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Revision 0

Surveillance and Maintenance Plan for the Fast Flux Test Facility (FFTF)

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

United States Department of Energy
P.O. Box 550
Richland, Washington 99352

Approved for Public Release;
Further Dissemination Unlimited

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Surveillance and Maintenance Plan for the Fast Flux Test Facility (FFTF)

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ACRONYMS

ALARA	as low as reasonably achievable
ASME	American Society of Mechanical Engineers
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
CFR	*Code of Federal Regulations*
CRD	*Contractor Requirements Document*
Cs	cesium
DEAR	*Department of Energy Acquisition Regulation*
DHX	Dump Heat Exchanger
DOE	U.S. Department of Energy
DSA	Documented Safety Analysis
EA	environmental assessment
EIS	environmental impact assessment
EMS	Environmental Management System
FACP	fire alarm control panel
FFTF	Fast Flux Test Facility
FHA	fire hazard analysis
FONSI	finding of no significant impact
FSF	Fuel Storage Facility
HAZWOPER	*Hazardous Waste Operations and Emergency Response Regulation*
HTS	Heat Transport System (this can apply to the HTS sodium systems or to the HTS buildings)
IDS	Interim Decay Storage
IEM	Interim Examination and Maintenance
ISMS	Integrated Environment, Safety, and Health Management System
ISA	Interim Storage Area
MHTS	Main Heat Transport System
NI-PEIS	Programmatic Nuclear Infrastructure Environmental Impact Statement
PCB	polychlorinated biphenyl
PPA	Property Protected Area
QA	quality assurance
QAPD	Quality Assurance Program Description
RCB	Reactor Containment Building
RCRA	*Resource Conservation and Recovery Act of 1976*
ROD	Record of Decision
RSB	Reactor Service Building
RL	Richland Operations Office
SCRD	*Supplemented Contractor Requirements Document*
S&M	surveillance and maintenance
SRE	sodium reactor experiment
SSR	Sodium Storage Facility
TC&WM	Tank Closure and Waste Management
Tri-Party Agreement	*Hanford Federal Facility Agreement and Consent Order*
TSD	treatment, storage, and/or disposal
VAC	volt alternating current
WAC	*Washington Administrative Code*
WDOH	State of Washington, Department of Health
WMU	Waste Management Unit

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1 INTRODUCTION

The *Hanford Federal Facility Agreement and Consent Order*, referred to as the Tri-Party Agreement, ensures compliance with the *Resource Conservation and Recovery Act of 1976* (RCRA) and the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA), as amended. The Tri-Party Agreement sets forth certain requirements and milestones for cleanup activities at the Hanford Site to include the requirements of surveillance and maintenance (S&M) activities at the Site.

This document provides the plan for the S&M phase of the Fast Flux Test Facility (FFTF). This plan has been prepared in accordance with the Tri-Party Agreement, Attachment 2 (Action Plan), Section 8.0, "Facility Decommissioning Process." Issuance of this report satisfies the requirement of the FFTF Project Tri-Party Agreement M-081-15, "Deactivation Milestone," due June 30, 2010. The objectives of the FFTF S&M phase are to ensure adequate containment of any contaminants left in place, to provide physical safety and security controls, and to maintain and monitor the facility in a manner that will present no significant risk to human health or the environment until final disposition of the facility is completed. The *Fast Flux Test Facility Deactivation End Point Criteria* (FFTF-25070, 2005) provides criteria to be evaluated prior to entering S&M. Proposed alternatives for the final disposition end state of FFTF (i.e., No Action [S&M], Entombment, and Removal) are being analyzed in the in process U.S. Department of Energy (DOE) Tank Closure and Waste Management (TC&WM) Environmental Impact Statement (EIS) for the Hanford Site (71 FR 5655, 2006). In this EIS and its future Record of Decision (ROD), the potential decision for the final disposition of FFTF would identify the end state for the above-ground, below-ground, and ancillary support structures.

S&M plans are prepared by DOE, Richland Operations Office (RL), and detail facility aspects and associated requirements including the following:

- Surveillance;
- Maintenance;
- Quality assurance;
- Radiological controls;
- Hazardous substance inventory, management, and protection;
- Health and safety/emergency preparedness;
- Safeguards and security;
- Cost and schedule; and
- Environmental compliance.

This S&M plan covers only the FFTF Plant nuclear facility (i.e., the Reactor Containment Building [RCB] and all contiguous buildings) and some additional buildings/areas within the 400 Area Property Protected Area (PPA) security fence that will contain hazardous substances and/or regulated units during the S&M phase. Therefore, all buildings within the PPA fence are not included in this plan because some buildings will remain operational (e.g., Building 402, Sodium Storage Facility; Building 481, Water Pump House; and Building 437, the Maintenance and Storage Facility) and some will be closed due to being standard office or warehouse buildings with no special environmental factors (e.g., Building 4710, FFTF Office Building, and Building 4713A, Warehouse).

The locations and listings of 400 Area PPA buildings/areas applicable to the S&M Plan are presented in Figure 1-1 and Table 1-1, respectively.

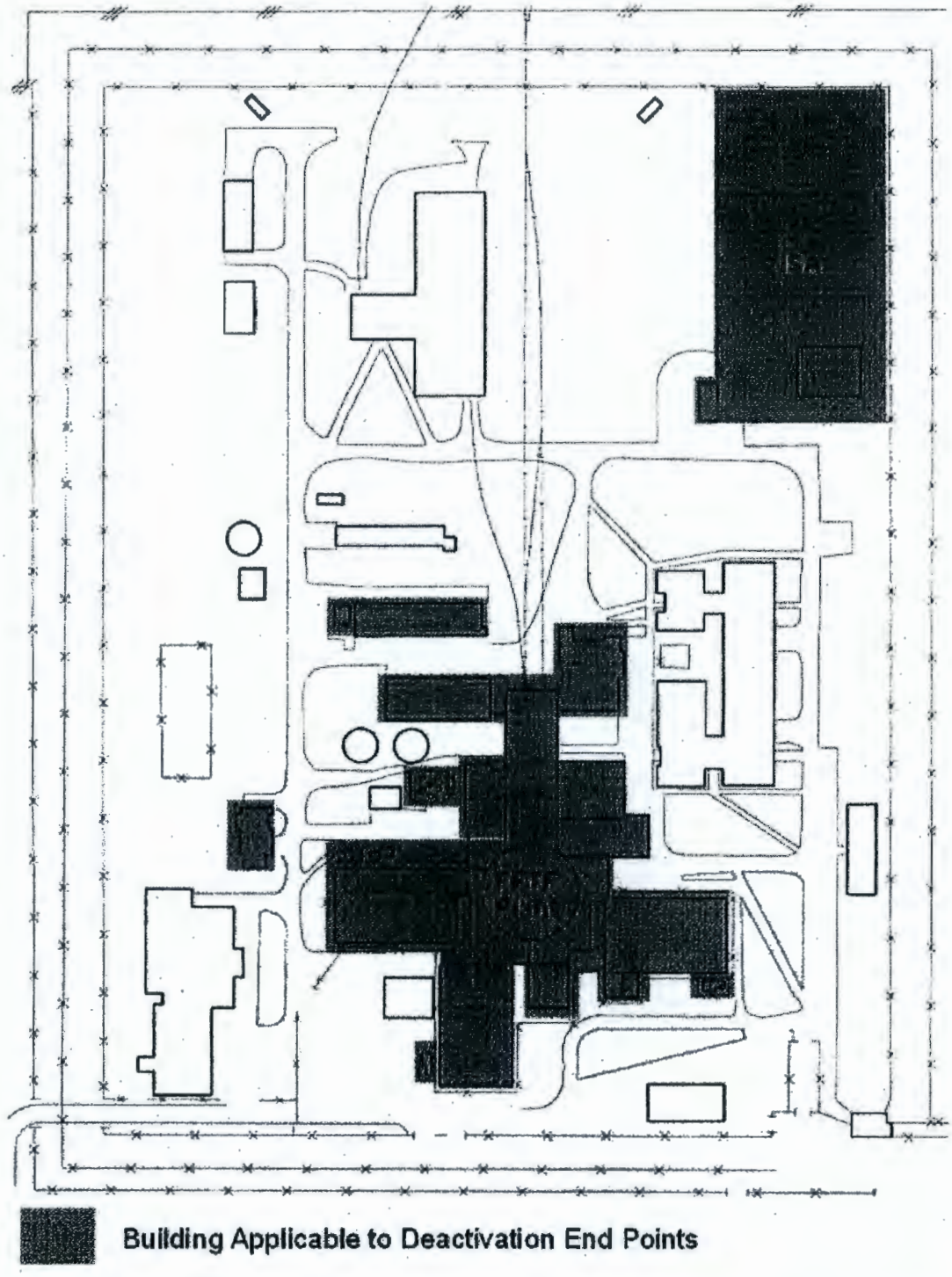

Figure 1-1. Locations of 400 Area PPA Buildings/Areas Covered by the FFTF S&M Plan

Table 1-1. List of 400 Area PPA Buildings/Areas Covered by the FFTF S&M Plan

Identification No.	Function/Description
FFTF Nuclear Facility (Current Facility Boundary)	
403	Fuel Storage Facility
405	Reactor Containment Building
408-A	Dump Heat Exchanger Structure (DHX) - East
408-B	Dump Heat Exchanger Structure (DHX) - South
408-C	Dump Heat Exchanger Structure (DHX) - West
409-A/B	Closed Loop Dump Heat Exchangers
491-E	Heat Transport System Service Building - East
491-S	Heat Transport System Service Building - South
491-W	Heat Transport System Service Building - West
4621-E	Auxiliary Equipment Building - East
4621-W	Auxiliary Equipment Building - West
4703	Control Building
4717	Reactor Service Building
Other S&M Buildings within the 400 Area PPA	
453-A, -B, -C	2.4 kV Transformer Stations
483	Cooling Towers, Chemical Addition Building
484	In-Containment Chill Water Equipment Building
4716	Rigging Loft
4718/432-A	Interim Storage Area (open, fenced-in area)/Interim Covered Equipment Storage
4721	Emergency Turbine Generator Building

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2 FACILITY BACKGROUND AND HISTORY

Activities conducted during the S&M phase are geared to ensure adequate containment of contaminants left in place, to provide physical safety and security controls, and to maintain the facility in a manner that will minimize risk to human health or the environment until final disposition of the facility is completed. This section provides a brief background discussion of the FFTF's history, description, and the systems that will be operational during S&M, including previous processes that resulted in hazardous and radioactive contamination and completed deactivation activities.

2.1 HISTORY

FFTF is a 400-megawatt (thermal) liquid-sodium-cooled, fast- neutron flux nuclear test reactor owned by DOE. The facility is located in the 400 Area of Hanford. Construction of FFTF was completed in December 1978 and initial operation (i.e., criticality) began in February 1980. From April 1982 to April 1992, FFTF operated successfully as a national research facility to test advanced nuclear fuels, materials, and components; nuclear power plant operations and maintenance protocols; and reactor safety designs. During this time, FFTF also produced a wide variety of medical and industrial isotopes, made tritium for the U.S. fusion research program, and conducted cooperative international research work. In December 1993, DOE ordered FFTF to be shut down due to a lack of economically viable missions at that time. In May 1995, DOE prepared an environmental assessment (EA) that evaluated the impacts of the shutdown (i.e., deactivation or transition) of FFTF, which resulted in a Finding of No Significant Impact (FONSI) (DOE/EA-0993, 1995).

In January 1997, the Secretary of Energy ordered FFTF to be maintained in a standby condition while its potential future role in DOE's tritium production strategy was evaluated. Consequently, FFTF deactivation work was limited to activities that would not inhibit a reactor restart. In December 1998, the Secretary of Energy announced that FFTF would not play a role in tritium production and that a decision on any other future FFTF missions would be made by spring 1999. In May 1999, DOE initiated a two-phase process for finalizing a path forward for FFTF that included development and review of a program scoping plan. By August 1999, DOE initiated preparation of a Programmatic Nuclear Infrastructure EIS (NI-PEIS), which was completed in December 2000 (DOE/EIS-0310F). The NI-PEIS evaluated the potential environmental impacts resulting from DOE expanding domestic civilian nuclear energy research and development and isotope production using existing and new resources. In the NI-PEIS, FFTF was evaluated as an alternative irradiation services facility to accomplish these missions. In the NI-PEIS ROD, published in January 2001, DOE ruled out the use of FFTF for isotope production and research missions and reaffirmed its decision to permanently deactivate the facility (66 FR 7877, 2001). From April 2001 to December 2001, DOE suspended its decision to resume permanent deactivation of FFTF to conduct additional reviews of the decision made in the *NI PEIS* ROD. Following these reviews, DOE decided in December 2001 that restarting FFTF was impractical and deactivation would resume. Major deactivation activities consisted of, but are not limited to, fuel offload, sodium draining and storage, and deactivation of the auxiliary plant systems.

During operations, FFTF reactor coolant systems and storage vessels contained about 260,000 gallons of radioactively contaminated sodium (HNF-33211, 2007). Sodium drain was initiated in November 1995 but stopped, and the reactor was placed in a standby period by DOE so alternative missions could be examined. During the standby period, selected plant equipment and systems were deactivated. Sodium drain was re-initiated in April 2003 and completed on October 5, 2006, with the drain of the Interim Decay Storage (IDS) vessel and transfer of its sodium to the Sodium Storage Facility (SSF). To date, all FFTF bulk sodium (approximately 243,000 gallons) has been drained to the extent practical and has been transferred to the SSF and allowed to freeze in the four large storage tanks. The FFTF bulk sodium, along

with about 34,000 gallons and about 7,000 gallons of radioactively contaminated sodium from the Hallam Reactor and Sodium Reactor Experiment (SRE), respectively, constitute the total estimated Hanford Site radioactively contaminated sodium inventory (284,000 gallons). Management and disposition of the Hanford Site sodium inventory are being addressed in the in-process TC & WM EIS.

In March 2006, DOE issued an EA (DOE/EA-1547F) that addressed the continuation of ongoing FFTF deactivation work that was not extensively discussed in the 1995 FFTF Shutdown EA. The activities analyzed included removing radioactively contaminated sodium residuals left over from draining of the Hanford radioactively contaminated inventory by reacting the sodium metal with water to produce caustic sodium hydroxide; removing associated equipment/components to allow sodium removal; and removing, disposing of, and stabilizing miscellaneous hazards and waste streams left over from the sodium drains. Approximately 6,000 to 15,300 gallons of radioactively contaminated sodium residuals still exists within the FFTF reactor vessel, storage vessels, and liquid metal piping systems (FFTF-36419, 2008).

Fuel offload was initiated with fuel removal from the reactor core in 1994. Fuel removed from the facility was placed in dry casks for interim storage at the Hanford 200 Area or shipped offsite. Fuel offload was completed April 30, 2008, with the final shipment of fuel from FFTF to Idaho.

As sodium drain and fuel offload progressed, un-needed plant equipment and systems were deactivated. Completion of deactivation activities has established a safe and environmentally secure configuration suitable for a long-term S&M program.

When the FFTF was retired from service, some hazardous materials were left in the facility. Those hazardous materials are listed in Appendix A, "Hazardous Material Remaining at the FFTF."

2.2 FACILITY DESCRIPTION

This section of the S&M Plan describes the major structures and operations of active systems; including status of systems such as ventilation, fire detection, utility distribution, and water.

As mentioned in Section 1.0, the FFTF Facility S&M area is bounded by the 400 Area PPA security fence. During the S&M period, the FFTF Plant has been designated a Hazard Category 3 nuclear facility. The nuclear facility boundary, as defined by the FFTF Documented Safety Analysis (DSA, FFTF-36419 2008), includes only the containment building and contiguous structures. Table 1-1 lists the buildings that are part of the nuclear facility boundary and the additional buildings that are covered by this S&M Plan. The Fire Hazards Analysis (FHA) is Appendix D to FFTF-36419.

The FFTF Facility S&M area includes the Building 405 (RCB) and some other buildings within the Property Protection Area (PPA) as shown in Figure 1-1. The containment building houses the reactor vessel, the primary Main Heat Transport System (MHTS), and the Interim Examination and Maintenance (IEM) Cell. The remaining buildings house the secondary MHTS (Buildings 491-E, -S, and -W), electrical power distribution, refueling support (Buildings 403 and 4717), chilled and cooling water supply, inert gas supply, fire detection and protection, and emergency power supplies (Buildings 4621-E and -W, and Building 4721).

The major deactivation activities in preparation for S&M were to drain sodium systems to the SSF (not part of S&M) and to offload all reactor fuel. All polychlorinated biphenyl (PCB) transformers and major electrical batteries were removed from the plant. Water-glycol cooling systems and various oil systems were drained to the extent practical. Contaminated refueling components were sealed. Movable combustibles and wastes were removed.

2.2.1 Operational Systems

The fire detection and alarm system, and the low pressure argon supply are the only systems that will be continuously operating during the S&M period. Selected ventilation fans and lighting will be operable to support plant entries. The FFTF DSA/FHA requires the availability of the water from the 400 Area water loop for fire hydrant supply in emergencies. The 400 Area water system, which also supplies operating buildings in the 400 Area, is not considered an S&M system.

2.2.1.1 Electrical System

The original electrical distribution system to FFTF is isolated and disconnected. A pole-mounted 480 volt alternating current (VAC) distribution is supplied to two disconnect switches located outside the plant. One is for continuous power for the fire detection and alarm system. During the normal, unoccupied periods, the fire detection and alarm system is the only plant system that is continuously energized. The other disconnect switch is only closed to provide power for lighting and ventilation equipment for plant entries.

2.2.1.2 Fire Detection System

The fire detection and alarm system inside the plant buildings will remain operational consistent with the FHA. Power is continuously supplied to three Fire Alarm Control Panels (FACPs) that receive signals from the detectors throughout the plant. Fire and trouble alarms from these panels are transmitted to the Hanford Fire Department. During the S&M period there is no fire suppression within the plant. The FHA requires that the 400 Area water supply system remain operable so that the water loop and associated fire hydrants have pressurized water. Again, the water system is not an S&M system.

2.2.1.3 Low-Pressure Argon Supply System

A low-pressure inert cover gas (argon) blanket will be maintained over the primary and secondary MHTS, and most auxiliary sodium and cover gas systems. The sodium was drained from these systems, but some sodium residuals remains, especially in low points such as tank heels. The cover gas will be supplied from one or more dewars on the dewar pad just outside the plant buildings. For the near future, the use of the inert gas preserves the potential for component reuse, and, for the long term, it minimizes the potential for boundary failure due to caustic attack and simplifies the final sodium residuals removal. Alarms for high or low pressure are transmitted to Building 481 (Water Pump House).

2.2.1.4 Surveillance Lighting System

Permanently installed lighting, portions of the system designated as emergency lighting during the FFTF operational stage, is operational for plant entries. Additional lighting may be supplied by plug-in cords as required. Because of the single supply and reduced lighting level, personnel entering the building will be required to have portable lighting.

2.2.1.5 Surveillance Ventilation System

Three permanent ventilation fans are operable during the S&M period. These fans will only be operated for access to their respective buildings. Two of the fans are the redundant Building 405 (RCB) exhaust fans, only one of which will be operated at any one time. The other unit is the exhaust fan for the Building 491-W (HTS-W) that will be run to support access required below the 550-foot (ground) level during periodic surveillance tours.

The only plant exhaust ventilation system remaining operable in the plant is the RCB exhaust stack. It is designated as a minor emission unit. The containment exhaust fans (R3 or R4) will only be run infrequently in support of entrances into the RCB. Since operations supplying airborne radionuclides to the ventilation system during S&M activities are not expected, the monitoring activities are expected to be at a minimum, yet still meet the U.S. Environmental Protection Agency's requirements and the State requirements of the *Washington Administrative Code* (WAC) 246-247, "Radiation Protection – Air Emissions." Environmental sampling of FFTF's main ventilation emissions during the FFTF S&M phase will be in accordance with the requirements of the State of Washington, Department of Health, and the Air Operating Permit.

3 FACILITY SURVEILLANCE

3.1 SURVEILLANCE ACTIVITIES

Plant entries will be made for S&M activities. Planned maintenance activities are entries to perform specific activities on specific components. These maintenance activities are described in Section 4.0, "Facility Maintenance." This section describes the surveillance activities to be conducted on a routine and non-routine basis by the S&M contractor and cover all other entries.

In addition, surveillance activities must satisfy the inspection requirements as identified in Section 7.0, "Environmental Compliance/Protection," Table 7.1, "FFTF Regulatory Compliance During Surveillance and Maintenance," and as required in the Hanford Facility RCRA Permit, Operating Unit Group 16.

3.2 SCHEDULED PLANT SURVEILLANCE TOURS

3.2.1 Indoor Surveillance Tour

The indoor surveillance will consist of a tour of the FFTF Plant as identified in the contractor's FFTF Facility surveillance procedure. This surveillance will be performed at least annually. The tour will consist of walking through/looking into most rooms on the 550-ft (ground level) and 570-ft levels of the all plant buildings. One planned entrance below the 550-ft level will be done in order to look down into the cell that contains the secondary sodium storage tank T-44 in Building 491-W (HTS-W) for evidence of water intrusion. The T-44 cell was chosen because other ex-containment cells and pipeways slope down to the T-44 cell. Any water accumulation may be indicative of water intrusion elsewhere and the T-44 cell would be the first place water might contact components containing sodium residuals.

The S&M contractor walk-through surveillance includes checking for indications of:

- Internal structural defects;
- Roof deterioration (as seen from the inside);
- Posting deficiencies;
- Contamination migration;
- Suspect hazardous materials;
- Hazardous conditions;
- Electrical hazards;
- Unidentified friable asbestos;
- Failed lights;
- Doors unlocked;
- Water leaks;
- Previously unidentified hazards;
- Unidentified or unlabeled containers;
- Occupational hazards;
- Animal or insect intrusion;
- Excess combustible materials; and
- Excess equipment or material or inadequate housekeeping from prior work.

It is expected that all required radiological control surveillances will be conducted in conjunction with the indoor surveillance tour.

3.2.2 External Surveillance Tour

An external surveillance of the plant buildings will also be conducted at least annually. The S&M contractor external surveillance includes checking for indications of:

- External structural defects;
- Roof deterioration;
- Posting deficiencies;
- Contamination migration;
- Suspect hazardous materials;
- Hazardous conditions;
- Electrical hazards;
- Unidentified friable asbestos;
- Doors unlocked;
- Water leaks;
- Excess combustible materials (e.g., tumbleweeds);
- Excess equipment or material;
- Ground subsidence;
- Inadequate housekeeping;
- Occupational hazards;
- Previously unidentified hazards;
- Unidentified or unlabeled containers; and
- Animal or insect intrusion.

3.2.3 Plant Building Roof Inspections

In addition to the annual walk-through surveillance, a qualified structural engineer will conduct an inspection of the FFTF Plant building roof and structures. These inspections are currently required every five years. The frequency, extent of future inspections, and recommendations resulting from these periodic inspections will be documented by the structural engineer.

3.3 WASTE MANAGEMENT UNIT INSPECTIONS

There is one Waste Management Unit (WMU) in the 400 Area with two active containerized storage areas of mixed waste, governed by the requirements of *the Hanford Facility RCRA Permit* (WA7 89000 8967). One of these storage areas is inside the Building 403 (Fuel Storage Facility [FSF]); the other storage area is on the Interim Storage Area (ISA). The mixed waste stored in these areas is limited exclusively to debris (e.g., piping, equipment, and components) contaminated with elemental sodium and sodium hydroxide. The permit application requires semi-annual inspections of each active storage area to ensure the waste remains in a safe configuration with respect to potential impacts on personnel or the environment.

3.3.1 FSF WMU Inspection

The FSF (indoor) inspection will consist of a visual inspection of the containers' integrity. In addition, the argon cover gas supply to the storage boxes will be verified.

3.3.2 ISA WMU Inspection

The ISA inspection will also consist of a visual check of the containers' integrity. In addition, it will check for external elements (e.g., combustible tumbleweeds) that could have an effect of the containers.

3.4 OTHER PLANT ENTRIES

In addition to the plant entries surveillances listed above, there are numerous valid additional reasons for plant entries. These include, but are not limited to, training, verifying specific conditions, and tours for selected personnel. The contractor has procedures to control all entries and ensure they are made safely.

4 FACILITY MAINTENANCE

This section describes the methodology applied by DOE to ensure that the S&M contractor establishes preventive and corrective maintenance activities to be performed. Preventive maintenance is conducted on a prescheduled basis to ensure proper functioning of operational equipment. Corrective maintenance is performed after equipment has malfunctioned, has required structural repair due to degradation, or to upgrade facilities and/or equipment.

4.1 MAINTENANCE ORGANIZATION AND ADMINISTRATION

The DOE requires the S&M contractor to develop and implement plans, programs, and procedures that specify maintenance program requirements for nuclear and non-nuclear facilities required by *Contractor Requirements Document* (CRD) O 433.1, *Maintenance Management Program for DOE Nuclear Facilities*, and CRD O 430.1B, *Real Property Asset Management*. The DOE conducts oversight of the S&M contractor's maintenance program implementation.

CRD O 433.1 specifically mandates that the S&M contractor implement a maintenance management program using a graded approach and that the maintenance management program shall address the following elements, as appropriate:

- Maintenance organization and administration;
- Training and qualification of maintenance personnel;
- Maintenance facilities, equipment, and tools;
- Types of maintenance;
- Maintenance procedures;
- Planning, scheduling, and coordination of maintenance;
- Control of maintenance activities;
- Post-maintenance Testing;
- Procurement of parts, materials, and services;
- Receipt, inspection, handling, storage, retrieval, issuance, and disposal/turn in of personal property;
- Control and calibration of measuring and test equipment;
- Maintenance tools and equipment control;
- Facility condition inspection;
- Management involvement;
- Maintenance history;
- Analysis of maintenance problems;
- Modification work; and
- Seasonal facility preservation.

4.2 TYPES OF MAINTENANCE

A proper balance of routine and preventive maintenance is employed to provide a high degree of confidence that facility equipment degradation is identified and corrected. Preventive and routine maintenance is conducted as described in the S&M contractor work control procedures.

4.3 S&M MAINTENANCE ACTIVITIES

The following maintenance and frequencies are recommended to satisfy codes and specifications, to meet manufacturers' recommendations, and to ensure optimum equipment operating life during the S&M program.

4.3.1 Maintenance Inside the FFTF Plant

The only required maintenance inside the plant will be annual testing of the fire detection system. This will involve testing at the three FACPs and local testing of identified, accessible detectors. To the extent practical, this will be scheduled in conjunction with the annual surveillance tour.

4.3.2 Maintenance External to the FFTF Plant

4.3.2.1 Argon Relief Valve Testing

The argon system relief valve, outside the plant at the dewar pad, will be tested in accordance with the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section VIII.

4.3.2.2 Potential Cold Weather Protection

Prior to winter conditions, special conditions may be put into effect for cold weather protection as defined in the contractor's cold weather protection program.

4.3.2.3 ASME Section VIII Tank Inspections

Tank inspections will be conducted in accordance with ASME Boiler and Pressure Vessel Code, Section VIII, at two-year intervals.

5 QUALITY ASSURANCE

The DOE requires the S&M contractor to comply with the requirements of Title 10, *Code of Federal Regulations*, Part 830, Subpart A, *Quality Assurance Requirements* (10 CFR 830); DOE O 414.1C, CRD, *Quality Assurance*; and State and Federal environmental regulations, for the establishment and implementation of its quality assurance (QA) program. The S&M contractor's Quality Assurance Program Description (QAPD), which is approved by DOE, describes the S&M contractor's implementation of these requirements. The QAPD is also the management system used for the conduct of environmental programs that acquire, generate, compile, report and use environmental data and technology. The S&M contractor QA program, as described by its QAPD, is to be applied on a graded basis to S&M contractor activities.

The QAPD requires the S&M contractor to establish and implement QA program/project plans for specific quality-affecting activities. These plans identify the applicable QA requirements, how the requirements are implemented, and the responsibilities, interfaces, and authority for their implementation. These plans also incorporate other local, State, and Federal government QA requirements as established in applicable permits, agreements, orders, regulations, laws, codes, and standards.

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6 TRAINING AND QUALIFICATION

The DOE requires that the S&M contractor's training and qualification programs be established and implemented to satisfy the requirements of 10 CFR 830.122(b), "Criterion 2 – Management/Personnel Training and Qualification," and DOE O 414.1C CRD, Section 3.b, "Management/Criterion 2 – Personnel Training and Qualification." (See Section 4.0, "Quality Assurance.")

In addition, training requirements for S&M personnel performing dangerous/mixed waste duties must also meet the standards of WAC 173-303-330 and the requirements as identified in Section 7.0 and Table 7.1.

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7 ENVIRONMENTAL COMPLIANCE/PROTECTION

This section identifies environmental compliance/protection requirements that are applicable to the S&M plan (Table 7-1). This plan has been prepared in accordance with the Tri-Party Agreement, Attachment 2 (Action Plan), Section 8.0, "Facility Decommissioning Process."

The S&M contractor is required to comply with all environmental laws, regulations, and procedures applicable to the work being performed under its contract with DOE. This includes, but is not limited to, compliance with applicable Federal, State and local laws and regulations; interagency agreements such as the Tri-Party Agreement, consent orders, consent decrees, and settlement agreements between DOE and Federal and State regulatory agencies; and DOE orders.

The DOE requires that the S&M contractor must establish, implement, and maintain an environmental protection program in accordance with the provisions of CRD DOE O 450.1, *Environmental Protection Program*. This CRD requires contractors to integrate numerous environmentally related requirements already placed on it by existing statutes, regulations, and policies through the use of an Environmental Management System (EMS) incorporated into an Integrated Environment, Safety, and Health Management System (ISMS). EMS requirements must be addressed in the contractor's ISMS, which must be submitted for DOE review and approval under *Department of Energy Acquisition Regulation*, (DEAR) 970.5223-1, *Integration of Environment, Safety, and Health into Work Planning and Execution.*

During the FFTF deactivation, major radioactive sources and/or dangerous chemicals and wastes were removed, stabilized, excessed, or disposed to the extent practical. This included removal of dangerous waste constituents to a minimum pumpable heel from accessible tanks and vessels, except those contained in the SSF and the 400 Area WMU.

The hazardous material remaining at the FFTF is shown in Appendix A, which identifies and describes the material, location, and quantity of mixed waste and hazardous materials covered by the scope of this plan. Hazards associated with these materials are minimal due to their remote locations and existing form.

Dangerous waste generation and disposal are not expected during S&M. However, waste generated will be handled in compliance with the applicable Federal State, and local environmental laws and regulations, and DOE orders. Compliance with the RCRA requirements found in WAC 173-303 and with the Hanford Facility RCRA Permit, Part III Operating Unit 16, during the S&M phase is addressed in Table 7-1.

7.1 FFTF AIR PERMITTING

Under the DOE Hanford Site Radioactive Air Emissions License FF-01, the DOE Hanford Site, and FFTF specifically, are licensed for airborne radioactive emissions. The FF-01 license is issued by the State of Washington, Department of Health.

7.2 RECORD KEEPING/DOCUMENTATION

Records and documents are retained at the S&M contractor's records area.

Documentation assembled as a means of documenting completion of endpoints are located in the endpoint files at the S&M records area. These records include the following:

- FFTF hazardous material remaining after deactivation list;
- Pre-closure work plan;
- Deactivation work plans;
- Electrical distribution drawings of new operational systems;
- Index identifying drawings and corresponding titles of essential and downgraded facility drawings;
- Final radiological surveys and maps;
- Fire Hazard Analysis;
- Radiological control surveillances and data of current postings;
- Identified industrial space hazards;
- Confined space program;
- Resolution of remaining outstanding Tri-Party Agreement and regulatory commitments;
- S&M safety evaluations documentation;
- S&M phase updated Facility Environmental Monitoring Plan;
- S&M phase updated Building Emergency Plan;
- S&M phase updated Documented Safety Analysis documentation;
- Special nuclear material inventory;
- Structural and roof evaluations;
- S&M procedures;
- Unusual occurrence reports considered relevant and informative for S&M;
- Hanford Facility RCRA Permit, Operating Unit Group 16. (400 Area WMU);
- Hanford Site Radioactive Air Emissions Permit, FF-01;
- Waste characterization data for egress waste, historical radiation survey data, and other radiological records;
- An administrative record was established for the FFTF as described on Table 9-4 of the Tri-Party Agreement Action Plan (Ecology et al. 2003). The administrative record for FFTF contains the following documents:
  - RCRA Analytical Data for the 400 Area WMU;
  - FFTF Pre-Closure Work Plan; and
  - Hanford Facility RCRA Permit WA7 89000 8967, Part III Operating Unit 16.

Operating records and regulatory documentation generated during this S&M program, concerning dangerous waste management, are managed in accordance with the WAC 173-303-210/220 and are maintained in a regulatory file.

7.3 HAZARDOUS MATERIAL PROTECTION

During the S&M program, the FFTF complies with the applicable requirements and as low as reasonably achievable (ALARA) considerations for control of potential personnel exposures to hazardous materials. Hazardous material protection requirements are accomplished by complying with the S&M contractor's safety and health procedures.

7.4 INSTITUTIONAL CONTROLS

Institutional controls do not apply to activities addressed by the FFTF S&M plan because a CERCLA-decision document has not been issued. As mentioned earlier, proposed alternatives for the final disposition end state of FFTF [i.e., No Action (S&M), Entombment, and Removal] are being analyzed in the in-process TC&WM EIS for the Hanford Site . In this EIS and its future ROD, the potential decision for the final disposition of FFTF would identify the end state for the aboveground, belowground, and

ancillary support structures. If a CERCLA-decision document is prepared and issued in conjunction with the implementing the final disposition end state for the FFTF facility, institutional controls will be implemented, as identified. Site security and access control are implemented as part of S&M activities.

Table 7-1. FFTF Regulatory Compliance during S&M

DANGEROUS WASTE REGULATIONS	S&M COMPLIANCE APPLICABILITY
Introductory Regulations WAC 173-303-010 to WAC 173-303-060	Dangerous waste generation and disposal are not expected during the FFTF S&M phase. However, waste generated will be designated in compliance with the S&M contractor's waste management procedures.
Dangerous Waste Designation WAC 173-303-070 to WAC 173-303-110	Dangerous waste generation and disposal are not expected during the FFTF S&M phase. However, waste generated will be designated in compliance with the S&M contractor's waste management procedures.
General Recycling Requirements WAC 173-303-120	Any recycling, reclaimed, or recovered dangerous waste during the FFTF S&M phase would be handled per current procedures and regulations.
Prohibitions and Restrictions WAC 173-303-140 to WAC 173-303-141/40 CFR 268	The Annual Report on Hanford Site Land Disposal Restrictions for Mixed Waste is updated annually as necessary.
Spills & Discharge Into the Environment WAC 173-303-145 and 40 CFR 302	Notifications and responses for spills and discharges of dangerous waste or hazardous substances into the environment during the FFTF S&M phase are addressed in the S&M contractor's spill and response procedures.
Division, Dilution, & Accumulation WAC 173-303-150	Dangerous waste generation and disposal is not expected during the FFTF S&M phase. However, waste generated will be handled in compliance with the S&M contractor's waste management procedures.
Containers WAC 173-303-160 to WAC 173-303-161	Dangerous waste generation and disposal are not expected during the FFTF S&M phase. However, containers used as a result of waste generated will be managed in compliance with the S&M contractor's waste management procedures.
Generator Requirements WAC 173-303-170 to WAC 173-303-230	Dangerous waste generation and disposal are not expected during the FFTF S&M phase. However, waste generated will be managed in compliance with the S&M contractor's waste management procedures.
Transporter Requirements WAC 173-303-240 to WAC 173-303-270	Dangerous waste generation and disposal are not expected during the FFTF S&M phase. However, waste generated will be transported in compliance with the S&M contractor's waste management procedures.
Notice of Intent WAC 173-303-280 Siting Criteria WAC 173-303-282	Not applicable during the FFTF S&M phase.

Table 7-1. FFTF Regulatory Compliance during S&M

DANGEROUS WASTE REGULATIONS	S&M COMPLIANCE APPLICABILITY
Performance Standards WAC 173-303-283	This section requires identification of performance standards for maintaining dangerous waste facilities to the maximum extent practical given the limits of technology to prevent endangerment to people and the environment, as specified. Compliance will be met through adherence to this S&M plan.
Required Notices WAC 173-303-290	N/A: No waste sources outside the Hanford site are received by the FFTF.
General Waste Analysis WAC 173-303-300	The purpose of this section is to confirm knowledge about dangerous waste before treatment, storage, and/or disposal (TSD). Appendix A lists the mixed waste remaining in the FFTF TSD units. Dangerous waste generation and disposal are not expected during the FFTF S&M phase. However, waste generated will be designated in compliance with the S&M contractor's waste management procedures. A Waste Analysis Plan for the TSD units will not be maintained as long as no waste is accepted into the FFTF TSD units, and as long as no samples of the mixed waste are acquired from the mixed waste managed in the FFTF TSD units.
Security WAC 173-303-310	Addressed in Safeguards & Security section of this S&M plan.
General Inspection WAC 173-303-320	Routine surveillances are performed as identified in this S&M plan. TSD unit inspections or surveillances will be performed as required in the Hanford Facility RCRA Permit, Operating Unit Group 16. (400 Area Waste Management Unit.)
Personnel Training WAC 173-303-330	Training is provided to meet the dangerous waste management duties identified in this table relating to WAC 173-303-330 compliance. A training plan will be identified and maintained in accordance with WAC 173-303-330(2), per the contractor's waste management procedures.
Construction Quality Assurance Program WAC 173-303-335	Not applicable during S&M.
Preparedness and Prevention WAC 173-303-340	Addressed in Section 9.0, "Emergency Management," of this S&M plan.
Contingency Plan/Emergency Procedures WAC 173-303-350	Addressed in Section 9.0, "Emergency Management," of this S&M plan.
Manifest System WAC 173-303-370	Dangerous waste will not be received from offsite sources during S&M.

Table 7-1. FFTF Regulatory Compliance during S&M

DANGEROUS WASTE REGULATIONS	S&M COMPLIANCE APPLICABILITY
Facility Record Keeping WAC 173-303-380	Dangerous waste generation is not expected during S&M. However, operating records for mixed waste generated or managed at the facility are compliant with the S&M contractor's waste management procedures and Section 7.0 of this S&M Plan.
Other General Requirements WAC 173-303-395	Generation and disposal of ignitable, reactive, or incompatible waste during S&M are not expected. However, waste generated will be managed in compliance with the S&M contractor's waste management procedures.
Facility Reporting WAC 173-303-390	Dangerous waste from an offsite source is not expected during S&M. Therefore, un-manifested waste reports will not be applicable. Supporting information for the Hanford Site Annual Dangerous Waste, Hanford Site Land Disposal Restrictions for Mixed Waste Report, and any applicable reports will be prepared and submitted as required by the DOE.
Hanford Facility RCRA Permit, Part III, Operating Unit Group 16. (400 Area Waste Management Unit)	Fuel Storage Facility (Building 403) and the Interim Storage Area (4718) will continue to store mixed waste per the Hanford Facility RCRA Permit, Part III, Operating Unit Group 16. The waste shall be managed in accordance with the requirements set forth in Part III of the permit and addendums.
Permits WAC 173-303-800 to WAC 173-303-840	The only permitting obligation will be to maintain the Hanford Facility RCRA Permit, Part III, Operating Unit Group 16.
Toxic Substance Control Act* and *Clean Air Act Requirements	
Polychlorinated biphenyls (PCB) 40 CFR 761 Subparts D and G	PCBs may exist in transformers, ballast, and lubricants/oils once used in the plant. The generation of PCB waste is a potential during the FFTF S&M phase. Waste generated will be managed in compliance with the applicable requirements.
Asbestos 40 CFR 61.150	Undetermined quantities of asbestos exist throughout the plant as a solid component. Asbestos waste generation is not expected during the FFTF S&M phase. However, waste generated will be managed in compliance with the applicable requirements.

Table 7-1. FFTF Regulatory Compliance during S&M

DANGEROUS WASTE REGULATIONS	S&M COMPLIANCE APPLICABILITY
Airborne Radionuclides 40 CFR 61, Subparts A and H WAC 173-480 WAC 246-247 The Department of Energy Hanford Site Radioactive Air Emissions License #FF-01	Minor levels of airborne radionuclides continue to be associated with the plant and contaminated structures. Air emissions abatement and monitoring, and associated testing, maintenance, quality assurance, recordkeeping, reporting, and notifications will continue to be conducted in compliance with the FF-01 license.

8 RADIOLOGICAL CONTROLS

This section provides a reference to the DOE ALARA policy and program, which includes but not limited to the following;

- External radiation exposure control;
- External dosimetry;
- Internal radiation exposure control;
- Internal dosimetry;
- Radiological protection instrumentation programs (both calibration and use);
- Respiratory protection program;
- Air monitoring;
- Radiological monitoring and contamination control;
- Radiological protection record keeping;
- Radiological area boundaries, posting, and controls;
- Radiological protection training; and
- Entry and exit control program.

The DOE requires the S&M contractor to establish, implement, and maintain a radiation protection program that satisfies the minimum requirements established by 10 CFR 835, *Occupational Radiation Protection Final Rule.*

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9 EMERGENCY MANAGEMENT

This section describes the DOE philosophy, objectives, and organization of the emergency preparedness functions for a spectrum of emergencies covering a range from local area emergencies to those that could affect offsite persons. This section addresses the activation of emergency organizations, assessment actions, notification processes, emergency facilities and equipment, training and exercises, and recovery actions.

The DOE requires the S&M contractor to comply with DOE Order 151.1A, *Comprehensive Emergency Management System*, CRD, DOE/Richland Operations Office (RL) (DOE/RL)-94-02. If an emergency or abnormal incident occurs, the situation will be responded to in accordance with the *Hanford Emergency Management Plan*, current revision, and DOE-0223, *Emergency Plan Implementing Procedures*, which establishes the emergency preparedness requirements for the Hanford Site. The S&M contractor's emergency plan is written to meet a variety of requirements, including the RCRA contingency plan requirements for the 400 Area Waste Management Unit. Personnel are trained ahead of time to deal with emergencies or abnormal incidents through formal classroom instruction and drills.

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10 HEALTH AND SAFETY

This section describes the DOE programs to ensure the health and safety of the workforce. Other topical areas such as radiological controls and facility maintenance may be driven by health and safety requirements; therefore, health and safety are included throughout the plan.

10.1 FIRE HAZARD ANALYSIS

The DOE requires the S&M contractor to establish requirements for the preparation, maintenance and approval of a FHA that comprehensively assesses the risk from fire within a DOE facility to determine whether the fire protection objectives of CRD O 420.1A, *Facility Safety*, Supplemental Contractor Requirements Document (SRCD) DOE O 420.1A, (Rev. 2) *Facility Safety*, and CRD O 440.1A, *Worker Protection Management for DOE Federal and Contractor Employees*, are met.

10.2 OCCUPATIONAL SAFETY AND HEALTH

The DOE requires the S&M contractor to comply with Occupational Safety and Health Administration standards. DOE directive DOE O 440.1A, *Worker Protection Management for DOE Federal and Contractor Employees*, Attachment 2, CRD requires compliance (when applicable) to 29 CFR 1910, *Occupational Safety and Health Standards*, and 29 CFR 1926, *Safety and Health Regulations for Construction*, and several consensus standards. Applicability of the 29 CFR 1910.120 Hazardous Waste Operations and Emergency Response Regulations (HAZWOPER) standards and the need for HAZWOPER training will be determined based on RL guidance.

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11 SAFEGUARDS AND SECURITY

The DOE requires the S&M contractor as the facility manager/asset owner to ensure protection is provided for all property, facilities, and materials according to the provisions of CRD M 473.1-1 (Supplemented Rev. 0), *Physical Protection Program Manual*. This DOE procedure for controlling access to the facility provides for an evaluation of the adequacy of existing physical controls (e.g., fencing, signs, entrance points into exclusion areas, door locks, and other barriers), provides a plan for the placement and monitoring of intrusion alarms, and describes the duties and scheduling of security patrols.

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12 COST AND SCHEDULE

Current DOE FFTF Project planning and budget levels show transitioning to low cost S&M beginning in late fiscal year (FY) 2009, with remaining deactivation (e.g., sodium residuals reaction/removal) work scope beginning in FY 2015. Proposed decommissioning is planned to begin in FY 2023.and completed by FY 2030.

The FFTF S&M costs will reflect the costs of routine activities and administrative and programmatic requirements. The frequencies of routine S&M activities, as identified in Section 3.0 of this plan, are identified in the contractor's work and maintenance procedures. In addition, there are administrative and programmatic requirements (e.g., assessments, documentation maintenance, etc.) associated with the nuclear facility and waste management units.

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13 REFERENCES

10 CFR 830, Subpart A, *Quality Assurance Requirements*, "Code of Federal Regulations," as amended.

10 CFR 835, *Occupational Radiation Protection*, "Code of Federal Regulations," as amended.

29 CFR 1910, *Occupational Safety and Health Standards*, "Code of Federal Regulations," as amended.

29 CFR 1926, *Occupational Safety and Health Standards for the Construction Industry*, "Code of Federal Regulations," as amended.

40 CFR 61, *National Emissions Standards for Hazardous Air Pollutants*, Subpart H, "National Emissions Standards for Emissions of Radionuclide Other Than Radon from Department of Energy Facilities," *Code of Federal Regulations*, as amended.

71 FR 7877, 2001, *Record of Decision: for the Final Programmatic Environmental Impact Statement for Accomplishing Expanded Civilian Nuclear Energy Research and Development and Isotope Production Missions in the United States, Including the Role of the Fast Flux Test Facility*, *Federal Register*, January 26, 2001.

71 FR 5655, 2006, *Notice of Intent to Prepare the Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, WA*, *Federal Register*, February 02, 2006.

American Society of Mechanical Engineers (AMSE) Boiler and Pressure Vessel Code, Section VIII.

CRD M 473.1-1 (Supplemented Rev. 0), *Physical Protection Program Manual.*

CRD O 420.1A, *Facility Safety*, Supplemental Contractor Requirements Document (SRCD) .

CRD O 430.1B, *Real Property Asset Management.*

CRD O 433.1, *Maintenance Management Program for DOE Nuclear Facilities.*

CRD O 450.1, *Environmental Protection Program.*

DEAR 970.5223.1, *Integration of Environment, Safety, and Health into Work Planning and Execution.*

DOE/EA-0993, *Environmental Assessment: Shutdown of the Fast Flux Test Facility, Hanford Site, Richland, Washington, and Finding of No Significant Impact*, " U.S. Department of Energy, Washington, D.C., May 1995.

DOE/EA-1547F, *Sodium Residuals/Reaction/Removal and Other Deactivation Work Activities, Fast Flux Test Facility (FFTF) Project, Hanford Site, Richland, Washington, and Finding of No Significant Impact*," U.S. Department of Energy, Richland Operations Office, March 2006.

DOE/EIS-0310F, 2000. *Final Programmatic Environmental Impact Statement for Accomplishing Expanded Civilian Nuclear Energy Research and Development and Isotope Production Missions in the United States, Including the Role of the Fast Flux Test Facility*, U.S. Department of Energy, Washington, D.C., December 2000.

DOE O 414.1C, *Contractor Requirements Document*, "Quality Assurance."

DOE O 420.1A, (Rev. 2) *Facility Safety*, DOE 151.1A.

DOE O 440.1, *Worker Protection Management for DOE Federal and Contractor Employees,* as amended, US Department of Energy, Washington, D.C.

DOE-0223, *Emergency Plan Implementing Procedures*

DOE/RL-94-02, *Hanford Emergency Response Plan*, as amended, US Department of Energy, Richland Operations Office, Richland, Washington.

Ecology, EPA, and DOE-RL, 2003, *Hanford Federal Facility Agreement and Consent Order,* Washington State Department of Ecology, U.S. Environmental Protection Agency, U.S. Department of Energy, Richland Operations Office, Olympia, Washington, as amended.

FFTF-25070, 2005, *Fast Flux Test Facility Deactivation End Point Criteria*, as amended, Fluor Hanford, Inc., Richland, Washington.

FFTF-36419, 2008, *Documented Safety Analysis for the Fast Flux Test Facility*, as amended, CH2M Hill Plateau Remediation Company, Richland, Washington.

HNF-33211, 2007, *Hanford Site Sodium Disposition Evaluation Report*, Fluor Hanford, Inc., Richland, Washington, May 2007.

HNF-SD-FF-DP-008, *Fast Flux Test Facility Asbestos Location Tracking Program,* Revision 15, D. J. Gerkensmeyer, Fluor Hanford, Inc., September 2008.

Resource Conservation and Recovery Act of 1976, 42 U.S.C. 6901, et seq., as amended.

WAC 173-303, "Dangerous Waste Regulations," *Washington Administrative Codes*, as amended.

WAC 173-480, "Ambient Air Quality Standards and Emission Limits for Radionuclides," *Washington Administrative Codes*, as amended.

WAC 246-247, "Radiation Protection – Air Emissions," *Washington Administrative Codes*, as amended.

WA7 89000 8967, *Hanford Facility RCRA Permit, Part III Operating Unit 16.*

APPENDIX A

HAZARDOUS MATERIAL REMAINING AT FFTF (WITHIN 400 AREA PPA)

Location(*)	Material description
GENERAL	Lead as a solid component, such as paint, shielding, light bulb contacts, sanitary water line joints packed with lead mesh; steam, air, and water safety relief valve seals; components of control panels – all abandoned in place and stable during S&M. Zinc used in galvanized piping; zinc, silver, and lead contacts are used in the electrical system. Lead and zinc were used as soldering in the electrical and plumbing systems. All stable during S&M. Mercury in thermostats and in electronic switches (i.e., electronic switches). Mercury vapor lights were also used for exterior lighting. Asbestos left in place throughout the plant as a solid component such as utility line insulation and gasket material. Refer to HNF-SD-FF-DP-008, *Fast Flux Test Facility Asbestos Location Tracking Program,* for additional descriptions of asbestos remaining at the FFTF. Unknown organic in liquid films, greases, and solid residues in bearings and gearboxes throughout the plant. Stable during S&M period. Undetermined quantities of PCB exist in transformers, ballasts, and lubricants/gear oil once used throughout the plant. Ethylene glycol used in the various cooling systems throughout the facility, located at various low point in piping, tanks and vessels.
Building 403 (FSF) Building 405 (RCB) Building 408-A, -B, and –C (DHXs) Buildings 491-W, -S, and –E (HTS Buildings) ISA Waste Storage Module	Sodium and sodium-related compounds in tanks, piping, vessels, and sodium-wetted waste stored in the 400 Area WMU. Argon cover gas used to inert sodium piping, tanks, and storage vessels.