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ATTACHMENT

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

**DOE/RL-2001-68**
**Decisional Draft Revision 1**

**June 2011**

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

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

U.S. DEPARTMENT OF ENERGY | Richland Operations Office

**P.O. Box 550**
**Richland, Washington 99352**

**Clearance process not performed.**

DOE/RL-2001-68
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# Removal Action Work Plan and Surveillance and Maintenance Plan for the 105-B Reactor Facility

P. M. Rogers
Mission Support Alliance

Date Published
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## Signature Sheet

Signature sheet for the Removal Action Work Plan and Surveillance and Maintenance Plan for the 105-B Reactor Facility. This action is conducted by the U.S. Department of Energy with the approval of the U.S. Environmental Protection Agency.

| | |
|---|---|
| Colleen French<br>Office of the Deputy Manager<br>U.S. Department of Energy<br>Richland Operations Office | Date |

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## Signature Sheet

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| | |
|---|---|
| Dennis Faulk<br>Manager<br>Region 10<br>U.S. Environmental Protection Agency | Date |

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## EXECUTIVE SUMMARY

This removal action work plan (RAWP) describes the activities necessary to mitigate chemical and radiological hazards in the 105-B Reactor Facility. This document also provides a summary of structural, mechanical, and electrical engineering upgrades designed to preserve the aging reactor facility for future use as a public tour facility. The 105-B Reactor Facility has been designated as a National Historic Landmark, and as such, the engineering upgrades and hazardous material mitigation activities are designed to preserve the facility for future generations while maintaining the original historic character of the facility. Associated with the National Historic Landmark status, it has been determined by the U.S. Department of Energy, Richland Operations Office that certain railcars (e.g., locomotives and various types of "well cars" or "cask cars") historically used for transportation of irradiated nuclear fuel may be sent to the 105-B Reactor for reuse and display, if practicable. The intent of this RAWP is to describe the activities to be performed during the removal action and surveillance and maintenance with a level of detail to accomplish the work as required by the Action Memorandum addendum. The work activities described herein will enable the U.S. Department of Energy to continue public access until the 105-B Reactor Facility undergoes final disposition.

Portions of the 105-B Reactor Facility are contaminated with chemical and radiological hazardous substances that pose a potential risk to human health and the environment, warranting a non-time-critical removal action under the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*[1] (CERCLA). The Action Memorandum (EPA 2002, *Action Memorandum for the 105-B Reactor Facility, Hanford Site, Benton County, Washington*[2]) documented the chosen hazard removal option as recommended in the engineering evaluation/cost analysis (DOE/RL-2001-09, *Engineering Evaluation/Cost Analysis for the 105-B Reactor Facility*[3]). Revision 0 of DOE/RL-2001-68, *Removal Action Work Plan and Surveillance and Maintenance Plan for the 105-B Reactor Facility*[4], provided the implementing guidance for removal action activities and direction for performing surveillance and maintenance.

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[1] Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 USC 9601, et seq.

[2] EPA, 2002, *Action Memorandum for the 105-B Reactor Facility, Hanford Site, Benton County, Washington, CCN 096526,* U.S. Environmental Protection Agency, Region 10, Seattle, Washington.

[3] DOE/RL-2001-09, 2001, *Engineering Evaluation/Cost Analysis for the 105-B Reactor Facility*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

[4] DOE/RL-2001-68, 2002, *Removal Action Work Plan and Surveillance and Maintenance Plan for the 105-B Reactor Facility,* Draft A, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

Hazardous material mitigation activities will result in risk reduction to visitors and will allow for public access to additional rooms/areas of the facility. The hazardous material mitigation activities include decontamination of radiological hazards, removal of asbestos, lead, mercury and polychlorinated biphenyl contaminated materials and biological hazards. In addition, floor drains will be grouted and sealed to prevent further collection of material. The estimated cost to implement the hazardous material mitigation activities is $11,558,000.

Engineering upgrades to the facility are expected to be performed in conjunction with the hazardous material mitigation and are briefly discussed in this document for informational purposes only. Structural, mechanical, and electrical upgrades will support preservation of the facility. Upgrades may include replacement of the facility roof and reinforcement of walls, updating the ventilation system, restoration of the original restroom facilities, and installation of emergency egress lighting, updated lighting fixtures, panel boards and fire alarm control panels.

This revision of the RAWP briefly describes the site conditions, the reactor facility, its historical significance, past CERCLA actions, extent of remaining contamination, and the activities planned to remove contamination. These activities will be performed in a manner that preserves the facility's historical significance. Upon completion of the removal action activities, additional areas of the facility are expected to be available for public access.

The Surveillance and Maintenance Plan, the Waste Management Plan, and the Air Monitoring Plan are provided as appendices to this RAWP.

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## TERMS

| | |
|---|---|
| ALARA | as low as reasonably achievable |
| ARAR | applicable or relevant and appropriate requirement |
| BARCT | best available radiological control technology |
| CERCLA | *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* |
| CFR | *Code of Federal Regulations* |
| CMU | concrete masonry unit |
| DOE | U.S. Department of Energy |
| DOE-RL | U.S. Department of Energy, Richland Operations Office |
| DOT | U.S. Department of Transportation |
| Ecology | Washington State Department of Ecology |
| EE/CA | engineering evaluation/cost analysis |
| EIS | Environmental Impact Statement |
| EPA | U.S. Environmental Protection Agency |
| ERDF | Environmental Restoration Disposal Facility |
| ETF | Effluent Treatment Facility |
| FR | *Federal Register* |
| FSB | fuel storage basin |
| FY | fiscal year |
| HCP EIS | *Record of Decision: Final Hanford Comprehensive Land Use Plan Environmental Impact Statement (HCP EIS)* (DOE 1999) |
| HEPA | high-efficiency particulate air |
| LLW | low-level waste |
| MLLW | mixed low-level waste |
| MPR | maximum public receptor |
| MSA | Mission Support Alliance, LLC |
| NEPA | *National Environmental Policy Act of 1969* |
| NPS | National Park Service |
| PCB | polychlorinated biphenyl |
| PTE | potential-to-emit |
| QA | quality assurance |
| RACM | regulated asbestos containing material |
| RAO | removal action objective |
| RAR | response action report |
| RAWP | removal action work plan |
| RCRA | *Resource Conservation and Recovery Act of 1976* |
| RCW | *Revised Code of Washington* |
| ROD | record of decision |

| | |
|---|---|
| RWP | radiological work permit |
| S&M | surveillance and maintenance |
| SSHASP | site specific health and safety plan |
| TBC | to-be-considered |
| TEDE | total effective dose equivalent |
| Tri-Party Agreement | *Hanford Federal Facility Agreement and Consent Order* (Ecology et al. 1989) |
| TSCA | *Toxic Substances Control Act of 1976* |
| VSR | vertical safety rod |

# 1.0 INTRODUCTION

The 105-B Reactor Facility 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 (EPA'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. As such, DOE has determined that a non-time-critical removal action is warranted at this facility.

Alternatives for conducting a non-time-critical removal action were evaluated in DOE/RL-2001-09, *Engineering Evaluation/Cost Analysis for the 105-B Reactor Facility*. The engineering evaluation/cost analysis (EE/CA) resulted in the recommendation to perform hazards mitigation activities to protect human health and the environment and to support future public access to the 105-B Reactor Facility. The DOE is the lead agency responsible for implementing the removal action at the 105-B Reactor Facility, and the EPA is the lead regulatory agency. This removal action work plan (RAWP) supports implementation of the non-time-critical removal action. The surveillance and maintenance (S&M) 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.

## 1.1 PURPOSE

Based on the potential hazards, the following removal action objectives (RAOs) have been identified to mitigate hazards and preserve access to the 105-B Reactor Facility:

- Reduce the inventory of hazardous substances within the 105-B Reactor Facility
- Protect visitors and personnel from chemical and radiological hazards posed by the facility
- Preserve the structural integrity of the facility
- Prevent adverse impacts to this historical, significant building
- Achieve applicable or relevant and appropriate requirements (ARARs) to the fullest extent practicable
- Reduce or eliminate the potential for a release of contaminants
- Safely manage (treat and/or dispose of) waste streams generated by the removal action
- Reduce or eliminate the need for future S&M activities.

## 1.2 SCOPE

This RAWP identifies the activities to be performed at the 105-B Reactor Facility. These activities are as follows:

- Remove remaining environmental hazards to minimize exposure to the public and workers
- Decontaminate and/or stabilize building surfaces
- Stage waste within the removal action area
- Package, store, and ship waste to an approved disposal facility
- Perform air monitoring activities for radioactive and toxic criteria emissions
- Perform surveillance and monitor the building and its remaining equipment
- Perform maintenance activities to maintain the facility in a safe manner
- Provide upgrades to the facility infrastructure to enhance visitor comfort.
- Perform engineering upgrades in support of preservation of the facility.

The scope of the removal action is limited to removal of radiological and chemical hazards in various locations (rooms and areas) within the 105-B Reactor Facility and railcars, as conditions warrant. A summary of engineering upgrades to the building to preserve the facility for future use as a public tour facility has been included for informational purposes only. The scope of this RAWP does not include deactivation and decommissioning of the building and the reactor pile. If the scope or schedule of this removal action needs to be modified due to unforeseen conditions, it will be made by the Project Managers for DOE Richland Operations Office (DOE-RL) and the Lead Regulatory Agency (EPA).

## 1.3 SITE CONDITIONS AND BACKGROUND

This section describes the 105-B Reactor Facility, provides a history of the regulatory process to date, and describes portions of the facility subjected to the removal activity. The removal action activities involve mitigation of environmental hazards. In addition, engineering upgrades will be performed to support preservation of the facility for future public access.

### 1.3.1 Regulatory Status Overview

Four areas of the Hanford Site (100, 200, 300, and 1100 Areas) were officially listed on the National Priorities List on November 3, 1989. This action officially put the 105-B Reactor Facility in the federal Superfund regulatory process under CERCLA authority. The *Hanford Federal Facility Agreement and Consent Order* (Ecology et al. 1989) (Tri-Party Agreement), the Federal Facility Agreement between DOE, Washington State Department of Ecology (Ecology), and EPA, was signed shortly thereafter. The Tri-Party Agreement is the legal document that binds DOE to environmental compliance and cleanup actions pursuant to compliance with the *Resource Conservation and Recovery Act of 1976* (RCRA), CERCLA, and RCW 70.105, "Hazardous Waste Management."

The 105-B Reactor Facility is identified as a "key" facility in Section 8.0, "Facility Disposition Process," of the *Hanford Federal Facility Agreement and Consent Order Action Plan* (Ecology et al. 1989). As such, the 105-B Reactor Facility is subject to the joint DOE-EPA "Policy on Decommissioning Department of Energy Facilities Under CERCLA" (DOE and EPA 1995). The policy endorses the use of non-time-critical removal actions under CERCLA authority to support DOE surplus facility decontamination and decommissioning activities. In 1992, 105-B Reactor Facility was added to the *National Register of Historic Places*. The *National Register of Historic Places* is the Nation's official list of cultural resources worthy of preservation. Authorized under the *National Historic Preservation Act of 1966*, the National Register is part of a national program administered by the National Park Service (NPS) to coordinate and support public and private efforts to identify, evaluate, and protect our historic and archeological resources. Properties listed in the National Register include districts, sites, buildings, structures, and objects that are significant in American history, architecture, archeology, engineering, and culture. For its role in the events that ended World War II, its contribution to the industrialization of plutonium production, and its status as a symbol of the World War II home front, the 105-B Reactor Facility holds a powerful historic significance. To ensure historic integrity, any physical alterations to the historic appearance of the 105-B Reactor Facility will be reviewed and approved by the State Historic Preservation Office.

The environmental impacts associated with the ultimate disposal of the Hanford Site reactors (excluding N Reactor) were evaluated under the authority of the *National Environmental Policy Act of 1969* (NEPA). In 1992 and 1993, the DOE issued an Environmental Impact Statement (EIS) (DOE/EIS-0119F, *Final Environmental Impact Statement: Decommissioning of Eight Surplus Production Reactors at the Hanford Site, Richland, Washington*) and record of decision (ROD) (58 FR 48509, "Record of Decision: Decommissioning of Eight Surplus Reactors at the Hanford Site, Richland, Washington, Environmental Impact Statement"), for the decommissioning of the eight surplus production reactors along the Columbia

River, including the 105-B Reactor Facility. The EIS and associated ROD recommended "interim safe storage followed by one-piece removal" for the surplus production reactors. The interim safe storage period extends up to 75 years or until the year 2068 (75 years from year 1993). Following the interim safe storage period, one piece removal of the reactor cores would occur with disposal on the Central Plateau. The ROD acknowledged the nomination and inclusion of the 105-B Reactor Facility on the *National Register of Historic Places* and notes that specific actions to mitigate cumulative impacts of decommissioning on the historic preservation of 105-B Reactor Facility will be determined later per 36 CFR 800, "Protection of Historic Properties."

In September 1995, BHI-00076, *105-B Reactor Facility Museum Phase I Feasibility Study Report,* was issued. Since the issuance of the surplus reactor ROD in 1993 (58 FR 48509), a decision was made to place the 105-B Reactor Facility on the *National Register of Historic Places*. Steps were taken towards preservation; including the installation of visitor displays, conducting hazard mitigation activities along the tour route, and conducting public tours of accessible areas. Some areas contain residual contamination and are not on the tour route. This study was conducted to define activities necessary to continue using the 105-B Reactor Facility as a public tour facility, evaluate the technical feasibility of those activities, examine the cost effectiveness of a public tour facility versus dismantlement, and evaluate options to improve the 105-B Reactor Facility as a public tour facility.

In November 1999, DOE 1999, *Record of Decision: Final Hanford Comprehensive Land Use Plan Environmental Impact Statement (HCP EIS),* was issued. The HCP EIS based its cleanup strategy on the assumption that ". . . the reactor blocks for the eight plutonium reactors will be kept in their present sites for up to 75 years . . .". The HCP EIS also made allowance for the 105-B Reactor Facility to be converted into a public tour facility and the surrounding area made available for public tour support facilities.

In June 2000, Bechtel Hanford issued BHI-01384, *105-B Reactor Museum Feasibility Assessment (Phase II) Project* to meet Tri-Party Agreement Milestone M-93-05. This report provided the basis and supporting documentation necessary to prepare the 105-B Reactor Facility for partial, unescorted-access public tours. Hazards and deficiencies in the 105-B Reactor Facility and proposed corrective actions were provided in this report. The report selected measures to reduce or eliminate risk to persons touring the facility, provided for appropriate accessibility under the *Americans with Disabilities Act of 1990*, and retained the character of the building to the maximum extent possible as dictated by its *National Register of Historic Places* status.

In June 2001, an EE/CA (DOE/RL-2001-09) was prepared to support and implement the DOE's decision to preserve the 105-B Reactor Facility for a period of up to 10 years during which decisions on the final configuration of 105-B Reactor Facility could be made. The EE/CA (DOE/RL-2001-09) was followed by the Action Memorandum (EPA 2002, *Action Memorandum for the 105-B Reactor Facility, Hanford Site, Benton County, Washington*) that documented the EE/CA recommendations.

In June 2002, DOE/RL-2001-68, *Removal Action Work Plan and Surveillance and Maintenance Plan for the 105-B Reactor Facility,* was issued pursuant to Tri-Party Agreement Milestone M-93-06. The EPA approved DOE/RL-2001-68 on August 16, 2002. DOE/RL-2001-68 provided the guidance for implementing the approved alternative (Alternative 3 - Hazards Mitigation for Public Access) and direction for performing S&M activities.

In February 2003, DOE/RL-2002-43, *Evaluation of Final Configuration Alternatives for the 105-B Reactor Facility* was issued. This document provided the alternatives for placing the reactor in the final configuration with the assumption that there will be no long-term public use or structural preservation of the facility.

In July 2004, the DOE/RL-2004-55, *Engineering Evaluation/Cost Analysis for the Final Configuration of the 105-B Reactor Facility*, was drafted based on the assumption that a long-term sponsor cannot be found and there will be no long-term public use or structural preservation of the facility. This draft was prepared to meet the Tri-Party Agreement Milestone C-16-06E, "Final Configuration of B-Reactor," but was never finalized.

In October 2004, President George W. Bush signed Public Law 108-340, *Manhattan Project National Historical Park Study Act,* directing the Secretary of the Interior, in conjunction with the DOE, to commission the NPS to conduct the *Manhattan Projects Sites Special Resources Study* to evaluate options for preserving and interpreting facilities at sites that were part of the World War II Manhattan Project. This study is intended to evaluate the potential for selected facilities at these sites to be included into the NPS system and/or to identify other management options. The 105-B Reactor Facility and T-Plant were Hanford Site facilities initially considered in the study.

In August 2005, DOE/RL-2005-45, *Surplus Reactor Final Disposition Engineering Evaluation* was issued to address Tri-Party Agreement Milestone M-93-25, "Submit an Engineering Evaluation of the Final Surplus Reactor Disposition to EPA and Ecology." The engineering evaluation reviewed the original assumptions and information contained in the final surplus production reactor EIS and ROD, including cost estimates and radiological inventories. It was concluded that no new information or technologies had been identified that would significantly change the conclusions of the EIS. The selected final disposition alternative, interim safe storage followed by deferred one-piece removal, appeared to be the most feasible in terms of duration, cost, and radiological dose.

In 2006, The NPS *Manhattan Projects Sites Special Resources Study* team conducted two public meetings with stakeholders in each of the study areas. The objective of the meetings was to present and describe the purpose and goals of the special resources study and to obtain input on the issues, concerns, and visions for the future of the various sites. The Hanford Site participants expressed strong support for preservation of the 105-B Reactor Facility as an interpreted historical exhibit.

In February 2007, the NPS team conducted a two-day workshop at the Hanford Site to review the results of their significance, suitability, and feasibility evaluation, and to develop a set of management options for the preservation and public use of the Hanford Site facilities. Since T-Plant did not meet the feasibility criterion, management options were considered only for the 105-B Reactor Facility.

On August 4, 2008, James Rispoli, Assistant Secretary for Environmental Management, gave direction to DOE-RL to prepare the 105-B Reactor Facility for routine public access by March 2009, and to begin a cost and alternatives analysis that can be used to support a formal decision on 105-B Reactor Facility's permanent status no later than fiscal year (FY) 2011.

On August 19, 2008, the 105-B Reactor Facility was declared a National Historic Landmark. In addition, the reactor has been recognized as a National Historic Mechanical Engineering Landmark by the American Society of Mechanical Engineers (1976), as a Nuclear Historic Landmark by the American Nuclear Society (1993), and as a National Civil Engineering Landmark by the American Society of Civil Engineers (1994). The 105-B Reactor Facility has also been listed on the National Register of Historic Places (1992) and recorded by the Historic American Engineering Record (2000).

In November 2009, the NPS Denver Office issued a draft of the *Manhattan Projects Sites Special Resources Study*. The study suggested that the 105-B Reactor Facility be excluded from the project. Public comments are being invited on the results of the study through a series of public meetings. Following the final revision of the draft study to incorporate public comments, the final study will be published, along with the associated ROD. The Secretary of the Interior will present the study results to

Congress and the report will be released to the public. It is anticipated that the removal action activities associated with the selected alternative will commence independent of the decisions documented in the NPS study and ROD.

In January 2011, DOE/RL-2010-84, *Removal Action Work Plan for Disposition of Surplus Railcars on the 212-R Rail Spur*, was issued to detail the decontamination, deactivation, decommissioning, and disposal of the railcars (e.g., locomotives and various types of "well cars" or "cask cars") that consist of 16 radiologically contaminated railcars that are staged on the 212-R rail spur. As noted in DOE/RL-2010-84 (page 13), it was determined by DOE-RL that certain railcars historically used for transportation of irradiated nuclear fuel may be sent to the 105-B Reactor for reuse and display, if practicable. DOE/RL-2010-84 (page 13) requires that, prior to relocating any railcar, it will be prepared for safe transfer, and the railcar(s) will be put in a configuration that supports reuse (i.e., radiological surveys and decontamination as appropriate, addition of self-leveling grout to cask and well cars for shielding and fixation of contamination, etc.). The removal action activities described in DOE/RL-2010-84 will ensure that any hazardous substances potentially within or on the railcars are placed in a protective and safe condition.

### 1.3.2 100-B/C Area Description

The 105-B Reactor Facility is located in the 100-B/C Area of the Hanford Site along the southern shore of the Columbia River in southeastern Washington State (Figures 1-1 and 1-2). The 100-B/C Area is a highly disturbed, fenced industrialized area covered with rocky soils and sparse, weedy vegetation dominated by Cheatgrass and Russian thistle. The 100-B/C Area contains two inactive reactor facilities, the 105-B Reactor and the 105-C Reactor. The 105-C Reactor has undergone interim safe storage and now exists in a safe storage enclosure under a long-term S&M program. The 105-B Reactor Facility is currently managed under an S&M program to ensure continued protection of human health and the environment through hazard mitigation. Guided tours are led through the 105-B Reactor Facility along a maintained tour route. Most of the support facilities for the 105-B and 105-C Reactors have been demolished. The 116-B Reactor Exhaust Stack remains standing adjacent to the 105-B Reactor Facility.

### 1.3.3 Facility Description

The 105-B Reactor Facility contains the reactor block, control room, spent fuel discharge area, fuel storage basin (FSB), fans and ducts to ventilate and re-circulate inert gas systems, water cooling systems, support offices, shops, and laboratories. The following subsections provide a brief description of the areas or rooms contained within the 105-B Reactor Facility that will be subject to removal action activities. Section 1.3.6 discusses the hazardous substances expected to be found in the facility.

***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 control rod room on the second level.

***Acid Mixing Room.*** The acid mixing room is located to the north of the valve pit area, above the valve pit extension area.

**Figure 1-1. Hanford Site Map.**

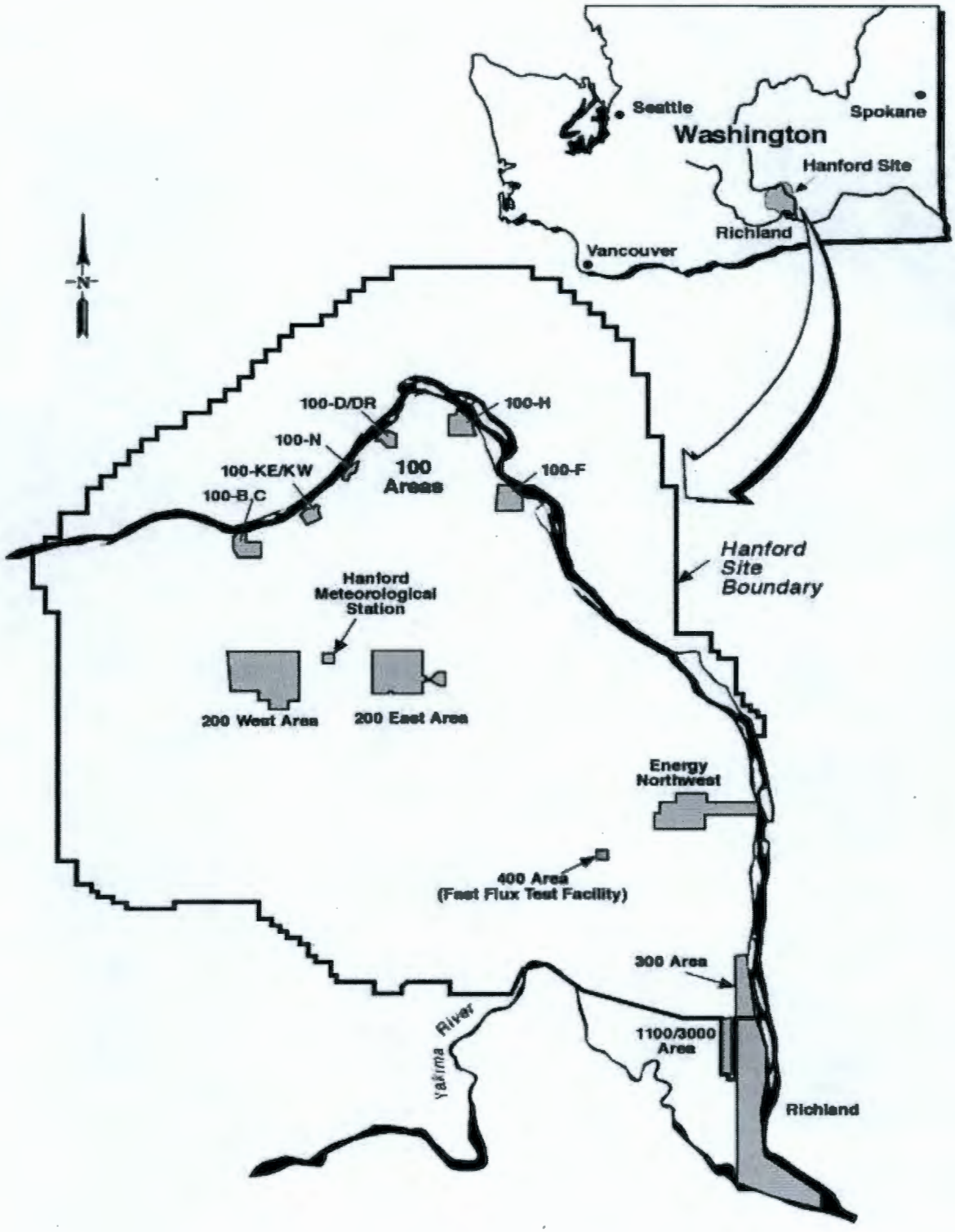

**Figure 1-2. 105-B Reactor Facility.**

***Area East of Air Conditioning Equipment Room.*** The area east of the air conditioning equipment room, also known as the instrument storage room, is located north of the control room (room 220) and south of the tool storage area corridor. It is currently used to store miscellaneous items that could later be used in displays along the public tour route.

***Ball Collection.*** The ball system consisted of hoppers full of boron-steel balls that would automatically drain into channels if the vertical safety rods (VSRs) did not terminate the chain reaction after receiving a shutdown signal. The hoppers are currently empty.

***Building #115.*** The building #115, also known as the helium rooms, is located on the south side of the 105-B Reactor Facility. The building #115 is only accessible from outside the facility.

***Charge Preparation Hallway.*** The charge preparation hallway (room 227a) is located to the east of the locker room and acid mixing room.

***Control Room, Control Room Hallway, Control Office A, Control Room Office B.*** 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 instrumentation and mechanisms for controlling the reactor and maintaining 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 (offices 219a and 219b/c). The control room and offices are part of the current tour route.

***Cubicle & Labyrinth South of Near Side Sample Room.*** The cubicle and labyrinth area is located east of the control room, adjacent to stair #7.

***Cushion Corridor.*** The cushion corridor runs along the north exterior of the control room, and control room offices. It continues to extend around the sample room including stair #7 and south to stair #2.

***Decontamination Room.*** The decontamination room is located on the west side of the 105-B Reactor below the valve pit flow lab.

***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.

***Electrical Switch Gear Room.*** See Office #1, Office #2, Office Storage Room, Electrical Switch Gear Room and Video Room.

***Elevator and Elevator Pit.*** The elevator and elevator pit area are located adjacent to the west side of the reactor block.

***Fan House Supply Fan/Exhaust Fan Rooms.*** The fan house consists of the supply fan room (room 315) and the exhaust fans (rooms 311, 312, 313, and 314). The area 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 inactive 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. 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.

***Fan House (Exhaust Chimney Manifold).*** See Fan House Supply Fan/Exhaust Fan Rooms description.

***Fan House (Exhausting Duct).*** See Fan House Supply Fan/Exhaust Fan Rooms description.

***Fan House (Exhaust Fans).*** See Fan House Supply Fan/Exhaust Fan Rooms description.

***Far Side Counterweight & Shaft for Front Face Elevator.*** The far side counterweight and shaft for the front face elevator is located on the south side of the front face elevator.

***Far Side and Near Side Counterweights & Shafts for Rear Face Elevator.*** Two counterweights and shafts for the rear face elevator are located on each side of the rear face elevator.

***Far Side Nozzle Shop.*** The far side nozzle shop is located south of the Reactor Block.

***Foyer, Metal Grating and Pit Entrance Far Side.*** Located on the south side of the 105-B Reactor on the southwest corner of the basin (spent fuel storage area). Allows access to pit #1 and pit #2.

***Front Face Reactor.*** See Reactor Block description.

***Front-Face Work Area.*** The front-face work area (room 110) is a 195 $m^2$ (2,100 $ft^2$) 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 the area posted as a fixed contamination area. The front-face work area is part of the present 105-B Reactor Facility tour route and contains a number of historical displays and interpretational items.

***Fuel Discharge Basin.*** See Fuel Storage Basin description.

***Fuel Discharge Storage Area.*** See Fuel Storage Basin description.

***Fuel Pits #1 and #2 and Pit #3.*** Located at the southwest corner of the fuel storage basin area.

***Fuel Storage Basin (Basin [Spent Fuel Storage Area] Work Area from Deck Planks to Ceiling/Basin Viewing Room.*** The basin work area (room 410) and basin viewing room (room 414) are located east of the rear face, separated from the reactor block by a 1.5 m (5 ft)-thick concrete wall. The spent fuel storage area basin served as an underwater collection, storage, and transfer facility for the irradiated fuel elements discharged from the reactor. The spent fuel storage area basin consisted of a fuel element pickup area, storage area, and transfer area covered with redwood planking. The basin is approximately 6 m (20 ft) deep. The redwood planking and the transfer area are visible from the basin viewing room.

***Infirmary.*** Located north of the control room offices.

***Inner Control Rod Room.*** The inner control rod room is located to the north of the reactor process area and above the control room at an elevation of 3.96 m (13 ft).

***Instrument Repairs Room.*** Located between the locker room and the electrical equipment room.

***Locker Room.*** See Restrooms, Shower and Locker Room.

***Machinery Room.*** The machinery room is located to the east of the reactor block at an elevation of 17.2 m (56.3 ft). This area does not include the stairs used for access.

***Near Side Counterweight & Shaft for Rear Face Elevator.*** See Far Side and Near Side Counterweights & Shafts for Rear Face Elevator description.

***Office #1, Office #2, Office Storage Room, Electrical Switch Gear Room, and Video Room.*** These rooms are located on the west side of the 105-B Reactor Facility, adjacent to the entrance door to the hallway 227a and 227b corridor No. 5. The rooms are currently used for a worker lunch room, offices, and storage area.

***Outer Control Rod Room.*** The outer control rod room is located to the north of the inner control rod room and the reactor block at an elevation of 3.96 m (13 ft), it lies above the control room and control room office area.

***Pit #3.*** See Fuel Pit description.

***Primary Coolant Pipe Tunnels.*** The primary coolant pipe tunnels run along the exterior of the front face work area.

***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 Reactor Facility 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).

***Rear (Discharge) Face Catwalk at Elevation 15 m (49 ft).*** See Rear Face Work Area.

***Rear (Discharge) Face Elevator.*** See Rear Face Work Area.

***Rear Face of Reactor Including Labyrinth up to Gates and Doors 104 & 107.*** See Rear Face Work Area

***Rear Face Work Area.*** The rear face work area is located east of the Reactor Block. The rear face work area is accessible through two stairways; one at the north end of the rear face work area, near Corridor 4 and the other at the south end of the rear face work area, near the western entrance to the transfer bay.

***Restrooms & Shower, Locker Room.*** The restrooms and shower are located to the north of the instrument repair room and the electrical equipment room. The locker room is located to the north of the valve pit area.

***Sample Room Including Stair #7.*** Located north-east of the control room.

***Sample Room (Sample Room #2) on South Side (Far Side).*** Sample room #2 is located on the southeast corner of the reactor on the second level.

***Shop and Storage Area Including Office A and Office B.*** The shop and storage areas are located at the far north of the 105-B Reactor directly north of the control room and control room offices.

***Stair #1, #2, and #5.*** The stairways are at various locations within the facility and contain lead hazards.

***Storage Area (Elevation 0.0 to 3 m [0.0 to 9.8 ft]).*** The storage area is located to the east side of the reactor fuel storage basin.

***Top of Reactor.*** See Reactor Block description.

***Transfer Area.*** The transfer area is located south of the spent fuel storage area basin and east of the rear face. Irradiated fuels were transferred to rail cars, which entered the transfer bay through a door in the east side of the room. The north end of the transfer bay is open to the spent fuel storage area basin.

***Valve Pit, Valve Pit Store Room #1 and Valve Pit Store Room #2.*** Adjacent to the Front Face Work Area (to the west) 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) and ran 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 valve pit flow lab (room 231a). The Valve Pit Store Rooms #1 and #2 are located at grade to the north of the Valve Pit.

***Valve Pit Extension.*** The valve pit extension is an area located below grade just to the north of the valve pit.

***Valve Pit Flow Lab.*** The valve pit flow lab includes the laundry room and machine maintenance room (room 231). It is located west of the valve pit and north of the supply fan room (room 315). The room contains displays for the current tour route.

***VSR Drives (Top of Reactor Block, Upper Deck).*** The VSRs were located on top of the reactor. Electromagnets held the VSRs with just the tips in the top of the thermal shield (BHI-01172).

***VSR Storage (Electromagnetic Room [Suspended Floor]).*** VSR Storage is located above the nozzle shop on the south side of the Reactor Block. The VSR storage is accessed from the stairs in the nozzle shop. The northern end of the VSR storage is exposed to the Reactor Block.

***Video Room.*** See Office #1, Office #2, Office Storage Room, Electrical Switch Gear Room and Video Room description.

***Walkways at Elevation 17.2 m (56.3 ft).*** The walkways surround the top of the reactor block on the north, east and south sides.

***Wash Area.*** The wash area is located on the east side of the fuel storage basin.

### 1.3.4 NEPA Values

NEPA and its implementing regulations (DOE O 451.1B, *National Environmental Policy Act Compliance Program*; DOE 2002, *DOE Policies on Application of NEPA to CERCLA and RCRA Cleanup Actions*; and DOE guidance for decommissioning [DOE G 430.1-4, *Decommissioning Implementation Guide*]) require that NEPA values be incorporated into decisions and documents as part of the CERCLA process. In accordance with the Secretary of Energy's Policy Statement on NEPA (DOE/RL-94-41, *NEPA Roadmap for the Environmental Restoration Disposal Facility Regulatory Package*) and DOE O 451.1B, NEPA values have been incorporated into this RAWP. This integration provides a more comprehensive analysis of potential impacts resulting from the proposed 105-B Reactor Facility removal activities. The integrated values include, but are not limited to, cumulative, ecological, cultural, historical, socioeconomic impacts, and irreversible and irretrievable actions.

### 1.3.5 Past Activities

The 105-B Reactor Facility has been deactivated. Deactivation included de-energizing the nonessential electrical sources and equipment, preserving tools and equipment, conducting routine housekeeping and radiological surveys, and applying fixatives to many radiologically contaminated surfaces. Previous reports define the hazards to the public, workers, and the environment within the 105-B Reactor Facility. The current status of these hazards within the facility is documented in Appendix G of this document and in the following:

- BHI-00076, *105-B Reactor Facility Museum Phase I Feasibility Study Report*
- BHI-01282, *Hanford B Reactor Building Hazard Assessment Report*
- DOE/RL-2001-09, *Engineering Evaluation/Cost Analysis for the 105-B Reactor Facility*
- DOE/RL-2001-68, *Removal Action Work Plan and Surveillance and Maintenance Plan for the 105-B Reactor Facility.*

Information regarding hazardous substances in the facility is based primarily on S&M survey data, knowledge of construction materials, historical operations, and process knowledge of the facility and of analogous facilities in the 100 Area. Information on the nature and extent of contamination is provided in Section 2.3. Primary references for the facility information are:

- BHI-01384, *105-B Reactor Museum Feasibility Assessment (Phase II) Project*
- DOE/RL-2001-09, *Engineering Evaluation/Cost Analysis for the 105-B Reactor Facility*
- DOE/RL-2001-68, *Removal Action Work Plan and Surveillance and Maintenance Plan for the 105-B Reactor Facility*

In addition, ongoing work activities in the 105-B Reactor Facility have resulted in the removal of tiles containing regulated asbestos containing material (RACM). These tiles were removed from the Control Room, the northern half of the Water Laboratory, and the Front Meeting/Lunch Room, including the three adjoining offices. Maintenance work in the Turco pit involved removal of bricks from the pit, and removal of chemically contaminated debris from the pit.

### 1.3.6 Release or Threatened Release into the Environment of a Hazardous Substance, Pollutant, or Contaminant

The primary hazard in the facility is radioactive materials (DOE/RL-2001-09). The 105-B Reactor Facility is both radiologically and chemically contaminated. Identified CERCLA hazardous contaminations include radiological contamination, lead, mercury, polychlorinated biphenyls (PCBs), miscellaneous oils, and asbestos.

In 2001, DOE/RL-2001-68 was prepared to outline the mitigation and S&M activities for the 2002 to 2012 timeframe and document the hazards that were mitigated. Many removal and upgrade activities have been performed at the reactor since the issuance of the 2001 RAWP. However, due to the nature of S&M activities, official documents of work completed within the 105-B Reactor Facility after the issuance of the RAWP do not exist. Therefore, field walk downs/inspections were performed in the summer of 2009 by Mission Support Alliance (MSA) and sub-contractor personnel. The walk

downs/inspections were to verify the mitigated and the remaining hazards. Results of the walk downs are provided in Appendix D. These results represent a combination of past document reviews and visual inspections performed during facility walk downs. These chemical and radiological hazards are discussed in the following subsections.

#### 1.3.6.1 Radiological Hazards

The primary hazard at the 105-B Reactor Facility is radioactive materials. The majority of the buildings' radiological inventory is in the reactor core and control rods, which are not subject to the removal action addressed in this document. Key radionuclide contaminants include tritium, carbon-14, cobalt-60, nickel-59, nickel-63, strontium-90, technetium-99, cesium-137, plutonium isotopes, and americium-241 (WCH-19, *Final Hazard Categorization for Surveillance and Maintenance of 100 Area Reactor Facilities)*. The remaining radiological contaminants are primarily found in the form of removable or fixed surface contamination throughout the facility.

#### 1.3.6.2 Chemical Hazards

The following chemical hazards have been identified and inventoried:

- Lead (lead paint, lead sheet and brick)
- Mercury (switches)
- PCBs (light ballasts, motor oil)
- Asbestos (pipe lagging, gaskets, floor tiles, ceiling tiles, transite panels, wire insulation)
- Biological hazards

These hazards were noted during 105-B Reactor Facility walk downs/inspections performed in the summer of 2009. Additional characterization will be conducted, if needed, as part of the removal action activities to support the waste designation.

1. **Lead:** Lead exists in surface coatings (i.e., lead-based paint) inside the 105-B Reactor Facility structures. Over 7,432 $m^2$ (80,000 $ft^2$) of lead-based paint have been identified. In several locations, where entire rooms are considered as contamination areas, the surface area of lead-based paint has not been measured. Unknown quantities of lead brick and blanket may also exist in the horizontal control rod room.

2. **Mercury:** Mercury switches are present in the Control Room and Helium Flow Monitoring Room. Forty-one mercury switches have been identified during the field verification.

3. **PCBs:** Any remaining hydraulic oil at the 105-B Reactor Facility is assumed to contain <2 ppm PCB. The amount of PCB-contaminated oil is unable to be estimated at this time. The oil contaminated with PCB exists in the facility's equipment such as pump motor, gear box, winch, overhead crane, and compressor. Existing light ballasts are also assumed to contain PCB. During the summer of 2009 field verification, 144 PCB-contaminated light ballasts were identified.

4. **Asbestos:** RACM is found in and around the 105-B Reactor Facility. RACM exists in many forms including pipe insulation (162.4 $m^2$ [1,748 $ft^2$]), floor tiles (99.2 $m^2$ [1,068 $ft^2$]), ceiling tiles (111.5 $m^2$ [1,200 $ft^2$]), transite panels (222.9 $m^2$ [2,400 $ft^2$]), ductwork insulation (111.5 $m^2$ [1,200 $ft^2$), and in an unquantifiable volume of wire insulation and gaskets. The given total areas are estimated because in several locations, where entire rooms are considered as contamination area, the area of RACM has not been measured.

5. **Floor Drains:** At least 10 floor drains and a floor sump in the Valve Pit were identified during the field verification. In the Top of Reactor and the Accumulator Room Below-Grade Vault, sub-floor drain piping leading to the exterior of the facility are also present.

6. **Biological Hazards:** At 105-B Reactor Facility, biological hazards exist in the form of animal carcasses, bird and rodent nests, feces, urine, and clean up material. Animal intrusion can occur when there is an opening in the facility enclosure.

# 2.0 REMOVAL ACTION ELEMENTS

The following subsections provide a general description of how activities will be performed to remove the environmental hazards inside the 105-B Reactor Facility.

The removal action includes the following activities:

- Performing site mobilization and preparation activities
- Removing hazardous substances (chemical, radiological, and biological)
- Handling, transporting, and disposing of waste
- Performing S&M activities

The following sections describe the field activities that will be at the 105-B Reactor Facility.

## 2.1 MOBILIZATION AND SITE PREPARATION

Upon initiation of removal action activities, personnel will be mobilized and required equipment and materials will be procured. The first activities to be performed will include mobilizing manual personnel and trailers to support project activities.

Concurrent with these activities, waste storage areas will be set up adjacent to the work areas or at a centralized location. Supervisor trailers, lunch trailers, change trailers, office trailers, mobile shower trailers, and restroom facilities will also be mobilized as required at the sites to prepare for removal action activities. Occupational Safety and Health Administration concerns (e.g., fall protection, guarding, and electrical) are addressed in the facility specific health and safety plan.

## 2.2 RADIOACTIVE AND HAZARDOUS SUBSTANCE REMOVAL

### 2.2.1 Radioactive Contamination

Removal of radiological contamination will be performed using aggressive means of decontamination (e.g., scabbling, grinding, or other abrasive/mechanical means). Decontamination waste will be managed per the facility Waste Management Plan. It is assumed that radiological contamination is largely fixed by lead-based paint or is bound in the surface layer of concrete therefore, removing the paint and concrete surface will remove the radiological contamination.

### 2.2.2 Lead Solid and Lead-based Paint

Unattached and accessible lead bricks and sheeting will be removed. Depending on radiological release status, lead bricks and sheets will be excessed or disposed per the Waste Management Plan.

Lead-based paint may be removed using one of the following methods or as directed by 105-B Reactor Facility management:

1. **Shrouded abrasive wheel:** The shrouded abrasive wheel will provide a 5.1 cm (2-in.) cutting width. The equipment is handheld, easily maneuverable, and weighs less than 3.6 kg (8 lbs). It has interchangeable belts for various surfaces, and depth of penetration can be adjusted. The removal

process has low airborne emissions, and the waste can be contained directly in a 55-gallon drum with attached high-efficiency particulate air (HEPA) filter.

2. **Needle gun:** This removal equipment is designed for corners and small areas. It is light weight and easy to use. Depth of removal can be adjusted, and minimal amount of waste will be generated. The equipment can be used with HEPA filters.

3. **Remote wall-traversing tool:** The remote wall-traversing tool is designed for large surfaces and it can be remotely operated. The removal speed is five times faster than the shrouded abrasive wheel technique. It cannot be used for corners or edges. Removal depth can be adjusted and a HEPA filter can be attached to waste collecting container.

4. **Abrasive blasting:** This standard method can be used using environmental friendly medium such as carbon dioxide in the form of dry ice or baking soda. The removal area needs an enclosure for airborne particle control, and can be fitted with a HEPA filter. The equipment is light and easy to operate.

### 2.2.3 Regulated Asbestos Containing Material

All RACM will be removed from the 105-B Reactor Facility. RACM typically consists of piping insulation. Piping insulation will be removed as Class I asbestos work, and nearly all other RACM will be demolished as Class II (e.g., floor tiles and cement asbestos board) during structural demolition. Asbestos work, air monitoring, and worker safety requirements will be performed in accordance with contractor's procedures for RACM removal and the facility specific health and safety plan. Asbestos waste will be managed per the Waste Management Plan.

### 2.2.4 PCB Contaminated Oil and Light Ballast

All remaining oil and grease currently existing in the facility are assumed to contain < 2 ppm PCB. PCB contaminated motor oil and grease will be drained. PCB light ballast will be removed provided their removal does not compromise the historic nature of the 105-B Reactor Facility. PCB contaminated waste will be managed per the Waste Management Plan.

### 2.2.5 Mercury Switches

Mercury, primarily in lighting switches, will be removed and disposed as hazardous or mixed waste or will be recycled consistent with guidelines per the Waste Management Plan.

### 2.2.6 Floor Drains

All accessible open floor drains will be sealed with grout or similar product to prevent incidental releases.

### 2.2.7 Biological Hazards

Biological cleanup will involve removing carcasses, urine, feces, and nests. Biological waste will be managed per the Waste Management Plan.

## 2.3 ENGINEERING UPGRADES

This section of the report outlines the necessary structural upgrades to the 105-B Reactor Facility for continued, long-term use of the facility through the next 100 years. Extensive repairs and renovations

need to be performed in order to extend the facility's life. The facility renovations outlined here are to preserve the facility for future public access. After modification, continued maintenance S&M will be required throughout the life of the facility. With the 105-B Reactor Facility's designation as a National Historic Landmark, the upgrades need to consider the historic aspects of the facility and ensure historic integrity. Any physical alterations to the historic appearance of the 105-B Reactor Facility will be reviewed and approved by the State Historic Preservation Office.

### 2.3.1 Structural Upgrades - Roof and Walls

#### 2.3.1.1 Roof

Structural analysis of the current roof configuration at the 105-B Reactor Facility shows that the pre-cast concrete roof panels likely cannot handle code-prescribed snow loading. The low slope of these pre-cast concrete roof panels results in water leakage and the potential for water pooling on the roof. These panels are deteriorating with age and more frequent repairs are anticipated. Since the panels are structurally inadequate and beginning to fail, a new roof system is required.

An engineering analysis will be performed to identify and support design of appropriate roof upgrades. For schedule and cost purposes, it is assumed that pre-cast plank and timber roofs will be removed and replaced with non-composite type B metal deck to meet current International Building Code requirements including drainage, snow drifts, wind uplift and lateral shear.

#### 2.3.1.2 Walls

The 105-B Reactor Facility has withstood seismic and wind loads since it was built in the early 1940s. The concrete masonry units (CMU) walls show some signs of stress and/or age resulting in cracking in the mortar joints and are in need of repair, upgrades, and potentially strengthening. An engineering analysis will be performed to identify and support design of appropriate CMU wall upgrades. For schedule and cost purposes, it is assumed that the CMU walls will be upgraded with new horizontal and vertical reinforcements placed within the CMU block and fully grouted in place. Positive anchorage to the roof and floors will be installed either through support angles or embedding bars into the existing concrete. In certain locations the overall CMU wall is in excess of the allowable height for out-of-plane lateral loads. In these areas, additional supports to the CMU walls will be installed in the form of horizontal trusses or beams to reduce the wall spans back down to acceptable levels.

### 2.3.2 HVAC System Upgrade

Currently, the original mechanical systems in the building are inoperable. The supply and exhaust fans which originally provided a cascade ventilation system to bring air from the "clean" areas of the facility to progressively more contaminated areas have been disabled. The existing ductwork on the exterior of the facility appears to be rusted and may require major rework for reuse.

The presence of radon in the facility has prompted the addition of ventilation units to certain areas of the facility. The current public tour path is provided with ventilation in order to reduce the levels of radon present. The ventilation equipment utilized part of the existing interior ductwork to route air to the facility. In addition, new ductwork was installed where needed. No central heating or cooling is provided to the facility at this time.

The mechanical upgrades outlined here are to provide heating, cooling, and ventilation to the building. The mechanical upgrades will provide for the comfort of the visitors to the facility and provide the outside air ventilation required by the Washington State Ventilation and Indoor Air Quality Code. The

mechanical equipment provided will also meet the current Washington State Non-Residential Energy Code. As much as possible, the exiting ductwork in the facility will be reused in order to retain the historic appearance of the facility. However, new ductwork and equipment will have to be installed in order to condition the space to the comfort levels needed for public occupancy. In addition, the new HVAC equipment will provide the needed outside air ventilation for dilution of radon present in the facility.

### 2.3.3 Electrical System Upgrade

In general, lighting levels throughout the current tour path are adequate and within levels recommended by the Illuminating Engineering Society for these functions but do not meet lighting power density requirements nor do the lighting sources take advantage of current technologies regarding energy efficiencies. Required exits and intended paths of emergency egress are not properly illuminated and the current fire alarm system is not code compliant for a public facility. The ability to report fire alarm activation to the Hanford Fire Department was removed when the building was deactivated.

The electrical upgrades recommended will provide for more energy conscious and efficient lighting sources, as well as mitigate hazards associated with the aging electrical distribution system. The upgrades will also address life-safety issues with respect to emergency egress illumination, exit marking, and fire detection and alarm notification. It should be noted that upon completion of the described upgrade or renovation, continued surveillance S&M will be required throughout the life of the facility.

## 2.4 MATERIAL HANDLING AND TRANSPORTATION

Contaminated bulk materials will be hauled in the standard Environmental Restoration Disposal Facility (ERDF) open-top, hinged-gate roll-off boxes that are designed for a maximum payload of approximately 18.1 metric tons (20 tons) or an equivalent alternative. The bulk containers will be transported on roll-on/roll-off trailers with hydraulic dumping capabilities that are towed by conventional tractor units or dump trucks.

Containers will be transported from the waste sites to the ERDF over existing Hanford Site roadways or by a direct-haul route. Each shipment of debris transported to the ERDF will be referenced to a waste profile that is intended to bind the levels of hazardous constituents in the material found at each site. The waste profile is in effect unless and until the characteristics of the waste stream change significantly.

Empty containers returning from the ERDF will be removed from the ERDF tractor trailers in either a site-specific waste container storage area or inside the area of contamination, and rolled on to project haul trucks for refilling or kept on the direct haul truck, as appropriate.

Non- bulk dangerous, radioactive, step-off pad, or mixed waste will be packaged in 55-gallon drum or other equivalent U.S. Department of Transportation-approved containers.

## 2.5 CHARACTERIZATION

Hazards at the 105-B Reactor Facility have been well characterized and documented. No new process or new source has been introduced to the facility in the past several years. Therefore, the facilities' current waste characteristics are not expected to have changed.

If new waste streams are generated from the removal activity, it is expected that they would be designated using process knowledge and existing waste characteristics. Should process knowledge be inadequate to support the waste designation, sampling and analysis documentation may be prepared, as needed.

The removal action at 105-B Reactor Facility is not conducted to support site closure. Rather, it is an interim action with no remedial or removal clean up goals. Therefore, sampling will not be required to demonstrate that action levels have been achieved.

## 2.6 DECONTAMINATION

Decontamination of equipment, waste containers, etc., to support removal activities will generally be performed using dry methods (e.g., wiping) to the extent possible. When the use of wet methods (e.g., pressure washers) is required to achieve decontamination objectives, the associated water or cleaning solutions will be collected, and work will be conducted by trained site workers in accordance with the following best management practices:

- Decontamination activities will be performed within active demolition areas of the CERCLA removal action area
- The amount of water used to clean equipment will be minimized
- Only raw or potable water will be used
- Regulated soaps, detergents, or other cleaning agents will not be added to wash water
- Pressure washing will normally use cold water.

When removal operations are completed for a given area, equipment will generally be relocated to the next area that will undergo removal activities, and decontamination may be performed at the new site in accordance with best management practices. If it is not practical or efficient to relocate the equipment to the new area, equipment decontamination may be performed within the initial demolition site. In such cases, pre- and post-surveys will be performed on the washing/decontamination area to determine whether any supplemental remediation of the area is needed as a result of the process. The project may also choose to perform other methods of equipment washing and/or decontamination for a completed site (e.g., wrap the equipment for transfer to a decontamination pad, provide for a temporary facility at the site to collect wash water, or fix the contamination to the equipment). Decontamination fluid/wash water that is collected will be managed in accordance with the Waste Management Plan.

## 2.7 WASTE DISPOSAL

All waste management activities will be performed in accordance with waste management ARARs identified in the Action Memorandum (EPA 2002) and as discussed in the Waste Management Plan. Solid radiological contaminated CERCLA waste from the removal action will be disposed at the ERDF. Liquid waste will be disposed at the 200 Areas Effluent Treatment Facility (ETF). The movement and treatment, storage, and/or disposal of wastes that do not meet the ERDF requirements for the Central Waste Complex or the ETF will require an offsite determination approval. The CERCLA waste also could be stored at another offsite facility that has been approved in accordance with 40 CFR 300.400. Treatment of waste may be necessary before disposal at ERDF, and contained waste could be stored at ERDF with the appropriate concurrence(s) while the waste is awaiting treatment. Liquid waste sent to the ETF will be treated separately from other non-CERCLA sources, and any treatment residues that meet ERDF waste acceptance criteria (WCH-191, *Environmental Restoration Disposal Facility Waste Acceptance Criteria*) could be disposed of at ERDF.

## 2.8 SURVEILLANCE AND MAINTENANCE

The goal of the long-term S&M is to sustain a facility in a safe condition. The S&M activities include routine radiological and hazard monitoring of a facility, safety inspections, and maintenance activities necessary to keep the facility in a safe condition. The S&M activities are tailored to the specific conditions of the facility. Waste generated during this period shall be evaluated for (if acceptable) disposal at the ERDF. It is expected that most waste generated during S&M activities will meet the acceptance criteria for ERDF. Waste generated during the S&M period sometimes does not require or is not eligible for disposal at ERDF. Examples include, but are not limited to, "replacement in kind" items such as light bulbs or trash that do not contain hazardous substances. The S&M activities are addressed in Appendix A.

## 2.9 POST-REMOVAL ACTION ACTIVITIES

Post-removal action activities for the facility normally include preparation of verification and monitoring plans, sample collection, demonstration of attainment of RAOs, and generation of documentation for facility closeout, as summarized in the following subsections. Since the activities outlined in this RAWP constitute an interim action, post-removal action activities will not apply, other than preparation of a response action report (RAR). Preparation of an RAR will allow the project to document those activities that occurred during the removal action, including the removal or fixation of hazards. This documentation will assist in future facility disposition activities.

### 2.9.1 Post-Removal Action Sample Collection

Because the activities described in this RAWP constitute an interim action, verification samples will not be collected. Results from samples collected are normally used to demonstrate attainment of the RAOs. In the case of this interim action, a facility walkdown and visual inspection, coupled with routine S&M will be used to demonstrate the attainment of RAOs. The results of the walkdown after removal action activities have occurred will be documented in an RAR.

### 2.9.2 CERCLA Cleanup Documentation

After completion of the removal action activities, a completion report will be developed to document the activities that were performed as part of the removal action. This report will include types of contamination removed, estimated quantities removed, and the locations from which the contaminants were removed. Should any areas in the facility still contain radiological or chemical contamination post-removal action, they will be included in the completion report to aid in future decision making. This report will support the eventual disposition of the 105-B Reactor Facility when the decision is made to terminate its current mission.

# 3.0 SAFETY AND HEALTH MANAGEMENT AND CONTROLS

All emergency planning and preparedness activities for this project will be consistent with planning and preparedness actions taken by other Hanford Site contractors and similar projects. Activities will be performed in a manner that ensures the health and safety of workers and the public, as well as the protection of the environment in the event of an abnormal incident during removal actions at the 105-B Reactor Facility.

## 3.1 EMERGENCY MANAGEMENT

The contractor's Emergency Management Program (including preparedness, planning, and response) contains the administrative responsibilities for compliance with DOE/RL-94-02, *Hanford Emergency Management Plan*, and all applicable DOE Orders. The Emergency Management Program establishes a coordinated emergency response organization capable of planning for, responding to, and recovering from industrial, security, and hazardous material incidents. Emergency action plans for contractor-managed hazardous facilities identify the capabilities necessary to respond to emergency conditions, provide guidance and instruction for initiating emergency response actions, and serve as a basis for training personnel in emergency actions for each facility.

The emergency response actions within the emergency action plan are provided for recognizing incidents and/or abnormal conditions, initiating protective actions, and making the proper notifications. Emergency response for this project will include appropriate notifications for reportable quantity releases and on-scene coordinator notification for other emergency situations.

## 3.2 SAFEGUARDS AND SECURITY

Access to the Hanford Site is controlled via manned guard stations. Access to the 105-B Reactor Facility is controlled by the contractor. Security controls, including administrative and physical access controls, are currently in place for the facility to limit unauthorized entrance. The facilities are locked and require approval prior to entry.

Access requirements for employees, non-employees, and/or visitors are defined in the site specific health and safety plan (SSHASP).

## 3.3 SAFETY AND HEALTH PROGRAM

The SSHASP prepared for this action will address chemical, radiological, and physical hazards and will specify the controls and requirements for work activities. Access and work activities are controlled in accordance with approved work packages or contractor statements of work, as required by established internal work requirements and processes. The SSHASP shall address the health and safety hazards of each phase of site operation and include the requirements for hazardous waste operations and/or construction activities, as specified in 29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response." Depending on the specific hazards present, one or more SSHASPs could be written for this removal action. As part of work package development, a job or activity hazards analysis will be written to identify the hazards associated with specific tasks in addition to the SSHASP.

In addition to the SSHASP, in accordance with contractor-level procedures and programs, a radiological work permit (RWP) will be prepared, as needed, for work in areas with potential radiological hazards. The RWP extends the Radiological Protection Program to the specific work site or operation. All personnel assigned to the project and all work site visitors shall strictly adhere to the provisions identified

in the SSHASP and RWP. Before work and before each activity begins, a pre-job briefing will be held with the involved workers. This briefing will include reviews of the hazards that could be encountered and the associated requirements. Throughout an activity, daily briefings also could be held, as well as special briefings before major evolutions.

### 3.3.1 Worker Safety Program

The Integrated Safety Management System will be incorporated into all work activities. The program includes the following elements:

- Organizational structure specifying the official chain of command and the overall responsibilities of supervisors and employees
- 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
- SSHASP developed when workers could be exposed to hazardous substances
- Worker training commensurate with individual job duties and work assignments
- Medical surveillance program administered to comply with the Occupational Safety and Health Administration requirements (29 CFR 1910.120)
- Contractor's internal work requirements and processes
- Voluntary protection program.

### 3.3.2 Health and Safety Plan and Activity Hazards Analysis

A SSHASP defines the chemical, radiological, and physical hazards and specifies the controls and requirements for work activities. Access and work activities are controlled in accordance with approved work packages, as required by established contractor procedures. The SSHASP addresses the health and safety hazards of each phase of site operation and includes the requirements for hazardous waste operations and/or construction activities, as specified in 29 CFR 1910.120. As part of work package development, a job or activity hazards analysis will be written to identify the hazards associated with specific tasks already not covered under the SSHASP. The elements included in the SSHASP are as follows:

- General overview of the hazards
- Employee training requirements
- Personal protective equipment requirements
- Medical surveillance requirements
- Work site hazard control measures
- Emergency response and reporting
- Confined space entry procedures
- Spill containment program.

In addition to the SSHASP, an RWP will be prepared, as needed, for work in areas with potential radiological hazards. The RWP extends the Radiological Protection Program (discussed in Section 3.3.3) to the specific work site or operation. All personnel assigned to the project and all work site visitors must

strictly adhere to the provisions identified in the SSHASP and RWP. Before work and before each activity begins, a pre-job briefing will be held with the involved workers. This briefing will include reviews of the hazards that could be encountered and the associated requirements. Throughout an activity, daily briefings may also be held, as well as special briefings before major evolutions.

### 3.3.3 Radiological Controls and Protection

The radiological controls and protection program is defined in DOE-approved programs and contractor-approved internal work requirements and processes. The radiological controls and protection program implements the contractor's policy to reduce safety or health risks to levels that are as low as reasonably achievable (ALARA), and to ensure the protection of workers are adequate. The contractor's radiological protection program meets the requirements of 10 CFR 835, "Occupational Radiation Protection." Appropriate dosimetry, RWPs, personal protective equipment, ALARA planning, periodic surveys, and radiological control technical support will also be provided.

The standard contractor's controls for work in radiological areas are assessed as adequate to control project activities. These controls will identify the specific conditions, govern the specific requirements for an activity, the periodic radiation and contamination surveys of the work area, and dictate the periodic or continuous observation of the work by the responsible radiological controls organization. The ALARA planning process will be used to identify shielding requirements, contamination control requirements, radiation monitoring requirements, and other radiation control requirements for the individual tasks conducted during the projects.

Measures also will be taken to minimize the possibility of releases to the environment. The Air Monitoring Plan (Appendix B) quantitatively addresses the radionuclide inventory and controls which may be utilized during project activities that could prevent the potential release of the inventory, but not to the exclusion of 10 CFR 835 requirements. Therefore, monitoring will be completed as described in the Air Monitoring Plan.

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# 4.0 ENVIRONMENTAL MANAGEMENT AND CONTROLS

## 4.1 ARAR COMPLIANCE

The 40 CFR 300, *National Oil and Hazardous Substances Pollution Contingency Plan* requires that the removal actions described in this document comply with the established ARARs. The ARARs for this removal action were identified in the Action Memorandum (EPA 2002). The purpose of this section is to discuss how each of the ARARs identified in the Action Memorandum (EPA 2002) will be met during the removal action. Table 4-1 identifies specific regulatory sections in each overarching regulation which is an ARAR, with an explanation as to why it is an ARAR. In addition, To-Be-Considered (TBC) information consists of non-promulgated advisories or guidance issued by federal or state governments that are not binding legally and do not have the status of ARARs. However, as appropriate, TBCs should be considered in determining the remedial actions necessary for protection of human health and the environment.

As the Lead Regulatory Agency, the EPA has the primary responsibility for the identification of ARARs at the 105-B Reactor Facility. The following key ARARs for the removal actions were established:

- Waste management standards
- Standards controlling releases to the environment
- Environment and health radiological standards
- Cultural, historical, and ecological protection standards.

Table 4-1 lists the ARARs for the removal actions.

**Table 4-1. List of Key ARARs and To-Be-Considered Information. (9 sheets)**

| Citation | ARAR or TBC | Requirement | Rationale for Use |
|---|---|---|---|
| **WASTE MANAGEMENT STANDARDS** | | | |
| Regulations pursuant to the *Resource Conservation and Recovery Act of 1976*, 42 USC 6901, et seq. – Implemented through the *Hazardous Waste Management Act*, RCW 70.105, Regulations pursuant to the *Resource Conservation and Recovery Act of 1976*, Subtitle C, implemented via 40 CFR 260 through 279, delegated to the State of Washington and implemented per WAC 173-303. | | | |
| "Dangerous Waste Regulations" (WAC 173-303): | | | |
| Solid Waste Identification<br>Specific subsections:<br>WAC 173-303-016<br>WAC 173-303-017 | ARAR | These regulations define how to identify when materials are and are not solid waste. | These regulations would be applicable because these define how to determine which materials are subject to the designation regulations.<br>This requirement is action- specific. |

**Table 4-1. List of Key ARARs and To-Be-Considered Information. (9 sheets)**

| Citation | ARAR or TBC | Requirement | Rationale for Use |
|---|---|---|---|
| Dangerous/Mixed Waste Designation<br>Specific subsections:<br>WAC 173-303-070<br>WAC 173-303-071<br>WAC 173-303-080<br>WAC 713-303-081<br>WAC 173-303-082<br>WAC 173-303-083<br>WAC 173-303-090<br>WAC 173-303-100<br>WAC 173-303-110 | ARAR | These regulations define the procedures to be used to determine if solid waste requires management as dangerous waste. These regulations identify which waste codes are appropriate for application to the waste. | These regulations are applicable to solid waste that may be generated during removal actions.<br>This requirement is action- specific. |
| Dangerous/Mixed Waste Management<br>Specific subsections:<br>WAC 173-303-073<br>WAC 173-303-077<br>WAC 173-303-170(3) | ARAR | These regulations establish the management standards for solid waste designated as dangerous or mixed waste. Special waste is addressed in WAC 173-303-073. Universal waste is addressed in WAC 173-303-077. Generator standards are identified through WAC 173-303-170(3). | These regulations are applicable to the management of materials subject to WAC 173-303. Specifically, the substantive standards for management of special waste and universal waste and the standards for management of dangerous/mixed waste are applicable to the interim management of certain waste that could be generated during the removal action. WAC 173-303-170(3) includes the provisions of WAC 173-303-200 by reference. WAC 173-303-200 further includes certain standards from WAC 173-303-630 and -640 by reference. This requirement is action- specific. |
| Dangerous/Mixed Waste Disposal<br>Specific subsection:<br>WAC 173-303-140 | ARAR | This regulation establishes state standards for land disposal of dangerous waste and incorporates by reference, federal land disposal restrictions of 40 CFR 268, that are applicable to solid waste that designates as dangerous or mixed waste in accordance with WAC 173-303-070. | This regulation is applicable to dangerous/mixed waste generated and removed from the CERCLA site during the removal action for offsite land disposal.<br>This requirement is action- specific. |

**Table 4-1. List of Key ARARs and To-Be-Considered Information. (9 sheets)**

| Citation | ARAR or TBC | Requirement | Rationale for Use |
|---|---|---|---|
| Recycling Requirements<br>Specific subsections:<br>WAC 173-303-120(3)<br>WAC 173-303-120(5) | ARAR | These regulations define the requirements for the recycling of materials that are solid and dangerous waste. Specifically, WAC 173-303-120(3) provides for management of certain recyclable materials, including spent refrigerants, antifreeze, and lead-acid batteries. WAC 173-303-120(5) provides for the recycling of used oil. | These regulations provide for the management of materials, such as antifreeze and used oil that might be generated during removal actions. Such materials can be recycled and/or conditionally excluded from certain dangerous waste requirements.<br>This requirement is action- specific. |
| Regulations pursuant to the *Solid Waste Management, Recovery and Recycling Act*, RCW 70.95 -"Solid Waste Handling Standards," (WAC 173-350) | | | |
| Nondangerous, Nonradioactive Solid Waste Management<br>Specific subsections:<br>WAC 173-350-025<br>WAC 173-350-300 | ARAR | These regulations establish requirements for the management of solid waste that is not dangerous or radioactive waste. Affected solid waste includes garbage, industrial waste, construction waste, and ashes. Requirements for contained storage, collection, transportation, treatment, and disposal of solid waste are included. | These regulations are applicable to onsite management and disposal of nondangerous, nonradioactive solid waste that could be generated during a removal action.<br>These requirements are action- specific. |
| ERDF Waste acceptance criteria | | | |
| *Environmental Restoration Disposal Facility Waste Acceptance Criteria* (WCH-191) | TBC | This document establishes waste acceptance criteria for the Environmental Restoration Disposal Facility. | Waste destined for management at ERDF must meet acceptance criteria to ensure proper disposal. |
| **STANDARDS CONTROLLING EMISSIONS TO THE ENVIRONMENT** | | | |
| Regulations pursuant to the *Clean Air Act of 1977*, 42 USC 7401, et seq.<br>"National Emission Standards for Hazardous Air Pollutants (NESHAP)," (40 CFR 61) | | | |
| Emissions of Hazardous Air Pollutants<br>Specific subsections:<br>40 CFR 61.01<br>40 CFR 61.05<br>40 CFR 61.12<br>40 CFR 61.14 | ARAR | These regulations establish emission standards for hazardous air pollutants including radionuclides (except radon) and asbestos.<br>These regulations provide general requirements and listings for regulated emissions at a regulated facility. | These regulations apply to the Hanford Site because there is potential to emit radionuclides to unrestricted areas. Radionuclide emissions from activities associated with the removal action must be controlled and monitored.<br>These requirements are action- specific. |

**Table 4-1. List of Key ARARs and To-Be-Considered Information. (9 sheets)**

| Citation | ARAR or TBC | Requirement | Rationale for Use |
|---|---|---|---|
| 40 CFR 61.92 | ARAR | 40 CFR 61.92 sets limits for emissions of radionuclides from the entire facility to ambient air. Radionuclide emissions cannot exceed those amounts that would cause any member of the public to receive an effective dose equivalent of 10 mrem/yr. The definition of facility includes all buildings, structures, and operations at one contiguous site. | These regulations apply to the Hanford Site because of the potential to generate airborne emissions of radionuclides to unrestricted areas. Radionuclide emissions from activities associated with the removal action must be controlled and monitored.<br>These requirements are action- specific. |
| 40 CFR 61.145(a)(1)<br>40 CFR 61.145(a)(5)<br>40 CFR 61.145(c)<br>40 CFR 61.150(a)<br>40 CFR 61.150(b)<br>40 CFR 61.150(c) | ARAR | These regulations define regulated asbestos-containing materials and establish removal requirements based on quantity present and handling requirements. These regulations also specify handling and disposal requirements for regulated sources having the potential to emit asbestos. | These regulations are applicable to the Hanford Site to provide for special precautions to prevent environmental releases or exposure to workers of airborne emissions of asbestos fibers during removal actions.<br>These requirements are action-specific. |
| Regulations pursuant to the *Washington Clean Air Act*, RCW 70.94 / *Department of Ecology*, RCW 43.21A | | | |
| "Radiation Protection - Air Emissions," (WAC 246-247) | | | |
| Radionuclide Emission Standards<br>Specific subsections:<br>WAC 246-247-120<br>WAC 246-247-130 | ARAR | These regulations establish limits for airborne radionuclide emissions as defined in WAC 173-480 and 40 CFR 61 Subparts H and I. The ambient air standards under WAC 173-480 require that the most stringent standard be enforced. Ambient air standards under 40 CFR 61 Subparts H and I are not to exceed amounts that result in an effective dose equivalent of 10 mrem/yr to any member of the public. These standards specify emission monitoring requirements and the application of best available radionuclide technology requirements. | These regulations are applicable because these set emission limits and use of best available radionuclide control technology or as low as reasonable achievable control technology for airborne radionuclides.<br>These requirements are action- specific. |

**Table 4-1. List of Key ARARs and To-Be-Considered Information. (9 sheets)**

| Citation | ARAR or TBC | Requirement | Rationale for Use |
|---|---|---|---|
| "General Regulations for Air Pollution," (WAC 173-400) | | | |
| Air Contaminant Emission Standards<br>Specific subsections:<br>WAC 173-400-040<br>WAC 173-400-075 | ARAR | These regulations require that reasonable precautions be taken to prevent the release of air contaminants associated with fugitive emissions resulting from materials handling, construction, demolition, or other operations. Emission standards are identified for visible, particulate, fugitive, odors, and hazardous air emissions.<br>The regulations require that source testing and monitoring be performed. | Requirements of this standard are relevant and appropriate to removal actions performed at the site that could result in the emission of hazardous air pollutants (e.g., fugitive dust). Substantive standards established for the control and prevention of air pollution under this regulation might be applicable during removal action.<br>These requirements are action- specific. |
| "Controls for New Sources of Air Pollution," (WAC 173-460) | | | |
| Controls for New Sources of Toxic Air Pollutants<br>Specific subsection:<br>WAC 173-460-040 | ARAR | This regulation requires that new sources of air emissions provide emission estimates for toxic air contaminants listed in the regulation. The standard requires that emissions be quantified and used in risk modeling to evaluate ambient impacts and to establish acceptable source impact levels. The standard establishes three major requirements for new sources of air pollutants: use of best available control technology, quantification of toxic emissions, and demonstration that human health is protected. | This regulation is relevant and appropriate to removal actions performed at the site, if a treatment technology that emits toxic air emissions is necessary during the implementation of the removal action.<br>This requirement is action- specific. |

**Table 4-1. List of Key ARARs and To-Be-Considered Information. (9 sheets)**

| Citation | ARAR or TBC | Requirement | Rationale for Use |
|---|---|---|---|
| "Ambient Air Quality Standards and Emission Limits for Radionuclides" (WAC 173-480) | | | |
| Ambient Air Standards for Radionuclides<br>Specific subsections:<br>WAC 173-480-040<br>WAC 173-480-050<br>WAC 173-480-060 | ARAR | These requirements establish that the most stringent federal or state ambient air quality standard for radionuclides be enforced. The WAC 173-480 standard defines the maximum allowable level for radionuclides in the ambient air, which shall not cause a maximum accumulated dose equivalent of 25 mrem/yr to the whole body or 75 mrem/yr to any critical organ. However, ambient air standards under 40 CFR 61 Subparts H and I, are not to exceed amounts that result in an effective dose equivalent of 10 mrem/yr to any member of the public. Emission standards for new and modified emission units shall utilize best available radionuclide control technology. | Substantive requirements of this standard are relevant and appropriate to removal actions performed at the site that could emit radionuclides to the air.<br>These requirements are action- specific. |
| "Protection of Stratospheric Ozone" (40 CFR 82) | | | |
| 40 CFR 82.156 "Required practices"<br>40 CFR 82.158 "Standards for recycling and recovery equipment"<br>40 CFR 82.161 "Technician certification" | ARAR | Specifies the procedures and processes that will be followed for recycling and recovery of ozone depleting substances (ODS). Establishes the required performance standards for ODS recycling and recovery equipment; and requires appropriate certification for workers who recover or recycle ODS. | Selected alternative may include the recycling or recovery of ozone depleting substances (ODS) that must be conducted in accordance with the applicable requirements and work practices. These requirements are action-specific. |

**Table 4-1. List of Key ARARs and To-Be-Considered Information. (9 sheets)**

| Citation | ARAR or TBC | Requirement | Rationale for Use |
|---|---|---|---|
| Regulations pursuant to the *Toxic Substances Control Act (TSCA)*, 15 USC 2601 et seq.<br>"Polychlorinated Biphenyls Manufacturing, Processing, Distribution in Commerce, and Use Provisions" (40 CFR 761) | | | |
| PCB Waste Management and Disposal<br>Specific subsections:<br>40 CFR 761.50(b)(1)<br>40 CFR 761.50(b)(2)<br>40 CFR 761.50(b)(3)<br>40 CFR 761.50(b)(4)<br>40 CFR 761.50(b)(7)<br>40 CFR 761.50(c) | ARAR | These regulations establish standards for storage and disposal of PCB wastes. | These regulations are applicable to the storage and disposal of PCB liquids, items, remediation waste, and bulk product waste at >50 ppm. The specific identified subsections from 40 CFR 761.50(b) reference the specific sections for management of each PCB waste type.<br>Radioactive PCB waste can be disposed in accordance with 40 CFR 761.50(b)(7).<br>These requirements are chemical-specific. |
| **CULTURAL, HISTORICAL, AND ECOLOGICAL RESOURCE PROTECTION REQUIREMENTS** | | | |
| *Archaeological and Historic Preservation Act of 1974* (16 USC 469) | | | |
| 16 USC 469aa-mm | ARAR | Requires that removal actions at the 105-B Reactor Facility do not cause the loss of any archaeological or historic data. This act mandates preservation of the data and does not require protection of the actual site. | Archeological and historic sites have been identified within the 100 Area, including the 105-B Reactor Facility; therefore the substantive requirements of this act are potentially applicable to actions that might disturb this facility. This requirement is location-specific. |
| *National Historic Preservation Act of 1966,* (16 USC 470) | | | |
| 16 USC 470, Section 106 | ARAR | Requires federal agencies to consider the impacts of their undertaking on cultural properties through identification, evaluation and mitigation processes, and consultation with interested parties. | Cultural and historic sites have been identified within the 100 Area, including the 105-B Reactor Facility; therefore the substantive requirements of this act are potentially applicable to actions that might disturb this facility. This requirement is location-specific. |

**Table 4-1. List of Key ARARs and To-Be-Considered Information. (9 sheets)**

| Citation | ARAR or TBC | Requirement | Rationale for Use |
|---|---|---|---|
| *Endangered Species Act of 1973* (16 USC 1531 et seq.) | | | |
| 16 USC 1531 et seq., subsection 16 USC 1536(c) | ARAR | Prohibits actions by federal agencies that are likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification or critical habitat. If the removal action is within critical habitat or buffer zones surrounding threatened or endangered species, mitigation measures must be taken to protect the resource. | Substantive requirements of this act are potentially applicable if threatened or endangered species are identified in areas where removal actions will occur. This requirement is location-specific. |
| **TRANSPORTATION STANDARD** | | | |
| Regulations pursuance to the *Hazardous Materials Transportation Act of 1974* (49 USC 1801-1813), implemented via the "U.S. Department of Transportation Requirements for the Transportation of Hazardous Materials" (49 CFR 100 through 179). | | | |
| EPA's Revised Procedures for Planning and Implementing Off-Site Response Actions [58 Federal Register 49200] | ARAR | Governs the transportation of potentially hazardous materials, including samples and waste. It is applicable to any wastes or contaminated samples that would be shipped off of the Hanford Site | The removal action may require offsite transportation of potentially contaminated samples and waste. Compliance to this ARAR would be achieved in the handling and shipping of wastes and samples. |
| **SAFETY AND HEALTH STANDARDS** | | | |
| *Occupational Radiation Protection* (10 CFR 835) | | | |
| 10 CFR 835 | ARAR | This regulation establishes occupational dose limits for adults. | Substantive requirements of this regulation are relevant and appropriate to removal actions performed at the site that could emit radionuclides to the air. This requirement is action- specific. |
| **RISK ASSESSMENT REQUIREMENT** | | | |
| *Radiation Risk Assessment at CERCLA Sites: Q&A*, December 1999. EPA 540/R/99/006 | TBC | Provides clarification for establishing protective cleanup levels and establishes that dose assessments should only be conducted under CERCLA where necessary to demonstrate ARAR compliance. | The removal action may require assessment where ARAR compliance needs to be demonstrated. |

**Table 4-1. List of Key ARARs and To-Be-Considered Information. (9 sheets)**

| Citation | ARAR or TBC | Requirement | Rationale for Use |
|---|---|---|---|
| **SOIL CLEAN-UP STANDARD** | | | |
| "Model Toxics Control Act -- Cleanup," WAC 173-340<br>"Soil Cleanup Standards for Unrestricted Land Use," WAC 173-304-740(3) | ARAR | Identifies the methods used to identify risk-based concentrations and their use in the selection of a cleanup action. Cleanup and remediation levels are based on protection of human health and the environment, the location of the site, and other regulations that apply to the site. The standard specifies cleanup goals that implement the strictest federal or state cleanup criteria. | The state-established risk-based concentrations for soils and protection of groundwater are relevant and appropriate to 105-B removal action. |

## 4.2 WASTE MANAGEMENT PLAN

Waste generated from the removal activity at 105-B Reactor Facility will be managed in accordance with the Waste Management Plan (Appendix C). The waste management ARARs as discussed in Section 4.1 provided the guidance for management of radioactive and dangerous waste generated from this removal action. Detailed instructions for waste storage, separation, segregation, minimization, recycling, sampling, designation, packaging, marking, labeling, inspection, transportation, disposal, treatment, and tracking will be specified in the site-specific waste management instructions.

## 4.3 STANDARDS CONTROLLING RELEASES TO THE ENVIRONMENT

The *Clean Air Act of 1990* and RCW 70.94, "Washington Clean Air Act," require regulation of air pollutants. The 105-B Reactor Facility removal action activities described in this RAWP have the potential to generate both radioactive and nonradioactive airborne emissions. As such, an air monitoring plan has been prepared to address radioactive and non-radioactive airborne emissions. The air monitoring plan is presented in Appendix B of this RAWP.

## 4.4 REPORTING REQUIREMENTS FOR NON-ROUTINE RELEASES

The following reporting requirements apply for hazardous substances that could be released during the remedial action activities:

- 40 CFR 302, "Designation, Reportable Quantities, and Notification," requires immediate notification to the National Response Center on discovery of a release of a hazardous substance into the environment in excess of a reportable quantity.

- 40 CFR 355, "Emergency Planning and Notification," 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, a comprehensive release of a reportable quantity of an extremely hazardous substance, or a CERCLA hazardous substance.

## 4.5 RELEASE OF PROPERTY

All property released for offsite disposal and/or reuse and recycle is non-real property. The release of non-real property will follow DOE guidance. If the property meets the surface contamination limits based on radiological surveys and/or characterization information, and the person or entity receiving the property is aware of the measured radioactivity on the property, the property could be dispositioned with low-levels of residual radioactivity. Property released via this process will be viewed as containing no, or *de minimus,* levels of CERCLA hazardous substances and, therefore, will not be subject to CERCLA.

## 4.6 CULTURAL/ECOLOGICAL RESOURCES

Cultural and ecological resource reviews will be performed before beginning the removal action activities in the areas where work will be conducted to identify any potential impacts. The cultural and ecological resource reviews will be conducted in accordance with DOE requirements. If potential impacts are discovered by these reviews, an appropriate mitigation plan will be developed and implemented.

# 5.0 PROJECT ADMINISTRATION

This chapter provides the project cost and schedule broken down into major phases or components. This chapter also includes a description of the project team, training and qualifications, quality assurance (QA), and post-removal action activities.

## 5.1 PROJECT COST AND SCHEDULE SUMMARY

The 105-B Reactor Facility removal action will be scheduled and estimated using the contractor's hierarchy of schedules, which include activity logic and restraints.

Activities will be resource-loaded for personnel. Equipment needs will be identified and other materials estimated and included in the budgeted cost of work scheduled.

Estimates of project costs will be prepared at the activity level by the project team and subsequently will be reviewed and approved by the contractor and the DOE. Cost collection will occur at the code of account level. Estimated costs for the 105-B Reactor Facility hazard mitigation activities are presented in Table 5-1. The Cost Estimate Backup (Appendix F) provides a detailed cost estimate summary and information used to determine the cost estimate.

The schedule, which encompasses the work scope of the 105-B Reactor Facility removal action, is presented in Figure 5-1. This schedule also will be subject to change to be compliant with the funding of continued work for the removal action. The schedule includes durations for the tour seasons, as it is assumed that physical work activities within the facility will not be performed during these times.

**Table 5-1. Hanford B-Reactor Building 105-B Interior Hazards Removal Cost Estimate Summary. (2 sheets)**

| Description | Total Cost for Radiation Hazard Removal | Total Cost for Lead Hazard Removal | Total Cost for Asbestos Hazard Removal | Total Cost for Other Hazards Removal | Line Item Cost | % Of Total Hazard Removal Cost |
|---|---|---|---|---|---|---|
| **Project Support Costs(divided between hazards)** | | | | | | |
| Scaffold rental and setup (cost distributed by % of hazard removal cost) | $53,000 | $294,000 | $35,000 | $0 | $381,000 | -- |
| Containment and negative air machines setup (cost distributed by % of hazard removal cost) | $4,000 | $23,000 | $3,000 | $0 | $30,000 | -- |
| **Hazard Removal** | | | | | | |
| Radiation hazard removal | $721,000 | $0 | $0 | $0 | $721,000 | 9.9% |
| Lead hazard removal | $0 | $5,380,000 | $0 | $0 | $5,380,000 | 74.0% |
| Asbestos hazard removal | $0 | $0 | $669,000 | $0 | $669,000 | 9.2% |

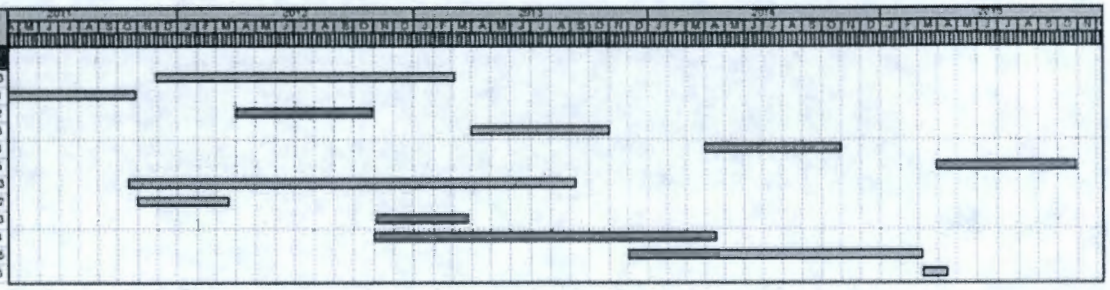
**Table 5-1. Hanford B-Reactor Building 105-B Interior Hazards Removal Cost Estimate Summary. (2 sheets)**

| Description | Total Cost for Radiation Hazard Removal | Total Cost for Lead Hazard Removal | Total Cost for Asbestos Hazard Removal | Total Cost for Other Hazards Removal | Line Item Cost | % Of Total Hazard Removal Cost |
|---|---|---|---|---|---|---|
| Reactor nozzles, front side, radiation and lead hazards removal | $112,000 | $112,000 | $0 | $0 | $224,000 | 3.1% |
| Reactor nozzles, back side, radiation and lead hazards removal | $112,000 | $112,000 | $0 | $0 | $224,000 | 3.1% |
| Floor drains grouted | $0 | $0 | $0 | $9,000 | $9,000 | 0.1% |
| All oil hazards removed | $0 | $0 | $0 | $32,000 | $32,000 | 0.4% |
| Mercury switches | $0 | $0 | $0 | $7,000 | $7,000 | 0.1% |
| **Project Support and Hazard Removal Totals** | **$1,002,000** | **$5,921,000** | **$707,000** | **$48,000** | **$7,677,000** | **100%** |
| **General Requirements** | | | | | | |
| Training (cost distributed by % of hazard removal cost) | $70,000 | $414,000 | $49,000 | $3,000 | $537,000 | -- |
| Capital equipment purchase(distributed 45%, 45%, 10%, 0%, based on capital equipment required for each hazard) | $248,000 | $248,000 | $56,000 | $0 | $552,000 | -- |
| **General Requirements Totals** | **$318,000** | **$662,000** | **$105,000** | **$3,000** | **$1,089,000** | -- |
| ***Subtotal of Hazards Removal and General Requirements*** | ***$1,320,000*** | ***$6,583,000*** | ***$812,000*** | ***$51,000*** | ***$8,766,000*** | -- |
| General contractor's markups, overhead and profit | -- | -- | -- | -- | $1,390,000 | -- |
| Tax | 8.30% | -- | -- | -- | $728,000 | -- |
| Bond & insurance | 2% | -- | -- | -- | $190,000 | -- |
| Contingency | 5% | -- | -- | -- | $484,000 | -- |
| **Total** | -- | -- | -- | -- | **$11,558,000** | -- |

**Note:** The general contractor's markups, overhead, profit, bond & insurance and contingency used above are assumed 'typical' percentages.

**Figure 5-1. Work Activity Summary Schedule.**

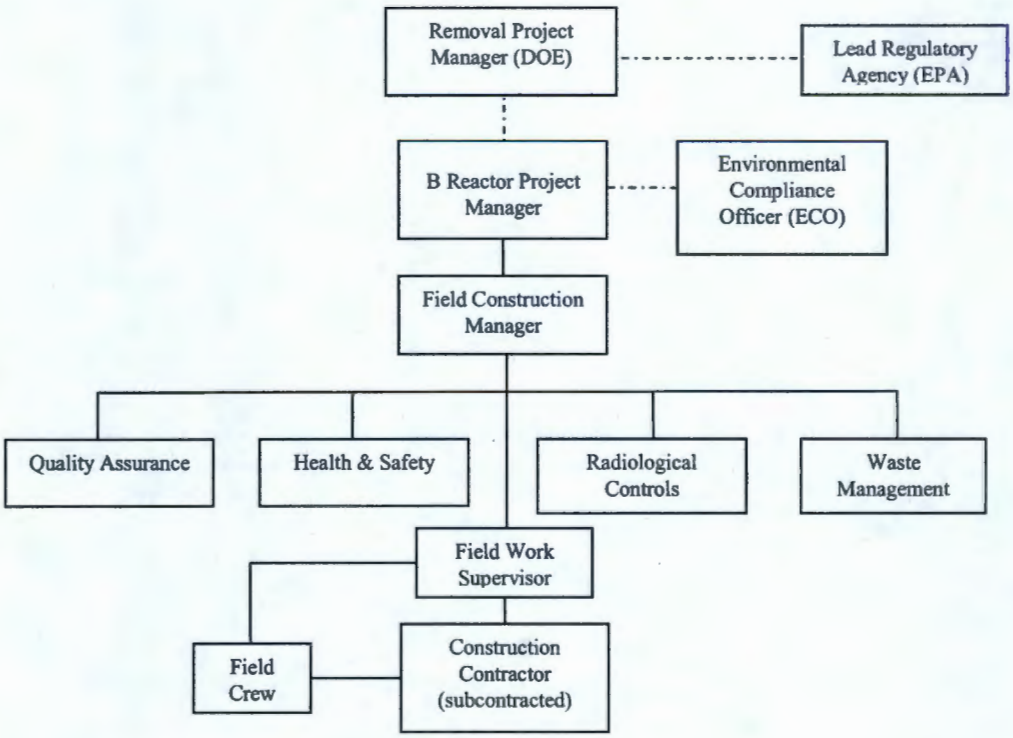
| Activity ID | Activity Name | Original Duration | Start | Finish |
|---|---|---|---|---|
| A1000 | Definitive Design Development | 317 | 30-Nov-11* | 05-Mar-13 |
| A1010 | Tour Season 2011 | 147 | 04-Apr-11* | 28-Oct-11 |
| A1020 | Tour Season 2012 | 148 | 02-Apr-12* | 29-Oct-12 |
| A1030 | Tour Season 2013 | 154 | 01-Apr-13* | 31-Oct-13 |
| A1040 | Tour Season 2014 | 152 | 31-Mar-14* | 31-Oct-14 |
| A1050 | Tour Season 2015 | 150 | 30-Mar-15* | 28-Oct-15 |
| A1060 | Hazard Mitigation Phase Activities | 478 | 17-Oct-11* | 09-Sep-13 |
| A1070 | Construction Activities Phase I | 88 | 01-Nov-11* | 20-Mar-12 |
| A1080 | Construction Activities Phase II | 96 | 05-Nov-12* | 25-Mar-13 |
| A1090 | Mechanical Upgrades | 369 | 01-Nov-12* | 17-Apr-14 |
| A1100 | Electrical Upgrades | 347 | 02-Dec-13* | 06-Mar-15 |
| A1110 | Completion Phase Activities | 27 | 09-Mar-15* | 14-Apr-15 |



## 5.2 PROJECT TEAM

The term "project team" includes the individuals working to accomplish the removal action (Figure 5-2). Accordingly, the project team includes the lead regulatory agency; the DOE-RL; the removal action manager, and the site project manager, both agents of DOE.

**Figure 5-2. Project Organization.**




- **Removal Project Manager (DOE)** - DOE is the government agency responsible for the removal actions throughout the Hanford Site, and as such, has assigned removal project managers to each main area and task involved with removal action activities. A Removal Project Manager is responsible for the management of the assigned activities, including scope, budget, schedule, quality, personnel, communication, risk/safety, contracts, and regulatory interface.

  The Remedial Project Manager also directs response efforts and coordinates all other efforts for this remedial action per 40 CFR 300.120.

- **Lead Regulatory Agency (EPA)** - The regulatory agency responsible for CERCLA removal action activities at the 105-B Reactor Facility is the EPA. EPA is the lead regulatory agency for the 105-B Reactor Facility and may request support from the non-lead agency, if necessary. As the lead regulatory agency, EPA is responsible for overseeing the activities to verify that all applicable regulatory requirements are met.

- **Site Project Manager** - The 105-B Reactor Facility Project Manager is responsible for direct management of regulatory documents and requirements, field activities, and subcontracted tasks. The 105-B Reactor Facility Project Manager ensures that the Field Construction Manager, Environmental Compliance Officer, and others responsible for implementation of regulatory documents are provided with current copies of these documents and any revisions thereto. The 105-B Reactor Facility Project Manager also works closely with the Quality Assurance and Health and Safety organizations and the Field Construction Manager to integrate these and the other lead disciplines in planning and implementing the work scope. The 105-B Reactor Facility Project Manager also coordinates with, and reports to DOE-RL, and the regulatory agency on all removal activities.

- **Environmental Compliance Officer** - The Environmental Compliance Officer provides technical oversight, direction and acceptance of project and subcontracted environmental work and develops appropriate mitigation measures with a goal of minimizing adverse environmental impacts. The Environmental Compliance Officer also reviews plans, procedures and technical documents to ensure that all environmental requirements have been addressed, identifies environmental issues that affect operations and develops cost effective solutions, and responds to environmental/regulatory issues or concerns raised by DOE and/or regulatory agency staff.

- **Field Construction Manager** – The Field Construction Manager has the overall responsibility for supporting the safety, environmental, QA, sampling, waste management, and radiological control staff in the planning, coordination, and execution of field removal activities. Responsibilities also include directing training, mock-ups, and practice sessions with field personnel to ensure that the field actions are understood and can be performed as specified. The Field Construction Manager communicates with the 105-B Reactor Facility Project Manager to identify field constraints that could affect the removal activities.

- **Radiological Controls** - The Radiological Controls Lead is responsible for the radiological/health physics support within the project. Specific responsibilities include conducting ALARA reviews, exposure and release modeling, and radiological controls optimization for all work planning. In addition, radiological hazards are identified and appropriate controls are implemented to maintain worker exposures to hazards at ALARA levels (e.g., personal protective equipment). Radiological Controls interfaces with the project health and safety representative and plans and directs radiological control technician support for all activities.

- **Health and Safety** - The Health and Safety organization responsibilities include coordination of industrial safety and health support within the project as carried out through health and safety plans, job hazard analyses, and other pertinent safety documents required by Federal regulation or by remediation primary contractor work requirements. In addition, assistance is provided to project personnel in complying with applicable health and safety standards and requirements. Personnel protective clothing requirements are coordinated with Radiological Controls Lead.

- **Quality Assurance** - The Quality Assurance Lead is matrixed to the 105-B Reactor Facility Project Manager and is responsible for QA issues on the project. Responsibilities include oversight of implementation of the project QA requirements; review of project documents; and participation in QA assessments on sample collection and analysis and other remediation activities, as appropriate.

- **Waste Management** - The Waste Management Lead communicates policies and procedures and ensures project compliance for storage, transportation, disposal, and waste tracking in a safe and cost-effective manner. Other responsibilities include identifying waste management sampling/characterization requirements (as required) to ensure regulatory compliance and interpreting

the characterization data to generate waste designations, profiles, and other documents that confirm compliance with waste acceptance criteria.

- **Construction Contractor** – The Construction Contractor is a subcontracted company that provides the field crew to implement the removal action. In addition, the Construction Contractor directs the procurement and installation of materials and equipment needed to support the field work.

- **Field Crew** - The Field Crew consists of laborers, teamsters, and equipment operators who provide hands-on support for implementing the removal action. In addition, the Field Crew includes a Field Work Supervisor who oversees the laborers, teamsters, and equipment operators.

## 5.3 CHANGE MANAGEMENT

There are three types of changes in the 105-B Reactor Facility removal action that could affect compliance with the requirements in the Action Memorandum (EPA 2002): (1) a non-significant or minor change, (2) a significant change to a component of the alternative, and (3) a fundamental change to the overall alternative.

A non-significant or minor change falls within the normal scope of changes occurring during the removal action processes. These minor changes should be documented in the appropriate post-decision project file (for example, through inter-office memoranda or logbooks). Non-significant changes shall not impact the requirements of the Action Memorandum (EPA 2002); nor will they impact the functional requirements. An example of non-significant changes may include, but are not limited to, modifications to the removal action schedule that do not impact agreed-upon milestones.

It may be determined that a significant change to the selected alternative as described in the Action Memorandum (EPA 2002) is necessary after the Action Memorandum has been signed. Significant changes are defined as changes that significantly modify the scope, performance, or component cost for the alternative as presented in the Action Memorandum. All significant changes will be addressed in a fact sheet. Examples of significant changes may include, but are not limited to, the following:

- A significant increase or decrease in the total cost of site removal action (greater than +50 percent or more than –30 percent) addressed in Appendix F of this RAWP.

- A significant delay in the point in time when the removal action or objectives are met.

A fundamental change is a change that does not meet the requirements set forth in the Action Memorandum (EPA 2002) or that incorporates removal activities not defined in the scope of the Action Memorandum. In few cases are there fundamental changes to an Action Memorandum. Should the situation arise, the Action Memorandum must be amended. Significant changes that fundamentally alter the alternative occur when the following situation arises:

- A land use is defined that is not compatible with the Action Memorandum (EPA 2002).

Determining the significance of the change is the lead regulatory agency's responsibility. The project manager is responsible for tracking all changes and obtaining appropriate reviews by staff. The project manager will discuss the change with DOE-RL, and DOE-RL will then discuss the type of change that is necessary with the EPA and Ecology. Appropriate documentation will follow, in accordance with the requirements for that type of change.

## 5.4 PERSONNEL TRAINING AND QUALIFICATIONS

During the performance of project activities, the experience and capabilities of the operating staff will be extremely important in maintaining worker and environmental safety. Day-to-day knowledge of ongoing operations, month-to-month understanding of conditions encountered, and lessons learned will be utilized for continued safe operations.

Training requirements will ensure that personnel have been instructed in the technologies to work safely in and around radiological areas, and to maintain their individual radiation exposure and the radiation exposures of others ALARA. Standardized core courses and training material will be presented, and site-specific information and technologies will be added to adequately train workers. Records of required training will be maintained in accessible files.

Health physics workers will be required to have completed and be current in radiological control technician 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 could 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 as opposed to project staff training.

The contractor Training Program will provide workers with the knowledge and skills necessary to safely execute assigned duties. A graded approach will be used to ensure that workers receive a level of training commensurate with their responsibility and that complies with applicable requirements. Specialized employee training will include pre-job safety briefings, plan-of-the-day meetings, and facility/work site orientations. Training and qualifications will be determined as required by job assignment for work activities.

The SSHASP, RWP, and activity hazards analysis will include specific requirements for project activities being conducted, which will include personal protective equipment and required training for project personnel.

## 5.5 QUALITY ASSURANCE PROGRAM

Overall QA for the work plan will be planned and implemented in accordance with 10 CFR 830, "Nuclear Safety Management," Subpart A, "Quality Assurance Requirements," EPA/240/B-01/003, *EPA Requirements for Quality Assurance Project Plans, EPA QA/R-5*, and SW-846, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*. The QA activities will use a graded approach based on the potential impact on the environment, safety, health, reliability, and continuity of operations. Other specific activities will include QA implementation, responsibilities and authority, document control, QA records, and audits. These activities are discussed in the following sections.

### 5.5.1 Best Management Practices/Quality Control

Removal action quality control shall be performed in accordance with contractor's best management practices and established quality control program. Such a program will include the following:

- Summary of responsibilities and authorities of all organizations and key personnel involved in the design and construction of site removal action.
- Qualifications of the QA personnel to demonstrate that they possess the training and experience necessary to fulfill their identified responsibilities.
- Descriptions of the reporting requirements for QA activities (including such items as daily summary reports, schedule of data submissions, inspection data sheets, problem identification and corrective measures reports, evaluation reports, acceptance reports, and final documentation) and descriptions of the provisions for the final storage of all records consistent with overall requirements of the contractor's records management program.

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# 6.0 REFERENCES

0000X-DC-W0001, 2010, *Supplemental Waste Acceptance Criteria for Bulk Shipments to the Environmental Restoration Disposal Facility*, Rev. 11, Washington Closure Hanford, Richland, Washington.

10 CFR 830, "Nuclear Safety Management," Subpart A, "Quality Assurance Requirements," Title 10, *Code of Federal Regulations,* , Part 830, as amended.

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

10 CFR 851, "Worker Safety and Health Program;" Title 10, *Code of Federal Regulations*, Part 851, as amended.

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

29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response," Title 29, *Code of Federal Regulations*, Part 1910, as amended.

29 CFR 1926, "Safety and Health Regulations for Construction," Title 29, *Code of Federal Regulations*, Part 1926, as amended.

36 CFR 800, "Protection of Historic Properties," Title 36, *Code of Federal Regulations,* Part 800, as amended.

40 CFR 61, "National Emission Standards for Hazardous Air Pollutants," Title 40, *Code of Federal Regulations*, Part 61, as amended.

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

40 CFR 300, "National Oil and Hazardous Substances Pollution Contingency Plan," Title 40, *Code of Federal Regulations,* Part 300, as amended.

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

40 CFR 355, "Emergency Planning and Notification," Title 40, *Code of Federal Regulations,* Part 355, as amended.

40 CFR 761, "Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions," Title 40, *Code of Federal Regulations*, Part 761, as amended.

40 CFR 82, "Protection of Stratospheric Ozone," Title 40, *Code of Federal Regulations*, Part 82, as amended.

49 CFR, "Transportation," Title 49, *Code of Federal Regulations,* as amended.

58 FR 48509, 1993, "Record of Decision: Decommissioning of Eight Surplus Reactors at the Hanford Site, Richland, Washington, Environmental Impact Statement" *Federal Register*, Vol. 58, pp. 48509 (September 16).

58 FR 49200, 1993, "Procedures for Planning and Implementing Off-Site Response Actions," *Federal Register*, Vol. 58 (September 22).

*Americans with Disabilities Act of 1990*, 42 USC 126, et seq.

*Archeological and Historic Preservation Act of 1974*, 16 USC 469, et seq.

BHI-00076, 1995, *105-B Reactor Facility Museum Phase I Feasibility Study Report*, Rev. 01, Bechtel Hanford, Inc., Richland, Washington.

BHI-01282, 1999, *Hanford B Reactor Building Hazard Assessment Report*, Rev. 0, Bechtel Hanford, Inc., Richland, Washington.

BHI-01384, 2000, *105-B Reactor Museum Feasibility Assessment (Phase II) Project*, Rev. 0, Bechtel Hanford, Inc., Richland, Washington.

*Clean Air Act of 1990*, *42* USC 7401, et seq.

*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*, 42 USC 9601, et seq.

DOE, 1999, *Record of Decision: Final Hanford Comprehensive Land Use Plan Environmental Impact Statement (HCP EIS)*, 6450-01-P, U.S. Department of Energy, Washington, D.C.

DOE, 2002, *DOE Policies on Application of NEPA to CERCLA and RCRA Cleanup Actions*, U.S. Department of Energy, Washington, D.C.

DOE and EPA, 1995, "Policy on Decommissioning Department of Energy Facilities Under CERCLA," external memorandum from S.A. Herman and E.P. Laws, U.S. Environmental Protection Agency, and T.P. Grumbly, U.S. Department of Energy, Washington, D.C., May 22.

DOE G 430.1-2, *Implementation Guide for Surveillance and Maintenance during Facility Transition and Disposition*, U.S. Department of Energy, Washington, DC.

DOE G 430.1-4, *Decommissioning Implementation Guide*, U.S. Department of Energy, Washington, D.C.

DOE M 470.4-2A, *Physical Protection*, U.S. Department of Energy, Washington, DC.

DOE O 151.1C, *Comprehensive Emergency Management System*, U.S. Department of Energy, Washington, DC.

DOE O 414.1C, *Quality Assurance*, U.S. Department of Energy, Washington, D.C.

DOE O 420.1B, *Facility Safety*, U.S. Department of Energy, Washington, DC.

DOE O 430.1B, *Real Property Asset Management*, U.S. Department of Energy,Washington, DC.

DOE O 433.1B, *Maintenance Management Program for DOE Nuclear Facilities*, U.S. Department of Energy, Washington, DC.

DOE O 440.1A, *Worker Protection Management for DOE Federal and Contractor Employees,* U.S. Department of Energy, Washington, DC.

DOE O 440.1B, *Worker Protection Program for DOE (Including the National Nuclear Security Administration) Federal Employees,* U.S. Department of Energy, Washington, DC.

DOE O 450.1A, *Environmental Protection Program,* U.S. Department of Energy, Washington, DC.

DOE O 451.1B, *National Environmental Policy Act Compliance Program*, U.S. Department of Energy, Washington, D.C.

DOE-0223, 1992, *Emergency Plan Implementing Procedures*, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE/EIS-0119F, 1992, *Final Environmental Impact Statement: Decommissioning of Eight Surplus Production Reactors at the Hanford Site, Richland, Washington*, U.S. Department of Energy, Washington, D.C.

DOE/RL-94-02, 2009, *Hanford Emergency Management Plan*, Rev. 3, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE/RL-94-41, 1994, *NEPA Roadmap for the Environmental Restoration Disposal Facility Regulatory Package,* Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE/RL-2001-09, 2001, *Engineering Evaluation/Cost Analysis for the 105-B Reactor Facility*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE/RL-2001-36, *Hanford Sitewide Transportation Safety Document,* U.S. Department of Energy, Richland, Washingon.

DOE/RL-2001-68, 2002, *Removal Action Work Plan and Surveillance and Maintenance Plan for the 105-B Reactor Facility,* Draft A, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE/RL-2002-43, 2003, *Evaluation of Final Configuration Alternatives for the 105-B Reactor Facility*, Draft B, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE/RL-2004-55, 2004, *Engineering Evaluation/Cost Analysis for the Final Configuration of the 105-B Reactor Facility,* Draft A, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE/RL-2005-45, 2005, *Surplus Reactor Final Disposition Engineering Evaluation,* Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE/RL-2006-29, 2006, *Calculating Potential to Emit Radiological Releases and Doses,* Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE/RL-2010-84, 2011, *Removal Action Work Plan for Disposition of Surplus Railcars on the 212-R Rail Spur,* Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

Ecology, EPA, and DOE, 1989, Hanford Federal Facility Agreement and Consent Order, as amended, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington, as amended.

Ecology, EPA, and DOE, 1989b, Hanford Federal Facility Agreement and Consent Order Action Plan, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington.

Endangered Species Act of 1973, 16 USC 1531-1544, et seq.

EPA 540/R/99/006, 1999, *Radiation Risk Assessment At CERCLA Sites: Q&A*, OSWER Directive 9200.4-31P, Office of Emergency and Remedial Response, Office of Radiation and Indoor Air, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 2002, *Action Memorandum for the 105-B Reactor Facility, Hanford Site, Benton County, Washington*, CCN 096526, U.S. Environmental Protection Agency, Region 10, Seattle, Washington (March 4).

EPA/240/B-01/003, 2001, *EPA Requirements for Quality Assurance Project Plans, EPA QA/R-5,* U.S. Environmental Protection Agency, Washington, D.C.

Hazardous Materials Transportation Act of 1974, 49 U.S.C. 1801-1819, et seq.

MSC-5173, *MSC Radiological Control Manual,* Mission Support Alliance, Richland, Washington.

MSC-MP-32219, *10 CFR 851 MSC Worker Safety and Health Program Description,* Mission Support Alliance, Richland, Washington.

MSC-MP-599, *Quality Assurance Program Description,* Mission Support Alliance, Richland, Washington.

MSC-RD-10606, *Fire Protection Program Requirements,* Mission Support Alliance, Richland, Washington.

MSC-RD-11440, *Physical Protection of Property and Facilities*, Mission Support Alliance, Richland, Washington.

MSC-RD-15332, *Environmental Protection Requirements,* Mission Support Alliance, Richland, Washington.

MSC-RD-7647, *Emergency Preparedness Program Requirements,* Mission Support Alliance, Richland, Washington.

MSC-SP-1145, *MSC Radiation Protection Program Plan,* Mission Support Alliance, Richland, Washington.

National Environmental Policy Act of 1969, 42 USC 4321, et seq.

National Historic Preservation Act of 1966, 16 U.S.C. 470, et seq.

*National Register of Historical Places*

NPS, 2007, *National Historic Landmark Nomination, United States Department Of The Interior, National Park Service,* OMB No. 1024-0018, U.S. National Park Services, Washington, D.C.

Public Law 108-340, 2004, *Manhattan Project National Historical Park Study Act,* 108th Congress, U.S. Congress, Washington, D.C.

RCW 43.21A, "Department of Ecology," *Revised Code of Washington*, Olympia, Washington.

RCW 70.105, "Hazardous Waste Management," *Revised Code of Washington,* Olympia, Washington.

RCW 70.94, "Washington Clean Air Act," *Revised Code of Washington,* Olympia, Washington.

RCW 70.95, "Solid Waste Management - Reduction and Recycling," *Revised Code of Washington*, Olympia, Washington.

*Resource Conservation and Recovery Act of 1976*, 42 USC 6901, et seq.

SW-846, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,* U.S. Environmental Protection Agency, Washington, D.C.

*Toxic Substances Control Act of 1976*, 15 USC 2601, et seq.

WAC 173-303, "Dangerous Waste Regulations," *Washington Administrative Code*, Olympia, Washington.

WAC 173-304, "Minimum Functional Standards for Solid Waste Handling," *Washington Administrative Code*, Olympia, Washington.

WAC 173-340, "Model Toxics Control Act--Cleanup," *Washington Administrative Code*, Olympia, Washington.

WAC 173-350, "Solid Waste Handling Standards," *Washington Administrative Code*, Olympia, Washington.

WAC 173-400, "General Regulations for Air Pollution Sources," *Washington Administrative Code*, Olympia, Washington.

WAC 173-460, "Controls for New Sources of Toxic Air Pollutants," *Washington Administrative Code*, Olympia, Washington.

WAC 173-480, "Ambient Air Quality Standards and Emission Limits for Radionuclides," *Washington Administrative Code*, Olympia, Washington.

WAC 246-247, "Radiation Protection—Air Emissions," *Washington Administrative Code*, Olympia, Washington.

WAC 296-62, "General Occupational Health Standards," *Washington Administrative Code,* Olympia, Washington.

WCH-19, 2008, *Final Hazard Categorization for Surveillance and Maintenance of 100 Area Reactor Facilities,* Rev. 0, Washington Closure Hanford, Richland, Washington.

WCH-191, 2008, *Environmental Restoration Disposal Facility Waste Acceptance Criteria,* Rev. 0, Washington Closure Hanford, Richland, Washington.

# APPENDIX A

# SURVEILLANCE AND MAINTENANCE PLAN FOR THE 105-B REACTOR FACILITY

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# A1.0 INTRODUCTION

The RAWP describes the activities to be performed to mitigate environmental hazards at the 105-B Reactor Facility. Some hazards at the 105-B Reactor Facility have been removed in the past as outlined in the DOE/RL-2001-68. These removal activities were evaluated in DOE/RL-2001-09, and selected per EPA 2002, *Action Memorandum for the 105-B Reactor Facility, Hanford Site, Benton County, Washington.*

The Tri-Party Agreement, ensures compliance with RCRA and CERCLA. The Tri-Party Agreement sets forth certain requirements and milestones for cleanup activities at the Hanford Site, including the requirements for S&M activities at the site.

This appendix provides the plan for S&M activities at the 105-B Reactor Facility. This plan has been prepared in accordance with the Tri-Party Agreement, Attachment 2 (Action Plan), Section 8.6, "Surveillance and Maintenance Phase", and DOE G 430.1-2, *Implementation Guide for Surveillance and Maintenance During Facility Transition and Disposition.* The plan will be effective upon the approval of the RAWP.

The objectives of the S&M phase are to ensure adequate containment of any contaminants left in place, to provide physical safety and security controls, and to maintain and monitor the facility in a manner that will minimize risk to human health and environment. As removal actions are implemented in accordance with the established schedule in the RAWP, the S&M plan will be revised to update the remaining hazards and facility condition as necessary.

The S&M plan is prepared by DOE-RL and details facility aspects by associated requirements including the following:

1. Surveillance
2. Maintenance
3. Quality assurance
4. Radiological controls
5. Hazardous substance inventory, management and protection
6. Emergency preparedness
7. Health and safety
8. Safeguards and security
9. Environmental compliance
10. Cost and schedule.

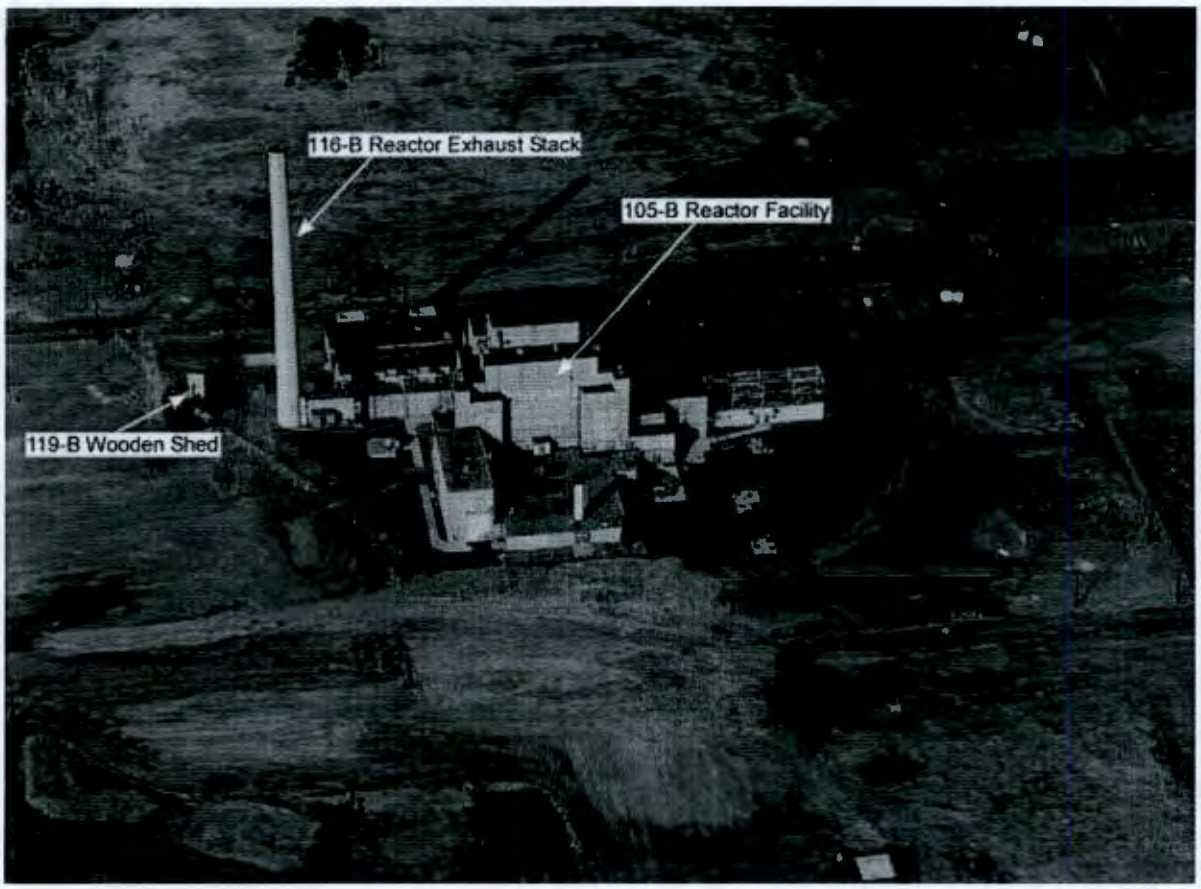
# A2.0 FACILITY DESCRIPTION

This section of the S&M plan describes the major structures, status of active systems, current tour operations, environmental hazard removal actions, and facility structural upgrades.

## A2.1 BUILDING DESCRIPTION

This S&M plan covers the 105-B Reactor Facility, the 116-B Reactor Exhaust Stack, and the 119-B Wooden Shed. Figure A-1 illustrates the 105-B Reactor Facility and surrounding support buildings.

**Figure A-1. 105-B Reactor Facility and Surrounding Support Buildings.**




### A2.1.1 105-B Reactor Facility

The 105-B Reactor Building is the only standard pile reactor building that remains intact at the Hanford Site. It is currently maintained in a condition to allow controlled access for public tours that are arranged through and sponsored by the DOE. The reactor building contains:

- A reactor block
- Fuel storage basin
- Inner and outer rod rooms (i.e., inner and outer horizontal control rod rooms)
- Vertical safety rod winch level, and front-face work area
- Fans and ducts for ventilation and re-circulating inert gas systems
- Water cooling systems
- Supporting offices, lunchroom, shops, and laboratories.

### A2.1.2 116-B Reactor Exhaust Stack

The 116-B Reactor Exhaust Stack was designed to discharge ventilation exhaust into the atmosphere from the 105-B Reactor. The ventilation system was designed so that air flowed from the office and service areas to potentially contaminated areas. The air was exhausted to the atmosphere through the 116-B Reactor Exhaust Stacks. The 116-B Reactor Exhaust Stack was used to discharge ventilation air 200 ft above grade from the 105-B Building. Initially, exhaust air flowed through concrete ducts from the 105-B Building directly out through the exhaust stack (without filtration). After a confinement project was completed in the 1950s, the air was diverted through underground reinforced-concrete ducts to the 117-B Filter Building (which has been demolished). After flowing through the fiber (particulate) and activated charcoal filters, the air went through below-grade and above-grade concrete ducts into the exhaust stack. The exhaust stack has been isolated from sources of potential contamination within the reactor building.

### A2.1.3 119-B Wooden Shed

The 119-B Wooden Shed is a small dimensioned storage building with a transite-material roof.

## A2.2 SYSTEM DESCRIPTION

At present, there is no process equipment or heating, ventilation, and air conditioning system in operation at the 105-B Reactor Facility. The original supply and exhaust fans have been disabled. The presence of radon in the facility has prompted the need for ventilation where the tour route is located. New ductwork was installed where needed to support ventilation fans along the tour route. A central heating or cooling system does not exist at this time.

The only electrical components in service are lights and ceiling mounted heaters. The supply water lines to the reactor facility have been disconnected or isolated. Portable canister fire extinguishers are available for use as a fire suppression system. The ability to report fire alarm activation to the Hanford Fire Department was removed when the building was decommissioned.

## A2.3 CURRENT TOUR OPERATIONS

Tours of 105-B Reactor Facility are being offered to the public. Tours are sponsored by DOE and guided by MSA personnel. Numbers of tours are varied each year. Public tours are conducted on a pre-planned and scheduled basis, limited to adults who are cleared through Hanford Site security process. Tours are conducted from March to October, and closed during the winter months. Tours depart from Richland, generally in government-provided transportation.

## A2.4 HAZARD REMOVAL ACTIVITIES

The primary environmental hazard at the 105-B Reactor Facility is radioactive contamination. Chemical hazards are also present and identified in the following bullets.

- Lead (lead paint, lead sheet and brick)
- Mercury (switches)
- Polychlorinated biphenyls (light ballasts, motor oil)
- Asbestos (pipe lagging, gaskets, floor tiles, ceiling tiles, transite panels, wire insulation)
- Oils/greases (PCB oil in lube and hydraulic)

The environmental hazard removal activities are described in Section 2 of this RAWP.

## A2.5 ENGINEERING UPGRADES

Structural, electrical, and ventilation systems at the 105-B Reactor Facility will be upgraded to preserve the facility for future public access, and provide comfort for the public tours. Although the engineering upgrades are not environmental in nature, and therefore are not part of this CERCLA removal action, they are described in this document due to the overlap of work activities. Engineering analyses will be performed to identify and support design of appropriate roof and wall upgrades. For cost and schedule purposes it is assumed that the existing precast concrete roof planks will be replaced with metal deck. Likewise, for cost and schedule purposes it is assumed the existing concrete masonry unit walls will be reinforced with new horizontal/vertical rods and grouted in place, while damaged concrete masonry unit blocks will be replaced. New the heating, ventilation, and air conditioning units will be installed throughout the facility. New power distribution service, lighting systems, and fire protection system will also be installed. Section 2 of this RAWP provides a summary of the structural, electrical, and ventilation upgrades.

# A3.0 SURVEILLANCE

This section describes the surveillance activities to be conducted on a routine and non-routine basis by MSA personnel. Routine surveillance activities are performed to ensure that the facility is in a safe condition for conducting educational tours. Non-routine activities surveillance focuses on corrective action for undesirable observations.

## A3.1 ROUTINE SURVEILLANCE

The purpose of the routine surveillance at the 105-B Reactor Facility is to ensure that the facility is in a safe condition for public entry. This surveillance will be performed prior to all scheduled tours. The surveillance will consist of walking through the established tour route and checking for indications of the following potential hazards.

- Animal or insect intrusion
- Barricade/posting deficiencies
- Hazardous conditions
- Occupational hazards
- Previously unidentified hazards
- Inadequate housekeeping from prior work.

## A3.2 NON-ROUTINE SURVEILLANCE

Non-routine surveillance is conducted to identify undesirable conditions. This surveillance will be performed annually or as directed by facility management. The walk-through surveillance will be performed both inside and outside. Surveillance personnel will be looking for indications of the following potential hazards in all accessible or observable areas.

- Structural defects
- Roof deterioration
- Posting deficiencies
- Contamination migration
- Suspect hazardous materials

- Hazardous conditions
- Electrical hazards
- Unidentified friable asbestos
- Failed lights
- Unlocked doors
- Water leaks
- Previously unidentified hazards
- Unidentified or unlabeled containers
- Occupational hazards
- Animal or insect intrusion
- Excess combustible materials
- Ground subsidence
- Inadequate housekeeping activity from prior work.

It is expected that required radiological control surveillances will be conducted in conjunction with this non-routine surveillance activity.

### A3.3 FACILITY STRUCTURAL INSPECTIONS

In addition to the annual walk-through surveillance, a qualified structural engineer will conduct periodic inspections of the roof and walls. The frequency, extent of future inspections, and recommendations resulting from these periodic inspections will be documented.

## A4.0 MAINTENANCE

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

### A4.1 MAINTENANCE ORGANIZATION AND ADMINISTRATION

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

DOE O 433.1B specifically mandates that the S&M contractor implements a maintenance management program using a graded approach and that the maintenance management program shall address the following major elements as appropriate:

- Maintenance organization and administration
- Training and qualification of maintenance personnel
- Maintenance facilities, equipment, and tools
- Types of maintenance
- Maintenance procedures

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

## A4.2 TYPES OF MAINTENANCE

A proper balance of preventive and corrective maintenance is employed to provide a high degree of confidence that facility equipment/structure degradation is identified and corrected. Preventive and corrective maintenance is conducted as described in the S&M contractor work control procedures. Routine preventive maintenance is scheduled periodically or as frequently as needed. Corrective maintenance is scheduled on an "as needed" basis.

Maintenance activities sometimes result in the generation of radiological or chemical contaminated waste. These waste streams must be properly managed per Appendix C, Waste Management Plan for the 105-B Reactor Facility.

Prior to the arrival of winter conditions, cold weather protection and preventive maintenance activities will be conducted as defined in the contractor's cold weather protection program.

# A5.0 QUALITY ASSURANCE

The MSA Quality Program, as documented in MSC-MP-599, *Quality Assurance Program Description*, satisfies the requirements of both 10 CFR 830.120, "Quality Assurance Requirements" and DOE O 414.1C, *Quality Assurance*.

The MSC-MP-599 establishes requirements, assigns responsibilities, and describes the management systems established to assure the quality of MSA activities and products.

## A5.1 TRAINING AND QUALIFICATION

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

In addition, training requirements for S&M personnel performing dangerous/mixed waste duties must also meet the standards of WAC 173-303-330, "Personnel Training."

## A6.0 RADIOLOGICAL CONTROL

DOE requires the contractor to establish, implement, and maintain a radiation protection program that satisfies the minimum requirements established by 10 CFR 835. MSC-SP-1145, *MSC Radiation Protection Program Plan* was prepared to satisfy this requirement. MSC-5173, *MSA Radiological Control Manual* further provides guidance for consistent and uniform implementation of radiological control requirements to MSA projects and activities.

## A7.0 HAZARDOUS SUBSTANCES INVENTORY, MANAGEMENT, AND PROTECTION

Major radioactive sources and/or dangerous chemicals and wastes were removed, stabilized, excessed, or disposed of from past removal actions. The hazardous material remaining at 105-B Reactor Facility is identified in Section A1.4. The environmental hazard inventory table (Appendix D) identifies and describes the material, location, and quantity of mixed waste and hazardous waste covered by the scope of this plan. Hazards associated with these materials are minimal due to their remote locations and existing form. The hazard inventory list will be revised periodically as the removal action progresses.

## A8.0 EMERGENCY MANAGEMENT

The MSA emergency management program is found in MSC-RD-7647, *Emergency Preparedness Program Requirements*. This document satisfies DOE O 151.1C, *Comprehensive Emergency Management System*; DOE/RL-94-02; and DOE-0223, *Emergency Plan Implementing Procedures*.

The emergency management requirements at the 105-B Reactor Facility are documented in the facility specific health and safety plan.

## A9.0 HEALTH AND SAFETY

MSC-MP-32219, *10 CFR 851 MSC Worker Safety and Health Program Description* describes the MSA worker safety and health program and provides the methods for implementing the requirements of 10 CFR 851, Subpart C.

### A9.1 FIRE HAZARD ANALYSIS

DOE O 420.1B, *Facility Safety* and DOE O 440.1B, *Worker Protection Program for DOE (Including the National Nuclear Security Administration) Federal Employees* defined DOE fire protection requirements. It required the contractor to establish requirements for preparation, maintenance, and approval of a fire hazards and analysis that comprehensively assesses the risk from fire within a DOE facility. MSC-RD-10606, *Fire Protection Program Requirements* was issued to satisfy this requirement.

## A9.2 OCCUPATIONAL SAFETY AND HEALTH

DOE requires contractor to comply with Occupational Safety and Health Administration standards. DOE directive DOE O 440.1A, *Worker Protection Management for DOE Federal and Contractor Employees* requires compliance to 29 CFR 1910, "Occupational Safety and Health Standards," and 29 CFR 1926, "Safety and Health Regulations for Construction."

The protection of the safety and health of the workers at 105-B Reactor Facility is specified in the facility specific health and safety plan.

# A10.0 SAFEGUARDS AND SECURITY

DOE requires the contractor as the facility manager/asset owner to ensure protection is provided for all property, facilities and materials according to the provisions DOE M 470.4-2, *Physical Protection.*

MSC-RD-11440, *Physical Protection of Property and Facilities* was prepared to satisfy this requirement. This MSA document, MSC-RD-11440, provides controlling access to the facility, evaluates the adequacy of existing physical controls (e.g., fencing, signs, entrance point into exclusion areas, door locks, and other barriers), provides a plan for the placement and monitoring of intrusion alarms, and describes the duties and scheduling of security patrols.

# A11.0 ENVIRONMENTAL COMPLIANCE

DOE requires the contractor to establish, implement, and maintain an environmental protection program in accordance with the provisions of DOE O 450.1A, *Environmental Protection Program.* The MSA environmental compliance program is established in MSC-RD-15332, *Environmental Protection Requirements.*

# A12.0 COST AND SCHEDULE

This section identifies the cost and schedule for S&M activities at the 105-B Reactor Facility.

The frequencies of routine and non-routine surveillance activities, along with preventive and corrective maintenance activities, are identified in Section 3.0 and 4.0 of this plan.

The 105-B Reactor Facility S&M costs will reflect the costs of activities, administrative, and programmatic requirements. Based on the current S&M budget, the S&M costs now and throughout the removal action are estimated to be approximately $300,000 annually. After completion of removal action activities, the cost of S&M is estimated to be reduced to approximately $80,000 annually since the hazardous materials within the facility will be significantly reduced.

# APPENDIX B

# 105-B REACTOR FACILITY ENGINEERING UPGRADES AND HAZARDS MITIGATION AIR MONITORING PLAN

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# B1.0 INTRODUCTION

This air monitoring plan describes the method of controlling air emissions and the proposed methods for effluent monitoring during engineering upgrades and hazards mitigation activities associated with the 105-B Reactor Facility CERCLA removal action.

## B1.1 BACKGROUND

The 105-B Reactor Facility is located in the 100-B/C Area of the Hanford Site along the southern shore of the Columbia River in southeastern Washington State (Figure B-1). The 105-B Reactor Facility (Figure B-2) is currently managed under a long-term surveillance and maintenance program to ensure continued protection of human health and the environment through hazard mitigation. Guided tours are led through the 105-B Reactor Facility along a maintained tour route. Most of the support facilities for the 105-B Reactor Facility have been demolished. The 116-B Reactor Exhaust Stack remains standing adjacent to the 105-B Reactor Facility.

## B1.2 REGULATORY OVERVIEW

Four aggregate areas of the Hanford Site (100, 200, 300, and 1100 Areas) were officially placed on the EPA's National Priorities List effective November 3, 1989. The Tri-Party Agreement was also signed by DOE, Ecology, and EPA in 1989. The Tri-Party Agreement is a legal agreement for achieving compliance with requirements for CERCLA response actions and with RCRA regulations and corrective actions.

The 105-B Reactor Facility is identified as a "key" CERCLA facility in Section 8.0, "Facility Decommissioning Process," of the Tri-Party Agreement Action Plan. As such, the 105-B Reactor Facility is subject to the joint DOE-EPA "Policy on Decommissioning Department of Energy Facilities Under CERCLA" (DOE and EPA 1995). The policy endorses the use of non-time-critical removal actions under CERCLA authority to support DOE surplus facility decontamination and decommissioning activities. In 1992, the 105-B Reactor Facility was added to the *National Register of Historic Places*[1]. Authorized under the *National Historic Preservation Act of 1966*, the *National Register of Historic Places* is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect our historic and archeological resources. Properties listed in the *National Register of Historic Places* include districts, sites, buildings, structures, and objects that are significant in American history, architecture, archeology, engineering, and culture. The *National Register of Historic Places* is administered by the NPS, which is part of the U.S. Department of the Interior.

The DOE is the lead agency for this CERCLA response action with the EPA as the lead regulatory agency. This plan describes the air monitoring and control activities identified as being required to meet the substantive air emission requirements.

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[1] Available at: http://www.nps.gov/nr/

**Figure B-1. Hanford Site Map.**

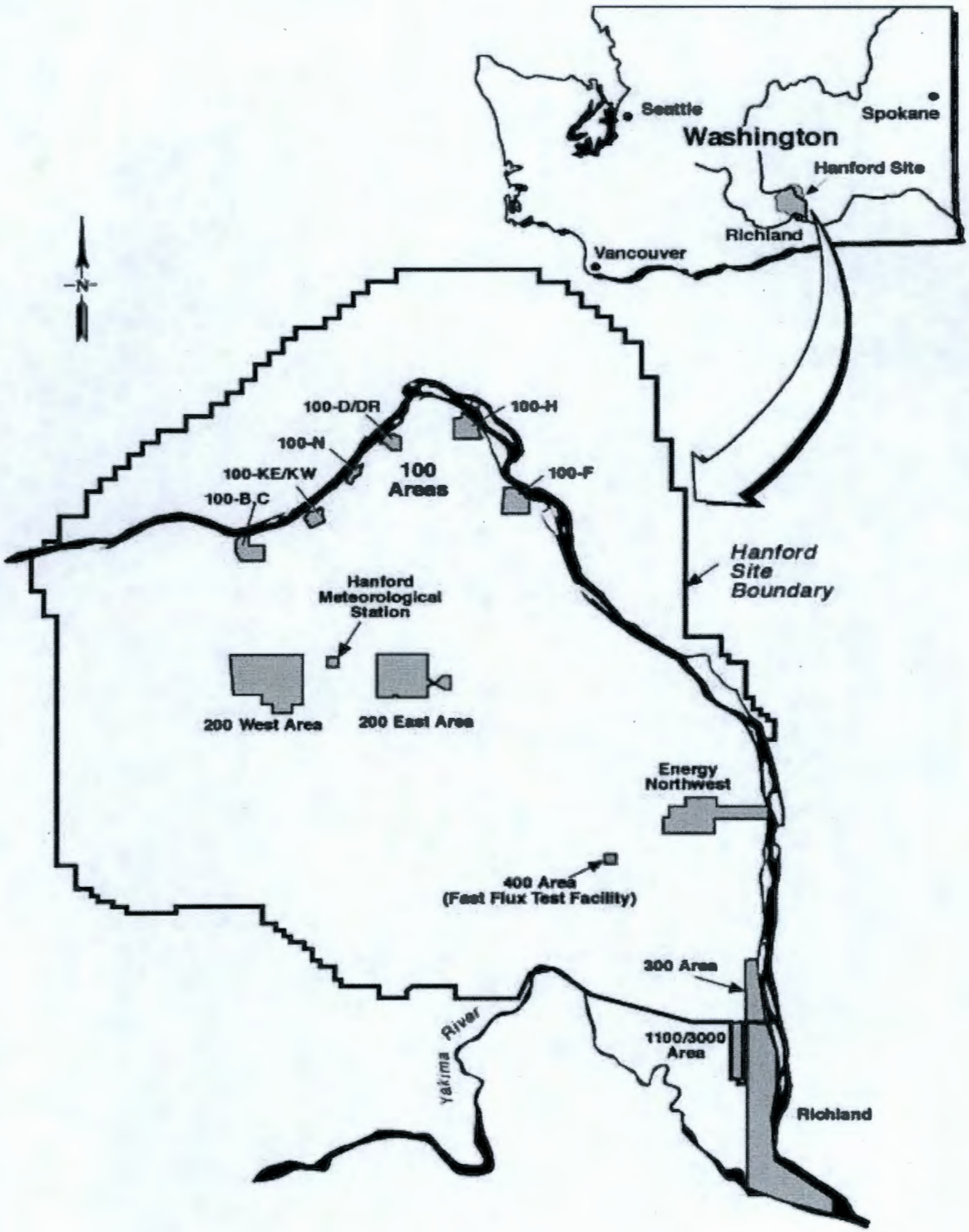
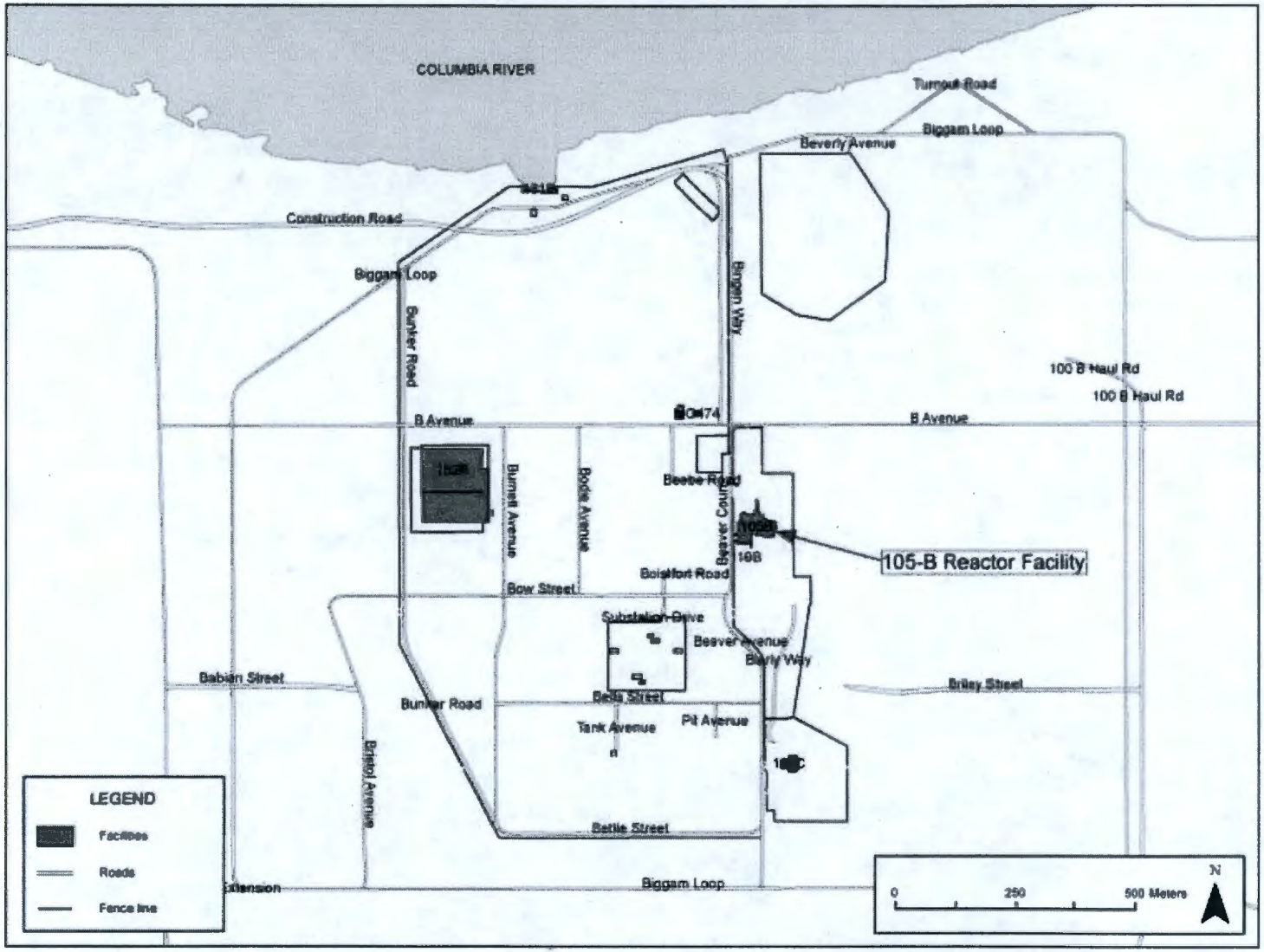


**Figure B-2. Location of the 105-B Reactor Facility in the 100-B/C Area.**



## B1.3 PLANNED ACTIVITIES

The105-B Reactor Facility will undergo a series of hazards mitigation and engineering upgrade activities in order to preserve the current mission as a public tour facility for future generations. The hazards mitigation activities will also allow for expansion of the current public tour to additional areas and rooms within the facility. The following activities are planned for the 105-B Reactor Facility.

### B1.3.1 Environmental Hazards Mitigation

The following activities will be performed in support of removal of environmental hazards from the facility. Additional details regarding the techniques/equipment that may be used for removal of these hazards can be found in Section 2.0 of this RAWP.

- Removal of lead-containing paint from facility interior walls.
- Removal of asbestos-containing material including:
  - Pipe insulation
  - Transite cement board
  - Floor tile
  - Acoustic ceiling tile
  - Wiring insulation
  - Duct insulation.
- Removal of radiological contamination from floors, walls, and other surfaces.
- Removal of mercury-containing switches or other instrumentation.
- Removal of polychlorinated biphenyl containing oils and light ballasts.
- Removal of non- polychlorinated biphenyl containing oils from miscellaneous equipment.
- Decontamination and/or application of fixatives, including, but not limited to, scraping, scabbling, abrasive blasting, and/or grinding.
- Waste treatment, packaging, and CERCLA onsite storage activities involving treatments such as, but not limited to, filtration, evaporation, separation, elementary neutralization, solidification, size reduction, waste repackaging, and amalgamation.
- In support of the activities described, portable HEPA-type-filtered vacuums, portable HEPA-type-filtered exhausters, and various types of containments also will be used as needed.

### B1.3.2 Engineering Upgrade Activities

Engineering upgrade activities will be performed in support of structural, electrical, and mechanical upgrades to the facility. Additional details regarding these activities can be found in Section 2.0 of this RAWP.

In support of the activities described in Section 2.0 of this RAWP, portable HEPA-type-filtered vacuums, portable HEPA-type-filtered exhausters, and various types of containments also will be used as needed.

Drilling, coring, and demolition of compromised CMU blocks will be performed; which have the potential to create airborne emissions of dust and other contaminants.

## B2.0 RADIOLOGICAL AIR EMISSIONS

The state implementing regulation WAC 173-480, "Ambient Air Quality Standards and Emission Limits for Radionuclides," sets standards that are as stringent or more so, than the federal *Clean Air Act of 1990* and amendments, and the federal implementing regulation, 40 CFR 61, Subpart H, "National Emission Standards for Emissions of Radionuclides Other than Radon from Department of Energy Facilities". The EPA partial delegation of the 40 CFR 61 authority to the state of Washington includes all substantive emissions monitoring, abatement, and reporting aspects of the federal regulation. The state standards protect the public by conservatively establishing exposure standards applicable to even the maximally exposed public individual, be that individual real or hypothetical. To that end, the standards address any member of the public, at the point of maximum annual air concentration in an unrestricted area where any member of the public may be. All combined radionuclide airborne emissions from the Hanford Site "facility" are not to exceed amounts that would cause an exposure to any said member of the public of greater than 10 mrem/yr effective dose equivalent. The state implementing regulation WAC 246-247, "Radiation Protection – Air Emissions", which adopts the WAC 173-480 standards and the 40 CFR 61, Subpart H standard, requires verification of compliance with the 10 mrem/yr standard, and would be applicable or relevant and appropriate to this removal action.

The WAC 246-247 addresses emission sources emitting radioactive airborne emissions by requiring monitoring of such sources. Such monitoring requires physical measurement of the effluent or ambient air, and quality assurance measures to assure the precision, accuracy, and completeness of the environmental measurements. The substantive provisions of WAC 246-247 that require monitoring of radioactive airborne emissions would be applicable or relevant and appropriate to this removal action.

The implementing regulations further address control of radioactive airborne emissions where economically and technologically feasible (WAC 246-247-040[3] and 040[4], "Radiation Protection Air Emissions", "General Standards", and associated definitions). To meet the substantive aspect of these requirements, best or reasonably achieved control technology will be applied by ensuring that applicable emission control technologies (those successfully operated in similar applications) will be used when economically and technologically feasible (i.e., based on cost/benefit). If it is determined that there are substantive aspects of the requirement for control of radioactive airborne emissions, then controls will be administered as appropriate using reasonable and effective methods.

## B3.0 CRITERIA/TOXIC AIR EMISSIONS

Under WAC 173-400, "General Regulations for Air Pollution Sources", and WAC 173-460, "Controls for New Sources of Toxic Air Pollutants", requirements are established for the regulation of emissions of criteria/toxic air pollutants. The primary non-radioactive emissions resulting from this CERCLA removal action will be regulated asbestos containing material (RACM) and lead particulate matter. In accordance with WAC 173-400-040, "General Standards for Maximum Emissions", reasonable precautions must be taken to prevent the release of air contaminants associated with emissions resulting from sampling, materials handling, or other operations.

The use of treatment technologies that would result in emissions of toxic air pollutants, which would be subject to the substantive applicable requirements of WAC 173-460, are not anticipated to be a part of this removal action. Treatment of some waste encountered during this removal action may be required to meet Environmental Restoration Disposal Facility waste acceptance criteria. In most cases, the type of treatment anticipated would consist of solidification/stabilization techniques such as macroencapsulation or grouting, and WAC 173-460 would not be considered an applicable or relevant and appropriate requirement. If more aggressive treatment is required that would result in the emission of regulated air pollutants, the substantive requirements of WAC 173-400-113(2) and WAC 173-460-060 would be evaluated to determine applicability.

## B3.1 FUGITIVE AND/OR DIFFUSE EMISSIONS

Emissions to the air will be minimized during implementation of the action through use of standard industry practices such as the application of water sprays and fixatives and/or use of temporary confinement enclosures. These techniques are considered to be reasonable precautions to control fugitive and/or diffuse emissions as required by the regulatory standards.

### B3.1.1 Regulated Asbestos Containing Material

The Federal implementing regulations also contain requirements for managing asbestos material associated with demolition and waste disposal (40 CFR 61.145[a], .145[c], and 61.150, Subpart H, "National Emission Standards for Asbestos").

Asbestos is expected to be encountered throughout the facility and will be removed to the extent practicable.

# B4.0 AIRBORNE SOURCE INFORMATION

There is a potential for particulate radioactive airborne emissions to result from the work activities described in Section B1.3. The radiological inventory for the 105-B Reactor Facility (other than the reactor block) was taken from the final hazard categorization document for surveillance and maintenance of the reactor facilities (WCH-19, *Final Hazard Categorization for Surveillance and Maintenance of 100 Area Reactor Facilities*). The primary radionuclides within the 105-B Reactor Facility include cesium-137, cobalt-60, europium-152, europium-154, europium-155, and strontium-90. Other radionuclides may also be encountered during work activities but are not anticipated at this time in other than negligible quantities. The estimates shown for abated emissions very conservatively assume no abatement affect; therefore, the abated and unabated estimates are listed as the same.

Other non-radiological sources of airborne contaminants include friable asbestos expected to be generated during asbestos containing material abatement activities, and lead dust expected to be generated during lead paint removal activities.

# B5.0 POTENTIAL FOR AIRBORNE EMISSIONS

The total potential fugitive emissions were calculated for the removal action and engineering upgrade activities identified in Section B1.3. The radionuclide inventory and subsequent potential emission calculations are summarized in Tables B-1 and B-2.

**Table B-1. Unabated Potential-to-Emit Calculation for Work Activities at the 105-B Reactor Facility.**

| Nuclide | Radionuclide Inventory (Ci)[a] | 40 CFR 61, Appendix D, Release Factor[c] | Unabated release rate (Ci/yr) | 100-B/C Area dose-per-unit release factor (mrem/Ci)[b] | Unabated PTE to MPR (mrem/yr) |
|---|---|---|---|---|---|
| ***Removal Action and Engineering Upgrades Activities:*** | | | | | |
| $^{60}Co$ | 8.45E-06 | 1.00E-03 | 8.45E-09 | 5.10E-01 | 4.31E-09 |
| $^{137}Cs$ | 1.47E-03 | 1.00E-03 | 1.47E-06 | 5.50E-02 | 8.10E-08 |
| $^{152}Eu$ | 1.19E-04 | 1.00E-03 | 1.19E-07 | 5.00E-01 | 5.95E-08 |
| $^{154}Eu$ | 2.17E-05 | 1.00E-03 | 2.17E-08 | 4.10E-01 | 8.90E-09 |
| $^{90}Sr$ | 3.40E-02 | 1.00E-03 | 3.40E-05 | 2.30E-01 | 7.82E-06 |
| | | | | **TEDE:** | **7.97E-06** |

[a] From WCH-19, Final Hazard Categorization for Surveillance and Maintenance of 100 Area Reactor Facilities, Table A-1. This inventory excludes the reactor block and FSB sediments.

[b] From DOE/RL-2006-29, Calculating Potential-to-Emit Radiological Releases and Doses, Table 4-3.

[c] 40 CFR 61 identifies a release fraction of $10^{-3}$ for particulate solids. A HEPA type filter will be used at the point of release to reduce potential emissions. For the abated emissions, multiply the unabated release rate by an additional factor of 0.01 as identified in Table 1 of 40 CFR 61, Appendix D.

MPR = maximum public receptor
PTE = potential-to-emit
TEDE = total effective dose equivalent

**Table B-2. Abated Potential-to-Emit Calculation for Work Activities at the 105-B Reactor Facility.[a]**

| Nuclide | Unabated Release Rate (Ci/yr) | 40 CFR 61, Appendix D, Release Factor[c] | Abated release rate (Ci/yr) | 100-B/C Area dose-per-unit release factor (mrem/Ci)[b] | Abated PTE to MPR (mrem/yr) |
|---|---|---|---|---|---|
| ***Removal Action and Engineering Upgrades Activities with HEPA-Type Filtered Containment/Vacuum Use:*** | | | | | |
| $^{60}Co$ | 8.45E-09 | 0.01 | 8.45E-11 | 5.10E-01 | 4.31E-11 |
| $^{137}Cs$ | 1.47E-06 | 0.01 | 1.47E-08 | 5.50E-02 | 8.10E-10 |
| $^{152}Eu$ | 1.19E-07 | 0.01 | 1.19E-09 | 5.00E-01 | 5.95E-10 |
| $^{154}Eu$ | 2.17E-08 | 0.01 | 2.17E-10 | 4.10E-01 | 8.90E-11 |
| $^{90}Sr$ | 3.40E-05 | 0.01 | 3.40E-07 | 2.30E-01 | 7.82E-08 |
| | | | | **TEDE:** | **7.97E-08** |

[a] From WCH-19, Final Hazard Categorization for Surveillance and Maintenance of 100 Area Reactor Facilities, Table A-1. This inventory excludes the reactor block and FSB sediments.

[b] From DOE/RL-2006-29, Calculating Potential-to-Emit Radiological Releases and Doses, Table 4-3.

[c] 40 CFR 61 identifies a release fraction of $10^{-3}$ for particulate solids. A HEPA type filter will be used at the point of release to reduce potential emissions. For the abated emissions, multiply the unabated release rate by an additional factor of 0.01 as identified in Table 1 of 40 CFR 61, Appendix D.

MPR = maximum public receptor
PTE = potential-to-emit
TEDE = total effective dose equivalent

The potential exposure to the maximum public receptor (MPR) of the public was estimated using dose factors taken from 40 CFR 61, Appendix D and DOE/RL-2006-29, *Calculating Potential-to-Emit Radiological Releases and Doses*. The appropriate release fraction was applied to the inventory of the various radionuclides to calculate the potential-to-emit (PTE). The calculated unabated annual total effective dose equivalent (TEDE) to the MPR from the 105-B Reactor Facility is 7.97E-06 mrem/year.

The distance to the nearest offsite MPR location (Location #1 as identified in Table 4-2 of DOE/RL-2006-29 and on Figure B-1 of this document) is 8,600 m north northwest of the 100-B/C Area. This location represents the nearest unrestricted public access and therefore, the MPR for purposes of assessing potential public exposure due to airborne releases. The total unabated emissions in terms of PTE assumed to represent the total abated emissions to the receptor from the removal action and engineering upgrade activities could result in up to 7.97E-06 mrem/year TEDE to the MPR (DOE/RL-2006-29).

Since the PTE is not major (i.e., greater than 0.1 mrem/yr TEDE to the MPR), continuous emissions monitoring or approved alternative monitoring is not required.

## B6.0 EMISSIONS CONTROLS

Implementing best available radiological control technology (BARCT) for the control of radionuclide air emissions has been identified as an applicable relevant and appropriate requirement. Each stationary source shall be maintained and operated, including associated equipment for air pollution control, in a manner consistent with good air pollution control practice for minimizing emissions pursuant to WAC 246-247-040(3) and 40 CFR 61.12(c).

Hanford Site experience and ongoing operations have demonstrated that the below listed available methods, systems, and techniques for the control of radionuclide emissions represent the most effective control technology from among known feasible alternatives, and represent the required level of BARCT for the work activities.

Based on analysis of the potential emissions and analysis of available control technologies, the following controls have been selected for use during removal action and engineering upgrade activities at the 105-B Reactor Facility. These controls apply to radiological and criteria/toxic (RACM, lead dust) airborne emissions:

- Water will be applied, as needed, during any work activities, for suppression of fugitive emissions (i.e., radiological, RACM) and dust. Since the work will be performed inside the facility, the use of water will be kept to a minimum.

- Waste packages will remain closed, except during packaging and waste inspection activities, once they are staged within the CERCLA Waste Management Area.

- Fixatives will be applied to contaminated debris, as needed, to minimize airborne contamination during operations for fugitive emissions and dust. Fixative application techniques may include spraying, brushing on, pouring or some other method, as necessary.

- Fixatives will be applied, or material will be contained for disturbed contaminated (i.e., asbestos) debris, associated with the action, when field activities will be inactive more than 24 hours.

- Field activities will be temporarily ceased and the area will be placed in a safe configuration if contamination control measures are not adequate, based on site conditions.

- Portable exhausters and vacuum cleaners will also be utilized to control emissions. For vacuuming and the use of portable ventilation units, HEPA filters are used to collect generated dust. The use of HEPA filters has been generally accepted as BARCT at the Hanford Site. HEPA filters shall have efficiency testing performed upon installation and on an annual basis thereafter and must demonstrate 99.95% removal efficiency. Glove bags may also be used to reduce potential emissions.

## B7.0 AIR MONITORING

The substantive requirements applicable to radioactive air emissions resulting from remediation activities are to quantify potential emissions, monitor the emissions, and identify and employ BARCT. Exemptions from these requirements may be requested if the PTE for the activity or emission unit would result in a TEDE of less than 0.1 mrem/yr.

Section B5 quantifies the potential emissions that may result from the 105-B Reactor Facility removal action activities. Because the calculated total unabated annual TEDE to the MPR from the removal action activities is 8.05E-06 mrem/yr, which is less than 0.1 mrem/yr, it is exempt from the requirements to monitor emissions. Therefore, no near-facility monitors are proposed for this action.

However, exhaust points from HEPA filters will be monitored on a routine basis for potential radionuclide releases and results records (e.g., post-survey results negative). Any positive survey results will require appropriate maintenance on the facility, exhauster, or vacuum to ensure that continued releases do not occur. Records of routine monitoring and necessary maintenance will be provided to the EPA staff upon request.

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# APPENDIX C

# WASTE MANAGEMENT PLAN FOR THE 105-B REACTOR FACILITY

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# C1.0 PURPOSE

This waste management plan establishes the requirements for management and disposal of waste associated with the removal action as stipulated in EPA 2002, *Action Memorandum for the 105-B Reactor Facility, Hanford Site, Benton County, Washington*. This removal action has been deemed necessary to protect public health and the environment. Waste generated by the removal action activities will be performed in accordance with the ARARs specified in EPA (2002) in accordance with CERCLA. These ARARs are also provided in Section 4.1 of this removal action work plan.

This plan also addresses the requirements for management and disposal of waste generated from the electrical, mechanical, and structural upgrades at the 105-B Reactor Facility. Although, not specifically a part of the CERCLA removal action, these upgrades are necessary to provide comfort to the public and for preservation of the 105 B Reactor Facility.

# C2.0 PROJECTED WASTE STREAMS

The following waste streams are expected to be generated from the removal action, facility upgrades, and S&M activities at the 105-B Reactor Facility. While most of the anticipated waste generated will be low-level waste, a small volume of dangerous and mixed waste is also expected. Although the majority of the waste will be in a solid form, some aqueous solutions may be generated. It is anticipated that waste generated from any of the removal action activities will be disposed at the ERDF. Section C3.0 discusses the specific instructions for management of the following waste streams:

- Asbestos
- Biological waste
- Radiologically contaminated waste/debris/materials
- Construction material and demolition debris
- Decontamination fluids
- Liquids from unplanned releases
- Lead solid and lead-based paint
- Mercury
- Polychlorinated biphenyl (PCB) oil
- Spent or unusable chemical/reagents, and used oil.

# C3.0 WASTE MANAGEMENT REQUIREMENTS

Waste generated in the 105-B Reactor Facility will be managed in accordance with all applicable Federal and State regulations, established ARARs, DOE orders, contractor procedures, this waste management plan, and the facility-specific waste management instructions.

## C3.1 WASTE MINIMIZATION

Waste minimization practices will be followed to the extent technically and economically feasible during the implementation of the removal action, building upgrades, and S&M activities. When feasible, waste

materials will be recycled, reused, or reclaimed. Introduction of clean materials into a contamination area 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 waste generated.

To minimize the volume of regulated waste, as it is generated, waste will be segregated according to waste type and category. Hazardous waste minimization will be considered in the selection of decontamination agents and solutions used in the 105-B Reactor Facility.

All materials released off site for disposal/recycling must be certified to be free of contamination in accordance with the DOE guidance for non-real property. Materials with no or de minimis levels of CERCLA hazardous substances are not considered CERCLA waste and therefore, are not subject to the 40 CFR 300.440, "Procedures for Planning and Implementing Off-Site Response Actions," off-site acceptability determination.

## C3.2 WASTE PACKAGING

Waste packaging will be performed in accordance with applicable regulations, the facility specific waste management instructions, or as directed by the Waste Management Specialist. Waste packaging must meet WAC 173-303, "Dangerous Waste Regulations," and U.S. Department of Transportation (DOT) requirements. For onsite waste shipments in accordance with DOE/RL-2001-36, *Hanford Sitewide Transportation Safety Document*, non-DOT packaging may be used if the container will provide an equivalent degree of safety and approval documents are in place.

Large volumes of low-level radiologically contaminated waste (e.g., building rubble) may be shipped in bulk to the ERDF using subcontractor transport conveyance. This conveyance uses roll-off/roll-on containers that may utilize liners and tarps to control contamination. If necessary, other approved packages (e.g., burial boxes and/or sea-land containers) may be used for bulk, low-specific activity shipments.

Large waste items not approved for bulk shipment will be physically reduced in size, packaged, and shipped in non-bulk containers to meet the appropriate disposal facility's waste acceptance criteria. All containers will be properly closed and labeled. The containers must also be weighed and visually inspected for leaks or damage prior to transportation.

## C3.3 WASTE LABELING

Containers will be labeled and marked appropriately to meet the waste designation WAC 173-303 and DOT requirements. All marking and labeling will be performed per the facility's waste management instructions and the Waste Management Specialist.

## C3.4 WASTE STORAGE

All wastes generated from the removal action will be stored in designated waste storage areas identified by signs reading "CERCLA WASTE MANAGEMENT AREA". Waste will be segregated and staged in accordance with the facility's waste management instructions or as directed by the Waste Management Specialist.

Waste may be temporarily accumulated near the point of generation and if required, moved to the central waste storage location pending analytical laboratory test results. To facilitate the removal activity logistics, waste staging and storage areas may be relocated within the boundary of the complex as needed. The amount of waste stored at the storage area will be kept to a minimum. Full containers should be

prepared for disposal as quickly as economically feasible. A means of tracking the waste staging/storage areas will be maintained at the facility.

The containers will be stored inside the site-specific waste container storage area. Containers awaiting analytical results will be marked and labeled as appropriate. Weekly, or at the frequency directed by the Waste Management Specialist, the waste storage areas will be inspected to document the integrity, container marking/labeling, physical container placement, storage area boundaries, identification, warning signs, and spill control. Containers showing signs of deterioration will be identified on the container inspection form and over-packed or repackaged. Non-dangerous waste storage areas will be inspected monthly or at the frequency directed by the Waste Management Specialist.

## C3.5 WASTE CHARACTERIZATION

Waste will be characterized and designated in accordance with WAC 173-303 using process knowledge, historical analytical data, and/or sample analyses as identified in the facility-specific sampling and analysis instruction.

Waste will be stored in the appropriate waste storage areas until it is characterized. The waste characterization and designation are used to support the waste profiling process. Waste profiling document specifies waste characteristics for each waste stream and ensures that the waste is shipped to the proper disposal facility. The designation and profiling are conducted in accordance with the requirements of WAC 173-303-070, "Designation of Dangerous Waste," (Sections 173-303-070 through 173-303-100). Dangerous waste will be evaluated for applicable land disposal restrictions in accordance with WAC 173-303-140, "Land Disposal Restrictions".

## C3.6 WASTE TRANSPORTATION

Waste packaging, marking, labeling, and transporting will be performed in accordance with DOT requirements specified in the 49 CFR 171-177, "Transportation," onsite DOE-approved transportation document (DOE/RL-2001-0036), and WAC 173-303, if appropriate.
Before transport to the ERDF or another disposal site, all waste containers must be:

- Properly packaged, marked, and labeled
- Weighed
- Visually inspected for leaks or other damage
- In proper condition for disposal.

Low-level waste may be shipped in either non-bulk or bulk mode. Dangerous and mixed waste must be shipped in containers for either storage or disposal, as prescribed by the receiving facility's waste acceptance criteria.

The Waste Management Specialist will use a Shipping Checklist per the facility specific waste shipping procedure. The applicable shipping paperwork will be prepared for each waste shipment. The process for developing proper waste shipping papers includes receipt of the following:

- Analytical results, if required
- Designation, profiling, and storage/disposal paperwork, and
- A completed tracking form for each waste shipment destined for the ERDF.

The completed tracking form is used as the shipping document and must accompany the shipment when the waste is sent to the ERDF or other approved facility. Emergency response information must be associated with and present during the shipment.

## C3.7 WASTE DISPOSAL

Waste generated at 105-B Reactor Facility may be disposed at the ERDF if the waste meets the ERDF waste acceptance criteria as defined in WCH-191, *Environmental Restoration Disposal Facility Waste Acceptance Criteria,* and 0000X-DC-W0001, *Supplemental Waste Acceptance Criteria for Bulk Shipments to the Environmental Restoration Disposal Facility*. Waste that does not meet the ERDF waste acceptance criteria will be evaluated for additional treatment at an approved onsite or offsite facility. If treatment options are not available, the waste may be managed within the Hanford Site Solid Waste Operations Complex as authorized by EPA. In accordance with 40 CFR 300.440, "Procedures for Planning and Implementing Off-site Response Actions", an offsite determination is also required prior to off-site shipment.

Construction waste and demolition debris that has contacted contaminated media may be disposed of at the ERDF as described above. Construction waste or demolition debris that is non-dangerous and that meets the Hanford Site free-release criteria may be disposed of in an appropriate solid-waste disposal facility (Subtitle "D" landfill). In addition, non-dangerous and no-radiation-added (non-radioactive) miscellaneous solid waste may be disposed of at an offsite solid waste landfill consistent with standard site refuse disposal practices. This waste must not have contacted suspect dangerous or mixed waste and shall not contain free liquids. Items in this category include paper, wood, construction debris, metals, plastic, glass, etc. A radiological release certification form should be attached and visible from the outside of the trash bag.

## C3.8 RECORDS

Original copies of all waste inventory documentation will be forwarded to the assigned waste management specialist to be included in the waste file and to initiate waste tracking in the *Solid Waste Information Tracking System*. The completed waste files will be included in the project file following final waste disposition in accordance with applicable records management processes.

# C4.0 WASTE STREAM-SPECIFIC MANAGEMENT REQUIREMENTS

The following sections describe the management requirements for each expected waste stream.

## C4.1 ASBESTOS

Removal and disposal of regulated asbestos containing material (RACM) is regulated under the *Clean Air Act* (40 CFR 61, Subpart M, "National Emission Standard for Asbestos") Occupational Safety and Health Administration regulations (29 CFR 1910.1101), and WAC 296-62, "General Occupation Standards." These regulations provide special precautions to prevent environmental releases, exposure of asbestos fibers to the workers, and packaging and disposal requirements.

Emissions of asbestos will be controlled during removal activities per the Air Monitoring Plan, facility specific waste management instructions, and work packages. RACM will be packaged and disposed at the ERDF.

## C4.2 BIOLOGICAL WASTE

Biological waste may be found at the 105-B Reactor Facility including animal carcasses, animal waste, and nests. Biological waste will be packaged per the facility specific waste management instructions and disposed at the ERDF.

## C4.3 CONSTRUCTION MATERIALS AND DEMOLITION DEBRIS

Construction materials and demolition debris that has not contacted contaminated media, is not WAC 173-303 dangerous waste, and has been radiologically released per MSC-5173, may be recycled or disposed offsite at a solid waste landfill or at an onsite demolition landfill, as appropriate. However, the vast majority of waste generated from activities at the 105-B Reactor Facility is expected to be disposed at the ERDF.

If contamination is determined to be fixed, the radiological control technician and task manager will make the decision to either remove the contamination using more aggressive methods or dispose of the material/debris as contaminated waste. Construction materials and demolition debris that contact suspect dangerous and/or suspect mixed waste may be decontaminated in a wash basin capable of retaining rinsate using either a three-bucket wash or a high-temperature and high-pressure wash at 82.2 °C and greater than 70.3 $kgf/cm^2$ (180 °F and greater than 1,000 $lb{\cdot}f/in^2$). Hanford Site potable water will be used for decontamination activities.

Construction and demolition waste will be contained and stored at the designated CERCLA waste management area.

## C4.4 DECONTAMINATION FLUIDS

Large volumes of decontamination fluids (water and/or non-dangerous cleaning solutions) generated from cleaning equipment and tools used in the removal actions will be contained, sampled, transported, and discharged at the Effluent Treatment Facility if the waste acceptance criteria can be met.

If necessary, small volumes (generally <55 gallons) of decontamination fluids may be contained, over-packed, and temporarily stored at the designated waste storage area. Small volumes of decontamination fluids may be stabilized to ≤1 percent free liquid and disposed of at the ERDF if the waste acceptance criteria can be met.

## C4.5 LIQUIDS FROM UNPLANNED RELEASES

Liquids generated by unplanned releases will be managed in accordance with the appropriate containment, storage, and disposal requirements. Liquids may be evaporated or stabilized (generally <55 gallons), then transported to the ERDF if the waste acceptance criteria are met.

## C4.6 LEAD SOLID AND LEAD-BASED PAINT

Lead solid and lead-based paint will be generated from the removal action at the facility. If possible, radiologically releasable lead solid will be recycled. Lead containing waste and radiologically contaminated lead solid will be characterized and disposed at the ERDF.

## C4.7 MERCURY

Mercury waste generated as a result of this removal action may require treatment such as solidification and stabilization (including amalgamation) and will be stored, packaged, and transported to ERDF or the Central Waste Complex, in accordance with DOT and State and Federal dangerous/hazardous waste regulations.

## C4.8 POLYCHLORINATED BIPHENYL

The management and disposal of PCB wastes are governed by the *Toxic Substances Control Act of 1976* (TSCA), as implemented by 40 CFR 761. The TSCA regulations contain specific provisions for PCB waste including PCB waste that contains a radioactive component. PCBs also are considered underlying hazardous constituents under RCRA. Requirements for the management of PCB waste is governed per WAC 173-303-071 and 40 CFR 268. PCB waste will be designated, characterized, packaged per the facility specific waste management instructions transferred and disposed at ERDF if the waste acceptance criteria are met.

## C4.9 SPENT OR UNUSABLE CHEMICALS/REAGENTS, USED OIL

Non-radiologically contaminated used oil and unusable or expired chemicals/reagents, will be recycled or disposed of at an offsite solid waste landfill, as appropriate. Radiologically contaminated chemicals/used oil will be managed and disposed at ERDF.

# APPENDIX D

# 105-B REACTOR FACILITY ENVIRONMENTAL HAZARD INVENTORY

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During the summer of 2009, a walk down was conducted to identify accessible remaining hazards at the 105-B Reactor Facility. The walk down was performed by MSA employees and sub-contractor personnel. Table D-1 identifies the hazards, the quality, and location.

**Table D-1. Room-By-Room Hazard Identification. (7 sheets)**

| Room | Also Known As | Asbestos | PCB | Rad | Lead[e] | Sub-floor Hazard Source | Oil/ Chemical/ Mercury |
|---|---|---|---|---|---|---|---|
| Office Storage | Worker Lunch Room | 15 ft x 1-in. pipe[d]<br>30 ft x 30 ft floor tiles[d] | | | 480 $ft^2$ [d] | | |
| Office #1 | Worker Office 1 | 15 ft x 8 ft floor tiles[d]<br>5 ft x 0.5-in. pipe[d] | | | 244 $ft^2$ [d] | | |
| Office #2 | Worker Office 2 | 20 ft x 1-in. pipe[d] | | | 336 $ft^2$ [d] | | |
| Maintenance Shop | Worker Maintenance Shop | 8 ft x 6-in. pipe[d]<br>6 ft x 1-in. pipe[d]<br>8 ft x 6 ft floor tiles[d] | | | | | |
| Electrical Equipment Room | | 75 ft x 6-in. pipe[d] | | | 720 $ft^2$ [d] | | |
| Hallway 227[a] | | 120 ft x 6-in. pipe[d] | | | 1200 $ft^2$ [d] | 1 drain source[d] | |
| Front Face | Front-Face Work Area, #110 | | 8 fixtures[d] | 100 ft x 100 ft contaminated floor [c,d] | 30,000 $ft^2$ [b, d] | | Oil in overhead crane [c] |
| Tool Storage | Below grade area of Nozzle Shop | 2 totes (3 ft x 3 ft x 4 ft) of gaskets[d] | | | | | |
| Nozzle Shop | West Reactor Area, #113[a] | | 3 fixtures [b] | Entire room | | 3 drain source[b] | |

**Table D-1. Room-By-Room Hazard Identification. (7 sheets)**

| Room | Also Known As | Asbestos | PCB | Rad | Lead[e] | Sub-floor Hazard Source | Oil/ Chemical/ Mercury |
|---|---|---|---|---|---|---|---|
| Experimental Room | #113b, X-1 Room | | | Entire room (7,250 $ft^2$) | | | |
| Exhaust Fan Room | | Fan Ducts[b]<br>60 ft x 4-in. pipe[d] | 2 motors, 5 gallons each[d] | 15 ft x 20 ft Entire room | | | 5 gallons of oil in both motors[b] |
| 315 Supply Fan Room | | 14 (6 ft x 8 ft) transite wall panels [b,d]<br>2 fans encased in 60 ft x 20 ft x 2-in. thick[d]<br>250 ft x 6-in. of pipe[d] | | | | | |
| Valve Pit Viewing Area | #230b Below Grade Valve Pit Area | 24 transite panels[d]<br>18 (4 ft x 8 ft) unencapsulated wall panels[d] | | | | | |
| Valve Pit | #230a Valve Pit | 6 gaskets exposed[d]<br>300 ft x 6-in. pipe[d] | | | | 200 ft x 12-in. sump[d] | |

**Table D-1. Room-By-Room Hazard Identification. (7 sheets)**

| Room | Also Known As | Asbestos | PCB | Rad | Lead[e] | Sub-floor Hazard Source | Oil/ Chemical/ Mercury |
|---|---|---|---|---|---|---|---|
| Laundry Storage Room | Lunch Room, Flow Lab, Machine Maintenance Room, #231 | | | | 1800 $ft^2$ [d] | | |
| Decon Room | Below Grade Area of Laundry Storage Room | | 11 fixtures[d] | | 2,120 $ft^2$ [d] | | |
| Acid Mixing Room | Below Elec. Equip. Room | | 13 fixtures[d]<br>20 gallons PCB containing oil[d] | | 7,500 $ft^2$ [d] | | |
| Corridor | Valve Pit to Changing Room Corridor | 20 ft x 6-in. pipe | | | 7,500 $ft^2$ [d] | | |
| Change Room | | | 4 fixtures[d] | | 405 $ft^2$ [d] | | |
| Corridor #5 | Front door to control room | 600 ft x 6-in. pipe[d] | | | 1,500 $ft^2$ [d] | | |
| Elevator/Electrical Room | #223 | | 5 fixtures[b,d] | | 900 $ft^2$ [d] | | |
| Mens Restroom | | | 5 fixtures (mens)[b] | | 1,080 $ft^2$ [d] | | |
| Womens Restroom | | | 2 fixtures (women)[b] | | 320 $ft^2$ of paint[d] | | |

**Table D-1. Room-By-Room Hazard Identification. (7 sheets)**

| Room | Also Known As | Asbestos | PCB | Rad | Lead[e] | Sub-floor Hazard Source | Oil/ Chemical/ Mercury |
|---|---|---|---|---|---|---|---|
| Instrument Repair Room | Repair Shop | | 4 fixtures[b] | | 1,200 $ft^2$ of [d] | | |
| Accumulator Room | #222 | | 7 fixtures[b,d] | 25 ft x 2 ft (at top of stairs) | 900 $ft^2$ [d] | | Oil in compressor[a] |
| Control Room | #220 | 30 ft x 40 ft ceiling tiles [b,d]<br>Wires (unquantifiable) [d] | 35 fixtures[d] | | 200 $ft^2$ [d] | | 21 switches |
| Office 219a | Control Room Office | | 3 fixtures[b,d] | | 480 $ft^2$ [d] | | |
| Office 219b | Control Room Office | | 3 fixtures[b,d] | | 480 $ft^2$ [d] | | |
| Room 26 | | | 2 fixtures[d] | | 792 $ft^2$ [d] | | |
| Room 10 | | | 2 fixtures[d] | | 792 $ft^2$ [d] | | |
| Room 27 | | | 2 fixtures[d] | | 792 $ft^2$ [d] | | |
| AC Equipment Room | | 50 ft x 2-in. pipe[d] | | | 225 $ft^2$ [d] | | |
| Corridor | Control room to tool storage | | 3 fixtures[d] | | 1,140 $ft^2$ [d] | | |
| Tool Storage Area | | Transite panels[d] | | | | | |
| Instrument Storage Room | Repair Shop | | | | 990 $ft^2$ | | |
| FSB Viewing Room, | #414 | Encapsulated [a] | 4 fixtures [b] | Entire room | Paint [a] | | |

**Table D-1. Room-By-Room Hazard Identification. (7 sheets)**

| Room | Also Known As | Asbestos | PCB | Rad | Lead[e] | Sub-floor Hazard Source | Oil/ Chemical/ Mercury |
|---|---|---|---|---|---|---|---|
| Corridor #4 | Control room to FSB Viewing, Hallway 211 | | | | | | |
| North Side Downcomer | End of Corridor 4, stairs to D-Elevator | 75 ft x 6-in. pipe[d] | | 200 ft x 10 ft [d] | 1,200 $ft^2$ [d] | | |
| Sample Room 1 | | 80 ft x 4-in. pipe[d] | 4 fixtures[d] | 200 ft x 10 ft [d] | 1,200 $ft^2$ [d] | | |
| Rear face | D-Elevator, #112 | Wiring (unmeasurable ) | | Reactor nozzles accessible [b]<br>50 ft x 200 ft fixed in paint[d]<br>Contaminated equipment [c] | 10,800 $ft^2$ [d] | | |
| Sample Room 2 | | | 3 fixtures [b] | 50 ft x 200 ft fixed in paint[d] | 1,600 $ft^2$ [d] | | |
| South Side Downcomer | South end of D-Elevator | 60 ft x 4-in. pipe[d] | | 200 ft x 10 ft fixed in paint[d] | 800 $ft^2$ [d] | | |
| Electromagnetic Room (Elev. 80 ft, above pile) | Winch Room | | | | | | Oil in 29 winches[d] |
| Inner/Outer Control Rod Rooms | #121 Inner Rod Room | | | Entire rooms are CA, RBA, and High Rad Area[d] | Paint [c] | 3 drain sources [b] | Oil in pump motors[b] |

**Table D-1. Room-By-Room Hazard Identification. (7 sheets)**

| Room | Also Known As | Asbestos | PCB | Rad | Lead[e] | Sub-floor Hazard Source | Oil/ Chemical/ Mercury |
|---|---|---|---|---|---|---|---|
| Transfer Bay | | 4 ft x 2-in. pipe [b] | | | Paint [c] | 3 drain sources[b] | |
| Helium Gas Valve Room | | | 4 fixtures[d] | CA[d] | 328 $ft^2$ [d] | | 3 gallons of oil in motors, 10 mercury switches[d] |
| Helium Flow Monitoring Room | | | 4 fixtures[d] | CA[d] | 328 $ft^2$ [d] | | 3 gallons of oil in motors, 10 mercury switches[d] |
| FSB | | Piping (unmeasurable)[b] | | Entire area is CA [d] | Paint (unmeasurable)[c] | | Oil in pump[b] |
| FSB Wash Pad | | | 13 fixtures[b] | Entire area is CA [d] | Paint (unmeasurable)[c] | | |
| Top of Reactor | 75 ft level | | | Entire area is CA [d] | | Sub-floor drain piping to exterior of facility | |
| Accumulator Room Below Grade Vault | -0 ft to -20 ft level | | | Piping internal contamination; fixed contamination [d] | Unknown quantity in piping joints [d] | Sub-floor piping to exterior of facility | |

**Table D-1. Room-By-Room Hazard Identification. (7 sheets)**

| Room | Also Known As | Asbestos | PCB | Rad | Lead[e] | Sub-floor Hazard Source | Oil/ Chemical/ Mercury |
|---|---|---|---|---|---|---|---|
| Horizontal Control Rod Room | HCR Inner/Outer Room | | 7 hydraulic motors [d] | Piping internal contamination; HCR columns internal contamination [d] | Unknown quantity of sheets and bricks[d] | | |

[a] DOE/RL-2001-68, 2002, *Removal Action Work Plan and Surveillance and Maintenance Plan for the 105-B Reactor Facility,* Draft A, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

[b] BHI-01384, 2000, *105-B Reactor Museum Feasibility Assessment (Phase II) Project*, Rev. 0, Bechtel Hanford, Inc., Richland, Washington.

[c] DOE/RL-2001-09, 2001, *Engineering Evaluation/Cost Analysis for the 105-B Reactor Facility*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

[d] B Reactor Walkdown.

[e] BHI-01282, 1999, *Hanford B Reactor Building Hazard Assessment Report,* Rev. 0, Bechtel Hanford, Inc., Richland, Washington.

[f] Measurements in square feet are related to lead-based paint only. Other forms of lead are as noted.

CA = contamination area
FSB = fuel storage basin
HCR = horizontal control rod
RBA = radiological buffer area

# APPENDIX E

# FLOOR PLANS FOR THE 105-B REACTOR FACILITY

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**Figure E-1. 105-B Reactor Facility Floor Plan at Elevation 0 Feet.**

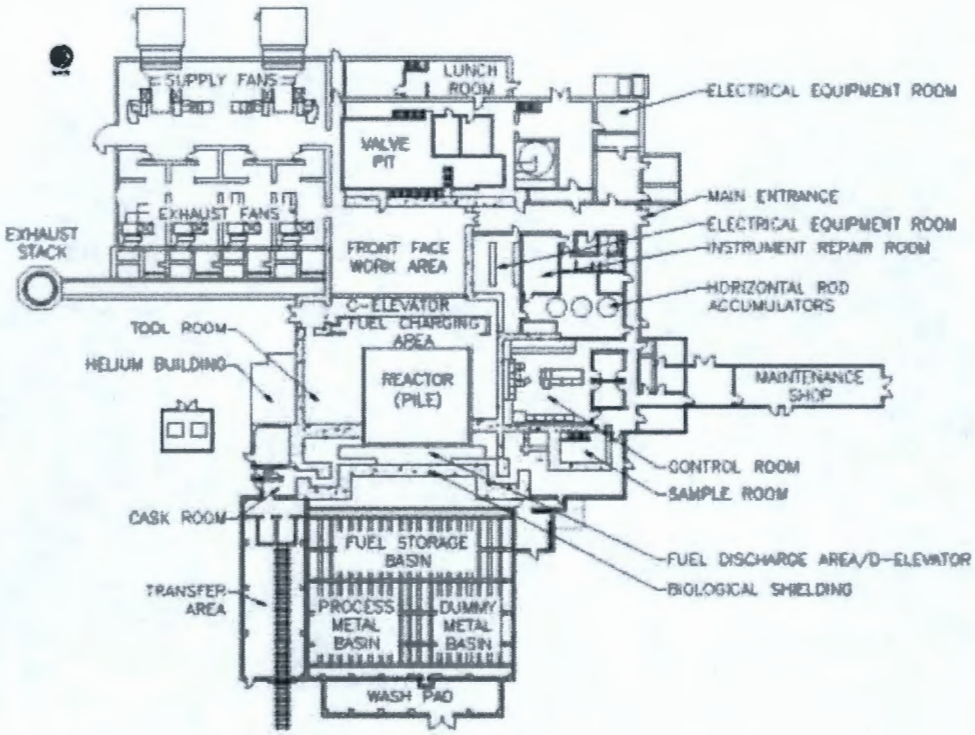


**Figure E-2. 105-B Reactor Facility Floor Plan at Elevation 13 Feet.**

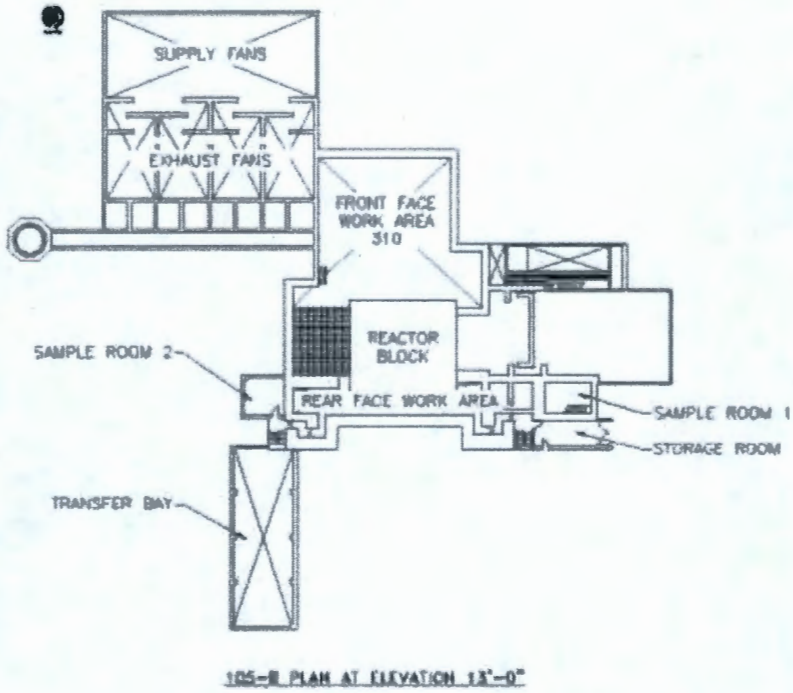


**Figure E-3. 105-B Reactor Facility Floor Plan at Elevations 15 Feet and 20 Feet.**

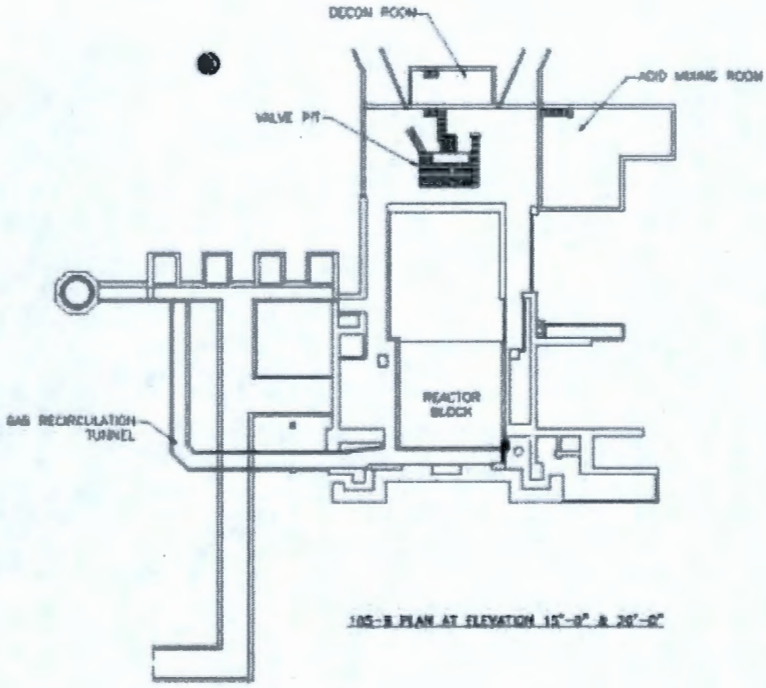


**Figure E-4. 105-B Reactor Facility Floor Plan at Elevation 20 Feet 9-Inches.**

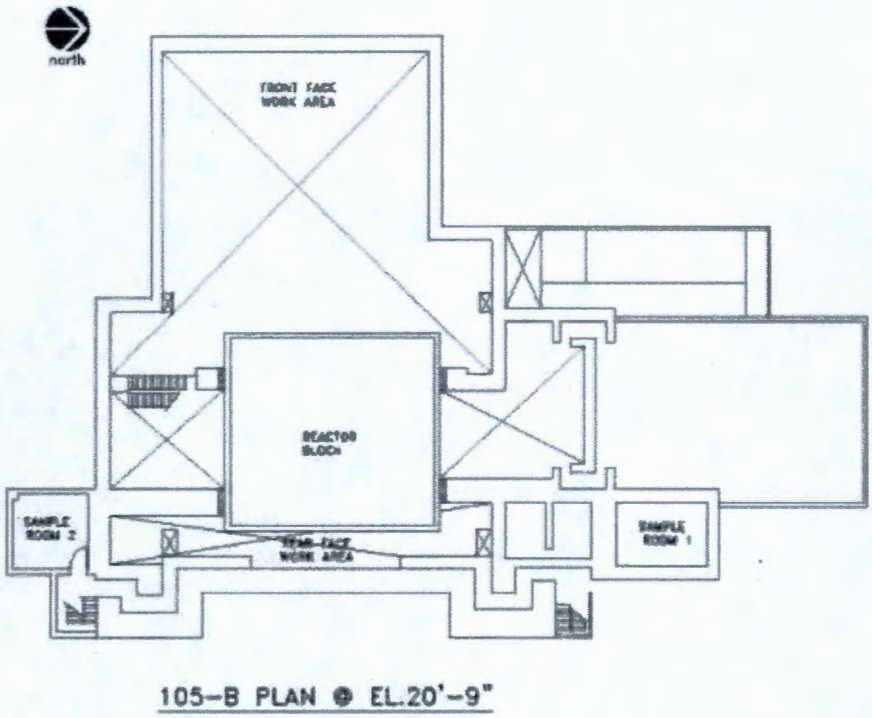
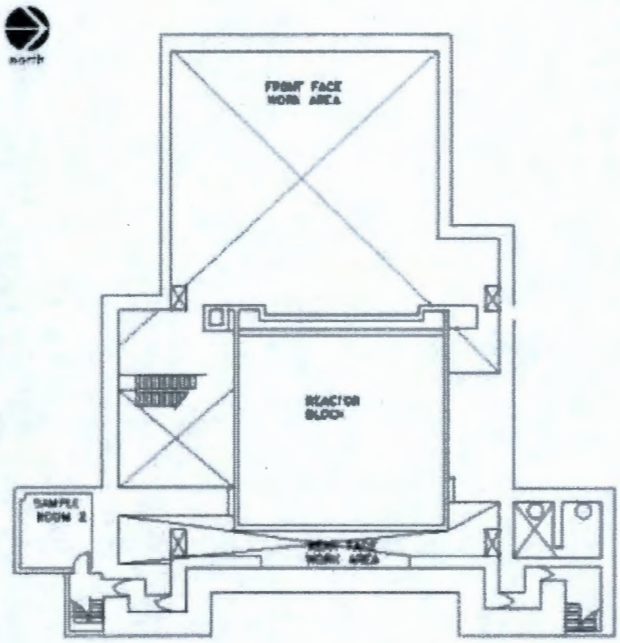


**Figure E-5. 105-B Reactor Facility Floor Plan at Elevation 30 Feet 9-Inches.**




105-B PLAN @ EL.30'-9"

**Figure E-6. 105-B Reactor Facility Floor Plan at Elevation 42 Feet 4.625-Inches.**

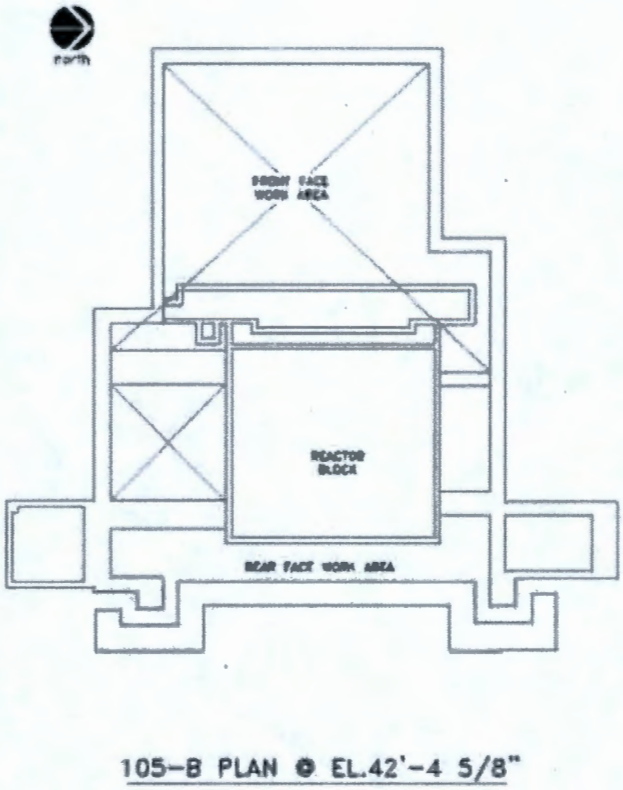


**Figure E-7. 105-B Reactor Facility Floor Plan at Elevation 56 Feet 4-Inches.**

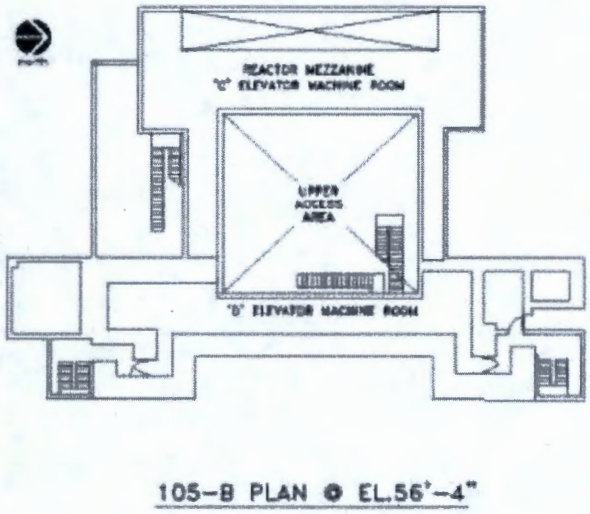
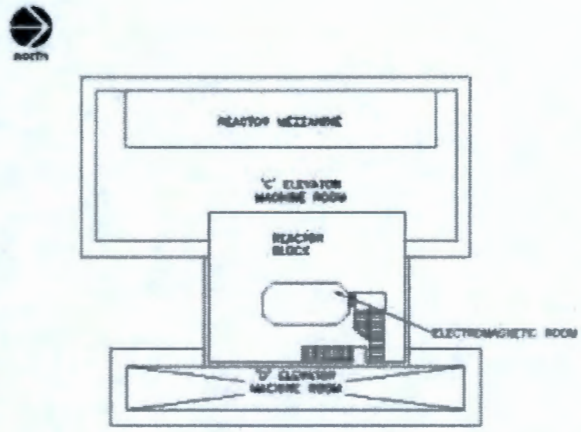


**Figure E-8. 105-B Reactor Facility Floor Plan at Elevation 71 Feet 3.75-Inches.**




105-B PLAN @ EL.71'-3 3/4"

**Figure E-9. 105-B Reactor Facility Floor Plan at Elevation 80 Feet 5.25-Inches.**

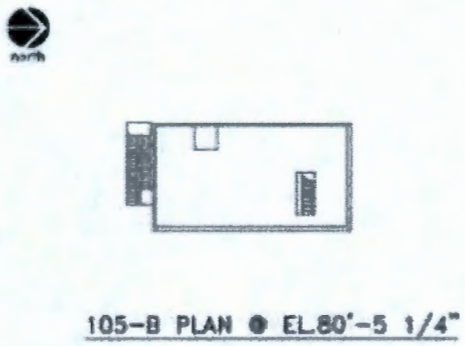
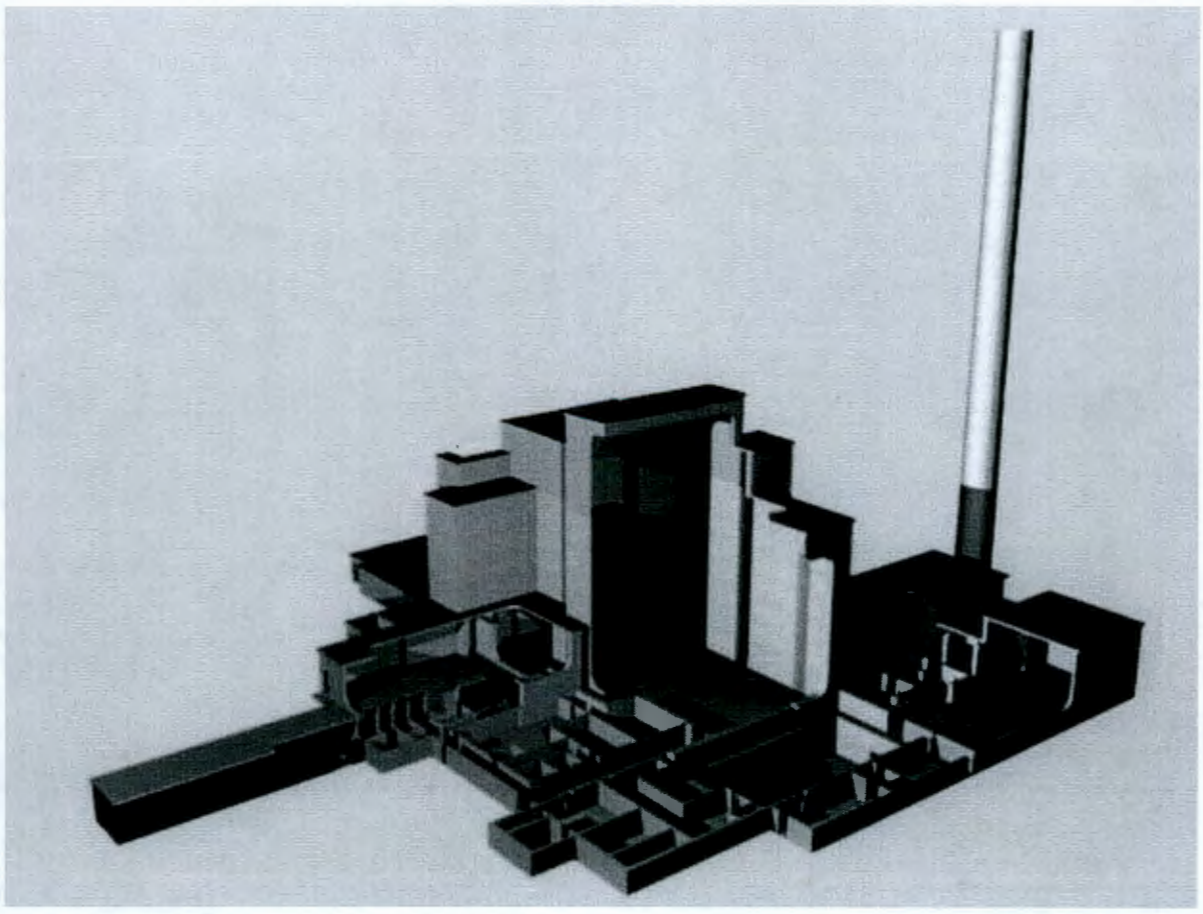


**Figure E-10. 105-B Reactor Facility Cut Away Floor Plan.**



# APPENDIX F

# COST ESTIMATE BACKUP

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# F1.0 COST ESTIMATE

The cost estimate for hazardous material removal activities was calculated based on the following assumptions. Cost estimates for mitigation of hazardous materials are presented in Table F-1. A detailed cost estimate summary is provided in Table F-2.

- Decontamination equipment for the removal of lead-based paint and radiological contamination will be purchased from a vendor. The recommended vendor is Pentek, Inc. Equipment costs were obtained from Pentek, Inc.

- Labor costs and production durations were developed using RS Means (2009), *RS Means Building Construction Cost Data 2009* with fourth quarter 2009 price updates.

- Asbestos pipe insulation will be entirely removed. New insulation will be installed to replicate the historic appearance.

- Suspended acoustic ceiling tile is assumed to contain asbestos. The suspended acoustic ceiling tiles will be replaced with approved tiles with a similar appearance.

- The ventilation duct for the reactor cooling supply fans is insulated with 2-in. thick asbestos sheets. The asbestos insulation will be removed and replaced with similar materials to preserve its historic appearance. No radiological contamination is anticipated in the ventilation duct to the control room and adjacent offices.

- Much of the instrument control wiring contains asbestos insulation. A large quantity of this wiring is viewable behind the control panels in the control room. Visible wiring containing asbestos deemed historically significant may be left in place.

- Oil containing PCB was a common coolant used in electrical transformers until the 1970s. The large transformers serving the building have had the coolant replaced. Smaller 'lighting' transformers within the building are 'dry-type' transformers that use no coolant. No liquid-cooled transformers are known to exist in the facility.

- Mercury-containing switches remain in instruments in the control room and the two helium rooms. Mercury switches will be removed, but instrument housings will remain in place for viewing.

- The existing fluorescent lighting fixtures contain tar-like PCB-laden material. Each lighting fixture will be inspected and the PCB-containing ballasts will be replaced.

- Building areas will be decontaminated of radiological contamination to maximize public access. This includes the FSB, Transfer Bay, and the C- and D-Elevators. A decontamination productivity rate of 100 $ft^2$/worker/day is assumed (RS Means, 2009).

- The inner and outer control rod drive rooms will be decontaminated. These rooms were sealed when the reactor was decommissioned to prevent the spread of airborne radioactivity.

- It is assumed that several layers of lead-based paint may have been applied in most areas. Lead-based paint will be removed to a height of 8 feet on walls. Non-lead-based paint will be used to restore the

historic appearance. A decontamination productivity rate of 100 $ft^2$/worker/day is assumed (RS Means, 2009).

- Any remaining lubricating and hydraulic oil are assumed to contain < 2 ppm PCB. Oil and lubricant will be removed, and not replaced.
- It is assumed that waste generated from the removal activity will be disposed at ERDF. All waste material was assumed to be low-level waste (LLW) or mixed low-level waste (MLLW).

**Table F-1. Hanford B-Reactor Building 105-B Interior Hazards Removal Cost Estimate Summary. (2 Sheets)**

| Description | Total Cost for Radiation Hazard Removal | Total Cost for Lead Hazard Removal | Total Cost for Asbestos Hazard Removal | Total Cost for Other Hazards Removal | Line Item Cost | % Of Total Hazard Removal Cost |
|---|---|---|---|---|---|---|
| **Project Support Costs(divided between hazards)** | | | | | | |
| Scaffold rental and setup (cost distributed by % of hazard removal cost) | $53,000 | $294,000 | $35,000 | | $381,000 | |
| Containment and negative air machines setup (cost distributed by % of hazard removal cost) | $4,000 | $23,000 | $3,000 | | $30,000 | |
| **Hazard Removal** | | | | | | |
| Radiation hazard removal | $721,000 | | | | $721,000 | 9.9 |
| Lead hazard removal | | $5,380,000 | | | $5,380,000 | 74.0 |
| Asbestos hazard removal | | | $669,000 | | $669,000 | 9.2 |
| Reactor nozzles, front side, radiation and lead hazards removal | $112,000 | $112,000 | | | $224,000 | 3.1 |
| Reactor nozzles, back side, radiation and lead hazards removal | $112,000 | $112,000 | | | $224,000 | 3.1 |
| Floor drains grouted | | | | $9,000 | $9,000 | 0.1 |

**Table F-1. Hanford B-Reactor Building 105-B Interior Hazards Removal Cost Estimate Summary. (2 Sheets)**

| Description | Total Cost for Radiation Hazard Removal | Total Cost for Lead Hazard Removal | Total Cost for Asbestos Hazard Removal | Total Cost for Other Hazards Removal | Line Item Cost | % Of Total Hazard Removal Cost |
|---|---|---|---|---|---|---|
| All oil hazards removed | | | | $32,000 | $32,000 | 0.4 |
| Mercury switches | | | | $7,000 | $7,000 | 0.1 |
| **Project Support and Hazard Removal Totals** | **$1,002,000** | **$5,921,000** | **$707,000** | **$48,000** | **$7,677,000** | **100** |
| **General Requirements** | | | | | | |
| Training (cost distributed by % of hazard removal cost) | $70,000 | $414,000 | $49,000 | $3,000 | $537,000 | |
| Capital equipment purchase(distributed 45%, 45%, 10%, 0%, based on capital equipment required for each hazard) | $248,000 | $248,000 | $56,000 | | $552,000 | |
| **General Requirements Totals** | **$318,000** | **$662,000** | **$105,000** | **$3,000** | **$1,089,000** | |
| ***Subtotal of Hazards Removal and General Requirements*** | ***$1,320,000*** | ***$6,583,000*** | ***$812,000*** | ***$51,000*** | ***$8,766,000*** | |
| General Contractor's Markups, Overhead and Profit | | | | | $1,390,000 | |
| Tax | 8.30% | | | | $728,000 | |
| Bond & Insurance | 2% | | | | $190,000 | |
| Contingency | 5% | | | | $484,000 | |
| **Total** | | | | | **$11,558,000** | |

**Note:** The general contractor's markups, overhead, profit, bond & insurance and contingency used above are assumed 'typical' percentages.

**Table F-2. Cost Estimate for Mitigation of Hazardous Materials. (22 sheets)**

| Room/Activity | Bare Material Cost | Installing Contractor's Labor Cost | Bare Equipment Cost | Total Cost |
|---|---|---|---|---|
| **General Requirements** | | | | |
| Training | $189,679 | $347,306 | $0 | $536,985 |
| Capital equipment | $0 | $0 | $552,115 | $552,115 |
| **Room-By-Room Hazard Remediation** | | | | |
| ***Accumulator Room*** | | | | |
| Radiological decontamination | $4,706 | $25,646 | $0 | $30,352 |
| Temporary decking | $1,441 | $10,001 | $0 | $11,442 |
| Floor drain hazard grouting | $234 | $646 | $0 | $880 |
| Lube and hydraulic oils (potential for pcbs) removal | $1,539 | $5,077 | $0 | $6,616 |
| Mercury switches removed and manometers drained | $33 | $66 | $0 | $99 |
| Lead paint hazard removal | $26,666 | $185,975 | $0 | $212,640 |
| Scaffolding | $1,472 | $13,815 | $1,320 | $16,607 |
| Negative air machine | $94 | $501 | $43 | $637 |
| **Subtotal** | **$36,183** | **$241,727** | **$1,363** | **$279,273** |
| ***Acid Mixing Room*** | | | | |
| Floor drains opened, surveyed, grouted to fill trap, grate reinstalled | $116 | $215 | $0 | $332 |
| Lube and hydraulic oils (potential for PCBs) drained for disposal | $1,115 | $2,423 | $0 | $3,538 |
| Lead paint hazard removal | $9,824 | $59,574 | $0 | $69,399 |
| Erect scaffold for upper walls and ceiling remediation work | $368 | $2,502 | $60 | $2,930 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$11,477** | **$64,965** | **$103** | **$76,545** |
| ***Area East of Air Conditioning Equipment Room*** | | | | |
| Lead paint hazard removal | $4,590 | $28,192 | $0 | $32,782 |

**Table F-2. Cost Estimate for Mitigation of Hazardous Materials. (22 sheets)**

| Room/Activity | Bare Material Cost | Installing Contractor's Labor Cost | Bare Equipment Cost | Total Cost |
|---|---|---|---|---|
| Erect scaffold for upper walls and ceiling remediation work | $368 | $2,502 | $60 | $2,930 |
| **Subtotal** | **$4,958** | **$30,694** | **$60** | **$35,712** |
| ***Ball Collection*** | | | | |
| Lead Paint Hazard Removal | $276 | $1,449 | $0 | $1,725 |
| **Subtotal** | **$276** | **$1,449** | **$0** | **$1,725** |
| ***Basin (Spent Fuel Storage Area) Work Area from Deck Planks to Ceiling*** | | | | |
| Radiological decontamination | $6,238 | $33,497 | $0 | $39,735 |
| Lube and hydraulic oils (potential for PCBs) drained for disposal. | $73 | $191 | $0 | $264 |
| Lead paint hazard removal | $45,600 | $341,557 | $0 | $387,157 |
| Erect scaffold for upper walls and ceiling remediation work | $368 | $2,502 | $60 | $2,930 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$52,333** | **$377,997** | **$103** | **$430,433** |
| ***Basin Viewing Room*** | | | | |
| Lead paint hazard removal | $7,556 | $46,804 | $0 | $54,360 |
| Erect scaffold for upper walls and ceiling remediation work | $368 | $2,502 | $60 | $2,930 |
| Asbestos removal, round duct and pipe to 12-in. diameter | $5,630 | $20,959 | $0 | $26,589 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$13,608** | **$70,515** | **$103** | **$84,226** |
| ***Bathrooms & Shower*** | | | | |
| Floor drains opened, surveyed, grouted to fill trap, grate reinstalled. | $353 | $1,292 | $0 | $1,645 |
| Lead paint hazard removal | $7,886 | $48,702 | $0 | $56,589 |

**Table F-2. Cost Estimate for Mitigation of Hazardous Materials. (22 sheets)**

| Room/Activity | Bare Material Cost | Installing Contractor's Labor Cost | Bare Equipment Cost | Total Cost |
|---|---|---|---|---|
| Erect scaffold for upper walls and ceiling remediation work | $368 | $2,502 | $60 | $2,930 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$8,308** | **$51,455** | **$103** | **$59,866** |
| ***Building #115*** | | | | |
| Radiological decontamination | $3,455 | $18,318 | $0 | $21,773 |
| Lube and hydraulic oils (potential for PCBs) drained for disposal. | $5,811 | $31,578 | $0 | $37,389 |
| Erect scaffold for upper walls and ceiling remediation work | $368 | $2,502 | $60 | $2,930 |
| Asbestos removal, round duct and pipe to 12-in. diameter | $5,035 | $18,506 | $0 | $23,541 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$14,918** | **$71,728** | **$103** | **$86,749** |
| ***Charge Preparation Hallway*** | | | | |
| Lead paint hazard removal | $18,345 | $137,902 | $0 | $156,247 |
| Door closer oil drained for disposal or closer replaced. | $438 | $179 | $0 | $617 |
| Erect scaffold for upper walls and ceiling remediation work | $368 | $2,557 | $180 | $3,105 |
| Asbestos removal, round duct and pipe to 12-in. diameter | $7,283 | $26,443 | $0 | $33,725 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$26,488** | **$167,332** | **$223** | **$194,042** |

**Table F-2. Cost Estimate for Mitigation of Hazardous Materials. (22 sheets)**

| Room/Activity | Bare Material Cost | Installing Contractor's Labor Cost | Bare Equipment Cost | Total Cost |
|---|---|---|---|---|
| ***Control Room*** | | | | |
| Mercury switches removed (includes instrumentation 'standard cells'.) | $599 | $1,978 | $0 | $2,577 |
| Lead paint hazard removal | $16,253 | $120,222 | $0 | $136,475 |
| Erect scaffold for upper walls and ceiling remediation work | $368 | $2,502 | $60 | $2,930 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$16,675** | **$122,975** | **$103** | **$139,752** |
| ***Control Room Hallway*** | | | | |
| Lead paint hazard removal | $2,767 | $17,151 | $0 | $19,918 |
| Erect scaffold for upper walls and ceiling remediation work | $368 | $2,502 | $30 | $2,900 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | $3,189 | $19,904 | $73 | $23,165 |
| ***Control Room, Office A*** | | | | |
| Lead paint hazard removal | $1,860 | $12,406 | $0 | $14,266 |
| Asbestos removal, round duct and pipe to 12-in. diameter | $479 | $1,298 | $0 | $1,777 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | | | | **$16,390** |
| ***Control Room Office B*** | | | | |
| Lead paint hazard removal | $1,860 | $12,406 | $0 | $14,266 |
| Asbestos removal, round duct and pipe to 12-in. diameter | $479 | $1,298 | $0 | $1,777 |

**Table F-2. Cost Estimate for Mitigation of Hazardous Materials. (22 sheets)**

| Room/Activity | Bare Material Cost | Installing Contractor's Labor Cost | Bare Equipment Cost | Total Cost |
|---|---|---|---|---|
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | | | | **$16,390** |
| ***Cubicle & Labyrinth South of Near Side Sample Room*** | | | | |
| Radiological decontamination | $554 | $2,617 | $0 | $3,171 |
| Lead paint hazard removal | $3,765 | $24,393 | $0 | $28,158 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$4,372** | **$27,260** | **$43** | **$31,675** |
| ***Cushion Corridor*** | | | | |
| Radiological decontamination | $1,524 | $7,851 | $0 | $9,375 |
| Lead paint hazard removal | $20,912 | $143,576 | $0 | $164,489 |
| Erect scaffold for upper walls and ceiling remediation work | $368 | $2,502 | $120 | $2,990 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$22,858** | **$154,180** | **$163** | **$177,200** |
| ***Decon Room*** | | | | |
| Floor drains opened, surveyed, grouted to fill trap, grate reinstalled. | $118 | $431 | $0 | $548 |
| Lead paint hazard removal | $4,796 | $21,960 | $0 | $26,756 |
| Erect scaffold for upper walls and ceiling remediation work | $368 | $2,502 | $30 | $2,900 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$5,218** | **$24,713** | **$73** | **$30,003** |

**Table F-2. Cost Estimate for Mitigation of Hazardous Materials. (22 sheets)**

| Room/Activity | Bare Material Cost | Installing Contractor's Labor Cost | Bare Equipment Cost | Total Cost |
|---|---|---|---|---|
| ***Electrical Equipment Room*** | | | | |
| Lead paint hazard removal | $8,198 | $46,194 | $0 | $54,392 |
| Erect scaffold for upper walls and ceiling remediation work | $368 | $2,502 | $60 | $2,930 |
| Asbestos removal, round duct and pipe to 12-in. Diameter | $2,494 | $8,513 | $0 | $11,008 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$11,114** | **$57,460** | **$103** | **$68,676** |
| ***Electrical Switch Gear Room*** | | | | |
| Lead paint hazard removal | $2,956 | $20,409 | $0 | $23,365 |
| Erect scaffold for upper walls and ceiling remediation work | $368 | $2,502 | $60 | $2,930 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | $3,377 | $23,162 | $103 | $26,642 |
| ***Elevator*** | | | | |
| Lube and hydraulic oils (potential for PCBs) drained for disposal. | $1,503 | $4,777 | $0 | $6,280 |
| Lead paint hazard removal | $10,705 | $81,667 | $0 | $92,372 |
| Erect scaffold for upper walls and ceiling remediation work | $552 | $5,356 | $360 | $6,268 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $320 | $463 | $43 | $826 |
| **Subtotal** | **$11,577** | **$87,486** | **$403** | **$99,466** |
| ***Elevator Pit*** | | | | |
| Lead paint hazard removal | $2,524 | $12,942 | $0 | $15,466 |

**Table F-2. Cost Estimate for Mitigation of Hazardous Materials. (22 sheets)**

| Room/Activity | Bare Material Cost | Installing Contractor's Labor Cost | Bare Equipment Cost | Total Cost |
|---|---|---|---|---|
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$2,578** | **$13,193** | **$43** | **$15,813** |
| ***Front Face of Reactor*** | | | | |
| Front face of reactor | $43,086 | $180,120 | $0 | $223,206 |
| **Subtotal** | **$43,086** | **$180,120** | **$0** | **$223,206** |
| ***Fan House (Supply Fans)*** | | | | |
| Lead paint hazard removal | $23,907 | $176,710 | $0 | $200,617 |
| Erect scaffold for upper walls and ceiling remediation work | $368 | $2,502 | $60 | $2,930 |
| Asbestos removal, round duct and pipe to 12-in. diameter | $70,001 | $223,458 | $0 | $293,459 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$94,330** | **$402,921** | **$103** | **$497,353** |
| ***Fan House (Exhaust Chimney Manifold)*** | | | | |
| Lead paint removal, floor | $13,122 | $81,835 | $0 | $94,957 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$13,176** | **$82,085** | **$43** | **$95,304** |
| ***Fan House (Exhaust Ducting)*** | | | | |
| Radiological decontamination | $2,906 | $15,178 | $0 | $18,084 |
| Lead paint hazard removal | $5,201 | $37,761 | $0 | $42,962 |
| Erect scaffold for upper walls and ceiling remediation work | $368 | $2,502 | $60 | $2,930 |
| **Subtotal** | **$8,475** | **$55,442** | **$60** | **$63,976** |

**Table F-2. Cost Estimate for Mitigation of Hazardous Materials. (22 sheets)**

| Room/Activity | Bare Material Cost | Installing Contractor's Labor Cost | Bare Equipment Cost | Total Cost |
|---|---|---|---|---|
| ***Fan House (Exhaust Fans)*** | | | | |
| Radiological decontamination | $9,966 | $54,432 | $0 | $64,398 |
| Mercury switches removed and manometers drained | $86 | $4,307 | $0 | $4,393 |
| Floor drains opened, surveyed, grouted to fill trap, grate reinstalled. | $355 | $1,507 | $0 | $1,862 |
| Lube and hydraulic oils (potential for PCBs) drained for disposal. | $684 | $3,777 | $0 | $4,461 |
| Lead paint hazard removal | $13,596 | $30,644 | $0 | $44,240 |
| Erect scaffold for upper walls and ceiling remediation work | $552 | $3,781 | $420 | $4,753 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$25,292** | **$98,699** | **$463** | **$124,454** |
| ***Far Side Counterweight & Shaft for Front Face Elevator*** | | | | |
| Radiological decontamination | $1,106 | $5,849 | $0 | $6,955 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$1,160** | **$6,099** | **$43** | **$7,301** |
| ***Far Side Counterweight & Shaft for Rear Face Elevator*** | | | | |
| Radiological decontamination | $1,106 | $5,849 | $0 | $6,955 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$1,160** | **$6,099** | **$43** | **$7,301** |
| ***Far Side Nozzle Shop*** | | | | |
| Radiological decontamination | $3,876 | $20,935 | $0 | $24,811 |

**Table F-2. Cost Estimate for Mitigation of Hazardous Materials. (22 sheets)**

| Room/Activity | Bare Material Cost | Installing Contractor's Labor Cost | Bare Equipment Cost | Total Cost |
|---|---|---|---|---|
| Floor drains opened, surveyed, grouted to fill trap, grate reinstalled | $234 | $646 | $0 | $880 |
| Lead paint hazard removal | $25,203 | $172,297 | $0 | $197,501 |
| Erect scaffold for upper walls and ceiling remediation work | $552 | $4,838 | $600 | $5,990 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$29,919** | **$198,967** | **$643** | **$229,529** |
| ***Foyer, Metal Grating and Pit Entrance Far Side*** | | | | |
| Lead paint hazard removal | $3,176 | $17,801 | $0 | $20,977 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$3,230** | **$18,051** | **$43** | **$21,323** |
| ***Front Face Work Area*** | | | | |
| Radiological decontamination | $4,246 | $20,958 | $0 | $25,204 |
| Floor drains opened, surveyed, grouted to fill trap, grate reinstalled. | $0 | $0 | $0 | $0 |
| Lube and hydraulic oils (potential for PCBs) drained for disposal. | $615 | $2,216 | $0 | $2,831 |
| Lead paint hazard removal | $43,586 | $293,846 | $0 | $337,431 |
| Erect scaffold for upper walls and ceiling remediation work | $1,104 | $9,119 | $1,200 | $11,423 |
| Set up poly containment partitions, negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $446 | $6,805 | $43 | $7,294 |
| **Subtotal** | **$49,997** | **$332,944** | **$1,243** | **$384,183** |

**Table F-2. Cost Estimate for Mitigation of Hazardous Materials. (22 sheets)**

| Room/Activity | Bare Material Cost | Installing Contractor's Labor Cost | Bare Equipment Cost | Total Cost |
|---|---|---|---|---|
| ***Fuel Discharge Basin*** | | | | |
| Radiological decontamination | $13,455 | $68,767 | $0 | $82,222 |
| Lead paint hazard removal | $5,915 | $47,586 | $0 | $53,501 |
| Erect scaffold for upper walls and ceiling remediation work | $736 | $6,228 | $600 | $7,564 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$20,160** | **$122,831** | **$643** | **$143,634** |
| ***Fuel Discharge Storage Area*** | | | | |
| Radiological decontamination | $9,400 | $49,730 | $0 | $59,130 |
| Lead paint hazard removal | $6,053 | $47,977 | $0 | $54,030 |
| Erect scaffold for upper walls and ceiling remediation work | $736 | $6,228 | $600 | $7,564 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$16,242** | **$104,185** | **$643** | **$121,070** |
| ***Fuel Pits #1 & #2*** | | | | |
| Radiological decontamination | $1,451 | $8,598 | $0 | $10,049 |
| Lead paint hazard removal | $886 | $6,768 | $0 | $7,654 |
| Erect scaffold for upper walls and ceiling remediation work | $736 | $6,228 | $600 | $7,564 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$3,126** | **$21,845** | **$643** | **$25,614** |
| ***Infirmary*** | | | | |
| Lead paint hazard removal | $5,053 | $32,136 | $0 | $37,189 |
| Erect scaffold for upper walls and ceiling remediation work | $368 | $2,502 | $60 | $2,930 |

**Table F-2. Cost Estimate for Mitigation of Hazardous Materials. (22 sheets)**

| Room/Activity | Bare Material Cost | Installing Contractor's Labor Cost | Bare Equipment Cost | Total Cost |
|---|---|---|---|---|
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$5,475** | **$34,888** | **$103** | **$40,466** |
| ***Inner Control Rod Room*** | | | | |
| Radiological decontamination | $5,667 | $30,356 | $0 | $36,023 |
| Floor drains opened, surveyed, grouted to fill trap, grate reinstalled. | $234 | $646 | $0 | $880 |
| Lube and hydraulic oils (potential for PCBs) drained for disposal. | $73 | $191 | $0 | $264 |
| Lead paint hazard removal | $6,219 | $47,478 | $0 | $53,698 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$12,247** | **$78,922** | **$43** | **$91,212** |
| ***Instrument Repairs*** | | | | |
| Lead paint hazard removal | $7,974 | $51,317 | $0 | $59,291 |
| Erect scaffold for upper walls and ceiling remediation work | $368 | $2,780 | $180 | $3,328 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$8,396** | **$54,347** | **$223** | **$62,965** |
| ***Locker Room*** | | | | |
| Lead paint removal, floor | $3,162 | $19,689 | $0 | $22,851 |
| Erect scaffold for upper walls and ceiling remediation work | $368 | $2,502 | $60 | $2,930 |

**Table F-2. Cost Estimate for Mitigation of Hazardous Materials. (22 sheets)**

| Room/Activity | Bare Material Cost | Installing Contractor's Labor Cost | Bare Equipment Cost | Total Cost |
|---|---|---|---|---|
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$3,583** | **$22,442** | **$103** | **$26,128** |
| ***Machinery Room*** | | | | |
| Lead paint hazard removal | $15,468 | $87,624 | $0 | $103,092 |
| Erect scaffold for upper walls and ceiling remediation work | $368 | $2,502 | $90 | $2,960 |
| Asbestos removal, round duct and pipe to 12-in. Diameter | $8,137 | $33,609 | $0 | $41,746 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$24,026** | **$123,986** | **$133** | **$148,145** |
| ***Near Side Counterweight & Shaft for Rear Face Elevator*** | | | | |
| Radiological decontamination | $1,106 | $5,849 | $0 | $6,955 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$1,160** | **$6,099** | **$43** | **$7,301** |
| ***Office #1*** | | | | |
| Lead paint hazard removal | $3,495 | $21,990 | $0 | $25,485 |
| Erect scaffold for upper walls and ceiling remediation work | $368 | $2,502 | $60 | $2,930 |
| Asbestos removal, round duct and pipe to 12-in. diameter | $459 | $1,944 | $0 | $2,402 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$4,375** | **$26,687** | **$103** | **$31,165** |

**Table F-2. Cost Estimate for Mitigation of Hazardous Materials. (22 sheets)**

| Room/Activity | Bare Material Cost | Installing Contractor's Labor Cost | Bare Equipment Cost | Total Cost |
|---|---|---|---|---|
| ***Office #2*** | | | | |
| Lead paint hazard removal | $4,554 | $29,657 | $0 | $34,211 |
| Erect scaffold for upper walls and ceiling remediation work | $368 | $2,502 | $60 | $2,930 |
| Asbestos removal, round duct and pipe to 12-in. diameter | $757 | $3,843 | $0 | $4,599 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$5,732** | **$36,252** | **$103** | **$42,087** |
| ***Office Storage*** | | | | |
| Lead paint hazard removal | $4,704 | $30,684 | $0 | $35,388 |
| Erect scaffold for upper walls and ceiling remediation work | $368 | $2,502 | $60 | $2,930 |
| Asbestos removal, round duct and pipe to 12-in. diameter | $459 | $1,944 | $0 | $2,402 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$5,584** | **$35,381** | **$103** | **$41,068** |
| ***Outer Control Rod Room*** | | | | |
| Radiological decontamination | $8,017 | $43,441 | $0 | $51,458 |
| Lead paint hazard removal | $9,077 | $70,433 | $0 | $79,510 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$17,148** | **$114,124** | **$43** | **$131,315** |
| ***Pit #3*** | | | | |
| Radiological decontamination | $93 | $366 | $0 | $459 |
| Lead paint hazard removal | $452 | $2,391 | $0 | $2,843 |

**Table F-2. Cost Estimate for Mitigation of Hazardous Materials. (22 sheets)**

| Room/Activity | Bare Material Cost | Installing Contractor's Labor Cost | Bare Equipment Cost | Total Cost |
|---|---|---|---|---|
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$599** | **$3,007** | **$43** | **$3,649** |
| ***Primary Coolant Pipe Tunnels*** | | | | |
| Lead paint hazard removal | $2,733 | $19,558 | $0 | $22,290 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$2,786** | **$19,808** | **$43** | **$22,637** |
| ***Rear Face of Reactor including access labyrinth up to gates and doors 104 & 107*** | | | | |
| **Subtotal** | **$43,086** | **$180,120** | **$0** | **$223,206** |
| ***Labyrinth & East Wall*** | | | | |
| Radiological decontamination | $8,911 | $48,151 | $0 | $57,062 |
| Lead paint hazard removal | $29,285 | $203,885 | $0 | $233,169 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$81,335** | **$432,407** | **$43** | **$513,785** |
| ***Rear (Discharge) Face Elevator*** | | | | |
| Lube and hydraulic oils (potential for PCBs) drained for disposal. | $1,503 | $4,777 | $0 | $6,280 |
| Lead paint hazard removal | $10,705 | $81,667 | $0 | $92,372 |
| Erect scaffold for upper walls and ceiling remediation work | $552 | $5,356 | $360 | $6,268 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$11,310** | **$87,274** | **$403** | **$98,987** |

**Table F-2. Cost Estimate for Mitigation of Hazardous Materials. (22 sheets)**

| Room/Activity | Bare Material Cost | Installing Contractor's Labor Cost | Bare Equipment Cost | Total Cost |
|---|---|---|---|---|
| ***Rear (Discharge) Face Catwalk At Elevation 49 ft*** | | | | |
| Lead paint hazard removal | $10,705 | $81,667 | $0 | $92,372 |
| Erect scaffold for upper walls and ceiling remediation work | $552 | $5,356 | $360 | $6,268 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$11,310** | **$87,274** | **$403** | **$98,987** |
| ***Sample Room Including Stair #7*** | | | | |
| Radiological decontamination | $1,245 | $6,804 | $0 | $8,049 |
| Lead paint hazard removal | $9,509 | $69,013 | $0 | $78,522 |
| Erect scaffold for upper walls and ceiling remediation work | $368 | $2,502 | $60 | $2,930 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$11,175** | **$78,570** | **$103** | **$89,848** |
| ***Sample Room on South Side (Far Side)*** | | | | |
| Radiological decontamination | $416 | $2,094 | $0 | $2,510 |
| Lead paint hazard removal | $4,587 | $27,690 | $0 | $32,277 |
| Erect scaffold for upper walls and ceiling remediation work | $2,024 | $19,461 | $1,890 | $23,375 |
| Asbestos removal, round duct and pipe to 12-in. diameter | $7,311 | $22,863 | $0 | $30,174 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$14,391** | **$72,358** | **$1,933** | **$88,682** |
| ***Shop and Storage Area*** | | | | |
| Lead paint hazard removal | $14,433 | $90,735 | $0 | $105,168 |

**Table F-2. Cost Estimate for Mitigation of Hazardous Materials. (22 sheets)**

| Room/Activity | Bare Material Cost | Installing Contractor's Labor Cost | Bare Equipment Cost | Total Cost |
|---|---|---|---|---|
| Erect scaffold for upper walls and ceiling remediation work | $368 | $2,502 | $60 | $2,930 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$14,855** | **$93,488** | **$103** | **$108,445** |
| ***Shop and Storage Office A*** | | | | |
| Lead paint hazard removal | $4,081 | $25,190 | $0 | $29,271 |
| Erect scaffold for upper walls and ceiling remediation work | $368 | $2,502 | $60 | $2,930 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$4,503** | **$27,943** | **$103** | **$32,548** |
| ***Shop and Storage Office B*** | | | | |
| Lead paint hazard removal | $2,936 | $18,216 | $0 | $21,152 |
| Erect scaffold for upper walls and ceiling remediation work | $368 | $2,502 | $60 | $2,930 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$3,357** | **$20,969** | **$103** | **$24,429** |
| ***Stair #1*** | | | | |
| Lead paint hazard removal | $8,360 | $58,024 | $0 | $66,384 |
| Erect scaffold for upper walls and ceiling remediation work | $368 | $2,502 | $60 | $2,930 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$8,782** | **$60,776** | **$103** | **$69,661** |

**Table F-2. Cost Estimate for Mitigation of Hazardous Materials. (22 sheets)**

| Room/Activity | Bare Material Cost | Installing Contractor's Labor Cost | Bare Equipment Cost | Total Cost |
|---|---|---|---|---|
| ***Stair #2*** | | | | |
| Lead paint hazard removal | $7,501 | $53,371 | $0 | $60,873 |
| Erect scaffold for upper walls and ceiling remediation work | $368 | $2,502 | $60 | $2,930 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$7,923** | **$56,124** | **$103** | **$64,149** |
| ***Stair #5*** | | | | |
| Lead paint hazard removal | $4,781 | $29,892 | $0 | $34,673 |
| Erect scaffold for upper walls and ceiling remediation work | $368 | $2,502 | $60 | $2,930 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$5,202** | **$32,645** | **$103** | **$37,950** |
| ***Storage Area (elevation 0.0 to 9.8 ft)*** | | | | |
| Radiological decontamination | $4,293 | $23,029 | $0 | $27,322 |
| Lead paint hazard removal | $31,825 | $156,208 | $0 | $188,033 |
| Erect scaffold for upper walls and ceiling remediation work | $368 | $2,780 | $180 | $3,328 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$36,539** | **$182,267** | **$223** | **$219,029** |
| ***Top of Reactor*** | | | | |
| Radiological decontamination | $4,700 | $25,646 | $0 | $30,346 |
| Mercury switches removed | $33 | $132 | $0 | $165 |
| Lead paint hazard removal | $12,748 | $102,916 | $0 | $115,664 |
| Erect scaffold for upper walls and ceiling remediation work | $7,544 | $72,361 | $2,820 | $82,725 |

**Table F-2. Cost Estimate for Mitigation of Hazardous Materials. (22 sheets)**

| Room/Activity | Bare Material Cost | Installing Contractor's Labor Cost | Bare Equipment Cost | Total Cost |
|---|---|---|---|---|
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $127 | $496 | $43 | $666 |
| **Subtotal** | **$25,152** | **$201,551** | **$2,863** | **$229,566** |
| ***Transfer Area*** | | | | |
| Floor drains opened, surveyed, grouted to fill trap, grate reinstalled. | $234 | $646 | $0 | $880 |
| Radiological decontamination | $2,216 | $12,038 | $0 | $14,254 |
| Lead paint hazard removal | $21,034 | $131,173 | $0 | $152,207 |
| Erect scaffold for upper walls and ceiling remediation work | $920 | $8,720 | $480 | $10,120 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$24,224** | **$152,181** | **$523** | **$176,927** |
| ***Valve Pit*** | | | | |
| Lead paint hazard removal | $24,043 | $188,942 | $0 | $212,985 |
| Erect scaffold for upper walls and ceiling remediation work | $920 | $8,552 | $600 | $10,072 |
| Asbestos removal, round duct and pipe to 12-in. Diameter | $1,716 | $6,463 | $0 | $8,180 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$26,733** | **$204,207** | **$643** | **$231,583** |
| ***Floor Drains*** | | | | |
| Floor drains opened, surveyed, grouted to fill trap, grate reinstalled. | $118 | $431 | $0 | $548 |
| **Subtotal** | **$118** | **$431** | **$0** | **$548** |

**Table F-2. Cost Estimate for Mitigation of Hazardous Materials. (22 sheets)**

| Room/Activity | Bare Material Cost | Installing Contractor's Labor Cost | Bare Equipment Cost | Total Cost |
|---|---|---|---|---|
| ***Valve Pit Extension*** | | | | |
| Lead paint hazard removal | $20,891 | $111,876 | $0 | $132,767 |
| Erect scaffold for upper walls and ceiling remediation work | $368 | $2,502 | $60 | $2,930 |
| Asbestos removal, round duct and pipe to 12-in. diameter | $326 | $936 | $0 | $1,263 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$21,639** | **$115,564** | **$103** | **$137,306** |
| ***Valve Pit Flow Lab*** | | | | |
| Floor drains opened, surveyed, grouted to fill trap, grate reinstalled. | $118 | $431 | $0 | $548 |
| Lead paint hazard removal | $16,364 | $94,414 | $0 | $110,779 |
| Erect scaffold for upper walls and ceiling remediation work | $368 | $2,502 | $90 | $2,960 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$16,786** | **$97,167** | **$133** | **$114,085** |
| ***Valve Pit Storage Room #1*** | | | | |
| Lead paint hazard removal | $590 | $1,364 | $0 | $1,953 |
| Erect scaffold for upper walls and ceiling remediation work | $368 | $2,502 | $60 | $2,930 |
| Asbestos removal, transite | $11,385 | $35,797 | $0 | $47,182 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$12,396** | **$39,913** | **$103** | **$52,412** |

**Table F-2. Cost Estimate for Mitigation of Hazardous Materials. (22 sheets)**

| Room/Activity | Bare Material Cost | Installing Contractor's Labor Cost | Bare Equipment Cost | Total Cost |
|---|---|---|---|---|
| ***Valve Pit Storage Room #2*** | | | | |
| Asbestos removal, duct or AHU | $11,466 | $35,797 | $0 | $47,262 |
| **Subtotal** | **$11,466** | **$35,797** | **$0** | **$47,262** |
| ***Video Room*** | | | | |
| Lead paint hazard removal | $8,402 | $50,983 | $0 | $59,385 |
| Erect scaffold for upper walls and ceiling remediation work | $368 | $2,502 | $60 | $2,930 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$8,823** | **$53,736** | **$103** | **$62,662** |
| ***Vertical Safety Rod Drives (top of reactor block, upper deck)*** | | | | |
| Radiological decontamination | $692 | $3,140 | $0 | $3,832 |
| Lube and hydraulic oils (potential for PCBs) drained for disposal. | $73 | $191 | $0 | $264 |
| Lead paint hazard removal | $8,239 | $63,703 | $0 | $71,942 |
| Erect scaffold for upper walls and ceiling remediation work | $368 | $2,502 | $60 | $2,930 |
| Asbestos removal, round duct and pipe to 12-in. diameter | $7,311 | $22,863 | $0 | $30,174 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$16,736** | **$92,651** | **$103** | **$109,489** |
| ***VSR Storage (Suspended Floor)*** | | | | |
| Radiological decontamination | $8,293 | $45,011 | $0 | $53,304 |
| Lead paint hazard removal | $19,079 | $148,337 | $0 | $167,416 |

**Table F-2. Cost Estimate for Mitigation of Hazardous Materials. (22 sheets)**

| Room/Activity | Bare Material Cost | Installing Contractor's Labor Cost | Bare Equipment Cost | Total Cost |
|---|---|---|---|---|
| Erect scaffold for upper walls and ceiling remediation work | $3,680 | $35,543 | $2,700 | $41,923 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$31,106** | **$229,141** | **$2,743** | **$262,990** |
| ***Walkways at Elevation of 56.3 ft*** | | | | |
| Radiological decontamination | $1,523 | $7,851 | $0 | $9,374 |
| Lead paint hazard removal | $7,319 | $56,476 | $0 | $63,795 |
| Erect scaffold for upper walls and ceiling remediation work | $1,656 | $15,539 | $540 | $17,735 |
| Asbestos removal, round duct and pipe to 12-in. diameter | $7,311 | $22,863 | $0 | $30,174 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$17,862** | **$102,979** | **$583** | **$121,425** |
| ***Wash Area*** | | | | |
| Radiological decontamination | $2,769 | $14,655 | $0 | $17,424 |
| Lead paint hazard removal | $17,046 | $111,373 | $0 | $128,419 |
| Asbestos removal, round duct and pipe to 12-in. diameter | $6,515 | $24,649 | $0 | $31,164 |
| Set up negative air blowers and HEPA filters and personnel decontamination chamber for lead paint or asbestos removal | $54 | $251 | $43 | $347 |
| **Subtotal** | **$26,383** | **$150,927** | **$43** | **$177,353** |
| **Project Subtotals** | **$1,298,970** | **$6,892,313** | **$572,815** | **$8,764,098** |

**Table F-2. Cost Estimate for Mitigation of Hazardous Materials. (22 sheets)**

| Room/Activity | Bare Material Cost | Installing Contractor's Labor Cost | Bare Equipment Cost | Total Cost |
|---|---|---|---|---|
| ***General Contractor's Markups*** | | | ***Assumed Percentage*** | ***Cost*** |
| On subcontractors | | | 15% | $28,452 |
| Overhead on labor and materials | | | 8% | $640,128 |
| Overhead on equipment subcontractor | | | 8% | $60,999 |
| Profits | | | 7% | $660,287 |
| **Subtotal** | | | – | **$1,389,866** |
| | | ***Grand Total*** | – | ***$10,153,965*** |

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# APPENDIX G

# ROOM-BY-ROOM HAZARDS MITIGATION FOR PUBLIC ACCESS

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**Table G-1. Room-by-Room Hazards Mitigation. (8 Sheets)**

| Room | Fiscal Year to be Completed | Mitigation Measures Planned | Status |
|---|---|---|---|
| ***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. | DONE |
| Asbestos Encapsulation | FY 2002 | Asbestos for this room has previously been encapsulated. | DONE |
| Canvas Drop Shield | FY 2002 | This safety hazard will be mitigated by securing a drop shield with cables mounted from I-beams. | DONE |
| 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. | DONE |
| 211 Corridor #4 (Cushion Corridor) | | | |
| Lead Paint Encapsulation | FY 2002 | This contaminant hazard will be mitigated by encapsulation by repainting with non-lead-based paint. | DONE |
| Decontamination | FY 2002 | The decontamination work mitigated by swiping and painting over an area. | DONE |
| 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. | DONE |
| ***220 Control Room*** | | | |
| Lead Paint Encapsulation | FY 2003 | This contaminant hazard will be mitigated by encapsulation by repainting with non-lead-based paint. | DONE |

**Table G-1. Room-by-Room Hazards Mitigation. (8 Sheets)**

| Room | Fiscal Year to be Completed | Mitigation Measures Planned | Status |
|---|---|---|---|
| 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. | DONE |
| ***222 Accumulator Room*** | | | |
| Lead Paint Encapsulation | FY 2003 | This contaminant hazard will be mitigated by encapsulation by repainting with non-lead-based paint. | DONE |
| 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. | DONE |
| Asbestos Encapsulation | FY 2003 | This hazard will be mitigated by encapsulation, where the asbestos will be wrapped to seal it and then painted. | DONE |
| ***223 Electrical Equipment Room*** | | | |
| Lead Paint Encapsulation | FY 2003 | This contaminant hazard will be mitigated by encapsulation by repainting with non-lead-based paint. | DONE |
| 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. | DONE |

**Table G-1. Room-by-Room Hazards Mitigation. (8 Sheets)**

| Room | Fiscal Year to be Completed | Mitigation Measures Planned | Status |
|---|---|---|---|
| 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. | A DECISION WAS MADE TO NOT CONSTRUCT THE RAMP DUE TO INFREQUENT ACCESS TO THE AREA. THE TRIPPING HAZARD HAS BEEN CLEARLY MARKED WITH BRIGHT YELLOW PAINT. |
| ***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. | DONE |
| Asbestos Encapsulation | FY 2002 | This hazard will be mitigated by encapsulation, where the asbestos will be wrapped to seal it and then painted. | DONE |
| Decontamination | FY 2002 | Decontaminated by wiping down and also fixed contamination in place by painting, followed by radiological down posting. | DONE |
| 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. | DONE |
| ***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. | DONE |
| Asbestos | 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. | THE FUEL BASIN AND VIEWING ROOM ARE UNDER THE CONTROL OF WASHINGTON CLOSURE HANFORD. |

**Table G-1. Room-by-Room Hazards Mitigation. (8 Sheets)**

| Room | Fiscal Year to be Completed | Mitigation Measures Planned | Status |
|---|---|---|---|
| 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. | DONE |
| 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. | THE FUEL BASIN AND VIEWING ROOM ARE UNDER THE CONTROL OF WASHINGTON CLOSURE HANFORD. |
| ***211 Hallway*** | | | |
| Lead Paint Encapsulation | FY 2003 | This contaminant hazard will be mitigated by encapsulation by repainting with non-lead-based paint. | DONE |
| 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. | DONE |
| ***219a Office*** | | | |
| Lead Paint Encapsulation | FY 2001 | This contaminant hazard was mitigated by encapsulation by repainting with non-lead-based paint. | DONE |
| Asbestos | FY 2001 | This hazard was mitigated by encapsulation, where the asbestos was wrapped to seal it and then painted. | DONE |
| ***219b Office*** | | | |
| Lead Paint Encapsulation | FY 2001 | This contaminant hazard was mitigated by encapsulation by repainting with non-lead-based paint. | DONE |

**Table G-1. Room-by-Room Hazards Mitigation. (8 Sheets)**

| Room | Fiscal Year to be Completed | Mitigation Measures Planned | Status |
|---|---|---|---|
| Asbestos | FY 2001 | This hazard was mitigated by encapsulation, where the asbestos was wrapped to seal it and then painted. | DONE |
| ***227a Hallway*** | | | |
| Lead Paint Encapsulation | FY 2001 | This contaminant hazard was mitigated by encapsulation by repainting with non-lead-based paint. | DONE |
| Asbestos | FY 2001 | This hazard was mitigated by encapsulation, where the asbestos was wrapped to seal it and then painted. | DONE |
| 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. | DONE |
| ***227b Corridor #5*** | | | |
| Lead Paint Encapsulation | FY 2001 | This contaminant hazard was mitigated by encapsulation by repainting with non-lead-based paint. | DONE |
| Asbestos | FY 2001 | This hazard was mitigated by encapsulation, where the asbestos was wrapped to seal it and then painted. | DONE |
| 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. | DONE |

**Table G-1. Room-by-Room Hazards Mitigation. (8 Sheets)**

| Room | Fiscal Year to be Completed | Mitigation Measures Planned | Status |
|---|---|---|---|
| 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. | DONE |
| ***227c Corridor #3*** | | | |
| Lead Paint Encapsulation | FY 2001 | This contaminant hazard was mitigated by encapsulation by repainting with non-lead-based paint. | DONE |
| 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. | DONE |
| Security | FY 2002 | This safety hazard was mitigated by a secure lock and doors to prevent visitor access to additional rooms. | DONE |
| ***230a Valve Pit*** | | | |
| Lead Paint Encapsulation | N/A | No action. Exposed concrete walls, no lead paint. | DONE |
| Asbestos | FY 2001 | This hazard was mitigated by encapsulation, where the asbestos was wrapped to seal it and then painted. | DONE |
| Grated Walkway | FY 2002 | This safety hazard will be mitigated by installing an engineered decking cover. | DONE |
| Breaker Box | FY 2001 | This safety hazard was mitigated by permanently locking the breaker box out. | DONE |

**Table G-1. Room-by-Room Hazards Mitigation. (8 Sheets)**

| Room | Fiscal Year to be Completed | Mitigation Measures Planned | Status |
|---|---|---|---|
| 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. | DONE |
| ***230b Valve Pit -15 Elevation*** | | | |
| Lead Paint Encapsulation | N/A | No action. Exposed concrete walls, no lead paint. | DONE |
| Asbestos | FY 2002 | This hazard was mitigated by encapsulation, where the asbestos was wrapped to seal it and then painted. | DONE |
| Decontamination | FY 2001 | The hazard associated with the process supply line has been mitigated by decontaminating, draining, and plugging the lines. | DONE |
| 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. | DONE |
| ***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. | DONE |
| Floor Drain | FY 2003 | Mitigation involves cleaning up (wiping up/sweeping up) heavy metals and solvents and installing a plastic plug. | THIS WORK IS PLANNED FOR COMPLETION BY MSA BEFORE THE END OF FY 2010. |
| Asbestos | FY 2003 | This hazard will be mitigated by encapsulation, where the asbestos will be wrapped to seal it and then painted. | DONE |

**Table G-1. Room-by-Room Hazards Mitigation. (8 Sheets)**

| Room | Fiscal Year to be Completed | Mitigation Measures Planned | Status |
|---|---|---|---|
| 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. The room will be upgraded to provide an egress to the exterior west side of the building. | DONE |
| Bio Hazard | FY 2001 | Mitigation involved cleaning up animal feces and remains. | DONE |

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