0054299

ACTION MEMORANDUM
OCTOBER 2000

SITE NAME AND LOCATION

United States Department of Energy
Hanford 100 Area National Priorities List (NPL)
105-D and 105-H Reactor Facilities and Ancillary Facilities
Hanford Site
Benton County, Washington

RECEIVED
JAN 17 2001
EDMC

I. STATEMENT OF BASIS AND PURPOSE

The purpose of this Action Memorandum is to document approval of the non-time critical removal action described herein for the 105-D and 105-H Reactor Facilities and Ancillary Facilities, United States Department of Energy's (USDOE's) 100 Area, Hanford Site, Benton County, Washington.

This Removal Action's objective is to reduce the risks to the public's human health, the environment, and site workers by minimizing the potential for release of hazardous substances from the 105-D and 105-H Reactor Facilities and Ancillary Facilities. The Ancillary Facilities are the 103-D Unirradiated Fuel Element Storage Building, the 190-DR Process Water Pumphouse, 1713-H Warehouse, and 1720-HA Arsenal. This action does not include preparation and transportation of the 105-D and 105-H Reactor blocks to the 200 Area Plateau.

This Action Memorandum has been developed in accordance with the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA), as amended by the *Superfund Amendments and Reauthorization Act of 1986*, and to the extent practicable, the *National Oil and Hazardous Substances Pollution Contingency Plan* (NCP). Specifically, this action is designed to conform with the requirements of the USDOE and United States Environmental Protection Agency (EPA) policy called, "Policy on Decommissioning Department of Energy Facilities Under CERCLA," and the *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement). This decision is based on the Administrative Record for the site.

A public comment period was held from August 21 through September 19, 2000, on the USDOE reports entitled *Engineering Evaluation/Cost Analysis for the 105-D Reactor Facility and Ancillary Facilities* (DOE/RL-2000-45, Rev. 0) and the *Engineering Evaluation/Cost Analysis for the 105-H Reactor Facility and Ancillary Facilities* (DOE/RL-2000-46, Rev. 0). The parties received three comments during the public comment period. None of the comments were opposed to the preferred alternative. Responses to comments are included in Appendix A of this Action Memorandum and can be found in the Administrative Record for these sites. 53507 53508

II. BACKGROUND AND FACILITY DESCRIPTION

A. Background

The Hanford Site is a federal facility managed by USDOE. It was established in 1943 to produce plutonium for nuclear weapons using reactors and chemical processing. The Hanford Site occupies approximately 1,456 km^2 (560 mi^2) along the Columbia River in Benton County, which is in southeastern Washington State. The Hanford Site is situated north and west of the cities of Richland, Kennewick, and Pasco, an area commonly known as the Tri-Cities (Figure 1).

An Environmental Impact Statement (EIS) was issued for the eight (8) reactor cores in the 100 Area, excluding the 100-N reactor core. Following the EIS, a Record of Decision (ROD) was issued by USDOE on September 14, 1993, which outlined the preferred alternative for the reactor cores. The EIS remedy selected by DOE was to place the reactor cores in safe storage for up to 75 years, with final one-piece removal to a burial site in Hanford's 200 West Area. The removal action selected in this Action Memorandum is a necessary prerequisite for the eventual one-piece removal of the reactor cores and does not preclude the final disposition.

In November 1989, the 100, 200, 300, and 1100 Areas of the Hanford Site were placed on the National Priorities List (NPL). In September 1996, the 1100 Area of the Hanford Site was deleted from the NPL. The facilities identified in this Action Memorandum reside in the 100 Area NPL, adjacent to the Columbia River (Figure 1). The 100 Area NPL includes the 100-D and 100-H areas, which are in various stages of the remediation process. Specifically, waste sites in the 100 Area have already been evaluated and are being remediated in accordance with various CERCLA RODs.

In general, facilities in the 100 Area are not identified as soil waste sites and are not included in the CERCLA RODs. However, in accordance with the joint USDOE and EPA decontamination and decommissioning (D&D) policy, buildings that are contaminated and that pose a threat to human health and the environment should be addressed as CERCLA Removal Actions. Surface or subsurface contamination over regulatory limits remaining after this removal action will be addressed as waste sites in the existing RODs. Ecology is the lead regulatory agency for these facilities.

B. Facility Descriptions

1. 105-D and 105-H Reactor Facilities

Each of the Reactor Facilities is similar in design and construction. Both plutonium production reactors are water cooled, single pass, and graphite moderated. Each facility contains a reactor core, reactor control room, fuel storage basin (FSB), spent-fuel discharge area, shield walls, ventilation room, battery/switchgear room, support offices, shops, and laboratories (Figures 2 and 3). The 105-D Reactor operated from 1944 to 1967, while the 105-H Reactor operated from 1949 to 1965. In general, the construction includes thick reinforced concrete walls that can measure up to 1.5 meters (m) thick. Concrete block was also used where shielding was not necessary. Overall dimensions of the Reactor Facilities are approximately 76 m long by 70 m wide by 29 m high.

The conditions of the FSBs in 105-D and 105-H Reactor Facilities are not equivalent. In the 105-D FSB, the water has been drained, cleaned of debris, and a fixative applied to radiologically contaminated surfaces. The sludge removed from the 105-D FSB (radiologically contaminated sediment composed of iron oxides and silt) has been buried in the 200 Area Low-Level Waste Burial Ground. In the 105-H FSB, the water has been drained until approximately 1 m of water remained. In this bottom 1 m of water, remains sediment and miscellaneous items (e.g., fuel buckets, fuel spacers, process tubes, tongs, wooden floor decking, and monorail pieces). Fine streambed sand and river cobble has been used to backfill the remainder of the 105-H FSB.

2. 103-D Unirradiated Fuel Element Storage Facility (100-D Area)

The Unirradiated Fuel Element Storage Facility was primarily used for pallet storage of unirradiated fuel elements before the fuel elements were used in the reactor. Potential exists for asbestos-containing materials (ACM) in the roof and polychlorinated biphenyls (PCBs) in the light ballests and gear oil. Lead may be present in shielding and/or paint. The potential for radioactive contamination exists from past storage practices of unirradiated fuel at this facility.

3. 190-DR Process Water Pumphouse (100-D Area)

The 190-DR Process Water Pumphouse supplied treated water to the reactor and other equipment for cooling. The primary chemical hazard of concern is sodium dichromate used for water treatment. PCBs, asbestos (roofing, siding, and thermal pipe insulation), mercury (installed in instrumentation and control systems), lead-based paint, and oils/grease are known or expected to exist throughout the facility.

4. 1713-H Warehouse (100-H Area)

The northern end of 1713-H Warehouse is currently used for the storage of 100-H Area CERCLA groundwater pump-and-treat system equipment and materials which is operating in accordance with an approved ROD. Demolition would not be planned until the pump-and-treat system is no longer needed. This warehouse is prone to electrical defects and may contain wiring insulated with asbestos material. It is painted with weathered, lead-based paint and the roof is expected to contain asbestos. Potential exists for radioactive contaminants from past warehouse operations.

5. 1720-HA Arsenal (100-H Area)

The 1720-HA Arsenal was used for central storage of ammunition by the Hanford Security Patrol, and most recently was used to store explosives for demolition work. There is no expectation that any of this material still exists. However, prior to demolition, the building, and the surrounding area will be inspected by a munitions expert. Lead-based paint and asbestos material in the roofing are expected. This building contains no radioactive material.

III. THREAT TO PUBLIC HEALTH/WELFARE/ENVIRONMENT

The facilities addressed by this Action Memorandum are either known or suspected to be contaminated with radioactive and/or nonradioactive hazardous substances. Radionuclides are known to be carcinogenic. These facilities are currently located in part of the 100-D and 100-H Areas radiologically controlled area, which means worker exposure would be less than 100 millirem (mrem)/year (yr) and only general employee radiological training is required to access the areas. However, access into these facilities is dependent upon the facility. A security fence encloses the 105-D and 105-H Reactor Facilities and the 103-D Facility. Entrance into fenced areas requires approval from the site superintendent and additional site-specific training.

As these facilities continue to age and deteriorate the threat of a potential release increases, and it becomes more difficult to confine these hazardous substances from the environment. Surveillance and maintenance activities required to confine the hazardous substances over the long term may increase the risk of potential exposure to personnel. In addition, the facilities are located adjacent to the Columbia River, which is accessible to the public and is habitat to several ecological receptors. Should these facilities deteriorate, hazardous substances, such as plutonium, could be released and potentially expose on-site workers, the public, and the environment.

These entry requirements are imposed because of the hazardous substances detected during facility walkdowns and radiological surveys. A worker occupying the facility full-time (i.e., 40 hours per week, 50 weeks per year) could receive an external exposure exceeding 100 mrem/yr. Although this level of exposure would be within allowable exposure levels for radiological workers, workers would require specific radiological worker training and monitoring to occupy the facility full-time in its present condition. This level of exposure would not be acceptable for general workers.

The primary pathway of concern from radionuclides is direct exposure. Inhalation and ingestion pathways are also of concern with the disturbance of piping, equipment, and building materials potentially containing radionuclides and/or hazardous substances.

IV. ENDANGERMENT DETERMINATION

In accordance with the USDOE and EPA joint policy called "Policy on Decommissioning Department of Energy Facilities Under CERCLA," and Executive Order 12580, "Superfund Implementation," DOE as the lead agency may determine that removal actions are appropriate to deal with releases or the potential threat of release from buildings or structures. In the case of these facilities, USDOE had determined prior to submission of the Engineering Evaluation/Cost Analysis (EE/CA) that a potential threat exists.

The facilities will continue to be a threat to the Columbia River, public, and several ecological receptors. The risk of potential exposure to personnel over the long term may increase with surveillance and maintenance activities. Actual or threatened releases of hazardous substances from these facilities as the facilities age and deteriorate if not addressed by implementing the removal action selected in this Action Memorandum may present a threat to public health, and/or welfare, and/or the environment.

V. PROPOSED ACTIONS AND ESTIMATED COSTS

Two (2) EE/CAs were prepared in order to develop removal action alternatives for these facilities. The removal action alternative must be protective of human health and the environment. The principal threats to be addressed in the selection of a removal action alternative are radioactive and/or nonradioactive hazardous substances contained in and around the facilities and contaminated surfaces of the facilities. Decontamination of these facilities has already occurred to the extent possible through removal of contaminated tools, equipment, loose materials, and by applying fixatives to many contaminated surfaces. However, significant contamination remains.

The two (2) EE/CAs evaluated three (3) removal action alternatives: (1) No action alternative; (2) Decontamination and demolition, interim safe storage alternative; or (3) Long-term surveillance and maintenance (S&M), followed by decontamination and demolition alternative. These are briefly discussed below.

With the exception of the no-action alternative, each alternative will result in generation of waste. Therefore, waste management is a common element to each of these alternatives.

Each alternative would evaluate recycling, when economically feasible, for releasable material to reduce the volume of material disposed. Inert uncontaminated and decontaminated rubble and other miscellaneous structural material that could not be recycled may be used to fill void spaces in the below-grade structures following demolition. Contaminated waste for which no reuse, recycle, or decontamination option is identified would be assigned an appropriate waste designation and disposed.

The majority of the contaminated debris is expected to be designated as low-level waste (LLW). Viable disposal options for LLW at the Hanford Site are the Environmental Restoration Disposal Facility (ERDF) and the Low-Level Burial Grounds (LLBG). The ERDF is a landfill located in the 200 West Area of the Hanford Site that was specifically designed and constructed as an isolation structure for long-term disposal of Hanford Site remediation wastes. Construction and operation of ERDF were authorized in a separate CERCLA ROD (EPA et al. 1995) and disposal of waste generated during demolition activities was authorized by the ERDF explanation of significant differences (ESD) (EPA et al. 1996). ERDF is an engineered structure designed to meet RCRA minimum technological requirements for landfills, including standards for a double liner, a leachate collection system, leak detection, and final cover.

LLBG are unlined landfills located in the 200 East and 200 West Areas of the Hanford Site, used for disposal of a variety of Hanford radioactive wastes. LLBG are unlined with no leachate collection; they will be provided with a final cover.

The ERDF and LLBG disposal options are technically similar in that they both involve land disposal of waste. However, ERDF provides a more appropriate level of protection at a lower cost. Therefore, only ERDF disposal is discussed in the alternative analysis.

1. No Action Alternative

Under the no-action alternative, D&D and interim safe storage (ISS) would not be performed, and current surveillance and maintenance (S&M) would be discontinued. However, Hanford Site institutional controls (e.g., fencing, posted signs) would be maintained to help minimize personnel, worker, and the public entry to the facilities. No other action would occur to address the hazards posed by the facilities. The facilities would continue to deteriorate and releases of contaminants from the facilities would ultimately occur.

This alternative was not selected because no action would increase risk due to the substantial likelihood of a loss of confinement of hazardous substances, including radioactive substances, which would present a potential and unnecessary threat to human health and the environment. The cost of this alternative is negligible.

2. Decontamination and Demolition, Interim Safe Storage Alternative

Under this alternative, D&D would occur on a portion of the 105-D and 105-H Reactor Facilities up to the reinforced shield walls housing the reactor cores, D&D on the entire 103-D Unirradiated Fuel Element Storage Building, D&D on the entire 190-DR Process Water Pumphouse, D&D on the entire 1713-H Warehouse, and D&D on the entire 1720-HA Arsenal. Demolition of the facilities would follow standard practices using heavy equipment. Water would be used to control dust during demolition.

Foundations outside of the reactor shield walls would also be removed. Subsurface structures and contaminated soil would be characterized and evaluated at the time of D&D in accordance with the remedial action objectives and cleanup standards specified below. This would involve sampling any subsurface structural materials to determine if the materials meet the cleanup standards for protection of human exposure vial direct contact, and protection of groundwater and the Columbia River. If any soil is known or suspected to be contaminated, the soil underlying the site would also be characterized and evaluated against the cleanup standards.

Data on chemical constituents would be compared with the State of Washington *Model Toxics Control Act* (MTCA) standards Method B to determine whether structural material or soil exceeds the chemical cleanup standards for direct exposure and protection of the ground water and the river. For shallow areas of the reactor undergoing cleanup, excavation of contamination within the top 15 feet may cease when contaminant levels are demonstrated to be at, or below, MTCA Method B for inorganics and organics for residential exposure, or at MTCA Method B levels, that ensure protection of the groundwater and river. For radionuclides, the EPA CERCLA risk range of 10^{-4} to 10^{-6} increased cancer risk is achieved. In order to meet the 10^{-4} to10^{-6} risk range, the total dose for radionuclides shall not exceed15 mrem/year above Hanford Site background for 1000 years following remediation, and residual contamination levels shall be at or below MCLs for protection of groundwater or AWQC.

For areas of the reactor where contaminated soil and debris extends below 15 feet, remediation will achieve RAOs, such that contaminant levels are demonstrated to be at, or below, MTCA Method B levels for metals and organics for protection of ground water, and for radionuclides, the EPA CERCLA

risk range of 10^{-4} to 10^{-6} increased cancer risk is achieved. In order to meet the 10^{-4} to 10^{-6} risk range, the total dose for radionuclides shall not exceed 15 mrem/year above Hanford Site background for 1000 years following remediation, and residual contamination levels shall provide protection of groundwater and the Columbia River.

The extent of remediation will have to ensure that contaminant levels are at, or below, MCLs for protection of groundwater and AWQC for protection of the Columbia River. For nonradioactive contaminants, MTCA specifies that concentrations of residual contaminants are protective of groundwater at levels equal to or less than the 100 times the groundwater cleanup levels established in accordance with WAC 173-340-720, unless it can be demonstrated that a higher soil concentration is protective of groundwater at the site. If residual concentrations exceed cleanup levels calculated using the 100 times rule, site specific modeling will be performed to provide refinement on contaminants found to simulate actual conditions. For radionuclides, groundwater and river protection will be demonstrated through a technical evaluation using the computer model Residual Radioactivity (RESRAD).

If the below-grade structures meet the cleanup standards specified in the appropriate 100 Area ROD, the remaining structures would be left in place. If the below-grade structures do not meet the risk level, or process knowledge indicate that an area will likely not meet the specified cleanup levels, excavation would continue until the cleanup standards are achieved. Structural materials or soil that exceed cleanup criteria would be removed and disposed of at an appropriate disposal facility. Upon completing D&D activities, a minimum 1.0 m of clean fill/soil cover would be placed over any remaining below-grade structures and inert/demolition material and would be graded to meet the surrounding terrain in such a manner that minimum infiltration or run-off from precipitation would occur.

If it is not feasible to remediate below-grade structures and soil at the time of D&D, the site would be identified as a discovery site in the Hanford Site Waste Site Database. Disposition of these sites would then be deferred to the Remedial Action and Waste Disposal Project, where they would be remediated in accordance with the appropriate 100 Area CERCLA ROD. Ecology's approval is necessary to defer the D &D action to the Remedial Action and Waste Disposal Project.

Following D&D of the reactor facilities, the existing shield walls would be used to create a safe storage enclosure (SSE), including a new metal roof (i.e., interim safe storage). The shield walls would support the roof and the enclosure would be completely sealed with only one (1) entrance--a door, which will be welded shut. A utility room, outside of the safe storage enclosure, would be used for ventilation controls, air monitoring, and electrical power. Surveillance and maintenance for the SSE would occur until final disposition of the reactor block, which is within 75 years, as defined by the EIS ROD. By design, the SSE structure would require minimal surveillance. It would be equipped with remote monitoring equipment and would only require physical entry once every five (5) years. The design of the SSE structure would be such that no significant maintenance would be required.

Disposal of waste from this action will either be sent to ERDF or an EPA approved, off-site disposal facility capable of accepting CERCLA waste. Treatment of waste may be necessary prior to disposal at ERDF. Should transuranic waste be encountered, storage shall be at Hanford's Central Waste

Complex (CWC).. Certain material is eligible for salvage and recycling, which is encouraged, provided the appropriate regulatory requirements are met. Liquid waste shall either be sent to ETF or treated to meet the acceptance criteria of the receiving facility.

The ERDF ESD document (EPA et al. 1996) modified the ERDF ROD (EPA et al. 1995) to clarify that any environmental cleanup waste generated as a result of CERCLA or RCRA cleanup actions, including decontamination and decommissioning wastes from the Hanford Site, can be disposed at the ERDF provided that the waste meets ERDF waste acceptance criteria and that appropriate CERCLA decision documents are in place. The waste generated from this removal action meets the definition of waste eligible for disposal at the ERDF established in the ERDF ROD and ERDF ESD.

The total cost of this alternative for the 105-D Reactor Facility, the 103-D Unirradiated Fuel Element Storage Building, and the 190-DR Process Water Pumphouse is $22,870,000 (Table 1).

The total cost of this alternative for the 105-H Reactor Facility, the 1713-H Warehouse, and the 1720-HA Arsenal is $23,356,000 (Table 2).

3. Long-Term Surveillance and Maintenance (S&M), followed by Decontamination and Demolition Alternative

The objective of long-term S&M is to sustain the Reactor Buildings in a safe condition for up to 75 years with ultimate demolition and disposal of the reactor cores to the 200 West Area. As for the ancillary facilities, the S&M period is up to 20 years with ultimate demolition and disposal by September 30, 2018, as required by the *Hanford Federal Facility Agreement and Consent Order*, Milestone M-16-00.

Elements of the S&M program include routine radiological and hazard monitoring of the facilities, safety inspections, periodic confirmatory measurements of ventilation inspections, roof inspections and replacement, as necessary, and minor structural repairs. The S&M activities would be tailored to be specific for each facility. Activities would be balanced to reduce hazards to workers while reducing the potential for releases of contaminants. As facilities age and deteriorate, S&M must typically become more aggressive and would involve increased frequency of required activities and a higher level of worker protection.

Without an increasingly aggressive S&M program, the threats associated with unplanned releases to the environment would increase. Conversely, an aggressive S&M program would require workers to enter facilities more often, and workers may be required to perform more invasive procedures to maintain the facilities, which would increase the potential for exposure to workers. Additionally, personal protection requirements to maintain the more aggressive program continually increase, which would add to the cost.

A variety of waste streams would be generated in the performance of S&M that would be characterized, packaged, and disposed. Waste that meets the ERDF waste acceptance criteria would be disposed at ERDF, and other wastes would be managed appropriately, described in Alternative 2.

Final disposition of the ancillary facilities would occur within the 18 year period of S&M, and final disposition of the reactor facilities would occur within the 75 year period of S&M. The cost of this eventual D&D was included in this alternative.

This alternative was not selected because it causes continued risk to workers without reducing the overall protection of human health and the environment. Additionally, the cost for continued S&M would continue to escalate over time as the facilities continue to degrade.

The total cost of this alternative for the 105-D Reactor Facility, the 103-D Unirradiated Fuel Element Storage Building, and the 190-DR Process Water Pumphouse is $30,580,000 (Table 3).

The total cost of this alternative for the 105-H Reactor Facility, the 1713-H Warehouse, and the 1720-HA Arsenal is $30,406,000 (Table 4).

4. Applicable, or Relevant and Appropriate Requirements

This removal action shall, to the extent practicable, attain applicable, or relevant and appropriate requirements (ARARs) under federal and state environmental laws. The selected alternative shall comply with the federal and state ARARs identified to the extent practicable. The ARARs identified for this removal action are:

- Safe Drinking Water Act (SDWA), 40 USC Section 300, Maximum Contaminant Levels (MCLs) for public drinking water supplies are relevant and appropriate for protecting groundwater.

- Model Toxics Control Act (MTCA) (70.105D RCW) and MTCA Cleanup Regulations, Chapter 173-340 WAC, establishes risk -based cleanup levels that are applicable for establishing cleanup levels for metal and organic contaminants in soil, structures, ground water, surface water, and debris.

- Clean Water Act, 33 USC Section 1251, for Protection of Aquatic Life are applicable for protecting the Columbia River.

- Water Quality Standards for Waters of the State of Washington, Chapter 173-201-035 WAC are applicable for protecting the Columbia River.

- National Primary and Secondary Ambient Air Quality Standards, 40 CFR Part 50, are applicable due to potential airborne emissions of particulates or lead during excavation, treatment, transportation, or disposal of hazardous materials.

- National Emission Standards for Hazardous Air Pollutants, 40 CFR part 61, are applicable for radionuclide emissions from facilities owned and operated by USDOE. Radionuclides are presented in the contaminated soils, structures and debris that will be excavated, treated, transported and disposed under this interim action.

- Clean Air Act (42 U.S.C. 7401, et seq.) and "National Emissions Standards for Hazardous Air Pollutants" (40 CFR 61 Subparts H and M). Applicable to removal activities that will result in airborne emissions of hazardous air pollutants, including prohibitions on radionuclide emissions that would result in an effective offsite dose equivalent of 10mrem/year and visible emissions from asbestos-handling activities.

- State of Washington Hazardous Waste Management Act (70.105 RCW) and Dangerous Waste Regulations, Chapter 173-303 WAC are applicable for the identification, treatment, storage, and land disposal of hazardous and dangerous wastes.

- RCRA Subtitle C (40 CFR Parts 261, 264, 268) are applicable for the identification, treatment, storage, and land disposal of hazardous wastes.

- U.S. Department of Transportation Requirements for the Transportation of Hazardous Materials (49 CFR Parts 100 to 179) will be applicable for any wastes that are transported offsite.

- Hazardous Materials Transportation Act (49 USC 1801-1813) is applicable for transportation of potentially hazardous materials, including samples and wastes.

- Minimum Standards for Construction and Maintenance of Wells (Chapter 173-160 and 162 WAC) applicable regulations for the location, design, construction, and abandonment of water supply and resource protection wells.

- Toxic Substances Control Act (15 U.S.C. 2601) implemented via 40 CFR 761. Applicable to the management and disposal of remediation waste containing regulated concentrations of polychlorinated biphenyls (PCBs), including specific requirements for PCB remediation waste.

- Nuclear Energy and Radiation Act (70.98 RCW) and State of Washington, Department of Health's "Radiation Protection + Air Emissions" WAC 246, 247 is applicable to removal activities that will result in airborne emissions of radionuclides, including requirement for best available radionuclide control technology (BARCT).

- "Emission Limits for Radionuclides" (WAC 173-480). Applicable to removal activities that will result in air emissions of radionuclides from specific sources.

- National Archeological and Historical Preservation Act (16 USC Section 469); 36 CFR Part 65, is applicable in order to recover and preserve artifacts in areas where an action may cause irreparable harm, loss, or destruction of significant artifacts.

- Native American Graves Protection and Repatriation Act (25 USC 3001) is applicable to any sites should Native American remains be found.

- National Historic Preservation Act (16 USC 470, *et. seq.)*; 36 CFR Part 800, is applicable in order to preserve historic properties controlled by a federal agency.

- Endangered Species Act of 1973 (16 USC 1531, *et. seq.*); 50 CFR Part 200; 50 CFR 402, is applicable in order to conserve critical habitat upon which endangered or threatened species depend. Consultation with the Department of the Interior is required.

Other Criteria, Advisories, or Guidance to be Considered for this Interim Removal Action (TBCs)

- EPA Memorandum, *Establishment of Cleanup Levels for CERCLA Sites with Radioactive Contamination* (Office of Solid Waste and Environmental Remediation [OSWER] Directive No. 9200.4-18). Provides EPA guidance that cleanup of radionuclides in soil to 15 mrem/yr above natural background is generally considered protective under CERCLA.

- *Environmental Restoration Disposal Facility Waste Acceptance Criteria,* BHI-00319, Rev. 3. Delineates primary requirements including regulatory requirements, specific isotopic constituents and contamination levels, the dangerous/hazardous constituents and concentrations, and the physical/chemical waste characteristics that are acceptable for disposal of wastes at the ERDF.

- 59 FR 66414. Radiation Protection Guidance for Exposure to the General Public. EPA protection guidance recommending (non-medical) radiation doses to the public from all sources and pathways to not exceed 100 mrem/year above background. It also recommends that lower dose limits be applied to individual sources and pathways. One such individual source is residual environmental radiation contamination after the cleanup of a site. Lower doses limits and individual pathways are referred to as secondary limits.

- EPA, 1995, Record of Decision, U.S. Department of Energy Hanford Environmental Restoration Disposal Facility, Hanford Site, Benton County, Washington, U.S. Environmental Protection Agency Richland, Washington.

- EPA, 1997, Amendment to the Interim Remedial Action Record of Decision for the 100-BC-1, 100-DR-1, and 100-HR-1 Operable Units, Hanford Site, Benton County, Washington, April 1997, U.S. Environmental Protection Agency, Region 10, Seattle, Washington.

- EPA, 1999, Record of Decision for the 100 Area Remaining Sites, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Richland, Washington.

5. Project Schedule

This removal action will begin upon approval of this Action Memorandum and the Removal Action Workplan. This Action Memorandum requires USDOE to submit the following reports/documents to Ecology for review and approval:

- Removal Action Workplan that documents USDOE compliance with CERCLA ARARs. The Workplan will also include a Waste Management Plan. The Workplan must be submitted to Ecology by October 31, 2000, and USDOE must receive Ecology approval prior

to initiating any demolition work.

- A Sampling and Analysis Plan for waste and soil characterization and disposal by March 31, 2001.

- Any Treatment Plans, if waste treatment is required, prior to disposal in ERDF.

- Final Cleanup Verification Packages within one hundred and eighty (180) days after sampling is completed.

- A final report within one hundred and eighty (180) days after the completion of the removal action. The final report will include the cleanup verification package results and all decisions based upon that data.

VI. EXPECTED CHANGE SHOULD ACTION BE DELAYED OR NOT TAKEN

The expected change to the 105-D and 105-H Reactor Facilities and Ancillary Facilities, should action be delayed, or no action taken, would be that the facilities would remain in their current configuration. Because the facilities are contaminated and would continue to deteriorate rapidly there would be an increasing potential that a release could expose site workers or members of the public to hazardous substances over time.

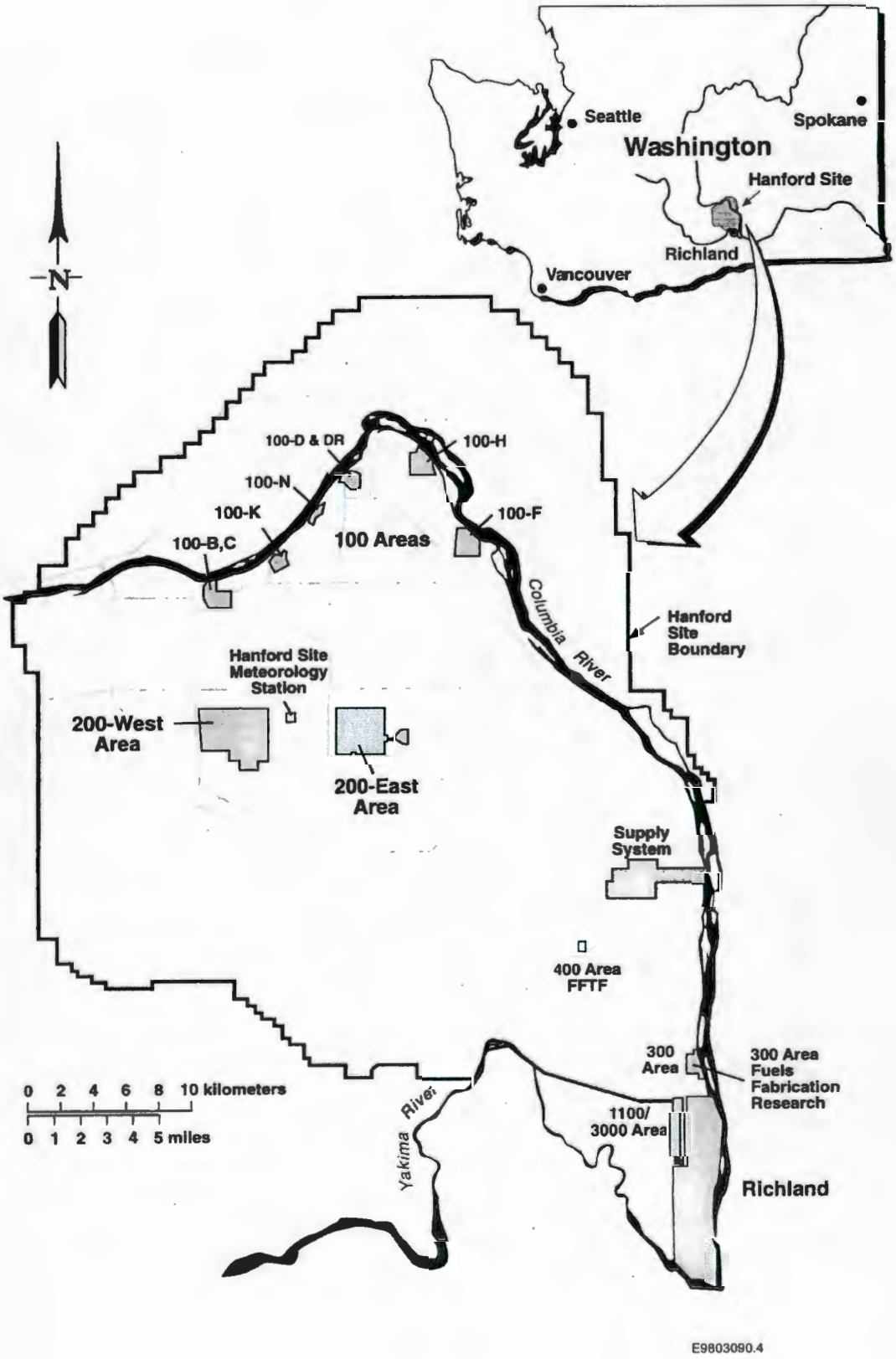
VII. OUTSTANDING POLICY ISSUES

Severe weather conditions can create facility conditions amenable to radiological releases, and deterioration of this facility can lead to eventual collapse. These conditions, accompanied by minimum surveillance efforts, could result in an unplanned release and represent a significant safety challenge and risk. Funding for this action is a priority and should continue until project completion.

VIII. RECOMMENDATION

USDOE and Ecology recommend Alternative 2, "Decontamination and Demolition, Interim Safe Storage" as the preferred alternative to be implemented for the 105-D and 105-H Reactor Facilities and Ancillary Facilities.

Figure 1. Hanford Site Map



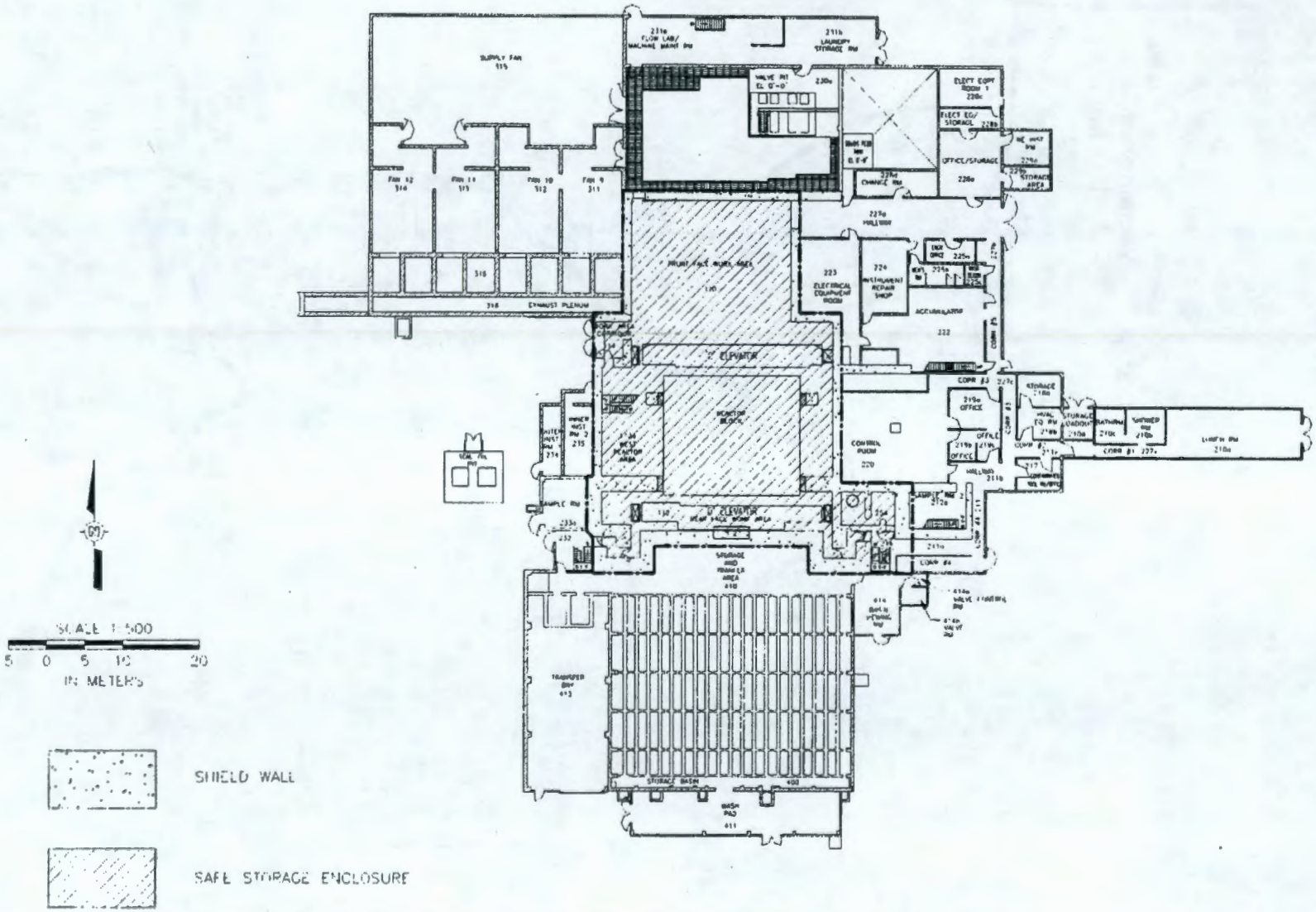


Figure 2. 105-D Facility Identifying the Safe Storage Enclosure Area

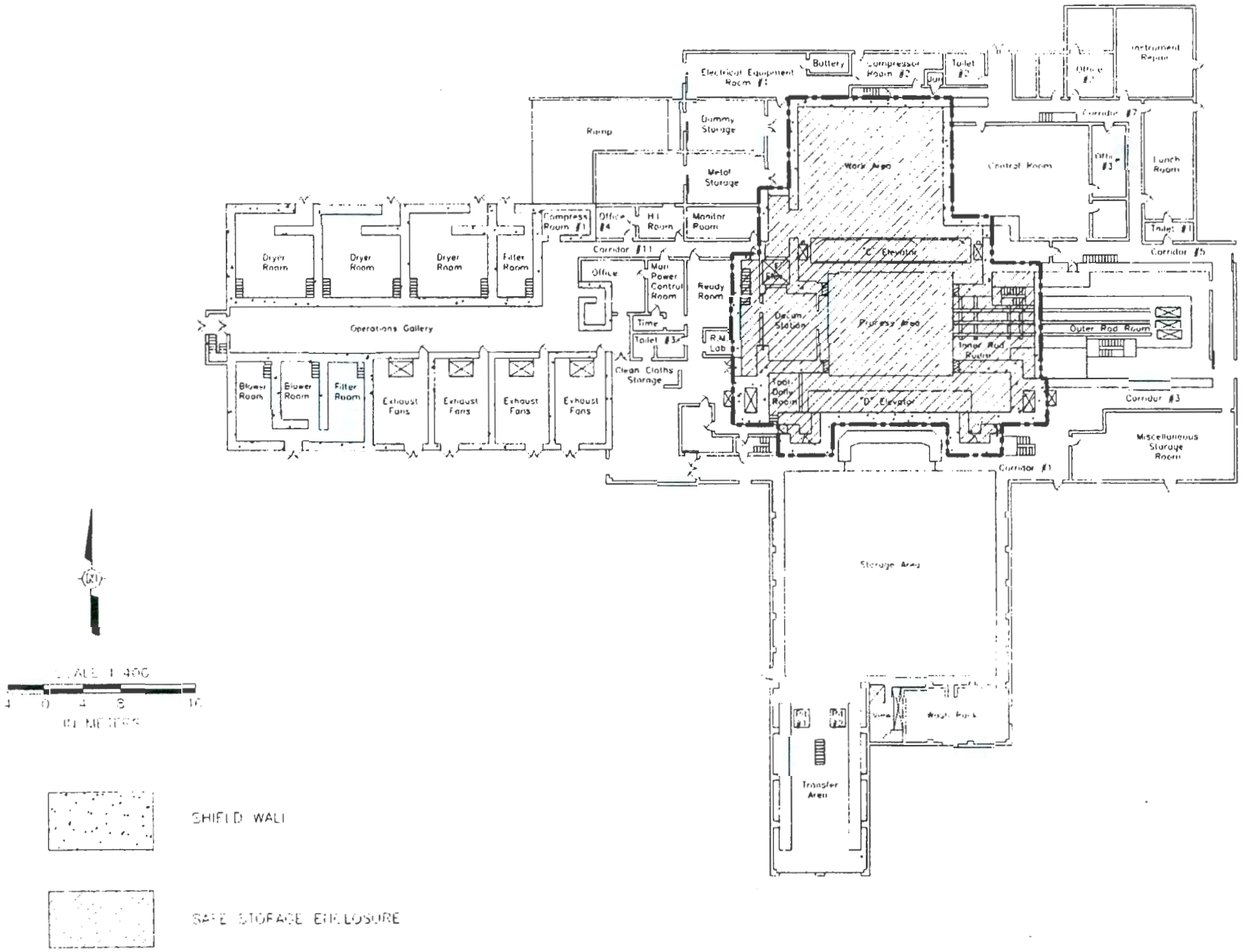


Figure 3. 105-H Facility Identifying the Safe Storage Enclosure Area

Table 1. Cost Estimates for Alternative Two - Decontamination and Demolition of the 105-D Facility Followed by Interim Safe Storage of the 105-D Facility and Long-Term Surveillance and Maintenance; and Decontamination and Demolition of Ancillary Facilities[a].

Facility	Estimated Cost ($)
Interim Safe Storage of the 105-D Facility	
Sampling and analysis[b]	350,000
Engineering[c]	200,000
Construction[d]	11,527,000
Equipment/materials[e]	1,390,000
Waste disposal[f,g] = 5,106 m^3	701,000
Fuel Basin structure removal to 4.6 m below surrounding grade[h]	
Decontamination and demolition	1,193,000
Waste disposal[g, f] = 1,843 m^3	253,000
Post-construction surveillance and maintenance[i]	336,000
Subtotal	**$15,950,000**
103-D Unirradiated Fuel Element Storage Facility[j]	
Decontamination and demolition	469,000
Waste disposal (approximately 78 m^3)	11,000
Subtotal	**$480,000**
190-DR Process Water Pumphouse[j]	
Decontamination and demolition	5,340,000
Waste disposal (approximately 8,003 m^3)	1,100,000
Subtotal	**$6,440,000**
Grand Total	**$22,870,000**

[a]Cost estimate for decontamination and demolition (D&D) of the 105-D Facility does not include costs required for preparation for transport and disposal of the 105-D Reactor block.

[b]Sampling and analysis: Costs associated with sample planning (e.g., data quality objectives and characterization plan), preparation, collection, and analysis. This activity provides pre-engineering information to assist in D&D planning and waste disposition planning.

[c]Engineering: Costs associated with all up-front engineering. Activity to include documentation associated with *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* planning, engineering evaluation/cost analysis, hazard classification, removal action work plan, etc.

[d]Construction: Costs associated with the actual demolition and safe storage of the reactor. This activity includes the demolition and the subcontract and other field support activities, as well as continued engineering in support of the safe storage.

[e]Equipment and materials: Costs associated with the procurement of materials and the rental/lease of heavy equipment. Activity will cover all costs of equipment and materials starting from the pre-engineering walkdowns through the final site restoration activities.

[f]Waste disposal volume estimates were derived from actual waste volume shipments from interim safe storage of the 105-C Reactor. The waste volumes do not delineate between waste type (e.g., low level or mixed) because it is assumed that all of the waste will meet the Environmental Restoration Disposal Facility (ERDF) waste acceptance criteria.

[g]Disposal cost assumptions: Disposal of low-level radioactive, dangerous, and mixed wastes at the ERDF at $137.33/$m^3$ ($105/$yd^3$). Includes all direct and indirect costs and cost of transportation from area to ERDF.

[h]Removal of complete basin structure additional waste would increase cost by $581,920.

[i]Surveillance and maintenance assumptions:

80 hours/year x $40/hour x 75 years	=	$240,000
160 hours x $40/hour x (75 years/5)	=	$96,000
for a total of		$336,000

[j]Estimated cost for D&D was obtained from the long-range plan document (DOE-RL 1998b), which used the Micro Computer-Aided Cost Estimating System (MCACES) model. Additional waste quantities were added to the estimates (also using the MCACES model), assuming 20% of the structure and its internals needed to be disposed at the ERDF.

Table 2. Cost Estimates for Alternative Two - Decontamination and Demolition of the 105-H Facility followed by Interim Safe Storage of the 105-H Facility and Long-Term Surveillance and Maintenance; and Decontamination and Demolition of Ancillary Facilities[a].

Facility	Estimated Cost ($)
Interim Safe Storage of the 105-H Facility	
Sampling and analysis[b]	350,000
Engineering[c]	200,000
Construction[d]	12,567,000
Equipment/materials[e]	1,990,000
Waste disposal[f,g]= 5,106 m^3	701,000
Fuel Storage Basin	
Removal of soil from top 5.2 m	683,000
Removal of remaining debris/equipment and demolition of basin	4,126,000
Waste disposal (3,576 m^3)	491,000
Post-construction surveillance and maintenance[h]	336,000
Subtotal	**$21,444,000**
1713-H Warehouse[i]	
Decontamination and demolition	1,600,000
Waste disposal (approximately 623 m^3)	100,000
Subtotal	**$1,700,000**
1720-HA Arsenal[i]	
Decontamination and demolition	209,000
Waste disposal (approximately 25 m^3)	3,000
Subtotal	**$212,000**
Grand Total	**$23,356,000**

[a]Cost estimate for decontamination and demolition (D&D) of the 105-H Facility does not include costs required for preparation for transport and disposal of the reactor block.

[b]Sampling and analysis: Costs associated with sample planning (e.g., data quality objectives and characterization plan), preparation, collection, and analysis. This activity provides pre-engineering information to assist in D&D planning and waste disposition planning.

[c]Engineering: Costs associated with all up-front engineering. Activity to include documentation associated with CERCLA planning, engineering evaluation/cost analysis, hazard classification, removal action work plan, etc.

[d]Construction: Costs associated with the actual demolition and safe storage of the reactor. This activity includes the demolition and the subcontract and other field support activities, as well as continued engineering in support of the safe storage.

[e]Equipment and materials: Costs associated with the procurement of materials and the rental/lease of heavy equipment. Activity will cover all costs of equipment and materials starting from the pre-engineering walkdowns through the final site restoration activities.

[f]Waste disposal volume estimates were derived from actual waste volume shipments from interim safe storage of the 105-C Reactor. The waste volumes do not delineate between waste type (e.g., low level or mixed) because it is assumed that all of the waste will meet the Environmental Restoration Disposal Facility (ERDF) waste acceptance criteria.

[g]Disposal cost assumptions: Disposal of low-level radioactive, dangerous, and mixed wastes at the ERDF at $137.33/$m^3$ ($105/$yd^3$). Includes all direct and indirect costs and cost of transportation from area to ERDF.

[h]Surveillance and maintenance assumptions:

80 hours/year x $40/hour x 75 years	=	$240,000
160 hours x $40/hour x (75 years/5)	=	$96,000
for a total of		$336,000

[i]Estimated cost for D&D was obtained from the long-range plan document (DOE-RL 1998b), which used the Micro Computer-Aided Cost Estimating System (MCACES) model. Additional waste quantities were added to the estimates (also using the MCACES model), assuming 20% of the structure and its internals needed to be disposed at the ERDF.

Table 3. Cost Estimates for Alternative Three – Long-Term Surveillance and Maintenance Followed by Decontamination and Demolition of the Ancillary Facilities and the 105-D Facility[a].

Facility	Estimated Annual Cost ($)	Estimated Cost ($) for Life Span
Surveillance and Maintenance		
105-D Facility[b]	100,000	7,500,000
103-D Unirradiated Fuel Element Storage Facility[c]	7,000	126,000
190-DR Process Water Pumphouse[c]	43,000	774,000
Subtotal	**$150,000**	**$8,400,000**
Roof Replacement on Reactor Building		
One time each 20 years	395,000	--
Roof waste disposal = 1,053 m^3	145,000	--
One time every 20 years (sum of replacement and disposal)	540,000	--
Four times per 75-year life span **(Subtotal)**		**$2,160,000**
Decontamination and Demolition		
105-D Facility[e]	--	480,000
190-DR Process Water Pumphouse[d]	--	6,440,000
103-D Unirradiated Fuel Element Storage Facility[d]	--	13,100,000
Subtotal	--	**$20,020,000**
Grand Total	--	**$30,580,000**

[a]Cost estimate for decontamination and demolition (D&D) of the 105-D Facility does not include costs required for preparation for transport and disposal of the 105-D Reactor block.
[b]Cost estimate for a life span of 75 years.
[c]Cost estimate for a life span of 18 years.
[d]Cost estimates are derived from the interim safe storage cost for 105-D (Table 1) and subtracting $2,500,000, which is the estimated cost for construction of the safe storage enclosure, and $336,000 for post-construction surveillance and maintenance.
[e]Cost estimates are the D&D and waste volume costs quoted in present-worth dollars (Table 1).

Table 4. Cost Estimates for Alternative Three – Long-Term Surveillance and Maintenance Followed by Decontamination and Demolition of the Ancillary Facilities and the 105-H Facility[a].

Facility	Estimated Annual Cost ($)	Estimated Cost ($) for Life Span
Surveillance and Maintenance		
105-H Facility[b]	100,000	7,500,000
1713-H Warehouse[c]	12,000	216,000
1720-HA Arsenal[c]	1,000	18,000
Subtotal	**$113,000**	**$7,734,000**
Roof Replacement on Reactor Building		
One time each 20 years	395,000	--
Roof waste disposal = 1,053 m^3	145,000	--
One time every 20 years (sum of replacement and disposal)	540,000	--
Four times per 75-year life span **(Subtotal)**		**$2,160,000**
Decontamination and Demolition		
105-H Facility[e]	--	1,700,000
1720-HA Arsenal[c]	--	212,000
1713-H Warehouse[d]	--	18,600,000
Subtotal	--	**$20,512,000**
Grand Total	--	**$30,406,000**

[a]Cost estimate for decontamination and demolition (D&D) of the 105-H Facility does not include costs required for preparation for transport and disposal of the 105-H Reactor block.
[b]Cost estimate for a life span of 75 years.
[c]Cost estimate for a life span of 18 years.
[d]Cost estimates are derived from the interim safe storage cost for 105-H (Table 2) and subtracting $2,500,000, which is the estimated cost for construction of the safe storage enclosure, and $336,000 for post-construction surveillance and maintenance.
[e]Cost estimates are the D&D and waste volume costs quoted in present-worth dollars (Table 2).

Signature sheet for the USDOE Hanford Action Memorandum covering the 105-D and 105-H Reactor Facilities and Ancillary Facilities. This action is between the United States Department of Energy and the Washington State Department of Ecology.

Keith A. Klein
Manager, Richland Operations Office
United States Department of Energy

12/8/00
Date

RECEIVED
DEC 19 2000
Department of Ecology
NWP-Kennewick

Signature sheet for the USDOE Hanford Action Memorandum covering the 105-D and 105-H Reactor Facilities and Ancillary Facilities. This action is between the United States Department of Energy and the Washington State Department of Ecology.

Michael A. Wilson
Program Manager, Nuclear Waste Program
Washington State Department of Ecology

11/6/00
Date

RECEIVED

DEC 19 2000

Department of Ecology
NWP-Kennewick

Appendix
A

Public Comment Resolution – EE/CA's for ISS of D and H Reactors

Comment from:

Gordon Rogers
Public at Large Seat, Hanford Advisory Board
1108 N Road 36
Pasco, WA 99301

Comment:

"…. I support the preferred alternative for cleanup of these facilities."

Resolution:

None Required

Comment from:

Nez Perce Tribe's Environmental Restoration and Waste Management (ERWM) PO Box 365
Lapwai, ID 83540-0365

Comments:

1) ERWM concurs with the preferred cleanup actions recommended in the documents,…
2) The ERWM would strongly suggest not to preclude demolishing and removing the shield wall and reactor blocks sometime in the future as new technologies become available. A true restoration of the land would remove all evidence of these facilities.
3) We (ERWM) also suggest that a mitigation and/or revegetation plan be written to restore this disturbed area with native grass, forbs, and shrubs.

Resolution:

1) None Required
2) The design of the ISS Project scope and the SSE weather enclosure were specifically chosen to not preclude the full piece removal option as discussed in the Eight Reactor Environmental Impact Statement (EIS) and the Record of Decision for this EIS. Both of these documents are referenced in the EE/CA's.
3) A Revegetation Plan will be developed and implemented following full piece removal of the reactor blocks. This work is outside the scope of the ISS Project, but will be part of the final removal action. A gravel, vegetation free, fire barrier must be maintained around the SSE to preclude range fire impact to the facility during the ISS period.

Comments from:

Alton Haymaker
1721 Cottonwood Drive
Pasco, WA 99301

Comments:

I am in favor of moving the reactor blocks NOW to higher ground, for several reasons:

1) Future Budget
2) Future unknown geology regarding stability of fault lines and Columbia River Dams.

Comment Resolution:

1) The budget to perform the reactor block removal work will be programmed by USDOE to meet the requirements of the Record of Decision for the Eight Surplus Reactors.
2) The design of the ISS Project scope and the SSE weather enclosure are to partially implement the preferred alternative in the Eight Reactor Environmental Impact Statement (EIS) and the resultant Record of Decision for this EIS (i.e., long term storage with eventual full piece removal). The remaining SSE is designed to withstand the maximum anticipate earthquake in the area. The overall risk regarding the 75-year storage period was evaluated as part of the EIS and found to be acceptable.