5. ENVIRONMENTAL CONSIDERATIONS

This chapter discusses potential environmental impacts resulting from site preparation and facility construction (Section 5.1), facility operation (Section 5.2), deactivation (Section 5.3), radioactive material transportation (Section 5.4), and potential facility accidents (Section 5.5). Also presented is a discussion of cumulative impacts (Section 5.6), impacts from alternatives to the proposed action (Section 5.7), impacts on short-term uses and long-term environmental productivity (Section 5.8), and commitment of resources (Section 5.9). Finally, an overview of environmental monitoring is discussed in Section 5.10. Environmental impacts that were projected in the SPD EIS (DOE 1999c) and remain valid in this ER are incorporated by reference but not discussed extensively.

The MFFF facility will be located on SRS land adjacent to F Area. F Area will be expanded to include the material disposition facilities. F Area has been used for over 40 years for the separation of plutonium. The area is highly industrialized and has undergone numerous land disturbances. The MFFF will be located on 41 ac (16.6 ha) of land, some of which most recently was used as the spoils area from the excavation of the Actinide Packaging and Storage Facility (APSF). F Area, near the geographic center of SRS, is at least 5 mi (8 km) away from public access. The public will be relatively insulated from any near-field impact of the MFFF. The previous use of the land in and adjacent to F Area and the relative isolation from the public are important factors in evaluating the environmental impacts of the construction and operation of the MFFF.

5.1 IMPACT OF SITE PREPARATION AND FACILITY CONSTRUCTION

This section discusses the effects of site preparation and construction activities on various environmental resources.

5.1.1 Land Use

Construction and grading on and around the MFFF site will require approximately 52 ac (21 ha); the completed facility will occupy 41 ac (16.6 ha) of land. A number of construction areas exist within F Area but are currently inactive. F Area has ample space available for construction (UC 1998). Land area requirements for the MFFF are relatively small. Because the land is used for industrial activities and could continue to be used for industrial activities after the MFFF deactivation, no permanent loss of land use would result from construction and operation of the facility at SRS. R1

Construction on the site is consistent with other SRS uses and with the industrial land use activity in the surrounding area. It is also consistent with the SRS Land Use Technical Committee's *Discussion Draft SRS Long Range Comprehensive Plan* (DOE 2000a) for land use in the area. R1

Part of the land within F Area has been previously disturbed and is partially developed. The area where the MFFF will be located is mostly evergreen plantation. Some changes in topography have already taken place. The MFFF site will be graded to a mean elevation of 272 ft (83 m) above MSL. The spoils pile currently in the middle of the MFFF site will be moved.

Grading the MFFF site (Figure 5-1) will result in 52 ac (21 ha), including the 41-acre (16.6-ha) MFFF site, being impacted by the site preparation activities. These site preparation activities include grading the site to 272 ft (82.9 m) (msl), reshaping the existing F-Area stormwater basin to 0.6 ac (0.2 ha) and grading a 1.5 ac (0.6 ha) MFFF stormwater basin. Some of the excess MFFF dirt would be used as fill for approximately 17 ac (6.9 ha) on the northeast corner of the PDCF site. The fill area would be logged, removing primarily pine plantations and a few hardwoods. The fill would be graded to blend in with the existing topography. The filled areas would be graded and seeded as part of the construction erosion and sedimentation control measures. Alternately, DOE may direct that a portion of the excess material may be stockpiled in a nearby previously-disturbed area. R1

Based on soil type, some areas of SRS could be considered prime farmlands; however, they are not designated as such because they are depleted from excessive past agricultural uses and are no longer available for agricultural purposes. R2

To support the MFFF activities, DOE will construct the WSB for the processing of liquid high alpha activity waste and stripped uranium waste. This facility, to be located near the MFFF and PDCF, will be connected to the MFFF by two stainless steel double-walled pipelines. The R1 pipelines will be used to convey the liquid high alpha activity waste and stripped uranium waste to the WSB. The WSB will also treat liquid waste from the PDCF. The route for the 2,000-ft R2 (609.6-m) pipeline is projected to be from the southwest corner of the MFFF to an existing utility corridor on the north side of the F-Area perimeter roadway, east and south along the F-Area perimeter road to the WSB. The width of the disturbed area is expected to be less than 25 ft R1 (7.6 m) comprising a total disturbed area less than 1.5 ac (0.6 ha).

During construction, utilities and waste pipelines will be put in place. A discussion of these impacts is provided in Section 5.1.11. The industrial nature of the site and absence of critical habitat suggests that sensitive vegetated areas can be avoided in selecting routes, thus minimizing impacts of construction.

5.1.2 Geology

The following discussion of construction impacts to geology and soils is taken from Section 4.26.4.1.1 of the SPD EIS (DOE 1999c). In general, grading and construction results in disturbance of about 52 ac (21 ha) of soils for the MFFF site [Text Deleted]. Soils on the site R1 will be moved, as appropriate, to achieve a uniform elevation. To date, no offsite borrow pits or spoil piles have been identified.

Actual creation of foundations and building of structures on the site will be limited to upper geological layers, minimizing impacts to geology and groundwater.

The soils at SRS are considered suitable for standard construction techniques. No economically viable geologic resources have been identified at SRS. While soils at SRS could be classified as prime farmlands, the U.S. Department of Agriculture does not classify them as prime farmlands because all of SRS is removed from public access.

[Text Deleted] R1

5.1.3 Water Use and Quality

Environmental impacts resulting from water use during MFFF construction were discussed in Section 4.26.4.2.1 of the SPD EIS (DOE 1999c) and are addressed in the following paragraphs.

All water for construction activities will be provided from existing SRS utilities. Local surface water would not be used in the construction of proposed facilities at SRS. Thus, there would be no impact on the local surface water availability to downstream users. Sanitary waste will be collected using a combination of portable toilets and semi-permanent facilities connected to the SRS CSWTF. All wastewater would be treated in the sitewide treatment system, which has sufficient hydraulic and organic capacity to treat the flows expected from these activities. No impacts on surface water quality would be expected from the discharge of these flows to the treatment system and, subsequently, to the receiving stream (Sessions 1997a).

The estimated annual average water usage for constructing all the proposed facilities at the MFFF site is 33.0 million gal (125 million L). Current water usage in F Area is 98.8 million gal/yr (374 million L/yr) (DOE 1999c). The DOE decision to close out operations of the F Canyon will reduce water use in F Area. The total construction requirement represents approximately 2% of the A-Area loop groundwater capacity, which includes F Area, of about 1.58 billion gal/yr (6.0 billion L/yr) (Tansky 2002). Therefore, no impact on water availability is anticipated. R2

Proven construction techniques will be used to mitigate the impact of soil erosion on receiving streams. The MFFF construction stormwater pollution prevention plan will be consistent with the existing SRS stormwater and erosion management practices. Because of the effectiveness of these techniques, no long-term impacts from soil erosion due to construction activities would be expected.

Because the construction of the MFFF will involve building structures, parking lots, and roadways, which will increase the impervious surface area, the stormwater runoff quantity at peak discharge would increase accordingly. The area within the boundary of the selected site is estimated to be 41 ac (16.6 ha). The total area of the impervious surfaces (e.g., roofs, roadways, paved parking lots) as a result of construction of the MFFF is estimated to be 17 ac (6.9 ha) or 41.4% of the site area.

To comply with *South Carolina State Standards for Stormwater Management and Sediment Reduction* (SCDHEC 2000b), stormwater ponds designed to control the release of the stormwater R1
runoff at a rate equal to or less than that of the pre-development stage will be built at strategic locations as part of the SRS infrastructure program. A stormwater basin would likely be located R1
southeast of the MFFF and north of the PDCF along the path of the existing discharge to the unnamed tributary of Upper Three Runs upstream of the designated wetlands area. Preliminary design of this basin has a surface area of approximately 1.5 ac (0.6 ha). The existing F-Area basin would be reshaped to 0.6 ac (0.2 ha) and would be located just west of the MFFF basin. R1

[Text deleted]

The stormwater runoff flow from MFFF and PDCF will discharge through the existing SRS stormwater NPDES outfall or new outfalls. If the existing stormwater outfalls are impacted by construction of the surplus plutonium disposition facilities, they will be relocated and/or new outfalls will be constructed.

As discussed in Section 4.4.3.3, any potential groundwater contaminants are approximately 76 to 93 ft (23.2 to 28.3 m) below the surface. Because MFFF grading will only extend to 40 ft R1
(12.2 m) below the surface, any potential groundwater contaminants should not interact with construction activities.

5.1.4 Air Quality

Potential impacts to local air quality during construction of the MFFF are presented in Section 4.4.1.1 of the SPD EIS (DOE 1999c).

Potential air quality impacts from construction of new MOX and support facilities at SRS were analyzed using ISCST3 as described in Appendix B. Construction impacts result from diesel fuel emissions from construction equipment, particulate matter emissions from disturbance of soil by construction equipment and other vehicles (i.e., construction fugitive emissions), operation of a concrete batch plant, construction worker vehicles, and trucks moving materials and wastes. Emissions from these sources are summarized in Table 5-1. Maximum air pollutant concentrations from construction activities are summarized in Table 5-2.

The incremental MFFF construction impacts shown in Table 5-2 are trivial compared to the existing ambient concentrations, and the total impacts are well below the most stringent air quality standard or guideline.

5.1.5 Ecology

Construction impacts to ecological systems were discussed in Section 4.26.4.3.1 of the SPD EIS (DOE 1999c). Impacts to the local ecology are not expected to be significantly different from those described in the SPD EIS. The following discussion of construction impacts is derived from the SPD EIS with updated data reflecting the present MFFF design and specific location adjacent to F Area.

5.1.5.1 Non-Sensitive Habitat

Constructing the MFFF at SRS would disturb a total of about 52 ac (21 ha). There should be no direct impacts on non-sensitive aquatic habitats because best-management practices for soil erosion and sediment control will be used to prevent construction runoff to these habitats, and direct construction disturbance would be avoided. It is estimated that approximately 28 ac (11.3 ha) of evergreen woodlands and other vegetation in the construction area would be lost as terrestrial habitat (Figure 4-13). The associated animal populations would be affected. Some of the less-mobile or established animals within the construction zone could perish during land-clearing activities and from increased vehicular traffic. Furthermore, activities and noise associated with construction could cause larger mammals and birds to relocate to similar habitat in the area. Also, animal species inhabiting areas surrounding F Area could be disturbed by the increased noise associated with construction activities, and the additional vehicular traffic could result in higher mortality for individual members of local animal populations. The recent survey of the site (DOA 2000) did not reveal any migratory bird nests. Prior to construction, the proposed site will be surveyed for nests of migratory birds. There would be no impacts on aquatic habitat from surface water consumption because water required for construction will be drawn from groundwater by the SRS utilities. R1 R1

In addition to grading related to the MFFF site, proper infrastructure upgrades for roads and utilities will disturb no more than 26 ac (10.5 ha). Utilities will be routed along existing road rights-of-ways or through existing industrial areas. Road upgrades for ingress and egress to the MFFF site will also be conducted in existing traffic rights-of-ways. Relocation of the SCE&G power line, Supervisory Control and Data Acquisition line, telephone lines, and adjacent survey area includes approximately 11 ac (4.5 ha) of flat sandy uplands, flanking slopes that transition to erosion ditches, and a small stream bottom. Within these topographic areas, the following plant communities are noted: upland longleaf pine, successional mixed pine-hardwood, dry oak-pine slopes, mesic hardwood slope, moist-bottom mixed pine-hardwood forest, and a series of early successional systems. Assessment of the general ecological conditions and potential wetland areas for the proposed plutonium disposition facilities found no wetland areas within the proposed construction site, no endangered or threatened species, and no rare or unique ecological resources. R1

5.1.5.2 Sensitive Habitat

Wetlands associated with floodplains, streams, and impoundments should not be directly impacted by construction activities. No runoff or sediments are expected to be deposited in these areas because appropriate erosion and sedimentation controls will be used during construction.

No critical habitat for any threatened or endangered species exists on SRS. However, as discussed in Section 4.6.2.1, the bald eagle, red-cockaded woodpecker, wood stork, American alligator, smooth purple coneflower, and Oconee azalea might occur near F Area (DOE 1995b). Surveys conducted in 1998 and 2000 did not find any federally listed threatened, endangered, proposed, or sensitive plant or animal species (DOA 2000). Consultations were initiated by

DOE with the U.S. Fish and Wildlife Service (USFWS) and the South Carolina Department of Natural Resources (SCDNR) to request comments on potential impacts on animal and plant species and to request any additional sensitive species information. The USFWS field office in Charleston, South Carolina, provided a written response indicating that the proposed facilities at SRS do not appear to present a substantial risk to federally listed species or other species of concern. That office also provided additional information concerning listed species and species of concern occurring in the vicinity of SRS (EuDaly 1998). In December 2000, DOE provided specific information to USFWS and SCDNR concerning the MFFF site. In June 2001, the USFWS replied that the MFFF project would not affect protected species or habitats (Appendix A). R1

5.1.6 Noise

MFFF construction impacts on local noise levels were evaluated in Section 4.4.1.1 of the SPD EIS (DOE 1999c).

The location of the MFFF relative to the site boundary and sensitive receptors was examined to evaluate the potential for onsite and offsite noise impacts. Noise sources during construction would include heavy construction equipment, employee vehicles, and truck traffic. Traffic noise associated with the construction of the MFFF would occur on the site and along offsite local and regional transportation routes used to bring construction materials and workers to the site.

Given the distance to the site boundary (about 5.4 mi [8.7 km]), noise emissions from construction equipment would not be expected to annoy the public. These noise sources would be far enough away from offsite areas that the contribution to offsite noise levels would be small. Some noise sources could have onsite impacts, such as the disturbance of wildlife. However, noise would be unlikely to affect federally-listed threatened or endangered species or their critical habitats because none are known to occur in F Area (see Section 4.6.2.2). Noise from traffic associated with the construction of the MFFF would likely produce less than a 1-dB increase in traffic noise levels along roads used to access the site, and thus would not result in any increased annoyance of the public.

Construction workers could be exposed to noise levels higher than the acceptable limits specified by the Occupational Safety and Health Administration (OSHA) in its noise regulations (29 CFR §1926.52). However, DOE has implemented appropriate hearing protection programs to minimize noise impacts on workers. These programs include the use of standard silencing packages on construction equipment, administrative controls, engineering controls, and personal hearing protection equipment.

5.1.7 Regional Historic, Scenic, and Cultural Resources

MFFF construction will not affect historic resources, including those associated with the Cold War Era, nor will construction affect resources of value to Native Americans. Preliminary consultations with appropriate American Indian Tribal Governments and the State Historic

Preservation Office have been performed by DOE. Consultations with Native American groups indicate that it is unlikely that significant Native American resources would be impacted.

Archaeological surveys of F Area in the vicinity of the MFFF site identified four prehistoric sites that could be affected by MFFF construction. As noted in Section 4.8.2, two of the sites, 38AK546/547 and 38AK757, have the potential to yield significant information about prehistoric periods in the Aiken Plateau and have been determined to be eligible for inclusion in the National Register of Historic Places (Green 2000). A data recovery plan for impact mitigation was developed for the two eligible sites and was submitted to the South Carolina State Historic Preservation Office for review and comment in compliance with the SRS PMOA prior to execution[1]. The South Carolina State Historic Preservation Office approved the mitigation plan April 11, 2001. All field mitigation work for site 38AK546/547 was completed in April 2002. Mitigation for Site 38AK757 will be complete in August 2002. Although it is usually preferable to leave sites intact and undisturbed, the mitigation actions should serve to minimize project impacts by recovering sufficient resources and data from the sites to gain whatever information they may contain concerning site use and age. Figure 4-5 illustrates the boundary of the archaeological sites in relation to the proposed MFFF facilities. R1 R1

Inadvertent discoveries of cultural resources will be handled in accordance with 36 CFR §800.11 (historic properties) or 43 CFR §10.4 (Native American human remains, funerary objects, objects of cultural patrimony, and sacred objects) as well as with the terms of the SRS PMOA.

The MFFF buildings will have a minimal effect on the scenic character of the surrounding area and are consistent with the VRM Class IV designation for the area. The buildings are low-rise structures of varying heights less than 100 ft (30 m). This height is consistent with the other building heights in the area, which range from 10 to 100 ft (3 to 30 m). 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, and its distance from sensitive receptors and screening by trees will minimize its impact as a visual intrusion to the scenic character of the area. R1 R1

The appearance of MFFF facilities in and adjacent to F Area would remain consistent with the area's industrialized landscape character. In height and size, the proposed facilities will be similar to existing buildings in F Area. Facilities are generally not visible offsite because views are limited by rolling terrain and heavy vegetation. Construction and operation of the MFFF would not effect a major change in any natural features of visual interest in the area. The nearest sensitive viewpoints are those on South Carolina Highway 125 and SRS Road 1, 4.3 mi (6.9 km) and 5.3 mi (8.5 km) away, respectively.

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1 The SPD EIS ROD (DOE 2000b) anticipated mitigation through avoidance. Subsequent shifts in the MFFF site boundaries made it impossible to avoid impacting the sites, hence the plan for mitigation through data recovery.

5.1.8 Socioeconomics

Construction of the MFFF at SRS would have minor beneficial socioeconomic impacts on the region. Construction employment requirements are listed in Table 5-3.

According to the U.S. Census Bureau (DOC 1997), over 18,000 residents of counties that comprise the 50-mi (80-km) region surrounding the MFFF site were employed in the construction trades in 1997. During a majority of the construction period, labor needs at the site should easily be met within the existing regional construction labor pool. At its peak, MFFF construction activities are expected to employ about 1,050 craft workers. Although the region should directly benefit from MFFF construction employment, the peak employment estimate represents approximately 8% of the total 1997 regional construction workforce and could adversely affect other construction activities in the region as a result of direct competition for labor. Since the 1,050-person peak need for labor is not expected to last for more than a few months, any adverse effects will be temporary and short-lived and should have no long-term impact on the overall economy of the area.

It is anticipated that some construction labor may be hired from counties that are outside of the 50-mi (80-km) region. The Columbia MSA, consisting of Lexington and Richland Counties in South Carolina, contained a total of 12,912 construction workers in 1997 and is a likely source of some of the construction labor. If workers from Richland County are included with those in the region (note that Lexington is partially within the 50-mi [80-km] region and already included as part of the labor pool), a total construction labor pool available to the project will be over 25,000 workers. This total drops the 1,050-person peak employment requirements for the MFFF to less than 4% of the combined regional total construction workforce. Since construction workers often commute considerable distances for short-term work and since a majority of Richland County is within about 65 mi (105 km) of the MFFF site, the inclusion of Richland County's construction labor force in this analysis is reasonable. Given that a majority of MFFF construction workers will be hired from within the existing regional labor pool, no significant relocation of workers is expected and secondary impacts to area businesses, public services, and facilities will be negligible.

Transportation impacts during construction of the MFFF will primarily be associated with construction labor. Currently, one 10-hour shift is planned per day. To minimize conflicts with other SRS activities, the work schedule (i.e., start and stop times) will be coordinated and staggered with other SRS schedules to minimize the number of vehicles entering and exiting the site during peak commuting periods. Table 5-3 lists the anticipated average number of workers that will be onsite each year of construction. Since some workers typically carpool, the number of worker vehicles anticipated each year during construction is assumed to be equivalent to about 60% of the average number of workers. As a result, during the third and fourth years of construction, an average of between 450 and 510 worker vehicles carrying construction workers R2
will make daily round trips to the site; during the peak construction period, an estimated 630 worker vehicles are anticipated.

As noted in Section 4.10.3.4, state road improvements, independent of the proposed action, are planned for three of the major roads in the local area, which will increase roadway capacity and help minimize the effect of worker traffic associated with MFFF construction. The widening of South Carolina Highway 302 to South Carolina Highway 19, and the completion of South Carolina Highway 118 around Aiken are scheduled to be completed prior to commencement of MFFF construction. The widening of U.S. Route 25 is scheduled for completion during the first year of MFFF construction.

Construction activities will also require the delivery of materials and equipment. Table 5-4 lists the estimated number of heavy vehicles per year that will be associated with MFFF construction. The largest number is anticipated during the first few years of construction with about 29 heavy vehicles anticipated during the first year, 25 anticipated in the two subsequent years and 15 in the last two years. These heavy vehicles will be scheduled to arrive at the site during "off" hours that do not correspond with SRS commuting times. As a result, delivery of the heavy vehicles, even during the first year, is insufficient to create any significant impacts to traffic flow in the local area.

5.1.9 Environmental Justice

The MFFF is located within SRS and is over 5 mi (8 km) from the nearest minority or low-income community. Impacts from construction activities that could affect public health, such as the generation of noise and dust, will be limited to the construction site area. As presented in Section 4.4.1.6 of the SPD EIS (DOE 1999c), there are no anticipated environmental justice issues associated with construction of the MFFF at SRS. Construction would pose no significant health risks to the public regardless of racial or ethnic composition, or economic status.

Increased traffic during peak commuting hours could cause some slowing of traffic on South Carolina Highways 125 and 19 through the towns of Jackson and New Ellenton, respectively. The effects associated with commuting will be limited to peak periods in the morning and evening and will last only for the duration of the construction period. In addition, staggering of work hours and scheduled roadway improvements should help minimize any adverse impacts. Because construction vendors and delivery routes are not known yet, the exact effect on traffic congestion is unknown. Given the limited nature of transportation changes that will result from MFFF construction, there should be no environmental justice issues associated with construction traffic.

5.1.10 Impacts from Ionizing Radiation

The human health risk from construction is discussed in Section 4.4.1.4 of the SPD EIS (DOE 1999c). No radiological risk would be incurred by members of the public from construction activities. The public is far enough from the MFFF site to be relatively unaffected by any construction emissions.

Construction workers are exposed to radiation as a result of existing F-Area operations and from radiography during construction. The SPD EIS presented a projected dose to construction workers in F Area of 4 mrem/yr. [Text Deleted] In accordance with 10 CFR §20.1502, individual monitoring or badging of workers for potential radiation exposure is required if the worker is likely to receive a dose in excess of 10% of the limits in 10 CFR §20.1201(a). The only workers during construction that are likely to receive a dose in excess of 10% of these limits are radiographers. Radiographers will be monitored or badged. The radiation exposure monitoring program for radiographers will be performed by the radiography contractor in accordance with the contractor's existing NRC or agreement state license(s) to perform this work. R1 R1

5.1.11 Infrastructure

As discussed in the Section 4.26.4.6.1 of the SPD EIS (DOE 1999c), MFFF construction would have negligible impacts on infrastructure resources at SRS.

Construction would require only a fraction of the available resources and thus would not jeopardize the resources required to operate the site. Total construction requirements for diesel fuel might be higher than currently available storage, but the majority of fuel usage would be connected to construction vehicle usage. Therefore, storage would not be limiting. Table 5-5 reflects estimates of the additional infrastructure requirements for construction of the proposed facilities. Site resource availability is also presented.

The MFFF will require a number of minor infrastructure upgrades in the F Area near the MFFF site. These will occur during construction and are discussed in the following paragraphs.

Permanent parking areas for the MFFF will be located within the respective facility site boundary. Temporary construction parking that may be needed will be on the MFFF site and to an area south of the PDCF site along the unpaved road connecting to SRS Road E. R1

The MFFF will require some improvements to the F-Area perimeter connector roadway, the total land area expected to be disturbed in connection with road work is less than 5 ac (2 ha).

Road upgrades for ingress and egress to the MFFF site will be conducted in existing traffic rights-of-ways.

The existing stormwater outfalls and drainage ways that are located between the MFFF and F Area may be relocated. A stormwater basin would likely be located southeast of the MFFF and north of the PDCF along the path of the existing discharge to the unnamed tributary of Upper Three Runs, upstream of the designated wetlands area. Preliminary design of this basin has a surface area of approximately 1.5 ac (0.6 ha). The existing stormwater basin [0.6 ac (0.2 ha)] that accumulates water from F Area, would be resized and located adjacent to the MFFF basin.

In accordance with SCDHEC regulations, the basins will be sized to mitigate any increased runoff impacts by retaining suspended solids and attenuating peak stormwater flows.

As noted in Section 5.1.1, DOE will construct the WSB for processing liquid high alpha activity waste and stripped uranium waste, along with two PDCF waste streams. This facility, to be located south of the PDCF, will be connected to the MFFF by two dedicated stainless steel double-walled pipelines, one for each waste stream. The pipeline will be used to convey the liquid high alpha activity waste and stripped uranium waste to the WSB. The route for the 2,000-ft (609.6-m) pipeline is projected to be from the southwest corner of the MFFF to an existing utility corridor on the north side of the F-Area perimeter roadway, east and then south along the F-Area perimeter roadway to the WSB. The width of the disturbed area is expected to be less than 25 ft (7.6 m) comprising a total disturbed area less than 1.5 ac (0.6 ha), most of which is on land already dedicated to the PDCF. R2

Assessment of the general ecological conditions and potential wetland areas for the proposed plutonium disposition facilities found no wetland areas within the proposed construction site, no endangered or threatened species, and no rare or unique ecological resources (DOA 2000).

General utilities for the MFFF will be routed along the existing F-Area Limited Area perimeter roadway to the east and to the north of the road.

The existing 115-kV transmission line entering F Area from the north crosses the MFFF site and will be rerouted around the facility. The proposed new route for the 115-kV line will parallel the MFFF northern boundary and turn south at the western boundary of the MFFF site. It will rejoin and follow the existing route across the F-Area perimeter road at a point south and west of the closed F-Area seepage basin. The power line relocation is expected to impact approximately 11 ac (4.5 ha) on the north and west sides of the MFFF site. R1

Relocation of the SCE&G power line, digital cable lines, telephone lines, and adjacent survey area includes flat sandy uplands, flanking slopes that transition to erosion ditches, and a small stream bottom. Within these topographic areas, the following plant communities are noted: upland longleaf pine, successional mixed pine-hardwood, dry oak-pine slopes, mesic hardwood slope, moist-bottom mixed pine-hardwood forest, and a series of early successional systems. Assessment of the general ecological conditions and potential wetland areas for the proposed plutonium disposition facilities found no wetland areas within proposed construction site, no endangered or threatened species, and no rare or unique ecological resources (DOA 2000).

5.1.12 Construction Waste

The SPD EIS (DOE 1999c) discusses the impacts of construction waste on SRS waste management resources.

Table 5-6 compares the wastes generated during the construction of the MFFF at SRS with the existing treatment, storage, and disposal capacity for the various waste types. It is anticipated that no TRU waste, LLW, or mixed LLW would be generated during the construction period. In addition, no soil contaminated with hazardous or radioactive constituents should be generated during construction. However, if any were generated, the waste would be managed in accordance with site practice and applicable federal and state regulations.

Hazardous wastes generated during construction would be typical of those generated during the construction of an industrial facility. Any hazardous wastes generated during construction would be packaged in DOT-approved containers and shipped offsite to permitted commercial recycling, treatment, and disposal facilities.

Nonhazardous solid wastes generated during the construction of the MFFF would be packaged in conformance with standard industrial practice and shipped to commercial or municipal facilities for recycling or disposal. The City of North Augusta Regional Material Recovery Facility is available for recycling waste generated during construction. The Three Rivers Landfill is available for wastes that cannot be recycled or recovered. Sanitary waste will be collected using a combination of portable toilets and semi-permanent facilities connected to the SRS CSWTF.

Several areas of SRS were considered as the site for the MFFF before F Area was selected (see Section 5.7.2.3). Indications of contamination on the surface or associated with groundwater were included in considering potential sites, and at least one other possible site was abandoned. In contrast, the area selected does not appear to have contamination to remediate prior to construction, thereby easing construction, speeding up approvals, and limiting potential liability.

5.1.13 Facility Accidents

The impacts of construction accidents were discussed in Section 4.4.1.5 of the SPD EIS (DOE 1999c) but are expected to be less than the projection in the SPD EIS. Recent construction labor projections are for 3,600 person-years. Applying standard U.S. Department of Labor accident rates for construction sites to this projection reduces the potential nonfatal occupational injury or illness to 356 potential cases and only 0.50 potential fatality. R2

Because construction would be in nonradiological areas, no radiological accidents are anticipated.

5.2 EFFECTS OF FACILITY OPERATION

This section describes the effects of facility operation on the environment surrounding the MFFF.

5.2.1 Impacts on Land Use and Site Geology

Operation of the MFFF is not projected to have any impact on land use other than the continued removal of the 41-ac (16.6-ha) site from other uses. The operation of the MFFF should not impact site geology.

5.2.2 Impacts on Surface Water Use and Quality

The MFFF does not discharge any process liquid directly to the environment. Noncontact HVAC condensate and stormwater will discharge through an approved NPDES outfall. All liquid wastes are transferred to SRS for treatment, storage, and ultimate disposal. A description of these wastes is provided in Section 3.3. R1

Liquid LLW will be transferred to the F-Area process sewer system that connects to the SRS Effluent Treatment Facility (ETF). Liquid LLW is estimated to be less than 10% of the remaining capacity of the ETF. Therefore, impacts on the system should not be major. Liquid LLW from MFFF will be discharged to Upper Three Runs after treatment at ETF. The discharge represents less than 0.01% of the Upper Three Runs 7-day 10-year low flow and is therefore, a negligible volume impact to Upper Three Runs. Because the ETF is able to treat these flows adequately to meet SRS NPDES permit limitations, negligible impacts on surface water quality are expected. R1

5.2.3 Impacts on Groundwater Quality

MFFF operations will withdraw approximately 1 gal/min (3.8 L/min) from the SRS groundwater system for process water. During start-up and process transitions, the groundwater withdrawals may increase to 30 gal/min (114 L/min). F area process water system capacity is 2,100 gpm with an average demand of 350 gpm (800 gpm peak). MFFF operations will withdraw approximately 3.7 gal/min (14 L/min) from the SRS groundwater system for domestic water. The domestic water capacity from deep wells supplying the A-area loop, which includes F Area, is 3,000 gpm and that the average domestic water consumption from the A-area domestic water loop in 2000 was 754 gpm (about 1,200 gpm peak). MFFF groundwater withdrawals are not anticipated to have any impact on SRS or local groundwater supplies. R1

The MFFF does not employ settling or holding basins as part of the wastewater treatment system. There will be no direct discharge of wastewater to the groundwater. Therefore, no impacts on groundwater quality are expected.

5.2.4 Impacts on Ambient Air Quality

There are four sources of air emissions from the MFFF operations:

- NO_X emissions from the MFFF stack derived from the aqueous polishing process
- Criteria pollutant emissions from routine testing of the emergency and standby diesel generators
- Fugitive emissions from chemical and fuel storage tanks
- Emissions from employee and site vehicles.

Impacts of the chemical air emissions from the MFFF are presented in Section 4.4.2.1 and Appendix G, Section G.4.2.4.2 of the SPD EIS (DOE 1999c), and are updated in the following discussion.

Potential air quality impacts from operation of the new MOX and support facilities at SRS were analyzed using ISCST3 as described in Appendix B. Emissions from these sources are summarized in Table 5-7. Emergency and standby generators were modeled as a volume source.

Maximum air pollutant concentrations resulting from the emergency and standby diesel generators and process sources, plus the SRS baseline concentrations, are summarized in Table 5-8.

The increased concentrations of nitrogen dioxide, PM_{10}, and sulfur dioxide from the operation of the MFFF would be a small fraction of the PSD Class II area increments, as summarized in Table 5-9.

Total vehicle emissions associated with activities at SRS would likely decrease somewhat from current emissions because of a decrease in overall site employment during this time frame.

The combustion of fossil fuels associated with MFFF operations would result in the emission of carbon dioxide, one of the atmospheric gases that are believed to influence the global climate. Annual carbon dioxide emissions from operations would represent less than 0.0002% of the annual United States emissions of carbon dioxide from fossil fuel combustion and industrial processes, and therefore would not appreciably affect global concentrations of this pollutant.

5.2.5 Ecological Impacts

The environmental impacts of MFFF operations on local ecology are discussed in Section 4.26.4.3.2 of the SPD EIS (DOE 1999c), and updated in the following discussion.

5.2.5.1 Nonsensitive Habitat

Noise disturbance would probably be the most significant impact of routine operation of the MFFF on local wildlife populations. Disturbed individual members of local populations could migrate to adjacent areas of similar habitat. However, impacts associated with airborne releases of criteria pollutants, hazardous and toxic air pollutants, and radionuclides would be unlikely because scrubbers and filters will be used. Impacts on aquatic habitats should be limited because all liquid will be transferred to SRS for disposal in accordance with approved permits and procedures (see Section 7.2).

5.2.5.2 Sensitive Habitat

Operational impacts on wetlands or other sensitive habitats would be unlikely because airborne and aqueous effluents would be controlled through state permits (see Section 7.2).

It is also unlikely that any federally listed threatened or endangered species would be affected, although South Carolina state-classified special-status species (American alligator) could be affected by noise or human activity during operations, as discussed for construction (Section 5.1.5.2).

5.2.6 Impacts from Facility Noise

The location of the MFFF relative to the site boundary and sensitive receptors was examined to evaluate the potential for onsite and offsite noise impacts. Noise sources during operations would include new or existing sources (e.g., cooling systems, vents, motors, material-handling equipment, emergency and standby diesel generators), employee vehicles, and truck traffic. Given the distance to the site boundary (about 5.4 mi [8.7 km]), noise emissions from equipment would not be expected to annoy the public.

Some noise sources could have onsite impacts, such as the disturbance of wildlife. However, noise would be unlikely to affect federally listed threatened or endangered species or their critical habitats because none are known to occur in F Area. Traffic noise associated with operation of the MFFF would occur on the site and along offsite local and regional transportation routes used to bring materials and workers to the site. Noise from traffic associated with operation of the MFFF would likely produce less than a 1-dB increase in traffic noise levels along roads used to access the site, and thus would not result in any increased annoyance of the public.

Operations workers could be exposed to noise levels higher than the acceptable limits specified by OSHA in its noise regulation (29 CFR §1926.52). However, DCS will implement appropriate hearing protection programs to minimize noise impacts on workers. These programs include the use of administrative controls, engineering controls, and personal hearing protection equipment.

5.2.7 Impacts on Historic, Scenic, and Cultural Resources

Once the construction impacts to the archaeological site have been mitigated, operation of the MFFF is not projected to have any impact on site or regional historic or cultural resources.

The MFFF buildings will have a minimal effect on the scenic character of the surrounding area and is consistent with the VRM Class IV designation for the area. The buildings are low-rise structures of varying heights less than 100 ft (30 m). This height is consistent with, and does not exceed, the other building heights in the area, which range from 10 to 100 ft (3 to 30 m). The tallest new structure is an exhaust stack, which is located on top of the MFFF building. The stack is less than 100 ft (30 m) above the existing grade, and its distance from sensitive receptors and screening by trees will minimize its impact as a visual intrusion to the scenic character of the area.

The appearance of MFFF facilities in and adjacent to F Area would remain consistent with the area's industrialized landscape character. In height and size, the proposed facilities will be similar to existing buildings in F Area. Facilities generally are not visible offsite because views are limited by rolling terrain and heavy vegetation. Construction and operation of the surplus plutonium disposition facilities would not effect a major change in any natural features of visual interest in the area. The nearest sensitive viewpoints are those on South Carolina Highway 125 and SRS Road 1, 4.3 mi (6.9 km) and 5.3 mi (8.5 km) away, respectively.

5.2.8 Socioeconomic Impacts

Approximately 400 new permanent jobs will be created in 2006 for MFFF operation. To fill these jobs, some employees may be hired from other regions of the state or country. Over 400,000 people resided within the five-county ROI in 1990. Assuming that any MFFF employees and their families that may move into the area as a direct result of MFFF employment choose to live in one of the five ROI counties, their numbers would represent less than 1% of the total 1990 ROI population. Given the size of the population of the region, and the rate of growth it is already experiencing, no significant socioeconomic impacts are anticipated.

5.2.9 Environmental Justice Impacts

Nuclear Materials Safety and Safeguards policy and procedures[2] specify that a 4-mi (6.4-km) radius should be used as the area of consideration in rural areas or areas that are outside of city limits. The MFFF is located on SRS. There is no resident population within a 5-mi (8-km) radius of the MFFF site, and the nearest minority or low-income community is over 5 mi (8 km) away. As noted in Section 4.9 and shown on Figures 4-15 and 4-16, a disproportionate minority or low-income population does not exist even within a 10-mi (16-km) radius of the MFFF site. As a result, MFFF operation will pose no significant health risks to the public regardless of the racial or ethnic composition or economic status.

MOX fuel fabrication requires uranium dioxide that will be transported to SRS from another location in the United States. The ER evaluates the impacts on environmental justice resulting from this transportation. The SPD EIS (DOE 1999c) identified a DOE enrichment facility near Portsmouth, Ohio, as a representative site for the source of the depleted uranium hexafluoride (UF_6) and a nuclear fuel fabrication facility in Wilmington, North Carolina, as a potential uranium conversion facility. Although the source of depleted uranium hexafluoride has not been selected for the MFFF, this ER analysis assumes transportation of uranium hexafluoride from Portsmouth, Ohio, to Wilmington, North Carolina, and then transport of converted uranium dioxide to the MFFF site. Minority and low-income populations residing along 1-mi (1.6-km) corridors centered on routes that are representative of those that could be used for the transportation of nuclear materials under the proposed action were identified in the SPD EIS (DOE 1999c) and are listed in Table 5-10. Population was calculated using U.S. Census block group data.

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[2] *Environmental Justice in NEPA Documents* (NRC 1999) specifies the guidelines for determining the area for assessment, "If the facility is located outside the city limits or in a rural area, a 4 mile radius (50 square miles) should be used."

Once the MOX fuel is fabricated, it will be transported to one of four operating nuclear power plants: the McGuire Nuclear Station Units 1 & 2 near Huntersville, North Carolina, or the Catawba Nuclear Station Units 1 & 2 near York, South Carolina. Travel from the MFFF to the Catawba Nuclear Station will be through South Carolina and Georgia and to the McGuire Nuclear Station will be through South Carolina, Georgia, and North Carolina. Minority populations (1990) along the corridors between the MFFF and the McGuire and Catawba Nuclear Stations are listed in Table 5-10. The populations were calculated using updated U.S. Census block group data and assume a 0.5-mi (0.8-km) corridor on either side of the roadways.

Potential transportation accidents are discussed in Section 5.4. As noted in that section, the NRC evaluated the environmental impacts of cargo-related accidents resulting from the transport of nuclear materials in NUREG-0170 (NRC 1977c) and concluded the potential impacts to be small. No radiological or nonradiological fatalities would be expected to result from accident-free transportation associated with the MFFF, nor would radiological or nonradiological fatalities be expected to result from transportation accidents. Consequently, transportation of materials associated with the operation of the MFFF would pose no significant risks to the public, including minority and low-income populations.

5.2.10 Impacts from Ionizing Radiation

Normal operations of the MFFF will result in radiological releases to the environment and direct in-plant exposures. Radiation doses to the general public, site workers (i.e., SRS workers not involved with the MFFF), and facility workers due to normal operations of the MFFF are presented below. A site specific analysis including AFS changes for the MFFF including R2
alternative feedstock and the WSB was performed and found to be bounded by the data presented below. R2

5.2.10.1 Radiation Doses to the Public

The estimation of radiological impacts to the public due to incident-free operations of the MFFF is summarized here and described in detail in Appendix D. The dose calculations used the GENII system (the Hanford Environmental Radiation Dosimetry Software System) (Pacific Northwest Laboratory 1988a, 1988b). The GENII model was selected to maintain a consistency with the SPD EIS analysis. The GENII model is also appropriate because it includes isotopes not included in traditional models for power plants and it provides dose estimates consistent with the most recent 10 CFR Part 20 guidance.

The calculated dose is the 50-year committed effective dose equivalent due to internal exposure and the effective dose equivalent due to external exposure resulting from one year of release and one year of uptake. Determination of dose to the maximally exposed individual (MEI) and the general public as a result of normal operations of the MFFF assumed the following:

- Chronic atmospheric releases.

- Exposure pathways of inhalation uptake, external exposure to the airborne plume, ingestion of terrestrial foods and animal products, and inadvertent soil ingestion.
- The entire population within the 50-mi (80-km) assessment area consists of adults (DOE 1988).
- The MEI resides 5 mi (8 km) from the facility in the southwest direction.
- No previous contamination of the ground surface and no previous irrigation with contaminated water.
- A finite plume model (i.e., center of the plume located at ground level) for the calculation of dose.
- The annual external exposure time to the plume and to soil contamination is 0.7 year for the MEI (NRC 1977a).
- The annual external exposure time to the plume and to soil contamination is 0.5 year for the general population (NRC 1977a).
- The annual inhalation exposure time to the plume is 1 year for the MEI and general population (NRC 1977a).
- A stack height equal to the actual stack height rather than the effective stack height to negate plume rise.
- Airborne releases used in the SPD EIS (DOE 1999c), which are about one order of magnitude higher than the releases expected during normal MFFF operations.
- The MEI and the general population consume only food grown within the assessment area and only animal products produced within the assessment area.
- Terrestrial food is irrigated with uncontaminated water.
- All water consumed by animals within the assessment area comes from an uncontaminated source.
- Animal food sources are not irrigated.
- No resuspension of soil particles into the air.
- A general population equal to the estimated population for 2030.

Dose for the MEI and the general population was calculated for a ground level release (1 ft [0.3 m] above grade). As a conservative measure, the airborne release used was identical to that used in the SPD EIS (DOE 1999c). Actual releases are estimated to be an order of magnitude R2 less than those used for this calculation. DCS determined that additional dose to the public from operations of the WSB are bounded by the conservative estimate of public dose for the MFFF (see Appendix G)[3]. Because the MFFF does not discharge any liquid directly to the environment, the liquid/aquatic pathway was not considered in the dose calculations. R2

Table 5-11 summarizes the potential radiological impacts on three individual receptor groups: the population living within 50 mi (80 km) of SRS, the maximally exposed member of the public, and the average exposed member of the public. This table also shows a comparison of the calculated potential doses due to normal operations to the all-pathway standard given in 10 CFR Part 20, Subpart D and the doses from natural background radiation.

Given incident-free operation of the MFFF, the total population dose would be 0.12 person-rem/yr. The annual dose to the maximally exposed member of the public from operation of the MFFF would be 1.5E-03 mrem/yr. The dose to the average individual in the population would be 1.2E-04 mrem/yr. Details regarding calculation of the radiological impact of normal operations of the MFFF on the general public are presented in Appendix D. R2 R2

5.2.10.2 Radiation Doses to Site Workers

Site workers are defined as those that work within the SRS boundaries but are not directly involved in process activities at the MFFF. The doses to site workers presented here were determined using the GENII system (Pacific Northwest Laboratory 1988a, 1988b). The calculated dose is the 50-year committed effective dose equivalent due to internal exposure and the effective dose equivalent due to external exposure resulting from one year of release and one year of uptake. Details related to the dose calculations for site workers can be found in Appendix D. R2

The current spatial distribution of site workers within the SRS boundary is not readily available. Therefore, a population dose for site workers could not be directly determined. Rather, a dose to a site worker located on the MFFF boundary (328 ft [100 m] from the release point) and a dose to a site worker located on the SRS boundary (5 mi [8 km] from the release point) were calculated. Those doses were then multiplied by the total number of site workers to obtain a maximum population dose at the boundary of the MFFF and at the boundary of SRS. These two values provide the maximum and minimum, respectively, estimated population dose for the site workers. Actual dose to SRS site workers is projected to be between these two extremes.

Calculation of the dose due to normal operations of the MFFF for the MEI representing site workers assumed the following:

- Chronic atmospheric releases.

[3] Using process inventory information and models for release of radionuclides from the MFFF and WSB processes, DCS projected emissions that are an order of magnitude lower than the emissions used in this ER. R2

- Exposure pathways of inhalation uptake, external exposure to the airborne plume, and inadvertent soil ingestion.
- All site workers are adults.
- There are no food products grown within the SRS boundary.
- The MEI is located at a distance of 328 ft (100 m) from the release point. R2
- The MEI is located in the direction from the release point that gives the maximum dose based on dose calculations for the 16 directions considered by GENII (in the east-northeast direction for the elevated release and in the southwest direction for the groundlevel release).
- The population dose can be bounded by a maximum dose calculated as the MEI dose at the MFFF boundary times the total number of site workers and a minimum dose calculated as the MEI dose at the SRS boundary times the total number of workers.
- A total number of site workers equal to the number of site workers in 2000 (approximately 13,616 workers).
- No previous contamination of the ground surface.
- A finite plume model (i.e., center of the plume located at ground level) for the calculation of dose.
- The annual external exposure time to the plume and to soil contamination is 0.7 year for the MEI (NRC 1977a).
- The annual inhalation exposure time to the plume is 1 year for the MEI (NRC 1977a).
- A stack height equal to the actual stack height rather than the effective stack height to negate plume rise.
- Airborne releases used in the SPD EIS (DOE 1999c), which are about one order of magnitude higher than the releases expected during normal MFFF operations.
- No resuspension of soil particles into the air.
- The meteorological data used to determine dose to the public (see Appendix D) were also used to determine dose to the site workers.

The calculation of dose to the site workers was essentially identical to that for the general public with the following exceptions:

1. The distance from the release point.

2. The number of persons exposed.
3. The spatial distribution of persons exposed.

Radiation dose due to the ingestion of food products was not included for the calculation of dose to the site workers because no agriculture occurs within the SRS boundary and, therefore, consumption of food grown within the SRS boundary is impossible. Workers are also assumed to be members of the public (see Section 5.2.10.1).

Doses were calculated for a groundlevel release (1 ft [0.3 m] above grade). The reason for providing dose calculations using a groundlevel release is to bound the calculated dose and provide a buffer in the event that the designed building and/or vent stack heights are modified in the future. R2

Given incident-free operation of the MFFF, the dose to the maximally exposed site worker located at the MFFF boundary from annual operation of the MFFF would be 3.0 mrem/yr. The maximum dose to the site worker population would range from 0.019 person-rem/yr for the site workers located at the SRS boundary to a maximum of 40.8 person-rem/yr for the site workers located at 100 m from the MFFF. As previously indicated, the maximum population dose was calculated as the dose to the MEI times the total number of site workers (i.e., 13,616 workers). The potential radiological impacts on the general public and site workers due to MFFF normal operations are summarized in Table 5-11 and Appendix D, Table D-8. Details regarding calculation of the radiological impact of normal operations of the MFFF on site workers are presented in Appendix D. R2

5.2.10.3 Radiation Doses to Facility Workers

Facility workers are those workers that work on MFFF activities within the MFFF fence. The estimate of average worker dose was calculated based on process and facility design and source term information. Although worker exposures vary, a design objective is to minimize the number of operators submitted to a dose equivalent higher than 500 mrem/yr during normal operation.

The annual dose to facility workers is projected to be 20 person-rem/yr, based on preliminary information concerning facility design and source terms. This dose could increase or decrease as a function of design or operation changes. This dose can also be expressed as an average worker dose of 50 mrem/yr. The dose to facility workers represents a latent cancer fatality (LCF) risk of [illegible]. Doses to individual workers will be kept to a minimum by instituting administrative limits and ALARA programs including worker rotations. R2

5.2.11 Impacts to SRS Infrastructure

SRS infrastructure will be modified and upgraded prior to and during the MFFF construction to accommodate the needs of the MFFF and other surplus plutonium disposition facilities.

Operation of the MFFF is not expected to significantly impact SRS infrastructure other than the impacts to the SRS waste management systems discussed in the next section.

The MFFF will require 130,000 MWh/yr of electricity during operations. SRS has 482,700 MWh of unused capacity. MFFF electrical needs are not anticipated to impact electricity availability for SRS.

The water usage for all mechanical fluid systems during MFFF operation is anticipated to be approximately 322,700 – 485,500 gal/yr (1.8 million L/yr). F area process water system capacity is 2100 gpm with an average demand of 350 gpm (800 gpm peak). The MFFF sanitary water usage is anticipated to be approximately 1.95 million gal/yr (7.4 million L/yr). The domestic water capacity from deep wells supplying the A area loop which includes F Area, is 3,000 gpm and that the average domestic water consumption from the A area domestic water loop in 2000 was 754 gpm (about 1,200 gpm peak). Therefore, no impacts on water availability would be expected. R2 R1

5.2.12 Waste Management Impacts

MFFF operational impacts on SRS waste management activities are discussed in Section 4.4.2.2 of the SPD EIS (DOE 1999c).

The waste management facilities within the MFFF will transfer all wastes generated to SRS waste management facilities. Table 5-12 compares the expected waste generation rates from operating the MFFF with the existing site waste generation rates. R

As described in Section 3.3, the MFFF will not generate any HLW. The aqueous polishing process produces a liquid high alpha activity waste and a stripped uranium waste that will be transferred through two separate double-walled pipes to the WSB. R1

The waste streams that comprise the high alpha liquid waste stream and are to be transferred to SRS for management include the americium stream, the alkaline wash stream, and the excess acid stream. The volume of this combined high alpha waste stream is estimated to be just under 22,000 gallons (83.3 m^3). The composite stream contains approximately 84,000 Curies of americium-241.

The stripped uranium stream will average 42,530 gallons (134 m^3) annually during normal operations and 46,000 gallons (175 m^3) annually during startup. The stripped uranium stream is 1% as uranium-235 to avoid criticality issues.

As described in Section 3.3.2.8, both of these waste streams will be converted to a solid waste suitable for disposal as TRU waste or LLW as appropriate. In addition to the MFFF waste, the WSB will convert approximately 11,000 gallons (41.6 m^3) per year of liquid waste from the PDCF to solid waste.

The MFFF is expected to generate about 385,800 gal (1,460 m^3) per year of low-level liquid waste. The MFFF will include collection tanks with sampling capability for the LLW stream. The waste stream will be verified to meet the acceptance criteria for the SRS Effluent Treatment Facility (ETF). After confirming waste acceptability, it will be pumped on a batch basis to a tie-in with the existing F-Area process sewer. The F-Area process sewer is used to transfer similar low level waste streams from existing operations to the ETF. R1

The WSB will generate a maximum of 235,000 gallons (890 m^3) of liquid LLW annually from the processing of the MFFF and PDCF high radioactivity waste streams. R2

The liquid LLW generated by the MFFF and WSB will be treated at the ETF before release to Upper Three Run. The volume of these wastes [620,800 gal/yr (2,350 m^3/yr)] would be less than 0.1% of the 1,930,000 m^3/yr capacity of the ETF and less than 0.01% of the 7-day, 10-year low flow for Upper Three Run.

The SRS ETF treats low-level radioactive wastewater from the F- and H-Area separations and waste management facilities. The ETF removes chemical and radioactive contaminants before releasing the water in Upper Three Runs, which flows to the Savannah River. Operation of the ETF is approved and permitted by SCDHEC and EPA. R1

The ETF is permitted to treat up to 430,000 gal (1,628 m^3) per day. The ETF includes wastewater collection and treatment operations that were modified for radioactive use. It is designed to remove heavy metals, organic and corrosive chemicals, as well as radiological contaminants.

ETF effluents are discharged within limits of permits issued by SCDHEC. All personnel operating ETF are certified by the South Carolina Environmental Certification Board.

With the proposed addition of 620,800 gal (2,350 m^3/yr) per year of MFFF and WSB low level liquid waste being only a fraction of the facility's design and permit capacity (<0.1%), the additional environmental impacts associated with treatment of this stream will be negligible. The MFFF and WSB contribution to ETF discharges would be 0.000093 m^3/sec compared to the receiving water (Upper Three Runs) 7-day 10-year low flow of 2.8 m^3/sec. R2

Potentially contaminated wastewater will be tested for radiological contaminant levels. If levels are acceptable for discharge, the waste will be discharged to the SRS CSWTF. If contaminant levels are not suitable for discharge, the liquid waste will be discharged to the ETF for processing.

Excess dodecane solvent, contaminated with plutonium, will be transferred to SRS waste management for treatment and disposal as a contaminated solvent waste. This is a very small waste stream of 3,075 gal/yr.

The solid low level and TRU wastes resulting from the MFFF will be processed along with other SRS wastes of the same type in an existing waste infrastructure. This infrastructure is described and the environmental impacts evaluated in the *SRS Waste Management Final Environmental* R1

Impact Statement (DOE 1995b) over a wide range of waste volumes, which could result from SRS and external operations. The MFFF solid TRU waste is estimated to be 248 yd^3 (190 m^3) per year. The WSB would produce an additional 405 yd^3 (310 m^3) of TRU waste per year. Over its lifetime, the MFFF and WSB would expect to generate 6,530yd^3 (5,000 m^3) of TRU waste. The forecast for SRS TRU waste generation over the next 30 years ranges from a minimum estimate of 7,578 yd^3 (5,794 m^3) to 710,648 yd^3 (543,329 m^3), with an expected forecast of 16,433 yd^3 (12,564 m^3) (DOE 1995b, Table A-1). The estimated MFFF lifetime TRU solid waste quantity is about 40% the expected SRS TRU waste forecast but only a small fraction (<1%) of the maximum SRS estimate.

The environmental impacts resulting from the disposal of TRU waste at the Waste Isolation Pilot Plant (WIPP) are discussed in *Waste Isolation Pilot Plant Disposal Phase Final Supplemental Environmental Impact Statement* (DOE 1997e). The impacts projected in DOE 1997e (Table 2-2 in DOE 1997e) were based on disposal of 170,000 m^3 TRU waste. The additional 5,000 m^3 TRU waste from the WSB represents an increase of 3% in the projected waste disposed. Any increase in impacts resulting from disposing WSB solid TRU waste at WIPP should be within the error associated with any projected impacts of WIPP operation. Furthermore, the *Waste Isolation Pilot Plant Disposal Phase Final Supplemental Environmental Impact Statement* projected that, "No LCFs would be expected in the population around WIPP from radiation exposure (3 E-4 LCFs). ... no cancer incidence (2 x 10^{-5} cancers) would be expected in the population from hazardous chemical exposure." (DOE 1997e, pg 5-29) The addition of 11,238 m^3 TRU waste from the WSB would not be expected to change this conclusion.

The MFFF solid low level waste (LLW) is estimated to be 134 yd^3 (102 m^3) per year. Assuming that solidification of stripped uranium waste does not result in any volume reduction, the WSB would produce an additional 228 yd^3 (175 m^3) of solid LLW per year. Over its lifetime, the MFFF and WSB would expect to generate 3,620 yd^3 (2,767 m^3) of LLW. The forecast for SRS LLW generation over the next 30 years ranges from a minimum estimate of 480,310 yd^3 (367,223 m^3) to 1,837,068 yd^3 (1,404,539 m^3), with an expected forecast of 620,533 yd^3 (474,431 m^3) (DOE 1995b, Table A-1). The estimated MFFF LLW quantity is only a small fraction of any of the SRS estimates. Consequently, the waste volumes generated from MOX are small in comparison to the annual SRS volumes and impacts to SRS waste management are well within the bounds evaluated in the *SRS Waste Management Final Environmental Impact Statement* (DOE 1995b). R2

R1

All TRU wastes and LLW transferred to SRS waste management facilities would meet the requirements of the applicable Waste Acceptance Criteria (WAC).

Table 5-12 illustrates that the MFFF waste generation rates are generally less than 5% of the SRS generation rates, except for solid TRU waste, which is projected to be about 700% of the SRS annual generation rate. Although the annual MFFF TRU waste generation exceeds the current annual SRS TRU waste generation, the MFFF cumulative TRU waste volumes are well below the maximum projected SRS TRU waste volumes. R1

[Text deleted] R2

5.3 DEACTIVATION

5.3.1 Introduction

The MFFF is owned by DOE and operated by DCS under the terms of the DOE-DCS contract and scope of work. After all of the MOX fuel is fabricated, DCS is required to deactivate the MFFF, terminate the NRC license, and return the facility in its deactivated state back to the DOE. Future use of the facility, including any decision by DOE to decommission or reutilize the facility, will be made after the NRC license is terminated and DCS is no longer involved in this venture. DOE has not determined when and under what circumstances the facility will be decontaminated and either reused or decommissioned (DOE 1999c). As a result, no meaningful alternatives or reasonably foreseeable future impacts of decommissioning can be assessed.

Deactivation is the process of removing a facility from operation and placing the facility in a safe-shutdown condition that is economical to monitor and maintain for an extended period until reuse or decommissioning (DOE 1999d). There are no explicit NRC regulations governing this process other than the requirement to continue compliance with the applicable provisions of 10 CFR Part 20 and 10 CFR Part 70 and any other facility-specific conditions imposed by NRC during MFFF operations. In SECY 99-177 (NRC 1999b), the NRC staff indicated that

> … DOE intends to assume responsibility for decommissioning the MOX fuel fabrication facility and has included in its contract with the consortium a requirement that, following completion of its mission for disposition of excess plutonium by conversion to MOX fuel, the facility will be deactivated and returned to DOE for decommissioning.… NRC licensing and regulatory authority applies to "…any facility under a contract with and for the account of the Department of Energy that is utilized for the express purpose of fabrication of mixed plutonium-uranium oxide nuclear reactor fuel for use in a commercial nuclear reactor…", NRC may interpret that authority to apply only when the facility is being operated under contract with DOE. Therefore the regulatory authority would end and the license could be terminated to return the facility to DOE regulatory oversight when the facility is no longer operated for this purpose.

Deactivation is similar to the restricted release of property allowed by 10 CFR §70.38 for decommissioning of facilities. NRC defines decommissioning as removing a facility or site safely from service and reducing residual radioactivity to a level that permits (1) release of the property for unrestricted use and termination of the license; or (2) release of the property under restricted conditions and termination of the license (10 CFR §70.4). The DOE-DCS contract statement of work describes the state of deactivation as having the following characteristics:

1. All loose surface contamination is removed.

2. The facility is accessible without protective clothing.

3. All gloveboxes and associated ventilation systems are sealed in accordance with applicable standards to enable removal from the facility.

4. All systems are depressurized and/or disabled, as applicable, except as required to enable accessibility as stated in (2) above.

5. All remaining unused plutonium and uranium feed materials are packaged in appropriate containers and provided to DOE for disposition. All nuclear waste products are packaged as required in Option 2 of the contract and provided to DOE for disposition.

6. All processing chemical substances are removed and disposed of in accordance with applicable regulations.

Deactivation of the MFFF must be accomplished in a manner that will support the ultimate decommissioning or reutilization of the facility in compliance with the applicable DOE regulations. 10 CFR §20.1101(b) requires that a licensee shall use, to the extent practicable, procedures and engineering controls based upon sound radiation principles to achieve occupational doses and doses to members of the public that are ALARA. Compliance with the ALARA requirement will be required throughout MFFF operations and will continue throughout the deactivation process by minimizing waste volumes and the spread of radioactive contamination. Upon completion of MFFF deactivation, the following conditions shall apply:

- The whole-body dose (internal and external) shall be less than 100 mrem/yr (less than 0.05 mrem/hr for continuous occupancy) for minors, students, visitors, and the public, resulting in a lower limit than specified in 10 CFR §20.1207 and 10 CFR §20.1301(a)(1).

- The external dose from the deactivated facility in any restricted area shall not exceed 2 mrem in any one hour, as specified in 10 CFR §20.1301(a)(2).

Upon completion of MFFF fuel fabrication activities, a preliminary characterization will be performed to establish a baseline of information concerning the physical, chemical, and radiological condition of the facility. These results will serve as the technical basis for selected preferred deactivation techniques and developing the detailed scope of work for the deactivation.

The following subsections discuss the design and administrative features that will facilitate the deactivation of the MFFF to a state where a fuel fabrication license from the NRC is no longer required. This section also discusses the potential environmental impacts associated with these deactivation activities and the availability of the MFFF and its site for reutilization after deactivation is completed.

5.3.2 Design Features to Facilitate Deactivation

Specific features are incorporated into the MFFF design that will facilitate both deactivation and the eventual decommissioning or reutilization of the facility. Facility design features that result in waste minimization, minimization of the spread of radioactive contamination, and maintenance of occupational and public doses at ALARA levels during MFFF operations will also serve to facilitate deactivation.

Design features that will minimize waste generation include placing only essential process equipment in gloveboxes, using materials that are easily cleaned, and isolating utility systems from plutonium processing equipment to prevent its contamination. These design features will simplify the deactivation approach and result in life-cycle cost reductions.

Six different types of design features are incorporated into the MFFF that will minimize the spread of radioactive contamination and maintain occupational and public doses ALARA:

1. **Plant layout**: All areas of the MFFF are sectioned off into clean areas and potentially contaminated areas with appropriate radiation zone designations to meet 10 CFR Part 20 criteria. Process equipment and systems are situated according to radiation zone designations and have adequate space to facilitate access for required maintenance to permit easy installation of shielding. The plant layout provides for ready removal of equipment and appropriate space for equipment decontamination. Thus, human factors in the design will result in minimal doses during deactivation. In addition, a comprehensive ALARA Report, documenting room-by-room ALARA reviews performed at various stages in the design process, will provide significant input into the deactivation process.

2. **Access control**: In accordance with ALARA design considerations in 10 CFR Part 20, an appropriate entry control program for MFFF radiological areas has been established with associated ingress and egress monitoring. The Access Control Point provides for removal of protective clothing and verification that personnel contamination has not occurred. Step-off pads and locked doors and barriers complete the access control design features, which will be actively used during the deactivation process.

3. **Radiation shielding**: The radiation shielding design is based on conservative estimates of quantity and isotopic materials anticipated during operations. The analyses address both gamma and neutron radiation and include exposures due to scatter and streaming radiation. Therefore, the shielding design will minimize the occupational doses during deactivation.

4. **Ventilation**: The MFFF ventilation system has been designed with the capability of capturing and filtering airborne particulate activity and is continuously maintained under a slight negative pressure. Lastly, gloveboxes and hoods are installed in various rooms to contain and/or move airborne contaminants away from the worker's breathing zone. Each of these design features contributes to meeting ALARA criteria during operations and deactivation.

5. **Structural, mechanical, instrumentation, and electrical components**: Numerous design features of the MFFF (e.g., use of washable epoxy coatings, segregation of waste streams, remote readout for instrumentation, and location of breaker boxes and electrical

cabinets in low-dose-rate areas) facilitate decontamination, minimize the spread of contamination, and maintain doses to facility personnel ALARA.

6. **Radiation monitoring**: The MFFF is designed with a comprehensive array of radiation monitoring systems to monitor working spaces and potential releases to the environment for the purpose of protecting the health and safety of the workforce, the public, and the environment. These systems include area radiation monitoring, airborne radiation monitoring, airborne radioactive effluent monitoring, and alarm monitoring. This protection will be afforded throughout operations and deactivation.

5.3.3 Administrative Features to Facilitate Deactivation

The MFFF design utilizes lessons learned from the operation of the MELOX and La Hague facilities in France to minimize contamination during operations, thereby reducing the effects of contamination on deactivation. Good housekeeping practices are essential in keeping plant surfaces clean. Periodic housekeeping is performed within contaminated areas to minimize the buildup of contamination and contaminated waste. Contaminated gloveboxes and the general work area are decontaminated periodically to minimize removable contamination. Appropriate control zones with limits and action levels to control contamination for those zones will be established. Contamination control will be accomplished through implementation of the many operational programs and practices that will significantly facilitate the eventual deactivation of the facility. These operational programs and practices will continue to be employed throughout facility deactivation and will complement the design features to ensure that the deactivation activities will result in minimal doses.

5.3.4 Projected Environmental Impacts of Deactivation

The design and administrative controls associated with the comprehensive deactivation activities, should maintain occupational and public doses within the ALARA criteria. Therefore, these controls will be well within applicable 10 CFR §20.1207, 10 CFR §20.1301(a)(1) and 10 CFR §20.1301(a)(2) levels. These levels are as follows:

- The whole-body dose (internal and external) shall be less than 100 mrem/yr (less than 0.05 mrem/hr for continuous occupancy) for minors, students, visitors, and the public, resulting in a lower limit than specified in 10 CFR §20.1207 and 10 CFR §20.1301(a)(1).

- The external dose from the deactivated facility in any restricted area shall not exceed 2 mrem in any one hour, as specified in 10 CFR §20.1301(a)(2).

The deactivation plan identifies four processes to deactivate the MFFF. These are radioactive and chemical characterization for the general areas; characterization of the gloveboxes; and remediation of the general areas and gloveboxes. The total occupational radiation exposure associated with these activities is 420 person-rem and is based on occupancy time in a low dose rate area. R1

Deactivation will not involve demolition or removal of buildings. Physical barriers to the release of contamination will continue in place during deactivation. Contaminant releases should be within the levels experienced during operations. Waste generated during deactivation should approximate that generated from routine maintenance activities during the operational phase of the MFFF. Since the ALARA criteria will be met, there will be no meaningful environmental impacts to the workers and the general public.

5.3.5 Projected Environmental Impacts of Decommissioning

The final facility disposition activity is typically decommissioning, where the facility is taken to its ultimate end state through decontamination and/or dismantlement to demolition or entombment. Although a general plan for decommissioning has not yet been developed, NNSA has proposed four options for decommissioning this facility. A conservative approach is to assume that the facility will be decontaminated, dismantled, and the environment restored as presently being implemented at the Rocky Flats Environmental Technology Site (RFETS) near Denver, Colorado. Utilizing recent information from the RFETS decommissioning project, DCS has conservatively established the approximate MFFF decommissioned building area, MFFF glovebox volumes, and MFFF glovebox weights. R1

The values for decommissioning waste volumes for the MFFF were estimated using waste volumes from the decommissioned RFETS facilities. The following assumptions apply to this analysis:

1. The MFFF waste estimate was based on the decommissioning waste estimating method used for similar RFETS plutonium handling facilities. This method used the physical characteristics and waste generated from the decommissioning of the first DOE site plutonium facility that was completed in 2000. Relevant metrics (e.g., cubic meters of glovebox volume, pipe length, process area square feet) were compared against the TRU, low-level, low-level mixed, and construction demolition waste generated during the decontamination, strip-out, and decommissioning of the building. Factors developed from these comparisons were consequently applied to the remaining plutonium facilities at the site. R1

2. The summary estimate methodology identified the RFETS buildings that were most representative of the processes within the MOX and AP facilities. The methodology assumed that the secondary systems (i.e., ventilation, instrumentation and control, power, etc.) were similar. It also assumed that the decommissioning methods used for these facilities would be similar to those that were used for RFETS facilities.

The results of the comparison projected 2,500 yd^3 (1,900 m^3) of TRU waste, 43,000 yd^3 (33,000 m^3) of LLW and 70,000 tons of nonradioactive demolition waste.

5.3.6 Accessibility of Land After Deactivation

Once the MFFF is deactivated and its NRC license terminated, accessibility to the land surrounding the facility will be controlled by DOE and subject to its applicable security requirements. If DOE decides not to reuse the facility and proceeds with decommissioning then further decontamination and dismantlement of the buildings will occur. In either case, a final radiological survey will verify that the radiological endpoint conditions have been satisfied. This survey will be designed and implemented with the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) methodology that will demonstrate compliance with dose- or risk-based regulation (NRC 2000b). Due to these comprehensive deactivation and/or decommissioning activities, no accessibility limitations resulting from radioactive contamination are expected. R1

5.4 TRANSPORTATION

An assessment of the human health risks of the overland transport of radioactive materials is important to a complete appraisal of the environment impacts of the MFFF. Operational transportation impacts may be divided into two parts: impacts due to incident-free transportation and those due to transportation accidents. They may be further subdivided into nonradiological and radiological impacts. Nonradiological impacts are specifically vehicular, such as vehicular emissions and traffic accidents. Radiological impacts are those related to the dose received by transportation workers (e.g., truck crew, inspectors) and the public during normal operations and in the case of accidents in which the radioactive material being shipped may be released. See Appendix E for more detailed information on the transportation analysis performed. The following discussion summarizes the transportation risk results for each of the types of material shipments.

5.4.1 Plutonium Oxide Feedstock

The environmental impacts of plutonium transport from the various DOE site to the SRS was evaluated previously (DOE 1999c). Cumulative dose to transportation workers was estimated at 7.8 person-rem representing a LCF risk of 3.9E-03. Cumulative dose to the public was estimated at 4.1 person-rem representing a LCF risk of 2.0E-03. R1

Plutonium oxide feedstock will be moved by an appropriate means of transport from the adjacent PDCF or the K-Area Material Storage (KAMS) facility to the MFFF. Because the facilities are located on SRS and there is no transport over public roads, there is no need to consider additional environmental impacts associated with plutonium feedstock movement to the MFFF. R2

5.4.2 Uranium Dioxide Feedstock

A specific supplier of uranium dioxide feedstock has not been selected at this time. For purposes of this ER, the assumptions employed in Section 4.4.2.6 of the SPD EIS (DOE 1999c) were used.

A DOE enrichment facility near Portsmouth, Ohio[4], was chosen as a representative site for the source of the depleted uranium hexafluoride (UF_6), and a nuclear fuel fabrication facility in Wilmington, North Carolina, was chosen as representative of a uranium conversion facility. The environmental impacts associated with the transfer and conversion of UF_6 to UO_2 are discussed in the SPD EIS (Section 4.30.3). A total of 110 shipments of up to five 30-in (76-cm) diameter UF_6 cylinders needed for the MOX fuel would be sent via commercial truck to the uranium conversion facility at Wilmington, North Carolina. After conversion into uranium dioxide, the depleted feed material would be shipped in 55-gal (208-L) drum containers via commercial truck from the conversion facility to the MFFF at SRS. A total of 60 shipments of depleted uranium dioxide would be required to supply sufficient feed material to satisfy the mission requirements for the disposition of 37.5 tons (34 metric tons) of plutonium. R1

R2

5.4.2.1 Impacts of Incident-Free Transportation

The total dose for the entire shipping campaign to the transportation workers associated with the UF_6 shipments is estimated to be 1.06 person-rem, corresponding to 4.22E-04 LCFs. The total dose to transportation workers associated with the UO_2 shipments is estimated to be 0.78 person-rem, corresponding to 3.10E-04 LCFs. R1

The dose to the public for the entire shipping campaign associated with the UF_6 shipments is estimated to be 0.21 person-rem, corresponding to 1.05E-04 LCFs. For the UO_2 shipments, the total dose to the public is estimated to be 0.14 person-rem, corresponding to 6.90E-05 LCFs. R2

R2

The estimated number of nonradiological fatalities due to exhaust emissions exceeds the radiological fatalities. The number of nonradiological fatalities associated with the UF_6 shipments is estimated to be 1.03E-02; the corresponding value for the UO_2 shipments is 2.68E-03. See Table E-3 for all incident-free transportation impacts. R2

5.4.2.2 Impacts of Transportation Accidents

The total transportation accident risks were estimated by summing the risks to the affected population from all hypothetical accidents. For the UF_6 shipments, this process resulted in an estimated number of LCFs of 3.11E-03, equivalent in magnitude to the nonradiological physical risk value of 2.24E-03 calculated by applying the historical accident rate by the number of miles shipped for this material. Similarly, for the UO_2 shipments, the estimated number of LCFs is 3.18E-06, well below the nonradiological value of 5.81E-04 calculated by applying the historical accident rate by the number of miles shipped for this material. R1 R1

[4] There is a large stockpile of depleted UF_6 from historical operations that will continue to be stored onsite and should be available for use in the fabrication of MOX fuel. As noted in the SPD EIS (pg 1-9 footnote 20) Portsmouth is the only gaseous diffusion facility capable of transferring UF_6 from the 14-ton storage canisters to the 2.5-ton feed canisters. R2

Biwer et al., in a recent 1997 *Transportation Impact Analyses in Support of the Depleted UF_6 Programmatic Environmental Impact Statement* noted, "The chemical risk associated with UF_6 cylinder transport would be much less than the radiological risk; however, the total risks would be dominated by vehicle-related risks, which would be about 10 times larger than the radiological and chemical risks combined." Consequently, the chemical hazard for UF_6 was not considered for incident-free transport.

The chemical hazard of UF_6 is only a concern in the unlikely event the container is breached during an accident and the UF_6 is released to the atmosphere and subsequently exposes people, primarily through inhalation. UF_6 is not a carcinogen, so latent cancer incidences are not expected.

Acute impacts to human health can range from slight irritation to fatality for the exposed individuals. Two endpoints for acute health effects were assessed in Biwer et al. 1997: potential for irreversible adverse health effects (from permanent organ damage or the impairment of everyday functions up to and including lethality) and potential for adverse effects (effects that occur at lower concentrations and tend to be mild and transient in nature). Using the collective population unit risk factors for the chemical hazards of UF_6 shipped by truck of 1.0E-12 adverse effects/km and 7.1E-13 irreversible adverse effects/km (Biwer et al. 1997) and the shipment distance and number of shipments, the calculated number of adverse effects is 1.0E-07 and the number of irreversible adverse effects is 7.2E-08. These impacts are much less than radiological impacts noted above. The impacts are also well below predicted risk of physical damage to individuals from traffic accidents involving the transport vehicles. See Table E-3 for all transportation accident impacts. R1

5.4.2.3 Maximally Exposed Individuals

The risk to MEIs under incident-free transportation conditions was estimated for four different hypothetical exposure scenarios: (1) an inspector receiving a dose while the vehicle is at a stop, (2) a person stuck in traffic for 30 minutes next to the vehicle, (3) a gas station worker receiving a dose while refueling the truck, and (4) a resident at his or her home located 98 ft (30 m) from the shipment route who is present for all shipments on this route. The maximum dose resulting from these scenarios was obtained for the person stuck in traffic next to a shipment of UO_2, with an estimated dose of 0.33 mrem (see Table E-8). If the exposure duration was longer, the dose would rise proportionately. This dose is minimal and indistinguishable from background radiation levels.

5.4.3 MOX Fuel

After fabrication, the unirradiated MOX fuel assemblies will be shipped via SafeGuards Transporter (SGT) truck (see Appendix E, Section E.3.3) to the selected commercial reactor sites: McGuire Nuclear Station and Catawba Nuclear Station. Much of the routes to both McGuire and Catawba are similar because of the close proximity of the two sites. These two sites, housing four reactors, represent the current contracts for irradiation of MOX fuel. For R2 purposes of this ER DCS has performed transportation analyses to a generic Midwestern mission reactor assumed to be located 1335 miles from the MFFF. This site was selected after considering a variety of distance and population permutations for the eastern United States and is considered to be bounding for any reactor located in the eastern or central United States. Between 2007 and 2021, a total of about 1,748 MOX fuel assemblies will be shipped from the MFFF at SRS to the mission reactors, with 238 shipments to the Catawba Nuclear Station, 212 shipments to the McGuire Nuclear Station, and 148 shipments to the generic mission reactor. Although the plutonium content will average about 4.3% of the total heavy metal per assembly, a maximum value of 6.0% plutonium content was used for the source term in the analysis for conservatism. R2

5.4.3.1 Impacts of Incident-Free Transportation

For all fuel shipments, the total dose to transportation workers, during the entire campaign, is estimated to be 34.1 person-rem, corresponding to 1.36E-02 LCFs (see Table E-3). The dose to the public associated with these shipments is estimated to be 9.98 person-rem, corresponding to 4.99E-03 LCFs (see Table E-3). R2

The estimated number of nonradiological fatalities (4.70E-02) due to exhaust emissions exceeds the radiological fatalities (4.99-03). The number of nonradiological fatalities associated with the MOX shipments is a function only of the total distance traveled.

5.4.3.2 Impacts of Transportation Accidents

The total transportation accident risks were estimated by summing the risks to the affected population from all hypothetical accidents for each of the individual routes and multiplying by the number of shipments to each site. For all MOX shipment routes, the nonradiological risks greatly exceed the radiological risks. The total number of LCFs due to radiological causes for the MOX fuel shipments is estimated to be 6.33E-11. The nonradiological estimate yielded 1.02E-02 fatalities, calculated by applying the historical accident rate by the number of miles shipped for this material. R1

5.4.3.3 Maximally Exposed Individuals

The risk to MEIs under incident-free transportation conditions was estimated for four different hypothetical exposure scenarios: (1) an inspector receiving a dose while the vehicle is at a stop, (2) a person stuck in traffic for 30 minutes next to the vehicle, (3) a gas station worker receiving a dose while refueling the truck, and (4) a resident at his or her home located 98 ft (30 m) from the shipment route who is present for all shipments on this route. However, the dose to the inspector and the gas station worker for the MOX shipments is not considered since these duties are performed by the SGT crew (who are subject to a radiation monitoring program). The maximum dose resulting from these scenarios was obtained for the person stuck in traffic next to a shipment of MOX fuel, with an estimated dose of 2.0 mrem (see Table E-8). If the exposure duration was longer, the dose would rise proportionately. This dose is minimal and indistinguishable from background radiation levels.

5.4.4 Radioactive Wastes

All radioactive wastes will be moved from the MFFF to the SRS facilities for radioactive waste treatment, storage, and disposal. These wastes will be handled in the same manner as other SRS site waste shipments and would not represent a large increase in the amount of waste generated at the site. The environmental impacts of transportation of waste from the SRS facilities to ultimate disposal sites are documented in the *Final Waste Management Programmatic Environmental Impact Statement for Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Waste* (DOE 1997a) and the *Savannah River Site Waste Management Final Environmental Impact Statement* (DOE 1995b). R2

Radioactive wastes from MFFF operations will be transferred to the WSB for treatment prior to transport and disposal either onsite at SRS centralized facilities (LLW), offsite LLW facilities or offsite at WIPP for the transuranic (TRU) waste. The *Final Waste Management Programmatic Environmental Impact Statement for Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Waste* (DOE 1997a) presents the evaluation of environmental impacts associated with the treatment, storage and disposal of LLW generated on the SRS. As noted in Section 5.2.12, the environmental impacts from the LLW generated by MFFF, PDCF, and WSB would be bounded by the impact estimates in DOE 1997a. In *Final Waste Management Programmatic Environmental Impact Statement for Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Waste*, DOE projected a 10-year cumulative dose to the offsite MEI of 2.1E-03 rem for transport of 130,030 shipments (Table 11.17-1) or a projected maximum annual dose of 0.21 mrem. Since the MFFF, PDCF, and WSB LLW would be, conservatively, 1% of the annual SRS LLW generation volume, the MFFF, PDCF, and WSB LLW contribution to the annual offsite transportation MEI dose would be less than 0.0025 mrem. R2

Following processing at the WSB to reduce waste volumes[5], and chemical treatment and solidification, the TRU wastes will be loaded into 55-gallon drums and inserted into TRUPACT II shipping containers for transport via truck to WIPP. The environmental impacts of transportation of TRU waste from SRS centralized facilities to WIPP are documented in the *Final Waste Management Programmatic Environmental Impact Statement for Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Waste* (DOE 1997a) and the *Savannah River Site Waste Management Final Environmental Impact Statement* (DOE 1995b). R2
Using data provided in these two documents, an estimate of public dose was developed for the shipment of MFFF generated TRU waste to WIPP[6]. For 35 shipments of TRU waste, the total R2

[5] DOE is evaluating two options for processing high alpha waste to solid TRU waste. One option involves volume reduction and the alternative option does not utilize any volume reduction. For conservativism, the number of shipments used (110) reflect the option without volume reduction.

[6] DOE 1997a, Table E-27 projects a dose of 3.6E-04 Rem for 2,370 shipments passing the MEI located at the site entrance for SRS in the decentralized option. This yields an average dose of 1.5E-07 per shipment.

additional dose to the MEI is 5.3 E-03 mrem, which equates to an increase in lifetime cancer risk of 2.6E-09. The consequences from the most severe transportation accidents involving the transport of the TRU waste are also bounded by the evaluation in DOE 1997a. R2

5.4.5 Comparison with NUREG-0170

The NRC analyzed the environmental impacts of the normal routine transportation of radioactive material in NUREG-0170, *Final Environmental Statement on the Transportation of Radioactive Material by Air and Other Modes* (NRC 1977c). This EIS included an evaluation of the impact of fuel cycle shipments in 1975 and a projected estimate of shipments in 1985. The 1985 projections reflected the potential development of plutonium recycle and included an estimate of 41 shipments of MOX fuel assemblies via truck. A total of 598 MOX shipments will be required for the MFFF over a period of 13 1/2 years, an average of about 44 shipments per year. R2

The NRC determined that the environmental impacts of normal transportation of radioactive material and the risk attendant to accidents involving these materials (which includes those fuel cycle activities associated with power production) were sufficiently small to allow continued shipments via the existing federal regulations. The analysis concluded that "The average radiation dose to the population at risk from normal transportation is a small fraction of the limits recommended for members of the general public from all sources of radiation other than natural and medical sources and is a small fraction of natural background dose." This conclusion has been confirmed for the MOX fuel shipments by comparing the dose determined by the NRC in its 1985 projections with a calculated dose from the SRS MFFF to the reactor sites at McGuire and Catawba Nuclear Stations. The incident-free dose per shipment (in person-rem) for the plutonium recycle shipments in NUREG-0170 was calculated to be 0.17, versus a maximum of 0.2 person-rem per shipment for the MOX shipments from the SRS MFFF to the generic mission reactor site (0.03 person-rem for transport to the Catawba and McGuire Nuclear Stations). The dose to the MEI for the person in traffic next to a shipment of MOX fuel is 2.0 mrem. This dose is a small fraction of the dose received from natural background radiation and is consistent with the conclusions of NUREG-0170. R2 R2

5.5 FACILITY ACCIDENTS

This section summarizes the evaluation of potential facility accidents at the MFFF and associated facilities. The evaluation includes internal process-related events, external man-made events, and events associated with natural phenomena. The evaluations of these events show that the environmental risk from a facility accident is low.

The information presented in this section is based on Chapter 5 of the MFFF Construction Authorization Request, Safety Assessment of the Design Basis. The analysis method uses conservative assumptions and produces a comprehensive, bounding analysis. Appendix F provides additional analysis details for the MFFF and Appendix G provides information for the WSB. R1 R2

5.5.1 Environmental Risk Assessment Method

Accidents that could occur as a result of MFFF operations are identified and evaluated in a systematic, comprehensive manner. The general approach includes the following evaluations:

- Internal Hazard Identification – A systematic and comprehensive identification of radioactive, hazardous material, and energy sources throughout the MFFF
- External Hazard Identification – A systematic and comprehensive identification of applicable natural phenomena and events originating from nearby facilities
- Hazard Evaluation – A systematic and comprehensive evaluation to postulate event scenarios involving the information developed in the Hazard Identification
- Accident Analysis – A detailed evaluation of postulated events to determine consequences and frequencies and to identify appropriate prevention and mitigation features. The accident analysis evaluates all credible events as defined in Appendix F. Thus, all internally initiated accidents are evaluated without regard to their initiating frequency, and all natural phenomena hazard and external man-made hazard generated events are evaluated unless their probability of impacting the MFFF is extremely low. The results of the evaluation include events with no or low consequences, design basis events, and severe accidents.

5.5.2 Environmental Risk Assessment Summary

Potential accidents that could occur as a result of MFFF operations have been grouped into one of the following event types:

- Natural phenomena
- Loss of confinement
- Internal fire
- Explosion
- Load handling
- External man-made events
- Criticality
- Direct radiation exposure
- Chemical releases.

The environmental risk assessment addresses the consequences associated with accidents in each event type up to and including design basis accidents. The environmental impacts of beyond design basis events are remote and speculative and do not warrant consideration under NEPA. While beyond design basis events are theoretically possible, their likelihood of occurrence is so low as to not result in any significant, additional risk from MFFF operations.

Design basis events for each event type are discussed in the following sections.

5.5.2.1 Natural Phenomena

A screening process was performed on a comprehensive list of natural phenomena to identify those credible natural phenomena that have the potential to affect the MFFF during the period of facility operation. Credible natural phenomena that could have an impact on MFFF operations include the following:

- Extreme winds
- External flooding
- Earthquakes
- Tornadoes
- External fires
- Rain, snow, and ice
- Lightning.

Natural phenomena could result in either the dispersion of radioactive material and hazardous chemicals or a loss of subcritical conditions. Natural phenomena events are discussed in the following sections.

5.5.2.1.1 Extreme Winds

Extreme winds are straight-line winds associated with thunderstorms or hurricanes. The design basis extreme wind has an annual exceedance probability of 1E-04. Extreme wind loads include loads from wind pressure and wind-driven missiles.

The associated wind load criteria are based on a basic wind speed of 130 mph. The wind-driven missile considered in the design is a 2- by 4-in (5.1- by 10.2-cm) timber plank, 15 lb (6.8 kg), at 50 mph (horizontal), at a maximum height of 50 ft (15.2 m).

The MFFF is designed to withstand the effects of the design basis extreme wind and the associated missiles. The design and associated margin reduce the likelihood of significant damage to the MFFF to Highly Unlikely. The likelihood definition is provided in Appendix F. Thus, no significant radioactive or hazardous material release or loss of subcritical conditions at the MFFF is postulated to occur for extreme wind events.

5.5.2.1.2 External Flooding

External flooding includes floods associated with rising rivers or lakes. The design basis flood has an annual exceedance probability of 1E-05 and would be expected to reach an elevation of less than 210 ft (64 m) above msl at SRS.

The MFFF site elevation is greater than 260 ft (79 m) above msl. Thus, no radioactive or hazardous material release or loss of subcritical conditions at the MFFF is postulated to occur for external floods.

5.5.2.1.3 Earthquakes

Earthquakes may result from movement of the earth's tectonic plates or volcanic activity. The design basis earthquake for the MFFF site is selected to have a 0.20g maximum ground acceleration applied at grade and a Regulatory Guide 1.60 spectral shape in the horizontal and vertical directions. This represents accelerations with an annual exceedance probability of approximately 1E-04 for frequencies of practical structural interest.. The possibility of soil liquefaction during an earthquake is also evaluated. R1

The MFFF is designed to withstand the effects of the design basis earthquake. The design and the associated design margin reduce the likelihood of significant damage to the MFFF to Highly Unlikely. Thus, no significant radioactive or hazardous material release or loss of subcritical conditions at the MFFF is postulated to occur for earthquakes.

5.5.2.1.4 Tornadoes

Tornadoes may occur in extreme weather such as thunderstorms or hurricanes. The design basis tornado has an annual exceedance probability of 2E-06. Tornado loads include loads due to tornado wind pressure, loads created by the tornado-created differential pressure, and loads resulting from tornado-generated missiles.

The associated wind load criteria and differential pressure load criteria for the MFFF site are based on the following:

- Maximum tornado wind speed: 240 mph
- Pressure drop across tornado: 150 psf
- Rate of pressure drop: 55 psf/sec.

The associated tornado-generated missile load criteria are based on the following:

Missile Description	Mass (lb)	Horizontal Impact Speed (mph)	Maximum Height (ft)	Vertical Impact Speed (mph)
3-in (7.6-cm) diameter steel pipe	75	75	100	50
2- by 4-in (5.1- by 10.2-cm) timber plank	15	150	200	100
Automobile	3,000	25	rolls and tumbles	not applicable

R1

The MFFF is designed to withstand the effects of the design basis tornado, and missile barriers are provided at building openings as necessary. The design and the associated design margin reduce the likelihood of significant damage to the MFFF to Highly Unlikely. Thus, no significant radioactive or hazardous material release or loss of subcritical conditions at the MFFF is postulated to occur for tornadoes.

5.5.2.1.5 External Fires

External fires are those fires associated with nearby forests or vegetation. Fires associated with nearby facilities are discussed in Section 5.5.2.6. The design basis external fire assumes a forest fire occurs in the forest nearby the MFFF site.

The MFFF is designed to withstand the design basis external fire. Thus, no radioactive or hazardous material release or loss of subcritical conditions at the MFFF is postulated to occur for external fires.

5.5.2.1.6 Rain, Snow, and Ice

Rain, snow, and ice are postulated to occur at the MFFF site several times during operation of the facility. The design basis rainfall has an annual exceedance probability of 1E-05, which corresponds to a peak rainfall of 7.4 in (18.8 cm) in one hour, or 3.9 in (9.9 cm) in 15 minutes. The design basis snow and ice events have an annual exceedance probability of 1E-02. The loads associated with these events are less than 10 psf. The effects of snow and ice loads associated with events that have a lower annual exceedance probability are bounded by the design for other live loads.

The MFFF is designed to withstand the effects of rain, snow, and ice. Thus, no radioactive or hazardous material release or loss of subcritical conditions at the MFFF is postulated to occur during or following these conditions.

5.5.2.1.7 Lightning

Lightning occurs during extreme weather (e.g., thunderstorms) and is postulated to occur on or near the MFFF site several times per year. Protection is provided in accordance with NFPA 780 (NFPA 1997). Thus, no radioactive or hazardous material release or loss of subcritical conditions at the MFFF is postulated to occur during or following these conditions.

5.5.2.2 Loss of Confinement

Within the MFFF, radioactive material is confined within one or more confinement barriers. Primary confinement barriers include gloveboxes and the associated ventilation systems; welded vessels, tanks, and piping; plutonium storage (inner can) containers; fuel rod cladding; ventilation system ducts and filters; and some process equipment. Secondary confinement barriers include plutonium storage containers (outer can), process rooms and the associated ventilation systems, and process cells and the associated ventilation systems. Tertiary confinement systems include the MFFF building and the associated ventilation systems.

The loss or damage of the primary confinement barrier may result in either the dispersion of radioactive materials and hazardous chemicals or a loss of subcritical conditions. Criticality events and the effects of hazardous chemicals are discussed in Sections 5.5.2.7 and 5.5.2.9, respectively. The loss at each level of confinement is necessary for a non-negligible release from the MFFF site to occur.

Damage to or failure of the confinement barriers can be caused by human error or equipment failure resulting in the following:

- Failure of negative pressure or a flow perturbation causing flow reversals between some confinement zones
- Breaches of container or rod confinement boundaries due to crushing, shearing, grinding, cutting, and handling errors
- Backflow into lines that penetrate primary and secondary confinement boundaries
- Corrosion-induced confinement failures
- Pipe or vessel breaks or leaks
- Clogging of filters
- Failure of filters
- Glove or seal failures during normal or maintenance operations
- Thermal excursions leading to failure of gloves, seals, and/or cladding.

Loss-of-confinement events caused by fires, explosions, load-handling events, natural phenomena, and external events are covered in their respective event discussions. Loss-of-confinement events are postulated to occur and are evaluated for each primary confinement within the MFFF without regard to the probability of the initiating event. Postulated loss-of-confinement events include the following:

- Loss of confinement from a glovebox containing powders, pellets, solutions, or fuel rods
- Loss of confinement from aqueous polishing process equipment containing plutonium or americium in solution form R2
- Loss of confinement from canisters, fuel rods, fuel assemblies, HEPA filters, or waste drums
- Loss of confinement from transportation packages or UO_2 drums.

The loss-of-confinement event postulated to produce the largest radiological consequences (See Appendix F for a definition of bounding events) is an event caused by a load handling accident of the Jars Storage and Handling Unit. See Section 5.5.2.5 for a description of this event. The bounding radiological consequences associated with this event are provided in Table 5-13. Appendix F provides assumptions associated with this event. The frequency associated with this event is estimated to be unlikely or lower since multiple failures are required for this event to occur. R2 R2

The bounding low consequence event consequence is a spill involving a silver recovery tank. Consequences are presented in Table 5-13b. The frequency of this event is estimated to be not unlikely or lower. R2

The MFFF utilizes many features to reduce the likelihood and consequences of these events as well as other loss-of-confinement events. Key features include reliable and redundant confinement systems; process temperature, pressure, and flow controls; radiation monitoring systems; redundant control systems; emergency procedures; and worker training.

As shown in Tables 5-13a and 5-13b, the radiological consequences at the SRS site boundary are low. Such impacts would not be sufficient to warrant evacuation of the public or interdiction or decontamination of land or food supplies. Tables 5-13a and 5-13b also show that the radiological consequences to the nearest site worker are low. Appendix F provides assumptions associated with this event. R2

R1

Given the low consequences and or low likelihood of this type of accident, the radiological risk from the loss-of-confinement events is low.

5.5.2.3 Internal Fire

A fire hazard arises from the simultaneous presence of combustible materials, an oxygen source, and a sufficient ignition source. A fire can spread from one point to another by conduction, convection, or radiation. The immediate consequence of a fire is the destruction, by combustion or by thermal damage, of elements in contact with the fire. A fire can lead to either the dispersion of radioactive materials and hazardous chemicals or a loss of subcritical conditions. Criticality events and the effects of hazardous chemicals are discussed in Sections 5.5.2.7 and 5.5.2.9, respectively.

Fires can be caused by human error, electrical equipment failures, equipment that operates at high temperatures, uncontrolled chemical reactions, or static electricity.

Fires are postulated to occur and are evaluated for each fire area within the MFFF without regard to the probability of the fire occurring. Fire areas and the associated fire boundary limit the size of the fire and contain the fire within the fire area. MFFF fire areas often correspond, but are not limited, to existing room boundaries. Thus, a facility-wide fire or a fire involving two or more fire areas simultaneously is a remote and speculative event. Postulated fires include the following: R2

- Fires within a fire area involving gloveboxes containing plutonium powder, pellets, solutions, or fuel rods R2
- Fires within a fire area involving aqueous polishing process equipment containing plutonium and/or americium in solution form R2
- Fires within a fire area involving fuel rods, fuel assemblies, canisters of plutonium, HEPA filters, or waste drums
- Fires within a fire area involving plutonium in transportation packages or uranium in drums.

The bounding fire event is a fire in the fire area containing the Final Dosing Unit. This unit contains polished plutonium powder for the purpose of down blending the mixed oxide powder to the desired blend for fuel rod fabrication. The evaluation conservatively assumes that a fire occurs in this fire area and impacts the powder stored in this area, resulting in a release of radioactive material. The bounding radiological consequences associated with this event are provided in Table 5-13a. The frequency associated with this event is estimated to be unlikely or lower since multiple failures are required for this event to occur. R2

The bounding low consequence fire event is a fire in a waste drum located in the truck bay. The frequency of this event is estimated to be not unlikely or lower as a fire could occur following the ignition of combustible material due to an electrical short or an unknown ignition source. Consequences of the event are presented in Table 5-13b. R2

The MFFF utilizes many features to reduce the likelihood and consequences of these events as well as other fire-related events. Key features include fire barriers, minimization of combustibles and ignition sources, ventilation systems with fire dampers and HEPA filters, nitrogen blanket systems, qualified canisters and containers, fire suppression and detection systems, emergency procedures, worker training, and local fire brigades. R1

As shown in Tables 5-13a and 5-13b, the radiological consequences at the SRS site boundary are low. Such impacts would not be sufficient to warrant evacuation of the public or interdiction or decontamination of land or food supplies. Tables 5-13a and 5-13b also show that the radiological consequences to the nearest site worker are low. R2 R2

Given the low consequences and/or low likelihood of this type of accident, the radiological risk from fire events is low.

5.5.2.4 Explosion

Internal explosion events within the MFFF result from the presence of potentially explosive mixtures and potential overpressurization events. These events may result in either the dispersion of radioactive materials and hazardous chemicals or a loss of subcritical conditions. Criticality events and the effects of hazardous chemicals are discussed in Sections 5.5.2.7 and

5.5.2.9, respectively. Explosions may be caused by human error or equipment failure and include the following:

- Loss of instrument air or offgas exhaust flow in units where radiolysis is possible
- High flow of fluids into tanks or vessels
- Pressurizing chemical reactions in vessels or tanks
- Increase in temperature beyond the safety limit in tanks and vessels
- Incorrect chemical addition/reagent preparation
- Excessive introduction of hydrogen into furnace
- Hydrogen accumulation
- Oxygen leaks
- Organic liquid vapor/methane reactions.

Postulated explosions include explosions involving flammable gases, chemical interactions, and overpressurization events.

The MFFF processes are designed to preclude explosions through the use of reliable engineering features and administrative controls. Key features include 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. Simultaneous failure of the design features and administrative controls resulting in an explosion and the subsequent release of radioactive materials is highly unlikely. Thus, explosions at the MFFF resulting in a radioactive material release are remote and speculative and need not be considered under NEPA.

Explosions are prevented by design features and administrative controls except in the laboratory. The radiological consequences of an explosion in the laboratory will not exceed regulatory limits. Although explosion events resulting in a radioactive material release at the MFFF are remote and speculative events, a hypothetical explosion event is evaluated. The evaluation conservatively assumes that an explosion occurs in an aqueous polishing process cell and involves the maximum material at risk in any process cell. The radiological consequences of this hypothetical event are presented in Table 5-13. As shown, the impacts to the public and the SRS workers are low. R2

Given the low consequences and/or low likelihood of this type of accident, the radiological risk from explosion events is low.

5.5.2.5 Load Handling

A load-handling hazard arises from the presence of lifting or hoisting equipment used during either normal operations or maintenance activities. A load-handling event occurs when either the lifted load is dropped or the lifted load or the lifting equipment impacts other nearby items. A load-handling event may result in either the dispersion of radioactive materials and hazardous chemicals or a loss of subcritical conditions. Criticality events and the effects of hazardous chemicals are discussed in Sections 5.5.2.7 and 5.5.2.9, respectively.

Load-handling events can be caused by equipment failure or human error.

Load-handling events are postulated to occur and are evaluated for all primary confinements throughout the MFFF without regard to the probability of the initiating event. Postulated load-handling events include the following:

- Drops impacting a glovebox containing powders, pellets, solutions or fuel rods
- Drops impacting aqueous polishing process equipment containing plutonium and/or americium in solution form R2
- Drops involving plutonium in canisters, fuel rods, fuel assemblies, HEPA filters, or waste drums
- Drops involving plutonium in transportation packages or uranium in drums.

The bounding load-handling event is a drop event involving the glovebox in the Jar Storage and Handling Unit. R2 This glovebox contains jars of plutonium powder. The glovebox is postulated to be impacted during maintenance operations by either a lifting device or a lifted load outside of the glovebox, damaging a portion of the glovebox causing some of its contents to drop to the floor, resulting in a release of radioactive material. The bounding radiological consequences associated with this event are provided in Table 5-13. The frequency associated with this event is estimated to be unlikely or lower since multiple failures are required for this event to occur. R2

The bounding low consequence load handing event is associated with the spill of a silver recovery tank postulated to occur during maintenance operations in the process cell. The frequency of this event is estimated to be not unlikely or lower as a tank spill could occur due to human error or equipment failure during maintenance activities. R2 Consequences are provided in Table 5-13b.

The MFFF utilizes many features to reduce the likelihood and consequences of this event as well as other load-handling events. Key features include loadpath restrictions, crane-operating procedures, maintenance procedures, operator training, qualified canisters, reliable load-handling equipment, and ventilation systems with HEPA filters.

As shown in Tables 5-13a and 5-13b, the radiological consequences at the SRS site boundary are R2 low. Such impacts would not be sufficient to warrant evacuation of the public or interdiction or decontamination of land or food supplies. Tables 5-13a and 5-13b also show that the radiological consequences to the nearest site worker are low. R2 Appendix F provides assumptions associated with this event.

Given the low consequences and low likelihood of this type of accident, the radiological risk from load-handling events is low.

5.5.2.6 External Man-Made Events

External man-made events originate from the operations of facilities or vehicles nearby the MFFF site. These events could then initiate events at the MFFF. The categories of nearby facilities and vehicles considered include the following: industrial facilities, military facilities, chemical facilities, SRS facilities, pipelines, automobiles, trucks, aircraft, helicopters, trains, and ships/barges. Events from these facilities and vehicles that could impact the MFFF are radiological releases, chemical releases, explosions, fires, and direct impact on the MFFF (i.e., airplane crash).

A screening evaluation was performed to determine if any credible external man-made events could impact MFFF operations. The screening evaluation determined that credible external man-made events will not significantly impact MFFF operations. The effects on the MFFF or the consequences from any potential MFFF event initiated by a credible external man-made event are bounded by the effects and consequences of events initiated by natural phenomena or MFFF internal hazards. Details of this evaluation are provided in MFFF CAR Chapter 5. R1

The screening evaluation did not include the effects of two nearby SRS facilities, PDCF and the WSB, due to their early design stage. These facilities will be evaluated as their safety analyses R2 become available. It is expected that the effects on the MFFF from credible events at these facilities are bounded by the effects of the natural phenomenon hazards and internal events currently evaluated. If necessary, additional features will be incorporated into the MFFF design and operations to account for potential accidents at these facilities.

Given the low consequences and low likelihood of this type of accident, the radiological risk from external man made events is low.

5.5.2.7 Criticality

Criticality is a physical phenomenon characterized by the attainment of a self-sustaining fission chain reaction. Criticality accidents can potentially release a large amount of energy over a short period of time. 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.

The immediate consequence of a criticality accident is a rapid increase in system thermal power and radiation as a "fission spike" that is generally terminated by heating and thermal expansion of the system. Subsequent spikes of less intensity may be expected. Direct radiation and dispersion of radioactive materials occur during and following a criticality accident. However, the direct radiation hazard to the public and the site worker is negligible since the radiation shielding afforded by facility structural features and the distances to these receptors inherently mitigate the direct radiation.

Criticality events are prevented by design features and administrative controls; however, criticality events can be caused by human error or equipment failure. R1

The MFFF processes are evaluated to determine where criticality events are possible. Further evaluations are performed, and prevention controls and measures are identified. Key controls include Geometry, Mass, and Moderation. These controls provide the primary means of protection against nuclear criticality events at the MFFF. Adherence to the double contingency principle, as specified in ANSI/ANS-8.1 (ANSI/ANS 1983b), ensures that a criticality event is Highly Unlikely. Thus, a criticality event at the MFFF is a remote and speculative event.

Although criticality events at the MFFF are remote and speculative, a generic hypothetical criticality event is evaluated. Regulatory Guides 3.71 (NRC 1998c) and 3.35 (NRC 1979) provide guidance for developing source terms for direct radiation and airborne releases resulting from a criticality accident. The radiological consequences of this hypothetical event are presented in Table 5-13a. In addition to the consequences shown in Table 5-13a, the radiological R2
consequences to a nearby MFFF worker (within meters of the event) could be severe.

Given the low likelihood of a criticality event occurring, and the low potential consequences to the site worker and public, the overall radiological risk from a criticality event is low.

5.5.2.8 Direct Radiation Exposure

A direct radiation hazard arises from the presence of radioactive material within the MFFF. Direct radiation exposure events include those events that result in a radiation dose from radiation sources external to the body. Due to the nature of the radioactive material present in the MFFF and the distance to the SRS site boundary, there are no accidents at the MFFF that R1
produce a direct radiation exposure hazard to the public from MFFF operations. Furthermore, there are no accidents (other than criticality) that produce a significant direct radiation hazard to the site workers. R1

5.5.2.9 Chemical Releases

A chemical hazard arises mainly from the use of chemicals in the aqueous polishing process and, to a much lesser extent, from chemicals used in the fuel fabrication process. Chemicals evaluated include those used during all modes of operation, those produced as a byproduct of operations, and those potentially produced by inadvertent chemical mixing and interactions. Chemical releases are postulated to occur from human error and equipment failures.

Consequences of chemical releases were determined for a potential release of each chemical. For evaporative releases, the chemical consequence analysis modeling for public consequences used R1
the ALOHA code (EPA 1999), the ARCON96 code (NRC 1997), and the MACCS2 code (NRC 1998a) to calculate the maximum airborne chemical concentration at the SRS boundary (5.0 mi

[8 km] from the MFFF). Calculated concentrations were compared to Emergency Response Planning Guidelines (ERPGs) or to Temporary Emergency Exposure Limits (TEELs). TEELs describe temporary or equivalent exposure limits for chemicals for which official ERPGs have not yet been developed. R1

An evaporation model extracted from the ALOHA code was used to calculate a release from a spilled or leaked chemical, which is assumed to form a puddle one-centimeter deep. A spill or leak from the largest tank or container holding the chemical was modeled.

Consideration for spill size, location, container integrity, and chemical concentration was included in the evaluation.

Based on the results, DCS concludes that the concentration of all chemicals at the SRS boundary following a release from the MFFF is low. The results also indicate that the maximum chemical concentrations for the site workers are low. The frequency of significant chemical releases at the MFFF is conservatively estimated to be unlikely. Appendix F provides additional information related to the chemical evaluation.

MFFF features to reduce the frequency and magnitude of a chemical release include the following: reagent preparation controls, separation and segregation of incompatible reagents, process temperature controls, ventilation controls, vessel level indications, drip trays, leak detection, sumps, drains, operating procedures, emergency procedures, operator training, hazardous material control, toxic gas exhaust systems, and an emergency control room.

Given the low consequences and/or low likelihood of this type of accident, the risk from chemical releases is low.

5.5.3 Evaluation of Facility Workers

The risk to workers is qualitatively evaluated for all MFFF events. Sufficient engineering design features and administrative controls have been incorporated into the MFFF design to ensure that any unacceptable consequence is highly unlikely.

Key design features include shielding, confinement systems, criticality and explosion prevention structures, systems, and components (SSCs), radiation monitoring systems, and fire protection systems. Key administrative controls include operator training, criticality safety, radiation protection, fire safety, and industrial hygiene programs. In addition, workers are trained and qualified and perform their work in accordance with approved procedures.

Given the low consequences and/or low likelihood of events, the overall radiological risk to the MFFF worker is low.

5.5.4 Conclusions

The environmental impacts that have been considered include potential radiation and chemical exposures to individuals and to the population as a whole, and the risk of near- and long-term adverse health effects that such exposures could entail. The evaluation demonstrates that the environmental risk is low. R1

5.6 CUMULATIVE IMPACTS

Cumulative impacts are the impacts on the environment which result from the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes those other actions. In the case of the MFFF, the cumulative impacts are divided into the following groupings:

1. **Impacts from SRS activities**: These are other activities in geographic proximity to the MFFF that combine with the MFFF to produce a larger impact to the environment than the MFFF alone. Included in these impacts are those related to construction, operation, and deactivation of the PDCF and PIP.

2. **Impacts of other actions near the MFFF and SRS**: These are impacts from activities of other federal or state agencies or private industry that may combine with the MFFF and SRS impacts to produce a larger impact to the environment than the MFFF alone.

3. **Transportation impacts**: These are impacts that the proposed action causes to the environment beyond the geographic bounds of the MFFF or SRS.

4. **Impacts at mission reactors**: These are impacts related to the proposed MFFF but not directly connected to MFFF operations.

Each of these impacts is discussed in the following sections.

5.6.1 Impacts from SRS Activities

The SPD EIS (DOE 1999c) discussed the impacts from constructing the PDCF [Text Deleted]. Appendix G of this ER presents environmental impact information for the proposed WSB. Environmental impacts of the proposed WSB are, in most cases, projected to be bounded by the impacts of the now cancelled immobilization plant. Consequently, for many of the WSB environmental impacts, the impacts projected in the SPD EIS for the immobilization plant are reported. Data presented in Appendices G, H, and J of the SPD EIS and Appendix G of this ER are summarized in Table 5-14. R2

In SPD EIS Section 4.32.2 and Appendix F of that document, DOE provided an extensive discussion of the cumulative impacts of the plutonium disposition activities. Environmental impacts of other current and reasonably foreseeable future SRS activities are combined with the impacts of the surplus plutonium disposition activities in Tables 5-15a through 5-15d. The R1 impacts of the PDCF and WSB reflect the impacts listed in the SPD EIS appendices for "other plutonium disposition facilities" at SRS. Impacts for other SRS activities reflect the impacts projected in various EISs prepared for SRS.

Impacts of the MFFF and the other surplus plutonium disposition facilities on land use, not illustrated in Tables 5-15a through 5-15d, are predominately from the grading of the land for the facility and the land used to bring utility services to the MFFF and remove waste. Current use of this land is either as a forest plantation or as existing right-of-way. All of the industrial land use on the SRS site is small compared to the amount of land devoted to forestry. R1

The overall effect of the projects on stormwater will be to increase total runoff in any given storm event. In accordance with SCDHEC regulations, the detention/retention basins will be sized to mitigate these impacts by retaining suspended solids and dampening peak stormwater flows.

As illustrated in Table 5-15a, increases in nonradiological airborne pollutants are dominated by other current and planned SRS activities. Because the MFFF only uses diesel generators as standby and emergency power sources, emissions of conventional pollutants are very small compared to other SRS activities. SRS is currently in substantial compliance with applicable federal, state, and local air quality requirements, and compliance would be maintained even with the consideration of the cumulative effects of all the surplus plutonium disposition activities.

Table 5-15b provides a comparison of radiological impacts from the MFFF to impacts from current and projected SRS activities. The MFFF is a small contributor to public dose. Projected MFFF radiological impacts would be less than 1% of the dose from the SRS baseline reported by Arnett and Mamatey in 1998. A review of recently released data for 2000 (Arnett and Mamatey 2001) confirms that projected MFFF doses to the maximally exposed member of the public would remain a small fraction of the dose from other SRS activities. R1

The liquid high alpha waste generated by the MFFF operations is largely a liquid americium waste with some acid recovery residues, and traces of unrecovered silver. This waste, along with the stripped uranium waste, will be solidified in the WSB. The solidified high alpha waste will be disposed as TRU waste and the solidified uranium waste will be disposed as LLW.

R2

The volumes of TRU waste, LLW, and nonradioactive wastes expected to be generated by the MFFF will be minor contributions to the current waste inventories. Table 5-15c illustrates that anticipated MFFF waste generation is 1% to 10% of all anticipated SRS waste generation.

5.6.2 Impacts from Other Nearby Actions

Nuclear facilities within a 50-mi (80-km) radius of SRS include the following:

- Georgia Power Company's Vogtle Electric Generating Plant in Sardis, Georgia, across the river from D Area of SRS

- Chem-Nuclear Services LLW disposal facility, several miles east of SRS
- Starmet CMI, Inc., located southeast of SRS, which processes uranium-contaminated metals.

Radiological impacts from operation of Vogtle Electric Generating Plant, a two-unit commercial nuclear power plant, are minimal. However, DOE factored them into the human health risk analysis for the SRS activities. The SCDHEC Annual Report (SCDHEC 1996) indicated that operation of the Chem-Nuclear Services facility and the Starmet CMI facility does not noticeably impact radiation levels in air or liquid pathways in the vicinity of SRS. Therefore, they are not included in this assessment.

The counties surrounding SRS have numerous existing and planned industrial facilities with permitted air emissions and discharges to surface water. Because of the large distances between SRS and the private industrial facilities (e.g., more than 20 mi [32.2 km] from Augusta-Richmond County industrial complex), there is little opportunity for interactions of facility emissions, and no major cumulative impact on air or water quality.

The planned federal and state highway projects in the vicinity of SRS, discussed in Section 4.10.3, are all expected to be completed before construction of the MFFF and do not represent a cumulative impact.

5.6.3 Transportation Impacts

The cumulative impacts of plutonium disposition program transportation activities and other SRS transportation activities were discussed in Section 4.32.4.5 of the SPD EIS. The SPD EIS projected 2,557 truck shipments for the plutonium disposition activities compared to 115,187 truck shipments for other SRS activities during the same period. Annual dose to the MEI was projected to increase by 12 % from 0.59 mrem/yr to 0.66 mrem/yr. This would result in a LCF risk of 4.9 E-06, which does not significantly increase the risk to the public. R2

5.6.4 Impacts Related to Fuel Irradiation at Mission Reactor Sites

The irradiation of MOX fuel is a related action that was evaluated in the SPD EIS (DOE 1999c). In the SPD EIS, DOE reported information about the mission reactors concerning the projected irradiation of MOX fuel. DOE used this information to project the impacts that might be expected from irradiating MOX fuel. DOE, in the S&D PEIS evaluated environmental impacts of irradiating fuel in generic mission reactors. In the SPD EIS, DOE evaluated the impacts of irradiating MOX fuel at six specific mission reactors. Although the North Anna Units 1 and 2 are no longer being considered for MOX fuel irradiation, the analyses of environmental impacts at mission reactors presented in the S&D PEIS and SPD EIS is still considered typical for any future mission reactors. More detailed information for the environmental impacts at selected mission reactors would be presented as part of the documents prepared for the mission reactor license amendments. R2

As discussed in Section 4.28 of the SPD EIS, there are no anticipated construction impacts because the irradiation of MOX fuel will not require any construction at the mission reactors. The SPD EIS discussed impacts to air quality, water quality, waste management, socioeconomics, human health, ecological resources, cultural resources, land use, and infrastructure. The SPD EIS determined that there should be no change in impacts to the environment during normal operations at the mission reactors resulting from the irradiation of MOX fuel. This conclusion is reinforced by a communication from Electricite de France, which operates several MOX fuel power plants in France. Electricite de France (Provost 1998) noted that average dose to the public at operating MOX fueled plants was not sensitive to low enriched uranium or MOX fuel and approximated 1 μSv/yr (0.1 mrem/yr), compared to natural exposure of 2,500 μSv/yr (250 mrem/yr).

The SPD EIS (Section 4.28.2.5) also determined that the impacts on the public of the design basis and beyond design basis accidents for the mission reactors involving MOX fuel were not significantly different from the impact of accidents involving low enriched uranium fuel. The analysis results reported by DOE were obtained using somewhat different methodology than would be used for NRC safety analyses. However, the results still support the conclusion that the environmental impacts related to the use of MOX fuel at the mission reactors are not significantly different from the impacts related to using uranium fuel. Safety and environmental impacts of design basis and beyond-design basis accidents will be analyzed by the mission reactor licensee as part of the 10 CFR Part 50 reactor license amendment process.

5.6.5 Impacts to Commercial Fuel Fabrication

The amount of MOX fuel that will be produced by the MFFF represents less than 1% of the domestic commercial fuel used (Clark 2000). Consequently, financial impacts to commercial fuel fabrication should be minimal.

5.7 ALTERNATIVES TO THE PROPOSED ACTION

Alternatives to the MFFF facility were evaluated as part of the SPD EIS (DOE 1999c). The SPD EIS ROD (DOE 2000b) announced the decisions regarding alternatives. It should be emphasized that the alternatives considered in the SPD EIS are not alternatives to the proposed action in this ER and therefore will not be presented is this ER. The No Action Alternative for this ER is denial of a license to possess and use SNM. This No Action Alternative, however, does not meet the "need" for the facility as described in the SPD EIS ROD or the joint U.S.-Russian Federation Agreement signed in September 2000 (White House 2000). The consequences of the No Action Alternative, continued long-term storage of surplus plutonium, are identical to the consequences for the No Action Alternative described in the SPD EIS. The impacts of this alternative are described in Section 5.7.1. The Preferred Alternative presented in the SPD EIS, and chosen in the SPD EIS ROD, included the location of the MFFF in F Area at SRS. Accordingly, the guidance in Appendix F of NUREG-1718 (NRC 2000a) regarding siting alternatives are not deemed relevant, and only siting alternatives for the MFFF within F Area are considered in this

ER. This evaluation is discussed in Section 5.7.2. Design alternatives that may impact the environment are discussed in Section 5.7.3.

5.7.1 No Action Alternative

As discussed in Section 1.3, the No Action Alternative is denial of a license to possess and use SNM. This No Action Alternative, however, does not meet the "need" for the facility as described in the SPD EIS ROD (DOE 2000b) or the joint United States-Russian Federation Agreement signed in September 2000 (White House 2000). The consequences of the No Action Alternative are continued storage of surplus plutonium. Surplus plutonium is currently stored at (1) the Hanford Reservation in Washington, (2) INEEL in Idaho, (3) the Pantex Site in Texas, (4) SRS in South Carolina, (5) Rocky Flats Environmental Technology Site (RFETS) in Colorado, (6) LANL in New Mexico, and (7) LLNL in California. The environmental impacts of continued surplus plutonium storage at these sites were discussed in the S&D PEIS (DOE 1996b) and the SPD EIS (DOE 1999c). The information presented in this section is a summary of the information from these two DOE NEPA documents.

The environmental impacts of continued plutonium storage at each of these sites are summarized in Table 5-16 and discussed in the following sections.

5.7.1.1 Air Quality

Continued storage of surplus plutonium would generate air pollutants associated with operation of boilers, diesel generators, vehicles, and other emission sources required to maintain the storage facilities in a stable configuration. The estimates of air pollutant impacts presented in Table 5-16 were extracted from Tables 4-1 through 4-7 of the SPD EIS (DOE 1999c). These estimates are based on emission rates reported in the S&D PEIS (DOE 1996b). The emission rates were based on actual air quality records for the various sites. For the No Action Alternative, the emissions data were converted to ambient concentrations using the EPA-recommended Industrial Source Complex Short-Term Model Version 2 (EPA 1992). A full discussion of the process used to generate these air quality impact estimates is provided in Appendix F of the S&D PEIS.

For most storage sites, with the exception of LLNL, the impact of continued surplus plutonium storage on ambient air quality concentrations is projected to be below the most stringent federal or state standard. At LLNL, continued storage of surplus plutonium is expected to result in an exceedance of the one-hour standard for nitrogen dioxide.

5.7.1.2 Human Health

For all sites, continued surplus plutonium storage would result in population doses within 50 mi (80 km) ranging from 6.3E-06 person-rem at Pantex to 2.7 person-rem at LANL. Dose to the MEI (public) would range from 1.8E-08 mrem at Pantex to 6.5 mrem at LANL. Potential LCFs, over the 50-year period examined in the SPD EIS (DOE 1999c), resulting from these doses to the population ranged from 0.36 at INEEL to 1.3 at SRS.

Health impacts to the public from exposure to hazardous chemicals would not change appreciably from existing impacts.

5.7.1.3 Facility Accidents

Facility accidents associated with continued surplus plutonium storage were evaluated in the S&D PEIS (DOE 1996b). The accident scenarios evaluated in the S&D PEIS are summarized in Table 5-17. The accident consequences evaluated are summarized in Table 5-18. Based on the analyses, for the sites evaluated, the beyond evaluation basis earthquake was the facility accident of greatest consequence. The population dose and associated potential LCFs for the beyond evaluation basis earthquake are summarized in Table 5-16.

5.7.1.4 Radioactive Waste Generation

Wastes generated by activities associated with the storage of surplus plutonium at each of the existing sites are a portion of the existing site generation rates. Waste generation rates should not appreciably change at these sites; therefore, impacts are not expected to change from those currently experienced from other site activities at each of these sites.

5.7.1.5 Transportation

Continued storage of surplus plutonium at existing sites would not involve intersite transportation of radioactive materials.

5.7.1.6 Ecological Resources

The No Action Alternative involves continued surplus plutonium storage in existing facilities. Under this alternative, there would not be any construction of new buildings or demolition of existing buildings. Consequently, there are no expected impacts to ecological resources.

5.7.2 Site Selection

The selection of a site for the MFFF involved evaluations included in the S&D PEIS (DOE 1996b), the SPD EIS (DOE 1999c), and the MFFF ER. At each stage of the selection process, the range of site alternatives was narrowed by using increasing detail in the evaluation of environmental and engineering impacts. The following is a summary of the processes used to select the final location of the MFFF.

5.7.2.1 Storage and Disposition Programmatic Environmental Impact Statement

In the S&D PEIS (DOE 1996b), DOE considered only sites that already possessed weapons-usable fissile material as candidate sites for the surplus plutonium disposition facilities. This criterion allowed for the utilization of existing security and facilities that were already adapted to weapons-usable fissile material. The Summary for the S&D PEIS notes the following:

> The Storage and Disposition PEIS analyzes six candidate sites for long-term storage of weapons-usable fissile material. These sites are Hanford, NTS [Nevada Test Site], INEL [Idaho National Engineering Laboratory now named the Idaho National Engineering and Environmental Laboratory], Pantex, ORR [Oak Ridge Reservation], and SRS. These same sites were also used to evaluate the construction and operation of various facilities required for the disposition alternatives.

The S&D PEIS did not select a site for the disposition facilities. The impacts of the surplus plutonium disposition facilities were considered for all the candidate sites as part of the evaluation of the generic impacts of the alternatives. Consequently, DOE did not conduct a separate siting study. As a result of the S&D PEIS evaluation, DOE issued a ROD. The following decision concerning the siting of the MFFF is found in the S&D PEIS ROD (DOE 1997c):

> The exact locations for disposition facilities will be determined pursuant to a follow-on, site-specific disposition environmental impact statement (EIS) as well as cost, technical and nonproliferation studies. However, DOE has decided to narrow the field of candidate disposition sites. DOE has decided that a vitrification or immobilization facility (collocated with a plutonium conversion facility) will be located at either Hanford or SRS, that a potential MOX fuel fabrication facility will be located at Hanford, INEL, Pantex, or SRS (only one site), and that a "pit" disassembly and conversion facility will be located at Hanford, INEL, Pantex, or SRS (only one site).

This decision is further discussed in Section V.B (p. 21) of the ROD:

> [DOE will] construct and operate a domestic, government-owned, limited-purpose MOX fuel fabrication facility at Hanford, INEL, Pantex, or SRS (only one site). As noted above, NTS and ORR will not be considered further for plutonium disposition activities. In follow-on NEPA review, DOE will analyze alternative locations at Hanford, INEL, Pantex, and SRS, for constructing new buildings or using modified existing buildings. The MOX fuel fabrication facility will serve only the limited mission of fabricating MOX fuel from plutonium declared surplus to U.S. defense needs, with shut-down and decontamination and decommissioning of the facility upon completion of this mission. [DCS is contractually responsible for deactivation of the MFFF. DOE will perform any required decommissioning after the license is terminated and the MFFF is turned over to DOE.]

5.7.2.2 Surplus Plutonium Disposition Environmental Impact Statement

In the SPD EIS (DOE 1999c), the selection of a site for the MFFF was integral to the selection of a preferred alternative. Consequently, DOE did not conduct a site selection separate from the environmental evaluation of the various alternatives.

The four potential sites selected in the S&D PEIS ROD (DOE 1997c) were combined with the three facilities (PDCF, MFFF, and PIP) to yield 64 possible alternatives. These alternatives were narrowed, as described in Section S.4 of the SPD EIS (DOE 1999c).

> In the Record of Decision (ROD) for the Storage and Disposition PEIS, DOE identified a large number of possible options to locate three surplus plutonium disposition facilities at four sites, and limited the immobilization options to Hanford and SRS. In addition to the four different sites for potential facility locations, the options were further increased by considering the use of either existing or new facilities at the sites, and by considering whether disposition would occur by the hybrid approach (MOX fuel fabrication and immobilization) or only through immobilization.

The following equally weighted screening criteria were used to reduce the large number of possible facility and site combinations to a range of reasonable alternatives:

- Worker and public exposure to radiation
- Proliferation concerns due to transportation of materials
- Infrastructure.

Over 64 options were evaluated, yielding a range of 20 reasonable alternatives that met all of the criteria. Examples of options that were eliminated include all those options placing three facilities at three different sites. In its NOI, DOE proposed to collocate the pit conversion and immobilization facilities for the immobilization-only alternatives. However, during the public scoping process, the comment was made that, under all situations, Pantex should be considered as a candidate site for the pit conversion facility because most of the surplus pits are currently stored there. After confirming that they met all of the screening criteria, three additional immobilization-only alternatives, which place the pit conversion facility at Pantex, were included in the range of reasonable alternatives evaluated in the draft SPD EIS. The number of reasonable alternatives was reduced to 15 in the Supplement when DOE determined that Building 221-F at SRS was no longer a reasonable location for the immobilization facility.

Using the data provided in the SPD EIS, DOE issued the following decision in the SPD EIS ROD (DOE 2000b).

> The Department has decided to implement a program to provide for the safe and secure disposition of up to 50 metric tons of surplus plutonium as specified in the Preferred Alternative in the *Surplus Plutonium Disposition Final Environmental Impact Statement*. The fundamental purpose of the program is to ensure that

> plutonium produced for nuclear weapons and declared excess to national security needs (now and in the future) is never again used for nuclear weapons. Specifically, the Department has decided to use a hybrid approach for the disposition of surplus plutonium. This approach allows for the immobilization of approximately 17 metric tons of surplus plutonium and the use of up to 33 metric tons of surplus plutonium as MOX fuel. The Department has selected the Savannah River Site in South Carolina as the location for all three disposition facilities. Based upon this selection, the Department will authorize DCS to fully implement the base contract.

The Preferred Alternative presented in the SPD EIS (DOE 1999c), and chosen in the SPD EIS ROD (DOE 2000b), included the location of the MFFF in F Area at SRS. Accordingly, only siting alternatives for the MFFF within F Area are considered in this ER. There are five potential plots within F Area that could be used for the MFFF. DOE determined the exact location of the MFFF subsequent to the SPD EIS ROD. The following section describes how the exact plot for the MFFF was selected.

5.7.2.3 Site Selection within SRS F Area

The site selection process considered the guidance in DOE Good Practice Guide GPG-FM-024, *Site Selection Process* (DOE 1996c), and NRC Regulatory Guide 4.7, *General Site Suitability Criteria for Nuclear Power Stations* (NRC 1998b). Figure 5-2 illustrates the location of the five potential plots (labeled 1 through 5) for the MFFF. The plot between locations 2 and 5 was previously selected by DOE for the PDCF. Area 1 was also designated for another use. After a preliminary evaluation, DOE identified four options:

- Option 1 – Locate the MFFF in Area 2
- Option 2 – Reconfigure and re-orient the PDCF and MFFF as far north as possible in Areas 4 and 5
- Option 3 – Locate the MFFF in Area 3 or some combination of Areas 3 and 4
- Option 4 – Locate the MFFF in Area 5.

5.7.2.4 Siting Qualification Criteria

The following criteria were chosen as the most significant challenges to successful licensing of the MFFF and represent the selection criteria that the site must meet:

- **Free from subsurface contamination**: There are no plumes of substances possibly requiring remediation or resulting in increased costs, delays, licensing difficulties, or health hazards.

- **Adequate terrain and area**: The site option provides sufficient level terrain and is generally suitable for the footprint of the MFFF without adverse impact to the facility function.

- **Free from RCRA/CERCLA features**: No features governed by RCRA or CERCLA are known to be present. The presence of such features poses an issue with as yet indeterminate and potentially significant liabilities for removal/remediation.

5.7.2.5 Siting Evaluation Criteria

Evaluation criteria are more qualitative in nature and are based on technical, environmental, and economic factors. The perceived relative importance of each of these criteria is determined and assigned a weight from 1 (least important) to 3 (most important). The ability of each site to meet each criterion is assessed, and a rating is assigned from 1 (marginal) to 3 (more than adequate). The product of the weights and ratings for each site criterion is determined and added for each site. The qualitative evaluation criteria chosen are as follows:

- **Protected species**: No known protected flora or fauna species.

- **Water table**: The water table must lie significantly below the MFFF substructure to ensure economical design and construction and to avoid nuclear design issues.

- **Topography**: Balancing of cut and fill, with a high site option being preferred for security purposes. Relatively level with a minimum of steep grades. It is impractical for an MFFF site to block natural drainage.

- **Accessibility**: Proximity to existing roads and to the planned PDCF site.

- **Soft zones**: Site differences in potential for subsurface soft zones.

- **Utilities/infrastructure**: A measure of availability of water, sewer, electricity, waste disposal, and related services.

- **Wetlands**: Low-lying areas where compensatory measures are required if the wetlands are altered or destroyed.

- **Archaeological features**: Indicates that historical artifacts requiring further investigation have been found.

- **Interference with existing SSCs**: Existing SSCs would have to be relocated or removed.

5.7.2.6 Summary of Siting Evaluation

Table 5-19 summarizes the evaluation scores for the four options considered by DOE to locate the MFFF within the SRS F Area.

Only Area F-2 (Option 1) actually met all the qualification criteria. Additionally, Area F-2 also had the best score among the evaluation criteria. Therefore, Area F-2 was selected as the plot for the MFFF.

5.7.3 Design Alternatives

As part of the consideration of reasonable alternatives to the proposed action, DCS considered several design alternatives for the MFFF in addition to the No Action and siting alternatives discussed earlier. In selecting design alternatives for review, DCS focused on possible alternatives that could have some potential impact or significance from an environmental perspective. Changes in the MFFF design that would not have any significant environmental impact (e.g., modifications to the size or construction of administrative buildings) were not considered in detail.

In 1999, while the SPD EIS (DOE 1999c) was in preparation, DOE selected DCS to execute the design, construction, operation, and deactivation of the MFFF. The Request for Proposals required the submission of a general facility and process design to accomplish the fabrication of MOX fuel. One of the bases for selection of DCS as the contractor was the DCS proposal to use a proven design (the COGEMA process) based on actual operations of similar facilities (MELOX and La Hague) in France. The COGEMA design represents the results of several iterations of process design and operating experience over several years of MOX fuel production in France. This design optimizes both production and safety. The selection of DCS and the contractual arrangements with DOE established the basic design of the facility and process.

In particular, the SPD EIS covered the throughput and support facilities for the MFFF. The MFFF maximum throughput was established at 3.9 tons (3.5 metric tons) of plutonium (DOE 1999c). The general design of the MFFF building is provided in the SPD EIS. The MFFF would be a hardened, reinforced-concrete structure. Areas of the facility in which plutonium would be processed or stored would be designed to survive natural phenomena and potential accidents. Ancillary buildings would be required for support activities. Facility operations would require a staff of about 385 personnel[7].

The SPD EIS identified the fuel fabrication areas as two parallel process lines with room for a third line to accommodate the potential for fabricating a different type of fuel. The process would be in batch operations conducted in continually monitored, negative-pressure, inert atmosphere gloveboxes. The building ventilation system would be designed to maintain

[7] Although the SPD EIS projected a staff level of 385, current projections are for a staff level of about 400 personnel.

confinement and include HEPA filters for both internal systems and building exhausts. Both intake and exhaust air would be filtered, and exhaust gases would be monitored for radioactivity. Power would be supplied to the MFFF by two independent offsite power supplies and backed up by an onsite uninterruptible power supply and standby generators.

The SPD EIS also indicated that the MFFF would contain areas for support activities including SNM vault areas, shipping and receiving, emergency generators, and process gas waste treatment. Support areas for access control, office space, and some warehouse space would be located outside the protective fence.

In selecting the SRS F Area as the location for the MFFF, DOE took advantage of the existing SRS infrastructure for providing security, emergency, and utility support services including existing waste management facilities. This decision, contained in the SPD EIS, eliminated the need for a new waste treatment system for the MFFF wastes. This decision reduces the environmental impacts associated with the construction and operation of a waste treatment system for the MFFF.

In the process of converting the COGEMA design, based on the MELOX and La Hague facilities, to meet United States regulations, codes, and standards, DCS considered the design alternatives discussed in the following sections.

The basic design of the MOX fuel fabrication building consists of an aqueous polishing process area, a MOX fuel fabrication process area, and a shipping and receiving area. The MOX fuel fabrication process area utilizes essentially two parallel process lines that maximize automation while performing batch operations in continually monitored, negative-pressure, and in many cases, inert atmosphere gloveboxes. The building ventilation system is designed to maintain dynamic confinement and includes two HEPA filters at the supply and exhaust of all gloveboxes, an intermediate supply and exhaust room filter in rooms that contain gloveboxes, and two final HEPA filters in all ductwork prior to discharge into a common stack. Exhaust gases are monitored for radioactivity. Power to the MFFF is supplied by two independent offsite power supplies and backed up for selective operations by redundant emergency and standby diesel generators and an onsite redundant emergency uninterruptible power supply. Support areas include office space, gas storage, portions of access control, and warehouse space.

This design is consistent with the design described in the SPD EIS and implements the COGEMA design, based on the MELOX and La Hague facilities. In implementing the COGEMA design, DCS also considered lessons learned based on past operating experience and Americanization to meet United States regulations, codes, and standards. During design development for the MFFF, DCS considered various design alternatives that involved auxiliary processes, support systems, and services that could potentially impact or have significance from an environmental perspective. Nine design alternatives are discussed in the following sections.

5.7.3.1 Reagent Process Building

DCS considered two options for locating the aqueous polishing reagent process. One option was to locate the preparation of reagents within the same area as the aqueous polishing area. The second option was to locate the reagent process in a separate building and pump mixed reagents to the aqueous polishing area.

The reagent preparation process involves an exothermic reaction that presents a potential explosion hazard. DCS decided to separate the preparation of material presenting the potential chemical explosion hazard from the SNM. The reagent preparation process was moved to a separate building adjacent to the aqueous polishing area. The mixed reagents will be pumped to the aqueous polishing area on an as-needed basis. The relocation of these processes reduces the potential of a chemical accident resulting in a release of radioactivity to the environment.

In the design of the Reagent Process Building, DCS considered the use of underground storage tanks to contain any overflows and spills from the reagent storage and mixing tanks. Because of the environmental risk associated with underground waste storage tanks, DCS decided to eliminate the underground tanks. Any overflows and spills from the reagent storage and mixing tanks will be contained in a curbed area and will be manually pumped to an above-ground waste collection vessel within the Reagent Process Building.

5.7.3.2 Recycling of Acid Recovery Distillates in the Aqueous Polishing Process

DCS selected a design alternative for the acid recovery process that consists of adding an evaporation step to lower the activity of these distillates and to recycle half of the volume of the distillates in place of fresh demineralized water. The reduced volume of evaporator concentrates is transferred to the F-Area Outside Facility as a liquid high alpha activity waste. The addition of this evaporator reduces the volume of liquid for processing at the F-Area Outside Facility and reduces the volume of demineralized water required for the process.

5.7.3.3 Reduction in TRU Waste Volume Due to Lower Glovebox Cooling Flow Rates

Glovebox internal cooling flow rates at MELOX are dependent on the heat release of reactor-grade plutonium. The heat release of weapons-grade plutonium is significantly lower than that of reactor-grade plutonium. Because of the lower heat release, the glovebox internals can be cooled by natural convective cooling, which results in a reduced airflow, filter size, and TRU solid waste volume during periodic filter replacement.

5.7.3.4 Recycling of Laboratory Effluents Using Aqueous Polishing Capability

Aqueous laboratory wastes at MELOX are precipitated and solidified, resulting in TRU wastes. In the MFFF, the plutonium is removed from the laboratory waste and recycled into the aqueous polishing process. The resulting laboratory wastes are LLW.

5.7.3.5 Decloggable Metallic Pre-filter in Powder Grinding Glovebox

Based on operating experience, DCS replaced a two-stage cyclone separator in the MOX powder processing with a decloggable metallic filter. This design results in an overall reduction of TRU waste volume during periodic filter replacement downstream of these components.

5.7.3.6 Sand Filters Compared to Multiple Fire Areas

DCS compared the advantages of sand filters and HEPA filters on the design, licensing, construction, and operation of the MFFF. The comparison was based, in part, on a recent study R1 by the DOE (Washington Group 2001). Both alternatives can provide an adequate confinement for prevention for releases. The sand filter decontamination factor is slightly less than that for the HEPA filter system, but both systems provide adequate decontamination efficiency (i.e., the change in decontamination factors is insignificant). The capital cost of the HEPA filter option is slightly ($4M) lower than the sand filter, while the life cycle cost of the sand filter option is slightly ($4M) lower than the HEPA filter configuration presented in this study. Overall, cost is not a significant distinguishing factor between the two alternatives. The D&D costs are not significantly different for either alternative, assuming all wastes are LLW (no TRU), and that sand filters will be entombed in place[8]. If complete site remediation is required, the costs for sand filter decommissioning would be large.

The differences in environmental impacts were not significant enough to influence the alternatives selection. The sand filter would inundate more land area. The sand filter is not as efficient as the HEPA filter at controlling facility releases, but the difference is minor (both systems meet environmental requirements). Since the HEPA filter alternative provides complete site remediation, there is no post-closure care unlike the sand filter alternative. The sand filter option will produce less LLW during the operation phase.

DCS selected HEPA filters for the following reasons:

- HEPA filters are used in the MELOX facility, which is the technical baseline for the MFFF.
- The MFFF HEPA filter system incorporates prefilters and spark arrestors. The MFFF building design limits the propagation of fires to small fire areas within the facility, eliminating the possibility of a facility-wide fire. This design maintains dynamic confinement during postulated fire. The design eliminates the need for sand filters to mitigate a facilitywide fire. R1
- Environmental impacts from the additional land requirements for the sand filters are eliminated.

[8] Although prefilters are not credited for the facility safety basis, they are expected to capture most or all particulates during both normal and off-normal operations and therefore the final HEPAs are anticipated to be LLW. R1

- HEPA filters are the nuclear industry standard for high-efficiency air cleaning, 99.97% for particulate matter.

- HEPA filters are identified in NRC Regulatory Guide 3.12 as being acceptable to the Regulatory staff for the design of ventilation systems for plutonium processing and fuel fabrication plants and, therefore, are considered "adequate to protect health and minimize danger to life and property." R1

- Sand filters have an increased design, cost, and operation risks because actual filter performance will not be known until the filters have been constructed and tested, while HEPA filters are factory tested before delivery and will have known performance characteristics.

5.7.3.7 Facility Heat Exchangers

Because the MFFF has a relatively small heat load, DCS evaluated both water-cooled (cooling tower) and air-cooled heat exchangers to dissipate the building and process heat loads. The engineering evaluation recommended the use of air-cooled heat exchangers for the MFFF. This decision eliminated any potential environmental impacts normally associated with water-cooled heat exchangers such as impacts from cooling tower drift or blowdown.

5.7.3.8 Physical Security Barriers

DCS evaluated a number of options for the creation of security barriers for the facility. One option included the construction of an engineered berm around the facility. This option, which would have required a larger site and impacted land resources, was eliminated in favor of other security barrier options, which resulted in less land disturbance.

5.7.3.9 Material Transfer From the PDCF and MFFF

Plutonium that has been converted to plutonium oxide must be transferred from the PDCF to the MFFF. DCS evaluated several different options for this transfer including a tunnel and a closed transfer trench. The engineering evaluation discarded both of these options in favor of transfer using an overland vehicle. Both the tunnel and trench options would have had minor impacts to land resources. The vehicle option requires no additional land and moves the material over relatively short distances within F Area.

5.8 SHORT-TERM USES AND LONG-TERM ENVIRONMENTAL PRODUCTIVITY

The use of land on SRS for the MFFF would be a short-term use of the environment; on completion of the disposition activities, such land could be returned to other uses, including other long-term productive uses.

Losses of the natural productivity of terrestrial and aquatic habitats due to construction and operation of the MFFF are possible. Land clearing and construction and operational activities could disperse wildlife and eliminate habitat. Because this land is managed by the U.S. Forest

Service, periodic habitat loss would normally occur. Although some destruction would occur during and after construction, losses will be minimized by careful siting of facilities and incorporation of mitigation measures into all construction activities. In addition, consultation and coordination with state and federal natural resource and wildlife agencies prior to any site disturbances will ensure that all potential sensitive species, candidate or listed, are protected to the maximum extent possible.

There are no other activities that would affect long-term productivity of environmental resources.

5.9 RESOURCES COMMITTED

Site preparation, construction, and operation of the MFFF commit both onsite and offsite resources, some of which are irreversibly committed and irretrievably lost. Irreversible and irretrievable commitments of resources include those resources consumed during facility operation and those that are not expected to revert to a natural state if the structures are removed at the end of the station life. Section 5.9.1 discusses the commitment of resources during construction, while Section 5.9.2 discusses the commitment of resources during operation.

5.9.1 Resources Committed During Construction

Construction of the MFFF will disturb 106 ac (42 ha), most of which will be returned to original use once construction is complete. Once constructed, the MFFF will occupy 41 ac (16.6 ha) of land as shown in Table 5-20. Approximately 28 ac (11.3 ha) of this land is currently managed as a timber crop by the U.S. Forest Service that could be harvested independent of the MFFF's construction. Although removal of this timber represents a resource loss, as part of a managed forest, the resource is normally considered replaceable. Part of the land is also currently used as a spoils area for soil excavated for the APSF. This soil will be used as fill for the PDCF and relocated to an SRS landfill prior to construction of the MFFF. Because the area is utilized by DOE as an industrial site, continued industrial use after completion of the MFFF mission is possible.

Water used during construction will be treated in the SRS waste treatment system and returned to the environment. Waste disposal capacity will be provided by the current SRS infrastructure.

During construction, the heavy equipment onsite will consume diesel fuel and electricity. Major materials required during facility construction include concrete aggregate and cement, reinforcing steel, aluminum, lumber, piping materials, and electric wire and cable.

Concrete and steel constitute the bulk of construction materials; however, there are numerous other minor resources incorporated into the physical plant. Some materials (e.g., copper wire and cable and aluminum) are valuable enough to be recycled, whereas the value of others does not encourage recycling.

5.9.2 Resources Committed During Operation

Water used during operation will be treated in the SRS waste treatment system and returned to the environment.

During operations, the MFFF will nominally convert 3.9 tons (3.5 metric tons) of surplus plutonium and 73.3 tons (66.5 metric tons) of surplus depleted uranium annually. The MFFF will also consume various chemicals as reagents. Consumption of chemicals is kept at a minimum through extensive recovery and recycling as feedstock. Estimated commitment of resources during MFFF operation is provided in Table 5-21.

5.10 ENVIRONMENTAL MONITORING PROGRAM

As provided in guidance for the ER (NRC 2000a), details of the preoperational and operational environmental monitoring programs are provided in the *Construction Authorization Request* and will be updated in the *License Application*. This section of the ER provides an overview of the environmental monitoring program and its objectives.

An environmental monitoring program is established to evaluate the impacts of facility construction, operation, and deactivation on the facility environs for chemical and radiological releases during normal operations, anticipated operational occurrences, and from postulated accidents. The environmental monitoring program will be established prior to construction and continue through deactivation. Since the MFFF will be located adjacent to other F-Area facilities, there may be areas of historical contamination that should be characterized prior to operation. Chemicals released from F-Area facilities include ammonia, nitrate, cadmium, chromium, hydrazine, mercury, manganese, nitric acid, and oxides of nitrogen. Major radiological contaminants released from F-Area facilities include moderate- to long-lived fission products such as Cs-137, Sr-89 and Sr-90; isotopes of uranium and plutonium, and other actinides (Fledderman 2000). The objectives of the preoperational environmental monitoring program are to:

- Establish a baseline of existing radiological, chemical, physical, and biological conditions in the area of the site and develop an understanding of the critical pathways that could transport contaminants to human and other receptors.
- Determine the presence of any contaminants that could be a safety concern for construction personnel.
- Evaluate procedures, equipment, and techniques used in the collection and analysis of environmental data and train personnel in their use.

The objective of the operational environmental monitoring program is to determine whether or not there are adverse impacts from operations that result in radiological, chemical, physical, and biological effects to the facility site and environs.

The SRS maintains an extensive environmental monitoring program for all activities conducted on the SRS including in the F Area (Fledderman 2000). DCS plans to make full use of the data provided from this monitoring to measure any construction or operational impacts of the MFFF in the vicinity of the SRS. DCS will augment the SRS environmental studies with additional sample collections as necessary based on the evaluations in this ER and operating experience.

As discussed in this chapter and summarized in Chapter 6, non-radiological impacts to the environment from the construction and operation of the MFFF are expected to be minimal. Consequently, non-radiological environmental monitoring prescribed through the various environmental permits for the construction and operation of the MFFF are expected to be sufficient to evaluate any non-radiological environmental impacts.

As discussed in this chapter and summarized in Chapter 6, radiological impacts to the environment from construction and operation of the MFFF are expected to be minimal. The radiological environmental monitoring program measures radiation levels and radioactivity in the facility environs due to radioactive effluent releases to the environment. Routine radioactive releases from the MFFF are limited to a single radioactive airborne release through a stack located on the roof of the MOX Fuel Fabrication Building. The transport of contaminants from the stack to the receptor can result in exposure by immersion, inhalation, and ingestion of foodstuffs on which contaminants have been deposited by either wet or dry deposition processes. Direction radiation measurements, air sampling, soil sampling, and vegetation sampling will be performed with analyses for uranium and plutonium, MFFF radionuclides of interest.

The MFFF will not be designed to routinely discharge any radioactive liquid directly to the environment. Process liquids are transferred to appropriate SRS treatment facilities. The non-radioactive liquid effluent is uncontaminated HVAC condensate and stormwater runoff. R1 Therefore, the radiological monitoring program will focus on the environmental media impacted by the airborne pathway for the anticipated types and quantities of radionuclides release from the facility. Although stormwater runoff is not expected to be contaminated, confirmatory measurements will be performed. Stormwater runoff drains to an unnamed tributary of Upper Three Runs (Fledderman 2000). Surface water sampling and sediment sampling will be performed with analyses for uranium and plutonium.

Data obtained from the radiological environmental monitoring program will be used to show that levels of radiation and radioactivity in the environment are consistent with those determined by the radioactive effluent monitoring and sampling program.

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Figures

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R1

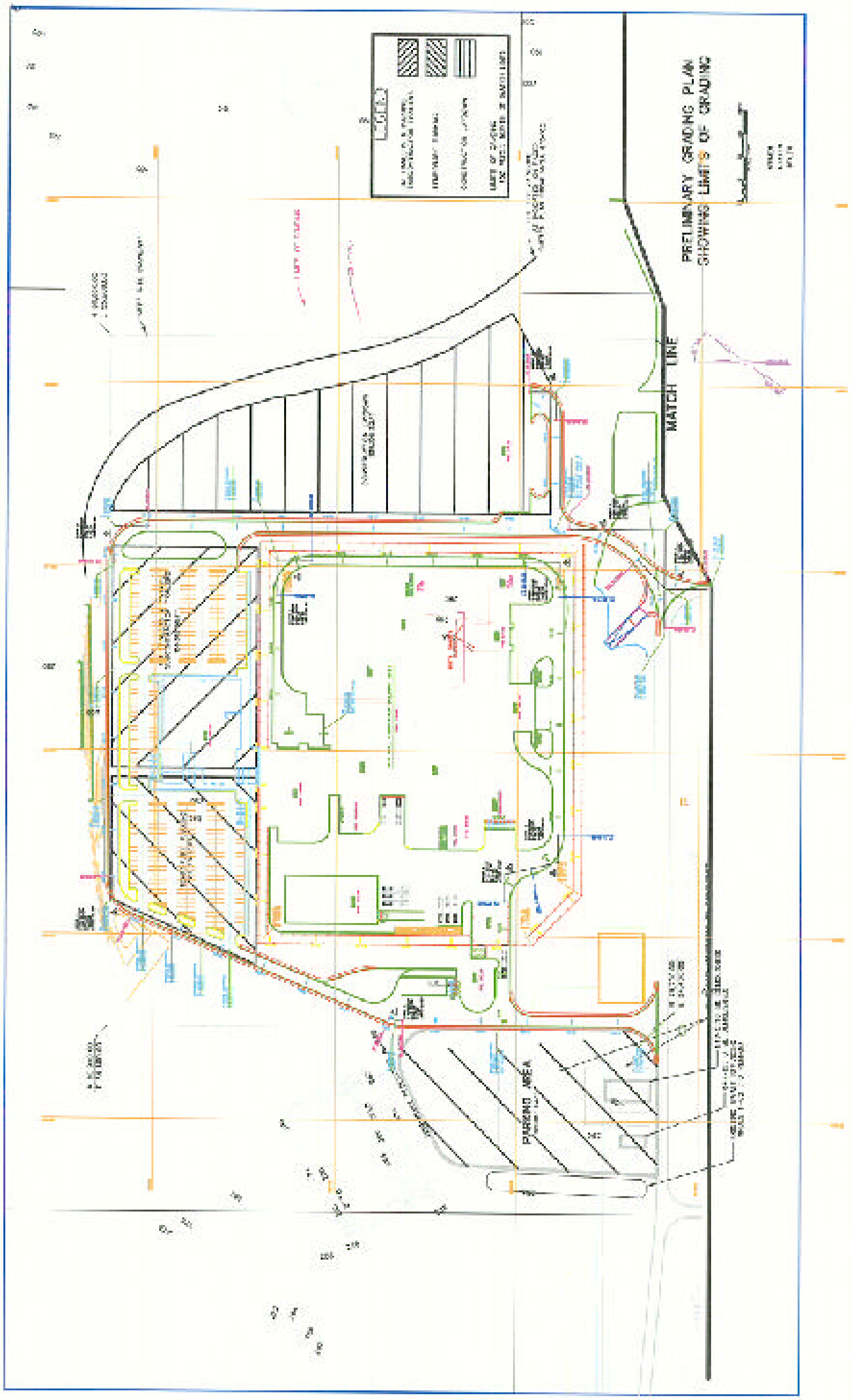

Figure 5-1. Preliminary Site Contour Map

C01

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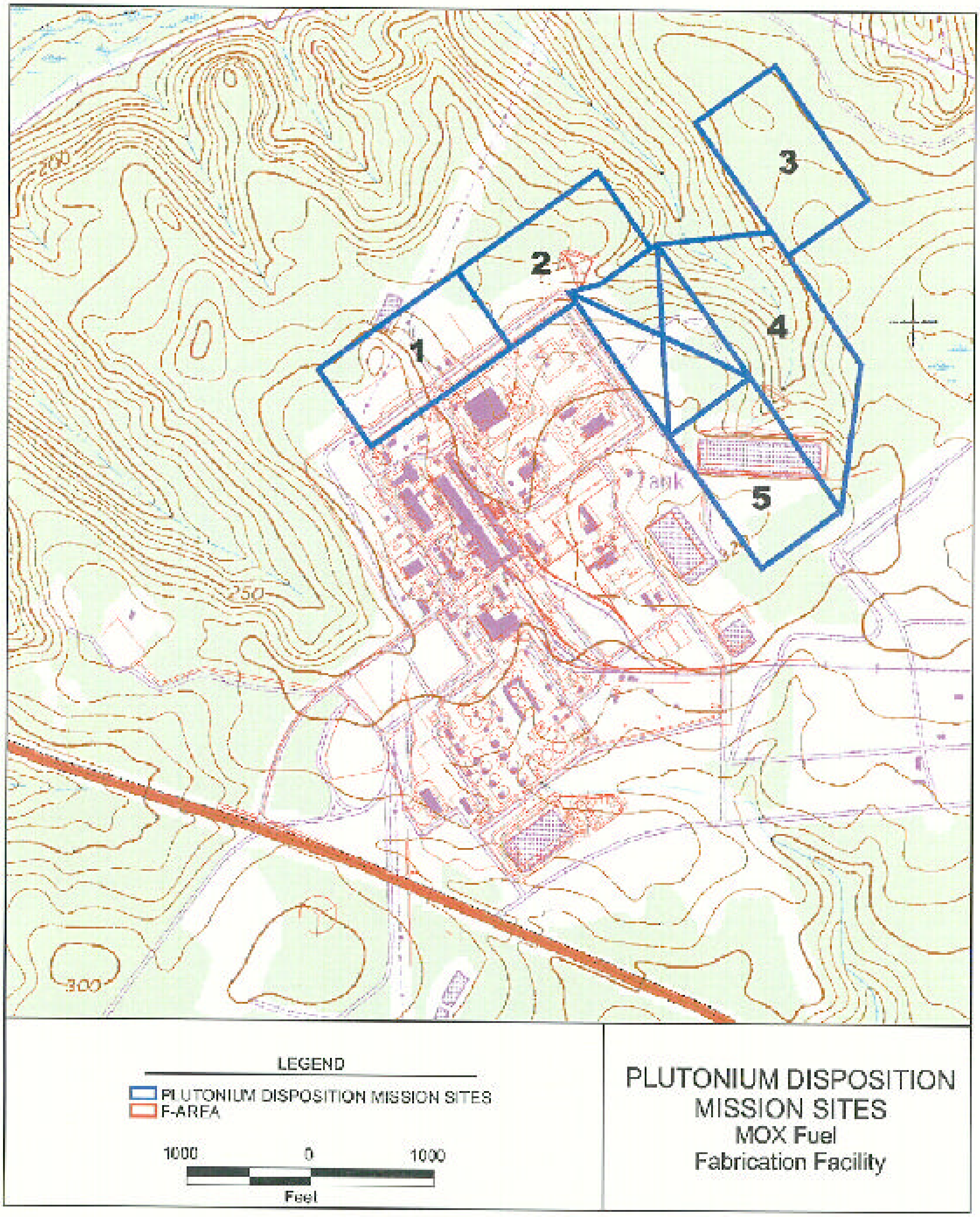

Figure 5-2. Location of Potential MFFF Sites

C02

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Tables

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Table 5-1. Emissions (kg/yr) from MFFF Construction

(update of Table G-65 of the SPD EIS, p. G-40)

Pollutant	Diesel Equipment	Construction Fugitive Emissions[a]	Concrete Batch Plant	Vehicles[d]
Carbon monoxide	28,481	0	0	33,574
Nitrogen dioxide	71,204	0	0	9,738
PM_{10}	10,743[b]	104,036	1,973[b]	34,359
Sulfur dioxide	6,371	0	0	0
Volatile organic compounds	10,743	0	0	4,494
Total suspended particulates	10,743	221,989	6,804	34,359
Air toxics[c]	0	<1	0	0

R2

[a] Does not include fugitive emissions from potential concrete batch plant.

[b] PM_{10} emissions were assumed to be the same as total suspended particulate emissions for this analysis resulting in some overestimate of PM_{10} concentrations.

[c] Various toxic air pollutants (e.g., lead, benzene, hexane) could be emitted during construction.

[d] Vehicle emissions based on construction worker, construction material, and waste shipment mileage.

Table 5-2. Increments to Ambient Concentrations (μg/m^3) at the SRS Site Boundary from MFFF Construction

(update of Table G-66 of the SPD EIS, p. G-40)

Pollutant	Averaging Period	Most Stringent Standard or Guideline[a]	SRS Maximum Concentration[b]	MFFF Contribution	Total
Carbon monoxide	8 hours	10,000	66	16.7	82.7
	1 hour	40,000	254	54.8	308.8
Nitrogen dioxide	Annual	100	17.2	0.17	17.4
PM_{10}	Annual	50	7	0.29	7.29
	24 hours	150	97	23.5	120.5
Sulfur dioxide	Annual	80	24	0.015	24
	24 hours	365	337	1.3	338.3
	3 hours	1,300	1,171	5.6	1,176
Total suspended particulates	Annual	75	46	0.53	46.5
Air toxics[b]	24 hours	150	20.7	0.0002	20.7

R2

[a] The more stringent of the federal and state standards is presented if both exist for the averaging period.

[b] Hunter (2001), Includes background plus SRS emissions

[c] Various toxic air pollutants (e.g., lead, benzene, hexane) could be emitted during construction.

Table 5-3. Construction Employment Requirements for the MFFF

Year	Average Number of Workers
2003	550
2004	850
2005	950
2006	650
2007	600

R2

Table 5-4. Estimate of Heavy Vehicles[a] on Site for Each Year of Construction

Year	Number of Vehicles
2003	29
2004	25
2005	25
2006	15
2007	15

[a] Heavy vehicles include earthmoving equipment and large delivery trucks.

R2

Table 5-5. Maximum Additional Site Infrastructure Requirements for MFFF Construction in F Area at SRS

Resource	MFFF	Availability[a]
Transportation		
Roads (mi)	2.0	142
Electricity (MWh/yr)	16	482,700
Diesel Fuel (gal/yr)	330,000	NA[b]
Water (gal/yr)	33,000,000	730,000,000

[a] Capacity minus current usage

[b] Not applicable due to the ability to procure additional resources.

R2

Table 5-6. Wastes Generated During Construction

Waste Type	Estimated Additional Waste Generation (yd^3/yr)	Disposal Capacity (yd^3/yr)
Hazardous	100	NA [a]
Nonhazardous		
Liquid	47,000	1,352,000 [b]
Solid	11,000	NA [a]

[a] Not Applicable; shipped offsite.

[b] Capacity of CSWTF.

Table 5-7. Emissions (kg/yr) from MFFF Operation

(update of Table G-67 of the SPD EIS, p. G-41)

Pollutant	Emergency/Standby Generators	Process	Vehicles
Carbon monoxide	1,855	0	32,658
Nitrogen dioxide	19,355	1,303[a]	9,472
PM_{10}	182[b]	0	33,422[b]
Sulfur dioxide	1,125	0	0
Volatile organic compounds	831	0.9[c]	4,372
Total suspended particulates	182	0	33,422
Chlorine	0	15[d]	0

R2

[a]Process NO_x emissions are from the MFFF stack due to the aqueous polishing process.
[b]PM_{10} emissions were assumed to be the same as total suspended particulate emissions for this analysis resulting in some overestimate of PM_{10} concentrations.
[c]Process VOC emissions are from the emergency and standby diesel generator fuel oil storage tanks.
[d]Process chlorine emissions are from the MFFF stack due to the chloride content of the Pu feedstock.

Table 5-8. Increments to Ambient Concentrations (μg/m³) from MFFF Operation [a]

(update of Table G-68 of the SPD EIS, p. G-41)

Pollutant	Averaging Period	Most Stringent Standard or Guideline[b]	SRS Maximum Concentration[c]	MFFF Contribution	Total
Carbon monoxide	8 hours	10,000	66	22.7	88.7
	1 hour	40,000	254	78.8	332.8
Nitrogen dioxide	Annual	100	17.2	0.048	17.2
PM_{10}	Annual	50	7	0.0004	7
	24 hours	150	97	0.78	97
Sulfur dioxide	Annual	80	24	0.002	24
	24 hours	365	337	4.8	342
	3 hours	1,300	1,171	22.4	1,193
Total suspended particulates	Annual	75	46	0.0004	46
Chlorine	24 hours	75	0.04	0.0004	0.04

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[a] Concentrations are the maximum occurring at or beyond the SRS boundary or a public access road.

[b] The more stringent of the federal and state standards is presented if both exists for the averaging period.

[c] Hunter (2001), Includes background plus SRS emissions.

Table 5-9. Comparison of MFFF Impacts to PSD Class II Limits

Pollutant	Averaging Period	Increase in Concentration ($\mu g/m^3$)	PSD Class II Area Allowable Increment ($\mu g/m^3$)	Percent of Increment
Nitrogen dioxide	Annual	0.0127	25	0.051
PM_{10}	Annual	0.00089	17	0.0052
	24 hours	0.0220	30	0.0073
Sulfur dioxide	Annual	0.00083	20	0.0042
	24 hours	0.0205	91	0.023
	3 hours	0.123	512	0.024

Table 5-10. Minority and Low Income Populations Along Transportation Corridors

	Portsmouth, OH to Fuel Fabrication	Fuel Fabrication to MFFF	MFFF to Catawba Nuclear Station	MFFF to McGuire Nuclear Station
Distance (km)	977	578	298	339
Estimated total population along route	239,221	75,050	74,531	102,182
Estimated minority population along route	40,636	30,702	29,010	53,094
% minority population along route	17.0	40.9	38.9	51.9
Estimated low income population along route	33,268	10,673	Not available	Not available
% low income population along route	13.9	14.2	Not available	Not available

Table 5-11. Potential Radiological Impacts on the General Public and Site Workers Due to Normal Operations of the MFFF

RADIATION DOSE TO THE GENERAL PUBLIC	Impact
Maximally Exposed Individual	
Annual Dose (mrem/yr)[a]	1.5E-03
Percentage of 10 CFR Part 20, Subpart D Standard[b]	1.5E-03
Percentage of Natural Background Radiation[c]	5.1E-04
Annual LCF Risk[d]	7.5E-10
General Population Within 50 mi (80 km)	
Annual Dose (person-rem/yr)[a]	0.12
Percentage of Natural Background Radiation[e]	3.9E-05
Annual LCF Risk[d]	6.0E-05
Average Exposed Individual Within 50 mi (80 km)	
Annual Dose (mrem/yr)[f]	1.2E-04
Percentage of 10 CFR Part 20, Subpart D Standard[b]	1.2E-04
Percentage of Natural Background Radiation[e]	4.1E-05
Annual LCF Risk[d]	6.0E-11

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RADIATION DOSE TO SITE WORKERS	Impact	
Maximally Exposed Site Worker		
Annual Dose (mrem/yr)[g]	3.0	
Percentage of 10 CFR Part 20, Subpart C Standard[h]	6.0E-02	
Percentage of Natural Background Radiation[c]	1.0	
Annual LCF Risk[i]	1.2E-06	
General Site Worker Population	**Minimum[j]**	**Maximum[k]**
Maximum Annual Dose (person-rem/yr)[l]	0.019	40.8
Percentage of Natural Background Radiation[m]	4.7E-04	1.0
Annual LCF Risk[i]	7.6E-06	1.6E-02
RADIATION DOSE TO FACILITY WORKERS	**Impact**	
Average Worker Dose (mrem/yr)[n]	50	
Percentage of 10 CFR Part 20, Subpart C Standard[h]	1	
Percentage of Natural Background Radiation[c]	17	
Annual LCF Risk[i]	2.0E-05	

Table 5-11. Potential Radiological Impacts on the General Public and Site Workers Due to Normal Operations of the MFFF (continued)

[a] Source is GENII model results for general public (see Appendix D).

[b] 10 CFR Part 20, Subpart D standard is an annual dose of 100 mrem.

[c] Natural background radiation is 295 mrem/yr (see Table 4-23).

[d] Calculated using a cancer risk factor of 0.0005 per rem (500 cancers/10^6 person-rem).

[e] Natural background radiation for the public was calculated as the individual background radiation (295 mrem/yr) times the number of people projected to live in the 50-mi (80-km) assessment area in 2030 (1,042,483 people). The calculated value is 307,532 person-rem/yr.

[f] Calculated as the population dose divided by the number of people projected to live in the 50-mi (80-km) assessment area in 2030 (1,042,483 people).

[g] Source is GENII model results for site workers (see Appendix D).

[h] 10 CFR Part 20, Subpart C standard is an annual dose of 5,000 mrem.

[i] Calculated using a cancer risk factor of 0.0004 per rem (400 cancers/10^6 person-rem).

[j] Minimum values based on a distance of 5 mi (8 km) from the release point (i.e., at the SRS boundary).

[k] Maximum values based on a distance of 328 ft (100 m) from the release point (i.e., at the MFFF boundary).

[l] Dose for the site worker population was determined by multiplying the MEI dose at the respective distance from the release point by the total number of site workers (13,616 workers). The MEI doses are as follows:

[Text Deleted]

MEI dose at the MFFF boundary for a groundlevel release = 3.0 mrem/yr

MEI dose at the SRS boundary for a groundlevel release = 1.4E-03 mrem/yr

[m] Natural background radiation for the site workers was calculated as the individual background radiation (295 mrem/yr) times the number of site workers in 2000 (13,616 workers). The calculated value is 4,017 person-rem/yr.

[n] Based on preliminary dose analyses for the MFFF.

Table 5-12. Potential Waste Management Impacts from MFFF Operation

Waste Type	Maximum Estimated MFFF Waste Generation		Annual Site Waste Generation [c] (yd^3/yr)	Percent of Annual Site Waste Generation
	Liquids[a] (gal/yr)	**Solid [b] (yd^3/yr)**		
Liquid LLW	385,800	Disposed as Liquid LLW at ETF	Not available	Not available
Solid LLW		134	10,615	4
Stripped Uranium (solidified and added to LLW)	46,000	228		
Liquid High Alpha Activity Waste (solidified and added to TRU waste)	21,841	405	93	700[d]
Solid TRU Waste		248		
Excess Low-Level Radioactive Solvent Waste	3,075	Disposed as Mixed LLW	NA	NA
Liquid Nonhazardous Waste	4,389,710	Disposed Through Approved NPDES Facilities	90,867,868	5
Solid Nonhazardous Waste		1,754	40,000	4

[a] From Table 3-3

[b] From Table 3-4. Values for Stripped Uranium and High Alpha Waste represent conversion to solid as discussed in Appendix G.

[c] From Table 4-27.

[d] Annual MFFF TRU waste generation exceeds current annual SRS generation but the MFFF cumulative volume is well below the maximum projected SRS cumulative volume.

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Table 5-13a. Summary of Bounding MFFF Events

Bounding Accident [a]	Meteorology [b]	Maximum Impact to Site Worker (mrem)	Maximum Impact to Site Worker (probability of cancer deaths)	Maximum Impact to Public at SRS Boundary (mrem)	Maximum Impact at SRS Boundary (probability of cancer deaths)	Impact on Population within 80 km (person-rem)	Impact on Population within 80 km (LCFs)
Internal Fire	bounding – 95% percentile	<100	<4E-5	<0.5	<3E-7	<3E-2	<2E-5
Load Handling	bounding – 95% percentile	<150	<6E-5	<1.0	<5E-7	<3E-2	<2E-5
Hypothetical Explosion Event	bounding – 95% percentile	<500	<3E-4	<3.0	<2E-6	<9E-2	<5E-5
Hypothetical Criticality Event	bounding – 95% percentile	<2200	<9E-4	<12	<6E-6	<6	<3E-3

[a] The bounding loss of confinement event is bounded by the load-handling event.
[b] Values calculated for 50th percentile indicate that median meteorology is at least three times lower than the bounding values.

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Table 5-13b. Summary of Bounding Consequences for MFFF Postulated Non-Mitigated Events

Bounding Accident	Meteorology[a]	Maximum Impact to Site Worker (rem)	Maximum Impact to Site Worker (probability of cancer deaths)	Maximum Impact to Public at SRS Boundary (rem)	Maximum Impact to Public at SRS Boundary (probability of cancer deaths)	Impact on Population within 80 km (person-rem)	Impact on Population within 80 km (LCFs)
Loss of Confinement	bounding – 95% percentile	<7	<4E-3	<.05	<3E-5	<8E-4	<4E-7
Internal Fire	bounding – 95% percentile	<0.5	<9E-5	<3E-3	<7E-7	<5E-3	<3E-6
Load Handling	bounding – 95% percentile	<7	<4E-3	<0.05	<3E-5	<8E-4	<4E-7
Hypothetical Explosion Event	bounding – 95% percentile	N/A	N/A	N/A	N/A	N/A	N/A
Hypothetical Criticality Event	bounding – 95% percentile	N/A	N/A	N/A	N/A	N/A	N/A

[a] Values calculated for 50[th] percentile indicate that median meteorology is at least three times lower than the bounding values

Table 5-14. Potential Impacts from Construction of the PDCF and WSB Facilities in the SRS F Area

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Pollutant	Impact from PDCF and WSB Construction[a]
8-hr Carbon Monoxide Increase ($\mu g/m^3$)[b]	3.8
Annual Nitrogen Dioxide Increase ($\mu g/m^3$)[b]	0.17
Annual PM_{10} Increase ($\mu g/m^3$)[b]	0.078
Annual Sulfur Dioxide Increase ($\mu g/m^3$)[b]	0.054
Annual Total Suspended Particulate Increase ($\mu g/m^3$)[b]	0.156
Dose to Workers[c] (person-rem/yr)	2.8
Average Worker Dose[c] (mrem/yr)	4
Hazardous waste[d] (m^3/yr)	85
Nonhazardous Waste[d]	
Liquid[d] (m^3/yr)	26,300
Solid[d] (m^3/yr)	2,320

[a] Source: MFFF ER Appendix G; SPD EIS (DOE 1999c)
[b] Table G-70 of the SPD EIS (DOE 1999c)
[c] Table J-55 of the SPD EIS (DOE 1999c)
[d] Table H-33 of the SPD EIS (DOE 1999c)

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Table 5-15a. Estimated Maximum Cumulative Ground-level Concentrations of Nonradiological Pollutants (micrograms per cubic meter) at SRS Boundary

Pollutant	Averaging Time	SCDHEC Ambient Standard (μg/m³)	SRS Maximum Concentration (μg/m³)[a]	MFFF (μg/m³)[b]	PDCF and WSB[c]	SNF[d]	Tank Closure (μg/m³)[e]	Salt Processing Alternative[f]	Other Foreseeable Planned SRS Activities (μg/m³)[d]
Carbon monoxide	1 hour	40,000	254			9.760	3.4	18.0	36.63
	8 hours	10,000	66	22.7	0.25	1.31	0.8	2.3	5.15
Oxides of Nitrogen	Annual	100	17.2	0.048	10.02	3.36	0.07	0.03	4.38
Sulfur dioxide	3 hours	1,300	1,171			0.98	0.6	0.4	8.71
	24 hours	365	337			0.13	0.12	0.05	2.48
	Annual	80	24	0.002	0.083	0.02	0.006	$5.0x10^{-4}$	0.17
Ozone	1 hour	235	NA	NA	NA	0.80	2.0	2	0.71
Lead	Max.quarter	1.5	0.0003			NA	$4.1x10^{-6}$	$4.0x10^{-7}$	0.00
Particulate matter (≤10 microns aerodynamic diameter)	24 hours	150	97			0.13	0.06	0.07	3.24
	Annual	50	7	0.0004	0.0036	0.02	0.03	$1.0x10^{-3}$	0.13
Total suspended particulates (μg/m³)	Annual	75	46	0.0004	0.0036	0.02	0.005	$1.0x10^{-3}$	0.06

[a] Hunter, 2001, *Memorandum from C.H. Hunter to D.C. Carroll, Clean Air Act Title V Dispersion Modeling for SRS (Revision 2)*, SRT-NTS-980189, March 15

[b] MFFF ER, Table 5-8

[c] MFFF ER, Appendix G; DOE 1999, *Surplus Plutonium Disposition Final Environmental Impact Statement*, DOE/EIS-0283, Table G-72

[d] DOE 2000, *Savannah River Site Spent Nuclear Fuel Management Final Environmental Impact Statement*, DOE/EIS-0279

[e] DOE 2000, *High-Level Waste Tank Closure Draft Environmental Impact Statement*, DOE/EIS-0303D

[f] DOE 2001, *Savannah River Site Salt Processing Alternatives Draft Supplemental Environmental Impact Statement*, DOE/EIS-0082-S2D

Table 5-15b. Estimated Average Annual Cumulative Radiological Doses and Resulting Health Effects to Offsite Population and Facility Workers

	Maximally exposed individual				Offsite Population				Facility Workers	
Activity	Dose from airborne releases (rem)	Dose from liquid releases (rem)	Total dose (rem)	Probability of fatal cancer risk	Collective dose from airborne releases (person-rem)	Collective dose from liquid releases (person-rem)	Total collective dose (person-rem)	Excess latent cancer fatalities	Collective dose (person-rem)	Excess latent cancer fatalities
SRS Baseline [a]	$5.0x10^{-5}$	$1.3x10^{-4}$	$1.8x10^{-4}$	$9.0x10^{-8}$	2.2	2.4	4.6	$2.3x10^{-3}$	165	0.066
MFFF [b]	$1.5 x10^{-6}$	(n)	$1.5 x10^{-6}$	$7.5x10^{-10}$	0.12	(n)	0.12	$6.0x10^{-5}$	20	$8x 10^{-3}$
PDCF and WSB [c]	$3.7x10^{-6}$	(n)	$3.7x10^{-6}$	$1.9x10^{-9}$	1.6	(n)	1.6	$8.0x10^{-4}$	446	0.18
Management of Spent Nuclear Fuel [d]	$1.5x10^{-5}$	$5.7x10^{-5}$	$7.2x10^{-5}$	$3.6x10^{-8}$	0.56	0.19	0.75	$3.8x10^{-4}$	55	0.022
Surplus HEU Disposition [e]	$2.5x10^{-6}$	(o)	$2.5x10^{-6}$	$1.3X10^{-9}$	0.16	(o)	0.16	$8.0x10^{-5}$	11	$4.4x10^{-3}$
Tritium Extraction Facility [f]	$2.0x10^{-5}$	(o)	$2.0x10^{-5}$	$1.0x10^{-8}$	0.77	(o)	0.77	$3.9x10^{-4}$	4	$1.6x10^{-3}$
Defense Waste Processing Facility [g]	$1.0x10^{-7}$	(o)	$1.0x10^{-7}$	$5.0x10^{-11}$	0.71	(o)	0.71	$3.6x10^{-4}$	120	0.048
Management Plutonium Residues/Scrub Alloy [h]	$5.7x10^{-7}$	(o)	$5.7x10^{-7}$	$2.9x10^{-10}$	$6.2x10^{-3}$	(o)	$6.2x10^{-3}$	$3.1x10^{-6}$	7.6	$3x10^{-3}$
DOE complex miscellaneous components [i]	$4.4x10^{-6}$	$4.2x10^{-8}$	$4.4x10^{-6}$	$2.2x10^{-9}$	$7.0x10^{-3}$	$2.4x10^{-4}$	$7.2x10^{-3}$	$3.6x10^{-6}$	2	0.001
Sodium-Bonded Spent Nuclear Fuel [j]	$3.9x10^{-7}$	$1.2x10^{-7}$	$5.1x10^{-7}$	$2.6x10^{-11}$	$1.9x10^{-2}$	$6.8x10^{-4}$	$2.0x10^{-2}$	$9.8x10^{-6}$	38	0.015
Tank Closure [k]	$5.2x10^{-8}$	(o)	$5.2x10^{-8}$	$2.6x10^{-11}$	$3.0x10^{-3}$	(o)	$3.0x10^{-3}$	$1.5x10^{-6}$	490	0.20
Salt Processing [l]	$3.1x10^{-4}$	(o)	$3.1x10^{-4}$	$1.6x10^{-7}$	18.1	(o)	18.1	$9.1x10^{-3}$	29	0.12
Plant Vogtle [m]	$5.4x10^{-7}$	$5.4x10^{-5}$	$5.5x10^{-5}$	$2.7x10^{-8}$	0.042	$2.5x10^{-3}$	0.045	$2.2x10^{-5}$	NA	NA

a Arnett and Mamatey, 1998, *Savannah River Site Environmental Data for 1997*, WSRC-TR-97-00322 as cited in DOE 2000, *Savannah River Site Spent Nuclear Fuel Management Final Environmental Impact Statement*, DOE/EIS-0279

b MFFF ER; Table 5-11

c MFFF ER Appendix G; DOE 1999, *Surplus Plutonium Disposition Final Environmental Impact Statement*, DOE/EIA-0283; Tables J-56 and J-57

d DOE 2000, *Savannah River Site Spent Nuclear Fuel Management Final Environmental Impact Statement*, DOE/EIS-0279

e DOE 1996, *Disposition of Highly Enriched Uranium Final Environmental Impact Statement*, DOE/EIS-0240

f DOE 1999, *Final Environmental Impact Statement for the Construction and Operation of a Tritium Extraction Facility at the Savannah River Site*, DOE/EIS-0271

g DOE 1994, *Final Defense Waste Processing Facility Supplemental Environmental Impact Statement*, DOE/EIS-0082-S

h DOE 1998, *Final Environmental Impact Statement on Management of Certain Plutonium Residues and Scrub Alloy at the Rocky Flats Environmental Technology Site*, DOE/EIS-0277F

i DOE 2000, *Savannah River Site Spent Nuclear Fuel Management Final Environmental Impact Statement*, DOE/EIS-0279

j DOE 1999, *Draft Environmental Impact Statement for the Treatment and Management of Sodium-Bonded Spent Nuclear Fuel*, DOE/EIS-0306D

k DOE 2000, *High-Level Waste Tank Closure Draft Environmental Impact Statement*, DOE/EIS-0303D

l DOE 2001, *Savannah River Site Salt Processing Alternatives Draft Supplemental Environmental Impact Statement*, DOE/EIS-0082-S2D

m NRC 1996, *Dose Commitments Due to Radioactive Releases from Nuclear Power Plant Sites in 1992.* NUREG/CR 2850

n All radioactive liquids are transferred to SRS waste management facilities.

o Cited in originals as less than minimum reportable levels

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Table 5-15c. Estimated Cumulative Waste Generation from SRS Concurrent Activities (cubic meters)

Waste Type	SRS Operations [a,b]	MFFF [c]	PDCF and WSB [d]	SNF Management [e]	Tank Closure [f]	Salt Processing [g]	Environmental Restoration/ D&D [d]	Other Waste Volume [d]
High-level	14,129	0		11,000	97,000	45,000	0	69,552
Low-level	118,669	16,900	9,500	140,000	19,260	920	61,630	110,102
Hazardous/mixed	3,856	120	910	270	470	56	6,178	4,441
Transuranic	6,012	11,560	3,280	3,700	0	0	0	8,820
Nonhazardous Liquid	416,000	166,170	800,000	Not Reported	Not Reported	Not Reported	Not Reported	Not Reported
Nonhazardous Solid	6,670	13,410	26,500	Not Reported	Not Reported	Not Reported	Not Reported	Not Reported

NOTE: LLW and TRU waste are liquid plus solid

[a] DOE 2000, *Savannah River Site Spent Nuclear Fuel Management Final Environmental Impact Statement*, DOE/EIS-0279

[b] Based on total 30-year expected waste forecast, which includes previously generated waste

[c] MFFF ER, Tables 3-3, 3-4, and 5-12

[d] MFFF ER, Appendix G; DOE 1999, *Surplus Plutonium Disposition Final Environmental Impact Statement*, DOE/EIS-0283; Table H-34

[e] DOE 2000, *Savannah River Site Spent Nuclear Fuel Management Final Environmental Impact Statement*, DOE/EIS-0279

[f] DOE 2000, *High-Level Waste Tank Closure Draft Environmental Impact Statement*, DOE/EIS-0303D

[g] DOE 2001, *Savannah River Sit Salt Processing Alternatives Draft Supplemental Environmental Impact Statement*, DOE/EIS-0082-S2D

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Table 5-15d. Estimated Average Annual Cumulative Utility Consumption

Activity	Electricity (megawatt-hours)	Water usage (liter)
SRS baseline [a]	$4.11x10^5$	$1.70x10^{10}$
MFFF [b]	$1.3x10^5$	$9.2x10^6$
PDCF and WSB[c]	$4.8x10^5$	$1.42x10^8$
SNF management [a]	$1.58x10^4$	$2.11x10^8$
Tank closure [d]	Not Available	$8.65x10^6$
Salt processing [e]	$2.4x10^4$	$1.2x10^7$
Other SRS foreseeable activities [a]	$1.51x10^3$	$6.73x10^8$

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[a] DOE 2000, *Savannah River Site Spent Nuclear Fuel Management Final Environmental Impact Statement*, DOE/EIS-0279

[b] MFFF ER

[c] MFFF ER, Appendix G; DOE 1999, *Surplus Plutonium Disposition Final Environmental Impact Statement*, DOE/EIS-0283; Table E-7 and E-17

[d] DOE 2000, *High-Level Waste Tank Closure Draft Environmental Impact Statement*, DOE/EIS-0303D

[e] DOE 2001, *Savannah River Site Salt Processing Alternatives Draft Supplemental Environmental Impact Statement*, DOE/EIS-0082-S2D

Table 5-16. Summary of Impacts for the No Action Alternative

Impact	Hanford	INEEL	Pantex	SRS	LLNL	LANL	RFETS
Air Quality							
Carbon Monoxide Emissions ($\mu g/m^3$)	8 hrs: 34.1 1 hr: 48.3	8 hrs: 302 1 hr: 1220	8 hrs: 620 1 hr: 2990	8 hrs: 671 1 hr: 5100	8 hrs: 69.69 1 hr: 235.5	8 hrs: 3000 1 hr: 5060	8 hrs: 145 1 hr: 534
Percent of State or Federal Standard (%)	8 hrs: 0.34 1 hr: 0.12	8 hrs: 3.0 1 hr: 3.1	8 hrs: 6.2 1 hr: 7.5	8 hrs: 6.7 1 hr: 13	8 hrs: 0.7 1 hr: 1	8 hrs: 38 1 hr: 43	8 hrs: 1.5 1 hr: 1.3
Nitrogen Dioxide ($\mu g/m^3$)	Annual: 0.25	Annual: 11	Annual: 1.94	Annual: 11.4	Annual: 6.08	Annual: 24 24 hrs: 119	Annual: 4.14
Percent of State or Federal Standard (%)	Annual: 0.25	Annual: 11	Annual: 1.9	Annual: 11	Annual: 6.1 1 hr: 1205.75	Annual: 32 24 hrs: 81	Annual: 4.1
Particulate Matter (10 μm) ($\mu g/m^3$)	Annual: 0.0179 24 hrs: 0.77	Annual: 3 24 hrs: 39	Annual: 8.79 24 hrs: 89.4	Annual: 4.94 24 hrs: 85.7	Annual: 0.83 24 hrs: 16.18	Annual: 11 24 hrs: 39	Annual: 0.235 24 hrs: 17.4
Percent of State or Federal Standard (%)	Annual: 0.036 24 hrs: 0.51	Annual: 6 24 hrs: 26	Annual: 18 24 hrs: 60	Annual: 9.9 24 hrs: 57	Annual: 2.8 24 hrs: 32	Annual: 22 24 hrs: 26	Annual: 0.5 24 hrs: 12

Table 5-16. Summary of Impacts for the No Action Alternative (continued)

Impact	Hanford	INEEL	Pantex	SRS	LLNL	LANL	RFETS
Sulfur Dioxide ($\mu g/m^3$)	Annual: 1.63 24 hrs: 8.91 3 hrs: 29.6 1 hr: 32.9	Annual: 6 24 hrs: 137 3 hrs: 591	Annual: 0 24 hrs: 2.0E-05 3 hrs: 8.0E-05 0.5 hr: 1.6E-04	Annual: 16.7 24 hrs: 222 3 hrs: 725	Annual: 0.08 24 hrs: 1.59 3 hrs: 10.44 1 hr: 16.01	Annual: 26 24 hrs: 171 3 hrs: 459	Annual: 0.295 24 hrs: 21.8 3 hrs: 64.6
Percent of State or Federal Standard (%)	Annual: 3.1 24 hrs: 3.4 3 hrs: 2.3 1 hrs: 5.0	Annual: 7.5 24 hrs: 38 3 hrs: 45	Annual: 0 24 hrs: <.001 3 hrs: <.001 0.5 hr: <.001	Annual: 21 24 hrs: 61 3 hrs: 56	Annual: 0.1 24 hrs: 1.5 3 hrs: 0.8 1 hrs: 2.4	Annual: 63 24 hrs: 83 3 hrs: 45	Annual: 0.37 24 hrs: 6 3 hrs: 9.2
Total Suspended Particulates ($\mu g/m^3$)	Annual: 0.0179 24 hrs: 0.77	(a)	(b)	Annual: 45.4	(a)	Annual: 14 24 hrs: 48	Annual: 0.284 24 hrs: 21
Percent of State or Federal Standard (%)	Annual: 0.036 24 hrs: 0.51	(a)	(b)	Annual: 61	(a)	Annual: 23 24 hrs: 32	Annual: 0.38 24 hrs: 14
Benzene ($\mu g/m^3$)	Annual: 6.0E-06	Annual: 2.9E-02	Annual: 5.47E-02 1 hr: 19.4	24 hrs: 20.7	(a)	(a)	(a)
Percent of State or Federal Standard (%)	Annual: 0.01	Annual: 24	Annual: 1.8 1 hr: 26	24 hrs: 14	(a)	(a)	(a)

Table 5-16. Summary of Impacts for the No Action Alternative (continued)

Impact	Hanford	INEEL	Pantex	SRS	LLNL	LANL	RFETS
Human Health							
Public Population Dose 50 mi (80 km) in 2030 (person-rem)	4.7 E-02	7.6E-05	6.3E-06	2.9E-04	6.7E-03	2.7	1.0E-01
50-year Fatal Cancers	1.2E-03	1.9E-06	1.6E-07	7.2E-06	1.7E-04	6.8E-02	2.5E-03
Maximally Exposed Public Individual in 2030 (mrem)	4.1E-04	1.4E-05	1.8E-08	6.8E-06	3.1E-04	6.5	4.8E-01
50-year Fatal Cancer Risk	1.0E-08	3.5E-10	4.5E-13	1.7E-10	7.8E-09	1.6E-04	1.2E-05
Facility Accident Type[c]	Beyond Evaluation Basis Earthquake	Beyond Evaluation Basis Earthquake	Beyond Evaluation Basis Earthquake	Beyond Evaluation Basis Earthquake	(b)	(b)	(b)
Frequency Estimate[c]	1.0E-07	1.0E-07	1.0E-07	1.0E-07	(b)	(b)	(b)
Public Population Dose Within 50 mi (80 km)[c] (person-rem)	2,410	723	821	2,590	(b)	(b)	(b)
LCFs [c]	1.2	0.36	0.41	1.3	(b)	(b)	(b)
Ecological Resource							
Surface Water	None	None	None	None	None	None	None
Surface Water Quality	None	None	None	None	None	None	None
Groundwater	None	None	None	None	None	None	None

Table 5-16. Summary of Impacts for the No Action Alternative (continued)

Impact	Hanford	INEEL	Pantex	SRS	LLNL	LANL	RFETS
Groundwater Quality	None	None	None	None	None	None	None
Endangered Species	None	None	None	None	None	None	None
Wetlands	None	None	None	None	None	None	None
Cultural, Historic and Archaeological	None	None	None	None	None	None	None
Land Use	None	None	None	None	None	None	None

Key: INEEL – Idaho National Engineering & Environmental Laboratory; SRS – Savannah River Site; LLNL – Lawrence Livermore National Laboratory; LANL – Los Alamos National Laboratory; RFETS – Rocky Flats Environmental Technology Site

[a] No state standards were presented in the SPD EIS (DOE 1999c) for the location.

[b] Information was not included in the SPD EIS (DOE 1999c)

[c] Information on facility accidents obtained from the S&D PEIS (DOE 1996b)

Table 5-17. Accident Scenarios for Plutonium Storage Under the No Action Alternative[a]

Accident Scenario	Accident Frequency	Source Term at Risk[b] (No. of PCV)	Source Term Related to the Environment (g Pu)
PCV puncture by forklift	6.0E-04	2	0.0387
PCV breach by firearms discharge	3.5E-04	1	3.87E-03
PCV penetration by corrosion	0.064	1	0.158
Vault fire	1.0E-07	120	81.3
Truck bay fire	1.0E-07	12	5.40
Spontaneous combustion	7.0E-07	2	7.75E-03
Explosion in vault	1.0E-07	45	12.7
Explosion outside vault	1.0E-07	1	0.058
Nuclear criticality	1.0E-07	Not Applicable	1.0E+19 fissions
Beyond evaluation basis earthquake	1.0E-07	194	146

[a] Source: S&D PEIS (DOE 1996b)

[b] Primary Containment Vessel (PCV) is assumed to contain up to 4,500 g of weapons-grade plutonium as a bounding case.

Table 5-18. Summary of Accident Dose (rem) for Plutonium Storage Under the No Action Alternative[a]

Accident Scenario	Hanford		INEEL		Pantex		SRS	
	MEI Dose	Population Dose	MEI Dose	Population Dose	MEI Dose	Population Dose	MEI Dose	Population Dose
PCV puncture by forklift	8.8E-05	0.64	8.8E-05	0.19	1.4E-03	0.22	1.4E-04	0.068
PCV breach by firearms discharge	8.8E-06	0.064	8.8E-06	0.19	1.4E-03	0.022	1.4E-05	0.068
PCV penetration by corrosion	3.6E-04	2.6	3.6E-04	0.78	5.8E-03	0.89	5.8E-04	2.8
Vault fire	0.18	1,340	0.19	402	3.0	456	0.3	1,440
Truck bay fire	0.012	89	0.012	26.7	0.20	303	0.020	95.5
Spontaneous combustion	1.8E-05	0.13	1.8E-05	0.038	2.8E-04	0.044	2.8E-05	0.14
Explosion in vault	0.029	209	0.029	62.7	0.46	71.2	0.046	224
Explosion outside vault	1.3E-04	0.96	1.3E-04	0.29	2.1E-03	0.33	2.1E-04	1.0
Nuclear criticality	6.5E-05	0.07	7.7E-05	0.018	1.9E-03	0.046	1.1E-04	0.094
Beyond evaluation basis earthquake	0.33	2,410	0.34	723	5.34	821	0.53	2,590

[a] Source: S&D PEIS (DOE 1996b).

PCV – Primary Containment Vessel

Table 5-19. F-Area Site Evaluation Matrix

Qualification Criteria	Area			
	3	**2**	**4**	**5**
Free from Subsurface Contamination	No		No	No
Adequate Terrain and Area			No	
Free from RCRA / CERCLA Features				No

Evaluation Criteria	Weight	Rating			
Protected Species	3	2	2	2	2
Water Table	3	2	2	1	3
Topography	3	3	3	1	2
Accessibility	2	1	3	2	3
Soft Zones	2	2	2	2	2
Utilities / Infrastructure	2	1	3	2	2
Wetlands	1	2	2	1	2
Archaeological Features	1	1	1	2	2
Interference with Existing SSCs	1	1	2	2	1
Sum of the (weights) x (ratings)		33	42	29	40

Rating:

3 = More than Adequate

2 = Adequate

1 = Marginal

Table 5-20. Irreversible and Irretrievable Commitments of Construction Resources for the MOX Fuel Fabrication Facility

Resource	Commitment	Comments
Land	106 acres	Land will be returned to industrial use after completion of the MFFF mission
Electricity (MWh)	16	
Fuel (gal)	330,000	
Water (gal)	33,000,000	Water will be treated and returned to the environment
Concrete (yd^3)	156,000	
Steel (tons)	38,000	

R2

Table 5-21. Irreversible and Irretrievable Commitments of Operations Resources for the MOX Fuel Fabrication Facility

Resource	Annual Resource Commitment	Comments
Electricity	130,000 MWh	
Water	2,438,410 gal (max)	Water will be treated and returned to the environment
Fuel Oil	111,000 gal	Used for emergency and standby diesels
Plutonium	3.5 metric tons (Pu)	
Depleted Uranium	66.5 metric tons (U)	
Argon	12,900,000 ft^3	
Argon-Methane	367,000 ft^3	
Dodecane	770 gal	
Helium	341,000 ft^3	
Hydrazine (35%)	400 gal	
Hydrogen	371,000 ft^3	
Hydrogen Peroxide (35%)	530 gal	
Hydroxylamine Nitrate	9,200 gal	
Manganese Nitrate	10 lb	
Nitric Acid	1,300 gal	95% of acid is recovered and recycled
Nitrogen	160,000,000 ft^3	
Nitrogen Tetroxide	132,000 ft^3	
Oxalic Acid Dehydrate	8,900 lb	
Oxygen	71,000 ft^3	
Porogen	660 lb	
Silver Nitrate	240 lb	96% of silver is recovered and recycled
Sodium Carbonate	440 lb	
Sodium Hydroxide (10M)	5 gal	
Tri-Butyl Phosphate	740 gal	
Zinc Stearate	617 lb	

R2

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6. ANALYSIS OF ENVIRONMENTAL IMPACTS OF PROPOSED ACTION AND ALTERNATIVES

This chapter summarizes each alternative examined in this ER, considering both the benefits and environmental costs of each alternative. The conclusion of the environmental analysis conducted in this ER is that the proposed action is the appropriate course of action.

6.1 PROPOSED ACTION

6.1.1 Benefits of the Proposed Action R2

As discussed previously, the proposed action is the issuance of an NRC license to possess and use SNM in an MFFF at SRS. The primary benefit of the proposed action is that it meets the purpose and need for action discussed in Chapter 2. The proposed action provides the mechanism to implement the joint United States and Russian Federation Agreement (White House 2000) [Text Deleted]. R2

In addition to the significant national security benefit of implementing the joint United States and Russian Federation Agreement, the proposed action also results in additional benefits to the local community around SRS by providing approximately 500 to 900 construction jobs and 400 R2 full-time jobs over the lifetime of the project. This increase in jobs will partially offset the planned job reductions as the SRS mission changes. The process of converting the surplus plutonium to MOX fuel will also consume up to 728 tons (660 metric tons) of surplus depleted uranium.

6.1.2 Monetary Costs of the Proposed Action

In February 2002, DOE submitted *Report to Congress: Disposition of Surplus Defense Plutonium at Savannah River Site* (NNSA 2002). This report provided updated cost estimates for various program alternatives requested by Congress. R1 DOE estimated the budget cost of the MFFF (Table 6-1) to be $2.1 billion with the added cost of the PDCF and WSB at $1.7 billion yielding a total cost $3.8 billion (NNSA 2002).

6.1.3 Environmental Costs of the Proposed Action

The direct environmental impacts of the proposed action are summarized in Table 6-2. Construction of the MFFF will disturb 106 ac (43 ha), most of which will be returned to original use once construction is finished. Once constructed, the MFFF will occupy 41 ac (16.6 ha) of land in the SRS F Area. All liquid and solid wastes will be transferred to the appropriate SRS waste treatment facility. Because the MFFF does not have any process liquid effluent, there are no expected impacts on surface water or groundwater. The MFFF site will have a stormwater collection and routing system that will discharge through the existing SRS stormwater NPDES outfall or new outfalls. There may be slight temporary impacts from construction runoff, but these should disappear once construction is completed.

The MFFF will have emergency and standby diesel generators that will be tested periodically, resulting in criteria pollutant emissions during the testing periods. Incremental increases in ambient concentrations of these criteria pollutants will be well below the ambient air quality standards for southwestern South Carolina. The MOX fuel fabrication process also will release small quantities of NO_X. The annual releases are accounted for in the nitrogen dioxide projections for the facility.

Dose to the public from normal MFFF operations (0.12 person-rem/yr population dose; 1.5E-03 mrem/yr for the MEI) will be well below NRC and EPA criteria and also below background radiation levels. R1

Although the construction and operation of the MFFF will disturb approximately 106 ac (43 ha) of SRS land, some of this land is already designated the site of the PDCF. There will be no impacts to sensitive ecological areas because no such areas were identified on the MFFF site. R1 The construction of the MFFF will require the excavation and recovery of two archaeological sites. Mitigation of one of these sites was completed in April 2002 and mitigation completion for the second site is anticipated for August 2002. R1 The archaeological site is not expected to contain any human or sacred artifacts and so the excavation and recovery of the artifacts may represent a benefit through the preservation of the artifacts.

[Text Deleted] With the exception of the solid TRU waste, the amounts of waste generated are a small fraction of annual SRS waste generation and will therefore have minimal impacts on SRS waste management resources. R1 The liquid high alpha activity waste generated by the MFFF will be solidified and disposed as 405 yd^3/yr solid TRU waste at WIPP. R2 This additional waste represents a < 1% increase in waste disposed at WIPP. The *Waste Isolation Pilot Plant Disposal Phase Final Supplemental Environmental Impact Statement* projected no latent cancer fatalities to the public from disposal activities. Addition of an insignificant amount of MFFF solid TRU waste is not expected to change this projection. [Text Deleted]

Cumulative impacts in the geographic vicinity of the MFFF and SRS are dominated by the impacts of existing SRS activities. SRS is currently in substantial compliance with applicable federal, state, and local air quality regulations, and compliance would be maintained even with the cumulative effects of all surplus plutonium disposition activities. Cumulative dose to the maximally exposed member of the public from all SRS activities would increase by 1.5E-03 mrem/yr or about 0.2% over the current SRS dose of 0.18 mrem/yr (Arnett and Mamatey 2001). R1 [Text Deleted]

Dose to the public and workers from the transportation of plutonium feedstock to SRS was evaluated in the SPD EIS (DOE 1999c) R2

The total dose to transportation workers associated with the UF_6 shipments is estimated to be 1.06 person-rem, corresponding to 4.22E-04 LCFs. The total dose to transportation workers associated with the UO_2 shipments is estimated to be 0.78 person-rem, corresponding to 3.10E-04 LCFs. R2

The dose to the public associated with the UF_6 shipments is estimated to be 0.21 person-rem, corresponding to 1.05E-04 LCFs. For the UO_2 shipments, the total dose to the public is estimated to be 0.14 person-rem, corresponding to 6.90E-05 LCFs. R2

The cumulative dose to the transportation workers associated with the MOX fuel shipments to the mission reactors is estimated to be 34.1 person-rem, corresponding to 1.36E-02 LCFs. The dose to the public associated with these shipments is estimated to be 9.98 person-rem, corresponding to 1.06E-03 LCFs. R2

The incident-free dose per shipment (in person-rem) for the plutonium recycle shipments in NUREG-0170 (NRC 1977c) was calculated to be 0.17, versus a maximum of 0.2 person-rem per shipment for the MOX shipments from the SRS MFFF to the mission reactor sites. The dose to the MEI for the person in traffic next to a shipment of MOX fuel is 2.0 mrem. This dose is a small fraction of the dose received from natural background radiation and is consistent with the conclusions of NUREG-0170 (NRC 1977c). R2

This ER relied on the mission reactor impacts analysis provided in the SPD EIS (DOE 1999c). The SPD EIS determined that there should be no change in impacts to the environment during normal operations at the mission reactors resulting from the irradiation of MOX fuel. This conclusion is reinforced by operating experience from Electricite de France, which operates MOX fuel power plants in France.

Because the MOX fuel that will be produced by the MFFF represents less than 1% of the domestic commercial nuclear fuel use, financial impacts to commercial fuel facilities should be minimal.

Although the proposed action does have environmental impacts, the impacts are small and consequently acceptable. The environmental impacts are outweighed by the benefit of enhancing nuclear weapons reductions both in the United States and in Russia.

6.2 NO ACTION ALTERNATIVE

6.2.1 Benefits of the No Action Alternative

R2

The No Action Alternative is the denial of a license to possess and use SNM in an MFFF at SRS. Because of previous DOE decisions in the SPD EIS ROD (DOE 2000b), the consequence of the No Action Alternative is continued storage of surplus plutonium. The No Action Alternative does not meet the need for implementing the joint United States and Russian Federation Agreement (White House 2000).

The primary benefit of the No Action Alternative is the avoidance of impacts associated with the proposed action. This avoidance is generally in the area of waste generation. R2

6.2.2 Monetary Costs of the No Action Alternative

DOE estimated the budget cost of continued storage as $4.6 billion, over the same period as the proposed alternative. Additionally, the No-Action Alternative would incur a $246 million annual cost indefinitely for as long as the material continued to be stored (NNSA 2002). R1

6.2.3 Environmental Costs of the No Action Alternative

Because the impacts of the No Action Alternative are spread over seven different locations, as reported in the SPD EIS (DOE 1999c), the range of impacts is summarized in Table 6-2. R1 Because the No Action Alternative uses existing storage facilities, there is minimal impact on land or water use.

For the No Action Alternative, emissions include not only emergency generators but also emissions from vehicles and maintenance activities. As with the proposed action, the impacts to ambient air quality under the No Action Alternative represent a small percentage of the state or federal standard. However, the emissions under the No Action Alternative would occur indefinitely, since storage would be required indefinitely.

For the No Action Alternative, all storage occurs in existing facilities with no ecological impacts for continued use of these facilities. Storage activities do not generate significant amounts of waste.

6.3 SITING ALTERNATIVES

R2

In the SPD EIS (DOE 1999c), DOE evaluated several combinations of facilities and sites and chose as its Preferred Alternative to site the MFFF (along with the PDCF) in F Area at SRS. In the subsequent ROD (DOE 2000b), DOE confirmed the SPD EIS Preferred Alternative. Subsequent to the ROD, DOE investigated several sites within F Area for the MFFF and other surplus plutonium disposition facilities. The results of this investigation are summarized in Section 5.7.2.

As discussed in Section 5.7.2, selection was based primarily on adequate area for construction, presence of any protected species, depth to water table, and avoidance of RCRA/CERCLA designated remediation area. Cost was not considered a significant discriminator in the selection of sites within the F Area. The cost of locating in any of the F-Area sites was considered to be similar for all of these sites because of the proximity to existing infrastructure. R2

Environmental impacts associated with facility operations (i.e., land use, water use, radiological and nonradiological emissions, and waste generation) are unaffected by the selection of any site within F Area. The selected site does not have wetlands or critical habitat; some alternative sites included wetlands. [Text Deleted] The selected site, however, required mitigation of an R2 archaeological site; most of the alternative sites would have avoided the archaeological site. In the final evaluation, none of the alternative sites were obviously superior to the selected site.

6.4 DESIGN ALTERNATIVES

R2

One of the bases for selection of DCS as the contractor for the MFFF was the DCS proposal to use a proven design (the COGEMA process) based on actual operations of similar facilities (MELOX and La Hague) in France. The COGEMA design represents the results of several iterations of process design and operating experience over more than 25 years of MOX fuel R2 production in France. This design optimizes both production and safety. The selection of DCS and the contractual arrangements with DOE established the basic design of the facility and process. In the process of converting the COGEMA design, based on the MELOX and La Hague facilities, to meet United States regulations, codes, and standards, DCS considered several design alternatives (see Section 5.7.3). In each case, the design alternatives selected resulted in a lower environmental impact.

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Tables

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Table 6-1. MFFF implementation costs (Thousands of 2001 dollars)[a]

Facility	R&D and Pre-Capital Costs	Design and Construction and Capital Equipment Costs	Operations Costs	Deactivation Costs	Contingency Costs	Total Costs
PDCF	249,300	440,900	718,200	9,100	267,700	$1,695,200
MFFF	326,800	1,058,200	1,226,800	9,100	497,800	$2,154,500
Total	**$576,100**	**$1,509,100**	**$1,945,000**	**$18,200**	**$765,500**	**$3,849,700**

[a] **Source: NNSA 2002**

R1

Table 6-2. Comparison of Environmental Impacts for the Proposed Action and the No Action Alternative R2

Environmental Impact	Proposed Action[a]	No Action Alternative[b]
Land Use (acres)	106 (Disturbed in Construction) 41 (Occupied during Operation)	0
Surface Water Quality	No Impact	No Impact
Groundwater Quality	No Impact	No Impact
Ambient Carbon Monoxide Increment (μg/m^3) 8-hour average	22.7	34.1 – 3000
Ambient Nitrogen Dioxide Increment (μg/m^3) Annual average	0.048	0.25 – 24
Ambient Particulate Matter – PM_{10} Increment (μg/m^3) 24-hour average	0.78	0.77 – 89
Ambient Sulfur Dioxide Increment (μg/m^3) 24-hour average	4.8	2.0E-05 – 171
Public Population Dose – 50 mi (80 km) in 2030 (person-rem)	0.12	6.3E-06 – 2.9E-04
Maximally Exposed Public Individual (mrem)	1.5E-03	6.8E-06 – 6.5
Bounding Accident Public Population Dose Within 50 mi (80 km) (person-rem)	< 6	723 – 2,590
Wetlands Affected (acres)	None	None
Critical Habitat Lost (acres)	None	None
Cultural Resources Disturbed	Excavation of archaeological site[c]	None
Liquid LLW (gal/yr)	359,672	No change
Solid LLW (yd^3/yr)	362	No change
[Text Deleted]		
Solid TRU Waste (yd^3/yr)	653	No change
Excess Low-Level Radioactive Solvent Waste (gal/yr)	3,075	No change
Liquid Nonhazardous Waste (gal/yr)[d]	4,389,710	No change
Solid Nonhazardous Waste (yd^3/yr)	1,754	No change
Cost ($ Billion)	3.8[e]	4.6

R2

R2

R1

Table 6-2. Comparison of Environmental Impacts for the Proposed Action and the No Action Alternative (continued)

Source for No Action Impacts: S&D PEIS (DOE 1996b) and SPD EIS (DOE 1999c)
Source for Mission Reactor Impacts: SPD EIS (DOE 1999c)

[a] Projected impacts are based on preliminary design and assumed to be bounding. Impacts of the proposed action are expected to occur for a 10-year period at design capacity of 3.5 metric tons plutonium converted per year.
[b] Impacts for the No Action Alternative are expected to occur indefinitely.
[c] Mitigation of the archaeological site may result in a positive environmental impact due to recovery of archaeological artifacts.
[d] Includes sanitary waste and HVAC condensate from external air intake system. R2
[e] Includes PDCF and WSB

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7. STATUS OF COMPLIANCE WITH FEDERAL AND STATE ENVIRONMENTAL REGULATIONS

Several environmental permits and plans required by federal and state agencies need to be developed and approved in order to construct and operate the MFFF. In addition, under NEPA rules and the enabling regulations of the NRC (10 CFR Part 51), consultations may be required with other federal agencies, as appropriate. Comments and recommendations made by these agencies are part of the review process for NRC project approvals. The status of these permits and their approvals is summarized in Table 7-1. R1

7.1 UNITED STATES GOVERNMENT

The following is a summary of federal agencies that will be involved in the environmental permit and plan approvals and the consultation process for MFFF project construction and operations activities.

7.1.1 U.S. Nuclear Regulatory Commission (NRC)

The NRC is responsible for the review and licensing of fuel fabrication facilities. The federal guidelines for licensing a fuel fabrication facility are identified in 10 CFR Part 70. Under 10 CFR Part 70, a comprehensive Construction Authorization Request, License Application, and R1 an Integrated Safety Analysis Summary must be submitted to NRC. An ER is submitted to meet the requirements of 10 CFR Part 51. NRC is responsible for establishing limits on radiological releases from the MFFF.

7.1.2 U.S. Environmental Protection Agency (EPA)

Permitting of the MFFF is governed by federal and state environmental laws and enabling regulations. SRS F Area has been an established industrial area for approximately 50 years. The area surrounding F Area has been impacted previously by F-Area construction and operations activities and is presently undergoing environmental restoration activities.

EPA Region IV in Atlanta, Georgia, has delegated regulatory jurisdiction to SCDHEC for virtually all aspects of permitting, monitoring, and reporting activities. Therefore, all activities associated with compliance to the Clean Air Act (CAA), Clean Water Act (CWA), Safe Drinking Water Act (SDWA), and Resource Conservation and Recovery Act (RCRA) will be undertaken with SCDHEC. This is addressed in Section 7.2.1.

R1

The projected quantities of all MFFF chemicals will not be greater than the threshold level in 40 CFR §68.130. Accordingly, compliance with 40 CFR Part 68, the Risk Management Rule, is not invoked, and a Risk Management Plan does not have to be developed.

7.1.3 U.S. Army Corps of Engineers (COE)

An Individual or General 404 Permit is not required from the COE since there are no plans to dredge and fill jurisdictional wetlands during the construction of the MFFF.

A Floodplain Assessment (WSRC 1999a) that addresses the flood history of the Savannah River and Upper Three Runs, and the effects of local intense precipitation at F Area, indicates that the MFFF site is situated well above the design basis flood level. The MFFF site is not located in a floodplain, nor is there any wetlands present within the MFFF site. R1

7.1.4 U.S. Department of Energy (DOE)

The MFFF will be an NNSA-owned, NRC-licensed facility located at SRS. The National Nuclear Security Administration (NNSA) is the owner, while DOE-SR is providing the host site. R1
Accordingly, environmental and site utility permits and plans are needed from DOE-SR for MFFF construction and operation. In addition, SRS site-wide permits will serve as a platform for some of the MFFF environmental permits. R1

7.1.5 U.S. Department of Transportation (DOT)

Transport of the MFFF fuel to the mission reactors requires compliance with the following DOT enabling regulations:

- 49 CFR Part 107, "Hazardous Materials Program Procedures," Subpart G: Registration and fee to DOT as a person who offers or transports hazardous materials
- 49 CFR Part 171, "General Information, Regulations, and Definitions"
- 49 CFR Part 173, "Shippers – General Requirements for Shipments and Packages," Subpart I: Radioactive materials
- 49 CFR Part 177, "Carriage by Public Highway"
- 49 CFR Part 178, "Specification for Packagings."

All provisions of these enabling regulations will be met prior to the transport of MFFF fuel assemblies from the MFFF to the mission reactors.

7.1.6 U.S. Department of Interior (DOI)

The U.S. Fish and Wildlife Services (USFWS) bureau of DOI is responsible for the protection of threatened and endangered species. Since there are no threatened or endangered species on the MFFF site, a negative declaration on endangered species has been received from the USFWS. R1

7.1.7 U.S. Department of Agriculture (USDA)

The U.S. Natural Resources Conservation Service (USNRCS) branch of the USDA is responsible for the preservation of prime or unique farmlands. However, the USNRCS does not identify SRS land as prime farmlands because the land is not available for agricultural production (DOE 1996b:3-230).

7.2 STATE OF SOUTH CAROLINA

With the exception of the NRC license, MFFF permitting is under the jurisdiction of South Carolina state agencies. The following is a summary of environmental permitting activities to be undertaken with the appropriate state agencies.

7.2.1 South Carolina Department of Health and Environmental Control (SCDHEC)

7.2.1.1 Preservation of Air Quality

MFFF construction and operations activities are not expected to have any measurable impact on the local air quality since no significant criteria or hazardous air pollutant emissions will result.

Any potential air quality-related impacts associated with the construction of the MFFF result from diesel fuel emissions from construction equipment, particulate matter emissions from disturbance of soil by construction equipment, if used, and other vehicles (i.e., construction fugitive dust emissions), operation of a concrete batch plant, operation of employee vehicles, and trucks moving materials and wastes. There are no SCDHEC regulations governing the generation of fugitive dust resulting from construction activities. However, for a project of this size, steps need to be taken to minimize fugitive dust emissions. Accordingly, a Construction Emissions Control Plan will be developed to provide assurance that fugitive dust emissions will be effectively managed and minimized throughout MFFF construction. This plan will include dust control techniques, such as watering of unpaved surfaces, chemical stabilization of potential dust sources, the use of portable wind screens and fences, and other equivalent mitigation measures. R1

During operations, MFFF gaseous emissions are limited to NOx and chlorine from aqueous polishing process offgas through the MFFF stack, criteria pollutants from intermittent usage of standby and emergency diesel generators and from the evaporation of a very small amount of VOCs from the ventilation stack on the diesel fuel storage tanks. These minor sources will not trigger 40 CFR Part 60 New Source Performance Standards or 40 CFR Part 52 Prevention of Significant Deterioration permitting requirements. In addition, small space heating sources of air pollutants (i.e., less than 1 million Btu/hr heat input) are exempt from applicable SCDHEC air quality regulations. Moreover, the diesel generators are non-construction stationary sources of air pollutants greater than 150 kW in size but are not expected to operate more than 250 hours per year. As long as diesel generator usage is appropriately documented, the diesel generators are exempted from permitting requirements in accordance with South Carolina Regulation 61-61.2, Section II.F.(2).(e). Finally, the quantity of criteria and hazardous air pollutants expected R2 R1 to be emitted during MFFF operations is not of sufficient magnitude to trigger any CAA Title V (40 CFR Part 71) permitting requirements. The MFFF sintering furnace, aqueous polishing screw calciner, and package boiler are all electrically fired and therefore will not generate any criteria pollutant emissions.

Although NRC-licensed facilities are exempted from National Emissions Standards for Hazardous Air Pollutants (NESHAP) requirements governing radiological releases, DOE-owned facilities are not exempted under 40 CFR 61 Subpart H. EPA Region IV and SCDHEC approved an alternate calculation methodology, which exempted MFFF from preparing a NESHAPS Construction Permit. Compliance with applicable enabling regulations and other guidance on radiological releases is addressed in the *Construction Authorization Request* and *License Application.* R1

Emissions of hazardous air pollutants from the Reagent Process Building will be under the triggers of 10 tons (9.1 metric tons) per year for a single hazardous air pollutant and 25 tons (22.7 metric tons) per year for all hazardous air pollutants. Refrigerants used for air conditioning at the MFFF will consist of Class II refrigerants (i.e., non-ozone-depleting substances). Therefore, permitting for CAA Title VI, "Stratospheric Ozone Protection" (40 CFR Part 82), relative to the usage and storage of refrigerants, will not be required.

Although the criteria and hazardous air pollutant emissions during MFFF operation are minimal, SCDHEC does require the development of Bureau of Air Quality permit forms (i.e., Permit Forms I IIA, IIB, and IIF) to obtain exemptions. Moreover, prior to operations, permit forms R1 need to be submitted to augment the SRS Title V Operating Permit. The appropriate forms for emissions from the MFFF stack, diesel generators, and diesel fuel storage vault will be prepared, and the SRS Title V Permit will be augmented appropriately.

7.2.1.2 Surface Water Protection

To protect jurisdictional waters from pollutants that could be conveyed in construction-related stormwater runoff, EPA enabling regulations require construction projects disturbing 5 ac (2 ha) or more of soil to secure coverage under an NPDES permit authorizing the construction-related stormwater discharges. Since a concrete batch plant is employed as part of the construction R1 activities, its runoff would also need to be addressed within this permitting structure (i.e., filing an NPDES Permit for no discharge basin). EPA regulates the proper disposition of stormwater from these larger construction sites through an NPDES permit program (i.e., 40 CFR §122.26(b)(14)) pursuant to Section 402 of the CWA. With respect to MFFF construction activities at SRS, a sitewide Construction NPDES General Permit (i.e., SCR100000) is available R1 to cover construction projects disturbing 5 ac (2 ha) or more of soil.

Coverage under the SRS General Permit will be secured by filing an application form with SCDHEC (i.e., Notice Of Intent [NOI]) at least 48 hours prior to initiating any construction R1 activities. The scope of construction will need to comply with applicable terms and conditions identified in the Storm Water General Permit.

Soil-disturbing activities associated with construction of the MFFF include the following:

- Site grading, clearing, and grubbing | R1
- Berms that will function as diversion ditches
- Stormwater detention basin
- Construction of the site access road
- Construction laydown area.

Once the NOI is filed with SCDHEC, coverage under the SRS General Permit is received by default 48 hours after filing. However, several activities must be conducted prior to filing an NOI. These activities include the preparation and approval of a Stormwater Pollution Prevention | R1 Plan (SWPPP).

The NOI will provide general information about the site, such as name, location, dates, and other general information relevant to the nature of the construction activities. Within the SWPPP, there will be provisions outlining erosion and sediment controls, soil stabilization practices, structural controls, and other Best Management Practices (BMPs) that will be employed during construction to protect offsite waters from adverse impacts from construction-related stormwater runoff. The SWPPP will also outline maintenance and inspection requirements and identify BMPs for the effective management of stormwater runoff from a concrete batch plant, if one is employed. If a detention basin is required, it will also be appropriately sized to meet the applicable criteria in the General Permit. BMPs include schedules of activities, prohibition of practices, maintenance procedures, and other management practices designed to prevent or reduce the pollution of waters of the United States from erosion and sedimentation. BMPs also | R1 include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

The SWPPP will be maintained onsite throughout the construction process and will be updated as appropriate. The SWPPP will also be made available for review, upon request, by the cognizant regulators.

Grading Permits, which are required by SRS, will be developed and filed, as appropriate.

Once construction has been completed, the existing SRS Industrial NPDES General Permit for stormwater that is exposed to pollutants in an industrial activity will be modified to accommodate the MFFF. The existing SRS (i.e., SC0000175) NPDES Permit for process water | R1 discharges will not require modification since there are no expected MFFF process water discharges.

Prior to operations, a Spill Prevention Control and Countermeasures (SPCC) Plan will be developed. A SPCC is required since more than 42,000 gallons of fuel will be stored underground. | R2

7.2.1.3 Drinking Water and Groundwater Protection

Drinking water requirements for construction and operation of the MFFF will be satisfied by a tie-in to the available drinking water from the SRS domestic water system. This system complies with applicable SDWA enabling regulations associated with the delivery of safe and reliable drinking water for SRS employees. A Domestic Water Distribution Construction Permit will be obtained prior to construction. Approval from the SRS Water Services Department and Environmental Protection Department will be sought by providing static and residual pressure at the tie-in and design calculations of head loss, interior flows, and fire fighting flow requirements. SCDHEC has delegated permitting authority for domestic water permits to the Environmental Protection Department. Prior to operations, a Domestic Water Distribution Operating Permit will be obtained following the same protocol.

Sanitary wastewater from MFFF construction and operations activities will be disposed of through a tie-in with the CSWTF. Influent quality requirements have to be met by each CSWTF contributor. The amount of sanitary waste generated during MFFF operations will result in a trivial increase to the CSWTF. Prior to MFFF construction, an Engineering Report that identifies all liquid waste streams, influent quality parameters (i.e., pre-treatment requirements), facilities, and lift stations will be developed, and a SCDHEC Sanitary Wastewater Construction Permit will be obtained prior to the tie-in. Prior to operations, a SCDHEC Sanitary Wastewater Operating Permit will be obtained following the same protocol.

Contaminated wastewater will be collected in a series of wastewater tanks to ensure zero liquid radioactive liquid discharges from MFFF operation. The wastewater will be transported periodically to a disposal facility in F Area for disposition.

[Text Deleted] R1

7.2.1.4 Pollution Prevention, Waste Minimization and Waste Management

The MFFF project is committed to pollution prevention and waste minimization practices and will incorporate RCRA pollution prevention goals, as identified in 40 CFR Part 261. A Pollution Prevention Waste Minimization Plan will be developed to meet the waste minimization criteria R1 of both NRC and EPA regulations. The Pollution Prevention Waste Minimization Plan will describe how the MFFF design procedures for operation will minimize (to the extent practicable) contamination of the facility and the environment and minimize (to the extent practicable) the generation of radioactive, mixed, hazardous, and nonhazardous solid waste.

Nonhazardous RCRA wastes from construction activities will be appropriately disposed at an offsite permitted landfill.

Throughout operations, the small quantities of waste generated will be appropriately handled and disposed. The small quantities of hazardous wastes that would be generated are expected to be much less than 100 kg/month. Thus, the MFFF should qualify as a Small Quantity Hazardous R1 Waste Generator. The MFFF-generated wastes will be transported to a satellite accumulation area and later relocated to a staging area or existing SRS-permitted RCRA storage area. Since there will be no treatment or long-term storage of MFFF RCRA wastes in MFFF facilities, there will be no need for an MFFF RCRA Part B Permit.

The MFFF design includes the storage of diesel fuel for the standby diesel generators in a double-walled tank and the storage of diesel fuel for emergency diesel generators in a tank within a vault. Only the double-walled tanks have to meet the design requirements of 40 CFR Part 280 and SCDHEC Regulation 61-92 Part 280 for underground storage tanks (USTs). The tank within a vault is exempted from UST regulations. Therefore, prior to construction, a UST Construction Permit will be obtained, and prior to operations, a UST Operating Permit will be obtained for the double-walled tanks. R1

MFFF-generated wastes will be treated, stored, and disposed through the existing SRS waste management infrastructure.

7.2.2 South Carolina Department of History and Archives

Construction activities that take place at SRS require compliance with applicable federal historic preservation requirements administered through the state of South Carolina.

The SPD EIS (DOE 1999c) documented that there are no cultural resources located on the MFFF site. However, there is an archaeological resource area on the MFFF. Discussions have been initiated with the state historic preservation officer and mitigation measures have been identified. These mitigation measures will precede any construction activities and are part of the SRS Infrastructure Project.

7.2.3 South Carolina Department of Natural Resources (SCDNR)

SCDNR is responsible for the protection of threatened and endangered species listed by the State of South Carolina. Since there are no threatened or endangered species on the MFFF site, a negative declaration on endangered species has been requested of the SCDNR.

7.3 AIKEN COUNTY

Aiken County does not have any applicable environmental permitting requirements.

As part of the notification requirements associated with 40 CFR Part 355 (implementing regulation for the Emergency Planning and Community Right-to-Know Act), any necessary notifications will be established with the Local Emergency Planning Committee, at the appropriate time, to identify hazardous materials that will be used once the MFFF is operational.

7.4 PERMIT AND APPROVAL STATUS AND CONSULTATIONS

7.4.1 Permit and Approval Status

Several permits and plans associated with construction activities have been prepared and will be formally filed with the appropriate agency prior to the commencement of construction. Construction and operational permit applications will be prepared and filed, and regulator approval and/or permits will be received prior to applicable construction or facility operation. EPA Region IV and SCDHEC have granted approval of an Alternate Calculation Technique for MFFF NESHAPS determinations pursuant to 40 CFR Part 61. R1 R1

Table 7-1 provides the status of compliance with federal and state environmental laws.

7.4.2 Agency Consultations

Initial consultations have been made with the cognizant agencies. The MFFF Environmental Permitting Plan was presented to SCDHEC on June 28, 2001. More specific discussions will be held, as appropriate, as the project progresses. R1

Tables

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Table 7-1. Status of Compliance with Federal and State Environmental Laws

Requirement	**Status**	**Comments**
Federal Laws and Enabling Regulations		
Negative declaration on cultural resources from the State Historic Preservation Officer (SHPO) 43 CFR Part 7; 36 CFR Parts 60, 61, 63, 65, 67, 68	Completed	SHPO approved mitigation plan on 11 April 2001. See Appendix A. Mitigation complete August 2002.
Negative declaration on endangered species from the U.S. Fish and Wildlife Services (USFWS) 50 CFR Parts 13, 17, 222, 226, 227, 402, 424, 450-453	Completed	USFWS issued negative declaration on 20 June 2001. See Appendix A.
Negative declaration on prime or unique farmlands from U.S. Natural Resources Conservation Service (USNRCS) 7 CFR Part 658	Not required	USNRCS does not identify SRS as prime farmlands because the land is not available for agricultural production (DOE 1996b: 3-230).
Negative declaration on 404 Permit from U.S. Army Corps of Engineers (COE)	Not required	No jurisdictional wetlands exist on MFFF site.
Floodplain Assessment	Completed	Floodplain Assessment incorporated into the design basis.

R1

Table 7-1. Status of Compliance with Federal and State Environmental Laws (continued)

Requirement	Status	Comments
State of South Carolina Laws and Enabling Regulations		
Negative declaration on endangered species from South Carolina Department of Natural Resources (SCDNR) 50 CFR Parts 13, 17, 222, 226, 227, 402, 424, 450-453	Pending	Discussions with SCDNR have been initiated. See Appendix A.

Construction Environmental Plans and Permits		
Construction Emission Control Plan 40 CFR 60 South Carolina Regulation 61.62-6	Included in MFFF Environmental Permit Plan Completed	Consultation with SCDHEC initiated Tree Removal, Move Transmission Line, Remove Spoils Pile, Clearing and Grubbing, Rough Grading, Move Outfall, Detention Basin.
Bureau of Air Quality Construction Permit 40 CFR 60 South Carolina Regulation 61.62-5	Included in MFFF Environmental Permit Plan Initiated	Consultation with SCDHEC initiated. Individual permits for MFFF Stack Construction; Installation of Diesel Generators; Installation of Diesel Fuel Tanks; Operation of Concrete Batch Plant. R1
NESHAPS Construction Permit 40 CFR 61 Subpart H 10 CFR 20 South Carolina Regulation 61.62-5	Included in MFFF Environmental Permit Plan Completed	Alternative Calculation methodology accepted by EPA Region IV and SCDHEC (April 2002). Exemption from NESHAPS Construction Permit achieved. Long-Lead Time Procurement of Construction Materials and Equipment.
Construction NPDES General Permit 40 CFR 122 South Carolina Regulation 61-9 South Carolina Regulation 61-68 South Carolina Regulation 72-300 through 72-316 (GR)	Included in MFFF Environmental Permit Plan Initiated	Consultation with SCDHEC initiated. Tree Removal, Move Transmission Line, Remove Spoils Pile, Clearing And Grubbing, Rough Grading, Move Outfall, Detention Basin.
Sanitary Wastewater Construction Permit 40 CFR 122 South Carolina Regulation 61-9 South Carolina Regulation 61-67	Included in MFFF Environmental Permit Plan Initiated	Consultation with SCDHEC initiated. Connect to SRS F-Area Lift Station.

Table 7-1. Status of Compliance with Federal and State Environmental Laws (continued)

Requirement	Status	Comments	
Construction Environmental Plans and Permits (continued)			
No Discharge NPDES Permit 40 CFR 122 South Carolina Regulation 61-9 South Carolina Regulation 61-68	Included in MFFF Environmental Permit Plan	Consultation with SCDHEC initiated. Operation of Concrete Batch Plant.	
Construction Stormwater Pollution Prevention Plan (SWPPP) 40 CFR 122 South Carolina Regulation 61-9 South Carolina Regulation 61-68 South Carolina Regulation 72-300 through 72-316 (GR)	Included in MFFF Environmental Permit Plan Initiated	Consultation with SCDHEC initiated. Tree Removal, Move Transmission Line, Remove Spoils Pile, Clearing And Grubbing, Rough Grading, Move Outfall, Detention Basin.	
Notice of Intent (supports SWPPP) 40 CFR 122 South Carolina Regulation 61-9 South Carolina Regulation 61-68 South Carolina Regulation 72-300 through 72-316 (GR)	Included in MFFF Environmental Permit Plan	Consultation with SCDHEC initiated. Tree Removal, Move Transmission Line, Remove Spoils Pile, Clearing And Grubbing, Rough Grading, Move Outfall, Detention Basin.	
Domestic Water Distribution Construction Permit 40 CFR 141 South Carolina Regulation 61-58 South Carolina Regulation 61-71 South Carolina Regulation 61-101	Included in MFFF Environmental Permit Plan Initiated	Consultation with SCDHEC initiated. Tie-in to SRS domestic water distribution system for delivery of potable water.	R1
Backflow Preventer Test Form (accompanies Domestic Water Distribution Construction Permit) 40 CFR 141 South Carolina Regulation 61-58 South Carolina Regulation 61-71 South Carolina Regulation 61-101	Included in MFFF Environmental Permit Plan Initiated	Consultation with SCDHEC initiated. Tie-in to SRS domestic water distribution system for delivery of potable water.	
Spill Prevention Control and Countermeasures (SPCC) Plan 40 CFR 112 Section 110 South Carolina Regulation 61-9	Not required. Included in MFFF Environmental Permit Plan Not required.	Consultation with SCDHEC initiated. Although not required, MFFF will have an equivalent of a SPCC Plan as a Best Management Practice during construction.	

Table 7-1. Status of Compliance with Federal and State Environmental Laws (continued)

Requirement	Status	Comments
Construction Environmental Plans and Permits (continued)		
Underground Storage Tank (UST) Installation Permit 40 CFR 112 40 CFR 280 South Carolina Regulation 61-92	Included in MFFF Environmental Permit Plan Initiated	Consultation with SCDHEC initiated. Installation of Fuel Tanks, Fuel Oil Lines, and Fuel Unloading Station. Standby diesel tank is classified as a UST since it is not in a vault.
Pollution Prevention and Waste Minimization Plan 40 CFR 261 40 CFR 262 40 CFR 264 40 CFR 268 South Carolina Regulation 61-66 South Carolina Regulation 61-79 South Carolina Regulation 61-99 South Carolina Regulation 61-104	Included in MFFF Environmental Permit Plan Initiated	Consultation with SCDHEC initiated. Best Management Practices for Construction Waste Management.
Operational Environmental Plans and Permits		
Title V Operating Permit 40 CFR 71 South Carolina Regulation 61.62-70	Included in MFFF Environmental Permit Plan	Consultation with SCDHEC initiated. All MFFF Air emissions will be contained in permit.
Risk Management Plan 40 CFR 68.130 Tables 1 & 3 South Carolina Regulation 61.62-68	Included in MFFF Environmental Permit Plan Not required	Consultation with SCDHEC initiated. MFFF will impose administrative limits on 40 CFR 68.130 and South Carolina Regulation 61.62-68 extremely hazardous chemicals, which will preclude the need for a Risk Management Plan. R1
Industrial NPDES General Permit 40 CFR 122 South Carolina Regulation 61-9 South Carolina Regulation 61-67	Included in MFFF Environmental Permit Plan	Consultation with SCDHEC initiated. Condensate and stormwater discharges will become part of SRS General Permits for Stormwater and Industrial Water.
Sanitary Wastewater Operating Permit 40 CFR 122 South Carolina Regulation 61-9 South Carolina Regulation 61-67	Included in MFFF Environmental Permit Plan	Consultation with SCDHEC initiated. Tie-in to SRS Central Sanitary Wastewater Treatment Facility (CSWTF) for ultimate treatment and disposal of sanitary waste.

Table 7-1. Status of Compliance with Federal and State Environmental Laws (continued)

Requirement	Status	Comments
Operational Environmental Plans and Permits (continued)		
Underground Storage Tank (UST) Operating Permit 40 CFR 112 40 CFR 280 South Carolina Regulation 61-92	Included in MFFF Environmental Permit Plan	Consultation with SCDHEC initiated. Operation of Fuel Tanks, Fuel Oil Lines, and Fuel Unloading Station Standby diesel tank is classified as a UST since it is not in a vault..
Spill Prevention Control and Countermeasures (SPCC) Plan 40 CFR 112 Section 110 South Carolina Regulation 61-9	Included in MFFF Environmental Permit Plan	Consultation with SCDHEC initiated. SPCC Plan prior to MFFF Operations is required since underground diesel fuel quantities exceed 42,000 gallons.
Domestic Water Distribution Operating Permit 40 CFR 141 South Carolina Regulation 61-58 South Carolina Regulation 61-71 South Carolina Regulation 61-101	Included in MFFF Environmental Permit Plan	Consultation with SCDHEC initiated. Tie-in to SRS domestic water distribution system for delivery of potable water.
RCRA Generator Identification Number South Carolina Regulation 61-79	Included in MFFF Environmental Permit Plan	Consultation with SCDHEC initiated. Identification numbers to be filed with SCDHEC for any materials that are classified as RCRA wastes.
RCRA Part B Permit South Carolina Regulation 61-66 South Carolina Regulation 61-79 South Carolina Regulation 61-99 South Carolina Regulation 61-104	Included in MFFF Environmental Permit Plan Not required	Consultation with SCDHEC initiated. Generated hazardous waste will be stored and accumulated for less than 90 days prior to being sent to SRS, which will preclude the need to obtain a RCRA Part B Permit. R1
Pollution Prevention and Waste Minimization Plan 40 CFR 261 40 CFR 262 40 CFR 264 40 CFR 268 South Carolina Regulation 61-66, South Carolina Regulation 61-79, South Carolina Regulation 61-99, South Carolina Regulation 61-104	Included in MFFF Environmental Permit Plan	Consultation with SCDHEC initiated. Recycling and waste minimization practices throughout operations.
Emergency Planning and Community Right-to-Know notifications 40 CFR 355 40 CFR 372	Included in MFFF Environmental Permit Plan	Consultation with SCDHEC initiated. MFFF is expected to report as part of the SRS Site Item Reportability and Issue Management (SIRIM) program.

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APPENDIX A. AGENCY CONSULTATIONS AND CORRESPONDENCE

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Department of Energy
Washington, DC 20585

October 30, 1998

Dr. Rodger Stroup
State Historic Preservation Office
8301 Parklane Road
Columbia, South Carolina 29223

Subject: *Consultation for Surplus Plutonium Disposition Environmental Impact Analysis Process*

Dear Dr. Stroup:

The purpose of this letter is to notify you that the United States Department of Energy (DOE) is in the process of conducting an Environmental Impact Analysis concerning the disposition of surplus plutonium.

With this letter we are soliciting specific concerns the South Carolina State Historic Preservation Office may have about the proposal. This consultation is in accordance with National Environmental Policy Act and Section 106 of the National Historic Preservation Act.

The *Surplus Plutonium Disposition Environmental Impact Statement* (SPD EIS) is tiered from the *Storage and Disposition of Weapons-Usable Fissile Materials Final Programmatic EIS* (DOE/EIS-0229), issued in December 1996, and the associated Record of Decision (62 FR 3014), issued on January 14, 1997. DOE is producing the SPD EIS in compliance with the National Environmental Policy Act (NEPA) and Council on Environmental Quality regulations implementing NEPA, DOE's NEPA Implementing Regulations (10 CFR 1021), and other applicable federal and state environmental legislation.

The purpose and need for the proposed action is to reduce the threat of nuclear weapons proliferation worldwide by disposing of surplus plutonium in the United States in an environmentally safe and timely manner. The SPD Draft EIS, a copy of which is attached for your review, examines the potential environmental impacts for 24 alternatives for the proposed siting, construction, and operation of three types of facilities: pit disassembly and conversion; mixed oxide (MOX) fuel fabrication; and plutonium conversion and immobilization.

If an alternative is selected that includes siting of surplus plutonium disposition facilities at the Savannah River site (e.g., Alternatives 3A or 3B), a maximum of about 31 hectares (77 acres) of land adjacent to the Actinide Packaging and Storage Facility (APSF) in F-Area, would be impacted. Not all areas within the proposed construction

Mr. Rodger Stroup
State Historic Preservation Officer
10/30/98
Page 2

area have been completely surveyed for cultural resources, and this area has a high potential to yield subsurface deposits with cultural material. Based on previous archaeological investigations, four archaeological sites have been recorded in or near the proposed construction areas. One of these sites (38AK546) has been recommended as eligible for nomination to the National Register. All compliance activities, including survey, testing, and impact mitigation would be conducted in accordance with *Programmatic Memorandum of Agreement for the Savannah River Site* (1989).

If you have any specific concerns about the SPD EIS proposal, we would like to hear from you. Please contact me with your concerns or questions at:

Marcus Jones
SPD EIS Document Manager
U.S. Department of Energy
Office of Fissile Materials Disposition
P.O. Box 23786
Washington, DC 20026-3786
(202) 586-0149.

You may also contact Mark Brooks, the Cultural Resources Manager at Savannah River Site, at (803) 725-3724.

Sincerely,

Marcus Jones
SPD EIS Document Manager

cc: Mark Brooks, Archaeological Program Manager, SRS
Lois Thompson, Federal Preservation Officer, DOE HQ

SPD EIS enclosure

November 12, 1998

Mr. Marcus Jones
SPD EIS Document Manager
Department of Energy
Washington, DC 20585

Re: Consultation for Surplus Plutonium Disposition Environmental Impact Analysis Process
Savannah River Site, Aiken County

Dear Mr. Jones:

Thank you for providing the draft Environmental Impact Statement for the disposition of surplus plutonium.

We note that Alternatives 3A and 3B, if selected, will affect the Savannah River Site. If these alternatives are selected, we further note that cultural resources survey, testing, and impact mitigation will be conducted. These measures will be conducted in accordance with the stipulations of the existing Programmatic Memorandum of Agreement for the Savannah River Site.

We look forward to further consultation if Alternatives 3A and 3B are selected. If you have questions, please don't hesitate to call me (803-896-6169) or Staff Archaeologist Bill Green (803/896-6181).

Sincerely,

Nancy Brock

Nancy Brock, Coordinator
Review and Compliance Programs
State Historic Preservation Office

Cc: Mr. Mark Brooks, Archaeological Program Manager, SRS

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Mr. A. B. Gould, Director
Environmental Quality Management Division
Department of Energy, Savannah River Operations Office
P.O. Box A
Aiken, South Carolina 29802

RE: Draft report: *Archaeological Survey and Testing of the Surplus Plutonium Disposition Facilities* (Technical Report Series Number 24) prepared by Adam King and Keith Stephenson of the Savannah River Archaeological Research Program.

Dear Mr. Gould:

Thank you for providing us with one copy of the above-referenced draft report. We have reviewed the report and found that it is well written and informative and meets the standards and guidelines established by the Secretary of the Interior and this office.

We concur with the authors' recommendation that archaeological sites 38AK155, 38AK546/547, and 38AK757 are **eligible** for inclusion in the National Register of Historic Places (NRHP) and that these sites should be avoided by the SPDF. If these sites cannot be avoided, we should begin consultation on ways to mitigate the adverse effects to these important sites.

In regard to sites 38AK154, 38AK330, and 38AK548, we also concur with the authors' recommendation that these sites are **not eligible** for inclusion in the NRHP and that no additional work is required. I have attached some additional technical comments that should be addressed prior to submitting three copies of the final report to this office. These comments are provided to assist you with your responsibilities under Sections 106 and 110 of the National Historic Preservation Act, as amended, and the regulations codified at 36 CFR Part 800. I can be contacted at 803-216-9330 if you have any questions or comments about this matter.

Sincerely,

William Green
Staff Archaeologist
State Historic Preservation Office

Attachment

cc: Mark Brooks, Savannah River Archaeological Research Program
Don Klima, Advisory Council on Historic Preservation (w/o attachment)
Keith Derting, South Carolina Institute of Archaeology and Anthropology (w/o attachment)

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Department of Energy
Savannah River Operations Office
P.O. Box A
Aiken, South Carolina 29802

DEC 0 8 2000

Ms. Nancy Brock, Coordinator
Review and Compliance Program
South Carolina Department of Archives and History
8301 Parklane Road
Columbia, SC 29223-4905

Dear Ms. Brock:

Re: Department of Energy, Surplus Plutonium Disposition Facilities
Mixed Oxide Fuel Fabrication Facility

Report: *Archaeological Survey and testing of the Surplus Plutonium Disposition Facilities* (Technical Report Series Number 24)

In October, 1998 the Department of Energy notified the South Carolina State Historic Preservation Office concerning plans to locate the Surplus Plutonium Disposition Facilities at the Savannah River Site and solicited comments on the Surplus Plutonium Disposition Environmental Impact Statement (letter from Mr. Marcus Jones to Dr. Rodger Stroup, October 30, 1998). Subsequently, the Savannah River Archaeological Research Program provided the South Carolina State Historic Preservation Office with a copy of *Archaeological Survey and testing of the Surplus Plutonium Disposition Facilities* (Technical Report Series Number 24) for your review. In response, the South Carolina State Historic Preservation Office concurred that sites 38AK155, 38AK546/547, and 38AK757 were eligible for inclusion in the National Register of Historic Places. Your office also requested that if the sites could not be avoided, the Department of Energy should begin consultations with your office on ways to mitigate any adverse impacts.

The Department of Energy pursued site investigations including soil testing for the site of the Mixed Oxide Fuel Fabrication Facility (one of the three surplus plutonium disposition facilities). This testing included core borings west of 38AK546/547.

The Department of Energy has prepared a preliminary site layout for the Mixed Oxide Fuel Fabrication Facility (one of the three surplus plutonium disposition facilities) which is illustrated on the enclosed map as site "2M". We have located the facility as far to the west as possible without infringing on other surplus plutonium facilities. However we anticipate that construction activities will impact 38AK546/547. The Department of Energy is committed to mitigate any impact to 38AK546/547 by recovering artifacts in the affected area before any site preparation. A proposed mitigation plan for this area is currently being prepared and will be transmitted to you in January 2001 for your review and concurrence.

Sincerely,

A. B. Gould, Director
Environmental Quality and Management Division

kwd/aeo
Att.

The South Carolina Archives & History Center

Honor & Heritage For All Generations

April 11, 2001

Mr. A. B. Gould, Director
Environmental Quality Management Division
Department of Energy, Savannah River Operations Office
P.O. Box A
Aiken, South Carolina 29802 R2

RE: Mitigation Plans for Sites 38AK757 and 38AK546 at the proposed Surplus Plutonium Disposition Facility, Savannah River Site, Aiken County, SC

Dear Mr. Gould:

I have reviewed the above referenced proposals for archaeological site mitigation and find them to be acceptable plans that address important questions and comply with state and federal standards and guidelines. The information resulting from this work should add significantly to our understanding of prehistory in the state of South Carolina.

These comments are being provided to you to assist you with your responsibilities Section 106 of the National Historic Preservation Act, as amended, and the regulations codified at 36 CFR Part 800. I can be contacted at (803) 896-6173 if you have any questions.

Sincerely,

Valerie Marcil
Staff Archaeologist
State Historic Preservation Office

cc: Mark Brooks, Savannah River Archaeological Research Program
Keith Derting, South Carolina Institute of Archaeology and Anthropology

S. C. Department of Archives & History • 8301 Parklane Road • Columbia • South Carolina • 29223-4905 • (803) 896-6100 • www.state.sc.us/scdah

Department of Energy
Washington, DC 20585

October 30, 1998

Mr. Tom Berryhill, Council Member
National Council of the Muskogee Creek
P.O. Box 158
Okmulgee, OK 74447

Subject: *Consultation for Surplus Plutonium Disposition Environmental Impact Analysis Process, Under Executive Memorandum Concerning Government-to-Government Relations with Native American Tribal Governments*

Dear Mr. Berryhill:

The purpose of this letter is to notify you that the United States Department of Energy (DOE) is in the process of conducting an Environmental Impact Analysis concerning the disposition of surplus plutonium.

With this letter we are soliciting specific concerns the National Council of the Muskogee Creek may have about the proposal. This consultation is in accordance with the Executive Memorandum (29 April 1994) entitled, "Government-to-Government Relations with Native American Tribal Governments", and DOE Order 1230.2. It also follows prior consultation initiated for compliance with the American Indian Religious Freedom Act (AIRFA) (PL 95-341) and the Native American Graves Protection and Repatriation Act (NAGFRA) (PL 101-601).

The *Surplus Plutonium Disposition Environmental Impact Statement* (SPD EIS) is tiered from the *Storage and Disposition of Weapons-Usable Fissile Materials Final Programmatic EIS* (DOE/EIS-0229), issued in December 1996, and the associated Record of Decision (62 FR 3014), issued on January 14, 1997. DOE is producing the SPD EIS in compliance with the National Environmental Policy Act (NEPA) and Council on Environmental Quality regulations implementing NEPA, DOE's NEPA Implementing Regulations (10 CFR 1021), and other applicable federal and state environmental legislation.

The purpose and need for the proposed action is to reduce the threat of nuclear weapons proliferation worldwide by disposing of surplus plutonium in the United States in an environmentally safe and timely manner. The SPD Draft EIS, a copy of which is attached for your review, examines the potential environmental impacts for 24 alternatives for the proposed siting, construction, and operation of three types of facilities: pit disassembly and conversion; mixed oxide (MOX) fuel fabrication; and plutonium conversion and immobilization.

Mr. Tom Berryhill, Council Member
National Council of the Muskogee Creek
10/30/98
Page 2

If an alternative is selected that includes siting of surplus plutonium disposition facilities at the Savannah River Site (e.g., Alternatives 3A or 3B), a maximum of about 31 hectares (77 acres) of land adjacent to the Actinide Packaging and Storage Facility (APSF) in F-Area, would be impacted. No Native American cultural sites are known to exist within the proposed construction area.

If you have any specific concerns about the SPD EIS proposal, we would like to hear from you. Please contact me with your concerns or questions at:

Marcus Jones
SPD EIS Document Manager
U.S. Department of Energy
Office of Fissile Materials Disposition
P.O. Box 23786
Washington, DC 20026-3786
(202) 586-0149

You may also contact A. Ben Gould, Savannah River Site Indian Liaison Officer, at: (803) 725-3969.

Sincerely,

Marcus Jones
SPD EIS Document Manager

cc: A. Ben Gould, SRS
Brandt Petrasek, EM-20, DOE HQ

SPD EIS enclosure

Department of Energy
Washington, DC 20585

October 30, 1998

Ms. Nancy Carnley, Secretary
Ma Chis Lower Alabama Creek Indian Tribe
Route 1
708 S. John Street
New Brockton, Alabama 36351

Subject: *Consultation for Surplus Plutonium Disposition Environmental Impact Analysis Process, Under Executive Memorandum Concerning Government-to-Government Relations with Native American Tribal Governments*

Dear Ms. Carnley:

The purpose of this letter is to notify you that the United States Department of Energy (DOE) is in the process of conducting an Environmental Impact Analysis concerning the disposition of surplus plutonium.

With this letter we are soliciting specific concerns the Ma Chis Lower Alabama Creek Indian Tribe may have about the proposal. This consultation is in accordance with the Executive Memorandum (29 April 1994) entitled, "Government-to-Government Relations with Native American Tribal Governments", and DOE Order 1230.2. It also follows prior consultation initiated for compliance with the American Indian Religious Freedom Act (AIRFA) (PL 95-341) and the Native American Graves Protection and Repatriation Act (NAGPRA) (PL 101-601).

The *Surplus Plutonium Disposition Environmental Impact Statement* (SPD EIS) is tiered from the *Storage and Disposition of Weapons-Usable Fissile Materials Final Programmatic EIS* (DOE/EIS-0229), issued in December 1996, and the associated Record of Decision (62 FR 3014), issued on January 14, 1997. DOE is producing the SPD EIS in compliance with the National Environmental Policy Act (NEPA) and Council on Environmental Quality regulations implementing NEPA, DOE's NEPA Implementing Regulations (10 CFR 1021), and other applicable federal and state environmental legislation.

The purpose and need for the proposed action is to reduce the threat of nuclear weapons proliferation worldwide by disposing of surplus plutonium in the United States in an environmentally safe and timely manner. The SPD Draft EIS, a copy of which is attached for your review, examines the potential environmental impacts for 24 alternatives for the proposed siting, construction, and operation of three types of facilities: pit disassembly and conversion; mixed oxide (MOX) fuel fabrication; and plutonium conversion and immobilization.

Ms. Nancy Carnley, Secretary
Ma Chis Lower Alabama Creek Indian Tribe
10/30/98
Page 2

If an alternative is selected that includes siting of surplus plutonium disposition facilities at the Savannah River Site (e.g., Alternatives 3A or 3B), a maximum of about 31 hectares (77 acres) of land adjacent to the Actinide Packaging and Storage Facility (APSF) in F-Area, would be impacted. No Native American cultural sites are known to exist within the proposed construction area.

If you have any specific concerns about the SPD EIS proposal, we would like to hear from you. Please contact me with your concerns or questions at:

Marcus Jones
SPD EIS Document Manager
U.S. Department of Energy
Office of Fissile Materials Disposition
P.O. Box 23786
Washington, DC 20026-3786
(202) 586-0149

You may also contact A. Ben Gould, Savannah River Site Indian Liaison Officer, at: (803) 725-3969.

Sincerely,

Marcus Jones
SPD EIS Document Manager

cc: A. Ben Gould, SRS
Brandt Petrasek, EM-20, DOE HQ

SPD EIS enclosure

Department of Energy
Washington, DC 20585

October 30, 1998

Miko Tony Hill
Indian People's Muskogee Tribal Town Confederacy
P.O. Box 14
Okemah, OK 74859

Subject: *Consultation for Surplus Plutonium Disposition Environmental Impact Analysis Process, Under Executive Memorandum Concerning Government-to-Government Relations with Native American Tribal Governments*

Dear Miko Hill:

The purpose of this letter is to notify you that the United States Department of Energy (DOE) is in the process of conducting an Environmental Impact Analysis concerning the disposition of surplus plutonium.

With this letter we are soliciting specific concerns the Indian People's Muskogee Tribal Town Confederacy may have about the proposal. This consultation is in accordance with the Executive Memorandum (29 April 1994) entitled, "Government-to-Government Relations with Native American Tribal Governments", and DOE Order 1230.2. It also follows prior consultation initiated for compliance with the American Indian Religious Freedom Act (AIRFA) (PL 95-341) and the Native American Graves Protection and Repatriation Act (NAGPRA) (PL 101-601).

The *Surplus Plutonium Disposition Environmental Impact Statement* (SPD EIS) is tiered from the *Storage and Disposition of Weapons-Usable Fissile Materials Final Programmatic EIS* (DOE/EIS-0229), issued in December 1996, and the associated Record of Decision (62 FR 3014), issued on January 14, 1997. DOE is producing the SPD EIS in compliance with the National Environmental Policy Act (NEPA) and Council on Environmental Quality regulations implementing NEPA, DOE's NEPA Implementing Regulations (10 CFR 1021), and other applicable federal and state environmental legislation.

The purpose and need for the proposed action is to reduce the threat of nuclear weapons proliferation worldwide by disposing of surplus plutonium in the United States in an environmentally safe and timely manner. The SPD Draft EIS, a copy of which is attached for your review, examines the potential environmental impacts for 24 alternatives for the proposed siting, construction, and operation of three types of facilities: pit disassembly and conversion; mixed oxide (MOX) fuel fabrication; and plutonium conversion and immobilization.

Miko Tony Hill
Indian People's Muskogee Tribal Town Confederacy
10/30/98
Page 2

If an alternative is selected that includes siting of surplus plutonium disposition facilities at the Savannah River Site (e.g., Alternatives 3A or 3B), a maximum of about 31 hectares (77 acres) of land adjacent to the Actinide Packaging and Storage Facility (APSF) in F-Area, would be impacted. No Native American cultural sites are known to exist within the proposed construction area.

If you have any specific concerns about the SPD EIS proposal, we would like to hear from you. Please contact me with your concerns or questions at:

Marcus Jones
SPD EIS Document Manager
U.S. Department of Energy
Office of Fissile Materials Disposition
P.O. Box 23786
Washington, DC 20026-3786
(202) 586-0149

You may also contact A. Ben Gould, Savannah River Site Indian Liaison Officer, at: (803) 725-3969.

Sincerely,

Marcus Jones
SPD EIS Document Manager

cc: A. Ben Gould, SRS
Brandt Petrasek, EM-20, DOE HQ

SPD EIS enclosure

Department of Energy
Washington, DC 20585

October 30, 1998

Ms. Virginia Montoya
Pee Dee Indian Association
101 E. Tatum Avenue
McColl, South Carolina 29570

Subject: *Consultation for Surplus Plutonium Disposition Environmental Impact Analysis Process, Under Executive Memorandum Concerning Government-to-Government Relations with Native American Tribal Governments*

Dear Ms. Montoya:

The purpose of this letter is to notify you that the United States Department of Energy (DOE) is in the process of conducting an Environmental Impact Analysis concerning the disposition of surplus plutonium.

With this letter we are soliciting specific concerns the Pee Dee Indian Association may have about the proposal. This consultation is in accordance with the Executive Memorandum (29 April 1994) entitled, "Government-to-Government Relations with Native American Tribal Governments", and DOE Order 1230.2. It also follows prior consultation initiated for compliance with the American Indian Religious Freedom Act (AIRFA) (PL 95-341) and the Native American Graves Protection and Repatriation Act (NAGPRA) (PL 101-601).

The *Surplus Plutonium Disposition Environmental Impact Statement* (SPD EIS) is tiered from the *Storage and Disposition of Weapons-Usable Fissile Materials Final Programmatic EIS* (DOE/EIS-0229), issued in December 1996, and the associated Record of Decision (62 FR 3014), issued on January 14, 1997. DOE is producing the SPD EIS in compliance with the National Environmental Policy Act (NEPA) and Council on Environmental Quality regulations implementing NEPA, DOE's NEPA Implementing Regulations (10 CFR 1021), and other applicable federal and state environmental legislation.

The purpose and need for the proposed action is to reduce the threat of nuclear weapons proliferation worldwide by disposing of surplus plutonium in the United States in an environmentally safe and timely manner. The SPD Draft EIS, a copy of which is attached for your review, examines the potential environmental impacts for 24 alternatives for the proposed siting, construction, and operation of three types of facilities: pit disassembly and conversion; mixed oxide (MOX) fuel fabrication; and plutonium conversion and immobilization.

Ms. Virginia Montoya
Pee Dee Indian Association
10/30/98
Page 2

If an alternative is selected that includes siting of surplus plutonium disposition facilities at the Savannah River Site (e.g., Alternatives 3A or 3B), a maximum of about 31 hectares (77 acres) of land adjacent to the Actinide Packaging and Storage Facility (APSF) in F-Area, would be impacted. No Native American cultural sites are known to exist within the proposed construction area.

If you have any specific concerns about the SPD EIS proposal, we would like to hear from you. Please contact me with your concerns or questions at:

Marcus Jones
SPD EIS Document Manager
U.S. Department of Energy
Office of Fissile Materials Disposition
P.O. Box 23786
Washington, DC 20026-3786
(202) 586-0149

You may also contact A. Ben Gould, Savannah River Site Indian Liaison Officer, at: (803) 725-3969.

Sincerely,

Marcus Jones
SPD EIS Document Manager

cc: A. Ben Gould, SRS
Brandt Petrasek, EM-20, DOE HQ

SPD EIS enclosure

Department of Energy
Washington, DC 20585

October 30, 1998

Mr. Al Rolland, Project Director
Yuchi Tribal Organization, Inc.
P.O. Box 1990
Sapulpa, OK 74067

Subject: *Consultation for Surplus Plutonium Disposition Environmental Impact Analysis Process, Under Executive Memorandum Concerning Government-to-Government Relations with Native American Tribal Governments*

Dear Mr. Rolland:

The purpose of this letter is to notify you that the United States Department of Energy (DOE) is in the process of conducting an Environmental Impact Analysis concerning the disposition of surplus plutonium.

With this letter we are soliciting specific concerns the Yuchi Tribal Organization may have about the proposal. This consultation is in accordance with the Executive Memorandum (29 April 1994) entitled, "Government-to-Government Relations with Native American Tribal Governments", and DOE Order 1230.2. It also follows prior consultation initiated for compliance with the American Indian Religious Freedom Act (AIRFA) (PL 95-341) and the Native American Graves Protection and Repatriation Act (NAGPRA) (PL 101-601).

The *Surplus Plutonium Disposition Environmental Impact Statement* (SPD EIS) is tiered from the *Storage and Disposition of Weapons-Usable Fissile Materials Final Programmatic EIS* (DOE/EIS-0229), issued in December 1996, and the associated Record of Decision (62 FR 3014), issued on January 14, 1997. DOE is producing the SPD EIS in compliance with the National Environmental Policy Act (NEPA) and Council on Environmental Quality regulations implementing NEPA, DOE's NEPA Implementing Regulations (10 CFR 1021), and other applicable federal and state environmental legislation.

The purpose and need for the proposed action is to reduce the threat of nuclear weapons proliferation worldwide by disposing of surplus plutonium in the United States in an environmentally safe and timely manner. The SPD Draft EIS, a copy of which is attached for your review, examines the potential environmental impacts for 24 alternatives for the proposed siting, construction, and operation of three types of facilities: pit disassembly and conversion; mixed oxide (MOX) fuel fabrication; and plutonium conversion and immobilization.

Mr. Al Rolland, Project Director
Yuchi Tribal Organization, Inc.
10/30/98
Page 2

If an alternative is selected that includes siting of surplus plutonium disposition facilities at the Savannah River Site (e.g., Alternatives 3A or 3B), a maximum of about 31 hectares (77 acres) of land adjacent to the Actinide Packaging and Storage Facility (APSF) in F-Area, would be impacted. No Native American cultural sites are known to exist within the proposed construction area.

If you have any specific concerns about the SPD EIS proposal, we would like to hear from you. Please contact me with your concerns or questions at:

Marcus Jones
SPD EIS Document Manager
U.S. Department of Energy
Office of Fissile Materials Disposition
P.O. Box 23786
Washington, DC 20026-3786
(202) 586-0149.

You may also contact A. Ben Gould, Savanna River Site Indian Liaison Officer, at (803) 725-3969.

Sincerely,

Marcus Jones
SPD EIS Document Manager

cc: A. Ben Gould, SRS
Brandt Petrasek, EM-20, DOE HQ

SPD EIS enclosure

Department of Energy
Washington, DC 20585

October 30, 1998

Mr. John Ross, Chief Elect
United Keetoowah Band
2450 S. Muskogee
Tahlequah, Oklahoma 74464

Subject: *Consultation for Surplus Plutonium Disposition Environmental Impact Analysis Process, Under Executive Memorandum Concerning Government-to-Government Relations with Native American Tribal Governments*

Dear Mr. Ross:

The purpose of this letter is to notify you that the United States Department of Energy (DOE) is in the process of conducting an Environmental Impact Analysis concerning the disposition of surplus plutonium.

With this letter we are soliciting specific concerns the United Keetoowah Band may have about the proposal. This consultation is in accordance with the Executive Memorandum (29 April 1994) entitled, "Government-to-Government Relations with Native American Tribal Governments", and DOE Order 1230.2. It also follows prior consultation initiated for compliance with the American Indian Religious Freedom Act (AIRFA) (PL 95-341) and the Native American Graves Protection and Repatriation Act (NAGPRA) (PL 101-601).

The *Surplus Plutonium Disposition Environmental Impact Statement* (SPD EIS) is tiered from the *Storage and Disposition of Weapons-Usable Fissile Materials Final Programmatic EIS* (DOE/EIS-0229), issued in December 1996, and the associated Record of Decision (62 FR 3014), issued on January 14, 1997. DOE is producing the SPD EIS in compliance with the National Environmental Policy Act (NEPA) and Council on Environmental Quality regulations implementing NEPA, DOE's NEPA Implementing Regulations (10 CFR 1021), and other applicable federal and state environmental legislation.

The purpose and need for the proposed action is to reduce the threat of nuclear weapons proliferation worldwide by disposing of surplus plutonium in the United States in an environmentally safe and timely manner. The SPD Draft EIS, a copy of which is attached for your review, examines the potential environmental impacts for 24 alternatives for the proposed siting, construction, and operation of three types of facilities: pit disassembly and conversion; mixed oxide (MOX) fuel fabrication; and plutonium conversion and immobilization.

Mr. John Ross, Chief Elect
United Keetoowah Band
10/30/98
Page 2

If an alternative is selected that includes siting of surplus plutonium disposition facilities at the Savannah River Site (e.g., Alternatives 3A or 3B), a maximum of about 31 hectares (77 acres) of land adjacent to the Actinide Packaging and Storage Facility (APSF) in F-Area, would be impacted. No Native American cultural sites are known to exist within the proposed construction area.

If you have any specific concerns about the SPD EIS proposal, we would like to hear from you. Please contact me with your concerns or questions at:

Marcus Jones
SPD EIS Document Manager
U.S. Department of Energy
Office of Fissile Materials Disposition
P.O. Box 23786
Washington, DC 20026-3786
(202) 586-0149

You may also contact A. Ben Gould, Savannah River Site Indian Liaison Officer, at: (803) 725-3969.

Sincerely,

Marcus Jones
SPD EIS Document Manager

cc: A. Ben Gould, SRS
Brandt Petrasek, EM-20, DOE HQ

SPD EIS enclosure

Department of Energy
Washington, DC 20585
July 28, 1998

Mr. Roger Banks
Field Supervisor
U.S. Department of the Interior
Fish and Wildlife Service
Post Office Box 12559
217 Fort Johnson Road
Charleston, SC 29422-2559

Dear Mr. Banks:

INFORMAL CONSULTATION UNDER SECTION 7 OF THE ENDANGERED SPECIES ACT FOR SURPLUS PLUTONIUM DISPOSITION

The Department of Energy (DOE) published its Notice of Intent to prepare the *Surplus Plutonium Disposition Environmental Impact Statement* (SPD EIS) in the Federal Register (Vol. 92, No. 99) on May 22, 1997. This SPD EIS is tiered from the *Storage and Disposition of Weapons-Usable Fissile Materials Programmatic EIS* (DOE/EIS-0229), issued in December 1996, and the associated Record of Decision (62 FR 3014), issued on January 14, 1997. To summarize, the purpose of the proposed action is to reduce the threat of nuclear weapons proliferation worldwide in an environmentally safe and timely manner by conducting disposition of surplus plutonium in the United States, thus setting a nonproliferation example for other nations.

The SPD Draft EIS, a copy of which is attached for your review, examines twenty-four alternatives and analyzes the potential environmental impacts for the proposed siting, construction, and operation of three types of facilities: pit disassembly and conversion, mixed oxide (MOX) fuel fabrication, and plutonium conversion and immobilization. The Savannah River Site (SRS) near Aiken, South Carolina is a candidate site for all three facilities. The candidate sites and alternatives are shown in Table 2-1 of the SPD Draft EIS. Please note that where practical, the modification of existing buildings is being considered.

Alternative 3A proposes locating the three surplus plutonium disposition facilities in new construction adjacent to the Actinide Packaging and Storage Facility in F-Area at SRS. In addition, the canister receipt area at the Defense Waste Processing Facility in S-Area would be modified to accommodate the receipt and processing of the canisters from the plutonium conversion and immobilization facility. Although several alternatives include locating facilities at SRS, Alternative 3A has the greatest potential for impacts on ecological resources.

Preliminary analyses suggest that overall impacts on ecological resources from constructing and operating the proposed surplus plutonium disposition facilities would be limited because the land area required (31 hectares [77 acres]) is relatively small in comparison to regionally available habitat; habitat disturbance would be minimized because construction would take place in previously disturbed or developed areas; and operational impacts would be minimized because facility releases of airborne and aqueous effluents would be controlled and permitted. Section 4.26.4.3 of the SPD Draft EIS presents the ecological resources analysis for SRS.

Although sources indicate that no critical habitat for any threatened and endangered species exists at SRS, there may be Federal or State-classified special status species in the environs surrounding F-Area. These species include American alligator, bald eagle, Oconee azalea, red-cockaded woodpecker, smooth purple coneflower, and wood stork. Noise disturbance is probably the most important impact affecting local wildlife populations.

Consistent with the Endangered Species Act, DOE requests that the Fish and Wildlife Service provide any additional information on the presence of threatened and endangered animal and plant species, both listed and proposed, in the vicinity of F- and S-Areas at SRS. Information on the habitats of these species would also be appreciated. DOE also requests information on any other species of concern that are known to occur or potentially occur in the vicinity of F- and S-Areas.

As part of DOE's National Environmental Policy Act process, DOE encourages the Fish and Wildlife Service to identify any concerns or issues it believes should be addressed in the SPD EIS. To facilitate incorporation of your input into the SPD Final EIS, please provide a written response by September 16, 1998.

Please mail your response to:

Marcus Jones
SPD EIS Document Manager
U.S. Department of Energy
Office of Fissile Materials Disposition
1000 Independence Avenue, SW
Washington, DC 20585

If you have any questions, please contact me at (202) 586-0149.

Sincerely,

Marcus Jones

Marcus Jones
SPD EIS Document Manager

cc: John B. Gladden, WSRC
David P. Roberts, DOE

United States Department of the Interior

FISH AND WILDLIFE SERVICE
P.O. Box 12559
217 Fort Johnson Road
Charleston, South Carolina 29422-2559

September 8, 1998

Mr. Marcus Jones
SPD EIS Document Manager
U.S. Department of Energy
Office of Fissile Materials Disposition
1000 Independence Avenue, SW
Washington, DC 20585

Re: FWS Log No. 4-6-98-364, Surplus Plutonium Disposition, Savannah River Site (SRS), Aiken County, South Carolina

Dear Mr. Jones:

We have reviewed the information received August 4, 1998 concerning the above-referenced project in Aiken County, South Carolina. The following comments are provided in accordance with the Fish and Wildlife Coordination Act, as amended (16 U.S.C. 661-667e), and Section 7 of the Endangered Species Act, as amended (16 U.S.C. 1531-1543), as well as, general comments from the review of the Draft Environmental Impact Statement (DEIS).

As indicated in your August 4 letter there is potential habitat for federally protected species within the action area of your proposed project. Therefore, we are providing you with the list of the federally endangered (E) and threatened (T) species which potentially occur in Aiken South Carolina (Table 1) and the habitat information you requested (Table 2). The list also includes species of concern under review by the Service. Species of concern (SC) are not legally protected under the Endangered Species Act, and are not subject to any of its provisions, including Section 7, until they are formally proposed or listed as endangered/threatened. We are including these species in our response for the purpose of giving you advance notification. These species may be listed in the future, at which time they will be protected under the Endangered Species Act. Therefore, it would be prudent for you to consider these species early in project planning to avoid any adverse effects.

[illegible] SOUTH CAROLINA COUNTY DISTRIBUTION RECORDS OF [illegible] THREATENED, AND CANDIDATE SPECIES FOR AIKEN COUNTY [illegible]
Updated July [illegible]

These lists should be used only as a guideline. The lists include known occurrences and areas where the species has a high possibility of occurring. Records are updated continually and may be different from the following.

Aiken County		
Bald eagle (Haliaeetus leucocephalus)	T	Known
Wood stork (Mycteria americana)	E	Known
Red-cockaded woodpecker (Picoides borealis)	E	Known
Shortnose sturgeon (Acipenser brevirostrum)*	O	Known
Relict trillium (Trillium reliquum)	E	Known
Piedmont bishop-weed (Ptilimnium nodosum)	E	Known
Smooth coneflower (Echinacea laevigata)	E	Known
Rafinesque's big-eared bat (Corynorhinus rafinesquii)	SC	Possible
Southeastern myotis (Myotis austroriparius)	SC	Possible
Loggerhead shrike (Lanius ludovicianus)	SC	Possible
Painted bunting (Passerina ciris)	SC	Known
Gopher tortoise (Gopherus polyphemus)	SC	Known
Gopher frog (Rana areolata capito)	SC	Known
Aphodius tortoise commensal scarab (Aphodius troglodytes)	SC	Possible
Onthophagus tortoise commensal scarab (Onthophagus polyphemi)	SC	Possible
Georgia aster (Aster georgianus)	SC	Possible
Sandhills milk-vetch (Astragalus michauxii)	SC	Possible
Chapman's sedge (Carex chapmanii)	SC	Possible
Burhead (Echinodorus tenellus var. parvulus)	SC	Known
Stream-bank spider-lily (Hymenocallis coronaria)	SC	Known
Bog spicebush (Lindera subcoriacea)	SC	Known
Boykin's lobelia (Lobelia boykinii)	SC	Possible
Carolina birds-in-a nest (Macbridea caroliniana)	SC	Known
Loose watermilfoil (Myriophyllum laxum)	SC	Known
Pickering's morning-glory (Stylisma pickeringii)	SC	Known
Meadow rue (Thalictrum subrotundum)	SC	Known
American sandfiltering mayfly (Dolania americana)		SC
Arogos Skipper (Atrytone Arogus Arogos)	SC	Known

E=Endangered; T=Threatened; SC=Service has on file limited evidence to support proposals for listing these species; O=Contact National Marine Fisheries Service.

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TABLE 2. HABITAT, FRUITING/FLOWERING PERIOD & COUNTY OCCURRENCES

Scientific Name	Common Name	Federal Status
Haliaeetus leucocephalus	Bald eagle	E
Associated with coasts, rivers, lakes, usually nesting near bodies of water where it feeds. Aiken, Barnwell, Beaufort, Berkeley, Calhoun, Charleston, Chesterfield, Clarendon, Colleton, Dorchester, Fairfield, Georgetown, Jasper, Kershaw, Lexington, Marion, McCormick, Newberry, Oconee, Orangeburg, Pickens, Richland, Sumter, Williamsburg.		
Mycteria americana	Wood stork	E
Freshwater and brackish wetlands, primarily nesting in cypress or mangrove swamps. Feeding in freshwater marshes, flooded pastures, flooded ditches. Aiken, Allendale, Barnwell, Beaufort, Berkeley, Charleston, Colleton, Dorchester, Georgetown, Hampton, Horry, Jasper, Marion, Williamsburg.		
Picoides borealis	Red-cockaded woodpecker	E
Open stands of pines 60+ years old provide roosting/nesting habitat. Foraging habitat is pine and pine/hardwood stands 30+ year old. Aiken, Allendale, Bamberg, Barnwell, Beaufort, Berkeley, Calhoun, Charleston, Chesterfield, Clarendon, Colleton, Darlington, Dillon, Dorchester, Edgefield, Florence, Georgetown, Hampton, Horry, Jasper, Kershaw, Laurens, Lee, Lexington, Marion, Marlboro, McCormick, Orangeburg, Richland, Saluda, Sumter, Williamsburg.		
Alligator mississippiensis	American alligator	T(S/A)
Rivers systems, canals, lakes, swamps.		
Echinacea laevigata	Smooth coneflower	E
Piedmont- mountains. Basic or circumneutral soils (Hayesville, Cecil, Porter, Madison) of meadows and woodlands. Successful colonies are almost always at sites featuring open, bare soil, a fairly high soil pH, and exposures allowing optimal sunshines. Late May-July. Aiken, Allendale, Anderson, Barnwell, Lancaster, Lexington, Oconee, Pickens, Richland.		

From review of the DEIS for this project, it does not appear that the proposed siting or construction of the proposed facilities represent a substantial risk to federally listed or proposed endangered or threatened plant or animal species. In view of this, we believe that the requirements of Section 7 of the Endangered Species Act have been satisfied. However, obligations under Section 7 of the Act must be reconsidered if (1) new information reveals

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impacts of this identified action that may affect listed species or critical habitat in a manner not previously considered, (2) this action is subsequently modified in a manner which was not considered in this assessment, or (3) a new species is listed or critical habitat determined that may be affected by the identified action.

In addition, the operation of these facilities and the subsequent disposition of large quantities of immobilized plutonium in geologic repositories at the SRS, may impact the future quality of the environment at the site. The DEIS does not fully address the issues associated with geological disposition and therefore they are not a part of this consultation. Once the issue of disposition in geologic repositories is addressed we would be glad to consult with DOE and provide any information necessary for the assessment of potential impacts to the environment.

Also, the DEIS does not present an adequate analysis of potential environmental impacts to the non-human environment. While human health is considered throughout the document, ecological health is rarely discussed. This presumably occurred due to the assumption that environmental receptors are not present within the action area. This assumption does suggest that substantial environmental impacts are improbable in the action area, but does not justify the exclusion of this analysis as a part of the environmental impact assessment. We suggest that the final Environmental Impact Statement (EIS) reflect that appropriate consideration was given not only to the human environment, but the ecological environment as well.

Your interest in ensuring the protection of endangered and threatened species and our nation's valuable wetland resources is appreciated. We hope this letter and the accompanying information on endangered and threatened species will be useful in project development. If you require further assistance please contact Mr. Rusty Jeffers of my staff at (803) 727-4707 ext. 20. In future correspondence concerning the project, please reference FWS Log No. 4-6-98-364.

Sincerely yours,

Edwin M. EuDaly
Edwin M. EuDaly
Acting Field Supervisor

EME/RDJ/km

Department of Energy
Savannah River Operations Office
P.O. Box A
Aiken, South Carolina 29802

DEC 0 [illegible]

Mr. Roger Banks
U. S. Department of the Interior
Fish and Wildlife Service
P. O. Box 12559
Charleston, SC 29422-2559

Dear Mr. Banks:

Re: Informal Consultation Under Section 7 of the Endangered Species Act for the Surplus Plutonium Disposition - Mixed Oxide Fuel Fabrication Facility

In July 1998, the Department of Energy notified the U.S. Fish and Wildlife Service of plans to locate the Surplus Plutonium Disposition Facilities at the Savannah River Site and solicited comment on the Surplus Plutonium Disposition Environmental Impact Statement. In your response (letter from Mr. R. Banks to Mr. M. Jones, September 8, 1998) you provided a listing of several species that are currently listed as endangered or threatened along with several species of concern that are known to exist in the Aiken, South Carolina area.

The Department of Energy has determined a preliminary site layout for the Mixed Oxide Fuel Fabrication Facility (one of the three surplus plutonium disposition facilities) which is illustrated on the enclosed map as site "2M". The Department of Energy also performed a survey of the Mixed Oxide Fuel Fabrication Facility site for wetlands, and endangered and threatened species or critical habitat. Enclosed is the survey report. We request your review and concurrence with the results of our survey.

Sincerely,

A. B. Gould, Director
Environmental Quality and Management Division

kwd/aeo
Att.

07/26/01 THU 16:08 FAX 843 727 4218 US FISH CHAS ES 001

Department of Energy
Savannah River Operations Office
P.O. Box A
Aiken, South Carolina 29802

DEC 0 4 2000

COPY

Mr. Roger Banks
U. S. Department of the Interior
Fish and Wildlife Service
P. O. Box 12559
Charleston, SC 29422-2559

Dear Mr. Banks:

Re: Informal Consultation Under Section 7 of the Endangered Species Act for the Surplus Plutonium Disposition - Mixed Oxide Fuel Fabrication Facility R2

In July 1998, the Department of Energy notified the U.S. Fish and Wildlife Service of plans to locate the Surplus Plutonium Disposition Facilities at the Savannah River Site and solicited comment on the Surplus Plutonium Disposition Environmental Impact Statement. In your response (letter from Mr. R. Banks to Mr. M. Jones, September 8, 1998) you provided a listing of several species that are currently listed as endangered or threatened along with several species of concern that are known to exist in the Aiken, South Carolina area.

The Department of Energy has determined a preliminary site layout for the Mixed Oxide Fuel Fabrication Facility (one of the three surplus plutonium disposition facilities) which is illustrated on the enclosed map as site "2M". The Department of Energy also performed a survey of the Mixed Oxide Fuel Fabrication Facility site for wetlands, and endangered and threatened species or critical habitat. Enclosed is the survey report. We request your review and concurrence with the results of our survey.

Sincerely,

A. B. Gould, Director
Environmental Quality and Management D

kwd/aeo
Att.

The U.S. Fish and Wildlife Service (USFWS) has reviewed the plans for this proposed project. Based on our review and the information received, we concur with your determination that the proposed action:

X will have no effect on resources under the jurisdiction of the USFWS that are currently protected by the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et. seq.)(Act). Therefore, no further action is required under Section 7(a)(2) of the Act.

is not likely to adversely affect resources under the jurisdiction of the USFWS that are currently protected by the Act. Therefore, no further action is required under Section 7(a)(2) of the Act.

It is our opinion that the proposed action is not likely to have significant adverse wetland impacts. Please contact the Corps of Engineers for more information.

U.S. Fish and Wildlife Service, 176 Croghan Spur Road, Suite 200, Charleston, SC 29407, (843) 727-4707

FWS Log No. 4-6-01-I-305 Date 6-20-01

FAX TRANSMITTAL
To Keith Dyer From Lori Duncan

Department of Energy
Washington, DC 20585
July 28, 1998

Mr. Tom Murphy
South Carolina Department of Natural Resources
Lower Coastal Wildlife Diversity
585 Donnelley Drive
Green Pond, SC 29446

Dear Mr. Murphy:

The Department of Energy (DOE) published its Notice of Intent to prepare the *Surplus Plutonium Disposition Environmental Impact Statement* (SPD EIS) in the Federal Register (Vol. 92, No. 99) on May 22, 1997. This SPD EIS is tiered from the *Storage and Disposition of Weapons-Usable Fissile Materials Programmatic EIS* (DOE/EIS-0229), issued in December 1996, and the associated Record of Decision (62 FR 3014), issued on January 14, 1997. To summarize, the purpose of the proposed action is to reduce the threat of nuclear weapons proliferation worldwide in an environmentally safe and timely manner by conducting disposition of surplus plutonium in the United States, thus setting a nonproliferation example for other nations.

The SPD Draft EIS, a copy of which is attached for your review, examines twenty-four alternatives and analyzes the potential environmental impacts for the proposed siting, construction, and operation of three types of facilities: pit disassembly and conversion, mixed oxide (MOX) fuel fabrication, and plutonium conversion and immobilization. The Savannah River Site (SRS) near Aiken, South Carolina is a candidate site for all three facilities. The candidate sites and alternatives are shown in Table 2-1 of the SPD Draft EIS. Please note that where practical, the modification of existing buildings is being considered.

Alternative 3A proposes locating the three surplus plutonium disposition facilities in new construction adjacent to the Actinide Packaging and Storage Facility in F-Area at SRS. In addition, the canister receipt area at the Defense Waste Processing Facility in S-Area would be modified to accommodate the receipt and processing of the canisters from the plutonium conversion and immobilization facility. Although several alternatives include locating facilities at SRS, Alternative 3A has the greatest potential for impacts on ecological resources.

Preliminary analyses suggest that overall impacts on ecological resources from constructing and operating the proposed surplus plutonium disposition facilities would be limited because the land area required (31 hectares [77 acres]) is relatively small in comparison to regionally available habitat; habitat disturbance would be minimized because construction would take place in previously disturbed or developed areas; and operational impacts would be minimized because facility releases of airborne and aqueous effluents would be controlled and permitted. Section 4.26.4.3 of the SPD Draft EIS presents the ecological resources analysis for SRS.

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Although sources indicate that no critical habitat for any threatened and endangered species exists at SRS, there may be Federal or State-classified special status species in the environs surrounding F-Area. These species include American alligator, bald eagle, Oconee azalea, red-cockaded woodpecker, smooth purple coneflower, and wood stork. Noise disturbance is probably the most important impact affecting local wildlife populations.

As part of DOE's National Environmental Policy Act process, DOE encourages the South Carolina Department of Natural Resources to identify any concerns or issues it believes should be addressed in the SPD EIS. To facilitate incorporation of your input into the SPD Final EIS, please provide a written response by September 16, 1998.

Please mail your response to:

Marcus Jones
SPD EIS Document Manager
U.S. Department of Energy
Office of Fissile Materials Disposition
1000 Independence Avenue, SW
Washington, DC 20585

If you have any questions, please contact me at (202) 586-0149.

Sincerely,

Marcus Jones
SPD EIS Document Manager

cc: John B. Gladden, WSRC
David P. Roberts, DOE

Department of Energy
Savannah River Operations Office
P.O. Box A
Aiken, South Carolina 29802

DEC 0 8 2000

Mr. D. L. Johnson
South Carolina Department of Natural Resources
1201 Main Street
Suite 1100
Columbia, SC 29201

Dear Mr. Johnson:

Re: U.S. Department of Energy, Savannah River Site
Surplus Plutonium Disposition - Mixed Oxide Fuel Fabrication Facility

In July 1998, the Department of Energy notified the South Carolina Department of Natural Resources, Lower Coastal Wildlife Diversity, of plans to locate the Surplus Plutonium Disposition Facilities at the Savannah River Site and solicited comment on the Surplus Plutonium Disposition Environmental Impact Statement (letter from Mr. M. Jones to Mr. T. Murphy July 28,1998).

The Department of Energy has determined a preliminary site layout for the Mixed Oxide Fuel Fabrication Facility (one of the three surplus plutonium disposition facilities) which is illustrated on the enclosed map as site "2M". The Department of Energy also performed a survey of the Mixed Oxide Fuel Fabrication Facility site for wetlands, and endangered and threatened species or critical habitat. Enclosed is the survey report. We request your review and concurrence with the results of our survey.

Sincerely,

A. B. Gould, Director
Environmental Quality and Management Division

kwd/aeo
Enc.

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