ENVIRONMENTAL ASSESSMENT
MANAGEMENT OF HANFORD SITE
NON-DEFENSE PRODUCTION REACTOR
SPENT NUCLEAR FUEL
HANFORD SITE, RICHLAND, WASHINGTON
U.S. DEPARTMENT OF ENERGY

The following NEPA Environmental Assessment (EA), DOE/EA-1185 has been finalized. Questions on the EA may be addressed to the RL-NEPA Document Manager, Robert M. Hiegel, at (509) 376-1062. Questions about the NEPA Process may be directed to the RL-NEPA Compliance Officer, Paul F. X. Dunigan, Jr., at (509) 376-6667.

Glossary

Acronyms and Initialisms

ALARA	As Low As Reasonably Achievable
BWR	Boiling Water Reactor
CFR	*Code of Federal Regulations*
CSB	Canister Storage Building
CY	Calendar Year
DNFSB	Defense Nuclear Facilities Safety Board
DOE	U.S. Department of Energy
DOH	State of Washington Department of Health
DOT	U.S. Department of Transportation
EA	Environmental Assessment
EBR	Experimental Breeder Reactor
EDE	effective dose equivalent
FFTF	Fast Flux Test Facility
FR	*Federal Register*
FSF	Fuel Storage Facility
HEDL	Hanford Engineering and Development Laboratory
INEEL	Idaho National Engineering and Environmental Laboratory

ISA	Interim Storage Area
ISC	Interim Storage Cask
LAMPRE	Los Alamos Molten Plutonium Reactor Experiment
LCF	latent cancer fatality
LLBG	Low-Level Burial Ground
LWR	Light Water Reactor
MCO	multi-canister overpack
MEI	maximally exposed individual
MRFA	maximum reasonably foreseeable accident
MTHM	metric tons of heavy metal
NEPA	*National Environmental Policy Act of 1969*
NRC	U.S. Nuclear Regulatory Commission
NRF	Neutron Radiography Facility
PFP	Plutonium Finishing Plant
PNL	Pacific Northwest Laboratory
PNNL	Pacific Northwest National Laboratory
PWR	Pressurized Water Reactor
RCRA	*Resource Conservation and Recovery Act of 1976*
RH-TRU	remote-handled transuranic
SNF	spent nuclear fuel
TSD	treatment, storage, and/or disposal
TWRS	Tank Waste Remediation System
WAC	*Washington Administrative Code*

Definition of Terms

<u>As Low As Reasonably Achievable</u>. An approach to radiation and toxicological protection to control or manage exposures (both individual and collective to the workforce and general public) as low as social, technical, economic, practical, and public policy considerations permit.

Background radiation. That level of radioactivity from naturally occurring sources; principally radiation from cosmogenic and primordial radionuclides.

Derived Air Concentrations . The airborne concentration that equals the annual limit on intake divided by the volume of air breathed by an average worker for a working year of 2,000 hours (assuming a breathing volume of 2,400 cubic meters [85,000 cubic feet]).

Derived Concentration Guide for Public Exposure. Those concentrations of radionuclides in air or water that would result in a maximum effective committed dose equivalent to 100 millirem per year using appropriate dose methodology under conditions of continuous exposure or use (i.e., continuously breathing or being immersed in contaminated air or exclusively drinking contaminated water).

Latent cancer fatality: The excess cancer fatalities in a population due to exposure to a carcinogen.

Maximally exposed individual. A hypothetical member of the public residing near the Hanford Site who, by virtue of location and living habits, could receive the highest possible radiation dose from radioactive effluents released from the Hanford Site.

Metric tons of heavy metal. Quantities of unirradiated and spent nuclear fuel and targets are traditionally expressed in terms of metric tons of heavy metal (typically uranium), without the inclusion of other materials, such as cladding, alloy materials, and structural materials. A metric ton is 1,000 kilograms, which is equal to about 2,200 pounds.

Person-rem. A population dose based on the number of persons multiplied by the radiation dose.

rem. A unit of dose equivalent that indicates the potential for impact on human cells.

Risk. The product of the probability of occurrence of an accident and the consequences of an accident.

TRIGA®. A registered trademark of General Atomics, the manufacturer of the reactor. TRIGA® is an acronym for Test Reactor and Isotope Production, General Atomics.

Metric Conversion Chart

If you know	Multiply by	To get
Length		
centimeters	0.393	inches
meters	3.2808	feet
kilometers	0.62	miles
Area		
square kilometers	0.39	square miles

square meters	10.76	square feet
Mass (weight)		
grams	0.0352	ounces
kilograms	2.2046	pounds
milligrams	2.2046226×10^{-6}	pounds
Volume		
liters	0.26	gallons
cubic meters	35.3147	cubic feet
Temperature		
Celsius	multiply by 9/5ths, then add 32	Fahrenheit
Pressure		
kilograms per-square-centimeter	14.223334	pounds per-square-inch

Source: *CRC Handbook of Chemistry and Physics*, Robert C. Weast, Ph.D., 70th Ed., 1989-1990, CRC Press, Inc., Boca Raton, Florida.

Scientific Notation Conversion Chart

Multiplier	Equivalent
10^{-1}	0.1
10^{-2}	.01
10^{-3}	.001
10^{-4}	.0001
10^{-5}	.00001
10^{-6}	.000001
10^{-7}	.0000001
10^{-8}	.00000001

Summary

The U.S. Department of Energy (DOE) needs to provide radiologically, and industrially safe and cost-effective management of the non-defense production reactor spent nuclear fuel (SNF) at the Hanford Site. This inventory is stored in various facilities throughout the Hanford Site. The various locations where SNF is currently stored include facilities undergoing deactivation consistent with the Hanford Site remediation effort, aging facilities with deteriorating systems that would require substantial upgrades to maintain SNF storage, and some storage containers which have a limited remaining design life. The proposed action would place the Hanford Site's

non-defense production reactor SNF in a radiologically- and industrially-safe, and passive storage condition pending final disposition. The proposed action would also reduce operational costs associated with storage of the non-defense production reactor SNF through consolidation of the SNF and through use of passive rather than active storage systems.

The Hanford Site currently stores approximately 29 metric tons heavy metal [MTHM[(1)]]) of non-defense production reactor SNF, which comprises approximately 1.4 weight percent of the MTHM of the total inventory of SNF at the Hanford Site. The non-defense production reactor SNF curie content (approximately 15,000,000 curies) represents approximately 20 percent of the total Hanford Site's SNF curie content (approximately 73,000,000 curies including defense production reactor SNF).

The Hanford Site non-defense production reactor SNF includes the Shippingport Naval Reactor Pressurized Water Reactor (PWR) Core II SNF at T Plant, Fast Flux Test Facility (FFTF) SNF and Neutron Radiography Facility (NRF) TRIGA® SNF at the 400 Area, Light Water Reactor (LWR) SNF at the 324 Building, and miscellaneous special-case commercial and experimental SNF at the Plutonium Finishing Plant (PFP), 200 Area Low-Level Burial Grounds (LLBG) and 300 Area laboratories.

Environmental, safety and health vulnerabilities associated with existing non-defense production reactor SNF storage facilities have been identified. Vulnerabilities included age of storage facilities and design life of storage containers. DOE has determined that additional activities are required to consolidate non-defense production reactor SNF management activities at the Hanford Site, including cost-effective and safe interim storage, prior to final disposition, to enable deactivation of facilities where the SNF is now stored. Cost-effectiveness would be realized: through reduced operational costs associated with passive rather than active storage systems (ventilation, cooling, etc.); removal of SNF from areas undergoing deactivation as part of the Hanford Site remediation effort; and eliminating the need to duplicate future transloading facilities at the 200 and 400 Areas. Radiologically- and industrially-safe storage would be enhanced through: 1) removal from aging facilities requiring substantial upgrades to continue safe storage; 2) utilization of passive rather than active storage systems for SNF; and 3) removal of SNF from some storage containers which have a limited remaining design life. The proposed action is consistent with a Defense Nuclear Facilities Safety Board recommendation.

The proposed action involves recovery/retrieval of the various categories of Hanford Site non-defense production reactor SNF, appropriately packaging the SNF (as necessary), and transport (via rail/truck) from the respective current locations to the Canister Storage Building (CSB) Complex (in the 200 East Area) or the PFP (in the 200 West Area). The proposed action would include construction of a 200 Area Interim Storage Area (ISA) and any/all modifications to the current storage facilities to accommodate the SNF.

Once at the CSB Complex, the SNF would be placed into appropriate interim storage. Some SNF may require repackaging prior to storage. Interim storage may be placement in the CSB itself or in casks on new outdoor concrete storage pads. Under the proposed action, PFP SNF (including slightly irradiated FFTF SNF) would be stored at PFP instead of the CSB due to safeguards and security requirements. Maintenance and upgrade of PFP storage would be completed as necessary to satisfy SNF storage criteria. The proposed action also includes providing transloading capability at the CSB for sodium-bonded FFTF SNF and transport to the Idaho National Engineering and Environmental Laboratory.

Alternatives to the proposed action include the No-Action Alternative and consolidation in two different single locations.

The potential for significant individual and cumulative environmental impacts due to the conduct of the proposed action has been analyzed. No substantial increase in Hanford Site environmental impacts would be expected from the proposed action. Environmental impacts from postulated accident scenarios also were evaluated, and indicated that the risks associated with the proposed action would be small.

1.0 Purpose and Need for Agency Action

The U.S. Department of Energy (DOE) needs to enhance safe and cost-effective management of the non-defense production reactor spent nuclear fuel (SNF) at the Hanford Site. This inventory is stored in various facilities throughout the Hanford Site.

2.0 Background

The Hanford Site currently stores about 80 percent (approximately 2,132 metric tons heavy metal [MTHM[(1)]]) of the current DOE complex-wide SNF inventory (approximately 2,650 MTHM). The Hanford Site SNF inventory is comprised of defense production reactor (N Reactor and Single-Pass Reactor) SNF at the 105-K Basins; and non-defense production reactor SNF including the Shippingport Naval Reactor Pressurized Water Reactor (PWR) Core II SNF at T Plant, Fast Flux Test Facility (FFTF) SNF and Neutron Radiography Facility (NRF) TRIGA® SNF at the 400 Area, Light Water Reactor (LWR) SNF at the 324 Building, and miscellaneous special-case commercial and experimental SNF at the Plutonium Finishing Plant (PFP), 200 Area Low-Level Burial Grounds (LLBG) and 300 Area laboratories. Relative locations of the facilities are shown in Figures 1, 2, 3, 4, and 5.

Activities are being expedited to relocate the defense production reactor SNF to the Canister Storage Building in the 200 Area of the Hanford Site for dry interim storage. These activities are consistent with the Record of Decision from the *Final Environmental Impact Statement: Management of Spent Nuclear Fuel from the K Basins at the Hanford Site, Richland, Washington* (DOE 1996a).

There also have been activities associated with deactivation of the Fast Flux Test Facility (FFTF), as described in DOE 1995b. This environmental assessment (EA) was prepared based on the deactivation scenario, with scope limited to the current inventory of FFTF SNF (see

Section 2.1). The impacts of management of this inventory are addressed in Section 5. DOE has recently evaluated potential restart of FFTF for various missions (i.e., tritium and medical isotope production). In a January 15, 1997, press release, DOE announced that the FFTF would be maintained in a "hot standby" condition, while any future role it may play in the department's dual track tritium production strategy is evaluated. If a decision to restart FFTF is made, technical feasibility studies, and appropriate safety and environmental analyses would be prepared to address the potential impacts (including additional FFTF SNF).

Environmental, safety and health vulnerabilities associated with existing non-defense production reactor SNF storage facilities have been identified (*Spent Fuel Working Group Report on Inventory and Storage of Department's Spent Nuclear Fuel and Other Reactor Irradiated Materials and the Environmental, Safety and Health Vulnerabilities*, DOE 1993). Vulnerabilities included age of storage facilities and design life of storage containers.

DOE has determined that additional activities are required to consolidate non-defense production reactor SNF management activities at the Hanford Site, including cost-effective and safe interim storage, prior to final disposition, to enable deactivation of facilities where the SNF is now stored. Cost-effectiveness would be realized: through reduced operational costs associated with passive rather than active storage systems (ventilation, cooling, etc.); removal of SNF from areas undergoing deactivation as part of the Hanford Site remediation effort; and eliminating the need to duplicate future transloading facilities at the 200 and 400 Areas. Radiologically- and industrially-safe storage would be enhanced through:

Figure 1. Hanford Site.

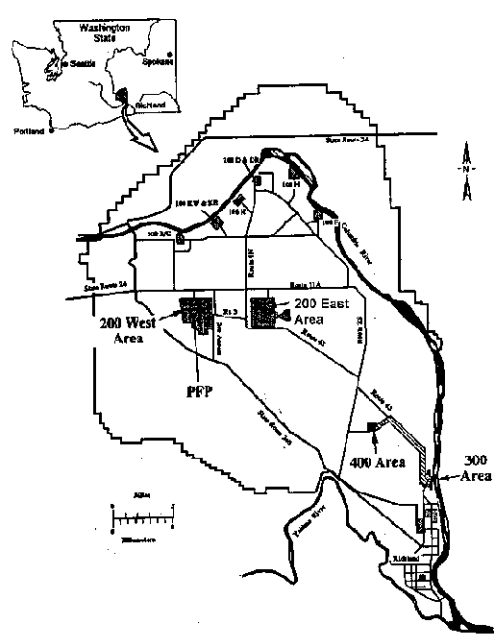


Figure 2. Hanford Site 400 Area.

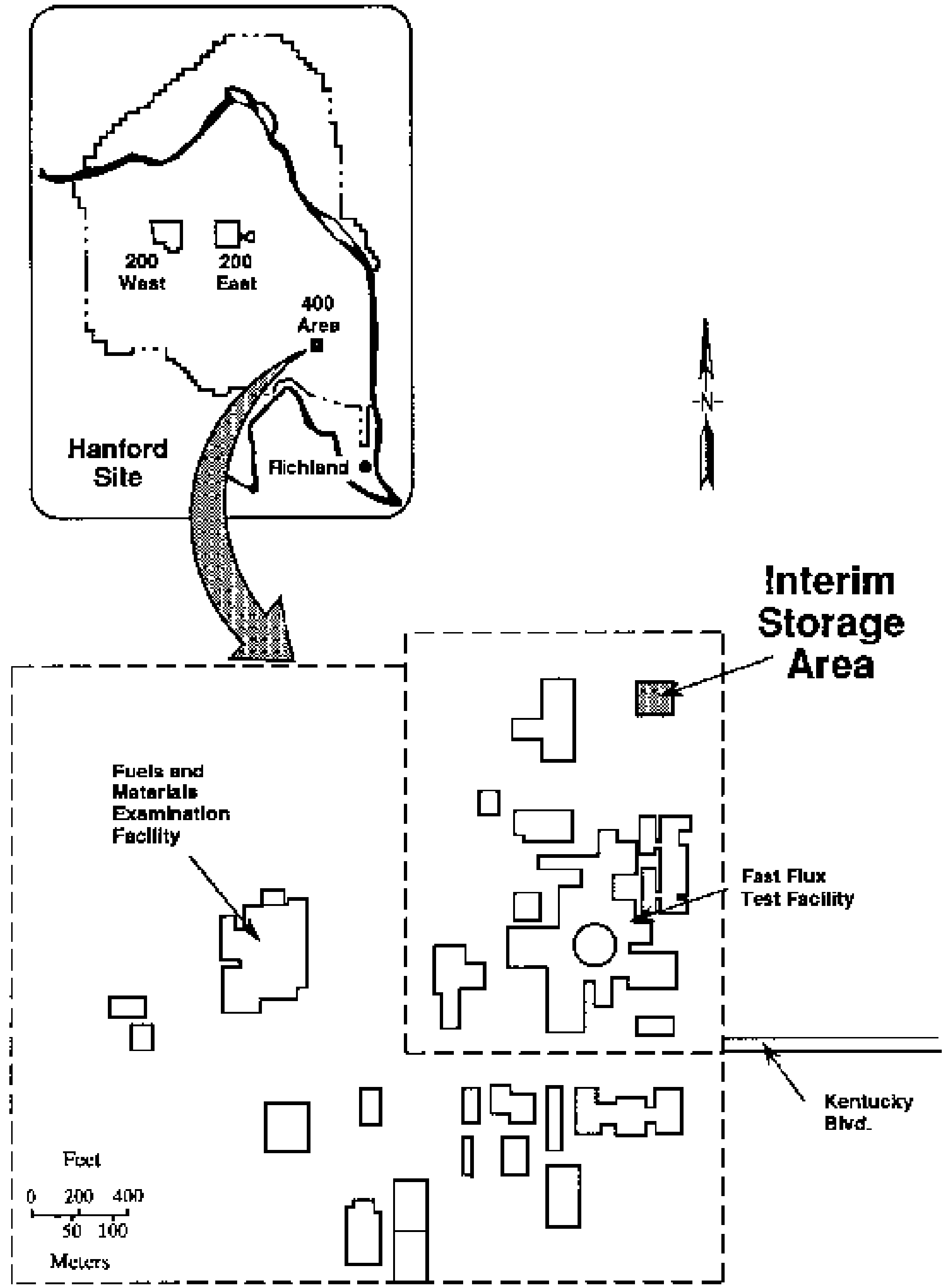


Figure 3. Hanford Site 200 West Area.

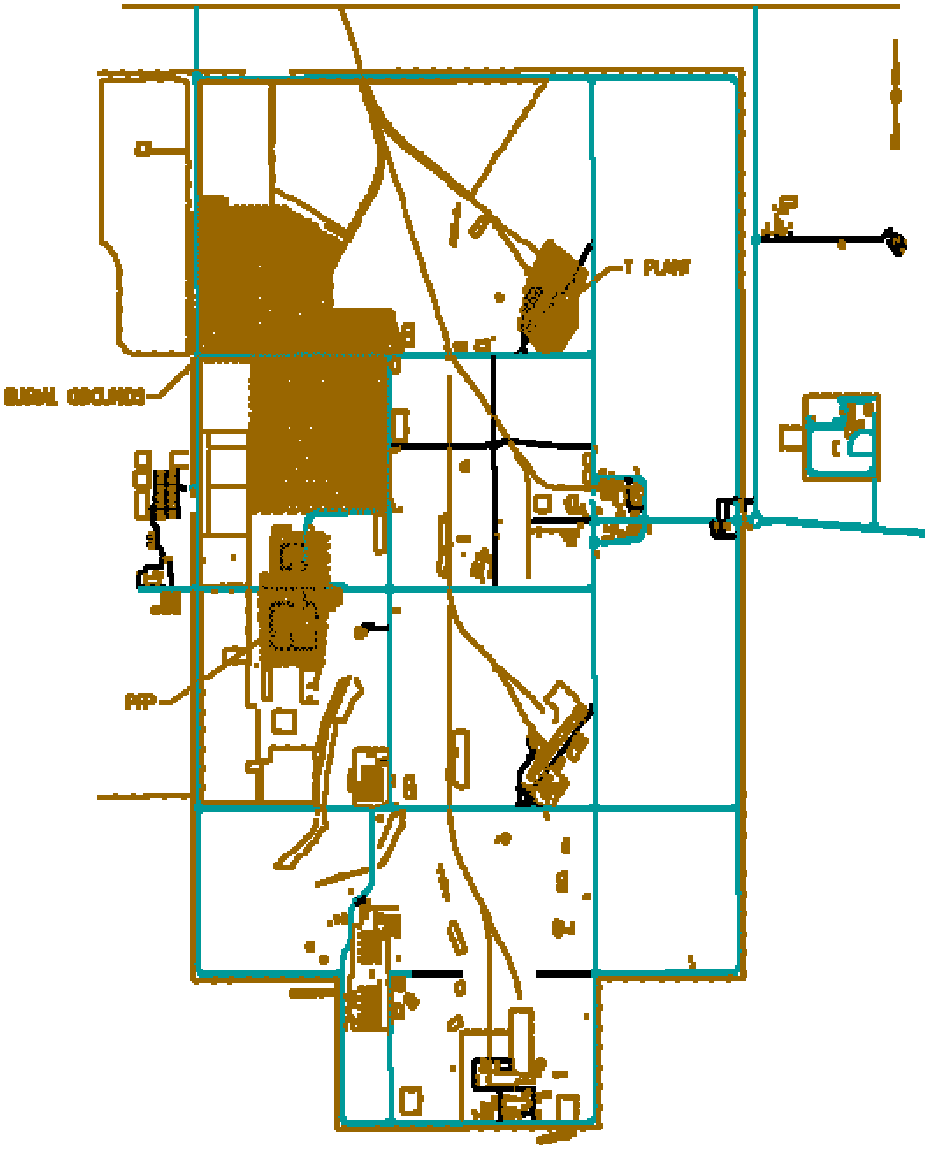


Figure 4. Hanford Site 200 East Area.

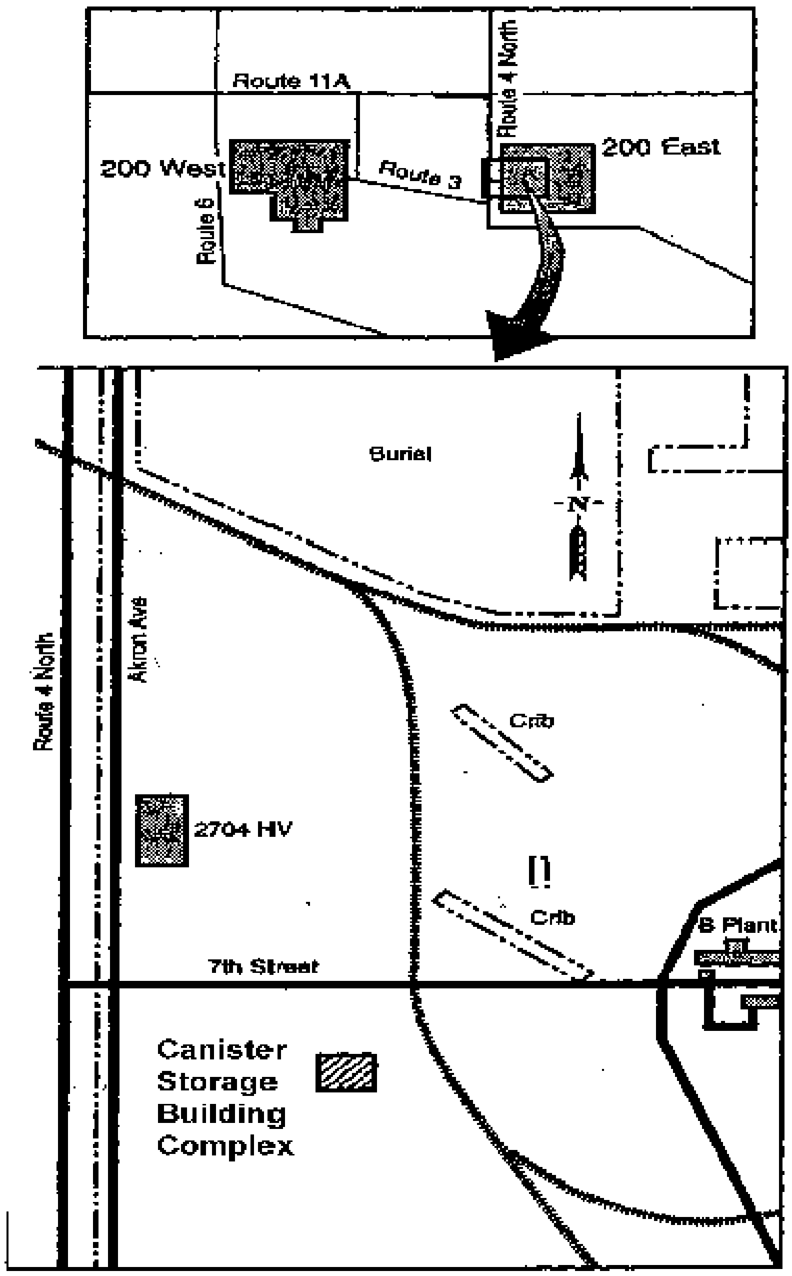
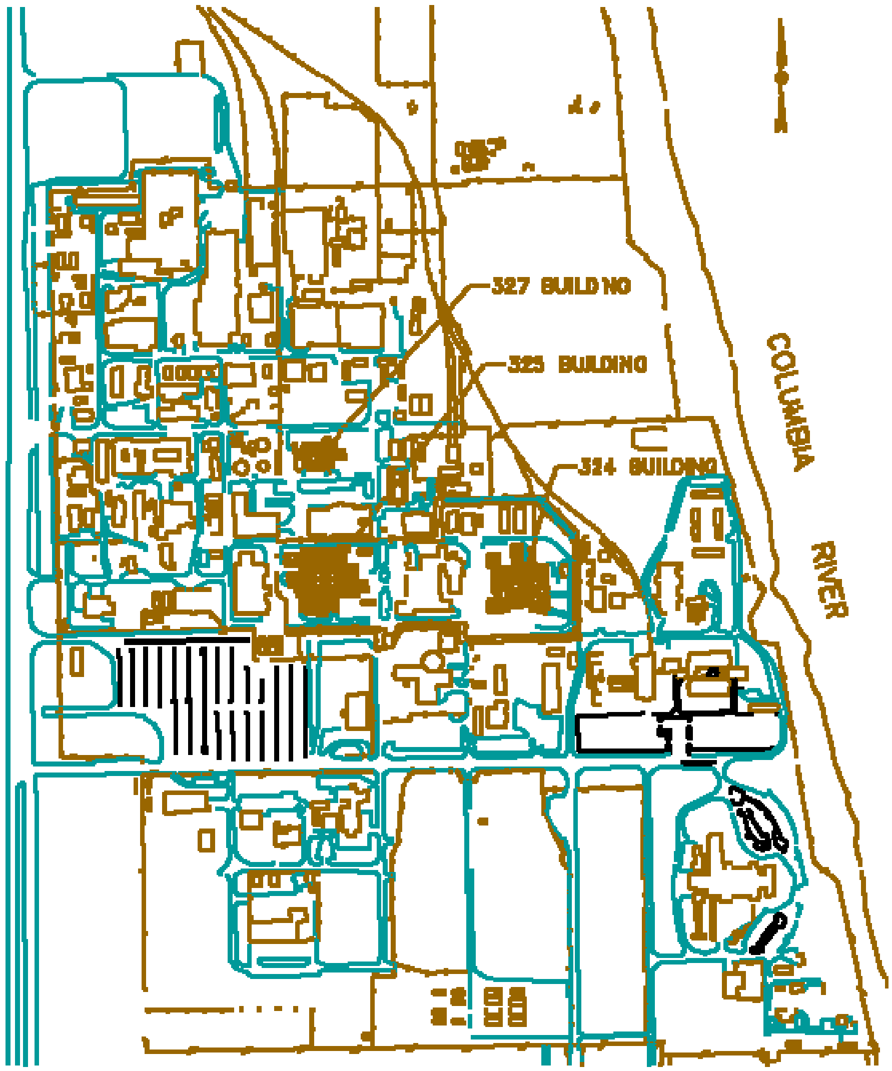


Figure 5. Hanford Site 300 Area.



1. removal from aging facilities requiring substantial upgrades to continue safe storage; 2) utilization of passive rather than active storage systems for SNF; and 3) removal of SNF from some storage containers which have a limited remaining design life.

These activities constitute the site-specific actions for the non-defense production reactor SNF that are necessary to implement the Record of Decision from the *Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement* (DOE 1995d), as amended to incorporate the settlement agreement between the State of Idaho, DOE, and the U.S. Department of the Navy (DOE 1995d) [Record of Decision March, 1996]). This environmental assessment (EA) is being prepared to address these activities.

The scope of this EA is limited to the approximately 29 MTHM of non-defense production reactor SNF at the Hanford Site, as identified above, and does not include defense production reactor SNF previously addressed in the *Final Environmental Impact Statement: Management of Spent Nuclear Fuel from the K Basins at the Hanford Site, Richland, Washington* (DOE 1996a). The non-defense production reactor SNF curie content (approximately 15,000,000 curies) represents approximately 20 percent of the total Hanford Site's SNF curie content (approximately 73,000,000 curies including defense production reactor SNF). A brief description of the SNF inventories and their management status follows. Additional details regarding the materials (including physical descriptions, origins, inventories, and radionuclide content) are found in *Hanford Spent Fuel Inventory Baseline* (WHC 1994a). Further specifics pertaining to the current storage facilities (e.g., structural layout, historical mission[s]) are available in *Hanford Site Existing Irradiated Fuel Storage Facilities* (WHC 1995) and *Fast Flux Test Facility Transition Project Plan* (WHC 1996c).

Some of the reactor-irradiated nuclear materials may be deemed SNF or categorized as some other product or waste type. DOE is developing criteria for categorization of some of these materials. For conservatism, this EA considers the impacts of managing the aforementioned material as SNF (Section 5).

2.1 400 Area

2.1.1 FFTF SNF

The FFTF is a liquid-metal cooled research reactor located at the DOE's Hanford Site 400 Area, near the City of Richland, Washington. The *Environmental Statement for the Fast Flux Test Facility, Richland, Washington* (AEC 1972), and the *Summary Description of the Fast Flux Test Facility* (HEDL 1980) provide details regarding the physical description and operation of the FFTF. In December, 1993, FFTF ceased operations after DOE determined that no combination of missions for the FFTF had a reasonable probability of financial viability over the next 10 years. Details regarding overall shutdown activities and requirements are found in WHC 1996c. Fuel washing, subsequent fuel storage in the 400 Area Interim Storage Area (ISA), and transport of some sodium-bonded SNF to the Idaho National Engineering and Environmental Laboratory (INEEL), are described in *Environmental Assessment: Shutdown of the Fast Flux Test Facility, Hanford Site, Richland, Washington* (DOE 1995b).

The current inventory of FFTF SNF, predominantly mixed plutonium-uranium oxides encapsulated in stainless steel, is approximately 11 MTHM. The sodium-bonded SNF constitutes approximately 3 weight percent (i.e., about 0.3 MTHM) of the total FFTF SNF inventory.

2.1.2 NRF TRIGA® SNF

The NRF TRIGA® reactor was operated intermittently from the mid-1970's until May, 1989. There are 101 irradiated TRIGA® reactor fuel assemblies made of uranium-zirconium hydride (8 to 8.5 weight percent uranium and 91.5 to 92 weight percent zirconium hydride (WHC 1994a). The TRIGA® SNF was transferred to the 400 Area ISA for interim storage in late 1995. Details of the packaging and transportation are found in *Environmental Assessment: Relocation and Storage of TRIGA® Reactor Fuel, Hanford Site, Richland, Washington* (DOE 1995a).

The current inventory of NRF TRIGA® SNF is approximately 0.02 MTHM.

2.2 200 West Area

2.2.1 Shippingport Pressurized Water Reactor Core II SNF

The Shippingport PWR Core II SNF is a developmental fuel evaluated under the U.S. Energy Research and Development Administration. There are 72 irradiated standard blanket assemblies, which were shipped to Hanford for storage in the 1978-1979 timeframe. The assemblies have been stored underwater at T Plant in the 221-T Building canyon pool cell (in the 200 West Area) since that time. Process knowledge and current analyses indicate very little storage pool water radiological activity, indicating the integrity of the fuel cladding is high.

The current inventory of Shippingport PWR Core II SNF is 15.8 MTHM.

2.2.2 Low-Level Burial Grounds

Since 1974, experimental reactor irradiated nuclear materials have been placed in retrievable storage at the LLBG in the 200 West Area. The materials originate from a variety of reactors, including FFTF; KE and KW (Hanford); the Experimental Breeder Reactor (EBR II) at INEEL; the TRIGA® reactor at Oregon State University in Corvallis, Oregon; and other experimental reactors (WHC 1994a).

These materials were received into the LLBG for retrievable storage as remote-handled transuranic (RH-TRU) waste, per the requirements of DOE Order 5820.2A, which states that: "Test specimens of fissionable material irradiated for research and development purposes only, and not for the production of power or plutonium may be classified as RH-TRU." DOE is currently developing criteria to determine whether these materials should continue to be managed as RH-TRU.

The current inventory of reactor irradiated nuclear materials in the LLBG is approximately 0.33 MTHM.

2.2.3 Plutonium Finishing Plant

There are 84 grams (0.00008 MTHM) of SNF stored in a single 55-gallon drum at the 2736-ZB Building at the PFP in the 200 West Area. The SNF was irradiated at the University of Washington. DOE is currently evaluating whether these materials should continue to be managed as SNF.

There also is SNF from the Los Alamos Molten Plutonium Reactor Experiment (LAMPRE), from Los Alamos National Laboratory in New Mexico. The LAMPRE inventory is approximately 0.008 MTHM.

2.3 300 Area

2.3.1 324 Building

There is SNF stored at the 324 Building in the 300 Area of the Hanford Site. The SNF was irradiated in several different PWR and boiling water reactors (BWR). This SNF is typical of end-of-life fuel conditions from U.S. commercial nuclear reactors, and has been characterized to support several DOE programs, including the investigation of different nuclear waste disposal forms for future emplacement in a geologic repository.

Activities are currently being implemented to place the 324 Building PWR and BWR SNF into dry storage casks, which could be temporarily staged at the 400 Area ISA.

There is 2.3 MTHM in the 324 Building.

2.3.2 325 Building

Reactor-irradiated nuclear materials (approximately 0.01 MTHM) are stored in the 325 Building in the 300 Area of the Hanford Site. The materials (which include fragments of irradiated fuel from the 324 Building, FFTF, N Reactor, and commercial fuels) have been used to support process demonstration and analytical chemistry requirements of several DOE programs.

2.3.3 327 Building

Reactor-irradiated nuclear materials (approximately 0.024 MTHM) are stored in the 327 Building in the 300 Area of the Hanford Site. These materials have been used for destructive examinations required to determine mechanical properties of SNF in support of several DOE programs.

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1. MTHM = metric tons of heavy metal. One MTHM equals approximately 2,200 pounds.

3.0 Alternatives Including the Proposed Action

3.1 Proposed Action

The proposed action would consolidate the Hanford Site's non-defense production reactor SNF in a cost-effective, radiologically- and industrially-safe, and passive storage condition, pending final disposition. The proposed action is consistent with *DNFSB Recommendation 94-1, Hanford Site Integrated Stabilization Management Plan* (WHC 1996a).

The proposed action involves recovery/retrieval of the various categories of non-defense production reactor SNF, appropriately packaging the SNF (as necessary), and transport (via rail/truck) from the respective current locations to the Canister Storage Building (CSB) Complex (in the 200 East Area) or the PFP (in the 200 West Area).[(1)] The proposed action would include any/all modifications to storage facilities to accommodate the SNF.

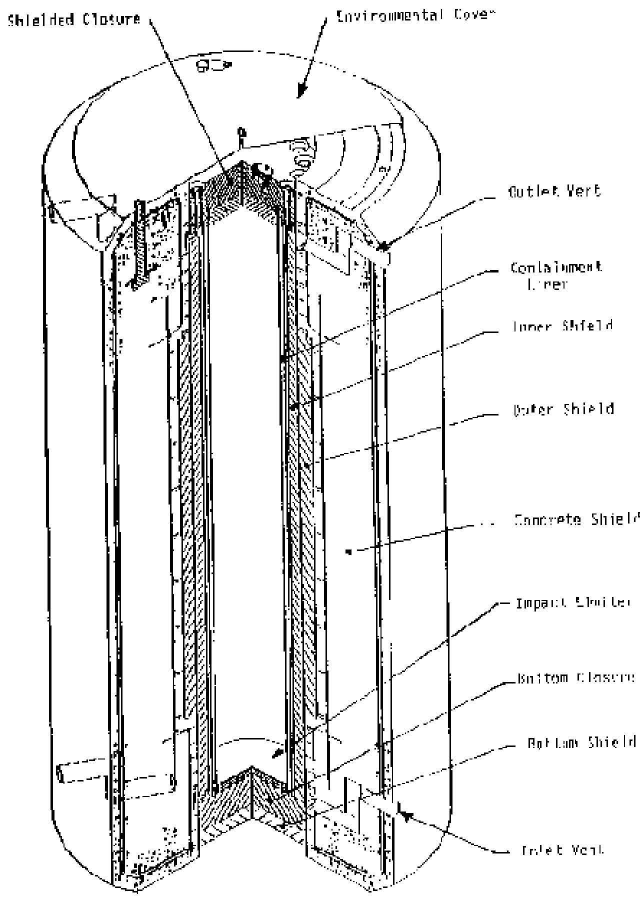
The proposed action includes several facets: once at the CSB Complex, the SNF may be repackaged, as appropriate, and placed into interim storage. Interim storage may be placement in the CSB itself or in casks on new outdoor concrete storage pads within the CSB Complex (i.e., the 200 Area ISA). The proposed action also includes any necessary modifications at the CSB Complex to provide transloading capability, safeguards and security, and cask maintenance, weather protection (e.g., casks may be placed into portable metal storage containers to minimize contact with rain and snow) and surveillance.

The proposed action includes continuing shipping cask surveillance and maintenance operations, and appropriate weather protection, in the 400 Area (with appropriate safeguards and security measures), and sodium-bonded FFTF SNF transport to INEEL (consistent with DOE 1995d).

Also under the proposed action, PFP SNF (including slightly irradiated FFTF SNF that will be transferred to PFP consistent with the FFTF Shutdown EA [DOE 1995b]) would continue to be stored at PFP, instead of the CSB, due to safeguards and security requirements. Maintenance and upgrade of PFP storage would be completed as necessary to satisfy SNF storage criteria.

Final facility decontamination and decommissioning is not within the scope of this EA.

Figure 6. Interim Storage Cask.



3.1.1 FFTF SNF

Based on the FFTF shutdown scenario, the irradiated FFTF fuel assemblies and pin containers have been, or would continue to be, placed into an Interim Storage Cask (ISC, Figure 6) and transferred to storage at the 400 Area Interim Storage Area (ISA). Each fuel assembly or pin container would be limited to a maximum decay heat value of 250 watts for fuel offload handling. At this level of decay, no active cooling would be required, and many of the fission products and noble gases would have decayed substantially.

A typical FFTF SNF handling sequence is as follows: sodium-wetted fuel assemblies are washed, using existing FFTF processes and equipment; the SNF is subjected to a moist argon atmosphere to slowly react residual sodium in a controlled manner; several water rinses of the SNF are conducted; final drying; and transfer to the ISC for interim storage. Additional specific details regarding cleaning, and subsequent storage of the FFTF SNF at the 400 Area ISA, may be found in DOE 1995b. The ISCs subsequently would be transferred to the CSB Complex in the 200 East Area for storage pending final disposition.

Due to safeguards requirements, some slightly irradiated FFTF SNF would be washed, placed into ISCs (it is anticipated that no more than five ISCs would be required), and shipped directly to PFP (DOE 1995b).

If the sodium-bonded FFTF SNF (less than 0.5 MTHM of the total FFTF SNF inventory) is not shipped from the 400 Area to INEEL, it eventually would be transloaded to appropriate shipping casks at the CSB Complex for shipment to INEEL. The potential impacts associated with transportation of the sodium-bonded FFTF SNF were analyzed in DOE 1995b and WHC 1994b. Those analyses did not consider transloading the material; the analysis considered direct emplacement of the sodium-bonded FFTF SNF into appropriate shipping casks.

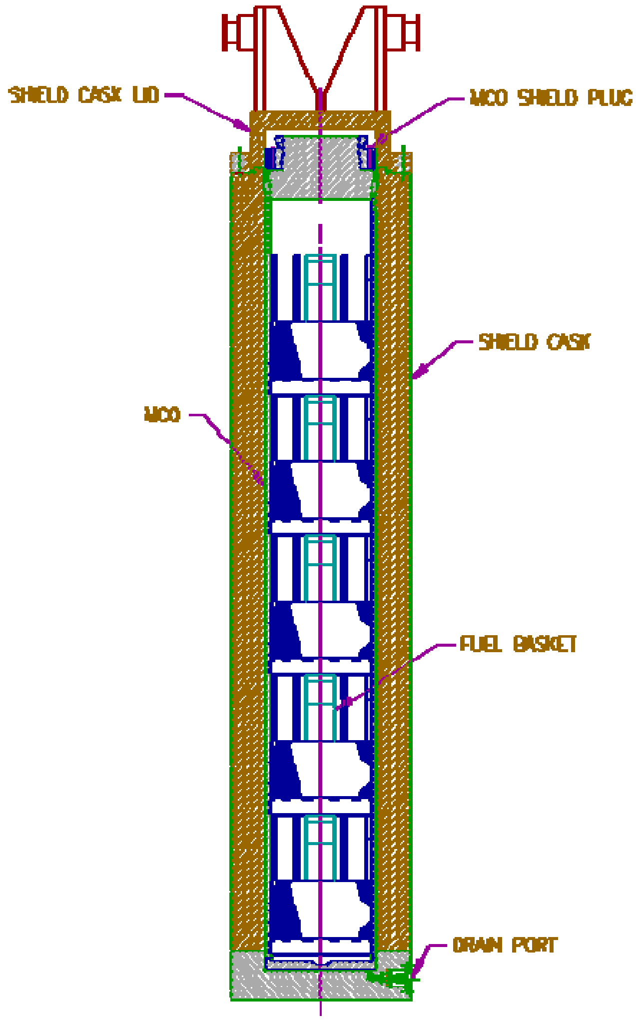
3.1.2 NRF TRIGA® SNF

The NRF TRIGA® SNF, originally stored in the 308 Building of the 300 Area, was transferred to the 400 Area ISA in 1995 (*Environmental Assessment: Relocation and Storage of TRIGA® Reactor SNF, Hanford Site, Richland, Washington* [DOE 1995a]). This material is stored in six casks and two U.S. Department of Transportation shipping containers in a vault module. The proposed action would include transfer of the casks, shipping containers, and the vault to a new interim storage area at the CSB Complex.

3.1.3 Shippingport PWR Core II SNF

The 72 Shippingport PWR Core II blanket assemblies are stored at T Plant in the 221-T Building canyon pool cell. The water depth in the pool cell is approximately 5.8 meters (19 feet). Each assembly is stored vertically in a separate compartment of a rectangular metal rack. The proposed action would include retrieval of the 72 Shippingport PWR Core II assemblies and placement into canisters similar to the K Basins

Figure 7. Multi-Canister Overpack



SNF Multi-Canister Overpack (MCO, Figure 7). Residual water from the canisters would be removed via vacuum. The current planning basis is to transfer the canisters to vault storage at the CSB Complex. If vault storage capability is not available or practical, the Shippingport PWR Core II SNF may be placed in dry cask storage at the 200 Area ISA. Appropriate safeguards and security measures would be provided for the dry cask storage scenario.

The proposed action would include any necessary modifications to T Plant to allow transfer of the Shippingport PWR Core II SNF. Modifications would include installation of an auxiliary three-ton hoist, which would be connected to the hook of the existing 10-ton bridge hoist during transfer operations. Also, a portable vacuum drying system would be provided and operated to remove residual water from the canister.

The residual water would be returned to the existing T Plant pool, pending truck transfer of all the pool cell water to the existing Effluent Treatment System in the 200 East Area for treatment and/or disposal. Residual contamination in the drained pool cell may be stabilized by applying a coating or other means. Ion exchange column(s) would be packaged and transported to existing disposal sites on the Hanford Site. The drying system may be decontaminated and/or disposed of as appropriate. Additional details are in *Removal Plan for Shippingport Pressurized Water Reactor Core 2 Blanket Fuel Assemblies from T Plant to the Canister Storage Building* (WHC 1996d).

3.1.4 PFP

Three types of non-production reactor SNF would be stored at PFP: LAMPRE SNF; FFTF SNF; and University of Washington High-Enriched uranium SNF. The storage would be consistent with PFP operations as described in the *Final Environmental Impact Statement: Plutonium Finishing Plant Stabilization* (DOE 1996b).

3.1.4.1 LAMPRE SNF

The LAMPRE SNF currently is stored in three casks in the protected area of PFP. The three casks are stored inside a concrete vault to provide an additional security barrier and supplement shielding capability. The LAMPRE SNF would be repackaged, if necessary, at PFP or the CSB for continued dry storage in the protected area of PFP.

3.1.4.2 FFTF SNF

As stated earlier in Section 3.1.1, some SNF from FFTF require additional safeguards and security measures. That is, per DOE Order 5633.3B, *Control and Accountability of Nuclear Materials* (DOE 1994), there would be insufficient radiation dose from the SNF to be self-protecting. Therefore, the proposed action would include emplacement of these materials into ISCs, with subsequent transfer to the PFP protected area for storage.

3.1.4.3 University of Washington High-Enriched Uranium SNF

This material, currently in one 55-gallon drum in vault storage at PFP, presently is categorized as SNF. The criteria being developed by DOE will determine future management of the material as SNF, or recategorization as highly-enriched uranium.

The material could be repackaged and dispositioned, as appropriate, per applicable regulations (WHC 1996a), based on those criteria.

3.1.5 Low-Level Burial Grounds (LLBG)

Reactor-irradiated, nuclear material is stored in the LLBG. The criteria being developed by DOE will determine future management of the material as RH-TRU (see Section 2.2.2), or SNF. For conservatism, this EA considers the impacts of managing this material in the LLBG as SNF (Section 5).

There are thirteen containers of TRIGA® fuel elements buried under four feet of soil in the 200 West Area LLBG (WHC 1996a). The containers are standard TRIGA® Fuel Element Storage Drums (WHC 1995). A typical storage configuration consists of drums stacked four-high, separated by plywood sheets. The arrays of drums are covered with heavy plastic sheeting to minimize contact with the soil cover. There are a total of 90 TRIGA® fuel elements (each drum contains either six or seven TRIGA® fuel elements). For the proposed action, during the course of typical Hanford Site solid waste retrieval operations, the drums would be exhumed simultaneously with other solid waste. Solid waste retrieval operations are described in *Environmental Assessment: Solid Waste Retrieval Complex, Enhanced Radioactive and Mixed Waste Storage Facility, Infrastructure Upgrades, and Central Waste Support Complex, Hanford Site, Richland, Washington* (DOE 1995c). The drums would be appropriately packaged (e.g., if necessary, overpack would be provided to stabilize the drums), and transferred to the CSB Complex and the SNF would be repackaged at the CSB into appropriate casks or canisters. The casks or canisters then would be stored in the 200 Area ISA or the CSB pending final disposition.

The remainder of the reactor-irradiated nuclear material currently stored in the LLBG also is being evaluated regarding continued management as RH-TRU or SNF. As with the TRIGA® fuel elements discussed above, if the material is determined to be SNF, during the course of typical Hanford Site solid waste retrieval operations (DOE 1995c) the containers would be exhumed simultaneously with other solid waste, repackaged into appropriate casks or canisters as necessary, and placed in consolidated interim storage at the CSB Complex. For conservatism, this EA considers the impacts of managing all this material as SNF (Section 5).

3.1.6 Miscellaneous 300 Area SNF

Management criteria for a small portion (approximately 2 weight percent) of the miscellaneous irradiated nuclear materials in the 300 Area also are being developed by DOE, regarding future management of the material as SNF or categorization as some other product or waste type. As with material in the LLBG (Section 3.1.4), management of the irradiated nuclear material will be based on the results of those criteria. For conservatism, this EA considers the impacts of managing all this material as SNF (Section 5).

3.1.6.1 324 Building

The SNF in the 324 Building would be placed in canisters and transferred to casks. It is anticipated that up to 7 casks may be required to transfer the material. The casks could be transferred to the 400 Area ISA for temporary storage and subsequently relocated to the 200 Area CSB Complex, or directly transferred to the 200 Area CSB Complex. The current planning basis is direct transfer to dry cask storage at the 400 Area ISA. Consideration also is being given for transfer of the canisters to vault storage at the CSB, similar to the Shippingport PWR Core II SNF (Section 3.1.3).

3.1.6.2 325 and 327 Buildings

Most of the SNF in the 325 and 327 Buildings would be appropriately packaged and transferred to the 324 Building hot cells for decontamination and encapsulation. As with the material from the 324 Building, the casks could be transferred to the 400 Area ISA for temporary storage and subsequently relocated to the 200 Area ISA, or directly transferred to the 200 Area ISA.

There are test materials in the 327 Building which originated at FFTF and N Reactor. Those FFTF materials would be returned to FFTF for disposition with the remainder of the FFTF SNF. The N Reactor materials would be packaged and transferred to K Basins for storage, consistent with interim storage of defense production reactor materials (DOE 1996a) and are outside the scope of this EA.

3.1.7. Storage Areas

3.1.7.1 400 Area ISA

The 400 Area ISA would continue to operate to accommodate FFTF SNF and NRF TRIGA® SNF, pending transfer to the 200 Area ISA. Minor modifications would be required for the interim storage of the miscellaneous 300 Area SNF (e.g., berms at the 400 Area ISA fence).

3.1.7.2 PFP

The PFP protected area would continue to operate for its current mission, including storage of the SNF described in Section 3.1.4. Minor modifications to PFP may be required (e.g., installation of a concrete pad[s] may be necessary to accommodate the non-defense production reactor SNF).

3.1.7.3 200 East Area CSB Complex

The CSB (Figure 8) is described in DOE 1996a for the vault storage of defense production reactor SNF. The proposed action would modify the CSB as detailed in *Evaluation of Other Spent Nuclear Fuel Management at the Canister Storage Building Complex* (WHC 1996b) to accommodate the inventory of non-defense production reactor SNF.

The modifications to the CSB could entail both internal and external facility modifications. Internally, one of the three vaults may be modified (e.g., ventilation system upgrades) to allow storage of the Shippingport PWR Core II SNF (nine tubes would be required for storage of this material), depending upon the needs for storage of the defense production reactor SNF (DOE 1996a). The CSB modifications would include provisions for repackaging/transloading capability in the CSB Receiving Area.

Externally, in the immediate vicinity of the CSB, a 200 Area ISA would be constructed for interim dry cask storage of the remainder of the non-defense production reactor SNF inventory. It is expected that the 200 Area ISA would be similar to the 400 Area ISA; i.e., a lighted area consisting of concrete pad(s) isolated by fencing (shown schematically in Figure 9). The 200 Area ISA also would include equipment storage capability, and weather protection (as required).

3.2 Alternatives to the Proposed Action

3.2.1 No-Action Alternative

Under the No-Action Alternative, most of the non-defense production reactor SNF would remain in its existing storage configuration. The FFTF SNF would continue to be offloaded from the FFTF and placed into ISCs for interim storage in the 400 Area ISA (DOE 1995b). The SNF in the 324 Building would be packaged and transferred for storage also at the 400 Area ISA.

Figure 8. CSB.

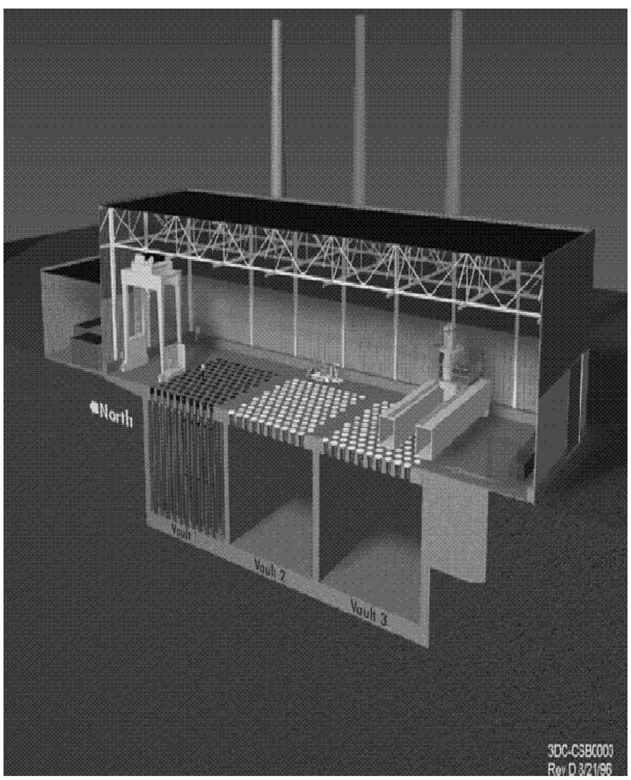
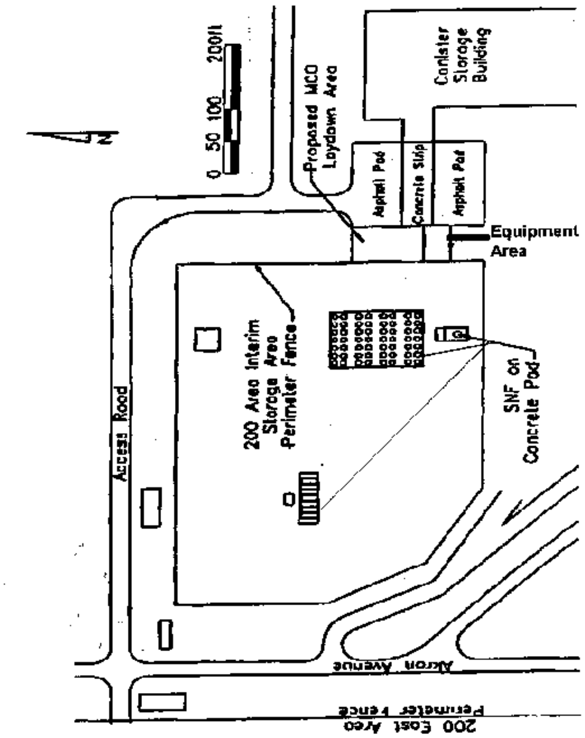


Figure 9. CSB Complex including Proposed 200 Area ISA.



This alternative would result in continued surveillance and maintenance of SNF storage systems at the 400 Area and T Plant (WHC 1994a). This alternative does not address vulnerabilities associated with aging storage facilities or storage containers which may exceed their design life in their current configuration (DOE 1993). This alternative continues storage with active systems rather than use of passive systems. This alternative would limit flexibility in transferring the sodium-bonded FFTF SNF (i.e., the material only could be shipped from the 400 Area).

The No-Action Alternative is not consistent with the efforts to deactivate facilities at the Hanford Site and reduce the cost of surveillance and maintenance at facilities consistent with the site remediation effort.

3.2.2 Consolidation in a Single Location; Dry Cask Storage at Existing 400 Area ISA

Consolidation of SNF at the existing 400 Area ISA would require modifications to and continued maintenance of the 400 Area ISA as well as maintaining portions of the FFTF. All SNF types would be placed on the ISA in outdoor cask storage configurations. Outdoor cask storage is more costly compared to vault storage at the CSB for the SNF currently stored at T Plant. Additional safeguards and security measures, at increased cost, would be required at the facility for SNF which is not considered self-protecting (specifically Shippingport PWR Core II SNF, LAMPRE SNF, University of Washington High-Enriched Uranium SNF, slightly irradiated FFTF SNF) per

DOE Order 5633.3B, *Control and Accountability of Nuclear Materials* (DOE 1994). Portions of the FFTF would have to be maintained to allow for transloading and shipment of the sodium-bonded FFTF SNF. Additionally, major costs would be incurred at a later date to provide capabilities at the 400 Area ISA to support repackaging and transloading of the non-sodium-bonded SNF. While it would be anticipated that expansion of the 400 Area ISA would not create substantially different environmental impacts than those associated with dry cask storage of material at the CSB Complex, these activities would require additional personnel and cost to perform the action and would result in additional worker exposure.

3.2.3 Consolidation in a Single Location; CSB Vault Storage

Vault storage for all the non-defense production reactor SNF in the CSB (WHC 1996b) would require CSB modifications (e.g., addition of storage tubes and completion of the ventilation system [with requisite cost] for one of the unused vaults within the CSB) as compared with the proposed action. Consolidation of the non-defense production reactor SNF within the CSB would require the unpackaging of all the FFTF SNF from the ISCs for tube storage of the FFTF SNF within the vault, as well as appropriately packaging of the other SNF to meet vault storage criteria. These activities would require additional personnel and cost to perform the action and result in additional worker exposure. The ISCs are designed for 50 year storage and no benefit would be derived from removing the FFTF SNF from the ISCs and placing it into the CSB for storage.

4.0 Affected Environment

Specific information regarding the affected environment and management of Hanford Site SNF may be found in DOE 1995d and DOE 1996a. Additional details regarding the Hanford Site may be found in the *Hanford Site Environmental Report for Calendar Year 1995* (PNNL 1996) and the *Hanford Site National Environmental Policy Act (NEPA) Characterization* report (Neitzel 1996). The Hanford Site is approximately 1,450 square kilometers (560 square miles) and located in the southeastern portion of the State of Washington. It is a semiarid region of rolling topography with some trees occurring along the Columbia River. Two topographical features dominate the landscape: Rattlesnake Mountain, a treeless 1,066-meter (3,500-foot) anticline located on the southwest boundary, and Gable Mountain, a small ridge 339 meters (1,112 feet) in height located on the central portion of the Hanford Site. The Columbia River flows through the northern part of the Hanford Site and forms part of the eastern boundary of the Hanford Site.

The Hanford Site is characterized as having a mild climate with 15 to 17 centimeters (6 to 7 inches) of annual precipitation, and occasional high winds of up to 129 kilometers (80 miles) per hour. Tornadoes are extremely rare, and no destructive tornadoes have occurred in the region surrounding the Hanford Site. The probability of a tornado hitting any given facility on the Hanford Site is estimated at 10 chances in 1 million during any given year. The region is categorized as one of low to moderate seismicity.

The vegetation of the Hanford Site is a shrub-steppe community dominated by big sagebrush and rabbitbrush. The sagebrush, cheatgrass, and Sandberg's bluegrass community are perhaps the most common. Extensive site development around the facilities has removed most of the native vegetative cover.

More than 300 species of insects, 39 species of mammals, 36 common species of birds, and 12 species of reptiles and amphibians have been identified on the Hanford Site.

Pocket mice and jackrabbits are the primary small mammal species observed on the Hanford Site. Large mammals are deer and elk, although the elk are almost entirely on the Arid Lands Ecology Reserve located on Rattlesnake Mountain. Coyotes and raptors are the primary predators.

The most common snakes are gopher snakes, yellow-bellied racers, and rattlesnakes. Toads and frogs are found along the Columbia River. Grasshoppers and various species of beetles are the most conspicuous insects in the community.

The bald eagle (federal- and state-threatened species) is a regular winter resident occurring principally along the Columbia River. The peregrine falcon (federal- and state-endangered species) is a casual migrant to the area but does not nest on the Hanford Site. No plants or animals on the federal list of "Endangered and Threatened Wildlife and Plants" (50 CFR 17) are found in the immediate vicinity of the proposed action (see Appendix A for a Biological Review of the 200 Area ISA).

The Hanford Site is known to be rich in cultural resources, and contains many well-preserved archaeological sites and structures, some dating back to both prehistoric and historical periods. Over 10,000 years of human activity have left extensive archaeological deposits along the Columbia River shoreline and at well-watered inland sites. Archaeological deposits at the Hanford Site have been spared some of the severe disturbances that have befallen unprotected sites in the area. The proposed activities are not expected to impact sensitive archaeological resources. Further, the 200 East Area has been previously disturbed over the past 50 years. No sensitive cultural resources or historic properties in the area of the CSB have been identified (See Appendix B for a Cultural Resources Review of the 200 Area ISA). Additional information regarding the cultural resources on the Hanford Site may be found in the *Hanford Cultural Resources Laboratory Annual Report for Fiscal Year 1994* (PNNL 1995).

The proposed activities would not occur immediately next to any natural water courses, and would not be located within a wetland or in a 100- or 500-year floodplain.

5.0 Environmental Impacts

The following sections discuss those potential environmental impacts that may result from activities being proposed for management of the Hanford Site's non-defense production reactor SNF. There are uncertainties and risks associated with even the most routine operations. However, the proposed action would not be expected to result in any additional radiological or hazardous material releases to the environment. All activities would comply with current DOE orders, and state and federal regulations.

Additional details pertaining to potential environmental impacts associated with all DOE SNF, including the proposed action, may be found in DOE 1995d.

5.1 Proposed Actions: Impacts from Routine Operations

The potential for release of radioactive emissions during routine activities exists. However, the existing facility ventilation systems (providing filtration of airborne effluents) would continue to be operational to maintain emissions at or below those reported in CY 1995 (PNNL 1996). It is expected that radioactive airborne emissions from the existing and proposed facilities would be no different than currently experienced at Hanford, and would be in compliance with DOE and the State of Washington Department of Health (DOH) guidelines and regulations that are in force at the time of the proposed action.

There would be some radiological exposure for the workers involved in the proposed activities (encompassing the entire range of construction, retrieval, packaging, transport, and storage). However, the anticipated exposure would not be expected to be substantially greater than current routine activities. Personnel radiation exposure for current SNF storage facilities is documented in WHC 1995.

For example, the FFTF SNF comprises approximately 40 weight percent (11 MTHM) of the non-defense production reactor SNF. The material has the highest radiological activity of the non-defense production reactor SNF. Since 1984, the average occupational external exposure to workers in the FFTF has been approximately 6 millirem per year, which is substantially less than the maximum allowable exposure of 5,000 millirem per year. The cessation of reactor operations (April 1992) has resulted in the termination of various plant activities which, in the past, contributed to personnel exposure. Therefore, personnel exposures would continue to be well below DOE guidelines (5,000 millirem per year for onsite workers, and 100 millirem per year to the public), in keeping with the As Low As Reasonably Achievable (ALARA) principle. Additionally, appropriate procedures and administrative controls (e.g., personnel training and Radiation Work Permits) would be in place prior to any proposed activities. Radiation exposure levels would continue to be monitored during the proposed activities.

As analyzed in DOE 1995b, assuming 200 radiation workers are involved with the proposed activities (including facility modifications and placement of FFTF SNF in approximately 60 ISCs) and are exposed to radiation at the average annual rate of 6 millirem per year (based on FFTF operations; a total of 1.2 person-rem), based on a dose-to-risk conversion factor of 4.0×10^{-4} (onsite) latent cancer fatality (LCF) per person-rem (56 FR 23363), 5×10^{-4} LCFs per year would be expected to result from the proposed activities. It is most likely that no cancer fatalities would be induced by the proposed activities during the entire duration, which may exceed one year. Appropriate safety and procedure reviews would be conducted to assure proposed storage configurations would maintain personnel exposures to ALARA guidelines.

It would be expected that potential worker radiological exposure for the proposed activities at the other existing storage facilities housing non-defense production reactor SNF, based on annual dose rate and number of workers, would be low (WHC 1995). The annual exposures at these storage facilities, and projected number of packages required for transfer to the CSB Complex, are shown in the Table 5-1. The packaging activities would be conducted remotely, with appropriate procedures and administrative controls, thereby minimizing potential radiation exposure.

Also, no public exposure above that currently experienced from Hanford Site operations is anticipated as a result of these actions. That is, the potential dose to the hypothetical offsite maximally exposed individual (MEI) during CY 1995 from Hanford Site operations was 0.02 millirem (PNNL 1996). The potential dose to the local population of 380,000 persons from 1995 operations was 0.3 person-rem. The 1995 average dose to the population was 0.0009 millirem per person. The current DOE radiation limit for an individual member of the public is 100 millirem per year, and the national average dose from natural sources is 300 millirem per year. No adverse health effects would be expected to result from these low doses.

Only small quantities of hazardous materials (e.g., solvents) may be used during the proposed activities. It is anticipated that routine operations would not provide substantial exposure of toxic or noxious vapors to workers or members of the general public.

Radioactive and hazardous materials routinely are transported on the Hanford Site. No substantial environmental impacts from the onsite transportation of materials would be anticipated as a result of the proposed action. As reported in DOE 1995a, there were no anticipated LCFs (i.e., 6×10^{-4} LCFs) as a result of transportation of the NRF TRIGA® SNF (8 packages). It would follow that, even with 200 packages being transferred to the CSB Complex, there would be no anticipated LCFs.

The sodium-bonded fuel assemblies from FFTF would eventually be transported, via truck trailer, to INEEL, using appropriate packaging. Transportation would be conducted using licensed casks under the prescribed shipping regulations (e.g., DOT) in force at the time. Previous analysis (WHC 1994b) indicated that

Table 5-1. Routine Worker Exposure at Other Non-Defense Production Reactor SNF Storage Facilities

Storage Location	SNF Type	Direct Staff Involved in Storage Surveillance	Total Annual Exposure (person-rem)*	Anticipated Maximum Number of Packages Required for Transfer to CSB Complex
T Plant	Shippingport	3	0.5 (WHC 1995)	18
LLBG	Miscellaneous	<<1	**	60
PFP	Miscellaneous	<1	0.002 (DOE 1995a)	10

300 Area	324, 325, 327 Buildings	<1	***	15

* Total annual exposure, in person-rem per year, is for those workers directly involved with active surveillance of the current non-defense production reactor SNF (WHC 1995).

** As discussed in WHC 1995, since 1974, 75 discrete items of experimental non-production reactor irradiated nuclear material have been placed in retrievable storage units in the LLBG. These materials, managed as RH-TRU, are in 61 shielded casks, a container, and thirteen 208-liter (55-gallon) drums. The container and drums have been buried, and visual surveillance of the shielded casks does not require physical contact.

*** Dose information for the 324, 325, and 327 Buildings is included in the overall dose measurements for all Hanford Site PNNL facilities, and is not tabulated separately (WHC 1995). As reported in WHC 1995, the total dose for PNNL facilities in 1992, shared among 693 workers, was 58 person-rem. The SNF in the 324, 325, and 327 Buildings is in hot cells, casks, or pools, which effectively limit worker exposure. Additionally, SNF accounts for only a fraction of the radiological material managed in those facilities (e.g., in the 324 B Cell, non-defense reactor SNF accounts for only about 10 percent of the total radionuclide inventory in the cell).

approximately 70 shipments may be required to transport this material to INEEL. The casks would be transported under highway route control procedures, which include specific routes, notifications to states and tribes, satellite tracking, and weather considerations. Any shipment would require less than 24 hours.

The potential transportation impacts associated with incident-free INEEL fuel shipments were evaluated in the *Radiological Transportation Risk Assessment of the Shipment of Sodium-Bonded Fuel from the Fast Flux Test Facility to the Idaho National Engineering Laboratory* (WHC 1994b). Two shipment scenarios (i.e., 70 shipments at 18 pins per shipment and 12 shipments at 100 pins per shipment) were considered based on potential transportation strategies. For both scenarios, the impact to workers is calculated to be approximately 0.4 person-rem (1.5×10^{-4} LCFs). The impact to the public is approximately 11 person-rem (5×10^{-3} LCFs). It now is anticipated that twelve (or fewer) shipments may be required.

DOE analyzed the environmental impacts of shipping all SNF (approximately 2,400 MTHM SNF) currently stored at other DOE sites, Fort St. Vrain, and university, foreign, and non-DOE research reactors, to INEEL (DOE 1995d). The sodium-bonded material represents a small fraction of the total inventory. The cumulative health effects from incident-free transportation by truck (for all SNF), for workers and the general population were calculated to be approximately 0.3 and 0.8 LCFs, respectively (DOE 1995d). The cumulative risk measures the total impact of transportation accidents over the entire shipment campaign (1995 to 2035). The FFTF sodium-bonded SNF shipments, which was included in the aforementioned analysis, represents a small fraction of those impacts.

Small amounts of radioactive wastes (e.g., radioactively-contaminated equipment and mixed wastes) would be generated as a result of the proposed activities. These materials would be appropriately packaged, stored, and disposed of at existing facilities on the Hanford Site. None of the materials would be anticipated to be generated in substantial quantities when compared to the annual amount routinely generated throughout the Hanford Site. For example, during CY 1995, 15,070 cubic meters (approximately 532,120 cubic feet) of solid radioactive waste was received for disposal and/or storage in the 200 Areas (WHC 1996e). This compares with a projection of approximately 30 cubic meters (1,000 cubic feet) of similar wastes for the proposed action.

Hazardous materials (e.g., solvents, asbestos) which may be used or generated would be managed and reused, recycled, or disposed of in accordance with applicable federal and state regulations.

Noise levels would be comparable to existing conditions at the Hanford Site. The amount of equipment and materials to be used, such as steel and other metals necessary for modifications, represent a minor long-term commitment of nonrenewable resources.

The proposed action is not expected to impact the climate, flora/fauna and habitat, air quality, geology, hydrology and/or water quality, land use, or the population. Biological and Cultural Resources Reviews support these expectations (Appendices A and B, respectively). It is anticipated that the bulk of necessary work force personnel would come from existing Hanford Site staff.

5.2 Proposed Actions: Impacts from Accidents

Accidents associated with management of SNF at the Hanford Site were discussed in Attachment A, Appendix A, DOE 1995d. The selection of accidents for analyses was based on information available in previously published safety or *National Environmental Policy Act of 1969* (NEPA) documents. The releases of radiological and nonradiological hazardous materials were based on actual or expected inventories at SNF management facilities using conservative release assumptions. Industrial construction and operational accidents were also evaluated based on person-years needed to build and operate SNF facilities.

5.2.1. Reasonably Foreseeable Radiological Accident Scenario

The proposed action is similar to an alternative discussed in DOE 1995d, which analyzed the impacts of retaining at Hanford the majority of SNF (defense and non-defense) currently stored at the Hanford Site. While several reasonably foreseeable radiological accident scenarios were addressed in DOE 1995d, the following is a discussion of the Maximum Reasonably Foreseeable Accident (MRFA), which is provided as discussed in the aforementioned reference.

The MRFA in DOE 1995d was assumed to be a severe cask impact followed by a fire at a new dry storage (small vault or cask) facility. The release associated with this accident was based on a hypothetical scenario of six irradiated FFTF fuel assemblies being subjected to a severe impact, causing fuel pins to rupture. The FFTF SNF has the highest activity of all the non-production reactor SNF currently stored at Hanford. The probability of such an accident resulting in breach of the cask was estimated to be 6×10^{-6}.

The risk to the directly involved worker (i.e., an individual in the immediate vicinity of an event) is highly dependent upon the worker's specific location, meteorological conditions, and nature of the accident. All of the aforementioned circumstances could either increase or mitigate the severity of the consequences. It is noted that the handling of materials, such as SNF and chemicals, is similar to routine activities conducted throughout the Hanford Site, and represent similar hazards and initiators associated with potential events for the proposed action. Workers wear required protective clothing and follow administrative controls in accordance with a radiation work permit and hazardous materials permit.

The following information is summarized from DOE 1995d: Individual doses were estimated based on exposure of the receptor during the entire release, except where the release was sufficiently long that it could be divided into short-term and long-term components. In that case, onsite workers and members of the public at accessible onsite locations were assumed to remain in the path of the plume for the duration of the short-term component. The exposure duration for onsite individuals was assumed to be two hours, and no ingestion pathways were considered.

An internal or external initiator which could cause a breach followed by fire in a dry storage facility would surely be noticed by nearby workers. It is assumed that the workers would immediately evacuate the area and, once at a safe distance, would move to a position upwind of the building. Evacuation time to that location would be measured in minutes. As presented in DOE 1995d, the potential exposure to the onsite worker (100 meters) from the MRFA was 120 rem, equating to 0.09 latent cancer fatalities (LCFs).

The offsite MEI could receive 0.05 rem, equating to 0.00003 LCFs. For collective dose, the area surrounding the source was divided into 16 directions and 10 sectors by distance, and the dose was calculated for only the direction resulting in maximum collective exposure. Dose to the population was calculated using both 50 percent and 95 percent atmospheric dispersion parameters. The collective dose (without ingestion) to the population within approximately 80 kilometers (50 miles) was calculated to be 45 person-rem (50 percent dispersion) and 900 person-rem (95 percent dispersion). Those doses equate to 0.02 and 0.45 LCFs, respectively.

Additional analyses (DOE 1995b and HEDL 1996) have evaluated the impacts of seven FFTF fuel assemblies being involved in cask accident scenarios. The calculated consequences of those accidents, which were small, support the conclusions of the aforementioned analysis presented in this EA.

Accidents associated with the offsite transportation of the FFTF SNF sodium-bonded metal fuel were evaluated in WHC 1994b. The calculated population risk for an isolated, worst-case transportation accident, was calculated to be approximately 3×10^{-4} person-rem (1.5×10^{-7} LCFs). DOE has analyzed the cumulative accident risk for transportation by truck of all SNF to INEEL (DOE 1995d), which was very small (i.e., 0.54 person-rem [2.7×10^{-4} LCFs]).

5.2.2. Reasonably Foreseeable Nonradiological Accident Scenario(s)

The environmental effects of accidents related to nonradiological materials are limited to those associated with most routine industrial activity. Personnel injuries, such as back strains or minor abrasions, would be handled as per DOE and contractor guidelines. Administrative controls, proper training and specification of detailed procedures used in handling the materials would be in place, all of which would mitigate the potential of any effects of such an accident.

The potential environmental impacts from nonradiological accidents also were addressed in DOE 1995d. For analysis purposes, a worst-case accident scenario involved a chemical spill within a building, followed by an environmental release from the normal exhaust system. It was assumed that the building remained intact, but containment measures failed, allowing release to occur through the ventilation system. It was assumed that all, or a portion of, the entire inventory of toxic chemicals stored in the building was released.

The toxicological analysis (DOE 1995d) was based on the presence of decontamination soap in the new dry storage facility, which would be used to decontaminate workers and/or equipment during routine operations. Argon, which could be used to create an inert atmosphere in a vault concept, was also considered. The postulated release of these materials would not pose a threat to onsite workers or offsite individuals or population.

5.3 Proposed Actions: Environmental Justice

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,* directs Federal agencies to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of their programs and activities on minority and low-income populations. DOE is in the process of developing official guidance for implementation of the Executive Order. However, the analysis in this EA (Sections 5.1 and 5.2) indicates that there would be minimal impacts to both the offsite population and potential workforce during the proposed action, under both routine and accident conditions. Additionally, transportation in the continental U.S. would involve established, existing highways, minimizing transit time and associated potential exposure. Therefore, it is not expected that there would be any disproportionately high and adverse impacts to any minority or low-income populations.

5.4 Proposed Actions: Cumulative Impacts

The proposed activities would contribute minimal risks in addition to those associated with routine Hanford Site operations. The proposed actions also would mitigate the potential for, and consequences of, inadvertent releases of radioactive and hazardous materials from the existing non-defense production reactor SNF storage facilities. The proposed activities would result in a long-term decrease in exposure, due to consolidated storage of the wide variety (inventory and location) of non-defense production reactor SNF.

The proposed actions would not be expected to contribute to a substantial increase in routine exposure at the CSB Complex when considering the total inventory of SNF at the Hanford Site which may be stored there. As discussed in Section 2.0, the non-defense production reactor SNF (approximately 29 MTHM) represents a small fraction of the total SNF at the Hanford Site (approximately 2,100 MTHM); i.e., the non-defense production reactor SNF is about 1.4 weight percent of the total MTHM SNF inventory.

An analysis of potential radiation exposure to onsite workers and the public from management of defense production reactor SNF (i.e., approximately 2,100 MTHM) was provided in DOE 1996a. As reported in DOE 1996a, cumulative exposures to workers, including retrieval and storage of the defense production reactor SNF, might result in at most one latent cancer fatality over a 40-year period. No health consequences to the public would be expected as a result of routine activities associated with any alternative evaluated in DOE 1996a. The worker exposure associated with activities proposed in this EA is a very small fraction when compared to defense production reactor SNF management activities analyzed in DOE 1996a.

6.0 Permits and Regulatory Requirements

No substantial additional radioactive airborne emissions are anticipated from the current storage facilities or the CSB Complex as a result of the proposed action. The facilities are registered with the appropriate regulatory agencies. Any changes to existing permits resulting from the proposed action would be followed by the appropriate notification and/or documentation. Fugitive emissions (especially dust) from modifications of existing storage facilities, and construction and operational activities associated with the 200 Area ISA would be controlled in accordance with normal practices, as per Benton County Clean Air Authority rules. Existing ventilation filtration would mitigate releases of dust from the existing non-defense production reactor storage facilities to the environment. Examples of such controls include wetting ground surfaces, and enclosing construction areas with plastic covering.

Any generated radioactive solid waste would be subject to the requirements of DOE Order 5820.2A, *Radioactive Waste Management*. Disposal of solid, low-level mixed waste would be subject to DOE Order 5820.2A and the additional requirements of the *Resource Conservation and Recovery Act of 1976* (RCRA), and "Dangerous Waste Regulations," *Washington Administrative Code*, as amended (WAC 173-303).

A small quantity of waste solvents may be handled as a liquid hazardous waste. Present plans do not involve storing this waste onsite for more than 90 days. All applicable requirements pertaining to generators of hazardous waste (i.e., RCRA, WAC 173-303) would be met. Radioactive waste water solutions would be appropriately stored and disposed of in the existing 200 Area facilities.

SNF transportation, including to the CSB Complex, the 400 Area ISA, and INEEL, would be in accordance with applicable DOE Orders and requirements. In addition, applicable requirements promulgated by DOT and NRC would be followed, including 10 CFR 71; and 49 CFR 171-173, 177, and 178.

7.0 Agencies Consulted

No outside agencies were consulted during the preparation of this EA. The Yakama Indian Nation, the Confederated Tribes of the Umatilla Indian Reservation, the Wanapum People, the Nez Perce Tribe, the States of Washington and Oregon, and other stakeholders were notified regarding the proposed action.

This EA was sent to the following for a 30-day review period: the Yakama Indian Nation; the Confederated Tribes of the Umatilla Indian Reservation; the Wanapum People; the Nez Perce Tribe; U.S. Fish and Wildlife Service; U.S. Bureau of Reclamation; the State of Washington Department of Ecology; the State of Washington Department of Health; the Washington State Department of Fish and Wildlife; and the Physicians for Social Responsibility. No comments were received.

8.0 References

10 CFR 71, 1993, "Packaging & Transportation of Radioactive Material," *Code of Federal Regulations*, as amended.

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APPENDIX A

BIOLOGICAL REVIEW OF 200 AREA ISA

October 11, 1996, Letter from Duke Engineering Services Hanford, Inc.

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October 11, 1996

Mr. Alan Carlson
Duke Engineering Services Hanford, Inc.
P. O. Box 350, MSIN R3-86
Richland, WA 99352

Dear Mr. Carlson:

BIOLOGICAL REVIEW OF THE 200 AREA INTERIM STORAGE AREA PROJECT, 200 E Area. #97-200-001

Project Description:

- Construction of an interim storage area for the spent nuclear fuel project.

Survey Objectives:

- To determine the occurrence in the project area of plant and animal species protected under the Endangered Species Act (ESA), candidates for such protection, and species listed as threatened, endangered, candidate, sensitive, or monitor by the state of Washington, and species protected under the Migratory Bird Treaty Act.
- To evaluate the potential impacts of disturbance on priority habitats and protected plant and animal species identified in the survey.

Survey Methods:

- Pedestrian and ocular reconnaissance of the proposed site was conducted by G. Fortner, and R. Zufelt on May 30, 1996. The Braun-Blanquet cover-abundance scale (Bonham 1989) was used to determine percent cover of dominant vegetation.
- Priority habitats and species of concern are documented as such in the following: Washington Department of Fish and Wildlife (1993, 1994), U. S. Fish and Wildlife Service (1985, 1994a & b) and Washington State Department of Natural Resources (1994).

Survey Results:

- No flora were observed in the vicinity.
- No migratory bird species were observed nesting in the vicinity of the proposed site.

Considerations and Recommendations:

- No plant and animal species protected under the ESA, candidates for such protection, or species listed by the Washington state government were observed in the vicinity of the proposed site.
- For the purposes of planning and NEPA compliance, no adverse impacts to species or habitats of concern are expected to occur from the proposed action.

- Because the start of construction will not occur until FY 1999, an additional evaluation for potential impacts to migratory birds and other biological resources will be required prior to the initiation of construction activities. Project planners should contact the Ecological Compliance Assessment Staff in late FY 98 or early FY 99 to determine appropriate follow-up surveys or actions.

Sincerely,

CA Brandt, Ph.D.
Project Manager
Ecological Compliance Assessment

CAB:mrs

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APPENDIX B

CULTURAL RESOURCES REVIEW OF THE 200 AREA ISA

October 9, 1996, Letter, Duke Engineering & Services, Inc.

October 9, 1996

No Known Historic Properties

Mr. A. B. Carlson
Duke Engineering & Services, Inc.
P. O. Box 250/R3-86
Richland, WA 99352

Dear Mr. Carlson:

CULTURAL RESOURCES REVIEW OF THE 200 AREA INTERIM STORAGE AREA.
HCRC #97-200-001.

In response to your request received October 2, 1996, staff of the Hanford Cultural Resources Laboratory (HCRL) conducted a cultural resources review of the subject project, located just west of the 200 East Area of the Hanford Site. According to the information that you supplied, the project entails the construction of a facility consisting of a boundary fence with a gate or gates, lighting along the perimeter, installation of electrical power, and construction of concrete pads to place dry storage casks. An equipment storage building (Butler-type) is also proposed to be sited near the Interim Storage Area. The project area measures approximately 500 feet by 400 feet. Size of the footing for the pads has not been determined but are expected to be about 3 to 5 feet in depth below grade. The trench for the electrical lines will be up to a few feet deep.

Our literature and records review shows that the project area has been previously surveyed for cultural resources (HCRC #87-200-004). None were identified during that survey. The project area has since been graded for another Hanford Site project. It is unlikely that any intact archaeological materials will be affected by the proposed project. Additional survey of the project area and monitoring of the excavation by an archaeologist are not necessary.

It is the finding of the HCRL staff that there are no known cultural resources or historic properties within the proposed project area. The workers, however, must be directed to watch for cultural materials (e.g., bones, artifacts) during all work activities. If any are encountered, work in the vicinity of the discovery must stop until an HCRL archaeologist has been notified, assessed the significance of the find, and, if necessary, arranged for mitigation of the impacts to the find. The HCRL must be notified if any changes to project location or scope are anticipated. This is a Class III case, defined as a project which involves new construction in a disturbed, low-sensitivity area.

Copies of this letter have been sent to D. W. Lloyd, DOE, Richland Operations Office, as official documentation. If you have any questions, please call me at 376-8107. Please use the HCRC# above for any future correspondence concerning this project.

Very truly yours,

N. A. Cadoret
Technical Specialist
Cultural Resources Project

Concurrence:

P. R. Nickens, Project Manager
Cultural Resources Project

cc: D. Lloyd, RL (2)
G. D. Cummins
R. J. Swan
File/LB