DOE/RL-2001-68
Rev. 0

Removal Action Work Plan and Surveillance and Maintenance Plan for the 105-B Reactor Facility

United States
Department of Energy

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P.O. Box 550, Richland, Washington 99352

INTRODUCTION

This document provides an opportunity to combine the **B Reactor removal action work plan** and the **B reactor surveillance and maintenance (S&M) plan** for an interim 10-year period of time. These documents have many similarities and, by combining them, text can be streamlined and efficiencies gained.

The 105-B Reactor Facility[1] is located in the 100-B Area of the Hanford Site, which is owned and operated by the U.S. Department of Energy (DOE), in Benton County, Washington. The 100 Areas (including the 100-B Area) of the Hanford Site were placed on the U.S. Environmental Protection Agency's National Priorities List under the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA). The DOE has determined that hazardous substances in the 105-B Reactor Facility present a potential threat to human health or the environment. The DOE has also determined that a non-time-critical removal action is warranted at these facilities.

Alternatives for conducting a non-time-critical removal action were evaluated in the *Engineering Evaluation/Cost Analysis for the 105-B Reactor Facility* (EE/CA) (DOE-RL 2001). Removal action evaluation and selection was complicated by the historical significance of the 105-B Reactor Facility. The 105-B Reactor Facility was the world's first full-scale production reactor and produced plutonium fuel for the world's first nuclear device and for the "Fat Man" atomic bomb detonated at Nagasaki, Japan, on August 8, 1945. Therefore, removal action alternatives were constrained to exclude any activities that could impact historical significance. The scope of the removal action required protection to be ensured for a period of up to 10 years. Long-term removal actions at the 105-B Reactor Facility were not proposed in the EE/CA because a DOE decision on its final configuration, which may include historical preservation of some or all of the facility structure and contents, is pending.

The EE/CA resulted in the recommendation to perform hazard mitigation actions to protect human health and the environment and to support public access to the 105-B Reactor Facility for a 10-year period. The DOE is the agency responsible for implementing the removal action in the 100-B Area, and the U.S. Environmental Protection Agency is the lead regulatory agency. This removal action work plan supports implementation of the non-time-critical removal action.

The surveillance and maintenance components of this plan provide for the implementation of activities to ensure that the 105-B Reactor Facility is maintained in a safe, environmentally secure, and cost-effective manner during and after the removal action for a period of up to 10 years.

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[1] The term "Facility" is used generically to encompass all the structures, buildings, tunnels, piping, etc., associated with the reactor building.

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ACRONYMS

ACM	asbestos-containing material
ALARA	as low as reasonably achievable
AM	action memorandum
AMP	Air Monitoring Plan
ARAR	applicable or relevant and appropriate requirement
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
BHI	Bechtel Hanford, Inc.
CFR	*Code of Federal Regulations*
CWC	Central Waste Complex
D&D	decontamination and decommissioning
DOE	U.S. Department of Energy
Ecology	Washington State Department of Ecology
EE/CA	Engineering Evaluation/Cost Analysis
EPA	U.S. Environmental Protection Agency
ERC	Environmental Restoration Contractor
ERDF	Environmental Restoration and Disposal Facility
ETF	Effluent Treatment Facility
FR	*Federal Register*
FSB	fuel storage building
HASP	health and safety plan
HEPA	high-efficiency particulate air
HGET	Hanford General Employee Training
LDR	land disposal restriction
OSHA	Occupational Safety and Health Administration
PCB	polychlorinated biphenyls
PHMC	Project Hanford Management Contractor
PMII	Project Manager's Implementing Instructions
PPE	personal protective equipment
RCT	radiological control technician
RL	DOE, Richland Operations Office
RWP	radiological work permit
S&M	surveillance and maintenance
SM&T	surveillance, maintenance, and transition
SS HASP	site-specific health and safety plan
SSWMI	site-specific waste management instruction
Tri-Party Agreement	*Hanford Federal Facility Agreement and Consent Order*
TSCA	*Toxic Substances Control Act of 1976*
TSD	treatment, storage, and disposal
WAC	*Washington Administrative Code*

METRIC CONVERSION CHART

Into Metric Units			Out of Metric Units		
If You Know	*Multiply By*	*To Get*	*If You Know*	*Multiply By*	*To Get*
Length			**Length**		
inches	25.4	millimeters	millimeters	0.039	inches
inches	2.54	centimeters	centimeters	0.394	inches
feet	0.305	meters	meters	3.281	feet
yards	0.914	meters	meters	1.094	yards
miles	1.609	kilometers	kilometers	0.621	miles
Area			**Area**		
sq. inches	6.452	sq. centimeters	sq. centimeters	0.155	sq. inches
sq. feet	0.093	sq. meters	sq. meters	10.76	sq. feet
sq. yards	0.836	sq. meters	sq. meters	1.196	sq. yards
sq. miles	2.6	sq. kilometers	sq. kilometers	0.4	sq. miles
acres	0.405	hectares	hectares	2.47	acres
Mass (weight)			**Mass (weight)**		
ounces	28.35	grams	grams	0.035	ounces
pounds	0.454	kilograms	kilograms	2.205	pounds
ton	0.907	metric ton	metric ton	1.102	ton
Volume			**Volume**		
teaspoons	5	milliliters	milliliters	0.033	fluid ounces
tablespoons	15	milliliters	liters	2.1	pints
fluid ounces	30	milliliters	liters	1.057	quarts
cups	0.24	liters	liters	0.264	gallons
pints	0.47	liters	cubic meters	35.315	cubic feet
quarts	0.95	liters	cubic meters	1.308	cubic yards
gallons	3.8	liters			
cubic feet	0.028	cubic meters			
cubic yards	0.765	cubic meters			
Temperature			**Temperature**		
Fahrenheit	subtract 32, then multiply by 5/9	Celsius	Celsius	multiply by 9/5, then add 32	Fahrenheit
Radioactivity			**Radioactivity**		
picocuries	37	millibecquerel	millibecquerels	0.027	picocuries

1.0 REMOVAL ACTION WORK PLAN

1.1 PURPOSE AND OBJECTIVE OF THE REMOVAL ACTION WORK PLAN

The purpose of this removal action work plan is to establish the methods and activities required to perform the following functions:

- Provide upgrades to facility infrastructures to ensure that risks to the public and workers from remaining hazardous substances are minimized

- Remove, decontaminate, contain, or encapsulate hazardous substances in publicly accessible areas of the 105-B Reactor Facility

- Perform routine surveillance and maintenance (S&M) activities in all areas of the 105-B Reactor Facility to protect workers and the public and prevent releases of hazardous substances to the environment during and after the removal action for a period of up to 10 years

- Manage and dispose of all waste generated during these actions.

This removal action work plan satisfies the requirement to submit a work plan outlining how compliance with the selected remedy and applicable regulations (refer to Section 4.0) will be achieved. Additionally, it serves as the S&M plan for this action (refer to Section 6.0). This removal action work plan was prepared in accordance with Section 7.2.4 of the *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) (Ecology et al. 1998).

The intent of this removal action work plan is to identify the basis and provide guidance for preparation of work packages and subcontract task orders for the project tasks. Using the most recent information concerning facility conditions, field-level work packages will be developed to direct work activities and instruct workers in the most applicable work methods. Existing procedures (as well as specifically developed instructions) will be used to perform and control the facility removal and disposal actions.

The 105-B Reactor Facility project schedule, which encompasses the work scope through project completion, presents the logical progression of events and estimated durations for each activity. The project schedule, included as Appendix A, is presented by fiscal year.

1.2 OBJECTIVES OF THE REMOVAL ACTION

The primary goal of *Comprehensive Environmental Response Compensation and Liability Act of 1980* (CERCLA) removal actions is to minimize or eliminate near-term threats to public health or the environment caused by the presence of hazardous substances. The *Engineering Evaluation/Cost Analysis for the 105-B Reactor Facility* (EE/CA) for the 105-B Reactor Facility

(DOE-RL 2001) presented three alternative approaches for future facility management and the resulting levels of protection of public health and the environment that may be anticipated. Based on the evaluation, hazard mitigation in support of public access was selected as the most responsive approach to ensure protection of human health and the environment and historical preservation pending U.S. Department of Energy (DOE) decision making.

The selected removal action will allow public access into the 105-B Reactor Facility during the 10-year interim action. It will effectively mitigate hazards associated with hazardous substances to the extent that exposure is minimized or eliminated. Wastes that will be generated during maintenance and removal activities will be disposed in the Environmental Restoration Disposal Facility (ERDF), which will provide reliable long-term protection.

Based on the potential hazards, the specific removal action objectives are as follows:

- Reduce or eliminate the potential for exposure to hazardous substances
- Reduce or eliminate the potential for a future release of contaminants
- Protect workers from the hazards posed by the continuing deterioration and aging of the 105-B Reactor Facility
- Prevent potentially adverse impacts to cultural/natural resources and threatened or endangered species
- Safely manage the wastes generated by the removal action
- Take no action that will preclude use of any and all portions of the 105-B Reactor Facility for historical interpretation until a decision is made by DOE as to the final configuration of the 105-B Reactor Facility.

1.3 FACILITY AND HAZARD DESCRIPTION

This section provides a facility description and discussion of the hazards of the 105-B Reactor Facility and describes portions of the facility to be mitigated for public access.

1.3.1 Facility Description

The 105-B Reactor Facility is located along the Columbia River in the northern portion of the Hanford Site in southeastern Washington State (Figure 1-1). Groundbreaking for the construction of the 105-B Reactor Facility began in October 1943 by the U.S. Army Corps of Engineers as a part of the Manhattan Project to produce sufficient quantities of weapons-grade plutonium for construction of a nuclear bomb. The reactor operated from 1944 to 1946 initially and was taken out of service from 1946 until 1948. In June 1948, the 105-B Reactor Facility was restarted and operated until 1968. Final shutdown and deactivation of the facility occurred during 1968. Deactivation of this facility has included deenergizing nonessential electrical sources and equipment, preserving tools and equipment, conducting routine housekeeping and radiological surveys, and applying fixatives to many contaminated surfaces. Although the 105-B Reactor Facility has not been fully decontaminated, nonessential systems and equipment (e.g., electrical and water that support reactor operations) have been deactivated and drain lines and contaminated materials have been removed.

The 105-B Reactor Facility is a steel-reinforced concrete and concrete block structure (Figures 1-2 and 1-3). It contains a reactor block, control room, spent fuel discharge area, fuel storage basin (FSB), fans and ducts for ventilation and recirculating inert gas systems, water cooling systems, support offices, shops, and laboratories. Within the reactor facility, massive reinforced concrete walls (0.9 to 1.5 m [3 to 5 ft] thick) extend upward to the height of the reactor block to provide shielding, with the upper sections constructed of concrete block. Asbestos, radiological, and hazardous material contamination exist at varying levels in the building.

The roof of the 105-B Reactor Facility is composed of pre-cast concrete roof tile, except over the discharge area enclosure (the rear face) and the inner horizontal rod room. Over those areas, the roof is composed of 1.8-m (6-ft)-thick reinforced concrete (Gerber 1993). The original pre-cast concrete tiles remain in place. Repairs have been made to individual pre-cast roof panels that were showing signs of excessive deflection and corrosion (WHC 1994). The 105-B Reactor Facility underwent interim roof repair in fiscal year 2001. Total roof replacement is identified in the EE/CA (DOE-RL 2001).

The following provides a brief description of some of the areas or rooms contained within the 105-B Reactor Facility that are of significance to this plan (part of the proposed or current public access area). Figure 1-3 shows a schematic drawing of the main reactor facility and the features described below.

Reactor Block. The reactor block consists of the following: a 1.8-m (6-ft)-thick concrete foundation; a steel baseplate 3.8 cm (1.5 in.) thick; a cast iron bottom shield 0.25 m (10 in.) thick; a cubical stack of graphite blocks 11 m (36 ft) wide, 11 m (36 ft) tall, and 8.5 m (28 ft) front to rear; cast iron thermal shield walls and cover approximately 0.25 m (10 in.) thick surrounding the graphite; steel and masonite biological shield walls and cover about 1.2 m (4 ft) thick; welded gas-tight seams and seals; and 2,004 aluminum process tubes, running from the front face to the rear face of the reactor block, to hold the uranium fuel and carry the cooling water. The reactor block is located in the center of the 105-B Building and is bordered on the west by the front-face work area (room 110) and to the east by the FSB/transfer area (room 410). The reactor block is not currently or proposed to be part of the public access area.

Front-Face Work Area. The front-face work area (room 110) is a 204-m^2 (2,200-ft^2) concrete room west of the charging face of the reactor block. The work area is sufficiently large enough that the 12-m (40-ft)-long aluminum process tubes could be inserted or removed from the reactor block for maintenance purposes. Several spots of fixed radioactive contamination exist on the floor of the front-face work area. The contamination has been painted over, and locations are clearly marked on the work area floor. The front-face work area is part of the present 105-B Reactor Facility public access area and contains a number of museum displays and interpretational items.

Valve Pit. Adjacent to and west of the front-face work area is the valve pit. The valve pit is surrounded at grade with a grated metal walkway. Below grade, the valve pit houses the main connections, piping, and control valves for the process water lines that came from the 190-B Process Pump House (now demolished) to the reactor block. The walkway elevated above the valve pit offers access to the supply fan and exhaust fan rooms (rooms 311 through 315), as well as the flow lab/machine maintenance room (room 231a). The walkway above the valve pit is part of the existing public access area and is visible over the railing.

Supply Fan/Exhaust Fan Rooms. The supply fan room (room 315) is located to the south of the valve pit. The supply fan room contains the main blowers, heaters, and air filters for the entire 105-B Reactor Facility heating and ventilation systems. There are two dual-drive supply fans and four exhaust fans. The exhaust fans, numbered 9 through 12, are isolated from the supply system in separate concrete cubicles (rooms 311, 312, 313, and 314). A concrete duct connected the fan room to the 61-m (200-ft)-tall reactor stack (116-B) via the 117-B Filter Building, which has been demolished. This equipment is inactive. The supply fan rooms are new additions to the public access area, and the exhaust fan rooms will be visible over the railing.

Flow Lab/Machine Maintenance Room. The flow lab/machine maintenance room (room 231a) is located west of the valve pit and north of the supply fan (room 315). The room is empty and will be upgraded to provide an egress to the exterior west side of the building. This room is a new addition to the public access area.

Office/Storage Room. The office/storage room (room 228a) is located on the west side of the 105-B Reactor Facility, adjacent to the entrance door to the 227a hallway and 227b corridor #5. The room currently serves as a lunchroom and meeting area. This room is a new addition to the public access area.

Electrical Equipment Room. The electrical equipment room (room 223) is located north of the front-face work area (room 110). The electrical equipment room contains inactive instrumentation for reactor operations. This room is a new addition to the public access area.

Accumulator Room. The accumulator room (room 222) is located north of the electrical equipment room (room 223) and west of the control room (room 220). The accumulator room contains inactive equipment associated with the accumulator tanks housed within. A doorway on the south side of the room leads to the electrical equipment room (room 223). Concrete stairs with wooden railings lead from the ground level of the accumulator room to a walkway and entrance to the outer rod room on the second level. This room is part of the existing public access area.

Control Room and Offices. To the north of and opposite the reactor block, and separated by a 0.9-m (3-ft)-thick concrete wall, is the 60-m^2 (650-ft^2) main control room (room 220). The control room housed instruments and equipment used to control the reactor and maintain its operational safety envelope. The room was air conditioned and lined with acoustic material. Adjacent to the control room and separated by a glass partition are two control room offices, office 219a and office 219b. The control room and offices are part of the current 105-B Reactor Facility public access area.

Fuel Storage Basin/Basin Viewing Room. The FSB/transfer area (room 410) is located east of the rear face, separated from the reactor block by a 1.5-m (5-ft)-thick concrete wall. The FSB served as an underwater collection, storage, and transfer facility for the irradiated fuel elements discharged from the reactor. The FSB consisted of a fuel element pickup area, storage area, and transfer area covered with redwood planking. The FSB is approximately 6 m (20 ft) deep. The redwood planking and the transfer area are visible from the basin viewing room (room 414). The basin viewing room is part of the existing public access area.

1.3.2 Facility Hazards

Previous work has been performed to define the hazards to the public, workers, and the environment within the 105-B Reactor Facility. This work has been described in the *105-B Reactor Facility Museum Phase I Feasibility Study Report* (Griffin et al. 1995), the *Hanford B Reactor Building Hazard Assessment Report* (Griffin and Sharpe 1999), the *100-B Area Site Specific Health and Safety Plan* (BHI 1999), and the EE/CA (DOE-RL 2001).

1.3.2.1 Hazardous Material Inventory. The 105-B Reactor Facility has been deactivated and all bulk chemical inventories have been removed for recycling or disposal. Some residual quantities of hazardous chemicals may remain in the process lines, tanks, and drains. In addition, several types of hazardous materials remain in the 105-B Reactor Facility, including the following:

- Polychlorinated biphenyls (PCBs) in oils and light ballasts
- Lead paint
- Lead shielding
- Mercury switches, gauges, and thermometers
- Mercury or sodium vapor lights
- Used oil in motors and pumps
- Friable and nonfriable forms of asbestos
- Sodium dichromate from water treatment chemicals.

Lead may exist in surface coatings (lead-based paint), plumbing, and as radiological shielding (lead shot, brick, sheet and cast-lead forms) inside the 105-B Reactor Facility. Workers performing job tasks that involve lead shall follow the applicable requirements of BHI-SH-02, *Safety and Health Procedures*, Volume 3, Procedure 4.2.2, "Lead," and the associated lead work package.

Asbestos-containing materials (ACMs) found in and around the 105-B Reactor Facility in vessel or piping insulation, floor tiles, transite wall coverings or panels, sheetrock, electrical wire insulation, ducting, or other materials will not be disturbed. Personnel involved in asbestos cleanup will follow the applicable requirements of BHI-SH-02, Volume 3, Procedure 4.2.1, "Asbestos"; BHI-FS-01, *Field Support Administration,* Section 8.0, "Asbestos Project Management"; and the associated Bechtel Hanford, Inc. (BHI) asbestos work package.

1.3.2.2 Radiological Material Inventory. Radionuclide inventories may be found in many areas of the facilities. Key radionuclide contaminants are transuranics, including plutonium-239 and americium-241, mixed fission products such as strontium-90 and cesium-137, and activation products such as carbon-14 and cobalt-60, and nickel-63. Contaminants are most likely to be contacted as adherent films and residues encrusted in or on deactivated process equipment, piping, and ventilation system ductwork. In addition, the FSB and associated transfer pit contains radioactive residues and sediments emitting gamma radiation that results in a direct exposure dose of 0.20 mrem/hr at the viewing window in the FSB viewing room in the public access area.

1.3.2.3 Data Quality Objectives and Sampling and Analysis Plan Requirements. The *Sampling and Analysis Plan for Disposition of the Standing Legacy Wastes in the 105-B, -D, -H, -KE, -KW Reactor Buildings* (DOE-RL 1999) addresses the rationale and strategy for the sampling and analysis activities that support disposition of legacy waste at the Hanford Site's reactors. This sampling and analysis plan was based on the data quality objectives developed for the legacy wastes found in the 105-B,105-D, 105-H, 105-KE, and 105-KW Reactor buildings (BHI 1998a). Therefore, a new data quality objectives summary report and sampling and analysis plan will not be required.

1.3.3 Hazardous Substance Inventory, Management, and Protection

The following hazardous substances will be managed in accordance with as low as reasonably achievable (ALARA) considerations and applicable requirements provided in Section 3.0. Compliance with hazardous material protection requirements is ensured as described in BHI-SH-01, *ERC Safety and Health Program;* BHI-SH-02, *Safety and Health Procedures,* Volumes 1 and 4; and BHI-SH-05, *Industrial Hygiene Work Instructions.*

1.3.3.1 Radiological Materials. The 105-B Reactor Facility is posted as a radiological control area (RCA). The radioactive materials contained in the 105-B Reactor Facility are listed in the EE/CA for the 105-B Reactor Facility (DOE-RL 2001).

The major radiological isotopes of concern for the 105-B Reactor Facility, however, include the following:

- Transuranics: plutonium-239 and americium –241
- Fission Products: cesium-137 and strontium-90
- Activation Products: cobalt-60, carbon-14 and nickel-63.

1.3.3.2 Lead. Lead may exist in surface coatings (lead-based paint), plumbing, and as radiological shielding (lead shot, brick, sheet and cast-lead forms) inside the 105-B Reactor

Facility. Personnel must exercise caution to avoid disturbing or contacting lead or suspect lead material. Workers performing job tasks that involve lead shall follow the applicable requirements of BHI-SH-02, Volume 3, Procedure 4.2.2, "Lead," and the associated lead work package.

1.3.3.3 Asbestos. Asbestos-containing materials are found in and around the 105-B Reactor Facility. Disturbance of vessel or piping insulation, loose floor tiles, transite wall coverings or panels, sheetrock, electrical wire insulation, ducting, or other suspect ACM must be avoided. Personnel involved in asbestos cleanup will follow the applicable requirements of BHI-SH-02, Volume 3, Procedure 4.2.1, "Asbestos"; BHI-FS-01, Section 8.0, "Asbestos Project Management"; and the associated BHI asbestos work package.

1.3.3.4 Biological Hazards. Refer to the facility-specific safety and health plan for biological hazard detail within the 105-B Reactor Facility.

1.3.3.5 Chemicals. Bulk chemical inventories have been removed. However, a potential exists for discovering old containers containing residual chemical constituents (e.g., solvents, oils, aerosols). If discovered, these items should not be disturbed, and the building administrator notified.

Figure 1-1. Hanford Site Map.

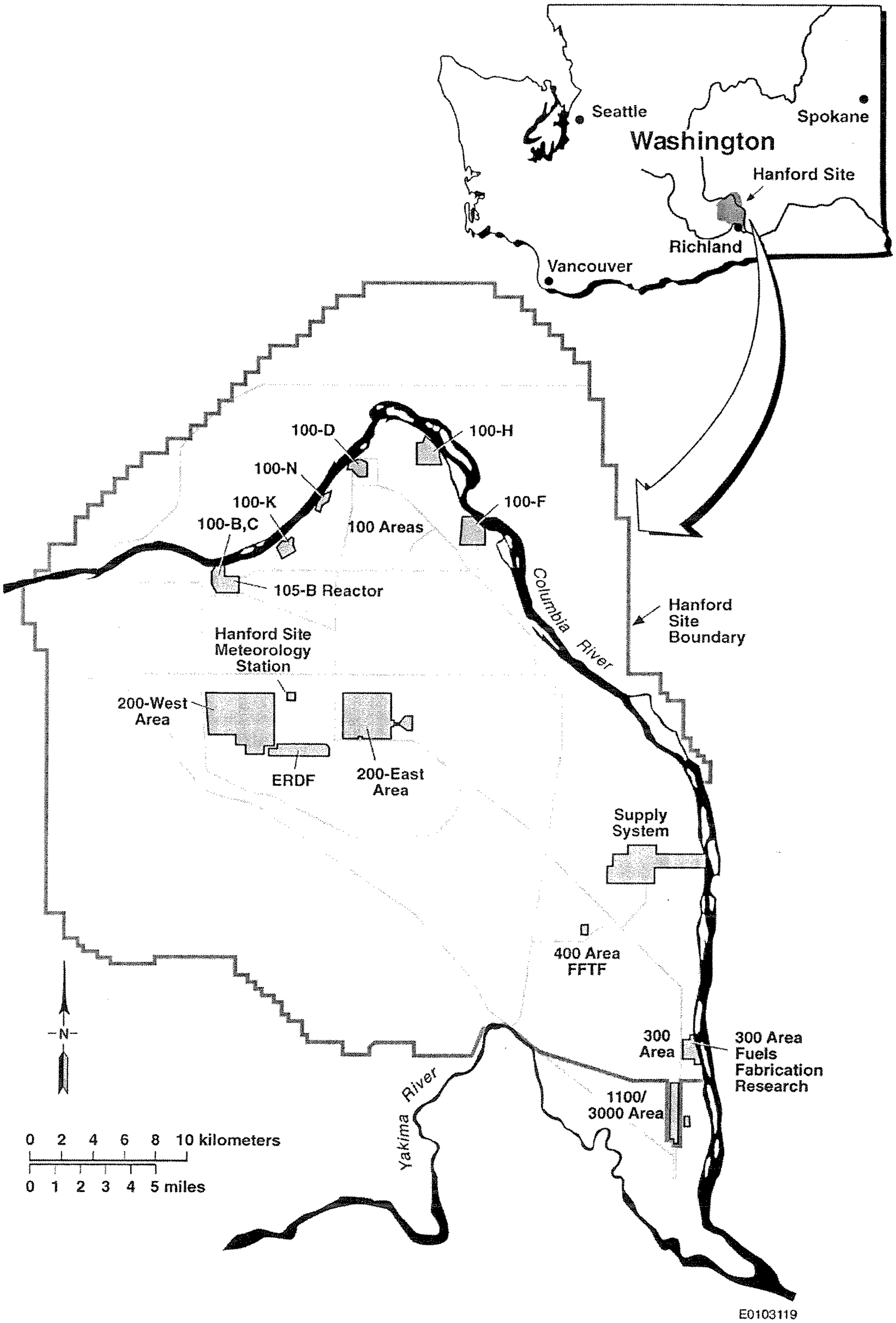


Figure 1-2. 105-B Reactor Facility.

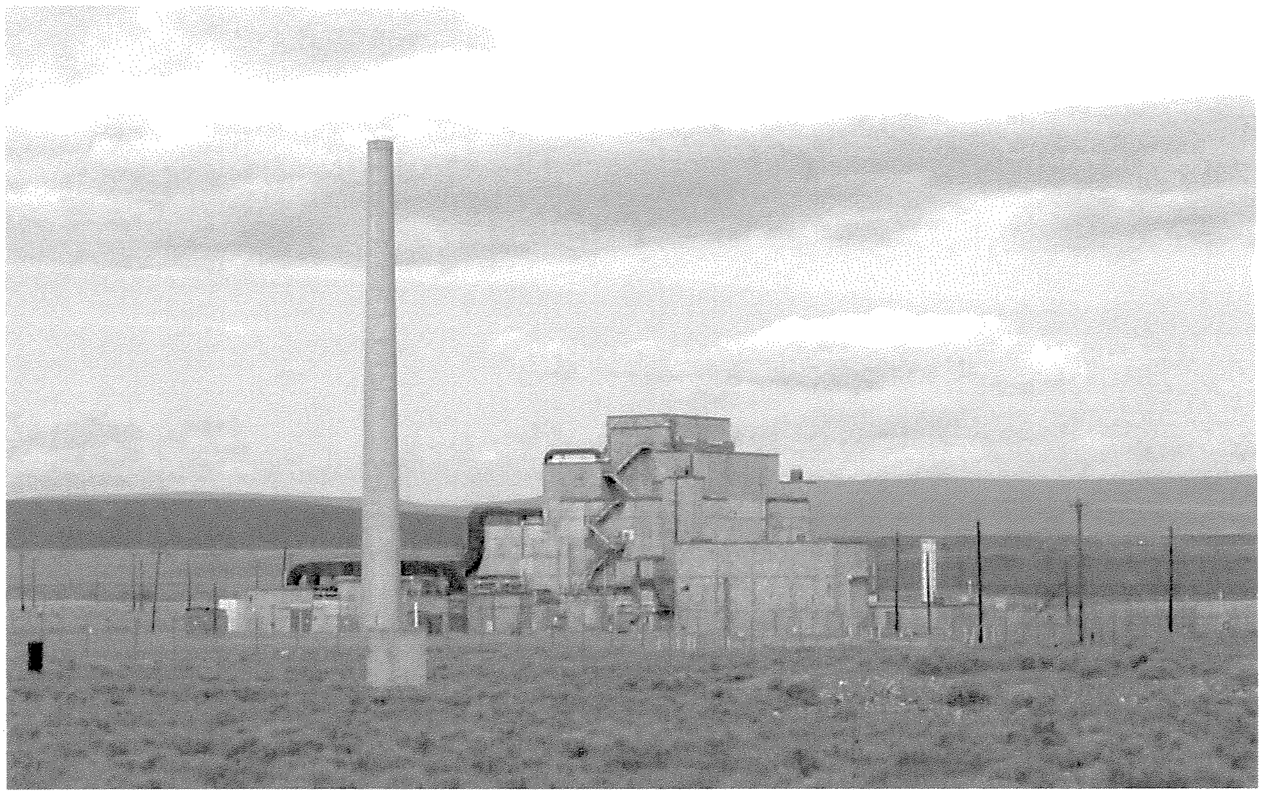
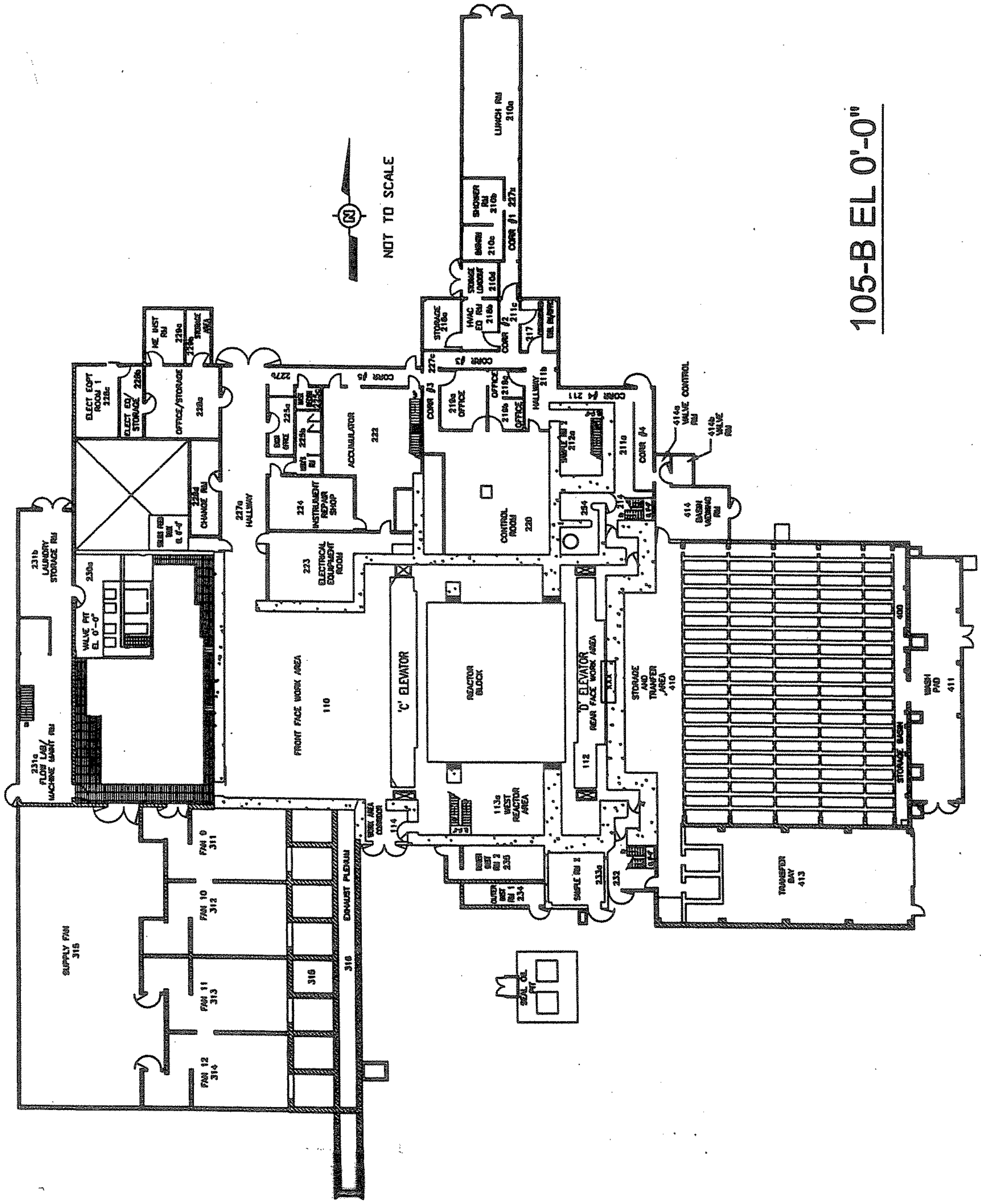


Figure 1-3. Schematic Drawing of the Ground Floor of the 105-B Reactor Facility.



2.0 REMOVAL ACTION ELEMENTS

2.1 REMOVAL ACTION WORK ACTIVITIES

The following sections provide a general description of work activities that will be performed for the 105-B Reactor Facility removal action. In accordance with the EE/CA and action memorandum (AM), these activities focus on areas of the facility that will be accessed for public tours (Figure 2-1). All of the removal action work activities will require consultation with the Washington State Historic Preservation Office. The general scope of work involved to implement this removal action is included. Many of these activities are also S&M activities. Table 2-1 shows the work activities and the fiscal year in which they were or will be completed. These dates may vary depending on funding. Additionally, Table 2-1 will be used as a checklist to document the completion of the interim removal action activities.

2.1.1 Specific Room Upgrades

2.1.1.1 110 Front-Face Work Area. Four proposed mitigation activities are associated with the front-face work area. These include securing the canvas drop shield, installing safety nets over the area, encapsulating lead paint, and plugging a floor drain. Details regarding the mitigation activities are as follows:

- The original canvas drop shield has been determined to be an overhead hazard and will be secured to eliminate the hazard. The canvas drop shield will be secured with cables mounted to I-beams. This will provide increased safety for visitors and personnel.

- Safety nets will be hung overhead in the front-face work area to provide additional protection from potential striking hazards to visitors and personnel. It is proposed that a large mesh (approximately 10.2-cm [4-in.]) net will be hung below the ceiling in the front-face work area. It is also proposed that another large-mesh net be hung from the I-beam above the canvas drop shield to the I-beam west of the C elevator walkway (approximately 18.3 m [60 ft] from the floor). These nets will provide protection over the entire front-face work area and the C elevator area of the front face of the reactor. The netting that will be used is similar to the overhead protection currently employed at the 105-H Reactor Facility for personnel safety.

- The lead paint hazard will be mitigated by encapsulation by repainting with non-lead-based paint.

- The floor drain hazard will be mitigated by sweeping and/or wiping up the solvents, plugging the floor drain, and sealing the source with a plug.

Asbestos in this room has previously been encapsulated.

2.1.1.2 Corridors 4 and 211. Mitigation of hazards in corridors 4 and 211 will include lead paint encapsulation, removing a contaminated step-off pad, and repairing roof panels. Radiologically contaminated areas have previously been characterized and decontaminated.

2.1.1.3 220 Control Room. The lead paint hazard will be mitigated by encapsulation with non-lead-based paint. The asbestos hazard in this room was mitigated by two methods. Encapsulation was one method, where the asbestos was wrapped to seal it and then painted. Asbestos piping for this room has been encapsulated. For asbestos floor and ceiling tile, new tiles were bought and placed over the old tiles.

2.1.1.4 222 Accumulator Room. The lead paint hazard will be mitigated by encapsulation with non-lead-based paint. The asbestos hazard in this room will be mitigated by encapsulation, where the asbestos will be wrapped to seal it and then painted. The oil hazard in this room will be removed by cleaning up the leaked oil and draining the oil reservoir in the compressor under the stairs and disposing of the oil.

2.1.1.5 223 Electrical Equipment Room. A tripping hazard due to a difference in elevation of the accumulator room and the electrical equipment room will be mitigated through the construction of a ramp. The lead paint hazard will be mitigated by encapsulation with a non-lead-based paint.

2.1.1.6 315 Supply Fan/Exhaust Fan Room. Four exhaust fan cells are located adjacent to the fan room. Two cells contain deactivated electric-driven exhaust fans and two cells contain deactivated steam-driven exhaust fans in addition to other miscellaneous equipment. The exhaust fans and the associated ductwork are posted for potential internal radioactive contamination. This area was wiped down to decontaminate it, and contamination was fixed in place.

Mitigation of hazards in this room includes encapsulating asbestos and lead paint and repairing roof panels. The asbestos hazard will be mitigated by encapsulation, where the asbestos will be wrapped to seal it, and then painted. The lead paint hazard will be mitigated by encapsulation with non-lead-based paint. Repair of roof panels is discussed in Section 2.2.2.

2.1.1.7 414 Fuel Basin Viewing Room. The south wall of the FSB viewing area (room 414) is a radiation area. The dose rate at the window was recorded at 0.20 mrem/hr. A handrail was installed along the width of the viewing room window. This will further reduce potential radiation exposure by preventing visitors from standing closer than 0.3 m (1 ft) from the viewing window. In addition, further reduction of exposure will be accomplished by replacing the existing viewing glass with leaded glass. Previously performed hazard mitigation includes shielding control by placement of a lead blanket, installing Plexiglas, placement of a railing to ensure distance from the window, glass repair, barricade installation, and door security.

A barrier will be installed on the breaker box within the viewing room to prevent visitor access. The lead paint hazard will be mitigated by encapsulation by repainting with non-lead-based paint. Asbestos in this room has previously been encapsulated.

2.1.1.8 219a and 219b Offices. The lead paint hazard in these rooms has previously been mitigated by encapsulation by repainting with non-lead-based paint. Asbestos in these rooms has previously been encapsulated.

2.1.1.9 227a Hallway. The lead paint hazard has previously been mitigated by encapsulation by repainting with non-lead-based paint. Asbestos in this room has previously been encapsulated.

2.1.1.10 227b Corridor #5. Corridor 227b will require construction of a ramp to eliminate a tripping hazard due to the difference in elevation between the doorways, as well as repairing a roof panel. The lead paint hazard has previously been mitigated by encapsulation by repainting with non-lead-based paint. Asbestos in this room has previously been encapsulated.

2.1.1.11 227c Corridor #3. The lead paint hazard has previously been mitigated by encapsulation by repainting with non-lead-based paint.

2.1.1.12 228a Office/Storage. The lead paint hazard has previously been mitigated by encapsulation by re-painting with non-lead-based paint. A security hazard was mitigated by installing a secure lock and doors to prevent visitors access to additional rooms.

2.1.1.13 230a Valve Pit. The grated walkway around the valve pit room has been identified as a tripping hazard and must meet Occupational Safety and Health Administration (OSHA) code for the safety of visitors and personnel. The proposed mitigation is the following:

- Apply fire-retardant marine-grade plywood decking over the grating.
- Apply expanded metal as follows:
  - Along the guardrails from the toeboard to the top of the guardrails to mitigate a potential falling hazard into the valve pit area
  - Hinged gates along the public access area where worker access will be required
- Apply clear "Plexiglass" around the abandoned transformer on the west wall.

A safety hazard was mitigated by permanently locking out the breaker box in this room. Asbestos in this room has previously been encapsulated.

2.1.1.14 230b Valve Pit – 15 Elevation. There was no lead paint hazard in this room because the walls were unpainted concrete. Asbestos in this room has previously been encapsulated. The hazard associated with the process supply line has been mitigated by decontaminating, draining, and plugging the lines.

Mitigation will include characterization of an unknown material on the lower level. The materials will be sampled according to the SAP (DOE-RL 1999) and managed with the requirements presented in this removal action work plan document.

2.1.1.15 Lunch Room. The asbestos hazard will be mitigated by encapsulation, where the asbestos will be wrapped to seal it, and then painted. The lead paint hazard will be mitigated by encapsulation by repainting with non-lead-based paint. Mitigation of the hazard associated with the floor drain involves cleaning up (i.e., wiping up/sweeping up) heavy metals and solvents and installing a plastic plug in the drain. Miscellaneous maintenance involves correcting tripping and striking hazards and security concerns. Mitigation of the biohazard in this room has been performed and involved cleaning up animal feces and remains.

2.1.2 General Upgrades

2.1.2.1 Electrical Upgrades. The existing electrical distribution system located within the 105-B Reactor Facility building is primarily the same system that has been in place since the reactor opened in 1944. The lighting and receptacle power for the facility is currently being provided from the old 2,400-volt emergency system. The existing electrical distribution system has many potential electrical shock hazards that will be mitigated to ensure that the safety of workers, public, and the environment are maintained. The upgrade will maintain the existing 2,400-volt system with the existing transformer and provide a 13.8-KV, 3-phase system to the facility and a new transformer for limited heating and some lighting for future expansion. Lighting and miscellaneous receptacle power will be provided from a 120-volt system. Conduits and electrical circuits may be upgraded (as necessary) by pulling new wires. The overall objective of this upgrade is to ensure that the safety of the workers and public is maintained during the next 10-year window.

2.1.2.2 Roof Panel Repair. Damaged roof panels have been identified as striking hazards in the fuel basin viewing room (414), corridor 211, corridor 227, the electrical room (223), valve pit (230a), and the supply fan room (315), and require repair or replacement. Mitigation assumes the use of the unistrut system (WHC 1994), similar to repairs in the valve pit area.

2.1.2.3 Exterior Hazards. Various activities will be required to ensure protection of the public, workers, and the environment from hazards outside the 105-B Reactor Facility. These activities include the following:

- Removing miscellaneous pipes and conduits that are not architectural-defining elements
- Cleaning abandoned transformers
- Restoring wooden structures, doors, handrails, and stairwells
- Repairing and reconstructing the security fence around the facility
- Placing asphalt to cover exposed surfaces on the ground

- Replacing the 105-B Reactor Facility roof. The roof replacement will include replacement of the underlayment board with a new asphalt and pea-gravel covering.

2.1.2.4 Ventilation. The 105-B Reactor Facility ventilation system is currently inoperable. The are two options for providing ventilation as follows:

- Ventilation fans will be installed through the outside walls of the facility into the work area, except in the control room. In the control room, a cascading air distribution system will be designed. The air will discharge to the outdoors through the openings in the exterior walls.

- The other concept is a system sized to provide ventilation to the whole facility. The air will enter the structure and be routed throughout the structure before discharging to the outdoors through an opening(s) in the exterior wall(s).

Either of the choices will be sized to provide ventilation for occupants and for radon mitigation. In addition, existing ventilation ducts that have in the past provided pathways for water leakage will be blanked off. Installation of ventilation will be performed in a way that will not detract from or adversely impact the existing architecture.

2.1.2.5 Fire-Suppression System. Fire-suppression system upgrades are required and will consist of installing five additional fire extinguishers and a new fire alarm and detection system. Detection devices will be provided along public access routes as well as in locations where early detection of fires in remote areas is necessary. Also, the wall separating the north lunchroom (room 210a) from the rest of the facility will be upgraded to at least a 1-hour fire-resistance rating in accordance with Section 8-3.2 of the National Fire Protection Association's *Life Safety Code*® (NFPA 101®) (NFPA 2000). An additional exit door from the valve pit area to the flow lab/machine maintenance room will be installed, and the door to the outside from the flow lab/machine maintenance room will be made accessible. Any structural upgrades made to the facility will be made with consultation and approval of the State Historic Preservation Office. Emergency lights and exit signs will be installed in the facility public access area.

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Figure 2-1. Public Access.

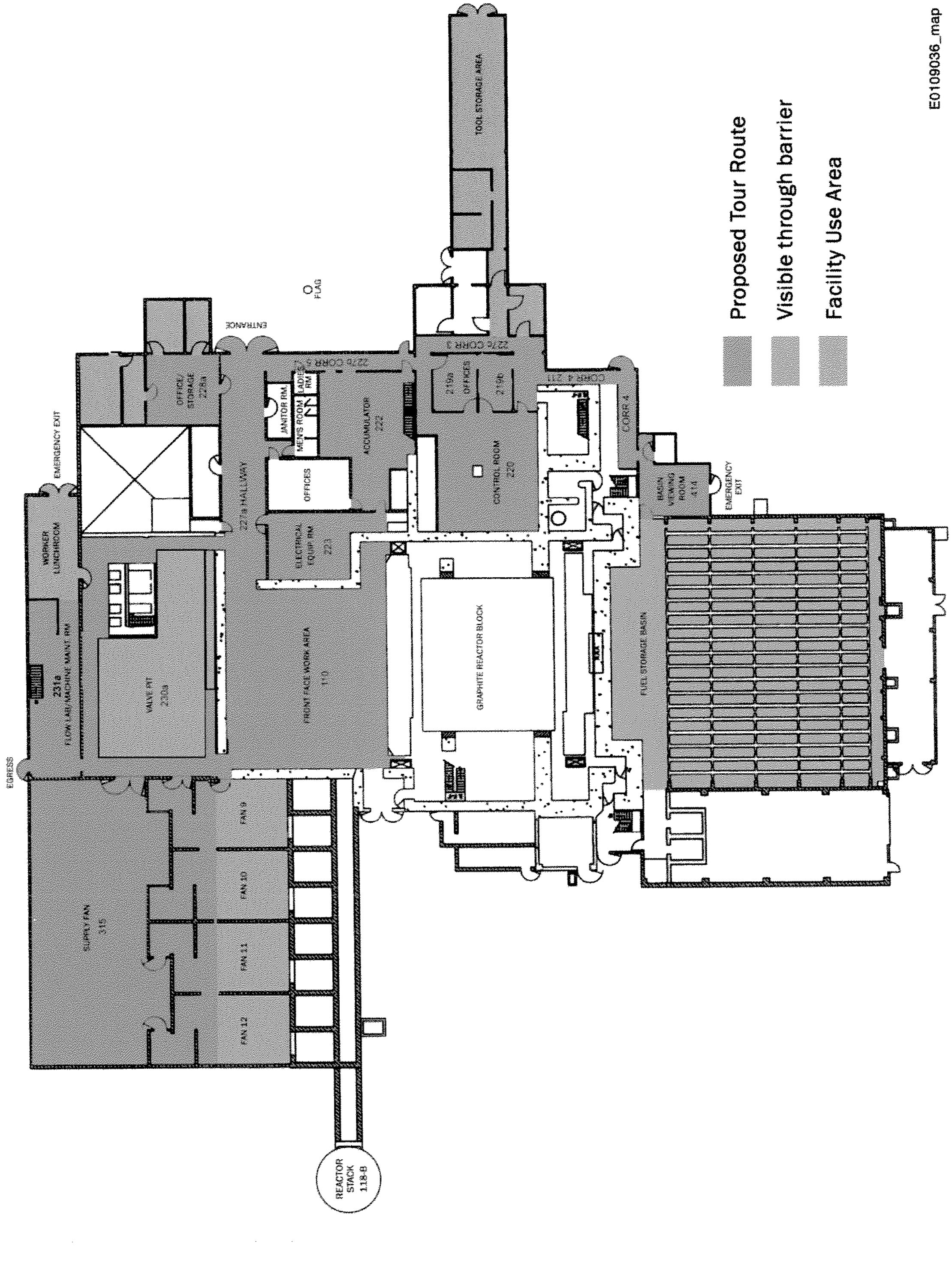

Table 2-1. Room-By-Room Hazards Mitigation for Public Access. (4 Pages)

Room	Fiscal Year to be Completed	Mitigation Measures
110 Front-Face Work Area		
Lead Paint Encapsulation	FY 2002	This contaminant hazard will be mitigated by encapsulation by repainting with non-lead-based paint.
Asbestos Encapsulation	FY 2002	Asbestos for this room has previously been encapsulated.
Canvas Drop Shield	FY 2002	This safety hazard will be mitigated by securing a drop shield with cables mounted from I-beams.
Floor Drain	FY 2002	This hazard will be mitigated by sweeping/wiping up the solvents, plugging the drain, and sealing the source with a plug.
211 Corridor #4		
Lead Paint Encapsulation	FY 2002	This contaminant hazard will be mitigated by encapsulation by repainting with non-lead-based paint.
Decontamination	FY 2002	The decontamination work mitigated by swiping and painting over an area.
Roof Panels	FY 2002	Panels have been identified as being cracked and needing repair, and one has been repaired. This striking/falling safety hazard will be mitigated by the use of the unistrut system (WHC 1994) similar to repairs in the valve pit area.
220 Control Room		
Lead Paint Encapsulation	FY 2003	This contaminant hazard will be mitigated by encapsulation by repainting with non-lead-based paint.
Asbestos	FY 2002	This hazard was mitigated by two methods. Encapsulation was one method, where the asbestos was wrapped to seal it and then painted. Asbestos piping for this room has previously been encapsulated. For asbestos floor and ceiling tile, new tiles were bought and placed over the old tiles.
222 Accumulator Room		
Lead Paint Encapsulation	FY 2003	This contaminant hazard will be mitigated by encapsulation by repainting with non-lead-based paint.
Oil	FY 2002	The oil will be removed by cleaning up the leaked oil and draining the oil reservoir in the compressor under the stairs and disposing of the oil.
Asbestos Encapsulation	FY 2003	This hazard will be mitigated by encapsulation, where the asbestos will be wrapped to seal it and then painted.
223 Electrical Equipment Room		
Lead Paint Encapsulation	FY 2003	This contaminant hazard will be mitigated by encapsulation by repainting with non-lead-based paint.
Roof Panels	FY 2002	Panels have been identified as being cracked and needing repair, and one has been repaired. This striking/falling safety hazard will be mitigated by the use of the unistrut system (WHC 1994) similar to repairs in the valve pit area.

Table 2-1. Room-By-Room Hazards Mitigation for Public Access. (4 Pages)

Room	Fiscal Year to be Completed	Mitigation Measures
Tripping Hazard	FY 2003	There is a tripping hazard due to the difference in elevation between the accumulator room and the electrical equipment room. Mitigation of this safety hazard assumes the construction of a ramp to allow smooth transition from room to room.
315 Supply Fan/Exhaust Fan Room		
Lead Paint Encapsulation	FY 2002	This contaminant hazard will be mitigated by encapsulation by repainting with non-lead-based paint.
Asbestos Encapsulation	FY 2002	This hazard will be mitigated by encapsulation, where the asbestos will be wrapped to seal it and then painted.
Decontamination	FY 2002	Decontaminated by wiping down and also fixed contamination in place by painting, followed by radiological downposting.
Roof Panels	FY 2002	Panels have been identified as being cracked and needing repair. Mitigation of this safety hazard assumes the use of the unistrut system (WHC 1994) similar to repairs in the valve pit area.
414 Fuel Basin Viewing Room		
Lead Paint Encapsulation	FY 2003	This contaminant hazard will be mitigated by encapsulation by repainting with non-lead-based paint.
Asbestos	FY 2002	Asbestos piping for this room has previously been encapsulated.
Radiological Control	FY 2002	This hazard was mitigated by shielding control by placement of a lead blanket, installation of Plexiglas, and placement of a railing to ensure distance from the window.
Roof Panels	FY 2002	Panels have been identified as being cracked and needing repair, and one has been repaired. This striking/falling safety hazard will be mitigated by the use of the unistrut system (WHC 1994) similar to repairs in the valve pit area.
Miscellaneous Maintenance	FY 2002	This safety hazard was mitigated by glass repair, barricade installation, and door security. Barricade installation prevents visitors from contacting the viewing window and creates less exposure to the fuel storage basin.
211 Hallway		
Lead Paint Encapsulation	FY 2003	This contaminant hazard will be mitigated by encapsulation by repainting with non-lead-based paint.
Roof Panels	FY 2002	Panels have been identified as being cracked and needing repair, and one has been repaired. This striking/falling safety hazard will be mitigated by the use of the unistrut system (WHC 1994) similar to repairs in the valve pit area.
219a Office		
Lead Paint Encapsulation	FY 2001	This contaminant hazard was mitigated by encapsulation by repainting with non-lead-based paint.
Asbestos	FY 2001	This hazard was mitigated by encapsulation, where the asbestos was wrapped to seal it and then painted.

Table 2-1. Room-By-Room Hazards Mitigation for Public Access. (4 Pages)

Room	Fiscal Year to be Completed	Mitigation Measures
219b Office		
Lead Paint Encapsulation	FY 2001	This contaminant hazard was mitigated by encapsulation by repainting with non-lead-based paint.
Asbestos	FY 2001	This hazard was mitigated by encapsulation, where the asbestos was wrapped to seal it and then painted.
227a Hallway		
Lead Paint Encapsulation	FY 2001	This contaminant hazard was mitigated by encapsulation by repainting with non-lead-based paint.
Asbestos	FY 2001	This hazard was mitigated by encapsulation, where the asbestos was wrapped to seal it and then painted.
Roof Panels	FY 2002	Panels have been identified as being cracked and needing repair, and one has been repaired. This striking/falling safety hazard will be mitigated by the use of the unistrut system (WHC 1994) similar to repairs in the valve pit area.
227b Corridor #5		
Lead Paint Encapsulation	FY 2001	This contaminant hazard was mitigated by encapsulation by repainting with non-lead-based paint.
Asbestos	FY 2001	This hazard was mitigated by encapsulation, where the asbestos was wrapped to seal it and then painted.
Roof Panels	FY 2002	Panels have been identified as being cracked and needing repair. This striking/falling safety hazard will be mitigated by the use of the unistrut system (WHC 1994) similar to repairs in the valve pit area.
Tripping Hazard	FY 2003	There is a tripping hazard due to the difference in elevation between the doorways. Mitigation of this safety hazard assumes the construction of a ramp to allow smooth transition from room to room.
227c Corridor #3		
Lead Paint Encapsulation	FY 2001	This contaminant hazard was mitigated by encapsulation by repainting with non-lead-based paint.
228a Office-Storage (Worker Lunch Room)		
Lead Paint Encapsulation	FY 2002	This contaminant hazard was mitigated by encapsulation by repainting with non-lead-based paint.
Security	FY 2002	This safety hazard was mitigated by a secure lock and doors to prevent visitors access to additional rooms.
230a Valve Pit		
Lead Paint Encapsulation	N/A	No action. Exposed concrete walls, no lead paint.
Asbestos	FY 2001	This hazard was mitigated by encapsulation, where the asbestos was wrapped to seal it and then painted.
Grated Walkway	FY 2002	This safety hazard will be mitigated by installing an engineered decking cover.

Table 2-1. Room-By-Room Hazards Mitigation for Public Access. (4 Pages)

Room	Fiscal Year to be Completed	Mitigation Measures
Breaker Box	FY 2001	This safety hazard was mitigated by permanently locking the breaker box out.
Roof Panels	FY 2002	Panels have been identified as being cracked and needing repair, and one has been repaired. This striking/falling safety hazard will be mitigated by the use of the unistrut system (WHC 1994) similar to repairs in the valve pit area.
230b Valve Pit -15 Elevation		
Lead Paint Encapsulation	N/A	No action. Exposed concrete walls, no lead paint.
Asbestos	FY 2002	This hazard was mitigated by encapsulation, where the asbestos was wrapped to seal it and then painted.
Decontamination	FY 2001	The hazard associated with the process supply line has been mitigated by decontaminating, draining, and plugging the lines.
Characterization	FY 2002	Mitigation will include characterization of an unknown material on the lower level. Mitigation may also include subsequent cleanup to ensure air quality for the visitors, if the material warrants it.
231a Lunch Room (Flow Laboratory/Machine Maintenance Room)		
Lead Paint Encapsulation	FY 2003	This contaminant hazard will be mitigated by encapsulation by repainting with non-lead-based paint.
Floor Drain	FY 2003	Mitigation involves cleaning up (wiping up/sweeping up) heavy metals and solvents and installing a plastic plug.
Asbestos	FY 2003	This hazard will be mitigated by encapsulation, where the asbestos will be wrapped to seal it and then painted.
Miscellaneous Maintenance	FY 2003	Safety hazards – tripping and striking hazards and security concerns. Mitigation of these safety hazards assumes construction of a ramp over the tripping hazard or leveling the tripping hazard; removal of the striking hazards or a barrier placement, and installation of locks on appropriate doors.
Bio Hazard	FY 2001	Mitigation involved cleaning up animal feces and remains.

Table 2-2. General Upgrades. (3 Pages)

Activity	Fiscal Year to be Completed	Mitigation Measures
Electrical	FY 2002	To mitigate hazards, the existing electrical systems in the facility shall be deactivated while isolating and supplying electrical power to only equipment that is needed and determined to be safe. The upgrades will maintain the existing 2,400-volt system with the exiting transformer and provide a 13.8 KV, 3 phase system to the facility and a new transformer for the limited heating and some lighting for future expansion. Lighting and miscellaneous receptacle power will be provided from a 120-volt system. Conduits and electrical circuits may be upgraded (as necessary) by pulling new wires.
Structural Analysis	FY 2002	An evaluation was performed of the building structure. Preliminary results do not identify any major deficiencies, but may identify minor repairs.
Structural Fall Protection Upgrades (front face)	FY 2002	Due to the design life of the facility, minor upgrades are expected based on the results from the structural analysis. This includes protective netting to mitigate striking hazards falling into the front face of the reactor.
Structural Upgrades (structure)	FY 2003	Repair concrete block cracks.
Ventilation	FY 2003	The 105-B Reactor Facility ventilation system is currently inoperable. The are two options for providing ventilation as follows: 1. (Ventilation fans will be installed through the outside walls of the facility into the work area, except in the control room.) In the control room, a cascading air distribution system will be designed. The air will discharge to the outdoors through the openings in the exterior walls. 2. The other concept is a system sized to provide ventilation to the whole facility. The air will enter the structure and be routed throughout the structure before discharging to the outdoors through an opening(s) in the exterior wall(s). Either of the choices will be sized to provide ventilation for occupants and for radon mitigation. In addition, existing ventilation ducts that have in the past provided pathways for water leakage will be blanked off. Installation of ventilation will be performed in a way that will not detract from or adversely impact the existing architecture.

Table 2-2. General Upgrades. (3 Pages)

Activity	Fiscal Year to be Completed	Mitigation Measures
Roof Replacement	FY05	The roof replacement will include replacement of the underlayment board with a new asphalt and pea-gravel covering.
Fire Suppression System	FY 2003	Fire suppression system upgrades are required and will consist of installing five additional fire extinguishers and a new fire alarm and detection system. Detection devices will be provided along public access routes as well as in locations where early detection of fires in remote areas is necessary. Also, the wall separating the lunchroom (room 210a) from the rest of the facility will be upgraded to at least a 1-hour fire-resistance rating in accordance with Section 8-3.2 of the National Fire Protection Association's *Life Safety Code*® (NFPA 101®) (NEPA 2000). An additional exit door from the valve pit area to the flow lab/machine maintenance room will be installed, and the door to the outside from the flow lab/machine maintenance room will be made accessible. Any structural upgrades made to the facility will be made with consultation and approval of the State Historic Preservation Office. Emergency lights and exit signs will be installed in the facility public access area.
Exterior Hazards		
Wooden Surfaces	FY 2004	Mitigation will require the removal of loose paint, repainting of wooden surfaces, and replacement of rotten wood.
Pipes and Conduits	FY 2004	Mitigation will require the removal of hanging pipes and conduit.
Transformers	FY 2002	Mitigation included cleaning out the transformers and securing all doors and openings.
Wooden Structures	FY 2004	Mitigation will include either demolish or a restore option. Restoration will include sealing all openings, repainting, re-roofing, and adding a door to the structure next to the stack.
Wooden Doors	FY 2004	Mitigation requires the replacement of wooden doors with metal, where appropriate, and the repair/replacement of casing as required.
Outside Stairwells	FY 2004	Currently, the stairwell will require maintenance to either demolish or restore.
Building Penetrations	FY 2004	Mitigation will include blocking and securing openings.
Miscellaneous Piping	FY 2004	Mitigation includes the installation of appropriate barricades and/or appropriate signage to warn visitors of protruding pipes and equipment from the reactor walls.
Stack analysis	FY 2002	A structural analysis was performed. Preliminary results do not identify any major deficiencies, but may identify minor repairs.
Stack Repairs	FY 2003	Repair if required.

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Table 2-2. General Upgrades. (3 Pages)

Activity	Fiscal Year to be Completed	Mitigation Measures
Fencing Perimeter	FY 2004	Based on security issues, the facility will require a fence to ensure safety and visitor intrusion. Assume the use of new, recycled, or used fencing.
Asphalt	FY 2004	Assumes asphalt is required to cover the exposed surface at a radius of 7.6 m (25 ft) around the entire facility.
Underground Piping	FY 2004	Assumes the 100-B/C Pipeline remediation effort will mitigate and cap underground effluent lines/pipes within 7.6 m (25 ft) of the facility.

3.0 SAFETY AND HEALTH MANAGEMENT AND CONTROLS

3.1 EMERGENCY PREPAREDNESS

Procedure manual BHI-SH-03, *Emergency Management Program* (all volumes), complies with and implements the requirements of the *Hanford Emergency Management Plan* (DOE-RL 1998a) and applicable DOE orders. The Emergency Management Program establishes a coordinated emergency response organization capable of planning for, responding to, and recovering from industrial, security, or hazardous material incidents. Specifically for the 105-B Reactor Facility, the emergency action plan is located in BHI-SH-03, Vol. 4, Section 1.0, and reflects the applicable emergency preparedness and response requirements.

3.2 SAFEGUARDS AND SECURITY

Access and keys to the 105-B Reactor Facility are controlled by BHI S&M Field Support personnel. Access will be limited to only those personnel (employees, nonemployees, and/or visitors) who have current training or are escorted by trained personnel. Because of the historical significance and nature of the 105-B Reactor Facility, many areas within the 105-B Reactor Facility will be made available for frequent entries and public access. Nonemployees and visitors touring the 105-B Reactor Facility will be required to stay within the clearly marked, designated tour areas of the facility. Specific training and badging requirements for nonemployees and visitors will be required prior to access to the facility, as follows:

- Frequent visitors (seven or more visits to 105-B Reactor Facility per year) – Hanford General Employee Training (HGET) will be required. BHI will provide the standard computer-based HGET training or provide a "modified" version of HGET training using overheads and classroom lecture as an alternative to accommodate special requests and/or needs. After HGET is completed the frequent visitor will undergo the process for annual badging.

- Infrequent visitors (less than seven visits to 105-B Reactor Facility per year) – HGET will not be required; however, BHI does require General Employee Radiological Training, viewing a 9-minute video tape, and completing the paperwork for temporary badging. This can be done as a group or individually, with only "1 day" notice.

- One-time visits to 105-B Reactor Facility with an escort – Reading an orientation pamphlet and completing the required paperwork for a temporary badge will be required.

3.3 SYSTEMS AND COMPONENTS THAT PROTECT FACILITY WORKERS

There are no active operating systems that are relied upon to control or mitigate the hazards associated with the inactive reactor and ancillary facilities at the 105-B Reactor Facility. The lack of safety-significant structures, systems, and components is consistent with the final hazard classification (BHI 2000a) of the inactive reactor and ancillary facilities as "radiological."

Engineering controls that may be employed during the 105-B Reactor Facility removal action (such as during asbestos removal) include temporary confinement enclosures, glovebag containments, and personal protective equipment (PPE). For housekeeping activities, vacuums may be used that are equipped with high-efficiency particulate air (HEPA) and/or charcoal filters, and exhausters will be equipped with HEPA filters. Vacuums that are used for cleaning contaminated areas will be in accordance with the Washington State Department of Health approved Notice of Construction for portable temporary radioactive air emission units (DOE 1997). Also, administrative controls such as radiological work permits (RWPs) and asbestos abatement work plans for asbestos removal will be in place as needed. Personnel monitoring and area monitoring will be used as required to determine and document worker exposures and work conditions.

3.4 HEALTH AND SAFETY PROGRAM

3.4.1 Worker Safety Program

The Environmental Restoration Contractor (ERC) Hazardous Waste Operations Safety and Health Program was developed for employees involved in hazardous waste site activities. The program was developed to comply with the requirements of 29 *Code of Federal Regulations* (CFR) 1910.120 and 10 CFR 835 and to ensure the safety and health of workers during hazardous waste operations. The principles and practices prescribed within the Integrated Environment, Safety, and Health Management System will be incorporated into all work activities. The program includes the following elements:

- An organizational structure that specifies the official chain of command and the overall responsibilities of supervisors and employees
- A comprehensive work plan developed before work begins at a site to identify operations and objectives and to address the logistics and resources required to accomplish project goals
- A site-specific health and safety plan (SS HASP) (BHI 1999) where workers may be exposed to hazardous substances
- Worker training commensurate with individual job duties and work assignments
- A medical surveillance program administered to comply with OSHA requirements (29 CFR 1910.120)

- BHI-SH-02, Volumes 1 through 4, and project/task-specific implementing plans and procedures

- Voluntary Protection Program.

3.4.2 Site-Specific Health and Safety Plan and Job Hazards Analysis

A SS HASP (BHI 1999) has been prepared that provides information regarding the hazards associated with the 105-B Reactor Facility. Building access and work activities are controlled by approved work packages, as required by established BHI/ERC procedures. As part of work package development, a job hazards analysis may be written to identify the hazards associated with specific tasks.

Before work activities begin, a pre-job briefing will be held with the involved workers. This briefing will include reviews of the hazards that may be encountered and the associated requirements. Throughout an activity, daily briefings may also be held as well as special briefings prior to major tasks.

3.4.3 Radiological Controls and Protection

The Radiological Controls and Protection Program is defined in DOE-approved programs and BHI-approved procedures (BHI-RC-02 through BHI-RC-05, and BHI-SH-01, *ERC Safety and Health Program*). This program implements the ERC's policy to reduce safety or health risks to levels that are ALARA and to ensure adequate protection of workers. The ERC Radiological Protection Program meets the requirements of occupational radiation protection regulations (10 CFR 835). Radiological material handling will be managed in accordance with the DOE radiological control manual (DOE 1994). Appropriate dosimetry, RWPs, PPE, ALARA planning, periodic surveys, and radiological control technical support will be provided.

Standard ERC programs for work in radiological areas are adequate to control the proposed project activities. These programs provide the specific requirements for identified activities, periodic radiation and contamination surveys of the work areas, and periodic or continuous observation of the work by the Radiological Control Organization. The ALARA planning process will identify shielding requirements, contamination control requirements (including local ventilation controls), radiation monitoring requirements, and other radiation control requirements for the individual tasks conducted during the course of the projects.

The 105-B Reactor Facility contains the following radiological areas:

- Radiological Control Areas
- Fixed Contamination Areas
- Radioactive Material Storage Areas
- Radiological Buffer Areas
- Contamination Areas

- High Contamination Areas
- Airborne Radioactivity Areas
- Radiation Areas
- High Radiation Areas.

Prior to the performance of radiologically related surveillance/maintenance or hazard mitigation activities, the proposed activity is discussed with the Radiological Control Organization to determine the scope of the activity and the survey requirements needed. Specific tasks may require an RWP. The RWP will be issued by the Radiological Control Organization to provide direction concerning the isotopes of concern, any specific survey and/or air sampling requirements, appropriate PPE, and dosimetry requirements. Additionally, depending on the work scope and expected radiological conditions, an ALARA review may be required. Radiological control technicians (RCTs) assess radiological conditions of the work/surveillance area in accordance with BHI procedures, document radiological survey results, and ensure correct radiological postings/boundaries of the area.

Areas designated as part of the public access area are designated as a Radiological Control Area. RCT surveys for these areas have shown that radiological conditions do not require dosimetry or an RWP. Visitors must satisfy the following two basic (reading) requirements prior to touring the facility:

- HGET– required for frequent visitors (more than seven visits) to the Hanford Site or General Employee Radiological Training for infrequent visitors (less than seven visits)

- Review of the SS HASP.

If future RCT surveys indicate that the conditions have changed, the appropriate radiological controls and postings will be implemented in accordance with approved procedures.

4.0 ENVIRONMENTAL MANAGEMENT AND CONTROLS

A removal action must, to the extent practicable, meet applicable or relevant and appropriate requirements (ARARs) and other Federal and state environmental statutes. The ARARs must be met for onsite CERCLA actions (CERCLA Section 121[d][2]). Onsite actions are exempted from obtaining Federal, state, and local permits (CERCLA, Section 121[e][1]). Nonpromulgated standards, such as proposed regulations and regulatory guidance, are also to be considered, to the extent necessary for the removal action to be adequately protective.

The ARARs for this removal action were identified in the EE/CA (DOE-RL 2001). These ARARs include waste management standards, standards controlling releases to the environment, and standards for protection of cultural, historical, and ecological resources. A discussion of how the removal action will comply with these ARARs is provided in the following subsections. Where pertinent to the discussion of compliance, materials to be considered have also been included.

4.1 WASTE MANAGEMENT

Waste management activities will be performed in accordance with waste management ARARs identified in the EE/CA for the 105-B Reactor Facility (DOE-RL 2001) and as discussed in Section 4.1.1. The requirements specified by the ARARs and other applicable guidance will be addressed in site-specific waste management instruction prepared in accordance with BHI-EE-10, *Waste Management Plan*, Part II, Procedure 5.0, "Site-Specific Waste Management Instructions." The site-specific waste management instruction (SSWMI) will address waste storage, transportation, packaging, handling, and labeling as they specifically apply to waste streams.

All waste generated at the 105-B Reactor Facility is managed per the directives of a SSWMI in accordance with BHI-EE-10. The SSWMI provides waste-stream-specific management requirements including designation, separation and segregation, waste minimization, packaging, marking and labeling, storage, inspection, transportation tracking, and traceability.

In conducting the removal action (including S&M), various waste streams will be generated. Each waste stream will require specific characterization, designation, and disposal. These waste streams may include the following:

- Solid waste (nonradioactive, nondangerous waste)
- Low-level radioactive waste
- Mixed waste (waste that is both low-level radioactive waste and dangerous waste)
- Hazardous, dangerous, and PCB wastes
- Transuranic waste.

4.1.1 Waste Management Standards

Dangerous and mixed wastes may be generated, and it is expected that these wastes will be primarily characteristic dangerous wastes (e.g., lead-contaminated materials). Some listed wastes (e.g., organic solvents) may also be generated. Both characteristic and listed dangerous or mixed wastes will be designated and managed in accordance with the dangerous waste management standards in *Washington Administrative Code* (WAC) 173-303. Any wastes determined to be dangerous or mixed waste will be treated as appropriate to meet the treatment standards of 40 CFR 268. For example, lead-contaminated waste could be encapsulated and disposed at the ERDF.

PCBs are identified as potential contaminants in the 105-B Reactor Facility, and PCB-contaminated waste will likely be generated. In accordance with 40 CFR 761, any PCB-contaminated wastes generated will be managed as PCB remediation waste or as PCB bulk product waste, as applicable. The ERDF is authorized to accept nonliquid PCB wastes for disposal. All waste suspected to contain PCBs will be evaluated to determine if the waste meets the ERDF waste acceptance criteria and disposed at the ERDF if it meets the criteria. Any PCB waste that does not meet the ERDF waste acceptance criteria will be sent to an onsite PCB storage area meeting the substantive requirements for *Toxic Substances Control Act of 1976* (TSCA) storage and will be transported for disposal at a TSCA-approved disposal facility. An offsite determination will require approval by EPA, with notification to the State of Washington Department of Ecology (Ecology).

If spills or discharges of materials containing greater than 5 parts per million (ppm) of PCBs (measured prior to the spill or discharge) occur, PCB cleanup will follow the requirements established in the PCB regulations (40 CFR 761). Included are provisions for reporting, cleanup methodology and decontamination requirements, disposal of cleanup debris and materials, record keeping, and post-cleanup sampling. Cleanup actions must be completed within 48 hours of discovery of the spill for low-concentration spills involving less than 0.45 kg (1 lb) of PCB. Cleanup actions for high-concentration spills or spills involving more than 0.45 kg (1 lb) of low-concentration PCBs must be completed within 24 hours.

Radioactive low-level waste will likely be generated and will be disposed at the ERDF, which is authorized to receive low-level waste resulting from remediation activities, as long as the waste meets the ERDF waste acceptance criteria. Transuranic waste may be generated and will be transferred to the Central Waste Complex (CWC) for interim storage pending offsite disposal at a geologic repository such as the Waste Isolation Pilot Plant.

Potential exists that some asbestos or ACM will have to be handled during the removal action and during S&M (when major repairs are required). In this case, asbestos and ACM will be removed and disposed in accordance with the *Clean Air Act of 1955* (40 CFR 61, Subpart M) and OSHA (29 CFR 1910.1101 and WAC 296-62), including appropriate worker protection and packaging. The asbestos and ACM will be disposed at the ERDF.

In addition to the ARARs specified above, the ERDF waste acceptance criteria must be met. The ERDF waste acceptance criteria define radiological, chemical, and physical characteristics for waste proposed for disposal placement and compaction requirements. Waste generated that could not meet or be treated to meet the ERDF waste acceptance criteria will be stored or disposed at an EPA-approved facility. Any waste disposal occurring off of the Hanford Site requires an offsite determination by EPA.

The removal action may require offsite transportation of potentially contaminated samples and, potentially, of waste. Through implementation of DOE orders and Federal procedures (e.g., EPA's *Revised Procedures for Planning and Implementing Off-Site Response Actions* [58 *Federal Register* 49200]), compliance with the *Hazardous Materials Transportation Act of 1974* (49 U.S.C. 1801-1813), implemented via the "U.S. Department of Transportation Requirements for the Transportation of Hazardous Materials" (49 CFR 100 through 179), will be achieved in the handling and shipping of wastes and samples.

4.1.2 Waste Characterization and Designation

Waste generated will be characterized in accordance with *Sampling and Analysis Plan for Disposition of the Standing Legacy Wastes in the 105-B, -D, -H, -KE, and –KW Reactor Buildings* (DOE-RL 1999) and designated in accordance with BHI-EE-10 and the requirements of the receiving facility. The generation of waste will be minimized to the maximum extent practical. Waste materials will be segregated by radioactive content, physical form, and chemical form.

Characterization, through radiological surveys and sampling/analysis, will be conducted to identify radiological and hazardous conditions that will be encountered during maintenance and waste handling operations. Analytical data generated in these efforts will be used to develop the following information:

- Contaminant identification
- Contaminant concentrations
- Compliance with cleanup standards
- Waste type categories
- Worker health and safety conditions
- Decontamination requirements
- Operational precautions
- Waste treatment requirements
- Waste packaging and disposal requirements.

A selected team of personnel will inspect the portions of the facility where the removal action/maintenance is to occur. The inspection will identify suspect chemical/hazardous and radiological materials in order to identify the waste streams for project planning.

4.1.3 Waste Handling, Storage, and Packaging

In general, waste generated from the removal actions discussed in this work plan will either be disposed at the ERDF or at an offsite disposal facility approved by the appropriate regulatory agencies. Specific information on waste handling, storage, and packaging for the wastes that may be encountered during the proposed removal actions is discussed below.

- Waste minimization practices will be followed to the extent technically and economically feasible during all phases of waste management. Waste materials will be recycled, reused, or reclaimed when feasible. Solid waste will primarily be sent to inert demolition waste landfills and for offsite disposal at a municipal/industrial landfill (e.g., the City of Richland landfill). All materials released offsite for disposal, recycle, or salvage must be certified free of radioactive contamination in accordance with the ERC material release program. Introduction of clean materials into a contamination area and contamination of clean materials will be minimized to the extent practicable. During all phases of waste management, emphasis will be placed on source reduction to eliminate or minimize the volume of wastes that will be generated.

- ACM will be wetted and double-bagged or double-wrapped in plastic according to the site-specific asbestos abatement work plan, which is maintained at the site. ACM packages will be limited to 18.2 kg (40 lb) each. Cement asbestos board has no weight restriction per package. Cut and wrapped pipe will be packaged to meet the requirements of the waste shipping and receiving plan.

- Biological wastes will be packaged in strong-tight containers that will not leak during storage.

- Used oil (except for PCB oils) will be managed as a recyclable material in accordance with the Hanford Site-wide used oil program. It will be evaluated with the material release program. Radioactively contaminated oil that meets the ERDF waste acceptance criteria will be solidified for disposal to ERDF.

- Generally, liquids will be collected in 209-L (55-gal) UN1A2 drums. Aqueous solutions with a pH ≤ 2 or ≥ 12.5 will be stored in 209-L (55-gal) UN1A2 drums. Signs stating "DANGER-UNAUTHORIZED PERSONNEL KEEP OUT" will be posted at each entrance of the storage area and along the boundary as necessary to be seen from any approach to the area. Portable fire extinguishers and spill-control equipment will be available. Containers will not be opened, handled, or stored in a manner that may rupture the container or cause the container to leak. Containers in poor condition will have the contents transferred to a container in good condition. A minimum 76.2-cm (30-in.) separation will be maintained between container rows. A row of containers will be no more than two containers wide. Aqueous solutions with a pH > 2 and < 12.5 may be stored in a large storage tank or in drums.

- Smaller items contaminated with mixed (radioactive and dangerous/hazardous) solids will be packaged in 209-L (55-gal) drums (UN1A2). The weight will not exceed 385.9 kg (850 lb). Larger pieces (e.g., bricks and sheets) shall be double-wrapped in plastic and stored on pallets.

- High-dose radioactive items will be placed in U.S. Department of Transportation-approved containers and shipped to a facility that is approved by EPA. For onsite shipments, high-dose radioactive items will be placed in containers specified by the receiving facility.

- Waste contaminated with alpha-emitting transuranic radionuclides with half-lives greater than 20 years and concentrations greater than 100 nCi/g at the time of assay is classified as transuranic waste (DOE Order 435.1). Transuranic waste will be managed in accordance with BHI-EE-10. The CWC, operated by the PHMC, will be used for interim storage of any transuranic waste encountered. Storage of transuranic waste at the CWC requires prior approval by EPA.

- Debris coated with paints that contain $\geq$50 ppm PCB is defined as "PCB bulk product waste" under TSCA. PCB bulk product waste will be managed within the area of contamination until it is loaded into an ERDF container in the onsite area. The ERDF container will be marked with a M_L marking (CAUTION-CONTAINS PCBs). The ERDF container will be closed and securely fitted with a tarp except when adding or removing waste.

- All containers, packages, or items requiring storage in a radioactive material area will be marked/labeled with radioactive material markings and unique consecutive identification numbers. Containers or packages of waste requiring tracking (e.g., hazardous, mixed) will be assigned a package identification number by a Waste Transportation Specialist.

- Nonradioactive solid items will be packaged in 209-L (55-gal) drums (UN1A2). Larger items will be double-wrapped in plastic and stored on pallets. Radioactive solids will be placed in bulk roll-off containers with side-swinging gates (400 and 700 series) for ERDF disposal. The containers will be lined with plastic sheeting and covered by a tarp. Lightweight material such as paper and plastic will be bagged prior to placement in the container to eliminate the potential of the materials blowing out of the container.

- Nonradioactive, dangerous solid wastes that do not meet the ERDF waste acceptance criteria may, with EPA approval, will be shipped offsite or to the 1100 Area Excess Yard or the 400 Area Consolidation Center if the material is recyclable. EPA approval will be obtained to ship PCB (TSCA) waste to offsite TSCA disposal facilities.

- Any area containing PCB oils will be marked with signs posting, "DANGER-UNAUTHORIZED PERSONNEL KEEP OUT," at each entrance and along the boundary as necessary to be seen from any approach to the area. The M_L marking will also be posted. Portable fire extinguishers and spill-control equipment will be available. Containers will not be opened, handled, or stored in a manner that may rupture the container or cause the container to leak. Containers in poor condition will have the contents transferred to a container in good condition. A minimum 76.2-cm (30-in.) separation will be maintained between container rows. A row of containers will be no more than two containers wide.

All containers (except containers used to collect fluorescent light tubes) will be closed and secured when not being filled or emptied. Radioactively contaminated waste will be stored in a radioactive materials storage area that is established, managed, and maintained in accordance with BHI procedures. Containers will be stored to prevent the accumulation of water.
A CERCLA staging area has been established inside the 105-B Reactor Facility in the valve pit and is secured with a locked door. The location of this area has been approved by EPA in *Concurrence to 105-B Standing Legacy Waste Management Plan Supporting B-Reactor Surveillance and Maintenance* (EPA and DOE-RL 2001).

4.1.4 Waste Treatment

Specific waste streams may be treated to provide safe transport or effective disposal. The type and location of treatment will be determined on a case-by-case basis by DOE and EPA in accordance with the substantive requirements of *Resource Conservation and Recovery Act of 1976* and WAC 173-303. Upon lead regulatory agency approval, solidification, encapsulation, and neutralization may be employed to treat various wastes. Other treatment methods may be considered if necessary. For wastes requiring treatment, the techniques will be documented in site-specific waste management instructions or an equivalent treatment document, which will be approved by the lead regulatory agency.

4.1.5 Waste Transportation and Shipping

When transportation subcontractor services are used for waste generated during the 105-B Reactor Facility removal action, the subcontractor will be responsible for using and maintaining appropriate transport motor vehicles and providing qualified commercial drivers. All shipments will be made in accordance with U.S. Department of Transportation regulations, 49 CFR 171-179, applicable sections of WAC 173-303, and BHI-EE-12.

4.1.6 Disposal

Waste resulting from this action will be disposed at the ERDF or at an offsite disposal facility approved by EPA. Materials shipped offsite for salvage or recycle must be certified free of radioactive contamination in accordance with the ERC material release program. Liquid waste will be shipped to the Hanford Site's Effluent Treatment Facility (ETF) or treated to meet the acceptance criteria of the receiving facility. Ecology approval is required prior to shipping contaminated water to the ETF for treatment. *Hanford Site Solid Waste Acceptance Criteria* (FDH 1998) identifies criteria for acceptance of waste at the CWC and ETF. *Environmental Restoration Disposal Facility Waste Acceptance Criteria* (BHI 1998b) and *Supplemental Waste Acceptance Criteria for Bulk Shipments to the Environmental Restoration Disposal Facility* (BHI 1997) provide the waste acceptance criteria for the ERDF.

4.1.7 Reporting Requirements for Nonroutine Releases or Abnormal Conditions

4.1.7.1 Federal Hazardous Substance. 40 CFR 302 requires immediate notification to the National Response Center upon discovery of a release of a hazardous substance into the environment in excess of a reportable quantity.

40 CFR 355 requires immediate notification to the community emergency coordinator for the local emergency planning committee and to the state emergency response commission for a release of a reportable quantity of an extremely hazardous substance or a comprehensive release of a reportable quantity of an extremely hazardous substance or a CERCLA hazardous substance.

4.1.7.2 Dangerous Waste/State Hazardous Substance. WAC 173-303-145 requires immediate notification for any release of a dangerous waste or a state hazardous substance such that human health or the environment is threatened, regardless of the quantity. Notifications must be made to Ecology as well as to local authorities in accordance with the local emergency plan.

WAC 173-303-360 requires immediate notification to Ecology in the event of a release, fire, or explosion at a dangerous waste TSD facility or from a less-than-90-day accumulation area if the event represents an emergency that could threaten human health or the environment. In addition, immediate notification to local authorities is required if the facility emergency coordinator determines that evacuation of local areas may be advisable. A written report on any incident that requires implementation of the facility contingency plan must be submitted to Ecology within 15 days in accordance with WAC 173-303-360(2)(k).

4.1.7.3 Polychlorinated Biphenyl Spills. 40 CFR 761.125 requires notification in the shortest time possible after discovery (but no later than 24 hours) to the Pesticides and Toxics Substances Branch of the EPA regional office for PCB spills in excess of 4.5 kg (10 lb).

4.1.7.4 Dangerous Waste Reports. WAC 173-303-220 requires an annual report from generators of dangerous waste. This provision will apply to any activities undertaken at the 105-B Reactor Facility resulting in the generation of a dangerous waste.

The Tri-Party Agreement (Ecology et al. 1998) requires an annual report pertaining to any LDR mixed waste generated, treated, stored, or disposed of at the Hanford Site. S&M activities at the 105-B Reactor Facility involving LDR mixed waste will need to be included in this report.

The Project Hanford Management Contractor (PHMC) is responsible for coordination of the preparation and compilation of the dangerous waste reports. The 105-B Reactor Facility S&M project will provide applicable information to the PHMC to support development of these reports, as appropriate.

4.2 STANDARDS CONTROLLING RELEASES TO THE ENVIRONMENT

The radionuclide emission standards (40 CFR 61, Subpart H, and WAC 246-247) will apply if any fugitive air emissions of radionuclides are generated during hazard mitigation and S&M activities.

If it is determined that there is a potential for nonzero radioactive emissions, an Air Monitoring Plan (AMP) will be required. The AMP will quantify the radioactive emissions, identify and implement the best available radionuclide control technology and air monitoring. The only hazard mitigation measures and S&M activities identified to date that have the potential-to-emit are the ventilation upgrades and the roof replacement. Prior to conducting these two mitigation measures, an AMP will be developed and put in place. Additionally, if any other activities are deemed to require an AMP, one will be obtained before work commences.

Once an AMP is issued the regulations require notification to the Washington State Department of Health within 24 hours of any shutdown, or of any transient abnormal condition lasting more than four hours, or other change in facility operations which, if allowed to persist, would result in emissions of radionuclides in excess of applicable standards. If requested by the Department of Health, a written report must be submitted within 10 days.

Standards for surface waste discharges and underground injection of rainwater are applicable to the 105-B Reactor Facility because all floor drains in the building are still intact and discharge to the process sewer, which is also intact. Spills are expected to be fully contained within the 105-B Reactor Facility. However, a variety of release reporting requirements may apply if a release to the environment were to occur. In addition to spill and release reporting requirements, routine reporting requirements apply to S&M activities as well.

4.3 CULTURAL, HISTORICAL, AND ECOLOGICAL RESOURCE PROTECTION STANDARDS

A total of 14 buildings and structures within the reactor compound have been recorded on historic property inventory forms. Of that number, 10 properties, which include the 105-B Reactor Facility, have been determined eligible for the National Register as contributing properties within the Manhattan Project and Cold War Era Historic District recommended for individual documentation (DOE-RL 1998b). The removal action will comply with the provisions of the *Archeological and Historic Preservation Act of 1974* (16 U.S.C. 469-469c) and the *National Historic Preservation Act of 1966* (16 U.S.C. 470, et seq.) by maintaining the historically significant 105-B Reactor Facility while not impacting the actions necessary to protect human health and the environment.

Ecological resource protection standards (*Endangered Species Act of 1973* [16 U.S.C. 1531, 50 CFR 402, and WAC 232-012-297] and the *Migratory Bird Treaty Act* [16 U.S.C. 703]) will have limited applicability because very few actions will occur outside of the 105-B Reactor

Facility. Ecological surveys have been conducted and have determined that no adverse impacts on protected species or critical habitat will result from the removal action and S&M.

5.0 PROJECT MANAGEMENT AND ORGANIZATION

5.1 PROJECT SCHEDULE AND COST ESTIMATE

The 105-B Reactor Facility removal action has been scheduled and estimated using the ERC hierarchy of schedules, which include activity logic and restraints. Activities will be resource loaded for both nonmanual and manual personnel. Equipment needs are identified and other materials are estimated and included in the budgeted cost of work scheduled.

Estimates of project costs have been prepared at the activity level by the project team and subsequently have been reviewed and approved by the ERC, RL, EPA, and Ecology. Cost collection will occur at the code of account level.

The schedule, which encompasses the work scope of the 105-B Reactor Facility removal action (beginning in fiscal year 2002 through project completion), is included in Appendix A. A more detailed schedule, including assumptions, resources, and activity breakdown, will be developed and submitted with the detailed work plans for each fiscal year.

Schedule status is reviewed periodically in review meetings. On a monthly basis, cost and schedule performances are reviewed by the ERC. Members of DOE, EPA, and Ecology are invited to participate in these review meetings.

5.1.1 Project Cost and Schedule Tracking

Performance measurement and analysis is performed by the Surveillance, Maintenance, and Transition (SM&T) Project Planning and Controls organization. Project cost and schedule are controlled and updated using the ERC Management Control System, as described in BHI-PC-01, *Baseline and Funds Management System.*

An earned-value system tracks the cost, schedule, and performance for all SM&T projects as they progress towards completion. Cost/schedule performance reports provide budgeted cost of work scheduled comparisons and budgeted costs of work performed against the actual cost of work performed. These reports provide variances to the baseline schedule and cost as budgeted in the project's detailed work plan. Variances above threshold values are documented, as well as the rationale for the variance(s) and any recovery plan required.

Trends and baseline change proposals are readily identified through the ERC formal trend and change control program (BHI-PC-01, PCP 1.11, "Trend Identification, Monitoring, and Analysis," and PCP 1.12, "Baseline Change Control"). All changes that affect the baseline are documented. The ERC trend register, which is reviewed monthly by ERC senior management, categorizes trends from conception to final resolution. Trends are identified as either performance trends or scope trends and are further defined as resolved or unresolved.

Fiscal year project staffing, as budgeted, is reconciled monthly during the project reviews to the actual number of full-time-equivalent personnel used during the month. Likewise, the corresponding number of hours actually worked are presented and compared to the budgeted current work plan. Actual overtime is monitored monthly (by department) and reconciled to the current budgeted overtime.

Cost and schedule variances to the current budget are tracked both on a monthly and to-date basis and are reconciled back to the cause of the variance. Project impacts due to the cost and/or schedule variance are described and corrective actions are identified and tracked to the point of final resolution.

5.2 CONDUCT OF OPERATIONS

Conduct of operations is imposed to ensure that work is performed in a controlled and organized manner, that all facets of work activities have been considered, and that necessary documentation is maintained. In accordance with DOE Order 5480.19, *Conduct of Operations Requirements for DOE Facilities*, operations at DOE facilities are to be conducted in a manner to ensure an acceptable level of safety. Operators at DOE facilities have procedures in place to control the conduct of their operations. Line organizations review existing and planned programs important to safe and reliable facility operations and assess the effectiveness of corporate directives, plans, or procedures at facilities under their cognizance.

The *Surveillance/Maintenance and Transition Project Manager's Implementing Instructions* (PMII) (BHI 2000b) provides policy, performance standards, and administrative procedures to support the ERC CONOPs Program. The PMII is based on a graded approach to the conduct of operations authorized by DOE Order 5480.19 Chg 2, and the ERC SM&T conduct of operations applicability matrix. The PMII are applicable to all ERC personnel, assigned or matrixed, who perform activities under the responsibility and direction of the SM&T project manager.

Conduct of operations strongly emphasizes technical competency, workplace discipline, and personal accountability to ensure the achievement of a high level of performance during all activities. Safety is the first priority, and all planning will include appropriate safety analyses to identify potential safety and health risks and the means to appropriately mitigate them. Workers will not start work until approved safety procedures, instructions, and directions that implement the Integrated Environment, Safety, and Health Management System are provided.

Conduct of operations requires workers to be alert and aware of conditions affecting the job site. Operators and workers conducting field activities should be notified of changes in the building and/or work area status, abnormalities, and difficulties encountered in performing project operations. Similarly, operators and workers will notify the chain of command of any unexpected situations. In accordance with the severity of a finding (i.e., emergency condition), notification requirements will be expanded to include upper-tier management and regulatory agencies.

5.3 CHANGE MANAGEMENT/CONFIGURATION CONTROL

If a change arises that results in a fundamental change to the selected response action that is not within the scope, another EE/CA or proposed plan and supporting documentation will be prepared to allow DOE and EPA to select a revised response action.

Established configuration/change control processes ensures that proposed changes are reviewed in relation to the specified commitments. If a breach of these commitments is discovered, work ceases so that stabilization and/or recovery actions may be identified and implemented as appropriate. Change management will comply with BHI-MA-02, *ERC Project Procedures*, Procedure 8.3, "Configuration Management and Change Control (CMCC)." BHI-DE-01, *Design Engineering Procedures Manual,* EDPI 4.40-01 defines the Management of Change process for facilities that have a final hazard classification of less than nuclear. The Management of Change process is used for the following purposes:

- Evaluate the impact of proposed changes that could affect authorization basis documents
- Determine whether proposed changes require prior DOE approval
- Evaluate the impact of discovered conditions
- Evaluate the effect of deviations from activities or commitments described in authorization basis documents.

5.4 PERSONNEL TRAINING AND QUALIFICATIONS

During the performance of project activities, the experience and capabilities of the operating staff are extremely important in maintaining worker and environmental safety. Day-to-day knowledge of ongoing operations, understanding conditions encountered, and lessons learned are vital to continued safe operations. The ERC Training Program provides workers with the knowledge and skills necessary to safely execute assigned duties. A graded approach is used to ensure that workers receive a level of training commensurate with their responsibility that complies with applicable requirements.

Radiation worker training ensures personnel have been instructed to work safely in and around radiological areas, and to maintain their individual radiation exposure and the radiation exposures of others ALARA. ERC RCTs are required to have completed and be current in RCT qualification training. These training courses require the successful completion of examinations to demonstrate understanding of theoretical and classroom material.

Specialized training will be provided as needed to instruct workers in the use of nonstandard equipment, in the performance of abnormal operations, and in the hazards of specific activities. Specialized training may be provided by on-the-job training activities, classroom instruction and testing, or pre-job briefings. The depth of training in any discipline will be commensurate with the degree of the hazard(s) involved and the knowledge required for task performance. Some activities will require the acquisition of expert services such as assaying waste packages for disposal.

5.5 QUALITY ASSURANCE REQUIREMENTS

The overall quality assurance for the removal action work plan will be planned and implemented in accordance with DOE Order 414.1A, 10 CFR 830.120, and other applicable standards. The quality assurance activities will be graded based on the potential impact on the environment, safety, health, reliability, and continuity of operations. Specific activities include quality assurance implementation, responsibilities and authority, document control, quality assurance records, and audits. These activities are discussed in the following subsections.

5.5.1 Quality Assurance Implementation

All project-related activities will establish and implement appropriate quality assurance requirements. Conditions adverse to quality will be identified in nonconformance reports, audit reports, surveillance reports, and corrective action requests. Investigation and corrective actions in response to these adverse conditions will be completed in a timely manner.

5.5.2 Responsibilities and Authority

BHI must perform quality engineering, design reviews, surveillance, and audits (as necessary) to achieve quality assurance objectives. BHI must also ensure that the various contractors and design agencies establish design and quality assurance programs to control design in accordance with applicable requirements. The SM&T contractor(s) must establish, implement, and document an inspection plan in accordance with approved specifications and drawings.

5.5.3 Document Control

The SM&T documents, such as specifications and drawings, will be controlled in accordance with approved configuration management procedures. The responsible design agency will maintain control of the design documents through acceptance of the documents. A project records checklist will be initiated to identify those records required for the final project file.

5.5.4 Quality Assurance Records

Each organization that maintains quality assurance records will be required to control the records in accordance with applicable BHI quality assurance requirements.

5.5.5 Audits/Assessments

Internal and external audits are to be performed by the Assessments, Regulatory, and Quality Programs organization to ensure project compliance with the quality assurance program requirements.

5.5.6 Self-Assessments

Self-assessments will be conducted by project personnel to determine compliance in accordance with the requirements of BHI-MA-02, Procedure 2.7, "Self-Assessment."

5.6 PROJECT CLOSEOUT

After completion of all removal action activities, a project closeout report will be prepared. The report will include a general summary of the following: waste dispositioned, project costs, lessons learned, and summarization of characterization and monitoring data. The report will be forwarded to the records retention center where it will be included in the Administrative Record for the 105-B Reactor Facility.

6.0 SURVEILLANCE AND MAINTENANCE PLAN

6.1 PURPOSE AND OBJECTIVES OF SURVEILLANCE AND MAINTENANCE PLAN

The purpose of the S&M activities identified in this document is to ensure that the 105-B Reactor Facility is maintained in a safe, environmentally secure, and cost-effective manner until a final decision is made on the long-term status (e.g., historic preservation, interim safe storage) of the 105-B Reactor Facility structure and contents. Routine S&M activities will be performed in all areas of the 105-B Reactor Facility to protect workers and the public and prevent releases of hazardous substances to the environment during the 10-year interim action. S&M activities encompass all areas of the 105-B Reactor Facility including the areas designated for public access. This information has been prepared in accordance with the guidelines provided in the DOE Office of Environmental Management Decommissioning Resource Manual (DOE 1995) and Section 8.6 of the Tri-Party Agreement (Ecology et al. 1998). Additionally, completion of this plan meets the Tri-Party Agreement Milestone M-93-06, "Complete Removal Action Work Plan/S&M Plan for B Reactor," by June 30, 2002.

The public access area S&M will consist of minor activities such as general housekeeping and radiation surveys and will begin following hazard mitigation of the public access area. The S&M for outside the public access area will be more intensive and is occurring at the same time as the hazard mitigation.

The following S&M activities will be conducted in the same manner as for the removal action as described previously:

- Hazard mitigation activities are the same as the removal action work activities described in Section 2.1
- Emergency preparedness is as described in Section 3.1
- Safeguards and security are the same as the removal action activities described in Section 3.2
- Health and safety requirements are as described in Section 3.4
- Radiological controls are as described in Section 3.4.3
- Environmental compliance and waste management requirements are as described in Section 4.0
- Cost and schedule are as described in Section 5.1

- Quality assurance is as described in Section 5.5.

Many objectives of the S&M program may be similar to or overlap those of the removal action work plan. Specific objectives of the S&M program are as follows:

- Ensure adequate confinement of remaining radioactive materials and hazardous substances
- Maintain access control for entries into the 105-B Reactor Facility
- Maintain the 105-B Reactor Facility in a manner that will minimize potential risks to the public, the environment, and onsite workers
- Provide adequate frequency of inspections to identify new potential hazards
- Maintain selected systems or equipment that will be essential for worker safety during hazard mitigation and to ensure safe public access
- Provide a mechanism for the identification and compliance with applicable environmental, safety and health, and safeguard and security requirements
- Preserve crucial information, documentation, and 105-B Reactor Facility artifacts to ensure compliance with future disposition decision(s) regarding the final end-state of the 105-B Reactor Facility
- Inspect and mitigate potential hazards associated with the natural aging of the facility that are above risk thresholds and warrant action in order to protect workers, the public, or the environment.

6.2 SURVEILLANCE AND MAINTENANCE ACTIVITIES

Although all operating/processing equipment inside the 105-B Reactor Facility has been deactivated, routine surveillance, maintenance, and radiological monitoring activities will be required to ensure worker and public safety and environmental protection. Some of the necessary S&M requirements will be satisfied by the removal action activities. Additional S&M activities outside the scope of the removal action will include the following:

- Annual surveillance of general facility condition
- Surveillance and maintenance of barriers and postings
- Identification and containment of asbestos (outside the public access area)
- Inspection and maintenance of asbestos containment

- Waste container management
- Repair and upgrades of structural components
- Caulking cracked walls
- Inspection for and response to spills
- Removal/disposal of hazardous materials (outside the public access area)
- Nondestructive assay, waste characterization, and sampling (outside the public access area)
- Removal of nonprocess equipment
- General inspections and periodic entries into many areas within the 105-B Reactor Facility to support public access
- Radiological surveys to support public access (e.g., tours) and surveillances
- General housekeeping activities (e.g., floors, displays, public access areas, bathrooms).

Surveillance activities at the 105-B Facility are conducted in accordance with BHI-FS-01, *Field Support Administration*, Section 3.1, "Surveillance and Maintenance."

6.2.1 Hazard Analysis for S&M Activities

Hazard analyses are conducted for S&M activities in accordance with the work control process. The project team examines available hazard analysis data and proposed activities, and develops controls for hazards that may pose a threat to workers, the public, or the environment. BHI-SH-02, Procedure 1.7, "Project Safety Planning and Documentation," in concert with BHI-FS-01, Procedure 2.1, "Work Control," and Procedure 2.4 "Job Hazard Analysis," ensure that the appropriate level of safety documentation is implemented for all S&M work activities.

7.0 REFERENCES

10 CFR 830, "Nuclear Safety Management," *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.

40 CFR 266, "Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities," *Code of Federal Regulations*, as amended.

40 CFR 268, "Land Disposal Restrictions," *Code of Federal Regulations,* as amended.

40 CFR 302, "Designation, Reportable Quantities, and Notification," *Code of Federal Regulations*, as amended.

40 CFR 355, Appendix A, "List of Extremely Hazardous Substances and Their Threshold Planning Quantities," *Code of Federal Regulations*, as amended.

40 CFR 761, "Polychlorinated Biphenyls (PCBs)," *Code of Federal Regulations*, as amended.

49 CFR 100-179, "U.S. Department of Transportation Requirements for the Transportation of Hazardous Materials," *Code of Federal Regulations,* as amended.

50 CFR 402, "Interagency Cooperation – Endangered Species Act of 1973," *Code of Federal Regulations*, as amended.

58 FR 49200, 1993, "Amendment to the National Oil and Hazardous Substances Pollution Contingency Plan; Procedures for Planning and Implementing Off-Site Response Actions," *Federal Register,* Vol. 58, pp. 49200 (September 22).

Archeological and Historic Preservation Act of 1974, 16 U.S.C. 469-469c, et seq.

BHI, 1997, *Supplemental Waste Acceptance Criteria for Bulk Shipments to the Environmental Restoration Disposal Facility*, 0000XDC-W0001, Rev. 2, Bechtel Hanford, Inc., Richland, Washington.

BHI 1998a, *Data Quality Objective Summary Report for Phase II of the 105-F and –DR Reactor Buildings*, BHI-01213, Bechtel Hanford Inc., Richland, Washington

BHI, 1998b, *Environmental Restoration Disposal Facility Waste Acceptance Criteria*, BHI-00139, Rev. 3, Bechtel Hanford, Inc., Richland, Washington.

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BHI, 2000a, *Surplus Reactor Auditable Safety Analysis,* BHI-01172, Rev. 1, Bechtel Hanford, Inc., Richland, Washington.

BHI, 2000b, *Surveillance/Maintenance and Transition Project Project Manager's Implementing Instructions,* 0000X-PMII-G0001, Rev. 2, Bechtel Hanford, Inc., Richland, Washington.

BHI-DE-01, *Design Engineering Procedures Manual*, Bechtel Hanford, Inc., Richland, Washington.

BHI-EE-10, *Waste Management Plan*, Bechtel Hanford, Inc., Richland, Washington.

BHI-EE-12, *ERC Transportation Manual*, Bechtel Hanford, Inc., Richland, Washington.

BHI-FS-01, *Field Support Administration*, Section 3.1, "Surveillance and Maintenance," Bechtel Hanford, Inc., Richland, Washington.

BHI-MA-02, *ERC Project Procedures*, Bechtel Hanford, Inc., Richland, Washington.

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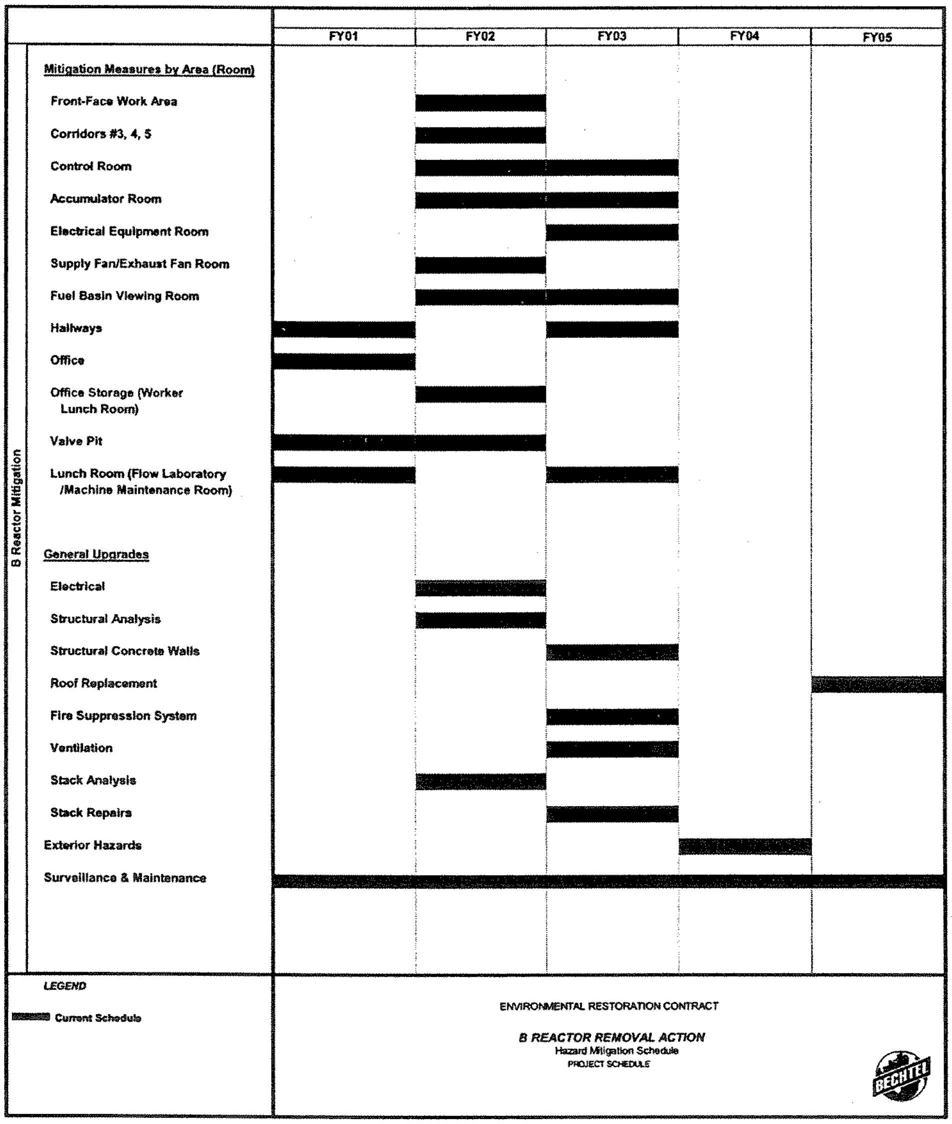
APPENDIX A

B REACTOR REMOVAL ACTION
HAZARD MITIGATION PROJECT SCHEDULE

Figure A-1. Project Schedule.



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