DOE/RL-95-38
Rev. 0

Approach and Plan for Cleanup Actions in the 100-FR-2 Operable Unit of the Hanford Site

United States
Department of Energy
Richland, Washington

Approved for Public Release

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1.0 INTRODUCTION

A new administrative approach is being used to reach a cleanup decision for the 100-FR-2 Operable Unit. The unit, located at the 100-F Area, contains solid waste sites and is one of the remaining operable units scheduled for characterization and cleanup in the 100 Area. Substantial information has been gained over the past 3 years in previous 100 Area operable units, which will help make decisions on the 100-FR-2 Operable Unit.

This Focus Package (1) describes the new approach and activities needed to reach a decision on cleanup actions for the 100-FR-2 Operable Unit and (2) invites public participation into the planning process.

The previous approach included the production of a Work Plan, a Limited Field Investigation Report, a Qualitative Risk Assessment, a Focused Feasibility Study, and a Proposed Plan, all culminating in an interim action Record of Decision. Information gathered to date on other operable units allows the analgous site approach to be used on the 100-FR-2 Operable Unit, and therefore, a reduction in documentation preparation. The U.S. Environmental Protection Agency, Washington State Department of Ecology, and the U.S. Department of Energy (Tri-Party Agreement) believe that the new approach will save time and funding. In the new approach, the Work Plan has been condensed into this 12 page Focus Package. The Focus Package includes a summary of 100-F Area information, a list of waste sites in the 100-FR-2 Operable Unit, a summary of proposed work, and a schedule.

The new approach will also combine the Limited Field Investigation and Qualitative Risk Assessment reports into the Focused Feasibility Study. The Focused Feasibility Study will analyze methods and costs to clean up waste sites. Consolidating the documents should reduce the time to complete the *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA) process by 16 months, compared to the previous approach. The step after the Focused Feasibility Study is the Proposed Plan, which will be produced by the U.S. Department of Energy (DOE) and will identify the preferred alternatives to clean up waste sites. Like the previous approach, the new approach will be conducted under CERCLA, also known as Superfund.

Public participation in the planning and approach for cleanup of the 100-FR-2 Operable Unit is appreciated. Public participation is invited at two points in the process, right now with this Focus Package and later with the Proposed Plan. Written comments on the information and approach presented in this Focus Package may be submitted to the lead regulatory agency (U.S. Environmental Protection Agency) or supporting agency (Washington State Department of Ecology) for the 100-FR-2 Operable Unit. Please submit written comments on this Focus Package by July 24, 1995, to:

Kevin Oates
U.S. Environmental Protection Agency
712 Swift Blvd, Suite 5
Richland, Washington 99352

or

Keith Holliday
Washington State Department of Ecology
1315 West 4th Avenue
Kennewick, Washington 99336-6018

Information about the Hanford Site, in general and the 100 Area in particular, is available at the following locations.

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Southwest Harrison and Park
Portland, Oregon 97207
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(503) 724-4729

RICHLAND -
WASHINGTON STATE UNIVERSITY/TRI-CITIES
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Government Publication Room
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Attn: Eleanor Chase
(206) 543-4664

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Spokane, Washington 99258
Attn: Lewis Miller
(509) 328-4220 Ext. 3125

2.0 100-F AREA INFORMATION

The Hanford Site was established by the U.S. Government during World War II to produce plutonium. One plutonium-producing nuclear reactor (designated 105-F) is at the 100-F Area; construction of this reactor began in 1943, with startup of the reactor in 1945. The reactor was deactivated in 1965. Adjacent to the 100-F reactor was the Experimental Animal Farm (EAF), which operated from 1945 to 1976. Early EAF studies were conducted to measure the effects of reactor effluents on fish. Later research included the use of swine, sheep, dogs, and rats. The 100-F Area includes the 100-FR-1 Operable Unit, which contains most of the liquid waste disposal sites associated with the reactor, such as the retention basin and cribs. Waste sites in the 100-FR-2 Operable Unit include primarily solid waste burial grounds that supported the reactor operations and the EAF. Other waste sites in the Operable Unit include a septic tank, burn pits, a dumping site, glass dump, and experimental gardens. The groundwater beneath the 100-F Area is designated the 100-FR-3 Operable Unit. Both 100-FR-1 and 100-FR-3 are in the proposed plan preparation stage of the CERCLA process.

Figure 1 shows the location of the 100-F Area. Figure 2 shows the 100-FR-2 Operable Unit and 100-FR-2 waste sites listed in Table 1.

More detailed information on the 100-F processes, facilities, and waste sites can be found in the *Technical Baseline Report for the 100-F Area* (Deford 1994). Background on geology, groundwater, ecology, and meteorology can be found in the 100-FR-1 and 100-FR-3 work plans (DOE/RL 1992a, 1992b, respectively). Additional information on the 100-FR-1 and 100-FR-3 Operable Units is in the Limited Field Investigations Reports for these operable units (DOE/RL 1994a, 1994b).

3.0 WASTE SITES

The 100-FR-2 cleanup actions are based on the Hanford Past-Practice Strategy (HPPS) (DOE-RL 1991). This strategy encourages a "bias for action," which helps to initiate and complete cleanup earlier than usual for Superfund projects and makes maximum use of existing data.

The 100-FR-2 structures and waste sites are identified in the Waste Information Data System (WIDS) and the *Technical Baseline Report for the 100-F Area* (Deford 1994). These sites (Table 1) fall under the purview of Superfund and have been dispositioned as high priority, low priority, or solid waste burial grounds. Some sites have been proposed as candidates for interim remedial measures (IRM). The IRM approach (from the HPPS) accelerates the cleanup of contamination posing a threat to human health and the environment. All radioactive solid waste burial grounds and high-priority sites are IRM candidates for early cleanup action. Sites considered to be "low priority" will be deferred to the final stage of cleanup actions for the 100-F Areas, as discussed in the HPPS.

Some of the waste materials disposed in the 100-FR-2 Operable Unit are as follows:

- **Radioactive solid waste**. Radioactive solid waste, such as reactor components and hardware, contaminated tools, and other items were usually buried in the 118-F-1, 118-F-2, and 118-F-3 burial grounds.

- **Biological solid waste**. Radioactive and nonradioactive biological wastes from the EAF and 108-F building consisting of animal tissues, animal wastes, and sawdust from pen floors, were buried in the 118-F-5, 118-F-6, 118-F-2, and 118-F-9 burial grounds.

- **Sanitary liquid wastes**. Sanitary wastes were routed by sewer lines from all the major buildings to septic tanks and drain fields. While there are no records of radioactive wastes being disposed to the septic systems, the possibility needs to be considered. Other wastes such as detergents, cleaning compounds, and solvents may have been discharged to the septic systems.

- **Nonradioactive solid wastes**. Paper, trash, light bulbs, reagent bottles, rags, concrete, and other solid wastes were either burned at a burning pit (e.g., 128-F-1), placed in a burial ground (e.g., 118-F-1), or disposed of in a shallow depression, such as the 120-F-1 glass dump. Excess paints and solvents were also burned at the burning pits.

4.0 PROPOSED WORK

During the next year, additional information will be gathered to help define cleanup needs and activities. The activities listed in Table 1 include the following:

- **Ground-penetrating radar surveys**. These surveys record the reflection of electromagnetic waves originating from a machine on the ground surface that bounce off buried material and are measured back on the surface. Ground-penetrating radar will be used to define the boundaries of waste sites and the approximate depth of buried material.

- **Screening for organic compounds**. Probes may be inserted into the ground in areas of suspected contamination, the soil gases extracted, and the gases tested for contaminants of concern.

- **Historical and cultural resource record searches**. Some of the historical records identifying waste sites and their locations are contradictory. A more thorough search of records, old photographs, and interviews with employees may help clarify potential contamination and waste site locations. In addition, a cultural resources review will help identify areas that need protection during cleanup. Records of previous sampling results will also be consulted in planning cleanup alternatives.

- **Analgous sites**. Because waste sites in each reactor area tended to receive the same types of wastes, data from waste sites that are similar to 100-FR-2 sites may be used to estimate potential contamination and associated risks.

- **Surface radiation surveys**. Surface radiation levels will be performed on selected sites that have not had recent surveys and be documented into Environmental Restoration records.

Documentation on work completed for the activities listed in Table 1 will be available in the Administrative Record and Information Repositories. These documents may be published as separate technical documents with summaries included in the Focused Feasibility Study report for this operable unit, or they may be published with the Focused Feasibility Study in their entirety. All work for the 100-FR-2 Operable Unit will follow the Quality Assurance Project Plan published as Appendix A in the work plan for the 100-FR-1 Operable Unit (DOE/RL 1992a). Data quality objectives have been established in coordination with the U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy.

5.0 SCHEDULE

Below is a schedule for completing an interim action Record of Decision for the 100-FR-2 Operable Unit. Once public review of this Focus Package is complete, the proposed milestones for submitting the Focused Feasibility Study and Proposed Plan will be finalized.

Focus Package Public Comment	June 23, 1995 through July 24, 1995
Issue Final Focus Package	August 16, 1995
Field Activities	February 9 to July 2, 1995
DOE Submits Focused Feasibility Study to Regulators[a]	August 16, 1995
DOE Submits IRM Proposed Plan to Regulators[a]	October 31, 1995

[a]Proposed Tri-Party Agreement milestones, dates are subject to change depending on fiscal year 1995 funding levels.

6.0 REFERENCES

Deford, D.H., 1994, *100-F Area Technical Baseline Report*, BHI-00031, Bechtel Hanford, Inc., Richland, Washington.

Deford, D.J., 1995, *Investigation of 100-F Suspect Waste Site, PNL Parallel Pits*, BHI Interoffice Memorandum #009798, Bechtel Hanford, Richland, Washington.

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DOE/RL, 1992a, *Remedial Investigation/Feasibility Study Work Plan for the 100-FR-1 Operable Unit, Hanford Site, Richland, Washington*, DOE/RL-90-33, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE/RL, 1992b, *Remedial Investigation/Feasibility Study Work Plan for the 100-FR-3 Operable Unit, Hanford Site, Richland, Washington*, DOE/RL-91-53, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE/RL, 1994a, *Limited Field Investigation Report for the 100-FR-1 Operable Unit*, DOE/RL-93-82, Draft A, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE/RL, 1994b, *Limited Field Investigation Report for the 100-FR-3 Operable Unit*, DOE/RL-93-83, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

Dorian, J.J. and V.R. Richards, 1978, *Radiological Characterization of the Retired 100 Areas*, UNI-946, UNC Nuclear Industries, Richland, Washington.

Miller, R.L., and R.K. Wahlen, 1987, *Estimates of Solid Waste Buried in 100 Area Burial Grounds*, WHC-EP-0087, Westinghouse Hanford Company, Richland, Washington.

Figure 1. Location of the 100-F Area.

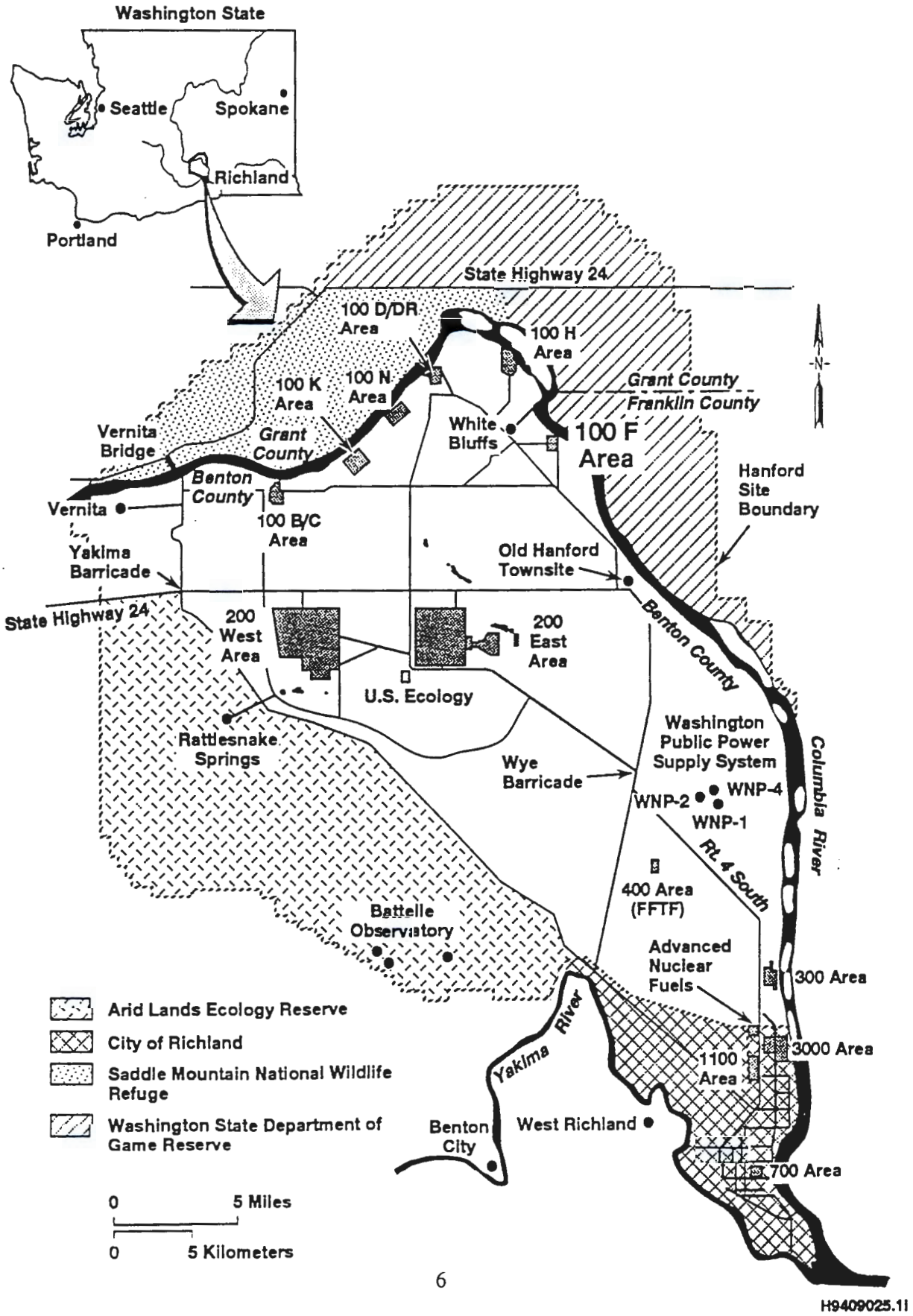

Figure 2. Locations of 100-FR-2 Waste Sites Listed in Table 1.

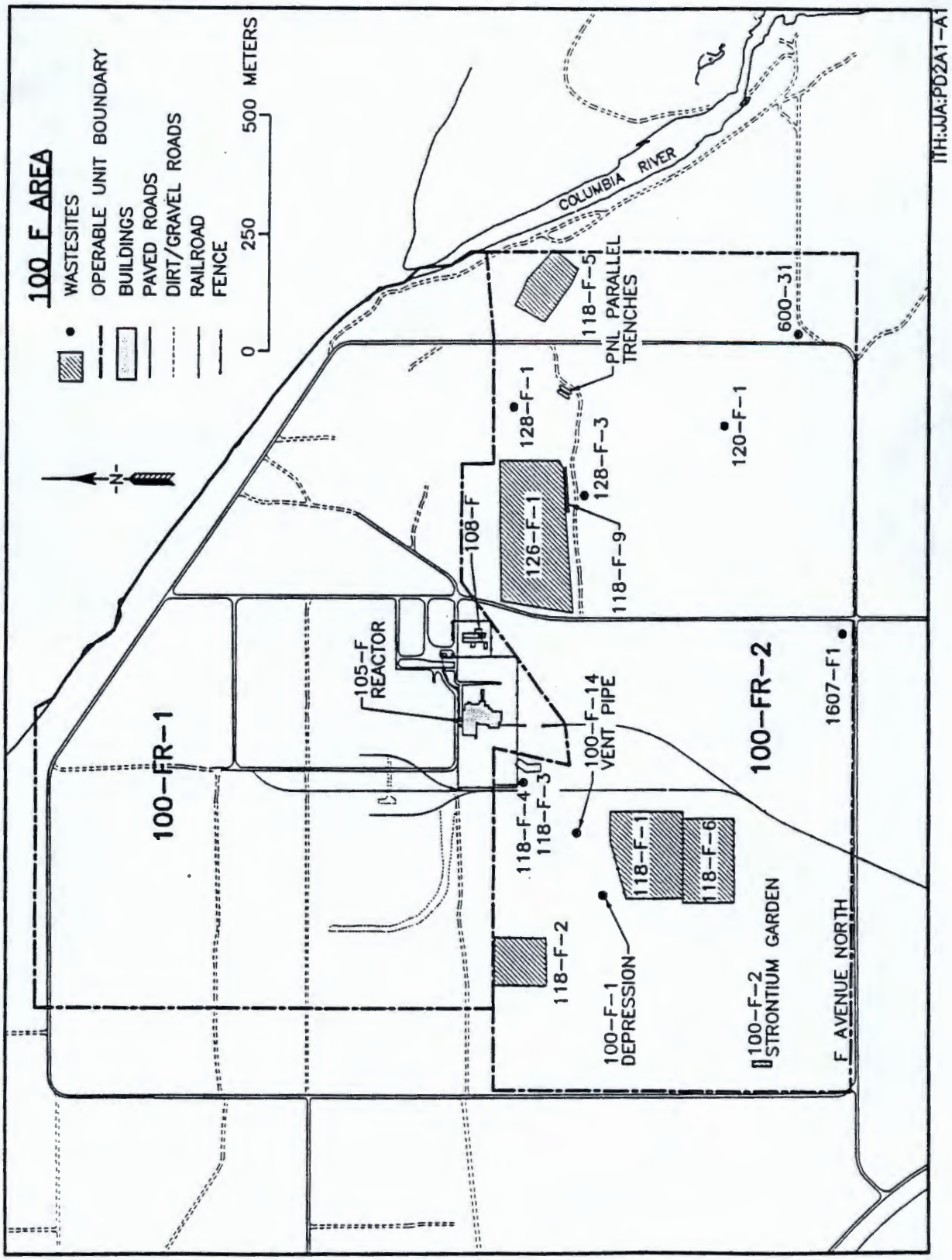

Table 1. Waste Sites in the 100-FR-2 Operable Unit. (4 sheets)

Site Designation (Alias)	Section[a]	Site Purpose	Site Description	Proposed Disposition	Investigation Approach
118-F-1 Burial Ground (100-F Primary Burial Ground)	5.1	1954 to 1965; Received misc. radioactive solid wastes, reactor components and hardware, and surface contaminated waste.	183 m (600 ft) long; 153 m (500 ft) wide; 6 m (20 ft) deep Burial ground; contains 3 trenches and 1 pit; backfilled with 0.6 to 2.0 m (2 to 6 ft) of soil; surface routinely treated with herbicide.	Burial Ground [b]IRM	Use other burial grounds such as 118-B-1 as analgous to this site. Review historical records to establish waste inventory.
118-F-2 Burial Ground (Solid Waste Burial Ground #1)	5.2	1945 to 1965; Received misc. solid waste from 105-F Reactor and the biology facilities and liquid waste from 108-F (the main biology laboratory).	112 m (368 ft) long; 99 m (326 ft) wide; 6 m (20 ft) deep Burial Ground; 8 trenches contain misc. solid waste from the 105-F Reactor; one trench contains solid waste from the biology facilities; seven metal pipes 2 to 6 m (6 to 18 ft) long with wooden lids were used for disposal of animal carcasses and liquid waste; surface routinely treated with herbicide.	Burial Ground [b]IRM	Review historical records to establish inventory.
118-F-3 Burial Ground (Burial Ground #3 or Minor Construction Burial Ground)	5.3	1952; Received irradiated reactor parts, primarily vertical safety rods and step plugs that were removed when 105-F Reactor converted from the liquid 3X to the ball 3X safety systems.	53 m (175 ft) by 15 m (50 ft) by 5 m (15 ft) deep Burial Ground; irregular shape; regularly sprayed with herbicide.	Burial Ground [b]IRM	Use other burial grounds such as 118-H-3 as analgous to this site. Review historical records to establish inventory.
118-F-4 Burial Ground (115-F Pit)	5.4	1949; Received radioactive silica gel wastes from the 115-F building.	3 m (10 ft) long; 3 m (10 ft) wide; 3 m (10 ft) deep Burial Ground; 1.2 to 1.5 m (4 to 5 ft) layer of waste covered by 1.5 to 1.8 m (5 to 6 ft) layer of backfill; surface routinely sprayed with herbicide.	Burial Ground [b]IRM	Review historical records to establish inventory.

Table 1. Waste Sites in the 100-FR-2 Operable Unit. (4 sheets)

Site Designation (Alias)	Section[a]	Site Purpose	Site Description	Proposed Disposition	Investigation Approach
118-F-5 Burial Ground (PNL Sawdust Pit)	5.5	1954 to 1975; Received radioactively contaminated sawdust from the floors of animal pens in the 100-F Experimental Animal Farm (EAF).	153 m (500 ft) long; 46 m (150 ft) wide; 5 m (15 ft) deep; sawdust from the EAF placed in paper boxes or 208 Liter (55 gallon) metal drums; solids at this site have been covered with a 2.2 to 2.5 m (7 to 8 ft) layer of soil; surface routinely sprayed with herbicide; sampled in 1979.	Burial Ground [b]IRM	Review historical records to establish inventory.
118-F-6 Burial Ground (PNL Solid Waste Burial Ground)	5.6	1965 to 1973; Received biological waste from animal research studies and contains 2 large rail tankcars for incineration of animal tissue and carcasses.	122 m (400 ft) long; 61 m (200 ft) wide; 6 m (20 ft) deep; site was backfilled and an additional 0.5 to 1.0 m (2 to 3 ft) of soil placed on the burial ground for stabilizing; surface routinely sprayed with herbicide.	Burial Ground [b]IRM	Review historical records to establish inventory.
118-F-9 Burial Ground (PNL Rad Site)	5.7	Solid waste from EAF	30 m (100 ft) long; 5 m (15 ft) wide; 1.5 to 3.0 m (5 to 10 ft) deep; exact location is unknown.	Burial Ground [b]IRM	Review historical records to establish inventory.
120-F-1 Glass Dump	5.8	Used to dump fluorescent tubes, batteries, chemical bottles, tool parts, incandescent light bulbs, and vacuum tubes.	9 m (30 ft) long; 2.5 m (8 ft) wide; 1.2 m (4 ft) deep.	Low priority	Conduct surface radiation survey, and if negative, defer to final F-Area cleanup.

Table 1. Waste Sites in the 100-FR-2 Operable Unit. (4 sheets)

Site Designation (Alias)	Section[a]	Site Purpose	Site Description	Proposed Disposition	Investigation Approach
126-F-1 Burial Ground (Powerhouse Ash Pit)	5.9	1944 to 1963; Received coal ash from the 184-F Powerhouse; radioactively contaminated due to leakage from the reactor effluent lines.	Irregularly shaped depression with several small rises; partly bounded by permanent concrete monuments and surface contamination signs; radiation survey performed in 1993.	High Priority [b]IRM	Review historical records to establish inventory.
600-31 Dumping Site		Dump site for laboratory bottles and bottle caps.	15 m (50 ft) long; 3 m (10 ft) wide.	Low Priority	Defer to final F-Area cleanup.
128-F-1 Burning Pit	5.10	1945 to 1965; Received nonradioactive, combustible materials, such as paint waste, office waste, and chemical solvents.	46 m (150 ft) long; 46 m (150 ft) wide; 3 m (10 ft) deep.	Low priority	Analgous site information (128-H-1); conduct surface radiation survey, and if negative, defer to final F-Area cleanup.
128-F-3 Burning Pit (PNL Burning Pit)	5.11	Unknown.	30 m (100 ft) long; 30 m (100 ft) wide, site sampling performed in 1988.	Low priority	Defer to final F-Area cleanup.
1607-F-1 Septic System	5.12	1944 to 1960; Received sanitary sewage from badge house, fire station, and administrative offices.	Septic tank and drain field.	Low priority	Defer to final F-Area cleanup.
100-F-14 Vent Pipe	5.13	Unknown.	10 cm (4 in) steel vent extends 100 cm (40 in) above grade.	Low Priority	Review historical records, perform surface radiation survey, [c]GPR, soil gas survey.

Table 1. Waste Sites in the 100-FR-2 Operable Unit. (4 sheets)

Site Designation (Alias)	Section[a]	Site Purpose	Site Description	Proposed Disposition	Investigation Approach
100-F-1 Depression in surface	5.14	Unknown.	2.5 m (8 ft) long; 2.5 m (8 ft) wide; 1 m (3 ft) deep.	Low Priority	Review historical records, perform surface radiation survey, [c]GPR, soil gas survey.
100-F-2 Strontium Garden	5.15	1952 to present, to measure uptake of Sr-90 and Cs-137 in selected plant species.	46 m (150 ft) by 7.6 m (25 ft) by 3 m (10 ft) high screened garden plot.	Low Priority	[d]Surface radiation survey of exterior perimeter, defer to final F-Area cleanup.
PNL Parallel Pits		Exact date unknown; however, appears to have been active in 1962; disposal of radioactive and nonradioactive materials from the EAF.	2 pits each one 75 ft (23 m) by 20 ft (6 m) by 8 ft (2.5 m), Historical research (Interoffice Memo #009798, D.H Deford to J.A. Stegen, Feb. 3 1995).	High Priority	Review historical records for waste inventory, surface radiation survey, [c]GPR.

Sources: Miller and Wahlen 1987; Dorian and Richards 1978; Interoffice Memorandum #009798, D.H. Deford to J.A. Stegen, Investigation of 100-F Suspect Waste Site, PNL Parallel Pits, 009798, February 3, 1995.

(a) Refers to the pertinent section in D.H. Deford, 1994, *100-F Area Technical Baseline Report*, BHI-00031, Bechtel Hanford, Inc., Richland, Washington.

(b) IRM: Interim Remedial Measure

(c) GPR: Ground Penetrating Radar

(d) Purpose is to determine if contamination has spread from the 100-F-2 Strontium Garden boundary.

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