0049444

ACTION MEMORANDUM
July 1998

SITE NAME AND LOCATION

USDOE Hanford 100 Area National Priorities List (NPL)
105-F and 105-DR Reactor Buildings and Ancillary Facilities
Hanford Site
Benton County, Washington

I. STATEMENT OF BASIS AND PURPOSE

The purpose of this Action Memorandum is to document approval of the proposed non-time critical removal action described herein for the105-F and 105-DR Reactor Buildings and Ancillary Facilities, USDOE Hanford Site, Benton County, Washington.

This removal action is to reduce risks to human health, the environment, and site workers by minimizing the potential for release of hazardous substances from the 105-F Reactor Building, 105-DR Reactor Building, and four Ancillary Facilities. The Ancillary Facilities are the 116-D Exhaust Air Stack, 116-DR Exhaust Air Stack, 117-DR Exhaust Filter Building, and 119-DR Exhaust Air Sample Building. Within the 105-DR Reactor Building proper, resides the 105-DR Large Sodium Fire Facility treatment, storage, and disposal (TSD) unit, which will also be addressed through the removal action.

This Action Memorandum has been developed in accordance with and under the authority of the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA), as amended by the *Superfund Amendments and Reauthorization Act* (SARA), and to the extent practicable the *National Contingency Plan* (NCP). This decision is based on the Administrative Record for the site.

A public comment period was held from May 18, 1998 through June 18, 1998 on the U.S. Department of Energy's (USDOE) report entitled E*ngineering Evaluation/Cost Analysis for the 105-DR and 105-F Reactor Facilities and Ancillary Facilities (DOE/RL –98-23, Rev. 0)*. Comments received support the proposed removal action. Responses to comments are contained in the Administrative Record for the 100-FR-1 and 100-DR-2 Operable Units.

Disposition of the 105-DR and 105-F Reactor Buildings is being conducted pursuant to Section 8 of the *Hanford Federal Facility Agreement and Consent Order, Revision 4*, and under the authority of CERCLA. The 116-D Exhaust Air Stack and 119-DR Exhaust Air Sample Building are designated as CERCLA past practice units, and disposition is pursuant to CERCLA. The TSD unit and the two Ancillary Facilities located within the TSD unit boundary (116-DR Exhaust Air Stack, 117-DR Exhaust Filter Building) are addressed pursuant to the approved TSD Closure Plan.

II. BACKGROUND AND FACILITY DESCRIPTIONS

A. Background

The Hanford Site occupies approximately 560 square miles of southeastern Washington State north of the confluence of the Yakima and Columbia Rivers (Figure 1). In November 1989, the 100, 200, 300, and 1100 Areas of the Hanford Site were placed on the NPL. Specifically, the facilities identified in this Action Memorandum reside in the 100 Area NPL, adjacent to the Columbia River. The 105-DR Reactor Building, 116-D Exhaust Air Stack, 116-DR Exhaust Air Stack, 117-DR Exhaust Filter Building, 119-DR Exhaust Air Sample Building, and 105-DR Large Sodium Fire Facility TSD unit are within the 100-D/DR Area (Figure 2). The Washington State Department of Ecology (Ecology) is the lead regulatory agency for facilities in the 100-D/DR Area. Located within the 100-F Area is the 105-F Reactor Building (Figure 3). The U.S. Environmental Protection Agency (EPA) is the lead regulatory agency for facilities in the 100-F Area.

An Environmental Impact Statement (EIS) was issued for the eight 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 USDOE 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 action selected in this Action Memorandum is a necessary prerequisite for the eventual one-piece removal of the cores.

B. General Facility Descriptions

1. **105-F and 105-DR Reactor Buildings:** Each of the Reactor Buildings is similar in design and construction. Both reactors are water-cooled, single pass, graphite moderated, and plutonium production reactors. Each building contains a reactor core, reactor control room, fuel storage basin, spent-fuel discharge area, shield walls, ventilation room, battery/switchgear room, support offices, shops, and laboratories (Figures 4 and 5). The 105-DR reactor operated from 1950 to 1964, while the 105-F reactor operated from 1945 to 1965. In general, the construction of the reactor facilities contains thick reinforced concrete walls that can measure up to 5 feet thick. Concrete block was also used where shielding was not necessary. Overall dimensions of the Reactor Building are 250 feet long, 230 feet wide, and 95 feet tall.

   The condition of the fuel storage basins is different in 105-F and 105-DR Reactor Buildings. In the 105-F fuel basin, 2 feet of water remains along with sediment, sludge, and miscellaneous debris. Additionally, fuel fragments may be in the residual sediment. In contrast, the 105-DR fuel basin is drained, cleaned of debris, and has a fixative on much of the surfaces.

Contained within the 105-DR Reactor Building proper is the 105-DR Large Sodium Fire Facility TSD unit (Figure 6). This facility was a research laboratory for studying the behavior of molten alkali metals, alkali metal fires, and storage of alkali metal waste. Operations started in 1972 and were discontinued in 1986. In 1995, some areas of this facility were cleaned and certified clean closed in 1996 pursuant to an approved Closure Plan. Additional areas in the facility require cleanup that will be addressed while performing the 105-DR Reactor Building decontamination and demolition.

Although the 105-DR Large Sodium Fire Facility TSD unit is mentioned in the EE/CA, the EE/CA did not include evaluating alternatives for determining the appropriate action for this TSD unit. The TSD unit has already been included in the Hanford Facility Site-Wide Resource Conservation and Recovery (RCRA) Permit in the 1995 Modification A' (Revision 2). The Permit specifies clean closure in accordance with the approved Closure Plan entitled *105-DR Large Sodium Fire Facility Closure Plan, DOE/RL-90-25, Revision 2*, and that portions of the TSD unit cleanup would be deferred and coordinated with the 105-DR Reactor Building demolition. Cleanup of the remaining portions of the TSD under this action is expected to satisfy the approved closure requirements. Public hearings were supportive of the clean closure.

Waste disposal from the TSD unit shall be in accordance with the Closure Plan and this Action Memorandum. The Environmental Restoration Disposal Facility (ERDF) can be utilized for disposal of waste from TSD units based on the Explanation of Significant Difference to the ERDF Record of Decision, which authorized the acceptance of inactive TSD waste provided the waste acceptance criteria for ERDF is met and a CERCLA decision document is in place. This Action Memorandum constitutes the CERCLA decision document.

2. **116-D Exhaust Air Stack:** Located south of the 105-D Reactor Building, this 200 foot tall reinforced concrete structure allowed for the discharge of exhaust air from the 105-D Reactor Building to the atmosphere. Air first passed through a filter prior to entering the exhaust stack. Radioactive and hazardous contamination exists within the interior of the structure. Some piping may be insulated with asbestos material. The air stack is a CERCLA past practice unit.

3. **116-DR Exhaust Air Stack:** Located south of the 105-DR Reactor Building, this 200 foot tall reinforced concrete structure allowed for the discharge of exhaust air from the 105-DR Reactor Building as well as the 105-DR Sodium Fire Facility TSD unit. The exhaust stack is within the TSD unit. Radioactive and hazardous contamination exists within the interior of the structure. Some piping may be insulated with asbestos material.

4. **117-DR Exhaust Filter Building:** Located south of the 105-DR Reactor Building, this 59 feet long, 39 feet wide, and 35 feet high reinforced concrete structure housed the filtration system for air discharged from the 105-DR Reactor Building and TSD unit. Filtered air would then be directed to the 116-DR Exhaust Air Stack. The filter building is within the TSD unit. The quantity of radioactive and hazardous contamination is unknown, and asbestos materials may have been used in the construction.

5. **119-DR Exhaust Air Sample Building:** Located south of the 105-DR Reactor Building, this 360 square foot prefabricated, metal building housed most of the instrumentation for sampling the discharged air. The air sample building is a CERCLA past practice unit. The quantity of radioactive and hazardous contamination is unknown, and asbestos materials may have been used in the construction.

The facilities described above are aging and continue to degrade more rapidly each year. Surveillance and Maintenance (S&M) continues to the extent practicable to minimize potential harm to site workers and releases to the environment. The primary contaminants of concern are polychlorinated biphenyl (PCB), lead, mercury, used oil, asbestos, sodium dichromate, cadmium, chromium, and multiple radioactive contaminants which are hazardous substances as defined by section 101 (14) of CERCLA.

III. THREAT TO PUBLIC HEALTH/WELFARE/ENVIRONMENT

The facilities addressed in this Action Memorandum are known to be contaminated with hazardous waste constituents. A potential threat exists to human health and the environment through the deterioration of the buildings which could result in a release of hazardous constituents to the air or soil.

IV. ENDANGERMENT DETERMINATION

Actual or threatened releases of hazardous substances, including radioactive substances, from these facilities, if not addressed by implementing the response action selected in this Action Memorandum, may present an endangerment to public health, welfare, or the environment.

V. ALTERNATIVES AND ESTIMATED COSTS

A. An Engineering Evaluation/Cost Analysis (EE/CA) was prepared in order to develop removal action alternatives for the 105-F Reactor Building, 105-DR Reactor Building, 116-D Exhaust Air Stack, 116-DR Exhaust Air Stack, 117-DR Exhaust Filter Building, and 119-DR Exhaust Air Sample Building. The EE/CA evaluated three alternatives that are briefly discussed below.

1. No Action Alternative

Under the no-action alternative, access to the facilities would be restricted, but no action would occur to address the hazards posed by the facilities. The facilities would continue to deteriorate. Although Hanford Site institutional controls would continue to help prevent personnel or worker entry to the facilities, 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. Long-Term Surveillance and Maintenance (S&M)

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 buildings and 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, safety inspections, ventilation inspections, roof inspections and replacement, and minor structural repairs.

This alternative was not selected because it causes continued risk to workers without sufficiently 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, and roof replacements would be necessary on the reactor buildings every 20 years at a cost of $503,460/reactor. The total cost of this alternative is $64,196,340 (Table 1).

3. Interim Safe Storage, Decontamination and Demolition

Decontamination and demolition shall occur on the 105-F and 105-DR Reactor Buildings up to the reinforced shield walls housing the reactor cores, 116-D Exhaust Air Stack, 116-DR Exhaust Air Stack, 117-DR Exhaust Filter Building, 119-DR Exhaust Air Sample Building, and 105-DR Large Sodium Fire Facility TSD unit. Foundations outside of the shield walls shall be removed. Additionally, structures below-grade shall be removed to a minimum of 3 feet below surrounding grade and the remaining portion can either be removed or left in place. The determination to leave below-grade structures or soil in place will be based on whether cleanup standards for direct exposure and protection of groundwater can be achieved for non-radiological contaminants pursuant to the State of Washington *Model Toxics Control Act* (MTCA), *Washington Administrative Code* (WAC 173-340), Method B. Furthermore, the remaining portion of the below-grade structures and soil containing radioactive contaminants must meet the risk range of 10^{-4} to 10^{-6} above background for direct exposure using the residual radioactivity computer dose model for

soil and buildings. Consistent with this risk range, EPA has considered cancer risk from radiation in a number of different contexts and has concluded that levels of 15 millirem/yr. above background are protective of human health and the environment. Additionally, the risk to groundwater may not exceed 4 millirem (mr)/year from all sources and not exceed the maximum concentration limit (MCL) for groundwater. If any of these factors can not be met, then removal of those portions of the below-grade structures and soils above cleanup levels shall occur. Cleanup of these waste sites shall be such that they meet the rural residential cleanup scenario previously agreed to in the Remedial Design Report/Remedial Action Workplan for the 100 Area. In the event that large volumes of contaminated soil is encountered or removal of contaminated soil inhibits reactor safe storage activities, the removal of contaminated soils may be deferred to the remedial actions program. The decision to defer contaminated soils to the remedial actions program will require concurrence by Ecology and EPA.

All contaminated soil and structures encountered in performing the demolition of the facilities shall be disposed of to an appropriate disposal facility for the purpose of this removal action.

Following decontamination and demolition of the reactor buildings, USDOE shall use the existing shield walls to create a safe storage enclosure, including a new metal roof. The shield walls shall support the roof and the enclosure shall be completely sealed with only one entrance--a door welded shut. A utility room, outside of the safe storage enclosure, shall be used for ventilation controls, air monitoring, and electrical power.

Disposal of waste from this action shall either be sent to ERDF or an EPA approved off-site disposal facility. Treatment of waste may be necessary prior to disposal at ERDF. Should transuranic waste be encountered, storage will be allowed at Hanford's Central Waste Complex (CWC) on a case by case basis and requires EPA/Ecology approval. Liquid waste shall either be sent to Hanford's Effluent Treatment Facility (ETF) or shipped offsite to an EPA approved facility. For any waste streams sent to ETF, USDOE must obtain approval from Ecology.

The total cost of this alternative is $42,095,660 (Table 2).

B. Common Elements

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

CERCLA Section 104(d)(4) states where two or more noncontiguous facilities are reasonably related on the basis of geography, or on the basis of the threat or potential threat to the public health or welfare or the environment, the President may, at his discretion, treat these facilities as one for the purposes of this section. The preamble to the NCP clarifies the stated EPA interpretation that when non-contiguous facilities are reasonably close to one another and wastes at these sites are compatible for a selected

treatment or disposal approach, CERCLA Section 104(d)(4) allows the lead agency to treat these related facilities as one site for response purposes and, therefore, allows the lead agency to manage waste transferred between such non-contiguous facilities without having to obtain a permit. Therefore, the facilities in the 100 Area addressed by this Action Memorandum and the various disposal/storage facilities such as the ERDF, CWC, and ETF, which are in the 200 Area, are considered to be a single site for response purposes under this Action Memorandum.

VI. APPLICABLE, OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARAR'S)

Removal actions shall, to the extent practicable considering the exigencies of the situation, attain applicable or relevant and appropriate requirements under federal and state environmental laws. The selected alternative shall comply with the federal and state ARAR's identified to the extent practicable. The ARAR's identified for this removal action are:

- State of Washington *Model Toxics Control Act*, WAC 173-340, Method B is applicable and specifies that cleanup actions must be protective of human health and the environment, comply with applicable state and federal regulations, and provide for compliance monitoring. The cleanup standards apply to soil, structures, and debris encountered during the removal action. Also, groundwater protection standards apply should contaminated soil or structures remain in place below 15 feet.

- State of Washington "Dangerous Waste Regulations" WAC 173-303 are applicable for dangerous wastes encountered during the removal action. Additionally, this regulation applies for Land Disposal Restricted waste, generator requirements, and transportation of hazardous wastes during the removal action.

- *The Toxic Substances Control Act of 1976* is applicable to the handling and disposal of PCB's should they be encountered during the removal action.

- *Clean Air Act* [40 Code of Federal Regulations (CFR) 61, Subpart M] provides the standards to ensure emissions from asbestos are minimized during collection, processing, packaging, and transportation. These standards are applicable to asbestos and asbestos containing material encountered during the removal action.

- *Clean Air Act* [40 CFR 61, Subpart H] provides the standards to ensure emissions from radionuclides are minimized during collection, processing, packaging, and transportation. These standards are applicable to radionuclides that may be encountered during the removal action to prevent exceeding 10 mrem/year effective dose equivalent to any member of the public.

- "U.S. Department of Transportation Requirements for the Transportation of Hazardous Materials" (49 CFR Parts 100 to 179) are applicable for any wastes transported off the Hanford Site.

- *Hazardous Materials Transportation Act* [40 United States Code (USC) 1801-1813] is applicable for transportation of potentially hazardous materials, including samples and waste.

- *Clean Air Act* (42 USC 7401, et seq.) is applicable to releases of airborne contaminants which may occur during the removal action as well as the air monitoring requirements.

- "Radiation Protection—Air Emissions" (WAC 246-247) are applicable to the release of airborne radionuclides which may occur during the removal action as well as the air monitoring requirements and best available radionuclide control technology.

- "General Regulation for Air Pollution Sources" (WAC 173-400) and "Controls for New Sources of Toxic Air Pollutants" (WAC 173-460) are applicable to the release of toxic air pollutants which may occur during the removal action as well as the air monitoring requirements and best available control technology for toxics.

- *Safe Drinking Water Act* (42 USC.300j-9) and "Maximum Contaminant Levels" (40 CFR 141, Subpart B) are applicable in establishing the cleanup goals of the soil and structures to ensure protection of groundwater.

- *Resource Conservation and Recovery Act (RCRA) - Title 42 USC 6901 et seq., Subtitle C* is applicable regarding the generation, transportation, storage, treatment, and disposal of hazardous waste. Hazardous waste management regulations promulgated pursuant to RCRA are codified at 40 CFR Part 260 through 268.

- *Clean Water Act* (33 USC 1251) standards for protection of aquatic life, and "Water Quality Standards for Surface Waters of the State of Washington" (WAC 173-201) are relevant and appropriate in establishing cleanup goals that are protective of the Columbia River. Additionally, these regulations are relevant and appropriate in protecting the Columbia River from any treatment discharges or storm water runoff resulting from the removal action and TSD unit closure.

- *The National Historic Preservation Act of 1966* (36 CFR 800) requires the preservation or mitigation of historic properties. The 105-DR and 105-F facilities were determined to be eligible for the *National Register of Historic Places*. Therefore, this regulation is applicable.

- *The Archeological Resources Protection Act of 1979* (43 CFR 37) is relevant and appropriate to recover and preserve artifacts in areas where activities may cause irreparable harm, loss, or destruction of significant artifacts.

- *Endangered Species Act of 1973* (50 CFR 402) and WAC 232-12-297 are relevant and appropriate to conserve critical habitat upon which threaten or endangered species depend. Endangered species are present in the 100 Areas of the Hanford Site. Consultation with the Department of the Interior is required.

- *The Native American Graves Protection and Repatriation Act* (25 USC 3001) is relevant and appropriate to consult and notify culturally affiliated tribes and Indian Nations when native American human remains are inadvertently discovered.

1. Other Criteria, Advisories, or Guidance to be Considered

- "Establishment of Cleanup Levels for CERCLA Sites with Radioactive Contamination" (EPA 1997) is an EPA policy that provides guidance on cleanup levels for radioactive contamination at CERCLA sites. Cleanup levels should consider exposure from all pathways, and through all media (e.g., soil, groundwater, surface water, sediment, air, structures, and biota). In addition, a 15 mrem/year, above background, effective dose equivalent is the maximum dose limit for humans. Background shall be determined on a site-specific basis.

- "Environmental Restoration Disposal Facility (ERDF) Waste Acceptance Criteria (Bechtel Hanford Incorporated (BHI 1996) and Supplemental Waste Acceptance Criteria for Bulk Shipments to the Environmental Restoration Disposal Facility" (BHI 1997b) specifies the regulatory requirements, specific isotopic constituents and contamination levels, dangerous/hazardous constituents and concentrations, and physical/chemical waste characteristics that are acceptable for disposal of wastes at the ERDF. ERDF is the primary disposal facility based on cost and protectiveness.

- "Revised Procedures for the Planning and Implementing Off-Site Response Actions" (EPA OSWER 9834.11) provides for EPA approval for all waste shipped off the Hanford Site.

- "Hanford Site Solid Waste Acceptance Criteria" (Westinghouse Hanford Company EP-0063, Revision 4) identifies criteria for acceptance of waste at the Central Waste Complex and Effluent Treatment Facility.

- USDOE Order 5820.2A, *Radioactive Waste Management* provides the requirements for management of low-level radioactive waste and transuranic waste.

- "Radiation Protection Guidance for Exposure to the General Public" [59 Federal Register (FR) 66414] provides EPA protection guidance recommending that non-

medical radiation doses to the public from all sources and pathways not exceed 100 mrem/year above background.

- USDOE Order 451.1A, *National Environmental Policy Act* (NEPA) requires that CERCLA address values of NEPA.

- *Hanford Federal Facility Agreement and Consent Order*

III. OUTSTANDING POLICY ISSUES

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

VIII. SELECTED ALTERNATIVE

Based on overall protection of human health and the environment, effectiveness, implementability, compliance with ARAR's, cost, and community acceptance, the selected removal action alternative is **Alternative #3, "Interim Safe Storage, Decontamination and Demolition"** for the 105-DR Reactor Building, 105-F Reactor Building, 116-D Exhaust Air Stack, 116-DR Exhaust Air Stack, 117-DR Exhaust Filter Building, and 119-DR Exhaust Air Sample Building. Decontamination and demolition of the 105-DR Large Sodium Fire Facility was already approved in 1995 through the Modification A' (Revision 2) of the Hanford Facility Site-Wide RCRA Permit, and will complete clean closure of the TSD unit through the demolition of the 105-DR Reactor Building. Foundations outside of the shield walls shall be removed. Additionally, structures below-grade shall be removed to a minimum of 3 feet below surrounding grade, and the remaining portion can either be removed or left in place. The determination to leave below-grade structures or soil in place will be based on whether cleanup standards for direct exposure and protection of groundwater can be achieved for non-radiological contaminants pursuant to the State of Washington *Model Toxics Control Act* (MTCA), *Washington Administrative Code* (WAC 173-340), Method B. Furthermore, the remaining portion of the below-grade structures and soil containing radioactive contaminants must meet the risk range of 10^{-4} to 10^{-6} above background for direct exposure using the residual radioactivity computer dose model for soil and buildings. Consistent with this risk range, EPA has considered cancer risk from radiation in a number of different contexts and has concluded that levels of 15 millirem/yr above background are protective of human health and the environment. Additionally, the risk to groundwater may not exceed 4 millirem (mr)/year from all sources and not exceed the maximum concentration limit (MCL) for groundwater. If any of these factors can not be met then removal of those portions of the below-grade structures and soils above cleanup levels shall occur. Cleanup of these waste sites will be such that they meet the rural residential cleanup scenario previously agreed to in the Remedial Design Report/Remedial Action Work Plan for the 100 Area.

Disposal of waste from this action will either be sent to ERDF or an EPA approved off-site disposal facility. Treatment of waste may be necessary prior to disposal at ERDF. Should transuranic waste be encountered, storage will be allowed at Hanford's Central Waste Complex (CWC) on a case by case basis, and requires EPA/Ecology approval. Liquid waste shall either be sent to Hanford's Effluent Treatment Facility (ETF) or an EPA approved offsite facility.

This alternative significantly reduces the potential for a release of hazardous and radioactive substances that could adversely impact human health and the environment, is protective of workers, reduces S&M costs, and is consistent with other cleanup actions in the 100 Area.

This decision document was developed in accordance with CERCLA as amended, is consistent with the NCP; and based on the administrative record for the 100-DR-2 and 100-FR-1 Operable Units and the Closure Plan for the 105-DR Large Sodium Fire Facility TSD unit.

IX. PROJECT SCHEDULE AND DELIVERALBES

This removal action will begin in August 1998 and be completed by September 2005. During this period, there are a total of two milestones for the 105-F and 105-DR Reactor Buildings in the *Hanford Federal Facility Agreement and Consent Order.* They are M-93-11, "Complete Interim Safe Storage of the 105-F Reactor Building," by September 2003 and M-93-16-T01, "Complete Interim Safe Storage of the 105-DR Reactor Building," by September 2005.

This Action Memorandum requires USDOE to submit the following reports/documents to EPA/Ecology for review and approval:

- Removal Action Workplan that shall outline how USDOE will comply with the ARAR's, as well as the enforceable schedule for the cleanup of the TSD unit , ancillary buildings demolition, and interim safe storage of the reactor buildings. The Workplan must be approved prior to initiating any removal work. The schedule shall also outline the timeframe for submittal of Sampling and Analysis Plans (SAP's) for characterization and waste disposal, verification SAP's, and the cleanup verification report.

- Sampling and Analysis Plans for characterization and waste disposal. This can be accomplished in phases if necessary.

- Treatment Plans if treatment is necessary prior to waste disposal in ERDF.

- Verification Sampling and Analysis Plans for soil and below-grade structures.

- Cleanup Verification Report

Figure 1 Hanford Site Map

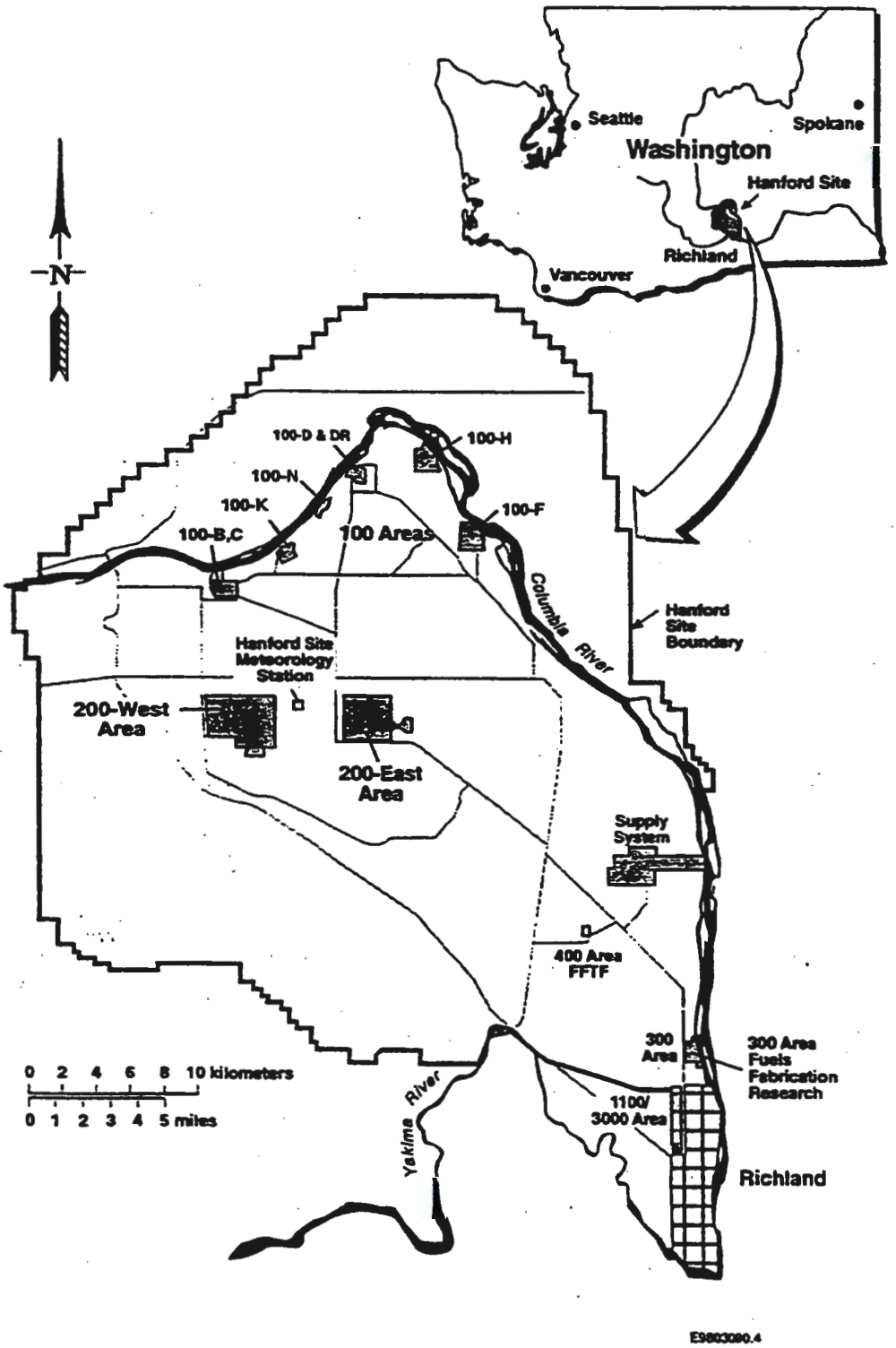

Figure 2 100-D/DR Area

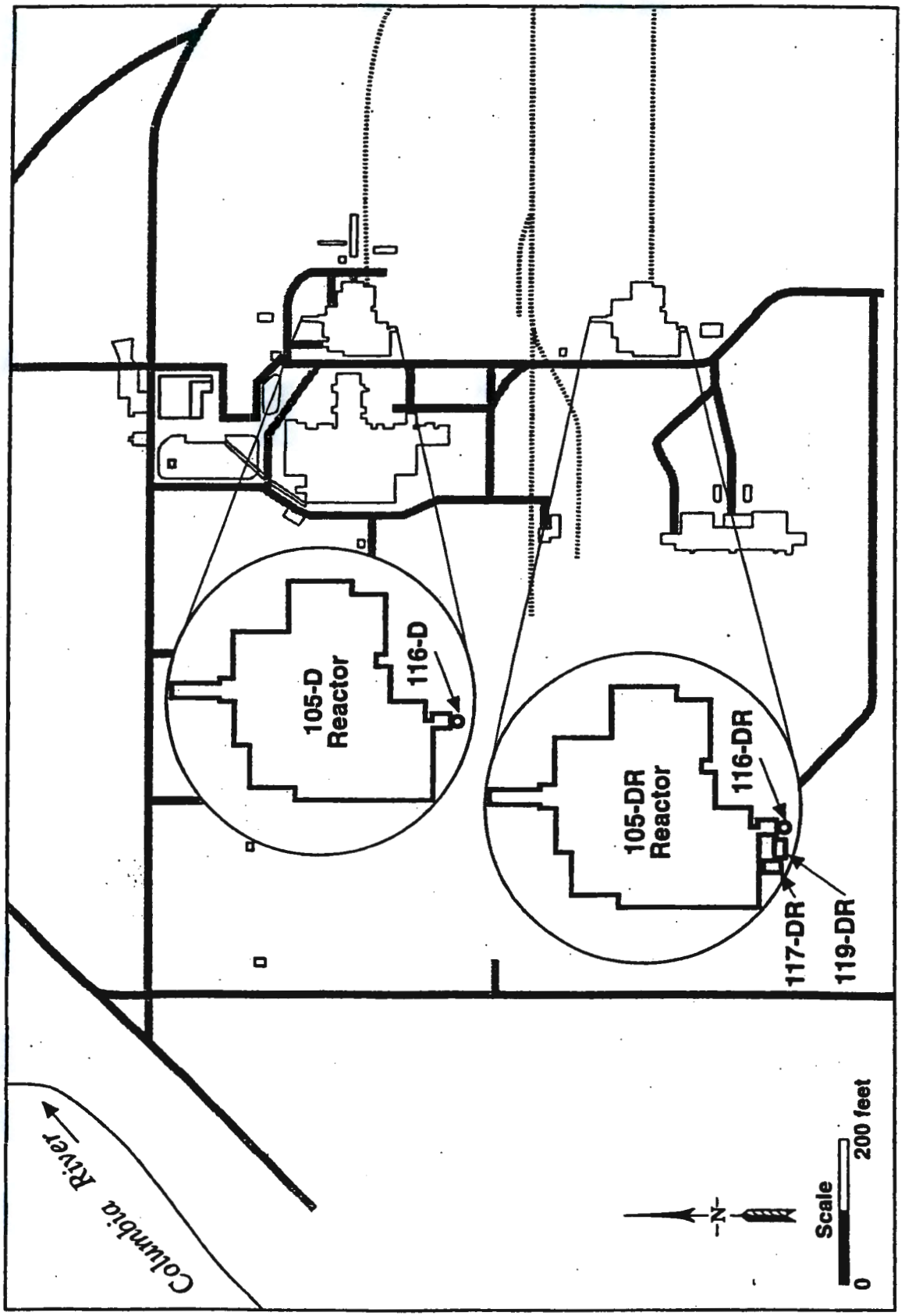

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Figure 3 100-F Area

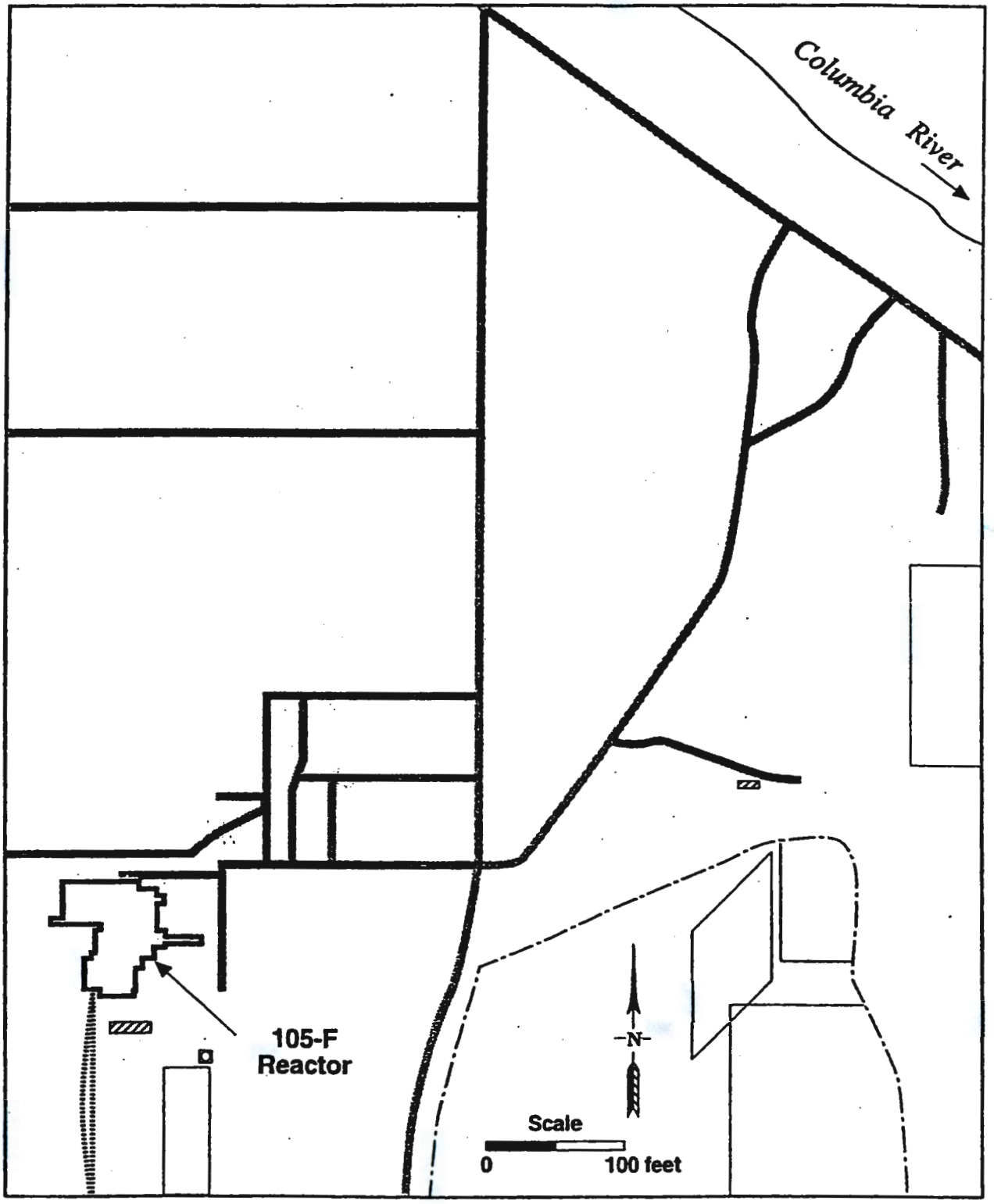

Figure 4 105-DR Facility Identifying the Safe Storage Enclosure Area

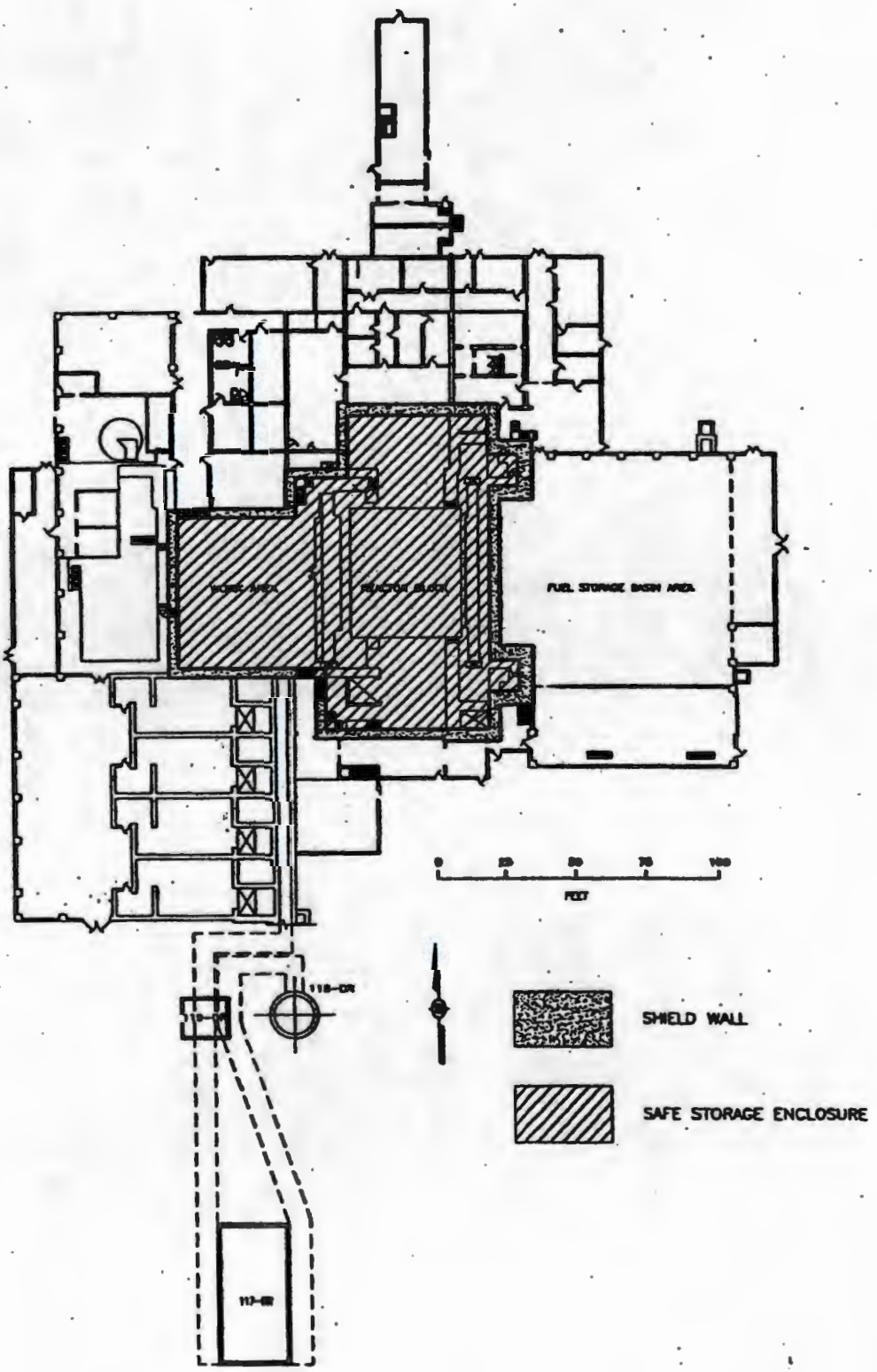

Figure 5 105-F Facility Identifying the Safe Storage Enclosure Area

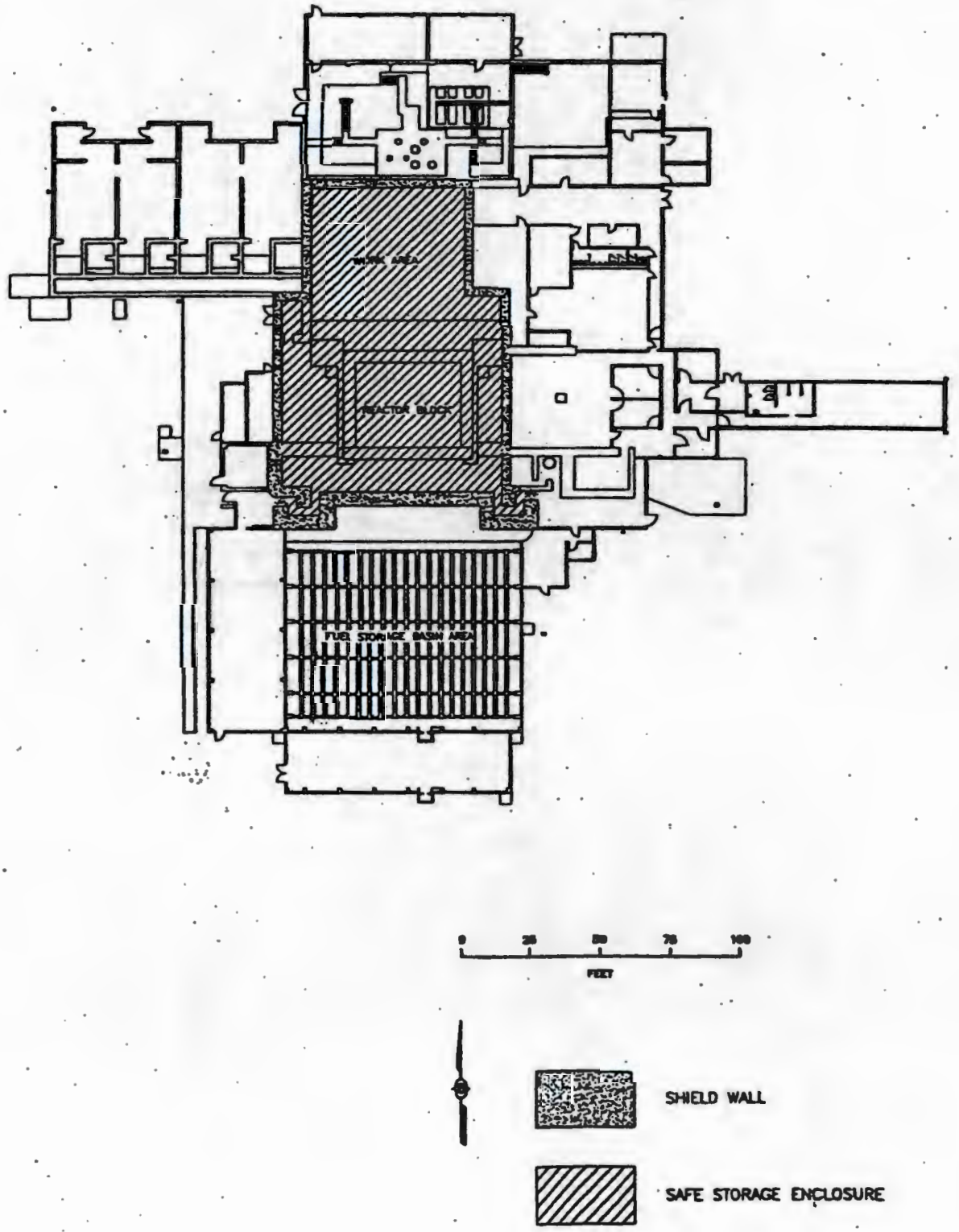

Figure 6 105-DR Large Sodium Fire Facility TSD Unit Boundary

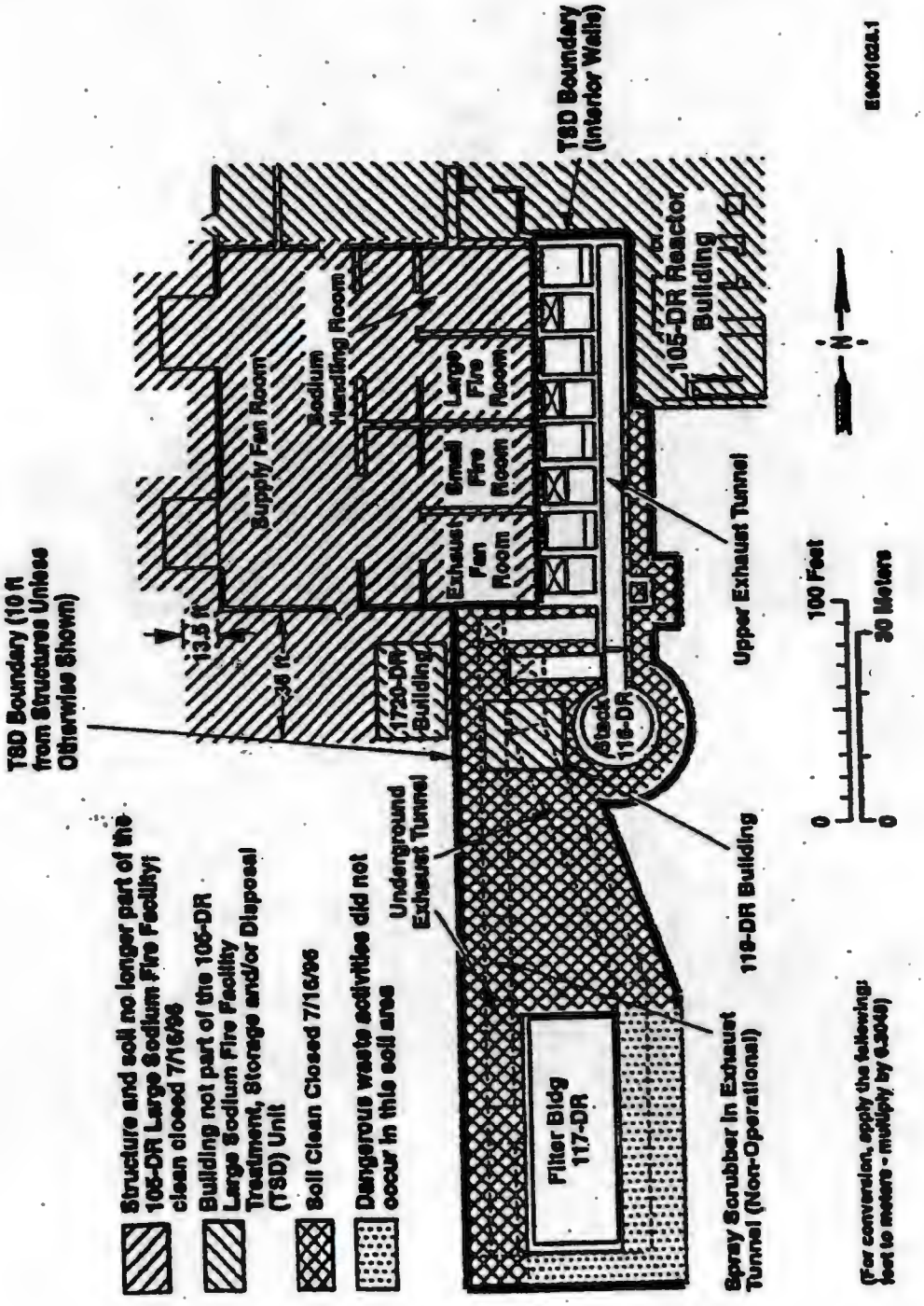

Table 1 Cost Estimates for Alternative Two – Long-Term Surveillance And Maintenance

Facility	Estimated Annual Cost in Dollars	Estimated Cost in Dollars for Life Span of 75 Years
Surveillance and Maintenance		
105-DR Facility	150,000	11,250,000
105-F Facility	150,000	11,250,000
116-D Exhaust Air Stack	2,340	175,500
116-DR Exhaust Air Stack	7,580	568,500
117-DR Exhaust Air Filter Building	3,950	296,250
119-DR Exhaust Air Sample Building	2,730	204,750
Subtotal	**216,600**	**23,745,000**
Roof Replacement on Reactor Buildings		
1 time each 20 years per reactor	395,000	—
Roof Waste Disposal = 1,053 m^3	108,460	—
1 time each 20 years per reactor	503,460	—
Times 2 reactors	1,006,920	—
4 times per 75 year life span **(Subtotal)**		**4,027,680**
Decontamination and Demolition		
116-D Exhaust Air Stack[a]		1,680,170
116-DR Exhaust Air Stack[a]		1,680,170
117-DR Exhaust Filter Building[a]		1,016,250
119-DR Exhaust Air Sample Building[a]		247,070
105-DR Facility[b]		15,350,000
105-F Facility[b]		16,450,000
Subtotal		**36,423,660**
Grand Total		**64,196,340**

[a] Cost estimates are the D&D and waste volume costs at present-day dollars (Table 4-2). Although this alternative assumes D&D to occur at the end of 75 years, the dollars are quoted in present-worth, because of the difficulty in accurately determining the D&D costs in 75 years.

[b] Cost estimates are derived from the ISS cost for 105-DR and 105-F (Table 4-2), and subtracting $2,500,000, which is the estimated cost for construction of the SSE, and $336,000 for post-construction S&M.

Table 2 Cost Estimates for Alternative Three – Interim Safe Storage, Decontamination and Demolition (2 Pages)

Facility	Estimated Cost in Dollars
ISS for 105-DR Facility	
Sampling and Analysis[a]	350,000
Engineering[b]	3,700,000
Construction[c]	10,197,250
Equipment/Materials[d]	1,694,000
Waste Disposal[e, f] = 5106 m^3	525,920
Basin structure removal to 4.6 m (15 ft) below surrounding grade[g]	
Decontamination and Demolition	1,193,000
Waste Disposal[e, f] = 1843 m^3	189,830
Post-construction S&M[h]	336,000
Subtotal	**18,186,000**
ISS for 105-F Facility	
Sampling and Analysis[a]	400,000
Engineering[b]	4,200,000
Construction[c]	9,300,750
Equipment/Materials[d]	1,890,000
Waste Disposal[e, f] = 5106 m^3	525,920
Removal of soil/debris from basin[i]	1,072,000
Waste Disposal = 1733 m^3	178,500
Basin structure removal to 4.6 m (15 ft) below surrounding grade[g]	
Decontamination and Demolition	1,193,000
Waste Disposal[e, f] = 1843 m^3	189,830
Post-construction S&M[h]	336,000
Subtotal	**19,286,000**
116-D Exhaust Air Stack	
Decontamination and Demolition	1,542,000
Waste Disposal[f]	
LLW = 1337 m^3	137,710
ACM = 35 m^3	460
Subtotal	**1,680,170**
116-DR Exhaust Air Stack	
Decontamination and Demolition	1,542,000
Waste Disposal[f]	
LLW = 1337 m^3	137,710
ACM = 35 m^3	460
Subtotal	**1,680,170**

Table 2 Cost Estimates for Alternative Three – Interim Safe Storage, Decontamination and Demolition (2 Pages)

Facility	Estimated Cost in Dollars
117-DR Exhaust Filter Building	
Decontamination and Demolition	895,000
Waste Disposal[f]	
LLW = 1131 m^3	116,490
DW = 46 m^3	4,740
ACM = 1.8 m^3	20
Subtotal	**1,016,250**
119-DR Exhaust Air Sample Building	
Decontamination and Demolition	246,000
Waste Disposal[f]	
LLW = 10 m^3	1,030
DW = 0.1 m^3	10
ACM = 2 m^3	30
Subtotal	**247,070**
Subtotal of the 4 ancillary facilities	4,623,660
Grand Total	**42,095,660**

[a] Sampling and Analysis: Costs associated with sample planning, preparation, collection, and analysis. This activity provides pre-engineering information to assist in decontamination and Demolition planning, as well as waste disposition planning.

[b] Engineering: Costs associated with all up front engineering. Activity to include documentation associated with CERCLA planning, as low as reasonably achievable (ALARA), Hazard Classification, Removal Action Report, etc.

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

[d] 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.

[e] Waste disposal volume estimates were derived from actual waste volume shipments to date and future estimated waste volumes from the ISS of the 105-C Reactor. The waste volumes do not delineate between waste type (i.e., low level or mixed) because ERDF does not require it.

[f] Disposal cost assumptions: Disposal of low-level radioactive, dangerous, and mixed wastes at the ERDF at \$103 m^3 (\$78.50 yd^3). Includes all direct and indirect costs and cost of transportation from area to ERDF. Asbestos-containing material (ACM) assumed to be non-contaminated and is to be disposed at the ERDF at \$13 m^3 (\$10 yd^3).
LLW = low-level waste
DW = dangerous waste.

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

[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 costs and waste volume derived from MCACES.

Signature sheet for the USDOE Hanford Action Memorandum covering the 105-DR Reactor Building, 105-F Reactor Building, 116-D Exhaust Air Stack, 116-DR Exhaust Air Stack, 117-DR Exhaust Filter Building, 119-DR Exhaust Air Sample Building, and 105-DR Large Sodium Fire Facility TSD unit. This action is between the USDOE, EPA, and Ecology.

Michael C. Wilson

July 10/98

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

Date

Signature sheet for the USDOE Hanford Action Memorandum covering the 105-DR Reactor Building, 105-F Reactor Building, 116-D Exhaust Air Stack, 116-DR Exhaust Air Stack, 117-DR Exhaust Filter Building, 119-DR Exhaust Air Sample Building, and 105-DR Large Sodium Fire Facility TSD unit. This action is between the USDOE, EPA, and Ecology.

Randall F. Smith

July 10, 1998

Randall F. Smith
Director, Environmental Cleanup Office
U.S. Environmental Protection Agency, Region 10

Date

Signature sheet for the USDOE Hanford Action Memorandum covering the 105-DR Reactor Building, 105-F Reactor Building, 116-D Exhaust Air Stack, 116-DR Exhaust Air Stack, 117-DR Exhaust Filter Building, 119-DR Exhaust Air Sample Building, and 105-DR Large Sodium Fire Facility TSD unit. This action is between the USDOE, EPA, and Ecology.

John D. Wagoner
Manager, Richland Operations Office
U.S. Department of Energy

Date 7/14/98