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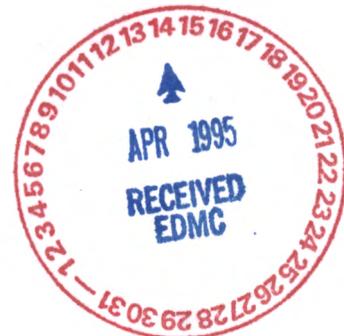
# Approach and Plan for Cleanup Actions in the 100-FR-2 Operable Unit of the Hanford Site

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P.O. Box 550  
Richland, Washington 99352



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**Focus**

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**APPROACH AND PLAN FOR CLEANUP ACTIONS IN THE  
100-FR-2 OPERABLE UNIT OF THE HANFORD SITE****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 be used to help make decisions on the 100-FR-2 Operable Unit.

This Focus Package has two purposes: (1) to describe the new approach and activities needed to reach a decision on cleanup actions for the 100-FR-2 Operable Unit and (2) to invite 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 dependable assumptions to be made on the 100-FR-2 Operable Unit, and therefore, a reduction in documentation preparation. The three signatories to the Tri-Party Agreement (Environmental Protection Agency, Washington State Department of Ecology, and the U.S. Department of Energy) believe that the new approach will save time and funding needs. 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 in about 8 months with the Proposed Plan. If you would like to provide written comments on the information and approach presented in this Focus Package, write 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 ----, 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.

**PORTLAND - PORTLAND STATE UNIVERSITY**

Branford Price Millar Library  
Southwest Harrison and Park  
Portland, Oregon 97207  
Attn: Michael Bowman or Susan Thomas  
(503) 724-4729

**RICHLAND - WASHINGTON STATE UNIVERSITY/TRI-CITIES**

Public Reading Room  
100 Sprout Road  
Richland, Washington 99352  
Attn: Terri Traub  
(509) 376-8583

**SEATTLE - UNIVERSITY OF WASHINGTON**

Suzzallo Library,  
Government Publication Room  
Seattle, Washington 98195  
Attn: Eleanor Chase  
(206) 543-4664

**SPOKANE - GONZAGA UNIVERSITY**

Foley Center  
East 502 Boone  
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 100-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 1945-1976. 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 reactors, such as the retention basins 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 and the 100-FR-2 Operable Unit. Figure 2 shows the 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 and DOE-RL 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 document 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 (Deford 1994). These sites 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.

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, 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

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

- **Surface radiation surveys.** Surface radiation surveys will be conducted at the 100-F-14 vent Pipe, 100-F-1 Depression in surface, and the PNL parallel trenches.
- **Defer to final 100-F Area cleanup.** Sites considered to be "low priority" will be deferred to the final stage of cleanup actions for the 100-F Area.

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). Precise methods (data quality objectives) for sampling will be defined 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                                     | May 18, 1995 through June 22, 1995 |
| Issue Final Focus Package  | July 24, 1995                      |
| Field Activities   | February - July, 1995              |
| DOE Submits Focused Feasibility Study to Regulators <sup>a</sup> | August 16, 1995                    |
| DOE Submits IRM Proposed Plan to Regulators <sup>a</sup>         | October 31, 1995                   |

<sup>a</sup>Proposed Tri-Party Agreement milestones.

## 6.0 REFERENCES

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

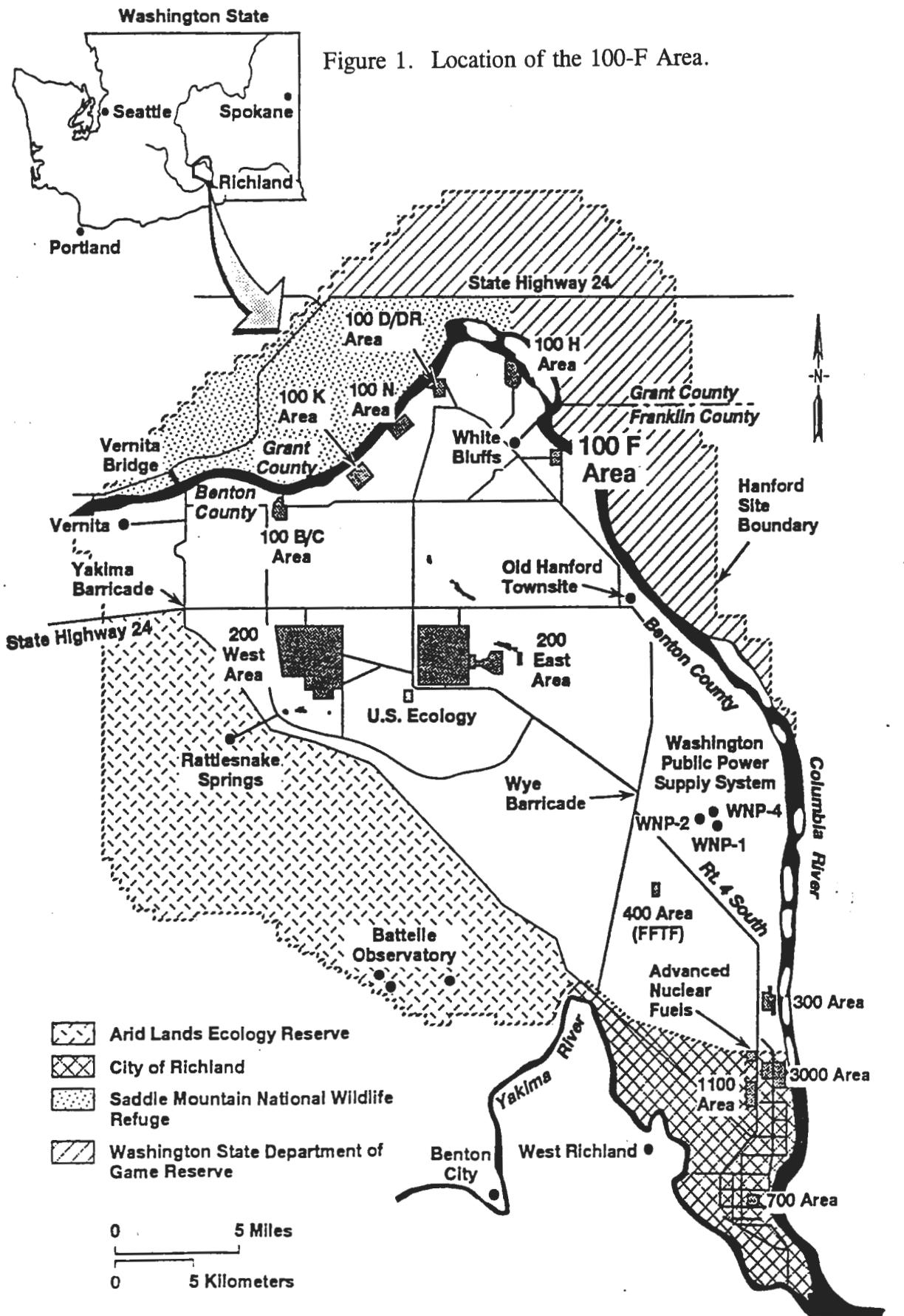
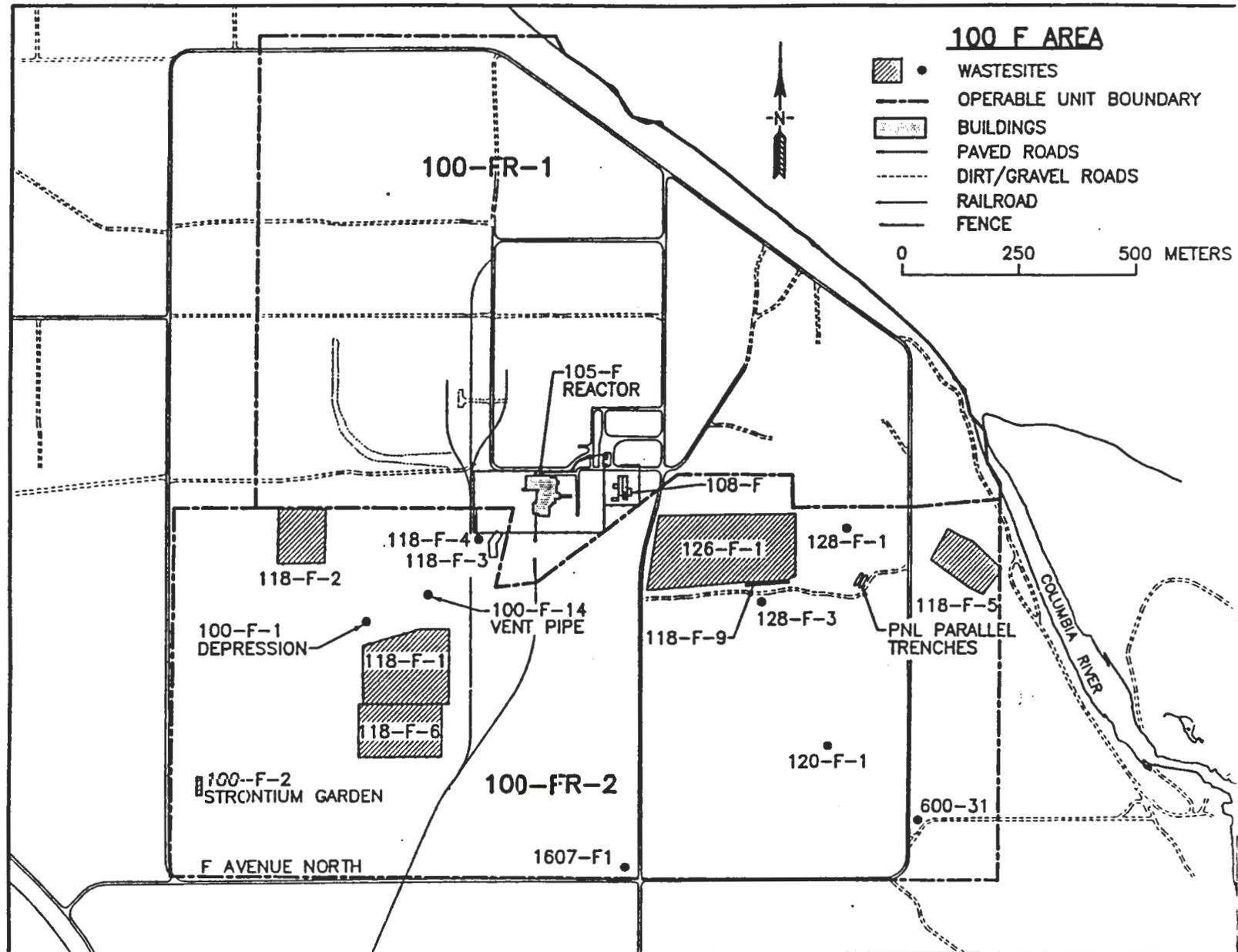


Figure 2. Locations of 100-FR-2 Waste Sites Listed in Table 1.



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

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

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

| Site designation<br>(Alias)                                 | Section <sup>(a)</sup> | Site Purpose   | Site Description   | Proposed Disposition                    | Investigation Approach                              |
|---|------------------------|--|--|---|---|
| 118-F-5 PNL Sawdust Pit<br>Burial Ground                    | 5.5                    | 1954-1975;<br>Received<br>radioactively<br>contaminated<br>sawdust from the<br>floors of animal<br>pens in the 100-F<br>Experimental<br>Animal Farm<br>(EAF)                 | 500 ft (153 m) long; 150 ft (46 m)<br>wide; 15 ft (5 m) deep; sawdust<br>from the EAF placed in paper<br>boxes or 55 gallon (208 L) metal<br>drums; solids at this site have been<br>covered with a 7-8 ft (2.2-2.5 m)<br>layer of soil; surface routinely<br>sprayed with herbicide; sampled in<br>1979 | Burial Ground<br><br><sup>(b)</sup> IRM | Review historical records<br>to establish inventory |
| 118-F-6 Burial Ground<br>(PNL Solid Waste Burial<br>Ground) | 5.6                    | 1965-1973;<br>Received biological<br>waste from animal<br>research studies<br>and contains 2<br>large rail tankcars<br>for incineration of<br>animal tissue and<br>carcasses | 400 ft (122 m) long; 200 ft (61 m)<br>wide; 20 ft (6 m) deep; site was<br>backfilled and an additional 2 to 3<br>ft (0.5-1.0 m) of soil placed on the<br>burial ground for stabilizing;<br>surface routinely sprayed with<br>herbicide   | Burial Ground<br><br><sup>(b)</sup> IRM | Review historical records<br>to establish inventory |
| 118-F-9 Burial Ground<br>(PNL Rad Site)                     | 5.7                    | Solid waste from<br>EAF  | 100 ft (30 m) long; 15 ft (5 m)<br>wide; 5-10 ft (1.5-3.0 m) deep;<br>exact location is unknown  | Burial Ground<br><br><sup>(b)</sup> IRM | Review historical records<br>to establish inventory |
| 126-F-1 Powerhouse Ash<br>Pit                               | 5.9                    | 1944-1963;<br>Received coal ash<br>from the 184-F<br>Powerhouse;<br>radioactively<br>contaminated due<br>to leakage from the<br>reactor effluent<br>lines                    | Irregularly shaped depression with<br>several small rises; partly bounded<br>by permanent concrete monuments<br>and surface contamination signs;<br>radiation survey performed in 1993   | High Priority<br><br><sup>(b)</sup> IRM | Review historical records<br>to establish inventory |
| 600-31 Dumping Site   |                        | Dump site for<br>laboratory bottles<br>and bottle caps   | 50 ft (15 m) long; 10 ft (3 m) wide  | Low Priority                            | Defer to final F-Area<br>cleanup                    |

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

| Site designation (Alias)      | Section <sup>(a)</sup> | Site Purpose  | Site Description  | Proposed Disposition | Investigation Approach   |
|-------------------------------|------------------------|---|---|----------------------|--|
| 120-F-1 Glass Dump            | 5.8                    | Used to dump fluorescent tubes, batteries, chemical bottles, tool parts, incandescent light bulbs, and vacuum tubes | 30 ft (9 m) long; 8 ft (2.5 m) wide; 4 ft (1.2 m) deep                  | Low priority         | Conduct surface radiation survey and if negative defer to final F-Area cleanup                                       |
| 128-F-1 Burning Pit           | 5.10                   | 1945-1965; Received nonradioactive, combustible materials such as paint waste, office waste, and chemical solvents  | 150 ft (46 m) long; 150 ft (46 m) wide; 10 ft (3 m) deep                | Low priority         | Analogous site information (128-H-1); conduct surface radiation survey and if negative defer to final F-Area cleanup |
| 128-F-3 PNL Burning Pit       | 5.11                   | Unknown   | 100 ft (30 m) long; 100 ft (30 m) wide, site sampling performed in 1988 | Low priority         | Defer to final F-area cleanup  |
| 1607-F-1 Septic System        | 5.12                   | 1944-1960; 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   | 4 in (10 cm) steel vent extends 40 in (100 cm) above grade              | Low Priority         | Review historical records, perform surface radiation survey, <sup>(c)</sup> GPR, soil gas survey                     |
| 100-F-1 Depression in surface | 5.14                   | Unknown   | 8 ft (2.5 m) long; 8 ft (2.5 m) wide; 3 ft (1 m) deep                   | Low Priority         | Review historical records, perform surface radiation survey, <sup>(c)</sup> GPR, soil gas survey                     |
| 100-F-2 Strontium Garden      | 5.15                   | 1952-present, to measure uptake of Sr-90 and Cs-137 in selected plant species.                                      | 150 ft (46 m) by 25 ft (7.6 m) by 10 ft (3 m) high screened garden plot | Low Priority         | <sup>(d)</sup> Surface radiation survey of exterior perimeter, defer to final F-Area cleanup                         |

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

| Site designation<br>(Alias) | Section <sup>(a)</sup> | Site Purpose  | Site Description   | Proposed Disposition | Investigation Approach   |
|-----------------------------|------------------------|---|--|----------------------|--|
| 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, <sup>(c)</sup> 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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