oxalate acid r.) collected on filters s.) Calciner-dried t.) blended u.) stored v.) master blended w.) mixed with depleted uranium x.) ground y.) mixed again z.) homogenized and lubricated aa.) pressed bb.) sintered at 3100 F cc.) ground again dd.) loaded into rods ee.) welded again and ff.) finally inspected, and that you expect one latent cancer fatality every 50,000 years (.00002) from an amount so small you can't see it when you are dealing with some 38 tons total, which all stretches credibility a bit.

I only mention these 30+ process steps, many of which involve high temperatures, dangerous acids, grinding producing many small particles, powders which are dangerously pyrophoric and can become explosively supercritical around neutron reflectors and in confined spaces, because I don't believe it can be done as safely as you describe doing it in this DEIS. 105-5 cont.

Plutonium is not the same as uranium. No mention in this DEIS is made for control of humidity, despite plutonium being much more reactive in a humid environment. Plutonium metal is also a concern in the PDCF. From 6-1.3 of the Plutonium Handbook, "When a container is opened spontaneous ignition may then occur, usually resulting in destruction of the container and the scattering of metallic oxide (Pu) through the glove-box train and the exhaust system." The DEIS mentions no precautions to prevent this. 105-15

6

DOE has sworn up and down that when the weapons plutonium disposition mission is completed, that the MOX FFF will be decommissioned. This promise is easily broken fifteen years from now. Then, proximity to the recently refurbished H canyon reprocessing facility will be convenient for the nuclear industry. The MOX FFF will then be perfect for making reactor grade plutonium fuel from reprocessed spent nuclear fuel. I ask what guarantees the public has that this is not true?

DOE promised the citizens of Amarillo and of Panhandle County that the storage bunkers holding most of this weapons grade plutonium would be upgraded from the decrepit old unsafe facilities they are now in. I see (page 4-2, line 27) that the promise has been broken. How can we trust your word when you break your promises so often?

It is no secret that the nuclear industry has wanted to implement the same reprocessing that has been going on in Britain and France, here in the U.S. The weapons plutonium disposition program is a means to that end, and has been part of their plan all along. They want to overturn Jimmy Carter's ban on fuel reprocessing. President Carter, being a navy nuke like myself, banned reprocessing for good reasons, including cost, reducing nuclear waste production, and lessening nuclear proliferation pressures. 105-6

There are those who believe that plutonium fuel use is more risky (pages 4-67 to 69). The DEIS glosses over the problems, so please allow me to explain why MOX use is not safe.

a.) Delayed neutron fraction of plutonium is .2% compared to .65% for uranium. Delayed neutrons are necessary, and the value of the reactivity "dollar" is determined by the difference between exactly critical and prompt critical. By reducing the fraction of delayed neutrons, the distance the control rods must move 105-7

7

to reach prompt critical is reduced. This is a significant safety reduction, totally unmentioned in the DEIS, and a valid reason to reject the whole MOX idea, in my opinion. Even with a 40% MOX core, the average delayed neutron fraction starts out around .45% and declines from there as uranium in the regular (non-MOX) rods is converted to plutonium through capture. This is a 30% reduction. Please explain in the final EIS why this is not of concern to you.

b.) Control rod effectiveness is reduced as the average neutron speed is increased. The higher capture cross section of plutonium, 269 barns, of the thermal neutrons leaves faster neutrons in the core. The control rods are best at absorbing neutrons at the slower energy. I have heard that there is a plan to add more control rods to the MOX use reactors, however this should be stated and specified in the EIS, and it isn't. These faster average neutrons have other attributes. Faster neutrons go through more shielding, causing slightly higher neutron embitterment and worker exposures. Faster neutrons also mean more generations per second, which can increase the slope and severity in power transients. Again, the literature is clear about this, and it should be incumbent on you to explain to us why these are not safety concerns. Put another way, I shouldn't have to point these facts out to you. Please explain your analysis and planned countermeasures. 105-7 cont.

c.) Moderator (delayed) Temperature Coefficient of Reactivity is positive, as stated in Nuclear Reactor Engineering, Gladstone & Sesonske, section 5.103. It gives a large positive change in fission per change in temperature. NRC rules specifically state that no reactor can operate with a combined positive temperature coefficient. The risk is clear. If a rise in temperature causes more reactivity (fissions) then a

8

positive feedback loop occurs leading to rapid reactor disassembly. The literature also says that reactor grade plutonium, due to Pu-240, is less of a concern. Thus, this is an instance where European MOX fuel experience doesn't apply. I request that the NRC reveal its' analysis of this important safety concern in the final EIS, with, if possible, prompt and delayed coefficients, graphed, formulas and explanations and countermeasures.

While few citizens might understand such an analysis, it is important to us to know for sure that you have looked at this very carefully. To further underscore my concern on this point, I must take us back to the Chernobyl accident, at 1:23 AM on April 26, 1986.

Grigori Medvedev in his book, "The Truth About Chernobyl", 1989, page 59, "...the RBMK reactor, which has a positive reactivity void coefficient of 2 beta and a positive reactivity temperature coefficient..." and page 70, "However...3 factors inimical to the reactor core all came together at the same time." Those three were the positive void coefficient which caused an increase in power when water became steam creating voids, a positive reactivity temperature coefficient, and the tips of the control rods which when the scram button was pushed actually added reactivity to the core momentarily. In addition, Medvedev mentions that the core was near the end of its burnup, which meant that the concentration of plutonium had reached its maximum amount, adding to the positive coefficients. 105-7 cont.

Those three factors look suspiciously similar to the three I have just mentioned, namely fewer delayed neutrons, reduced control rod worth and positive moderator temperature coefficient of reactivity.

9

d.) The synergy between the three just mentioned factors significantly reduces safety of the nuclear power plant operation, to a degree such that the Nuclear Regulatory Commissioners have just cause to reject the application for construction and operation of the MOX fuel Fabrication facility and its' attendant support facilities. Isn't it up to you guys to prove this is not true?

e.) Plutonium fission increases fission product gas production threatening fuel rod ruptures and increased radioactive gas releases to the environment, including twice the level of tritium production when compared to uranium.

f.) Plutonium fuel melts at a lower temperature, reducing safety margins.

g.) Reactor cores will not be homogenous threatening to create dangerous hot spots in the core or seriously complicating core-loading strategies.

105-7 cont.

Reason # 3 Speed of Disposition is greater compared to Immobilization

Faster disposition leaves less time for diversions, thefts or accidents. DOE did mention this as being an advantage for immobilization as compared to MOX fuel.

However, immobilization is no longer a choice. Left on the table are only MOX fuel and No Action. As such, MOX fuel is faster than doing nothing! I still say MOX is not safe, and favor immobilization as being faster, safer and cheaper.

105-8

If I were given the choice (as a Nuclear Regulatory Commissioner) between No Action and MOX fuel, I would have to choose No Action. Contaminating people and land with plutonium, as I believe MOX will do, is not worth the disposition benefits.

105-9

10

Reason # 4 Nuclear Proliferation risk is greater with MOX fuel.

Britain, France, Russia, India, Japan and North Korea all have reprocessing programs. The current issue of Bulletin of the Atomic Scientists details Iran's current attempts to join the club. The U.S. MOX program will a.) set an example for civilian plutonium use b.) advance the technology and c.) undercut arguments against reprocessing. The current trend is towards a future with many countries separating plutonium and using it for fuel, weapons or both.

Such a future is dangerous due to terrorism, diversions, accidents and nuclear weapons brinksmanship. At the same time, there is an alternative for this plutonium, which is faster, safer and cheaper which does not promote proliferation and plutonium use. That the United States has not chosen this alternative sends a strong signal to other countries and can only be attributed to greed among the nuclear industry. The Russians, U.S. nuclear industry, DOE, nuclear scientists and others are all competing for money.

Who is going to stand up and speak some common sense? I ask the Nuclear Regulatory Commissioners to be that somebody, and say no to the construction and operating license for the MOX FFF, PDCF and WSF, please.

105-10

Reason # 5 Dishonest NEPA Analysis

On page 4-83, line 30 & 31, of the MOX DEIS it is stated that, "Therefore, continued storage would result in higher annual impacts." Storing the plutonium in hardened bunkers without touching or processing it would result in MORE damage than all that plutonium transportation, processing, reactor use and removal to Yucca Mountain? This is not intellectually honest, a farce really.

105-11

11

On page 1-2, lines 12 & 13 and lines 21 & 22 the DOE stated the purpose of the stated action, "To better insure that weapons usable material does not fall into the hands of rogue states or terrorist groups." And the reason for killing immobilization, "The DOE determined that in order to make progress with available funds, that only one approach could be supported." Another intellectually dishonest bait and switch routine. Not only would immobilization have accomplished the goal faster, safer and cheaper without promoting nuclear proliferation, but their blame the Russians reason vanishes when you realize that it would have been fine for the U.S. to immobilize its' plutonium while the Russians did MOX with theirs. There is no valid reason both countries must use the same path towards plutonium disposition. These statements fail to accurately and honestly fulfill NEPA requirements. 105-12

On page 4-8, lines 44 & 45 DCS uses data from the MELOX plant in Marcoule, France to estimate worker radiation dose at .009 LCF per year. Besides the cherry picking of sites to use, there is no way to confirm the data. Cogema promised to make the relevant data available when I attended the scooping hearing in Charlotte, N.C. back in 2001. They broke their promise. People who oppose the proposed action have no resort to substantiate their claims. The reading room near Pantex was stripped of all relevant documents, as were other sources nationwide following the events of September 11, 2001. The .009 estimated latent cancer fatality rate is dishonest, but opponents have been unfairly denied the means to prove it. 105-13

Those who are concerned (alarmed!) by the proposed actions are supposed to be protected by an impartial, unbiased and fair assessment performed by our government protectors (DOE, NRC, etc.) That this DEIS fails to do so in many more ways than I can 105-14

12

briefly mention is very clear. There is clear bias in favor of the proposed action at every turn. This is illegal; and fails the spirit of the laws meant to protect the citizens of this United States of America. In my opinion, the Nuclear Regulatory Commissioners have good reasons to reject the requested license. 104-14 cont.

Sincerely,

Robert B. Mills IVth (aka Robin Mills)

Maplerock Box 80

Rio, West Virginia 26755

Robinmills4@yahoo.com

9 May 2003

Disclaimer: I am employed by no organization, entity or persons who have or will compensate me for this DEIS response. The above stated opinions are my own and may be plagiarized by anyone who wishes to copy them.

13

00106

5/1/03
4/28/03
68FR9728
(37)

RECEIVED
2003 MAY 13 PM 3:09
Rules and Directives
Branch
USNRC

Dear Chief:

I am deeply concerned about the possibility of a plutonium MOX fuel factory at the Savannah River site nuclear facility. As a resident of the general area (Georgia) I am concerned about the safety of this factory, particularly in light of possible terrorist actions at the sight. Also, I'm concerned about the safety of transportation of plutonium to the site and wastes from the site. 106-1

I urge you to consider safer and cheaper options and not allow this dangerous scheme to go forth. I would certainly not travel to the area and would consider moving out of Georgia if it is implemented. 106-1

Thank you for consideration of my concerns.

Sincerely,

Diane F. Matesic

Diane F. Matesic
2493 Willow Wood Ct
Atlanta, GA 30345

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2003 MAY 13 PM 3:09
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Template = ADM-013 — E-RIDS = ADM-03
Add = T. Harris (TEH)
A. Lester (ALL2)

00107

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

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2003 MAY 20 AM 9: 20
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May 14, 2003

Chief, Rules Review and Directives Branch
U.S. Nuclear Regulatory Commission
Mail Stop T6-D59
Washington, D.C. 20555-0001

4/28/03
68 FR 9728
(33)

RE: EPA Review and Comments on
Construction and Operation of a Mixed Oxide Fuel Fabrication (MOX) Facility
NUREG-1767, at the Savannah River Site, South Carolina
Draft Supplemental General Management Plan and
Draft Environmental Impact Statement (DEIS)
CEQ No. 030070

Dear Chief:

The U.S. Environmental Protection Agency (EPA) reviewed the subject *Draft Environmental Impact Statement* (DEIS), Pursuant to Section 102(2)(C) of the National Environmental Policy Act (NEPA), and Section 309 of the Clean Air Act. The document provides information to educate the public regarding general and project-specific environmental impacts and analysis procedures, and follows the public review and disclosure aspects of the NEPA process. The purpose of this letter is to inform you of the results of our review.

The stated goal of the project is to ensure that plutonium produced for nuclear weapons and declared excess to national security is converted to proliferation-resistant forms. DOE proposes to design, construct, and operate a proposed Mixed Oxide (MOX) Fuel Fabrication Facility that would convert depleted uranium and surplus weapons-grade plutonium into MOX fuel. The proposed MOX facility would be located at the Savannah River Site in South Carolina, and would be part of DOE's surplus plutonium disposition program. Because Congress gave the NRC licensing and related regulatory authority over the proposed MOX facility, its construction and operation will require NRC approvals, issued pursuant to the *Code of Federal Regulations*, Title 10, Part 70 (10 CFR Part 70).

Support facilities are part of the proposed action: an associated Pit Disassembly and Conversion Facility (PDCF) would be constructed, along with a Waste Solidification Building (WSB). The PDCF would provide for the recovery of plutonium from disassembled weapons, converting it to plutonium dioxide powder for feedstock. The WSB would be used for processing liquid waste streams and converting them to solid transuranic waste (TRU) or low-level waste (LLW). A pipeline would also be constructed between the support facilities and the MOX facility.

E-RIDS = ADM-03
Add = T. Harris (TEH)
A. Lester (ACL1)

Overall, the DEIS is well-written and clearly explains the proposed action and the alternatives. We particularly appreciate the discussion of mitigation plans which was included in the DEIS. Based on EPA's review of the document, the document recieved an "EC-1" rating; that is, environmental concerns exist regarding some aspects of the proposed project. Specifically, hazardous and radioactive wastes generated from the proposed facility will require specialized waste management procedures, as well as safety and emergency response plans, in order to prevent impacts.

Transuranic (TRU), low-level radioactive waste (LLW), and hazardous and non-hazardous (both liquid and solid) wastes are expected to be generated during operation of the proposed facility, and will require specialized handling, storage, transportation and disposition measures in order to safeguard human health and the environment.

Exhausts from the proposed facility will be treated to remove radioactive materials before the exhaust is discharged to the atmosphere. Monitoring is planned during the operation and decommissioning phases of the project. Groundwater quality impacts are not anticipated, since there would be no discharges to underlying aquifers; regular monitoring of the double-walled liquid high-alpha waste pipeline is planned.

Thank you for the opportunity to comment on this DEIS. If you have any questions or require technical assistance, you may contact Ramona McConney of my staff at (404) 562-9615.

Sincerely,

Heinz J. Mueller, Chief
Office of Environmental Assessment

Attachment

EPA Review and Comments on
Construction and Operation of a Mixed Oxide Fuel Fabrication (MOX) Facility
NUREG-1767, at the Savannah River Site, South Carolina
Draft Supplemental General Management Plan and
Draft Environmental Impact Statement (DEIS)

__General:__ The DEIS clearly describes the proposed action and the anticipated environmental impacts of the project. We appreciate the tables which summarize the data in the DEIS.

__Endangered Species:__ The DEIS discusses the presence of endangered species in the vicinity of the Savannah River Site. The document states that the facility construction and operation would have no effect on threatened and endangered species under USFWS and SCDNR jurisdictions.

__Air Quality:__ The DEIS states that transuranic, (TRU), and low-level radioactive wastes, (LLW), will be generated during operation of the proposed facility. Exhausts from the proposed facility will be treated to remove radioactive materials before the exhaust is discharged to the atmosphere. Please provide further information in the FEIS regarding frequency and duration of air quality monitoring measures and monitoring of the facility's emissions to the atmosphere. 107-1

The DEIS discusses the need to demonstrate that the offgas treatment system will limit hydrazene, (listed as a hazardous air pollutant under the Clean Air Act), to very low levels. The DEIS states that these levels would not cause adverse health impacts to members of the public or employees. Information about plans for monitoring the offgas treatment system for hydrazene should be included in the FEIS. 104-2

__Radiological Impacts:__ The DEIS states that annual radiological impacts to SRS employees and the public from exposure to radioactive air pollutants are expected to be small. The DEIS also cites plans for emergency preparedness. Plans for regular monitoring of the double-walled liquid high-alpha waste pipeline are discussed in the document.

__Hazardous Waste Management:__ Hazardous waste from the proposed MOX facility would be shipped off-site to commercial RCRA permitted facilities. Estimated volumes for TRU, low-level, and hazardous waste would represent approximately 3% and 20% of Waste Isolation Pilot Plant (WIPP) and SRS storage capacities.

00108

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2/28/03 68 FR 9728 (50)

Monday, 12 May 2003
3265 Marlborough Dr.
Tucker, GA 30084

Mr. Lesar,

Having attended the public hearing in Savannah, GA, in March, I was ~~totally~~ unconvinced that the situation had been careful in considering all the aspects of the processing of MOX materials. The highly radioactive slurry that would be produced was pretty much not addressed as an issue. As a member of the public in this general area, I am angry that such a serious issue should not address the entire life of the nuclear waste. 108-1

A secondary issue is the cost of the process. The federal government thinks there is a endless source of tax income, but as a taxpayer, I am outraged at how our tax money is spent. 108-2

Nuclear waste should be immobilized not processed into MOX. 108-3

Sincerely,
Carolyn Clin

Template = ADM-013

E-RIDS = ADM-03
Call = T. Harris (TJH1)
A. Lester (ALL1)

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2003 MAY 20 AM 9:20

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2/28/03
68 FR 9728
(57)

April 12, 2003

Michael T. Lesar
Chief, Rules & Directives Branch
Division of Administrative Services
Office of Administration
Mail Stop T-6D59
U.S. Nuclear Regulatory Commission
Washington, DC 20555

RE: NUREG-1767

Dear Michael T. Lesar:

I am writing to express my concerns about using plutonium bomb fuel as an energy source. Currently, I strongly believe this is a dangerous idea that should not come to fruition. It is imperative to not only protect, but also enhance the quality of life for the citizens and the environment. Safer and cheaper options need to be investigated before using MOX as an energy source. 109-1

Sincerely,

Jennifer Zanck
Po box 3105
Savannah, GA 31402

Template-ADM-013

E-RIDS=ADM-03
Add= A. Harris (TEH)
A. Lester (ACL1)

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2003 MAY 20 AM 9:20

Rules and Directives Branch USNRC

2/28/03
68 FR 9728
(32)

April 12, 2003

Michael T. Lesar
Chief, Rules & Directives Branch
Division of Administrative Services
Office of Administration
Mail Stop T-6D59
U.S. Nuclear Regulatory Commission
Washington, DC 20555

RE: NUREG-1767

Dear Mr. Lesar,

I am a 28 years old and quite concerned with the plutonium issue. Simply put, I am concerned with the effects it will have on our environment and the quality of our lives based on the draft report by the US Nuclear Regulatory Commission. 110-1

Please consider that there are options. I want to live to be 128 years old and see my great grandchildren.

Thank you for your time.

Sincerely,

Mai Dang
2430 East 38th Street
Savannah, Georgia 31404

Template-ADM-013

E-RIDS=ADM-03
Add= T. Lester (TEH)
A. Lester (ACL1)

00111

Environmentalists, Inc.
FOUNDED 1972
1339 SINKLER ROAD
COLUMBIA, SC 29206
803-782-3000

May 22, 2003

Tim Harris
US Nuclear Regulatory Commission
Washington, DC 20555
teh@NRC.gov

Dear Mr. Harris:

These comments are being submitted by Environmentalists, Inc. (E.I.) for consideration by the Nuclear Regulatory Commission (NRC) in regard to the Draft Environmental Impact Statement (NUREG-1767, draft) for the MOX Fuel Fabrication Facility (MOXFFF) at Savannah River Site (SRS), one of the alternatives which the Department of Energy (DOE) described in its plan for Surplus Plutonium Disposition (SPD).

Comment No. 1

NUREG-1767, draft, is very clear about the NRC's role as an independent judge of the plan to build and operate a Mixed Oxide Fuel Fabricating Facility in South Carolina. The Department of Energy has chosen this MOX plant and other related activities as a way of addressing the countries excess plutonium problem. It is the NRC's responsibility to decide whether the overall MOX proposal could be carried out in a "safe and environmentally acceptable manner." (Page XVII, Executive Summary)

Comment No. 2

There are numerous process steps in the DOE's MOX plan. Figure 2.2, for example, identifies 13 steps in the Fuel Fabricating Process. The Aqueous Polishing Process has almost as many steps, according to Figure 2.1, however, less than half of them appear to involve plutonium. The PIT Disassembly and Conversion Facility (PDCF) and the Waste Solidification Building (WSB) both have a variety of operations which would take place. Added to all of these processing steps and related activities are those associated with transport between facilities, unloading, loading, and storage as well as the long-distance shipments of uranium and plutonium from seven different locations throughout the country.

It is imperative that a containment chapter be added to NUREG-1767, one which is devoted exclusively to addressing the need for preventing the release of plutonium "under all conceivable conditions."* This new chapter would identify all the containment measures being proposed for maintaining a plutonium management approach of "absolute containment,"* with diagrams and written text explaining where containment design features are located, description of procedures for routine and off-normal conditions of operation, release levels expected under routine and accident situations, back-up systems such as those that are designed to prevent non-routine releases in the event of failure of glove box ventilation, maintenance requirements, frequency at which monitors are checked and read, etc. 111-1

* *Both quotes are from the transcript of the NRC Proceeding, in the matter of Allied General Nuclear Services, Docket No. 50-332 (pages 4277 and 4321) November 4, 1974. (The choice of these is based on both statements being clear and concise.)*

Thank you for the opportunity to comment on this draft EIS, the process provided by the National Environmental Policy Act to insure that all possible alternatives are considered when a proposed facility will impact the environment.

Sincerely,

Ruth Thomas, President
Environmentalists, Inc.

JUN-09-2003 11:04

00112

Michael T. Lesar
Chief, Rules and Directives Branch
Division of Administrative Services, Office of Administration
Mail Stop T-6D59, U.S. Nuclear Regulatory Commission
Washington DC 20555
Re: Nureg 1767 May 21, 2003

Dear Mr. Lesar

In response to the Nuclear Regulatory Commission's Draft Environmental Impact Statement (DEIS) on the proposed plutonium fuel factory (MOX) at the Dept of Energy Savannah River site nuclear facility, I must respond strongly that the construction of the MOX facility, and more importantly, the operation of that facility, is environmentally unsound. 112-1

The DEIS must address the reasonable alternative to MOX-plutonium immobilization.

Immobilization would achieve the MOX program stated goal "to safeguard weapons-grade plutonium". Continued storage of the weapons grade plutonium is an unacceptable security risk. 112-2

The DEIS should produce verifiable projections of waste → 112-3

JUN-09-2003 11:05 P.03/03

2

volumes as well as discuss the environmental risks and consequences of DOE failure to implement MOX waste management. 113-3 cont.

In addition the possible environmental and public health impacts of an attack on this facility are unacceptable to the people of the Southeast. 113-4

(9) Terror

These problems should promptly be addressed with the DEIS.

Thank you for your prompt attention to these concerns.

Sincerely
Ruth Sanford
May 21, 2003

H30N. Jamestown RD #201
Decatur GA 30033
E-MAIL RUTHSANFORD@HOTMAIL.COM

TOTAL P.03

JUN-13-2003 16:33

P.02/02
ML031...

00113

SIERRA CLUB
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South Carolina Chapter
P. O. Box 2388
Columbia, SC 29202
803-256-8487 • Fax 803-256-8448

May 30, 2003

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68FR9728
(66)

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2003 JUN -4 AM 8:57
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Michael T. Lesar, Chief
Rules and Directives Branch
Division of Administrative Services
Office of Administration
Mail Stop T-6D59
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Re.: DEIS on MOX

Dear Mr. Lesar:

The following comment is being submitted by The South Carolina Chapter of the Sierra Club for consideration by the Nuclear Regulatory Commission in regard to the Draft Environmental Impact Statement (NUREG-1767, draft) for the MOX Fuel Fabrication Facility at the Savannah River Site, one of the alternatives which the Department of Energy described in its plan for Surplus Plutonium Disposition.

It is imperative that a containment chapter be added to NUREG-1767, one which is devoted exclusively to addressing the need for preventing the release of plutonium under all conceivable conditions. This new chapter would identify all the containment measures being proposed for maintaining a plutonium management approach of "absolute containment," with diagrams and written text explaining where containment design features are located, description of procedures for routine and off-normal conditions of operation, release levels expected under routine and accident situations, back-up systems such as those that are designed to prevent non-routine releases in the event of failure of glove box ventilation, maintenance requirements, and frequency at which monitors are checked and read. 113-1

Thank you for the opportunity to comment on this draft EIS.

Sincerely,

Dell Isham
Chapter Director
SC Sierra Club

cc: SC Chapter Steering Committee

E-RIDS=ADM-03
Add=T. Harris (TEH)
A. Lester (ACL1)

TOTAL P.02

00114

From: Louis Zeller [BREDL@skybest.com]
Sent: Sunday, June 15, 2003 4:23 AM
To: Tim Harris
Subject: February 2003 Draft EIS for the Mixed Oxide Fuel Fabrication Facility at SRS

Blue Ridge Environmental Defense League

www.BREDL.org ~ PO Box 88 Glendale Springs, North Carolina 28629 ~ Phone (336) 982-2691 ~ Fax (336) 982-2954 ~ BREDL@skybest.com

May 14, 2003

US Nuclear Regulatory Commission

Michael T. Lesar, Chief

Rules & Directives Branch

Division of Administrative Services

Office of Administration, Mail Stop T-6D59

Washington, DC 20555-0001

Re: February 2003 Draft EIS for the Mixed Oxide Fuel Fabrication Facility at SRS

Dear Sir:

On behalf of the Board of Directors of the Blue Ridge Environmental Defense League and our members in South Carolina, I write to provide additional comments on the draft *Environmental Impact Statement on the Construction and Operation of a Mixed Oxide Fuel Fabrication Facility at the Savannah River Site, South Carolina prepared by Argonne National Laboratory for the U.S. Nuclear Regulatory Commission* (DEIS).

In accord with the federal *Code of Federal Regulations*, Title 10, Part 70 (10 CFR 70), 10 CFR 51, and 40 CFR 1500, the NRC is to address the direct, indirect, and cumulative impacts related to building, operating, and decommissioning the proposed plutonium fuel (MOX) facility at SRS. However, the DEIS fails to address several major environmental impact at the proposed facility.

According to the DEIS, the purpose of the proposed 41-acre plutonium fuel factory located in the F-Area of SRS would be to convert 37.5 tons of weapons-grade plutonium into a mixed oxide fuel of uranium and plutonium. However, the declaration "surplus plutonium" is not a technical term; it is a political phrase without scientific basis. For example, the January 2000 DOE Record of Decision (ROD) stated 38.4 tons of surplus plutonium would be converted into MOX fuel and another 19 tons was to be immobilized. Total "surplus plutonium" was then 55.4 tons. Nine months later Russia and the United States designated 37.5 tons of weapons-grade plutonium as surplus, a difference of 47% (*Agreement between the Government of the United States of America and the Government of the Russian Federation Concerning the Management and Disposition of Plutonium Designated as No Longer Required for Defense Purposes and Related Cooperation*, September 2000). 114-1

The proposed plant would actually be licensed to handle up to 3.9 tons of plutonium dioxide annually for a period of 20 years. Therefore, the plant envisioned by NRC has the potential to handle a total of 78 tons of plutonium. The DOE is on record stating that it has a stockpile of 123 tons of plutonium (111.4 MT), of which 94 tons (85.1 114-2

06/17/2003

MT) is weapons-grade plutonium (*Plutonium: The First 50 Years*, DOE, 1996). During the next two decades, treaty obligations could conceivably result in 78 tons of "surplus plutonium" being declared. However, the February 2003 draft states, "This DEIS is based on a total of 34 MT (37.5 tons) of surplus plutonium." Notwithstanding this arbitrary and capricious estimate, the potential to emit air pollutants (PTE) for this facility should be based on the maximum annual throughput for the licensing period. This is the standard methodology utilized by federal and state agencies to evaluate major sources of pollution. To be valid, the EIS must be based on the maximum throughput of 78 tons of plutonium in its estimates of both criteria pollutants and hazardous air pollutants, including radionuclides. 114-2 cont.

The DEIS omits a critical component of plutonium disposition. The plutonium-MOX fuel would be fabricated for the sole purpose of irradiating it in nuclear reactors. In order to irradiate all the weapons-grade plutonium produced by the proposed fuel factory as outlined by DOE and NRC, additional and as yet unknown commercial nuclear power reactors must be designated. Originally, DOE had contracted with two electric utilities to provide this service: Duke Energy and Virginia Power. But Virginia Power has withdrawn its reactors from the program, leaving Duke as the sole provider of plutonium irradiation reactors. Duke's Catawba and McGuire reactors cannot provide sufficient capacity to irradiate 37.5 tons of plutonium. The DEIS acknowledges this deficiency but offers no remedy: 114-3

> The DOE had earlier identified Duke Power Company's four reactors at the Catawba and McGuire stations (two at each station) as potential candidates to irradiate MOX fuel. The potential candidate reactors can accommodate up to 25.5 MT (28.2 tons) of surplus plutonium in MOX fuel. The DOE has not yet identified the additional candidate reactors necessary to accommodate the additional MOX fuel (8.5 MT [9.4 tons]) to be irradiated under the amended ROD. [February 2003 DEIS, 1.1.1 Surplus Plutonium Disposition Program]

In order to address the direct, indirect, and cumulative impacts related to the proposed plutonium fuel factory, NRC should include impacts of the maximum throughput to its analysis of impacts on mission reactors including fuel transportation and irradiation, and dumping in a waste repository in DEIS Section 4.4.3. 114-4

The February 2003 draft states, "For purposes of this DEIS, a period of operation of 10 years is assumed to bound impacts." Again, there is no rational basis to delimit environmental impacts to a period less than the expected licensing period. In order to be truly conservative, NRC should utilize a twenty-year basis for all its analyses. 114-2 cont.

Hazardous and radioactive wastes are permitted to be burned in the H-Area Consolidated Incinerator Facility (Unit ID # H-010). Although South Carolina DHEC has stated that the CIF is not currently in operation, it recently granted DOE-Westinghouse Savannah River Company a new permit to operate the waste incinerator. The DEIS states that the Waste Solidification Building will send waste to other facilities at SRS:

> The WSB would process liquid waste streams from the PDCF and proposed MOX facility. Other waste from the proposed MOX facility, not sent to the WSB, would be transferred to and managed by the SRS. . [February 2003 DEIS, Executive Summary]

The CIF is required to comply with 40 CFR 61 Subpart H, *National Emission Standards of Radionuclides Other Than Radon From Department of Energy Facilities*. Although radionuclide emission rates from the stacks of the CIF and other sources are measured, the millirem standard for maximum allowable dosage to the public is an ambient standard, not an emission limit. Without ambient measurements, neither DOE nor Westinghouse Savannah River Company can assure that emissions of radionuclides are below 10 millirem per year to any member of the public. Likewise, the NRC fails to cite any direct ambient measurement a basis for estimates of radioactive dose to the public in the DEIS. The DEIS states: 114-5

> The annual collective dose to members of the public (i.e., those living and working within 80 km [50 mi] of the SRS) produced by routine operation of the proposed MOX facility would be expected to result in a latent cancer fatality (LCF) rate of approximately 0.0004/yr or less. Routine operation of the proposed MOX facility, the PDCF, and the WSB is expected to produce insignificant air quality impacts, and would not cause exceedance of any ambient air quality standards for criteria pollutants at the SRS. However, maximum levels of $PM_{2.5}$ in the vicinity of the SRS already exceed the annual standard of 15 µg/m³. Facility construction would contribute temporarily less than 0.1% of this $PM_{2.5}$ standard level, and facility operation would contribute less than 0.01% of this level. [February 2003 DEIS, Executive Summary] 114-5 cont.

06/17/2003

About a year ago the DOE jettisoned the immobilization option which had been posited by Secretary O'Leary in 1996. [*Amended Record of Decision for the Surplus Plutonium Disposition Program*,. Federal Register 67:19432, April 19] Secretary Abraham cited cost-savings and pressure from the Russian Federation as reasons for ending the two-track, or hybrid, approach. The February 2003 draft states:

> [I]n April 2002, the DOE issued an amended ROD (DOE 2002), in which it decided not to pursue its hybrid approach. The DOE determined that in order to make progress with available funds that only one approach could be supported. Russia does not consider immobilization alone to be an acceptable approach because immobilization, unlike the irradiation of MOX fuel, fails to degrade the isotopic composition of the plutonium. Russia further contends that the United States could easily retrieve plutonium from the immobilized waste at a later date and reuse that plutonium in nuclear weapons (DOE 2002). Because an immobilization-only approach would jeopardize Russia's continued involvement in the joint effort to reduce supplies of weapons grade plutonium, the DOE decided that if only one disposition approach is to be pursued, the MOX fuel approach is the preferred one. [February 2003 DEIS, 1.1.1 Surplus Plutonium Disposition Program]

But the record reveals quite a different picture. From the beginning both the American and the Russian plutonium programs have been bankrolled by the U. S. Treasury. The decision by the DOE to utilize the more expensive plutonium fuel option was not made in the interest of either the American or the Russian people. Experts in both counties have lambasted the decision. The Washington-based Nuclear Control Institute condemned the amended ROD:

> Moreover, the Bush Administration continues to cave in to Russia's insistence that plutonium from dismantled warheads be recycled as mixed-oxide ("MOX") fuel for commercial nuclear power plants. "The Energy Department's own studies document that the MOX approach is far more expensive and dangerous than directly disposing of plutonium by immobilizing it as waste," noted Dr. Edwin Lyman, NCI scientific director. "The Bush Administration reportedly pressured President Putin to accept U.S. terms in the draft nuclear arms agreement, but has never been willing to resist Russia's ambitions to pursue a MOX-only plutonium disposal strategy. Russia cannot afford to pursue any plutonium disposition strategy on its own. If the U.S. Government made it a priority, an immobilization approach could be up and running in a relatively short period of time." May 14, 2002 NCI press release, http://www.nci.org, 114-6

Ten time zones away Russian experts who support dismantlement of nuclear weapons continually call for abolition of the plutonium fuel program and advocate immobilization of weapons-grade plutonium. Opposition to plutonium fuel programs based on the negative health and safety aspects continues unabated in cities across the Russian Federation. A Russian group's recent press release (Appendix A) stated:

> "Using plutonium as a fuel for NPPs [nuclear power plants] may lead to nuclear accidents and plutonium pollution of the Russian territories. It also gives the possibility of nuclear material theft and proliferation," said Vladimir Slivyak, Ecodefense co-chair. "Plutonium must be immobilized and never used again", he added. In 2000, Russian and US governments agreed on disposing 68 t of weapon-grade plutonium (34 t each). Cost of Russian part of the program is nearly $2 billion while the US part exceeds $4 billion. According to this approved scheme, weapon-grade plutonium must be mixed with uranium to fabricate MOX fuel (Mixed Oxides of uranium and plutonium) which then would be used in civil nuclear reactors. This plan includes the construction of new facilities in Savannah River Site (US) and Seversk (near Tomsk city, Siberia/Russia) to produce weapons grade MOX and then burning the fuel in civil reactors. In 1993, an explosion at the Seversk facility, where plutonium is extracted out of dissolved spent uranium fuel elements, caused plutonium contamination around facility. Involving plutonium into the civil nuclear industry may lead to new nuclear reactor accidents , plutonium contamination of Russian and US territories, and nuclear proliferation. http://www.antiatom.ru/entext/030528anc.htm Antiatom.ru, May 28, 2003 114-7

The NRC has arbitrarily determined that immobilization of plutonium does not require an in-depth evaluation because it is not a "reasonable alternative" and because the agency seeks to avoid foreign policy issues. One of the most dumbfounding statements in the DEIS:

06/17/2003

The second reason that immobilization is no longer a reasonable alternative to the proposed action is its connection with the conduct of United States foreign policy. Evaluating the immobilization alternative now would involve the NRC in foreign policy matters that the DOE has been conducting on behalf of the United States. In the NRC's view, an alternative that would block the implementation of an agreement with another country involves foreign policy matters that are outside NEPA's scope. Therefore, the NRC concludes that immobilization is not a reasonable alternative requiring detailed analysis in this DEIS. (February 2003 DEIS, 2.3.3 Immobilization of Surplus Plutonium) 114-7 cont.

Despite numerous requests to evaluate the technical aspects of immobilization by people at public meetings in North Augusta, South Carolina; Savannah, Georgia; and Charlotte, North Carolina, the NRC steadfastly refuses to accede to the wishes of the citizens most directly affected by the proposed plutonium dismantlement operations at SRS. The possibility that environmental impacts may affect policy considerations foreign or domestic most certainly does not negate the requirements of NEPA. The NRC simply cannot recycle the mendacity of the DOE and its contractors. A comprehensive analysis of the impacts of the plutonium-MOX facility must needs include a side-by-side comparison with immobilization. 114-8

Perhaps the most stunning flaw in the DEIS is the failure to even consider possible environmental consequences of terrorist acts on plutonium-MOX fuel fabrication and transportation. The February 2003 draft states:

> Many commenters raised a number of different issues concerning terrorism. The Scoping Summary Report stated that the EIS would not address the impacts of terrorism because these impacts are not considered to be reasonably foreseeable as a result of the proposed action. However, following the events of September 11, 2001, the Commission decided to consider the question of whether NEPA requires the evaluation of such impacts. By order dated December 18, 2002 (CLI-02-24), the Commission ruled that NRC has no obligation under NEPA to consider intentional malevolent acts in conjunction with the licensing of the proposed MOX facility. [February 2003 DEIS, 1.4.1 Scoping Process]

Because the plutonium-MOX fuel plan necessitates shipping nuclear weapons-usable plutonium over enormous distances, it might well increase the likelihood that such material could fall into the hands of terrorists. The U.S. National Academy of Sciences stated that shipments of plutonium fuel will require security measures equivalent to those needed for transport of nuclear weapons. Harvard Law School and the United Kingdom Royal Commission on Environmental Pollution have also raised concerns about the security measures needed for plutonium as an article of commerce. 114-9

A report prepared by a special commission of International Physicians for the Prevention of Nuclear War and the Institute for Energy and Environmental Research states:

> Using plutonium as fuel on a large scale would be difficult to safeguard and would involve a high risk of diversion. In the case of plutonium from weapons, there would be a regular traffic of plutonium oxide from dismantlement and storage sites to fabrication facilities and reactors, with the risk of attack along transportation routes. [International Physicians for the Prevention of Nuclear War and The Institute for Energy and Environmental Research, Plutonium: Deadly Gold of the Nuclear Age, International Physicians Press, Cambridge Massachusetts, 1992, p.133-134]

MOX fuel has a greater quantities of plutonium and other hazardous radioactive isotopes such as Americium 241 and Curium 242--actinide elements which would cause additional harmful radiation exposure to the public.

> Public attention has been drawn to the higher actinide inventories available for release from MOX than from conventional fuels. <u>Significant releases of actinides during reactor accidents would dominate the accident consequences.</u> Models of actinide release now available to the NRC staff indicate very small releases of actinides from conventional fuels under severe accident conditions. (emphasis added) [Letter from Advisory Committee on Reactor Safeguards to Nuclear Regulatory Commission Chairman, May 17, 1999] 114-10

06/17/2003

The plutonium oxide fuel would be valuable target. The Department of Energy's program would transport plutonium from Defense Department sites to South Carolina for fuel fabrication. From Savannah River tons of plutonium in mixed oxide fuel would be transported across hundreds of miles of isolated countryside to utility reactors in North Carolina and South Carolina. This overland transport link presents a unique opportunity to those who might intercept and divert the fuel for weapons use. The freshly fabricated fuel rod assemblies would be the most desirable form for groups who would go after the plutonium for unlawful use in their own explosive devices. DOE admits this vulnerability:

> [T]he unirradiated fuel contains large quantities of plutonium and is not sufficiently radioactive to create a self-protecting barrier to deter the material from theft.... 114-11
>
> Revised Conceptual Designs for the FMDP Fresh MOX Fuel Transport Package, Ludwig et al, ORNL/TM-13574, March 1998

The risks of deliberate diversion and/or destruction of a fresh nuclear fuel or irradiated waste transport cask are increased by plutonium fuel. Higher actinide inventories increase the public health risks. The strategic value of plutonium oxide for new weapons increases the threat of diversion.

On October 9, 1995, a ten car Amtrak train with 248 passengers and twenty crew was derailed near Hyder, Arizona. Spikes had been removed from the rail bed, a metal bar connecting the rails had been removed, and the missing section wired to circumvent the electronic warning system. A terrorist group, Sons of the Gestapo, left a note at the scene claiming credit and criticizing law enforcement agencies, citing the Waco and Ruby Ridge incidents.

On October 1, 1995 a jury convicted Sheik Omar Abdel Rahman of conspiracy to use diesel-fertilizer bombs which would have been used to blow up United Nations headquarters, the Lincoln and Holland tunnels, the George Washington Bridge, and the New York federal building. The George Washington Bridge has been used for shipments of irradiated fuel and plutonium from Brookhaven National Laboratory to the Savannah River Site.

Incidents of rail and highway sabotage reveal that: 1) terrorist attacks would likely be designed to inflict maximum human injury, 2) electronic warning systems designed to alert officials and prevent accidents can be defeated by technical countermeasures, 3) effective attacks using home made explosives are possible, avoiding the need for exotic military weapons to breach transport containers, and 4) saboteurs have the ability to create damage which exceeds the containment standards of NRC certified shipping containers.

> The willingness of terrorists to kill or injure large numbers of Americans, demonstrated in the World Trade Center and Oklahoma City bombings, compels any current assessment to focus on incidents that are clearly intended to cause, or could cause, radiological sabotage." The FBI's <u>Terrorism in the United States: 1995</u> reported: "In the past year, the country witnessed the re-emergence of spectacular terrorism with the Oklahoma City bombing. Large-scale attacks designed to inflict mass casualties appear to be a new terrorist method in the United States. [*Nuclear Waste Transportation Security and Safety Issues: The Risk of Terrorism and Sabotage Against Repository Shipments*, Halstead and Ballard, December 1998]

Halstead and Ballard state that risk assessments must consider direct attacks on transport casks using high energy explosive devices with or without capture of the shipments. Capture and control of the cask by terrorist agents would allow the cask to be breached with a variety of devices including commercially available conical shaped charges and cutting charges, or a massive diesel fuel-fertilizer truck bomb. Attackers may use transport personnel as hostages to retain control of the cask for hours. With the timed gained, attackers could increase the effect of explosives by removing barriers and applying them to the most vulnerable part of the cask.

Full scale tests by Sandia National Laboratory published in 1983 utilized a military shaped charge (US Army M3A1) on a GE IF-200 truck cask containing unirradiated fuel. Even this outdated test demonstrated that the cask could be breached and that radioactive materials would be released.

Current weapons, such as the Superdragon anti-tank missile, are more powerful and can penetrate 18 inches of armor plate. This weapon was used by the U.S. in Operation Desert Storm, and is used by at least ten other

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nations. The release of even more toxic radioactive elements would cause more fatalities immediately following an accident. Lindsay Audin's analysis of fuel rod behavior during incidents involving sabotage explains how much greater amounts of fine particles and vapors would be released from a conventional irradiated fuel cask.

> An attempt to disperse the fuel would likely involve a high explosive device that must first penetrate a transport cask. Such a device would penetrate one or both sides of the cask, shatter the fuel rods and pellets in its path, and heat the area along that path. The shock and heat involved would...initiate several processes not normally experienced by uranium dioxide and zirconium alloy. At high temperatures in the presence of oxygen, both materials will change form. Uranium dioxide UO2 will "reoxidize" and become U3O8...expanding and forming a very fine power in the process. Zirconium will literally ignite, vaporizing itself.... The fuel pellets may also shatter back to the consistency of the uranium power involved in their manufacture. Ruthenium will vaporize and combine with oxygen to form minute particles, while other elements, such as iodine, will be released as gases. [Analyses of Cask Sabotage Involving Portable Explosives: A Critique, Lindsay Audin, 1989]

Emergency response to rail or highway accidents must be well-prepared and rapid. Delays in response to accidents which involve the release of radioactive material would expose unknown numbers of people to negative health effects. In 1996, a DOE Transport and Safeguards Division Safe Secure Transport (SST) trailer carrying nuclear weapons slid off the road and rolled over in rural Nebraska. Four hours elapsed before DOE headquarters were notified, and it was 20 hours before a Radiological Assistance Program team determined there was no release. A similar delay in response to a plutonium-MOX fuel accident could make effective emergency response dangerous and clean-up impossible. The following comment by the Georgia Environmental Protection Division cites vehicular tests of powdered materials deposited on roadways and takes issue with the DOE's approach to emergency response to accidental plutonium fuel releases. 114-12

> After passage of about 100 cars only a small fraction of the original contamination remained on the road surface. Unless emergency officials promptly close the accident scene to vehicle traffic (an unlikely situation), emergency responders may face an incident scene that is, unknown to them, extremely hazardous due to respirable plutonium. Post emergency actions may also be complicated due to the enhanced spread of contamination by vehicle traffic. [Georgia Environmental Protection Division comments on DOE SPD DEIS]

The NRC must go back to the drawing board and include a full-scale environmental impact analysis of potential terrorist acts on plutonium-MOX fuel shipments. The Commission's order of December 18, 2002 (CLI-02-24) which found that the NRC has no obligation under NEPA to consider intentional malevolent acts in conjunction with the licensing of the proposed MOX facility is so wrong it beggars description. Even if CLI-02-24 does not find an obligation to investigate potential terrorist acts, you have an obligation as Americans in the 21st Century to use due diligence in this matter. 114-13

Respectfully,

Louis Zeller

Southern Anti-plutonium Campaign Director

Cc: Tim Harris

Attachment

06/17/2003

JUN-18-2003 10:58 P.02/11

Tim Harris - Additional MFFF comment / [Fwd: BREDL's EPA petition on SRS]

00115

From: Mary Olson <nirs.se@mindspring.com>
To: <deh@nrc.gov>
Date: 6/13/03 6:15PM
Subject: Additional MFFF comment / [Fwd: BREDL's EPA petition on SRS]

Nuclear Information and Resource Service
Southeast Office
PO BOX 7586
Asheville, NC 28802

May 30, 2003

Michael T. Lessar c/o Tim Harris – via e-mail
US Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr's Lessar and Harris,

I would like to submit the following as an additional comment for Nuclear Information and Resource Service.

We are forwarding the attached (on this message) from Louis Zeller of the Blue Ridge Environmental Defense League which includes 2 documents: their submission to the US Environmental Protection Agency in objection to the Title V permit issued to the DOE for the Savannah River Site, and particularly the second document: their reply to the South Carolina Department of Health and Environmental Control (DHEC) after the permit was awarded. Blue Ridge Environmental Defense League's work, summarized in these submissions to DHEC and EPA, clearly establishes that the Savannah River Site does not currently meet five Title V emission standards with the existing operations at the Site. The addition of the Pit Disassembly and Conversion, waste processing, MOX Fuel Factory, and now, likely because of these plutonium missions, the siting of the Modern Pit Facility may, in fact, cause additional violations. The most troubling non-compliance in terms of these new plutonium factories is the fact that SRS exceeds NESHAPS -- National Emission Standards for Hazardous Air Pollutants standard of 10 millirems to the public under the currently permitted activities. The incinerator is clearly part of what is at issue in this determination, but there is nothing to ensure that it, or a similar operation will not be utilized during the term of operation of the MFFF, since it is included in the currently permitted activities. 115-1

The EIS must show that any ADDITIONAL activities and cumulative and additive activities would not result in exceeding the NESHAP limit when combined with current operations. Further, the NESHAP is written in millirems to individuals off site. There is no current monitoring done by DOE, or reported in the DEIS that can, in fact confirm public doses from all current sources of radiation exposure to the public at SRS.

The Blue Ridge Environmental Defense League (BREDL) documents also include abundant information about the use of HEPA filters that is not included in the DEIS on the MFFF. HEPA filters clearly can contribute to additional radioactive air emissions. 114-2

While BREDL may have submitted this information in their comments on the

JUN-18-2003 10:58 P.03/11

Tim Harris - Additional MFFF Comment ...

MFFF, the purpose of this submission is to reinforce our own earlier comments about how additional construction, operation and waste generation at SRS might cause the Site to exceed current regulations. We find that the BREDL submission, and the supporting documents referenced offer additional substance to our assertion, and ask that you consider it in detail.

It is clear to us that the accident analysis NRC did for the MFFF and PDCF likely apply to many other accident scenarios --and actual accidents that have occurred -- from current and past operations at SRS. If this is the case, then the environmental justice concerns that apply to any future accident apply to the impacts associated with violating emission limits and other standards. We believe that it is a violation of the principles of equal protection under the law for NRC to grant additional licenses to additional activities at SRS that will exacerbate an existing problem of environmental discrimination and injustice. 115-3

Finally, we would like to bring to the Commission's attention the issues being considered at Erwin, Tennessee's Nuclear Fuel Services (see: http://frwebgate5.access.gpo.gov/cgi-bin/waisgate.cgi?WAISdocID=442311280+10+0+0&WAISaction=retrieve)

NFS is applying for a license amendment to reduce the source term at their site, since they are digging up soil that no longer meets applicable standards, and sending it to Utah. NFS is cleaning up waste burial grounds because they are not licensed to be a nuclear waste dump. NIRS would like to submit to NRC that there is no reason to think that sending waste over the fence line into an unlicensed burial ground at Savannah River Site is any different than Nuclear Fuel Services burying waste on their own site. In both cases it is wrong, it is bad for ground water, surface water, workers, wild life and any other living thing you want to mention. It is a disgrace...and yet, that is the answer that DOE and Duke COGEMA Stone offer us...just dump it next door, out of NRC's regulatory space. This is not adequate or acceptable...and the environmental impacts of doing so should be explicated in detail in this document, not merely stated that the SRS has waste capacity to take it. 115-4

Respectfully Submitted,

Mary Olson
nirs.se@mindspring.com

CC: Lou & Janet Zeller <BREDL@SkyBest.Com>

JUN-18-2003 10:59 P.04/11

00116

DEIS Comments for MOXFFF at SRS

May 14, 2003
from Peter James Atherton

FAX to: 301-415-5398

NRC,
NMSS,

Dear T. Harris:

Please accept these draft comments on the EIS for MOX. I only recently became re-involved with MOX & have had insufficient time to properly review the various ER's, CAR's, DSER's & DEIS to put forth a properly presented set of comments by the latest 5/14/03 deadline.

1. Arbitrary deadlines appear to be the managing force behind the MOX safety review. I suggest that wherever possible, deadlines should take a back seat to safety, so that the public develops confidence that NRC is protecting them. 116-1

2. DEIS, ~~[illegible]~~ chapt; pg. 1-18. The NRC commission order of 12/18/2002 (CLI-02-24) ruled that "NRC has no obligation under NEPA to consider intentional malevolent acts in conjunction with the licensing of the proposed MOX facility." I suggest that public health & welfare require NRC to be reasonable and consider malevolent external man-made events as a bounding security issue. The design of the MOXFFF should glean insights from terrorist 116-2

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acts at the design phase so that important anti-terrorist design features are included in the construction of the facility. The environmental impact of a large fully fueled aircraft loaded with explosives crashing into MOXFFF is necessary so that the public knows about the danger. Plant design features could be a significant preventive/mitigative safety measure if included in facility design before construction begins. I suggest that NRC reconsider the environmental impact of facility destruction by a well planned terrorist act. 116-2 cont.

3. The terrorist act – The U.S.A. is at war, we have color codes (red, orange, yellow, etc) for various security levels of threatened terrorist acts. In any new construction involving potent radioactive materials, threatening terrorist acts require NRC consideration of the necessary preventive/mitigative features to protect public health & safety. It is suggested that NRC review the probability of happening of previous "incredible" events – Three Mile Island #2 in 1979; Chernobyl in 1986, the N.Y. City twin towers in 1993 & again in 2001. The probability that these events would 116-3

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happen in the manner in which they occurred (before they occurred) is very, very small – incredibly small. If, the incredible happened, NRC should awaken to the reality of today's environment & work to vigorously protect public health & safety. Worst case events from incredible happenings require NRC review & consideration in determining nuclear safety. Accordingly, it is suggested that the worst case scenario be evaluated for all possible events and accidents. 116-3 cont.

4. The MOXFFF appears to be an engineering experiment. Usually, prototype models of new designs precede a final design. The MOXFFF as it is proposed has no known predecessor in this country. While there are similar fuel fabrication designs in this country & experience with recycling in other countries, the proposed MOXFFF in this country is a trial with the local population placed at risk. While I am not suggesting that our engineers cannot safety design & operate such a facility, the NRC it is suggested should proceed with caution and not rapid abandon. Caution requires consideration of every measure needed 116-4

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to protect public health & safety. Safety should take precedence over arbitrary deadlines. 116-4 cont.

5. The NRC is licensing MOX and is not licensing WSB or PDCF. MOX is generating chemical & radioactive waste, which is then transferred to unlicensed facilities for disposal. I suggest that the polluting history of SRS requires that an independent NRC get involved with the proper disposal of the wastes generated by MOX. Incineration, burial and transport of chemical and radioactive wastes that require NRC to become involved through the EIS in a proper outcome. NRC should reconsider the bounds of its EIS. 116-5

6. NRC should alternatively consider a self-sufficient MOXFFF with a WSB & PDCF totally separate & independent of the remaining SRS. The necessary design changes should be included and reviewed at this time with a revised EIS. 116-6

7. Natural phenomenon - the earthquake. It is not obvious that the worst case earthquake would not devastate the current MOX design. If PSSC's survive the earthquake, non-PSSC equipment & structures might not 116-7

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survive and their destruction could have an adverse impact on the PSSC's, assuming the PSSC's themselves survive. So the worst case earthquake could also cause explosions, spills, criticality accidents, fires and leaks of radioactive material. NRC should review this worst case scenario and its environmental impact. 116-7 cont.

8. Why are not accidents also viewed simultaneously with a hurricane, when the winds are fiercest. 116-8

9. Transportation - Did NRC consider both fatal & non-fatal truck accidents? Why are "neutral weather" conditions and not the "worst case" weather conditions considered in an xport accident? What are the transportation risks on site at SRS? 116-9

10. Nuclear accountability - How are MOX pellets accounted for? How many pellets are produced? What is the probability of theft? How are waste streams accounted for? 116-10

11. If there is an emergency response plan at SRS, where is the offsite emergency planning for the public. How is the public made 116-11

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aware of an incident at SRS? Is emergency evacuation planned & practiced? 116-11 cont.

12. Pipes between facilities – what is the chance of a criticality event in a pipe? Does NRC have complete jurisdiction to review the scenarios to ensure that enriched U & Pu are at safe levels in the pipes? 116-12

13. Why not ensure public protection from fire & smoke by using both sand & HEPA filters? Series or parallel connections could be considered. 116-13

14. DCS plans to use both preventive and mitigative measures in accident evaluations. A more conservative approach is to allow for the accident and mitigate the consequences while simultaneously designing to prevent the accident. Why is not this philosophy applied & the EIS consequences considered? 114-14

15. For airborn releases of radiation, in an accident the MEI is at the north SRS boundary. yet the 1 year maximum dose is at the S-SW boundary. Why? For most of the year there are no prevailing winds at SRS. It appears there is no real "safe" direction 116-15

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to evacuate to in the event of an accident. Emergency planning (EP) takes on a new meaning. 116-15 cont.

16. Is high alpha particle waste currently planned to be treated as HLW, LLW, mixed or what? 116-16

17. I was informed that the ECRR has published a 2003 set of recommendations on health effects of ionizing radiation exposure at low doses for radiation protection purposes. Regulator's Edition: Brussels, Jan. 2003. How does this information compare with what NRC uses? Which is valid? 116-17

18. It would probably help if some standard is used to quantify the terms "unlikely", "highly unlikely" & "incredible". Is NRC planning to associate quantitative criteria with these terms that meets some standard? 116-18

19. I have questions concerning the environmental impact that the worst case H_2 explosion could cause. What is its impact? 116-19

20. Are offsite radiation monitors planned to monitor radiation continually? ~~planned~~ What about on site? Please identify the capability to actually measure α, β, γ & (n) radiation 116-20

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continually in & around SRS. What types of detectors are used; how frequently are they calibrated? Is the system automatic or manual? Where is this info maintained? 116-20 cont.

Mr. Harris, these 20 comments are all I have time for by this date. I hope that this helps "make your day!" Seriously though, there are issues that need NRC attention.

Thanks,

Peter James Atherton
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planned copy: UCS, NIRS, GANE, BREDL, Sierra Club of Ga., Greenpeace, Public Citizen

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TOTAL P.11