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Proposed Plan for Interim Remedial Actions at the 100 Area Remaining Sites

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Proposed Plan for Interim Remedial Actions at the 100 Area Remaining Sites

October 1998

United States Department of Energy

P.O. Box 550, Richland, Washington 99352

PROPOSED PLAN FOR INTERIM REMEDIAL ACTIONS

AT THE 100 AREA REMAINING SITES

Hanford Site, Richland, Washington

EPA, ECOLOGY, AND DOE ANNOUNCE PROPOSED PLAN

This **Proposed Plan**[1] identifies the preferred alternative for **interim remedial actions** and **corrective actions** at **waste sites** and **solid waste management units** at the Hanford Site (Figure 1) as identified in Tables A-1 and A-2 of Appendix A. The waste sites subject to this Proposed Plan are referred to as the **100 Area Remaining Sites**[2] and consist of radioactively and chemically contaminated soils, structures, and associated debris located within 12 **Operable Units** in the 100 Area and 1 Operable Unit in the 200 Area of the Hanford Site. Contamination at the 100 Area Remaining Sites presents a risk to human health and the environment.

Also included in this Proposed Plan is the preferred alternative for disposal of 100 Area reactor building materials.

This Proposed Plan is being issued by the U.S. Environmental Protection Agency (EPA), the lead regulatory agency for the 100-B, 100-C, 100-K, 100-F reactor areas and the 100-IU-2, 100-IU-6 and 200-CW-3 Operable Units, the Washington State Department of Ecology (Ecology), the lead regulatory agency for the 100-D and 100-H Areas, and the U.S. Department of Energy (DOE), who is the responsible agency. These three agencies are referred to as the Tri-Parties.

The 100 Area Remaining Sites subject to this Proposed Plan are designated as either solid waste management units to be addressed under Section 3004(u) of the *Resource Conservation and Recovery Act* (RCRA) (as implemented through Washington Administrative Code [WAC] 173-303-646), or remedial action sites to be addressed under Section 120 of the *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA). Tables A-1 and A-2 of Appendix A identify the regulating authority for each 100 Area Remaining Site. A process for integrating CERCLA and RCRA sites is described later in this Proposed Plan.

The Tri-Parties are proposing that the preferred alternative for 46 of the 100 Area sites (contained in Appendix A, Table A-1) is to remove the contaminated soil, structures, and associated debris that pose a risk to human health and the environment, treat these wastes as required to meet disposal facility waste acceptance criteria (such as **land disposal restrictions**), dispose of the wastes at the Hanford Site **Environmental Restoration Disposal Facility** (ERDF), backfill with

MARK YOUR CALENDAR

This Proposed Plan is being issued by the Tri-Parties. These agencies encourage you to comment during the public comment period on the preferred alternative and all other alternatives presented, and the approach toward remedy selection for the 100 Area Remaining Sites. The preferred alternative for disposal of 100 Area reactor building waste is also presented for your comment. Based on public comments, the Tri-Parties may modify the preferred alternatives or the remedy selection approach presented in this Proposed Plan.

A 30-day public comment period for this Proposed Plan will be from November 2 to December 2, 1998. A public meeting on this Proposed Plan is not scheduled to be held unless requested by the public. To request a public meeting or send written comments, please contact:

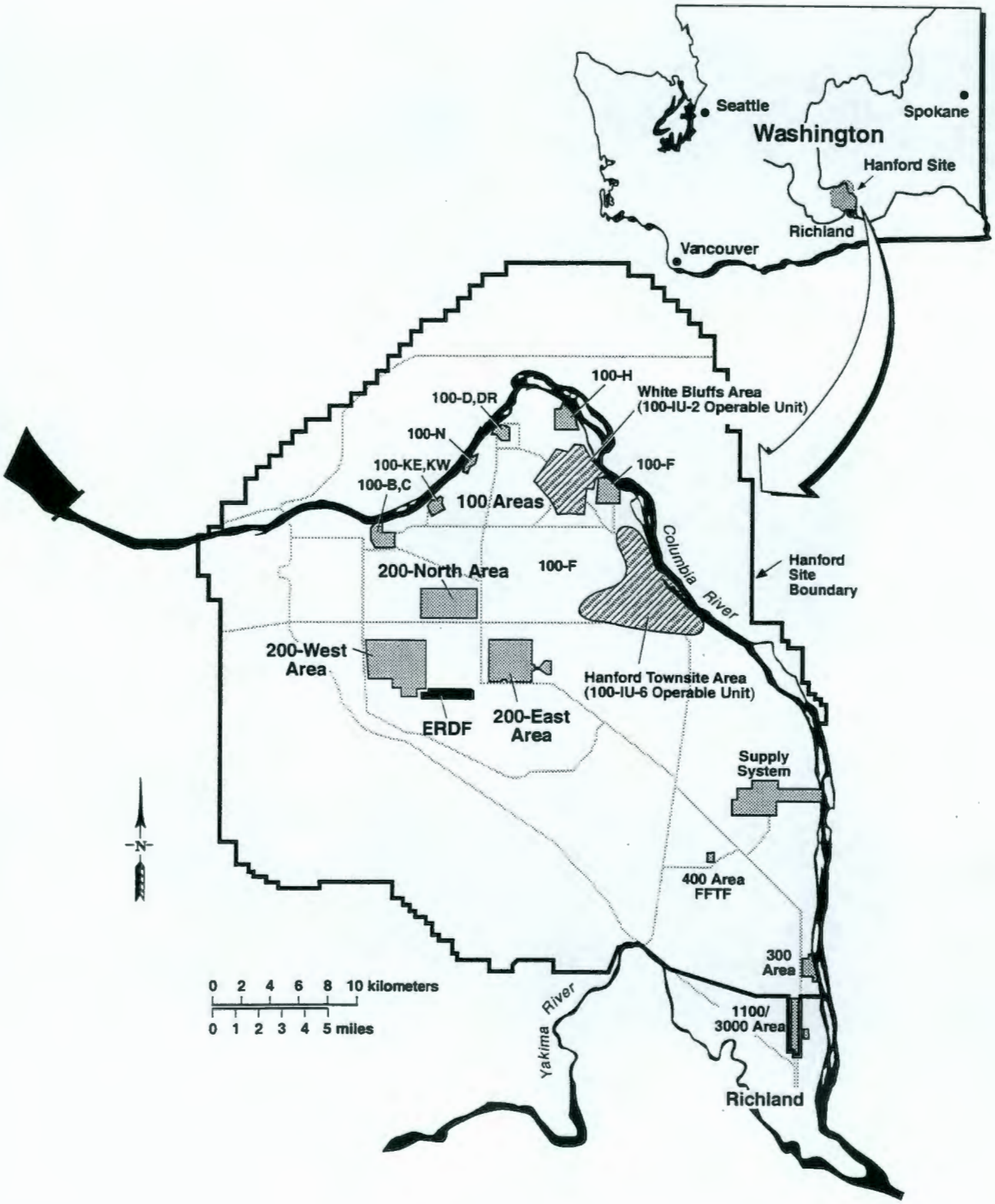
Dennis Faulk
U.S. Environmental Protection Agency
712 Swift Boulevard, Suite 5
Richland, WA 99352

(509)376-8631
e-mail: Faulk.dennis@epa.gov
or call the Hanford Cleanup Toll-free Line at 1-800-321-2008

[1] Technical terms in bold are defined in the glossary at the end of this document.

[2] 100 Area solid waste burial grounds, waste sites in the 100-N Reactor Area, and structures and buildings associated with continuing decontamination and decommissioning actions are not included in the 100 Area Remaining Sites and are planned to be addressed in separate decision documents.

Figure 1. Map of the Hanford Site Showing the Reactors in the 100 Areas and the Environmental Restoration Disposal Facility.



clean material, and revegetate[3] the excavated areas. This alternative is called the Remove/Treat/Dispose Alternative.

In addition to proposing a preferred alternative for 46 waste sites, this Proposed Plan also proposes the use of an innovative approach, called the **Plug-in Approach**, for remedy selection at 161 other 100 Area sites and sites within the 200-CW-3 Operable Unit (contained in Appendix A, Table A-2). The EPA has used the Plug-in Approach at other **National Priorities List** (NPL) sites around the country and at the Hanford Site to enhance the efficiency of waste site cleanups. The Plug-in Approach allows a previously selected remedy, or **standard remedy**, to be applied to multiple similar, but separate sites at a facility. Cleanup actions can proceed under this approach without a time-consuming re-evaluation of **remedial alternatives** through the entire CERCLA process. Use of this approach will save both time and resources.

The sites contained in Table A-2 are candidates for remediation through Remove/Treat/Dispose, however, further sampling is required to determine whether there is a need for remedial action. Because these sites are similar to the 46 sites being proposed for Remove/Treat/Dispose, it is proposed that they "plug-in" this same remedy if a remedial action is warranted.

The Tri-Parties are also proposing that any newly discovered 100 Area sites requiring remedial action that are identified after remedy selection and that are similar to the 100 Area Remaining Sites be "plugged-in" to the Remove/Treat/Dispose remedy. The Tri-Parties will notify the public regarding the decision to plug-in newly discovered waste sites through the periodic publication of Explanations of Significant Differences (ESDs). If these sites are RCRA corrective action sites, they will be incorporated into the **Hanford Facility RCRA Permit**.

This Proposed Plan also identifies the preferred alternative for disposal of hazardous and radioactive equipment and debris at ERDF, from the 105-B, 105-D, 105-H, 105-KE, and 105-KW reactor buildings. The preferred alternative as well as other alternatives analyzed for disposal of reactor building waste is included in Appendix B of this Proposed Plan. The proposed alternative for disposal of reactor building waste is consistent with previous CERCLA disposal decisions for the 100-C, 100-F, and 100-DR reactor areas. The Tri-Parties are including alternatives for disposal of reactor building waste in this Proposed Plan because the reactor buildings are located in 100 Area Remaining Site operable units and contain similar waste types and contaminants. Inclusion of this information will streamline the administrative process for remediation of the reactor areas at Hanford.

The Tri-Parties may select the preferred alternatives or another alternative or combination of alternatives presented in this Proposed Plan after reviewing all public comments. Written comments on this Proposed Plan must be submitted by December 2, 1998 (see box on page 1). Responses to comments will be presented in a responsiveness summary that will be part of the 100 Area Remaining Sites **Record of Decision** (ROD) and will be placed in the CERCLA Operable Unit and RCRA permit modification **administrative record**.

INTEGRATION OF CERCLA AND RCRA REQUIREMENTS

The Tri-Parties recognize the similarities between RCRA corrective action and CERCLA remedial action processes and their common objective of protecting human health and the environment from potential releases of hazardous substances, wastes, or constituents. As such, they are electing to combine response actions under RCRA corrective action and CERCLA remedial action. The *100 Area Source Operable Unit* ***Focused Feasibility Study***, (DOE/RL-94-61), which forms the basis for this Proposed Plan, conforms with the RCRA corrective action and CERCLA remedial action processes for describing and analyzing remedial alternatives (i.e., the CERCLA feasibility study is functionally equivalent to a RCRA Corrective Measures Study).

RCRA corrective action authorities have clear jurisdiction over waste with chemical constituents (in particular, hazardous waste and hazardous constituents), and "mixed wastes" (mixtures of hazardous waste and radiological contaminants), but not over waste with radiological contaminants only. CERCLA authorities provide jurisdiction over hazardous substances including radiological contaminants. The Tri-Parties agreed in the Hanford Federal Facility Agreement and Consent Order (referred to as the Tri-Party Agreement) that they intend for all remedial and corrective actions conducted under the Tri-Party Agreement to address all aspects of contamination so that no further action will be required under federal and state law. In particular, they agreed that any units managed under RCRA corrective action shall address all CERCLA hazardous substances for the purposes of corrective action. Therefore, actions taken to remediate these operable units will comply with the

[3] Revegetation activities are neither part of nor necessary for completion of the preferred alternative. However, revegetation will provide overall environmental benefits to the site and will be accomplished at sites to be remediated.

provisions of both CERCLA and RCRA. For example, in order to meet **applicable or relevant and appropriate requirements** (ARARs) and be protective, the proposed actions are to achieve the soil cleanup standards of the Model Toxics Control Act (MTCA) Method B values for chemical contaminants and 15 millirem/year (mrem/yr) above natural background for radionuclides, as identified in EPA guidance at all 100 Area sites. By applying CERCLA authority jointly with that of RCRA, additional options for disposal of corrective action and remedial action wastes at ERDF are possible. By allowing flexibility in final disposal options, the three agencies intend to minimize disposal costs as much as possible while remaining fully protective of human health and the environment.

It is the intent of the Tri-Parties to select the same remedy for sites requiring RCRA corrective action as for those requiring CERCLA interim remedial actions. The Tri-Parties are issuing this Proposed Plan as part of their public participation responsibilities under Section 117(1) of CERCLA for CERCLA remedial action sites. Following completion of the public involvement process for this Proposed Plan, the regulatory agencies will prepare the CERCLA ROD that will authorize the selected remedial action after signature by the Tri-Parties.

The Tri-Parties invite public comment on the proposed CERCLA preferred alternative as well as on the intent to recommend the same alternative for RCRA corrective action sites in the Hanford Facility RCRA Permit. It is anticipated that the Hanford Facility RCRA Permit will be modified to include the RCRA corrective action sites pursuant to a Class 3 Permit modification, as specified in WAC 173-303-840, in the summer of 1999. At that time, the public will have the opportunity to comment on the permit conditions relevant to these actions. in accordance with the Tri-Party Agreement and applicable State and Federal Regulations.

The DOE is also issuing this Proposed Plan as part of its responsibility under the *National Environmental Policy Act of 1969* (NEPA). NEPA values include impacts to natural, cultural, and historical resources; socioeconomic aspects; and irreversible and irretrievable commitments of resources.

SITE BACKGROUND

The Hanford Site is located in southeastern Washington. It was established in 1943 to produce plutonium for nuclear weapons using reactors and chemical processing plants. The 100 Area of the Hanford Site is located along the Columbia River and includes nine inactive nuclear reactors used for plutonium production between 1943 and 1987 (Figure 1). The 200 Area of the Hanford Site is the location of the chemical separations. However, the 200 Area sites included within this Proposed Plan received waste solely from 100 Area reactor operations. Operations at the Hanford Site are now focused on environmental restoration and waste management.

In November 1989, the EPA designated the 100 and 200 Areas of the Hanford Site as Superfund sites and placed them on the NPL because of soil and groundwater contamination that resulted from past operation of the nuclear facilities. To organize cleanup efforts under Superfund, contaminated source areas at the inactive reactors were subdivided into 100 and 200 Area Operable Units. The 100 Area Remaining Sites are contained within 13 of these Operable Units and are shown in Appendix A, Figures A-1 through A-8.

The waste sites being considered for remediation in this Proposed Plan are in the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-1, 100-FR-2, 100-HR-1, 100-HR-2, 100-KR-1, 100-KR-2, 100-IU-2, 100-IU-6, and 200-CW-3 Operable Units. The 100-IU-2 and 100-IU-6 Operable Units are the former locations of temporary housing and support facilities for the Manhattan Project, and include the former townsites of White Bluffs and Hanford. Because of their process history, the Tri-Parties have determined that the waste sites of the 200-CW-3 waste site group are most closely aligned with liquid waste disposal sites in the 100 Area and will therefore be considered part of the Remaining Sites. These waste sites received cooling water and sludge from 100 Area reactor operations. The remainder of the above operable units include waste sites around the 100 Area production reactors where liquid and solid radioactive wastes and industrial chemicals were disposed to the soil.

SCOPE AND ROLE OF ACTION

This Proposed Plan presents interim remedial actions for contaminated soil, structures, and debris at the 100 Area Remaining Sites. The proposed interim remedial actions are to identify and reduce potential future threats to human health and the environment from waste site contaminants. While these are considered interim actions, it is expected that no additional remedial actions will be required at these sites. Other waste sites within the 100 Area will require cleanup, which has been or will be addressed in other CERCLA and/or RCRA public notices and decisions.

Consistent with the previous 100 Area soil cleanup decisions, the Tri-Parties have agreed to remediate the 100 Area Remaining Sites, to the extent practicable,

such that future use of the land is not precluded by contamination left from past Hanford operations. This would be accomplished by remediating the sites to minimize potential direct exposure effects, air and groundwater releases, and by minimizing ecological and cultural impacts. The selected remedy will be reevaluated if future land use determinations are inconsistent with this assumption.

SUMMARY OF SITE RISK

Potential risks to human health and ecological receptors have been evaluated in **qualitative risk assessments** for some individual waste sites in the 100 Areas. Where remedial investigation results are not available, potential risks were evaluated by comparison to analogous sites with similar process history, similar environmental media, similar waste material, and similar contaminants. As discussed in the *100 Area Source Operable Unit Focused Feasibility Study Report* (DOE/RL-94-61), the Tri-Parties have designated high- or medium-priority waste sites within the 100 Area as requiring remediation. The following paragraphs discuss the results of applying the evaluation methods of the Focused Feasibility Study Report to the 100 Area sites. The results of these evaluations show that remedial measures are warranted at 46 of the 100 Area sites.

In the Superfund process, potential risks to human health and the environment are evaluated to determine whether significant risks exist due to site contaminants. Two types of potential human health effects due to contact with site contaminants are evaluated at Superfund sites. The first is the potential increase in cancer risks. This potential increase is expressed exponentially as 1×10^{-4}, 1×10^{-5}, 1×10^{-6} (one in ten thousand, one in one hundred thousand, one in a million, respectively). This means that for a 1×10^{-4} risk, if 10,000 people were exposed to a contaminant of concern for some period of time, one additional person could be expected to be diagnosed with cancer in his/her lifetime. Based on current national cancer rates, 2,500 people out of 10,000 are expected to be diagnosed with cancer. Under a 1×10^{-4} risk, 2,501 cancer diagnoses could be expected. For the second type of potential human health effect, non-carcinogenic health impacts, a **hazard index** is calculated. A hazard index greater than or equal to 1.0 may pose a potential adverse human health risk.

Human Health Risk

Contamination detected or known to exist at waste sites poses the potential for increased human health risk to future site users. The level of potential health risk posed by contaminants differs depending upon the future site use. Two future site use scenarios were evaluated in the qualitative risk assessments: an occasional use scenario, which corresponds to a recreational use, and a frequent use scenario, which corresponds to a residential use. In either case, future users could be exposed to contaminants in soil through ingestion of soil, inhalation of wind-blown dust, or external exposure to radiation.

Based on the qualitative risk assessments, the contaminants in 100 Area soil providing the highest contribution to potential increased human health risks include heavy metals (chromium, lead, and zinc); various radionuclides including cesium-137, cobalt-60, strontium-90, and europium-152; and organic compounds such as polychlorinated biphenyls (PCBs) and polyaromatic hydrocarbons (PAH). Environmental media and waste material contaminated by these constituents include soil, metallic waste, concrete, asbestos, and miscellaneous debris. Depth of contamination varies from surface soils to structures such as cribs and reverse wells with potential for much deeper contamination. The 46 waste sites shown in Table A-1 are considered by the Tri-Parties to have sufficient analytical or analogous data to conclude that these contaminants pose a risk to human health and the environment.

Table 1 provides a comparison of representative maximum contaminant levels with the preliminary **remediation goals** in soil for contaminants of concern. The preliminary remediation goals in this table generally represent a 1×10^{-6} risk level or hazard index of 1 for unrestricted land use. Representative maximum contaminant levels are presented for five waste sites in the 100-DR-1, 100-DR-2, and 100-FR-1 Operable Units. These data were taken from the qualitative risk assessments for waste sites 100-D-4, 100-D-12, 100-D-31, 116-D-5, and 116-D-5 identified in Section 7 of the *100 Area Source Operable Unit Focused Feasibility Study Report*, DOE/RL-94-61. Comparison of these data to the preliminary remediation goals in Table 1 indicates that the risks to future site users would be expected to be above the risk range of 1×10^{-4} to 1×10^{-6} and above a hazard index of 1. Calculation of site risk from these data shows that these contamination levels present an average risk of 7.2×10^{-3}, which is considered a conservative average of the risk at these sites. This risk level shows that remedial action is necessary at these sites.

Table 1. Comparison of Representative Waste Site Concentrations with Preliminary Remediation Goals in Soil

Contaminant	Representative Waste Site Concentrations[1]	Preliminary Remediation Goals[2]
Heavy metals		
Arsenic	12.4 mg/kg	6.5 mg/kg
Chromium (VI)	73.4 mg/kg	2.2 mg/kg
Lead	574 mg/kg	353 mg/kg
Radionuclides		
Cesium-137	75 pCi/gm	6.2 pCi/gm
Cobalt-60	46 pCi/gm	1.4 pCi/gm
Strontium-90	360 pCi/gm	4.5 pCi/gm
Europium-152	460 pCi/gm	3.3 pCi/gm
Organic compounds		
PCBs	2.4 mg/kg	0.5 mg/kg
PAHs	0.48 mg/kg	0.33 mg/kg

[1] Data for individual contaminants were obtained from qualitative risk assessment reports prepared for individual 100 Area sites identified in Section 7 of the *100 Area Source Operable Unit Focused Feasibility Study Report* (DOE/RL-94-61).

[2] From Table 2-7 of the *Remedial Design Report/Remedial Action Work Plan for the 100 Area* (DOE/RL-96-17), Rev. 1, May 1998. The PCB value is based upon MTCA Method B using EPA's most recent carcinogenic potency factor of 2 kg-day/mg.

Ecological Risk - Ecological risks from the 100 Area sites were estimated by evaluating potential impacts to the Great Basin pocket mouse. Where remedial investigation results were not available, ecological risks were evaluated by comparing 100 Area sites to analogous sites with similar characteristics. Risks to the mouse were estimated assuming the food pathway was the primary route of exposure to both radionuclides and inorganic/organic contaminants. An **Environmental Hazard Quotient** (EHQ) equal to or greater than 1.0 was considered to indicate that individual mice were at risk.

Nearly all of the radiological risk (EHQ > 1.0) to the mouse at the 100 Area sites was attributable to strontium-90, although cobalt-60 also exceeded an EHQ of 1.0 at some sites. Comparison to analogous sites indicates that the risk estimates to the Great Basin pocket mouse due to exposure to heavy metals and various organic contaminants at selected sites would also exceed an EHQ of 1.0.

SUMMARY OF REMEDIAL ALTERNATIVES

The *100 Area Source Operable Unit Focused Feasibility Study Report* (DOE/RL-94-61) identified six general response actions that could be applied to waste sites in the 100 Areas. The alternatives evaluated for interim remedial action are as follows:

- No Action
- **Institutional Controls**
- **Containment**
- **In Situ Treatment**
- Remove/Treat/Dispose.

NOTE: The No Action, **Institutional Controls**, Containment, and In Situ Treatment Alternatives would limit the future uses of small portions of the 100 Area, namely the waste sites themselves. A summary of alternatives considered is provided below.

No Action - The No Action Alternative was evaluated to provide a baseline for comparison to the other alternatives. It represents a hypothetical scenario where no restrictions, controls, or active remedial measures other than those currently existing are applied to a site.

Institutional Controls - This alternative includes the following:

- Deed and/or access restrictions
- Groundwater monitoring.

Deed restrictions would consist of limitations on certain types of land-uses (e.g., prohibiting drilling or excavation) at an individual waste site. Access restrictions would include fences or signs. Groundwater monitoring would include sampling for potential changes in groundwater contaminant concentrations underlying the waste sites. These Institutional Controls would limit exposure to humans

and would monitor changes in groundwater quality until a final response action could be evaluated and implemented.

Containment - This alternative includes the following elements:

- Institutional controls
- Groundwater monitoring
- Surface water controls
- Installation of a barrier at the surface.

As described under the Institutional Controls Alternative, deed restrictions and/or access restrictions, combined with groundwater monitoring, would be implemented along with surface water controls during and after installation of a surface barrier, such as the Hanford Barrier.

In Situ Treatment - This alternative applies to contaminated soil and solid waste and includes the following elements:

- Institutional controls
- Groundwater monitoring
- Surface water controls
- **In situ vitrification** (soil sites only)
- Dynamic compaction (soil/solid waste sites)
- Installation of a surface barrier, if needed (soil/solid waste sites)
- Void grouting (pipelines).

Specific types of in situ treatment were identified for individual waste groups in the Focused Feasibility Study. Similarly, this alternative would encompass different treatment technologies depending upon the specific 100 Area Remaining Site for which it would apply. For example, at some solid waste sites institutional controls such as deed restrictions and/or access restrictions, groundwater monitoring and surface water controls would be implemented after completion of the dynamic compaction process and surface barrier placement. Contaminated soil sites would be vitrified in place. Pipelines would be grouted to eliminate void spaces. In situ treatment may not apply to some of the 100 Area sites.

Remove/Treat/Dispose - This alternative applies to contaminated soils, debris, equipment, and structures, and includes the following:

- Remove contaminated media
- Dispose media at an approved disposal facility
- Backfill excavated areas with clean material.

Under this alternative, contaminated media would be excavated, transported, and disposed at ERDF in accordance with waste acceptance criteria established for the disposal facility. Any material that exceeds the disposal facility acceptance criteria would be stored onsite consistent with requirements until the material is treated to meet acceptance criteria or a treatability variance is approved. As the contaminated material is excavated, it would be characterized and segregated prior to transportation. Excavation would continue until all contaminated material exceeding the cleanup goal is removed. The site would then be backfilled with clean material.

PREFERRED INTERIM REMEDIAL ALTERNATIVE

The preferred alternative for the 46 100 Area sites contained in Table A-1 is Remove/Treat/Dispose. Contaminated soil and/or structures and debris would be excavated using the **observational approach**. The observational approach relies on information from historical process operations and limited field investigations on the nature and extent of contamination, combined with a "characterize and remediate in one step" methodology. This latter methodology utilizes **field screening** for contaminants. Remediation (excavation) proceeds until it can be demonstrated, through a combination of field screening and sampling and laboratory analysis, that the site is cleaned up. The observational approach enhances the efficiency of remediation efforts by combining **characterization** and remediation steps to optimize the use of resources.

As the contaminated material is excavated, it would be characterized and segregated before transportation. Excavation would continue until all contaminated material exceeding the remediation goals is removed.

Remediation goals for the 100 Area sites will be consistent with ARARs or **To Be Considered** requirements established in previous 100 Area soil cleanup decisions. These goals have been developed by the Tri-Parties in the most recent revision of the *Remedial Design Report/Remedial Action Work Plan for the 100 Area* (DOE-RL-96-17). Preliminary remediation goals will include, but are not limited to the following requirements:

- Attainment of the EPA human health guidance limit of 15 mrem/yr above background for radiation.

- Compliance with soil cleanup standards for chemicals in MTCA Method B.

- Ensure that contaminants leaching from soils do not cause groundwater to exceed maximum contaminant levels (drinking water standards).

- Ensure that contaminants leached from soils do not cause surface waters to exceed ambient water quality criteria (river protection standards).

After excavation, the site would be backfilled with clean material and revegetated. Contaminated waste would be transported and disposed at the ERDF in accordance with ERDF's waste acceptance criteria. Any material that exceeds the ERDF waste acceptance criteria would be stored within the waste site or at ERDF until treated to meet acceptance criteria. Should it be impracticable to treat waste to meet ERDF waste acceptance criteria, it will be stored until a disposal decision is made.

The September 1995 ROD that addressed the first 37 waste sites in the 100 Area specifies that the Tri-Parties may use balancing factors for the determination of the extent of remediation at certain 100 Area sites. Balancing factors include reduction of risk by decay of radionuclides, protection of human health and the environment, costs, sizing of ERDF, worker safety, presence of ecological and cultural resources, the use of institutional controls, and long-term monitoring costs. The use of these balancing factors to determine the extent of remediation is proposed on a selective, site-specific basis for the 100 Area sites.

The application of the criteria for the balancing factors, and the process for determining the extent of remediation has been described in the *Remedial Design Report/Remedial Action Work Plan for the 100 Area* (DOE/RL-96-17). It is anticipated by the Tri-Parties that this report will be used for application of balancing factors at the 100 Area Remaining Sites as well. In the event that the consideration of balancing factors results in a recommendation to leave contaminated soils or debris in place at a waste site at levels that exceed remedial action objectives, the Tri-Parties will seek public comment prior to making a final decision.

The preferred remedy of Remove/Treat/Dispose is intended to reduce potential human health and ecological risks and ensure that contaminants present at these waste sites will not adversely impact groundwater beneath the sites or the Columbia River. The cleanup alternative will be selected only after the public has had the opportunity to comment on this recommendation and all comments have been reviewed and considered.

EVALUATION OF REMEDIAL ALTERNATIVES

The preferred alternative of Remove/Treat/Dispose is believed to provide the best balance of tradeoffs between the alternatives with respect to the nine CERCLA evaluation criteria and RCRA corrective action performance standards for the 46 sites identified in Table A-1. A description of the CERCLA criteria is presented on page 10. The criteria are divided into three categories of weighted importance: threshold, balancing, and modifying criteria. The first two criteria (Overall Protection of Human Health and the Environment and Compliance with ARARs) are threshold criteria: only those remedial alternatives that provide adequate protection of human health and the environment and comply with ARARs (or justify a waiver) are eligible for consideration. The five balancing criteria help describe relative technical and cost differences among the remedial alternatives. The two modifying criteria (State and Community Acceptance) may prompt modification of the remedial alternatives based on community comments and concerns.

The No Action Alternative has been evaluated to provide a baseline for comparison to the preferred remedy. It represents a hypothetical scenario where no restrictions, controls, or active remedial actions are applied to a site.

Overall Protection

The No Action Alternative does not meet this criteria. Institutional Controls alone cannot be relied upon to provide protection. The Containment and In Situ Treatment Alternatives would provide protection of human health and the environment by eliminating or reducing exposure to the contaminants. The Remove/Treat/Dispose Alternative would provide overall protection of human health and the environment by removing and/or treating contaminants to attain protective concentrations.

Compliance with Applicable or Relevant and Appropriate Requirements

The No Action and Institutional Controls Alternatives would not meet soil, groundwater, and river protection ARARs. All other alternatives are expected to be able to meet ARARs.

Long-Term Effectiveness

The No Action and Institutional Controls Alternatives would not meet cleanup goals and, therefore, would not provide for long-term effectiveness. Containment and In Situ Treatment would provide a greater degree of

long-term effectiveness by stabilizing and isolating the wastes in place but would require long term institutional controls. The Remove/Treat/Dispose Alternative would provide the greatest long-term effectiveness and permanence by removing contaminated material from the 100 Area and thus allowing a variety of future land uses.

Reduction of Toxicity, Mobility, or Volume Through Treatment

The No Action, Institutional Controls, Containment, and In Situ Treatment Alternatives would rely on various processes of natural attenuation, most importantly radioactive decay, to reduce contaminant concentrations. The Remove/Treat/Dispose Alternative would include treatment should waste require it to meet ERDF waste acceptance criteria, such as for land disposal restriction compliance.

Short-Term Effectiveness

The No Action and Institutional Controls Alternatives pose minimal risk to implement. The Containment and In Situ Treatment Alternatives require technology that is readily available with minimal risk to workers. The Remove/Treat/Dispose Alternative would achieve protection relatively quickly, however would present a short-term risk to workers.

Implementability

The No Action Alternative would be easy to implement. The Institutional Controls Alternative would require administrative actions, such as deed restrictions, and therefore it may not be easy to maintain implementability over a long period of time. The Containment, In Situ Treatment, and Remove/Treat/ Dispose Alternatives are implementable with existing technologies.

Costs

The Remove/Treat/Dispose Alternative was shown to be the most cost-effective alternative, is protective of human health and the environment, and will allow for a wider range of future land use. Because of the similarities of the 100 Area Remaining Sites to the sites that have been previously assessed and are currently undergoing remediation, the Remove/Treat/Dispose Alternative would continue to be the most cost-effective alternative for remediation of these sites.

Because of this, and because the other alternatives would limit the future uses of the 100 Area, detailed costs have not been provided in this Proposed Plan for the other alternatives.

The Remove/Treat/Dispose Alternative costs for sites addressed in Table A-1 of this Proposed Plan are estimated to be approximately $26 million.

State Acceptance. State Acceptance of the preferred remedy has been achieved through the publication of this Proposed Plan.

Community Acceptance. The Community Acceptance modifying criterion will be considered after all public comments on this Proposed Plan have been received.

RCRA Corrective Action Performance Standards. The RCRA corrective action performance standards of WAC 173-303-646(2) state that corrective actions must:

- Protect human health and the environment for all releases of dangerous wastes and dangerous constituents, including releases from all solid waste management units;
- Be required regardless of the time at which waste was managed at the facility or placed in such units and regardless of whether such facilities or units were intended for the management of solid or dangerous waste;
- Be implemented by the owner/operator beyond the facility property boundary, where necessary to protect human health and the environment.

The RCRA corrective action performance standards will be achieved under the preferred proposed CERCLA remedial action. Ecology bases this determination on the guidance memorandum issued by the EPA on September 24, 1996, entitled *Coordination Between RCRA Corrective Action and Closure and CERCLA Site Activities*. This memorandum describes the similarity, therefore equivalency, between RCRA corrective action and the CERCLA remedial action programs.

National Environmental Policy Act Evaluation

The NEPA regulations require an evaluation of the environmental consequences of remedial alternatives under consideration. Criteria used to compare alternatives include potential effects on ecological, cultural, and historical resources; socioeconomic aspects; and identification of irreversible and irretrievable commitment of resources. The following summary compares how the remedial alternatives impact NEPA values.

The No Action, Institutional Controls, Containment, and In Situ Treatment Alternatives would require

irreversible and irretrievable commitment of natural resources by restricting availability of surface use of the sites. **Cumulative impacts** would occur at the borrow pit associated with the Containment Alternative.

The Remove/Treat/Dispose Alternative would result in an irreversible and irretrievable commitment of natural resources at the disposal unit (i.e., ERDF) and borrow sites used to obtain materials to fill the excavated sites and cover ERDF. Excavation could disturb cultural resources located at a site, and careful adherence to cultural resource mitigation planning would be required. Excavation may also impact ecological resources. Cumulative impacts may occur at borrow sites and transportation routes.

PLUG-IN OF 100 AREA REMAINING SITES

The Plug-in Approach is a process that is proposed for 161 100 and 200 Area sites identified to date and contained in Table A-2.. In the future, the Plug-in Approach is proposed for any newly discovered 100 Area waste site that is similar to the 100 Area Remaining Sites. The Plug-In Approach benefits the goal of remediating waste sites at the 100 Area of the Hanford Site. The traditional CERCLA approach for remedy selection would require the development of multiple Proposed Plans and RODs that, for similar sites, would be nearly identical to the feasibility studies, proposed plans, and RODs already developed and proven to be successful. The Plug-in Approach allows remedial actions to begin much more quickly at a site and without the need for redundant remedy selection processes.

The Plug-in Approach requires three main elements in order to establish its use as a cost-effective tool for remediation at the 100 Area. First, multiple sites must be identified that share common physical and contaminant characteristics. These characteristics are referred to as the **site profile**. Second, a remedial alternative, or standard remedy, must be established that has been shown to be protective and cost-effective for sites sharing the common site profile. Lastly, sites sharing a common site profile must be shown to require remedial action due to contaminant concentrations that pose a risk to human health and the environment.

The following information describes how the Plug-In Approach is proposed to be used for remedy selection at the 100 Area Remaining Sites. Costs are also provided for addressing sites that are candidates for the Plug-in Approach.

EXPLANATION OF CERCLA EVALUATION CRITERIA

1. *Overall Protection of Human Health and the Environment* is the primary objective of the remedial action and addresses whether a remedial action provides adequate overall protection of human health and the environment. This criterion must be met for a remedial alternative to be eligible for consideration.
2. *Compliance with Applicable or Relevant and Appropriate Requirements* addresses whether a remedial action will meet all of the applicable or relevant and appropriate requirements and other federal and state environmental statutes, or provides grounds for invoking a waiver of the requirements. This criterion must be met for a remedial alternative to be eligible for consideration.
3. *Long-Term Effectiveness and Permanence* refers to the magnitude of residual risk and the ability of a remedial action to maintain long term reliable protection of human health and the environment after remedial goals have been met.
4. *Reduction of Toxicity, Mobility, or Volume Through Treatment* refers to an evaluation of the anticipated performance of the treatment technologies that may be employed in a remedy. Reduction of toxicity, mobility, and/or volume contributes toward overall protectiveness.
5. *Short-Term Effectiveness* refers to evaluation of the speed with which the remedy achieves protection. It also refers to any potential adverse effects on human health and the environment during the construction and implementation phases of a remedial action.
6. *Implementability* refers to the technical and administrative feasibility of a remedial action, including the availability of materials and services needed to implement the selected solution.
7. *Cost* refers to an evaluation of the capital, operation and maintenance, and monitoring costs for each alternative.
8. *State Acceptance* indicates whether the state concurs with, opposes, or has no comment on the preferred interim alternative based on review of Focused Feasibility Study and the Proposed Plan.
9. *Community Acceptance* assesses the general public response to the Proposed Plan following a review of the public comments received during the public comment period and open community meetings. The remedial action is selected only after consideration of this criterion.

Establishment of the Site Profile

The site profile for the 100 Area sites is based on the site characteristics contained in the Focused Feasibility Study. These characteristics are defined by the:

- Types of contaminants (radiological, chemical)
- Types of contaminated environmental media (soil)
- Types of contaminated waste material (e.g., concrete, metal, wood).

Burial grounds are not included in this site profile. The Tri-Parties have agreed to address the 100 Area Burial Grounds in a separate Proposed Plan and ROD because they are significantly different from other 100 Area sites. Burial grounds are typically larger and contain heterogeneous solid wastes generated principally from the removal of irradiated reactor equipment.

Based on available information, the Tri-Parties have determined that the 100 and 200 Area sites contained in Table A-2 share common physical and contaminant characteristics with those sites contained in Table A-1. Sampling is proposed in order to verify that these sites meet the site profile.

Establishment of the Standard Remedy

The Remove/Treat/Dispose Alternative has been chosen in previous 100 Area decision documents and is being recommended for numerous sites in the 100 Area that share a common site profile. The CERCLA analysis presented in this Proposed Plan proposes this alternative as the best remedy and therefore it will apply equally to the sites that need remedial action under the Plug-in Approach.

It has also been proven in the field to be both cost-effective and environmentally protective. Full-scale remediation in the 100 Areas using Remove/Treat/Dispose began in July 1996. To date, these actions have resulted in the disposal of over one million tons of contaminated soil and debris to ERDF.

Because of its proven success, the Tri-Parties are proposing to establish Remove/Treat/Dispose as described in this Proposed Plan as the standard remedy for the Plug-in Approach to be used to evaluate the 100 and 200 Area sites contained in Table A-2 and for similar waste sites that may be identified in the future in the 100 Area.

Establishing the Need for Remedial Action

Waste sites that share a common site profile will plug-in to the standard remedy if: they are determined to require remedial action due to a risk to human health and the environment. For sites contained in Table A-2, insufficient information exists to determine whether contamination is above unacceptable levels. At these sites, sampling will be performed to determine contaminant types and concentrations. The results will be used to determine whether the site will require remedial action. Remedial action will be required for:

- Sites that contain radioactive contaminants that exceed 15 mrem/yr above natural background

- Sites that contain chemical contaminants that exceed unacceptable risk levels or a hazard index of 1.

For sites that exceed these criteria, cleanup for nonradioactive contaminants will be based on MTCA Method B cleanup levels. For sites that do not exceed these criteria, no further action is proposed. Should sampling determine that a site does not fit the site profile but contains contaminants that exceed these criteria, remedial action will be deferred to a separate CERCLA action or other regulatory authority for cleanup.

Newly discovered 100 Area sites may be identified after the ROD or subsequent decision documentation is signed and the Hanford RCRA Permit is modified. Where these newly discovered sites are determined by the Tri-Parties to fit the site profile and to require remedial action, it is the expectation of the Tri-Parties that they will be remediated using the standard remedy of Remove/Treat/Dispose.

Remediation goals established for the candidate plug-in sites will remain consistent with those established for the preferred remedy as identified in the "Preferred Interim Remedial Alternative" section of this Proposed Plan.

Public Involvement in the Plug-in Approach

In order to ensure that the public is involved in the application of the Plug-in Approach to the 100 Area sites, the Tri-Parties will publish ESDs at the following points in the plug-in process:

- When newly discovered sites are proven through analysis to be above remediation goals and can plug-in to the standard remedy.

- When sites contained in Table A-2 or newly discovered sites are above remediation goals but cannot plug-in to the standard remedy because they do not contain characteristics similar to the 100 Area sites in Table A-1. These sites will be addressed through a separate CERCLA process or other regulatory authority.

Costs for Addressing Plug-in Sites

The cost for addressing candidate plug-in sites contained in Table A-2 is estimated at $30 million. The two major cost elements associated with the use of the Plug-in Approach at these sites are:

- Sampling of sites identified in Table A-2 - $12 million

- Remediation of plug-in sites - $18 million (for the purposes of this cost estimate, approximately 20 percent of the 161 plug-in sites are assumed to require remedial action using the standard remedy of Remove/Treat/Dispose.

SUMMARY OF PROPOSED INTERIM REMEDIAL ACTIONS

This Proposed Plan is the public's opportunity to comment on proposed interim remedial actions to be taken at the 100 Area Remaining Sites. The public is being asked to comment on both the preferred alternative of Remove/Treat/Dispose for sites contained in Table A-1 of this Proposed Plan as well as all other alternatives presented in this Proposed Plan and on the use of the Plug-in Approach for remediation of similar 100 Area sites that are determined to require remedial action in the future. Sites that are candidates for the Plug-in Approach are those that are currently identified and listed in Table A-2 as well as those that have yet to be identified but may be discovered in the future. The total cost for implementing the preferred alternative and the Plug-in Approach for the 100 Area Remaining Sites is estimated at $56 million.

The public is also being asked to comment on the preferred alternative and the No Action Alternative presented for the disposal of 100 Area reactor building materials presented in Appendix B of this Proposed Plan. The total cost for implementing the preferred alternative for disposal of 100 Area reactor building materials at ERDF is approximately $196,000.

SUPPORTING DOCUMENTS

The public is encouraged to read the following documents to gain a better understanding of the 100 Area Remaining Sites:

Hanford Past Practices Strategy, DOE/RL-91-40

Interim Remedial Action Record of Decision for the 100-BC-1, 100-DR-1, 100-HR-1 Operable Units, 1995

Amendment to the Interim Remedial Action Record of Decision for the 100-BC-1, 100-DR-1, 100-HR-1 Operable Units ,1997

100 Area Source Operable Unit Focused Feasibility Study, DOE/RL-94-61 (A complete reference list of Work Plans, Limited Field Investigations, Qualitative Risk Assessments, and Proposed Plans for each Operable Unit containing 100 Area Remaining Sites is contained in Appendix N of DOE/RL-94-61)

100 Areas Feasibility Study, Phases 1 and 2, DOE/RL-92-11

Hanford Federal Facility Agreement and Consent Order, as amended ,1989

Hanford Facility Resource Conservation and Recovery Act Permit for the Treatment, Storage, and Disposal of Dangerous Waste, as amended, 1994

ADMINISTRATIVE RECORD

The Administrative Record can be reviewed at the following location:

Lockheed Martin Services, Inc.
Administrative Record
2440 Stevens Center Place, Room 1101
Richland, Washington 99352
509/376-2530
ATTN: Debbi Isom

POINTS OF CONTACT

U.S. Department of Energy Representative
Glenn Goldberg
Project Manager
509/376-9552

U.S. Environmental Protection Agency Representative (Region 10)
Dennis Faulk
Project Manager
509/376-8631

Washington State Department of Ecology Representative
Wayne Soper
Project Manager
509/736-3049

INFORMATION REPOSITORIES

This Proposed Plan is available for review at the following public information repositories:

University of Washington, Suzzallo Library
Government Publications Room
Box 3529000
Seattle, Washington 98195
206/543-4664
ATTN: Eleanor Chase

Gonzaga University, Foley Center
Tri-Party Information Repository
E. 502 Boone
Spokane, Washington 99258
509/324-5932
ATTN: Tim Fuhrman

Portland State University, Branford Price Millar Library
Science and Engineering Floor
Tri-Party Information Repository
SW Harrison and Park
Portland, Oregon 97207-1151
503/725-3690
ATTN: Michael Bowman

U.S. DOE Richland Public Reading Room
Washington State University, Tri-Cities
Consolidated Information Center, Room 101L
Richland, Washington 99352
509/376-8583
ATTN: Terri Traub

GLOSSARY

The first usage of technical terms and other specialized text in this Proposed Plan is shown in bold in the document and defined below.

100 Area Remaining Sites - 100 Area source sites (other than the 100-N Area, 100 Area Burial Grounds, and decontamination and decommissioning structures and buildings) within Operable Units listed on the National Priorities List that are not already addressed in the 1995 ROD or 1997 ROD Amendment or any other decision document at the time of publication of the Proposed Plan for these sites. In addition, sites from the 200-CW-3 Operable Unit have been included because their process history more closely aligns with the 100 Area Remaining Sites. Groundwater remediation is not included in remedial actions for 100 Area Remaining Sites.

Administrative Record - The files containing all the documents used to select a response action at a CERCLA remedial action site or a RCRA corrective action site. This Proposed Plan identifies the location where the Administrative Record for the Hanford Site is maintained.

Applicable or Relevant and Appropriate Requirements (ARARs) -Those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, or that address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well-suited to the particular site.

Characterization - Identification of the characteristics of a site, often through sampling and analysis of environmental media and materials, to determine the nature and extent of contamination such that informed decisions can be made as to the level of risk presented by the site and therefore the appropriate remedial response.

Class 3 Permit Modification - Changes to a dangerous waste permit that are generally significant in nature. Class 3 modifications become effective upon completion of a public review process and approval by the regulating agency. Categories of Class 3 modifications are contained in WAC 173-303-830 Appendix I.

Containment - A general remedial alternative category for which the intent is to leave contaminants in place but minimize their future mobility and access using engineered barriers.

Corrective Actions – Actions taken to clean up solid waste management units under the RCRA Section 3004(u) program.

Cumulative Impacts - Impacts to human health and the environment that occur through the additive effect of a number of smaller incidents.

Environmental Hazard Quotient – The ratio of exposure toxicity for ecological receptors of contaminants. When the Environmental Hazard Quotient exceeds 1.0, a possible ecological risk is assumed to exist.

Environmental Restoration Disposal Facility (ERDF) - The Hanford Site's disposal facility for most waste and contaminated environmental media (contingent upon meeting the Environmental Restoration Disposal Facility waste acceptance criteria) generated under a CERCLA remedial action. ERDF currently receives wastes from ongoing remedial actions at Hanford.

Field Screening - Chemical and radiological analyses that can be performed in the field and that allow for rapid turnaround of data. Typically, this type of analysis is used to indicate contamination rather than to quantify it.

Focused Feasibility Study – An engineering study on a waste site that evaluates a limited number of remedial alternatives for cleaning up environmental contaminants.

Hanford Facility RCRA Permit – The sitewide permit consisting of the dangerous waste permit issued by the Washington State Department of Ecology under its RCRA authorized program containing requirements for final status treatment, storage, and disposal units on the Hanford Site and EPA's Hazardous and Solid Waste Amendment portion of the permit, both issued in 1994. The dangerous waste portion of the permit is modified at least annually by a Class 3 modification to incorporate other Hanford Site units into the permit.

Hazard Index – The ratio of exposure to toxicity for receptors of contaminants. When the Hazard Index exceeds 1.0, a possible human health risk is assumed to exist.

In Situ Treatment - A general category of remedial alternatives that treat contaminants at a waste site in place and without prior removal.

In Situ Vitrification – A treatment technology that converts soil into stable glass or glass-like crystalline substances and stabilizes the contaminants in-place.

Institutional Controls - A general category of remedial alternatives that do not actively remediate contaminants at a waste site but rather limit or prohibit activities that may interfere with the integrity of a cleanup action or result in exposure to hazardous substances at a waste site.

Interim Remedial Actions - A remedial action that is taken at a site for a limited period of time to address one or more of the contamination problems, but not necessarily all of the contamination problems. For the purposes of this Proposed Plan, interim remedial actions are initiated at any time before the final remedial action to be taken in response to a final Record of Decision at the 100 Areas of the Hanford Site.

Land Disposal Restrictions - Regulations promulgated under RCRA that provide treatment standards and requirements on the generation, treatment, storage, and disposal of hazardous waste.

National Priorities List - A list of top-priority hazardous waste sites in the United States that are eligible for investigation and cleanup under the Superfund law.

Observational Approach - A method of planning, designing, and implementing a remedial action that uses a limited amount of initial field characterization data to create a general understanding of the site conditions. Information that is gathered during the remedial action phase is used to make real-time decisions to guide the remedial action. This method is considered more cost and time effective than traditional methods that require large amounts of initial data to make very detailed plans and designs for remedial actions.

Operable Unit - As applied to the Hanford Site, an Operable Unit is a group of land disposal sites placed together for the purposes of investigation and subsequent cleanup actions.

Plug-in Approach - An approach to the selection of a preferred remedial alternative at sites that contain multiple subsites that are similar physically and share common contaminants above remediation goals.

Proposed Plan - The plan that presents the preferred alternative for remedial action of waste sites to the public by the responsible parties.

Qualitative Risk Assessment – An evaluation of risk for a predefined set of human and environmental exposure scenarios that assists Tri-Party signatories in making decisions on the necessity of interim remedial measures.

Record of Decision - The formal document in which the lead regulatory agency sets forth the selected remedial measure and the reasons for its selection.

Remedial Alternative - General or specific actions that are evaluated to determine the extent to which they can eliminate or minimize threats posed by contaminants to human health and the environment.

Remediation Goals - Contaminant concentrations, usually risk-based that, when exceeded at a CERCLA waste site, require cleanup.

Site Profile - A range of characteristics for which a standard remedial action will be successful.

Solid Waste Management Units – any discernable location where solid wastes have been placed at any time, irrespective of whether the location was intended for the management of solid or dangerous waste. Such locations include any area at a facility at which solid wastes, including spills, have been routinely and systematically released. Solid waste management units are required under RCRA to be cleaned up under the RCRA Section 3004(u) corrective action program.

Standard Remedy – A common remedial action remedy applied to multiple waste sites that was established through previous CERCLA decisionmaking actions for similar waste sites.

To Be Considered - Generally unpromulgated criteria, advisories, or guidance that are used with discretion to define cleanup parameters at a site. Not considered "applicable or relevant and appropriate" requirements.

Waste Sites - Sites that are contaminated or are potentially contaminated due to past operations. Contamination may be contained in environmental media, such as soil or groundwater, or in manmade structures or waste, such as debris.

APPENDIX A

100 AREA REMAINING SITES

Table A-1. 100 Area Remaining Sites for Remove/Treat/Dispose. (7 Pages)

Operable Unit	Site Name	Current Site Knowledge	Media/ Material	Potential Contaminants	Estimated Volume for Disposal (LCY [a])	Estimated Cost of Site Remediation
100-BC-1 (CERCLA site -EPA lead)	116-B-7 (1904-B1 Outfall Structure)	Received B Reactor process effluent for discharge to pipelines to the Columbia River. Site consists of an open concrete sump and a concrete spillway from the sump to the river shoreline. Currently enclosed with aviary exclusion wire and cyclone fence. Spillway has been covered with soil to an unknown depth. Outfall structure is 8.2 x 4.3 x 6.4 m deep (27 x 14 x 21 ft deep). (References: Carpenter 1994, DOE-RL 1992e, DOE-RL 1994e, EPA 1996)	Concrete, soil	Cs-137, Co-60, Eu-152, Eu-154, Eu-155, H-3, Ni-63, Sr-90	494	$229,585
	128-B-3 (Coal Ash and Demolition Waste Site)	Formerly used for burning nonradioactive, combustible wastes and disposal of solid building demolition waste. Chemical-stained soil and stressed vegetation visible along the river banks. Vegetation-covered depression 137.2 x 18.3 m (450 x 60 ft). Operated 1944-1968. This site includes former waste site 600-57. (References: Carpenter 1994, DOE-RL 1992e, EPA 1996)	Soil, construction debris	Undetermined organic and inorganic chemicals	17,250	$2,056,748
	132-B-6 (1904-B2 Outfall Structure)	Received B Reactor effluent for discharge to effluent pipelines to the Columbia River. Concrete outfall structure and spillway reduced to grade and covered with clean soil. Underground 1.7-m (66-in) effluent discharge line remains in place. Operated 1954-1969. Surface radionuclide contamination is reported to be present. Site is 8.2 x 4.3 m (27 x 14 ft); total depth assumed to be 6.4 m (21 ft); overburden depth unknown. (References: Carpenter 1994; DOE-RL 1992e, 1994e; EPA 1996)	Concrete, soil	Cs-137, Co-60, Eu-152, Eu-154, Eu-155, H-3, Ni-63, Sr-90	446	$226,298
	132-C-2 (1904-C Outfall Structure)	Received C Reactor effluent and process sewer effluent for discharge effluent pipelines to the Columbia River. Concrete outfall structure and spillway reduced to grade and covered with clean soil. Operated 1952-1969. Surface radionuclide contamination is reported to be present. Site is 16 x 8.2 x 6.4 m deep (52 x 27 x 21 ft deep); overburden depth unknown. (References: Carpenter 1994; DOE-RL 1992e, 1994e; EPA 1996)	Concrete, soil	Cs-137, Co-60, Eu-152, Eu-154, Eu-155, H-3,Ni-63, Sr-90	1,536	$399,619
100-DR-1 (CERCLA site -EPA lead)	100-D-1 (Contaminated Storm Drain)	Received radioactive and hazardous liquid waste leakage from 116-D-7 (107-D) retention basin. Site is a concrete storm drain system, 1 x 1 m (3.3 x 3.3 ft) box (depth unknown) covered with steel plate. It is attached to underground 22.5-cm (9-in.) piping running from the south side of the patrol road to the 1904-D Outfall. (References: Carpenter 1993, EPA 1996)	Concrete, steel, soil	Undetermined radionuclides (beta and gamma)	75	$151,201
	100-D-2 (Lead Sheeting)	Lead sheeting was not removed from concrete pad when pad was buried during demolition of 190-D Building in 1995. Located near the 190-D Annex, 1.2 x 1.2 m (4 x 4 ft). Purpose unknown. (References: Carpenter 1993, EPA 1996)	Lead, concrete	Pb	1	$19,298
	100-D-3 (Silica Gel Burial Site)	Received silica gel from the 115-D/DR drying towers. May also be the site of the 100-D Pluto Crib. Potentially contaminated with radioactive and hazardous materials. Site is in a vegetation-free graveled lot; site dimensions are unknown. (References: Carpenter 1993, EPA 1996)	Soil, silica gel	C-12, radionuclides, inorganic, organic chemicals	477	$188,527

Table A-1. 100 Area Remaining Sites for Remove/Treat/Dispose. (7 Pages)

Operable Unit	Site Name	Current Site Knowledge	Media/ Material	Potential Contaminants	Estimated Volume for Disposal (LCY [a])	Estimated Cost of Site Remediation
100-DR-1 (cont.)	100-D-19 (Sludge Trench near 116-D-7)	Received reactor process effluent containing radioactive and hazardous contaminants from the 116-D-7 (107-D) retention basin during fuel cladding failures. Dimensions unknown. (References: Carpenter 1993, DOE-RL 1992b, WHC 1993)	Soil	Co-60, Cs-137, Eu-152, Eu-155, U-138, Cr VI	8,202	$1,075,555
	100-D-31 (Process Sewer System)	Carried water treatment waste and rainwater runoff to outfall 116-D-5 until 1977. The process sewer drainage was diverted solely to the 120-D-1 100-D Ponds from 1977 to 1994. Site does not include process sewer for reactor facilities or reactor process effluent. Dimensions unknown. (Reference: WIDS)	Concrete, steel, soil	Cr, Hg, undetermined radionuclides and organic chemicals	5,547	$2,386,452
	116-D-5 (1904-D Outfall Structure)	Received reactor process effluent from the 116-D-7 retention basin from 1944 to 1975. Also received process waste water from 183-D, 184-D, 190-D, 185/189-D, and other miscellaneous facilities. Located 122 m (400 ft) west of the 116-D-7 retention basin on the bank of the Columbia River. The structure is 18.3 x 7.3 m (60 x 24 ft); depth unknown. (References: Carpenter 1993; DOE-RL 1992b, 1994g; EPA 1996; WHC 1993)	Concrete, steel, soil	C-14, Cs-137, Sr-90, U-235, U-238, Pu-239/240, undetermined inorganic chemicals	1,633	$391,615
	116-DR-5 (1904-DR Outfall Structure)	Received reactor process effluent from the 116-DR-9 retention basin. Located 91 m (300 ft) north of the northwest corner of the 107-D retention basin. Structure is 8.2 x 4.3 m (27 x 14 ft); depth unknown. (References: Carpenter 1993; DOE-RL 1992b, 1994g; EPA 1996; WHC 1993)	Concrete, steel, soil	C-14, Cs-137, Sr-90, U-235, U-238, Pu-239/240, undetermined inorganic chemicals	442	$213,890
	120-D-2 (186-D Waste Acid Reservoir)	Designated as a waste site because lead flashing was not removed when the facility was demolished in place in 1979. Located at the northeast corner of the 186-D Building; 28 x 28 x 4 m deep (92 x 92 x 14 ft deep) pit constructed of acid-proof brick, waterproof membrane, vitrified pipe, #8 lead flashing, and gunnite. Facility never used (no records found to document use). (References: Carpenter 1993, EPA 1996)	Brick, lead	Pb	7,022	$2,058,138
100-DR-2 (RCRA site - Ecology lead)	100-D-12 (Sodium Dichromate and Acid Unloading Station)	Received sodium dichromate and sulfuric acid solutions in water from flushing and draining of hoses and pipelines connected to railcars and trucks for unloading. Test pits during the 100-DR-2 Limited Field Investigation (LFI) (DOE-RL 1995c, p. D-78) found chromium VI and radionuclides above Hanford Site background. Dimensions unknown. Has adjacent 0.9-m- (3-ft) diameter french drain. (References: Carpenter 1993, DOE-RL 1995c)	Concrete, steel, soil	Cs-137, Eu-152, Th-228, Sulfate, Cr VI	579	$196,177
	116-D-8 (100-D Cask Storage Pad)	Concrete pad and two associated French drains contaminated by radionuclides, potassium borate, and other inorganic chemicals. Dimensions unknown. (References: Carpenter 1993, EPA 1996)	Concrete, steel, soil	Cs-137, Eu-152, Th-228, U-238	5,957	$902,645

Table A-1. 100 Area Remaining Sites for Remove/Treat/Dispose. (7 Pages)

Operable Unit	Site Name	Current Site Knowledge	Media/ Material	Potential Contaminants	Estimated Volume for Disposal (LCY [a])	Estimated Cost of Site Remediation
100-DR-2 (cont.)	116-DR-7 (Inkwell Crib)	Received liquid potassium borate solution contaminated with radionuclides. Site is 1.5 x 1.5 x 3 m deep (5 x 5 x 10 ft deep). One or two 2,082-L (550-gal) storage tanks may also be buried at the site. (References: Carpenter 1993, EPA 1996)	Soil	Cs-137, Eu-152, Th-228, U-238	163	$146,689
100-FR-1 (CERCLA site -EPA lead)	116-F-8 (1904-F Outfall Structure)	Received reactor process effluent from the 116-F-14 retention basin. Demolished concrete structure formerly 8.2 x 4.3 x 7.9 m deep (27 x 14 x 26 ft deep). Area is marked with underground radioactive contamination warning signs. Lower part of spillway is exposed and intact. (References: Deford 1994; DOE-RL 1992a, 1994d; EPA 1996)	Concrete, soil, steel	Co-60, Eu-152, Eu-154, Eu-155	402	$230,601
	116-F-15 (108-F Radiation Crib)	Concrete sump in the ground floor of the 108-F Radiobiology Laboratory. Received drainage from lab floor and hood drains. Sump is 0.9 x 0.9 x 0.9 m deep (3 x 3 x 3 ft deep). (References: Deford 1994, Harris 1996)	Concrete, steel	Pu-239/240, Sr-90, U--238, Pb	2	$20,193
	116-F-16 (PNL Outfall)	Concrete spillway connected to the 116-F-8 Outfall, which received waste water from the 100-F-29 EAF sewers. Most of the spillway has been backfilled, but a portion near the river shoreline is visible. Dimensions are 30.5 x 4.6 m (100 x 15 ft). (References: Deford 1994; DOE-RL 1992a, 1994d; EPA 1996)	Concrete, steel, soil	Cs-137, Pu-239/240, Sr-90	894	$312,063
	1607-F2 (Septic tank and drain field)	Received sanitary wastes from the 190-F, 105-F, 108-F, and other buildings. Marked with underground radioactive material warning signs. Reinforced concrete septic tank is 8.1 x 3.5 x 4.1 m deep (27 x 12 x 14 ft deep); drain field is 3,107 m^2 (33,408 ft^2). (References: Deford 1994, EPA 1996)	Concrete, tile, pipe, soil	Undetermined radionuclides	24,432	$2,825,824
	1607-F6 (124-F-6 Septic tank and drain field)	Received sanitary sewage from the 146-F and 146-FR Buildings. Site contains of two concrete tanks (each 0.9 m [3 ft] long by 0.9 m [3 ft] diameter), a steel tank 1.9 m (6.25 ft) long by 1.83 m (6 ft) diameter, a drain field, and pipelines. The drain field is 280 m^2 (3,000 ft^2). (References: Deford 1994, EPA 1996)	Concrete, metal, tile, soil	Undetermined organic and inorganic chemicals	2,157	$385,893
100-FR-2 (CERCLA site -EPA lead)	100-F-2 (Strontium Gardens)	PNL ecological study garden formerly used for growing plants in soils containing radionuclides. Site is completely enclosed by a 24 x 9 x 3 m tall (80 x 30 x 10 ft tall) screen structure. (References: Deford 1994; DOE-RL 1995a [Appendix L], 1995c; EPA 1996)	Soil	Cs-137, Sr-90	2,011	$414,521
	120-F-1 (Glass Dump)	Site is an open trench, 10.7 x 2.4 x 1.2 m deep (35 x 8 x 4 ft deep) containing approximately 0.6 m (2 ft) of fluorescent tubes, light bulbs, vacuum tubes, small batteries, and empty chemical bottles. (References: Deford 1994; DOE-RL 1995a [Appendix L], 1995c; EPA 1996)	Debris, soil	Undetermined inorganic chemicals	48	$130,139

Table A-1. 100 Area Remaining Sites for Remove/Treat/Dispose. (7 Pages)

Operable Unit	Site Name	Current Site Knowledge	Media/ Material	Potential Contaminants	Estimated Volume for Disposal (LCY [a])	Estimated Cost of Site Remediation
100-HR-1 (CERCLA site -EPA lead)	100-H-11 (Expansion Box French Drain E)	The site is a french drain inside a concrete expansion box next to the south wing of the 105-H Reactor. A 1.5-m- (5-ft) diameter effluent line makes a 40-degree turn in the box, and the drain was designed to drain any leaks from the pipe. Dimensions unknown. (References: Deford and Einan 1995, EPA 1996)	Concrete, soil, steel	Undetermined radionuclides	72	$153,712
	100-H-12 (Expansion Box French Drain F)	The site is a french drain inside a concrete expansion box next to the 105-H Reactor. A 1.5-m- (5-ft) diameter effluent line makes a 90-degree turn in the box, and the drain was designed to drain any leaks from the pipe. The manhole access to the box is blocked with lead bricks to shield from a high dose. Dimensions unknown. (References: Deford and Einan 1995, EPA 1996)	Concrete, soil, steel, lead	Pb, undetermined radionuclides	72	$153,712
	100-H-13 (French Drain G)	The site is a 1.2-m- (4-ft) diameter vitrified clay pipe with a 6.3-cm (2.5-in.) steel pipe entering from the 105-H Reactor. The purpose of the drain and pipe are not known. (References: Deford and Einan 1995, EPA 1996)	Vitrified clay, steel	Undetermined radionuclides	72	$153,712
	100-H-14 (Surface contamination Zone H)	Surface contamination zone of unknown origin next to the south wall of the 105-H Reactor Building fuel storage basin. Contamination was stabilized with 46 to 61 cm (18 to 24 in.) of soil and marked as subsurface contamination. The source of the contamination and dimensions of the contaminated area are unknown. (References: Deford and Einan 1995, EPA 1996)	Soil	Undetermined radionuclides	1,022	$256,644
	100-H-22 (Effluent Pipeline Leak)	Soil at this site was contaminated by leakage from the 105-H Reactor process effluent pipeline. Sampling in 1971 showed radioactivity of the soil was less than detection levels. Dimensions unknown. (References: Deford and Einan 1995; DOE-RL 1992c, 1993b; EPA 1996)	Soil	Co-60, Eu-152, Cr VI	4,153	$656,276
	100-H-24 (151-H Substation, Laydown Yard)	Sampling of stained soil in 1991 showed polychlorinated biphenyl levels below Toxic Substances Control Act cleanup levels (seven samples). The site is described in WIDS as a demolition landfill from the demolished 151-H electrical substation. Site dimensions are 125 x 84 x 3.4 m deep (410 x 276 x 11 ft deep). (References: DOE-RL 1993b, EPA 1996)	Soil	PCBs	532	$183,555
	100-H-31 (PCB in soil at 105-H Reactor)	Sampling of stained oil in 1991 at this former location of an electrical substation found 1,200 ug/kg of Aroclor-1260 in one soil sample. Dimensions of the waste site are unknown. (References: DOE-RL 1993b, EPA 1996)	Soil	PCBs	72	$153,712
	116-H-5 (1904-H Outfall Structure)	Received H Reactor process effluent for discharge to pipelines to the Columbia River. This site is a former concrete structure that was demolished in place. Dimensions of the structure were 8.2 x 4.3 m (27 x 14 ft); depth unknown. Site is covered with 3 m (10 ft) of soil. (References: Deford and Einan 1995; DOE-RL 1992c, 1993b; EPA 1996)	Concrete, steel, soil	Co-60, Sr-90, Cs-137, Eu-152, Eu-154, Pu-239/240, Cr VI	193	$173,706

Table A-1. 100 Area Remaining Sites for Remove/Treat/Dispose. (7 Pages)

Operable Unit	Site Name	Current Site Knowledge	Media/ Material	Potential Contaminants	Estimated Volume for Disposal (LCY [a])	Estimated Cost of Site Remediation
100-HR-1 (cont.)	116-H-9 (117-H Crib for drainage of Filter Building Seal Pits)	Gravel-filled crib 6.1 x 6.1 x 4.6 m deep (20 x 20 x 15 ft deep) that received drainage from the 117-H Filter Building seal pits. Drainage entered through an 80-m (263-ft) long 10.2-cm (4-in.) cement-asbestos pipe. Crib received short-lived radionuclides that have decayed. Site was released from radiation controls in 1967, and the 100-HR-1 LFI (DOE-RL 1993b) concluded that the site was "a clean site." However, the crib remains listed as a Class V underground injection well. (References: Deford and Einan 1995; DOE-RL 1992c, 1993b; EPA 1996)	Soil, concrete asbestos	Cs-137, Eu-152, Ra-226, Th-228, Th-232, U-238	83	$149,018
	1607-H2 (Septic Tank and Drain Field)	Received sanitary sewage from the 182-H, 183-H, 190-H, and all 1700 maintenance service buildings. Concrete septic tank reported to be 12.2 x 3 x 2.5 m deep (40 x 10 x 8.3 ft deep); drain field is 91.5 x 30.5 m (300 x 100 ft). Septic tank sludge samples showed elevated heavy metal concentrations. (References: Deford and Einan 1995, DOE-RL 1993b, EPA 1996)	Soil, concrete, tile	Ag, As, Ba, Cd, Ar, Cu, Hg, Ni, Pb, Zn, Sulfate, Co-60, Cs-137, Eu-152, Ra-226, Th-228, Th-232	21,858	$2,556,444
	1607-H4 (Septic Tank and Drain Field)	Received sanitary sewage from the 181-H River Pumphouse. The size and construction material are unknown; a 1990 ground penetrating radar survey showed underground pipes that ended abruptly, without detecting a septic tank. LFI sampling showed heavy metal contamination around the discharge pipe to the former septic tank. Tank is believed to have been 1.2 x 0.6 x 2.5 m deep (4 x 2 x 8 ft deep). The drain field is believed to be 36 m^2 (384 ft^2). (References: Deford and Einan 1995, DOE-RL 1993b, EPA 1996)	Soil	Ba, Cu, Pb, Zn, Cs-137, Eu-152, Ra-226, Th-228, Th-232, U-233/234, U-238	2,607	$428,422
100-KR-1 (CERCLA site -EPA lead)	116-K-3[a] (1904-K Outfall Structure)	Formerly received KE and KW Reactor process effluent for discharge to pipelines to the Columbia River. Currently regulated by a U.S. EPA NPDES outfall permit to discharge clean process cooling water and water treatment effluent to the Columbia River. The outfall structure is a reinforced concrete water box with attached spillway 10 x 10.7 x 7 m deep (33 x 35 x 23 ft deep). (References: Deford and Einan 1995; DOE-RL 1992c, 1993b; EPA 1996)	Concrete, steel, soil	Co-60, Sr-90, Cs-137, Eu-152, Eu-154, Pu-239/240	2,098	$551,904
100-KR-2 (CERCLA site -EPA lead)	100-K-14 (183-KE Acid Neutralization Pit and Overflow French Drain)	Received sulfuric acid overflow from the 183-KE day-use acid tank. The excavation for the drain was 1.5 m (5 ft) wide, 4.6 m (15 ft) deep. It was filled with aggregate to 17.5 cm (7 in.) from the top and covered with a limestone layer 12.5 cm (5 in.) deep. The steel cover of the pit is west of the alum storage tanks, south of the southwest corner of the 183-KE water treatment plant chlorine storage building. (Reference: Carpenter and Cote 1994)	Soil	As, Ba, Cd, Cr, Pb, Hg, Ag, Se, Sulfate	78	$154,462
	100-K-18 (183-KW Caustic Neutralization Pit)	The site is a lined pit used to neutralize caustic solutions before disposal to the process sewer system. The pit is a 2.5 x 2 x 0.9 m deep (8.3 x 6.3 x 3 ft deep) brick-lined concrete box located 2.4 m (8 ft) southwest of the sulfuric acid tank at the 183-KW water treatment plant. (References: Carpenter and Cote 1994, DOE-RL 1994a)	Concrete, brick	As, Ba, Cd, Cr, Pb, Hg, Ag, Se	15	$115,472

Table A-1. 100 Area Remaining Sites for Remove/Treat/Dispose. (7 Pages)

Operable Unit	Site Name	Current Site Knowledge	Media/ Material	Potential Contaminants	Estimated Volume for Disposal (LCY [a])	Estimated Cost of Site Remediation
100-KR-2 (cont.)	100-K-34 (183-KW Acid Neutralization Pit)	Received sulfuric acid tank transfer and overflow waste for neutralization before draining to the process sewer. The pit is a 2.5 x 2 x 1.5 m deep (8.3 x 6.3 x 5 ft deep) brick-lined concrete box located adjacent to the west outside wall of the 183-KW water treatment plant building and just north of the chlorine storage building. (References: Carpenter and Cote 1994, DOE-RL 1994a)	Concrete, brick	As, Ba, Cd, Cr, Pb, Hg, Ag, Se, Sulfate	22	$117,014
	100-K-42[a] (105-KE Fuel Storage Basin)	The site is the fuel storage basin for the 105-KE Reactor. Although the basins originally served the K Reactors, N Reactor spent nuclear fuel was accumulated in the K basins from 1979 through 1987. Approximately 2,100 metric tons of spent nuclear fuel remain in the K Basins. A portion of the fuel elements in the 105-KE fuel storage basin and the concrete of the basin walls have degraded leaving sludge, fuel particles, and debris which must be removed before remediation of this site can occur. (References: Carpenter and Cote 1994)	Concrete, soil	Co-60, Sr-90, Cs-137, Eu-152, Eu-154, Pu-239/240	6,719	$1,098,786
	100-K-43[a] (105-KW Fuel Storage Basin)	The site is the fuel storage basin for the 105-KW Reactor. Although the basins originally served the K Reactors, N Reactor spent nuclear fuel was accumulated in the K basins from 1979 through 1987. Approximately 2,100 metric tons of spent nuclear fuel remain in the K Basins. The fuel elements in the 105-KE fuel storage basin and the concrete of the basin walls have degraded leaving sludge, fuel particles, and debris which must be removed before remediation of this site can occur. (References: Carpenter and Cote 1994)	Concrete, soil	Co-60, Sr-90, Cs-137, Eu-152, Eu-154, Pu-239/240	2,009	$1,559,047
	100-K-53 (100-KE Glycol Underground Pipelines)	Underground 0.5- m- (1.5-ft) diameter steel supply and return pipelines that transported ethylene glycol solutions between the 150-KE heat recovery station (116-KE-5) and the 165-KE Powerhouse. Length of the two parallel pipes is approximately 300 m (1,000 ft) each. (References: Carpenter and Cote 1994, DOE-RL 1992d)	Steel, soil	Ethylene glycol	191	$745,078
	100-K-54 (100-KW Glycol Heat Recovery Underground Pipelines)	Underground 0.5-m- (1.5-ft) diameter steel supply and return pipelines that transported ethylene glycol solutions between the 150-KW heat recovery station (116-KW-4) and the 165-KW Powerhouse. The pipelines originate at 116-KW-4 and end at 165-KW Building north wall. Length of the two parallel pipes is approximately 300 m (1,000 ft) each. (References: Carpenter and Cote 1994, DOE-RL 1994c)	Steel, soil	Ethylene glycol	191	$745,078
	120-KE-1 (183-KE Filter Water Facility Dry Well)	Received sulfuric acid and sulfuric acid sludge for neutralization before draining to the process sewer system. The site is a brick-lined concrete box 2.5 x 2 x 1.5 m deep (8.3 x 6.3 x 5 ft deep) that contained crushed limestone. During the time this facility operated, sulfuric acid and sludge were contaminated with mercury. Identical to 120-KW-1. (References: Carpenter and Cote 1994, DOE-RL 1994a, EPA 1996)	Concrete, brick	As, Ba, Cd, Cr, Pb, Hg, Ag, Se, Sulfate	22	$117,014

Table A-1. 100 Area Remaining Sites for Remove/Treat/Dispose. (7 Pages)

Operable Unit	Site Name	Current Site Knowledge	Media/ Material	Potential Contaminants	Estimated Volume for Disposal (LCY [a])	Estimated Cost of Site Remediation
100-KR-2 (cont.)	120-KE-2 (183-KE Filter Waste Facility French Drain)	French drain used from 1955 to 1971 for disposal of sulfuric acid sludge removed from sulfuric acid tanks. A 0.9-m- (3-ft) diameter, 1.8-m- (6-ft) long vitrified clay pipe was placed vertically in an excavation 4 m (13 ft) across and 3.4 m (11 ft deep). The bottom 0.3 m (1 ft) of the pipe and bottom 1.5 to 1.8 m (5 to 6 ft) of the excavation were filled with coarse rock. Identical to 120-KW-2. (References: Carpenter and Cote 1994, EPA 1996)	Soil, Clay Pipe	As, Ba, Cd, Cr, Pb, Hg, Ag, Se, Sulfate	123	$160,115
	120-KW-1 (183-KW Filter Water Facility Dry Well)	Received sulfuric acid and sulfuric acid sludge for neutralization before draining to the process sewer system. The site is a brick-lined concrete box 2.5 x 2 x 1.5 m deep (8.3 x 6.3 x 5 ft deep) that contained crushed limestone. During the time this facility operated, sulfuric acid and sludge were contaminated with mercury. Identical to 120-KE-1. (References: Carpenter and Cote 1994; DOE-RL 1994a, 1995a [Appendix K]; EPA 1996)	Concrete, brick	As, Ba, Cd, Cr, Pb, Hg, Ag, Se, Sulfate	15	$115,472
	120-KW-2 (183-KW Filter Water Facility French Drain)	French drain used from 1955 to 1971 for disposal of sulfuric acid sludge removed from sulfuric acid tanks. A 0.9-m- (3-ft) diameter, 1.8-m- (6-ft) long vitrified clay pipe was placed vertically in an excavation 4 m (13 ft) across and 3.4 m (11 ft deep). The bottom 0.3 m (1 ft) of the pipe and bottom 1.5 to 1.8 m (5 to 6 ft) of the excavation were filled with coarse rock. Identical to 120-KE-2. (References: DOE--RL 1994a, EPA 1996)	Soil, Clay Pipe	As, Ba, Cd, Cr, Pb, Hg, Ag, Se, Sulfate	123	$160,115
100-IU-6 (CERCLA site - EPA lead)	600-149 (Small Arms Range)	The site was used from the 1940s through the 1950s as a practice range for handguns, rifles, shotguns, machine guns, hand grenades, smoke bombs, and other small arms and incendiary devices. Rubble, wire, lead bullets, and transite piping remnants are scattered about the site. The area containing lead bullets measures approximately 92 x 6 x 1.5 m deep (300 x 20 x 5 ft deep). (References: Deford 1995, DOE-RL 1996)	Soil, lead, transite, misc. debris	Pb	1,278	$239,035
TOTALS: 46 Remaining Sites for Remove/Treat/Dispose					123,390	$25,859,176

NOTE: See 100 Area Source Operable Unit Focused Feasibility Study (DOE/RL-94-61), Appendix N, Section N5.0 for references cited throughout this table.

[a] This site is an active waste management unit where hazardous substances have been potentially released or a substantial threat of a release of a hazardous substance exists. While these units are currently in service in support of DOE project activities, they are planned to be taken out of service by DOE when the project mission for these units has been completed and addressed by the selected remedy specified in the 100 Area Remaining Sites Interim ROD.

LCY = Loose Cubic Yards

Table A-2. Candidate 100 Area Remaining Sites for Plug-in of Remove/Treat/Dispose. (18 Pages)

Operable Unit	Site Name	Current Site Knowledge	Media/ Material	Potential Contaminants	Estimated Cost of Sampling
100-BC-1 (CERCLA site - EPA lead)	100-B-3 (Former Hot Thimble Burial Ground)	Undocumented solid waste site. A highly contaminated vertical thimble was removed from the 105-B Reactor Building in 1952 and temporarily buried in a trench at this site. The thimble was later removed and taken to another burial ground. Radioactive and nonradioactive contaminants may remain in the unlined trench, which was approximately 30 x 7.6 x 6.1 m deep (100 x 25 x 20 ft deep). (References: Carpenter 1994, DOE-RL 1992e, EPA 1996)	Soil	H-3, C-14, Co-60, Sr-90, Cs-137, Eu-152, Eu-154, Cd, Hg, Pb, undetermined organic chemicals	$97,235
	100-B-5 (Effluent Vent Disposal Trench)	Site is result of leakage that occurred at a junction box for reactor effluent pipeline. This site is within the larger "Underground Radioactive Material" area extending the length of the effluent pipeline. The site is about 30 x 3 x 3 m deep (100 x 10 x 10 ft deep). (Reference: Carpenter 1994)	Soil	Undetermined radionuclides, Cr VI	$52,638
	100-B-10 (107-B Basin Leak and Warm Springs)	In February 1949 several warm springs were observed along the Columbia River below the 100-B Area Retention Basin. The springs were attributed to leaks in the 116-B-11 retention basin. Samples of the water in 1949 showed 4 nCi/L beta activity. Dimensions unknown. (Reference: DOE-RL 1992e)	Soil	Undetermined radionuclides, Cr VI	$52,638
	116-B-15 (Cleanout Percolation Pit)	Received treated water from the 105-B Fuel Storage Basin cleanup project. Contaminated water was processed through filters and an ion exchange system before discharge. Site is an open excavated pit 30.5 x 15.2 x 1.8 m deep (100 x 50 x 6 ft deep) with cobble and soil walls. (References: Carpenter 1994, DOE-RL 1992e)	Soil	Co-60, Sr-90, Cs-137, Eu-155, U-238, Cr VI	$49,203
	120-B-1 (Battery Acid Sump)	Site is a concrete-lined sump, cleaned in 1986, immediately adjacent to the 105-B Reactor Building. Sump was formerly used for disposal of waste battery acid, solvents, and ethylene glycol. Dimensions not stated. (References: Carpenter 1994, DOE-RL 1992e, EPA 1996)	Concrete, soil	Cr VI, Pb, Hg, ethylene glycol, undetermined organic chemicals	$64,663
	126-B-3 (184-B Coal Pit)	Solid waste site; Inert Landfill. Received non-hazardous, non-radioactive solid waste and demolition debris. Unlined pit 122 x 69 x 3 m deep (400 x 225 x 10 ft deep).	Concrete, soil	Lead (batteries)	$100,201
	128-B-2 (100-B Burn Pit No. 2)	Used for burning of nonradioactive, combustible wastes, including office wastes, paint, and chemical solvents. Unlined pit 137.2 x 15.2 x 9.1 m deep (450 x 50 x 30 ft deep). (References: Carpenter 1994, DOE-RL 1992e, EPA 1996)	Soil, concrete, misc. debris	Undetermined organic and inorganic chemicals	$176,869
	132-B-1 (108-B Tritium Separation Facility)	Facility originally designed for mixing and adding chemicals for treatment of reactor cooling water. Later converted to tritium recovery. Building demolished to 3 m (10 ft) below grade; any contaminated rubble left in situ. The site is 45 x 10 m (150 x 32 ft),depth unknown. (References: Carpenter 1994, DOE-RL 1992e, EPA 1996)	Soil, concrete	Tritium (H-3)	$51,350
	132-B-3 (108-B Ventilation Exhaust Stack Site)	Stack and foundation were decontaminated, decommissioned, and demolished using explosives in 1983. Allowable residual contaminant level (ARCL) report calculations predicted 2.2 mrem/yr exposure from a radionuclide inventory of 21 mCi. Burial trench 9.1 x 76 x 5.5 m deep (30 x 250 x 18 ft deep). Trench and rubble covered with clean fill. (References: Carpenter 1994, EPA 1996)	Concrete, steel liner, soil	Undetermined radionuclides	$80,057

Table A-2. Candidate 100 Area Remaining Sites for Plug-in of Remove/Treat/Dispose. (18 Pages)

Operable Unit	Site Name	Current Site Knowledge	Media/ Material	Potential Contaminants	Estimated Cost of Sampling
100-BC-1 (cont.)	132-B-4 (117-B Filter Building)	Building was decontaminated, decommissioned, and demolished in situ. ARCL report calculations predicted less than 1 mrem/yr exposure from a radionuclide inventory of 92 nCi. Rubble was buried from 1 to 5 m deep (3.3 to 16 ft deep) under clean fill. Building was originally reinforced concrete 18.3 x 12 m (59 x 39 ft) and 10.7 m (35 ft) high, with only 2.4 m (8 ft) above grade. (References: Carpenter 1994, EPA 1996, DOE-RL 1993a)	Concrete, soil	H-3, C-14, Sr-90, Cs-137, Pu-239/240	$95,088
	132-B-5 (115-B/C Gas Recirculation Facility)	Building was decontaminated, decommissioned, and demolished in situ. ARCL report calculations predicted 17 mrem/yr exposure. The facility contained vacuum and pressure seal pits and tunnels. The site is 51 x 30 x 3.4 m deep (168 x 98 x 11 ft deep). (References: Carpenter 1994, EPA 1996, DOE-RL 1993a)	Concrete, soil	H-3, C-14, Co-60, Sr-90, Cs-137, Eu-152, Pu-239	$69,188
	1607-B2[a] (124-B-2 Septic System)	Received sanitary wastes from office buildings, 105-B Reactor, and 190-B Pumphouse. Reinforced concrete septic tank and tile drain field. Top visible, has two steel manhole covers on concrete slab. Site is reported to be 7.6 x 3.5 x 4 m deep (25 x 11.5 x 13 ft deep). Drain field is 90 x 23 m (300 x 75 ft). (References: Carpenter 1994, EPA 1996)	Concrete, soil, steel, tile	Undetermined organic and inorganic chemicals	$72,945
	1607-B7 (124-C-1 Septic System)	Received sanitary sewage from 183-B Water Treatment Plant. Reinforced concrete septic tank and tile drain field. Tank is 1.8 x 1 x 2.5 m deep (6 x 3 x 8 ft deep); drain field is 71 m^2 (768 ft^2). (References: Carpenter 1994, EPA 1996)	Concrete, tile, soil	Undetermined organic and inorganic chemicals	$51,350
100-BC-2 (CERCLA site – EPA lead)	100-B-1[b] (Surface Chemical Dumping Area)	Undocumented solid and liquid waste site and laydown yard. Area approximately 45.7 x 30.5 m (150 x 100 ft) containing several surface dump sites. Depth of contamination unknown. Site reportedly smells of oil and other petrochemicals. Affected soils are vegetation-free. (Reference: Carpenter 1994)	Soil, concrete, miscellaneous debris	Petroleum hydrocarbons; Undetermined organic and inorganic chemicals	$74,126
	100-C-3 (119-C Sample Building French Drain)	Received water coolant from the heat exchanger for the air sampler and effluent from the building swamp cooler and floor drain. Site is a small French drain (approximately 0.6 m [2 ft] diameter) associated with the 119-C Sample Building. (Reference: Carpenter 1994)	Soil, unknown construction materials	Undetermined organic and inorganic chemicals	$52,495
	100-C-7 (183-C Filter Building Demolition Waste)	Building demolished with concrete contaminated with sodium dichromate left in place, along with steam pipe covered with asbestos. Remaining concrete backfilled to minimum of 1 m (3 ft). Site leveled to match existing terrain. Site is 93 x 88 x 3 m deep (305 x 290 x 10 ft deep). (Reference: WIDS)	Concrete, soil, steel, asbestos	Sodium dichromate	$120,703
	116-C-3 (Chemical Waste Tanks)	Two below ground storage tanks which may have never been used. The tanks were installed to receive caustic waste from the metal examination facility and may be filled with water. Both tanks are 3.7 m (12 ft) diameter x 3.7 m (12 ft) deep. (References: Carpenter 1994, EPA 1996)	Steel, soil	Undetermined organic and inorganic chemicals	$59,382
	116-C-6 (Percolation Pit)	Received treated water from the 105-C Fuel Storage Basin cleanup project. Contaminated water was processed through filters and an ion exchange system before discharge. Site is an unlined, "L"-shaped, open excavated pit with side lengths of 30.5 m, 30.5 m, 13.7 m, 16.8 m, and 15.2 m; total area of 674 m^2 (side lengths of 100 ft, 100 ft, 45 ft, 50 ft, 55 ft; total area of 7,250 ft^2). (Reference: Carpenter 1994)	Soil	Co-60, Sr-90, Cs-137, Eu-155, U-238, Cr VI	$52,638

Table A-2. Candidate 100 Area Remaining Sites for Plug-in of Remove/Treat/Dispose. (18 Pages)

Operable Unit	Site Name	Current Site Knowledge	Media/ Material	Potential Contaminants	Estimated Cost of Sampling
100-BC-2 (cont.)	128-C-1 (100-C Burning Pit)	Used for burning nonradioactive combustible materials and disposal of noncontaminated equipment and other solid waste. Site is 68.6 x 38 m (225 ft x 125 ft) and reportedly contains short-lived radionuclides. (References: Carpenter 1994, DOE-RL 1994f)	Soil, concrete, miscellaneous debris	Undetermined organic and inorganic chemicals	$77,792
	132-C-1 (105-C Reactor Stack Burial Ground)	Stack and foundation were decontaminated, decommissioned, and demolished using explosives in 1983. ARCL report calculations predicted 4.4 mrem/yr exposure from a radionuclide inventory of 2.8 millicuries. Site is an unmarked, vegetation-free cobble-covered field 61 m (200 ft) long, 9.2 m (30 ft) wide, and 4.6 m (15 ft) deep. (References: Carpenter 1994, DOE-RL 1994f)	Concrete	Co-60, Sr-90, Cs-137, Eu-154, Pu-238, Pu-239/240	$55,803
	132-C-3 (117-C Filter Building Site)	Building was decontaminated, decommissioned, and demolished in situ in 1988. ARCL report calculations exist. Rubble was buried from 1 to 5 m deep (3.3 to 16 ft) under clean fill. Building was originally reinforced concrete 18 x 12 m (59 x 39 ft) and 10.7 m (35 ft) high, with only 2.4 m (8 ft) above grade. (References: Carpenter 1994; DOE-RL 1994f, 1993c)	Concrete, soil	H-3, C-14, Sr-90, Cs-137, Eu-154, Eu-152, Pu-239/240	$95,088
	1607-B8 (Septic Tank and Drain Field)	Received sanitary sewage from 190-C Pumphouse. 1,325-L (350-gal) steel septic tank and tile drain field. Septic tank dimensions are 1.8 x 0.9 x 2.5 m deep (6 x 3 x 8.3 ft deep). Drain field is 59 m^2 (640 ft^2). (References: Carpenter 1994, EPA 1996)	Steel, tile, soil	Undetermined organic and inorganic chemicals	$51,350
	1607-B9 (Septic Tank and Drain Field)	Received sanitary sewage from 105-C Reactor. 9,085-L (2,400-gal) septic tank and tile drain field. Septic tank dimensions are 4.3 x 0.9 x 2.5 m deep (14 x 3 x 8.3 ft deep). Drain field is 408 m^2 (4390 ft^2). (References: Carpenter 1994, EPA 1996)	Concrete, tile, soil	Undetermined organic and inorganic chemicals	$51,350
	1607-B10 (Septic Tank and Drain Field)	Received sanitary sewage from headhouse of 183-C Water Treatment Plant. 1,325-L (350-gal) steel septic tank and tile drain field. Site dimensions are 4.6 x 9.1 m (15 30 ft), depth assumed to be 2.5 m (8.3 ft). Drain field is 59 m^2 (640 ft^2). (Reference: EPA 1996)	Steel, tile, soil	Undetermined organic and inorganic chemicals	$51,350
	1607-B11 (Septic Tank and Drain Field)	Received sanitary sewage from 183-C Filter Building and Pump Room. 1,325-L (350-gal) steel septic tank and tile drain field. Site dimensions are 4.6 x 9.1 m (15 x 30 ft), depth assumed to be 2.5 m (8.3 ft). Drain field is 59 m^2 (640 ft^2). (References: Carpenter 1994, EPA 1996)	Steel, tile, soil	Undetermined organic and inorganic chemicals	$51,350
100-DR-1 (CERCLA site – EPA lead)	100-D-8 (105-DR Process Sewer Outfall)	Received waste water from water treatment facilities, including chemical discharges from spills in the treatment facilities. Potential contamination from the 100-D Area Cask Pad storm drains. Site is upstream of the 181-D Pumphouse. Structure was demolished in 1978, and covered to blend with the riverbank appearance. Dimensions unknown. (Reference: Carpenter 1994)	Concrete, soil	Undetermined radionuclides and organic chemicals	$70,389
	100-D-7 (Dumping Area)	Solid waste surface dumping areas containing nonradioactive, non-hazardous waste including vitrified clay pipe, concrete cores, metal paint cans, and wood debris located north and east of the 128-D-2 burn pit. Approximate dimensions are: west area – 35 x 24 m (115 x 80 ft); northeast area – 80 x 45 m (260 x 120 ft); east area – 31 x 45 m (100 x 120 ft).	Concrete, tile, soil	Undetermined organic and inorganic chemicals	$96,300
	100-D-24 (119-D Sample Building French Drain)	Site drawing H-1-19810 shows an "existing dry well" located south of the 119-D Sample Building (demolished) that received drainage from a floor drain. A 5-cm (2-in) drain pipe 0.9 m (3 ft) below grade connected the building to the dry well. The site is not marked or posted, lies in a cobble-covered field, and cannot be distinguished. Dimensions unknown. (Reference: WIDS)	Soil	Undetermined radionuclides, inorganic and organic chemicals	$73,824

Table A-2. Candidate 100 Area Remaining Sites for Plug-in of Remove/Treat/Dispose. (18 Pages)

Operable Unit	Site Name	Current Site Knowledge	Media/ Material	Potential Contaminants	Estimated Cost of Sampling
100-DR-1 (cont.)	100-D-30 (Sodium Dichromate Soil Contamination)	Sodium dichromate soil contamination found after demolition of the 190-D Building. Also called 185-D NaCr Trench. Dimensions given are 93 x 1 m (304 x 3.3 ft). Site may be covered with 3 m (10 ft) of clean soil and rubble backfill from 190-D Building demolition. (Reference: WIDS)	Soil	Sodium dichromate	$48,645
	116-D-10 (105-D Fuel Storage Basin Cleanout Percolation Pits)	Received treated water from the 105-D Fuel Storage Basin cleanup project. Contaminated water was processed through filters and an ion exchange system before discharge. After an unplanned release, the two pits were excavated, contaminated soil was removed, and the site surveyed, released, and backfilled. West pit was 10.7 x 6.7 x 0.9 m deep (35 x 22 x 3 ft deep), under the backfill. East pit was 15.2 x 7.3 x 1.2 m deep (50 x 24 x 4 ft deep). (References: Carpenter 1994, EPA 1996)	Soil	Undetermined radionuclides	$51,350
	128-D-2 Burning Pit	Received noncontaminated graphite blocks and other solid wastes during reactor construction. Located about 180 m (600 ft) northeast of the 128-D-1 burn pit. Site is approximately 73 x 73 m (240 x 240 ft). No definite boundaries. Concrete and metallic debris exposed. Currently used to dispose of tumbleweeds. (References: Carpenter 1994, EPA 1996)	Soil, concrete, metals	Undetermined inorganic and organic chemicals	$123,037
	130-D-1[b] (1716-D Gasoline Storage Tank Site)	Former location of a steel underground gasoline storage tank (removed during 1989). Tank was part of the former 1706-D fuel station that operated from 1944 to 1968 and was used for storage of leaded gasoline. After removal of the tank, the site was backfilled without removal of contaminated soil. Dimensions unknown. (Reference: Carpenter 1994)	Soil	Petroleum hydrocarbons; Undetermined organic and inorganic chemicals	$52,940
	132-D-1 (115-D/DR Gas Recirculating Facility)	Building was decontaminated, decommissioned, and demolished in situ in 1985-1986. ARCL report calculations exist. Site consisted of a building with vacuum and pressure seal pits and tunnels to the 105-D and 105-DR Reactor Buildings. Site is 51 x 30 x 3.4 m deep (168 x 98 x 11 ft deep). Buried under at least 1 m (3.3 ft) of backfill. (References: Carpenter 1994, EPA 1996, DOE-RL 1994g)	Concrete, metal	H-3, C-14, Co-60, Sr-90, Cs-137, Eu-152, Pu-239	$72,513
	132-D-2 (117-D Filter Building)	Building was decontaminated, decommissioned, and demolished in situ in 1986. ARCL report calculations exist. The site is 18 x 12 x 8.2 m deep (59 x 39 x 27 ft deep). Contaminated rubble is buried a minimum of 1 m (3.3 ft) deep, except for seal pit rubble, which is buried under minimum of 5 m (16.4 ft) clean fill. (References: Carpenter 1994, EPA 1996, DOE-RL 1994g)	Concrete, soil	H-3, C-14, Co-60, Sr-90, Cs-137, Eu-152, Pu-239	$99,382
	132-D-3 (1608-D Waste Water/Effluent Pumping Station)	Building was decontaminated, decommissioned, and demolished in situ in 1986-1987. ARCL report calculations exist. Received water from reactor building drains (primarily fuel storage basin overflows) containing low-level radionuclides and decontamination chemicals. Pumped water from collection pits to 105-D Reactor process effluent pipelines. Site is 6.1 x 6.1 x 9.8 m deep (20 x 20 x 32 ft deep). (References: Carpenter 1994, EPA 1996, DOE-RL 1994g)	Concrete, soil	C-14, Sr-90, Tc-99, Ra-226, U-235, U-238, Pu-239, Am-241, undetermined organic chemicals	$128,823
	628-3 (Burn Pit)	Used for burning of nonradioactive, combustible wastes, including construction debris and chemical solvents. Depression in site center shows signs of severe plant stress and soil discoloration. Site is approximately 76 x 12.2 m (250 x 40 ft) and poorly defined. Site is littered with burned wood, nails, metal pipes, rebar, and glass debris. (References: Carpenter 1994, EPA 1996)	Soil, miscellaneous debris	Undetermined organic and inorganic chemicals, asbestos	$126,540
	1607-D4 (Septic Tank and Drain Field)	Received sanitary sewage from the 115-D/DR Gas Recirculation Building. Reinforced concrete tank is 1.2 x 0.6 m (4 x 2 ft), buried about 2.5 m (8 ft) deep. Tile drain field is 36 m^2 (384 ft^2). (References: Carpenter 1994, EPA 1996, DOE-RL 1994g)	Concrete, tile, soil	Cs-137, Eu-152, undetermined organic and inorganic chemicals	$61,657

Table A-2. Candidate 100 Area Remaining Sites for Plug-in of Remove/Treat/Dispose. (18 Pages)

Operable Unit	Site Name	Current Site Knowledge	Media/ Material	Potential Contaminants	Estimated Cost of Sampling
100-DR-1 (cont.)	1607-D5[a] (Septic Tank and Drain Field)	Received sanitary sewage from the 181-D River Pumphouse. Reinforced concrete tank is 1.2 x 0.6 m (4 x 2 ft), buried about 2.4 m (8 ft) deep. Tile drain field is 36 m^2 (384 ft^2). (References: Carpenter 1994, EPA 1996)	Concrete, tile, soil	Undetermined organic and inorganic chemicals	$61,657
	UPR-100-D-1[b] (Oil Soaked Soil)	Site is a small depression 0.6 m (2 ft) in diameter surrounded by oil-soaked soil. Natural vegetation partly obscures the site located east of the former location of the 190-D Building and south of a paved road. (Reference: Carpenter 1994)	Soil	Petroleum hydrocarbons; Undetermined organic chemicals	$46,912
100-DR-2 (RCRA site – Ecology lead)	100-D-13 (1607-DR3 Septic Tank and Drain Field)	Received sanitary sewage from temporary construction facilities and overflow from the water towers at 100-D and 100-DR Reactors. Site is described as an Imhoff tank with open pit drain field. Tank is reinforced concrete 8.2 x 3.8 x 7.3 m deep (27 x 13 x 24 ft deep); open pit drain field is 18.2 18.2 m (60 x 60 ft). (Reference: Carpenter 1994)	Concrete, soil, pipes	Undetermined radionuclides	$49,203
	100-D-15 (Solid Waste Burial Site/ Borrow Pit)	Received debris and miscellaneous waste described as non-radioactive and non-hazardous, including paint cans, solvent cans, and construction materials. Waste material has been dumped at two locations in a large borrow pit southeast of the 100-DR reactor facilities (Gravel Pit #21). (Reference: WIDS)	Concrete, metal, miscellaneous debris	Undetermined organic and inorganic chemicals	$126,540
	100-D-23 (119-DR Building French Drain)	Site drawing H-1-19810 shows an "existing dry well" that received floor drainage and effluent from evaporative cooler in the 119-D Sample Building (demolished). The site is not marked or posted, lies in a cobble-covered field, and cannot be distinguished. Dimensions unknown. (Reference: WIDS)	Soil	Undetermined radionuclides, inorganic and organic chemicals	$73,824
	100-D-27 (151-D Substation Transformer Leak)	Mineral oil containing less than 50 ppm PCBs leaked from Transformer #A401C at the 151-D electrical substation. The transformer was repaired, and facility was powerwashed, all contaminated material was shoveled into seven 55 gallon drums, and the site backfilled with clean gravel. (Reference: WIDS)	Soil, gravel	PCBs	$52,940
	100-D-28 (190-DR Septic System)	Received sanitary sewage from the 190-DR Building. Described as a 2,725-L (720-gal) steel septic tank and clay tile drain field southwest of 190-DR Building. Tank is 1.8 x 1.8 x 2.5 m deep (6 x 6 x 8.3 ft deep); drain field is 122 m^2 (1,317 ft^2). (Reference: WIDS)	Steel, tile, soil	Undetermined organic and inorganic chemicals	$51,350
	116-DR-8 (117-DR Seal Pit Crib)	Received water contaminated with radioactive wastes from the 117-DR Building containment system and seal pits. Released from radiological controls prior to 1967 (Dorian and Richards [1978]). Located about 76 m (250 ft) south of DR exclusion area fence and directly east of the 118-DR-1 burial ground. Crib is 3 x 3 x 5.2 m deep (10 x 10 x 17 ft deep), buried 1.2 m (4 ft) deep. Facility is registered as an injection well. Operated 1960-1964. (References: Carpenter 1994, EPA 1996, DOE-RL 1995c)	Soil	H-3, C-14	$81,798
	116-DR-10 (105-DR Fuel Storage Basin Cleanout Percolation Pond)	Received treated water from the 105-DR Fuel Storage Basin cleanup project. Contaminated water was processed through filters and an ion exchange system before discharge. In 1984 contaminated soil was removed and site was released using ARCL methodology. Pit has been backfilled and graded to match the terrain of the area. Site is 24.4 x 15.2 m (80 x 50 ft); depth of excavation is unknown. (References: Carpenter 1994, EPA 1996, DOE-RL 1995c)	Soil	Undetermined radionuclides	$49,203

Table A-2. Candidate 100 Area Remaining Sites for Plug-in of Remove/Treat/Dispose. (18 Pages)

Operable Unit	Site Name	Current Site Knowledge	Media/ Material	Potential Contaminants	Estimated Cost of Sampling
100-DR-2 (cont.)	128-D-1 (100-D/DR Burning Pit)	Used for burning of an estimated 40,000 m^3 of nonradioactive combustible materials such as paint waste, office waste, and chemical solvents. Disposal site was used from 1944-1967. Site was 30.5 x 30.5 x 3 m deep (100 x 100 x 10 ft deep). Radioactively contaminated materials were found at the site in 1951 and removed. (References: Carpenter 1994, EPA 1996, DOE-RL 1995c)	Soil, asbestos, miscellaneous debris	Undetermined radionuclides, inorganic and organic chemicals	$80,059
	132-DR-1 (1608-DR Wastewater/ Effluent Pumping Station)	Building was decontaminated, decommissioned, and demolished in situ in 1987. Received water from reactor building drains (primarily fuel storage basin overflows) containing low-level radionuclides and decontamination chemicals. Pumped water from collection pits to 105-DR Reactor process effluent pipelines. Site is 11 x 10.4 x 8.5 m deep (36 x 34 x 28 ft deep). (References: Carpenter 1994, EPA 1996, DOE-RL 1995c)	Concrete, soil	Undetermined radionuclides, organic and inorganic chemicals	$121,951
	600-30 (100-DR Construction Lay-down Area)	Site is an open field containing miscellaneous debris and areas of distressed vegetation. Approximate dimensions are 213 x 183 x 1.5 m deep (700 x 600 x 5 ft deep).	Soil	Organic Solvents; Petroleum Hydrocarbons	$134,127
100-FR-1 (CERCLA site – EPA lead)	100-F-4 (108-F Building 12-in. French Drain)	Vertical 0.3-m- (1-ft) diameter vitrified clay pipe adjacent to south wall of the 108-F Building. A 1.3-cm (½-in.) steel pipe enters the drain from the 108-F Building. No record of dates of operation, waste type, or quantity. (References: Deford 1994, EPA 1996)	Clay and steel pipes	Undetermined organic and inorganic chemicals	$52,638
	100-F-7[b] (1705-F Building Fuel Storage Tank)	Location of a steel underground fuel oil storage tank for the 1705-F Building Heater Room (building was demolished in 1975). It is not known if the tank was removed when the building was demolished. Dimensions unknown. (Reference: Carpenter 1994)	Soil	Undetermined organic and inorganic chemicals	$55,087
	100-F-9 (First French Drain at East End of 105-F Storage Room)	Vertical 0.9-m- (3-ft) diameter concrete pipe buried to unknown depth with upper surface 5 cm (2 in.) above grade. Located adjacent to the northeast corner of the 105-F Miscellaneous Storage Room of the 105-F Reactor. The upper surface is a few inches above grade and is gravel filled. No record of dates of operation, waste type, and quantity. Drain has a 2.5-cm (1-in.) steel pipe coming from the 105-F Building. (Reference: Deford 1994)	Concrete, soil	Undetermined organic and inorganic chemicals	$52,638
	100-F-10 (Second French Drain at East End of 105-F Storage Room)	Vertical 0.9-m- (3-ft) diameter concrete pipe buried to unknown depth with upper surface 5 cm (2 in.) above grade. Located adjacent to the southeast corner of the 105-F Miscellaneous Storage Room of the 105-F Reactor. The upper surface is a few inches above grade and is gravel filled. No record of dates of operation, waste type, and quantity. Drain has a 2.5-cm (1-in.) steel pipe coming from the 105-F Building. (References: Deford 1994, EPA 1996)	Concrete, soil	Undetermined organic and inorganic chemicals	$52,638
	100-F-11 (108-F Building 18-in. French Drain)	Vertical 0.5-m- (1.5-ft) diameter concrete pipe (length unknown) adjacent to northwest corner of the electrical substation on west wall of 108-F Building. No record of dates of operation, waste type, and quantity. The drain surface is a few inches above grade, has no cover, and is filled with gravel. (References: Deford 1994, EPA 1996)	Concrete, soil	Undetermined organic and inorganic chemicals	$52,638
	100-F-12 (36-in. French Drain at 105-F Building)	Vertical 0.9-m- (3-ft) diameter concrete pipe of unknown length standing 5 cm (2 in.) above grade with a steel lid. Located at the northeast corner of the 105-F Reactor. No record of dates of operation, waste type, or quantity. (References: Deford 1994, EPA 1996)	Concrete, steel, soil	Undetermined organic and inorganic chemicals	$52,638

Table A-2. Candidate 100 Area Remaining Sites for Plug-in of Remove/Treat/Dispose. (18 Pages)

Operable Unit	Site Name	Current Site Knowledge	Media/ Material	Potential Contaminants	Estimated Cost of Sampling
100-FR-1 (cont.)	100-F-16 (108-F Building 30-in. French Drain)	Vertical 0.8-m- (2.5-ft) diameter steel pipe of unknown length adjacent to south wall of 108-F Building east porch. No record of dates of operation, waste type, or quantity. (Reference: Deford 1994)	Steel, soil	Undetermined organic and inorganic chemicals	$52,638
	100-F-18 (Former Condensate Tank at 105-F)	Received condensate from the 105-F Fan House and discharged to a drain field. Tank and piping were removed during demolition of the fan house in 1994, but drain field may remain in place. No record of dates of operation, waste type, or quantity. (Reference: Deford 1994)	Steel	Undetermined organic and inorganic chemicals	$68,686
	100-F-23 (141-F Drywell)	Received liquid wastes from the 141-C Building. During removal of the 141-C Building foundation, the adjacent soil was found to be contaminated and removed; the drywell (within 3.5 m [10 ft] of the building) may have been removed at that time. There is no current evidence of a drywell at the site, but the site is located within an area posted as "Underground Radioactive Material." (Reference: WIDS)	Soil	Undetermined radionuclides	$63,518
	100-F-24 (145-F Drywell/ French Drain)	The drywell received liquid animal wastes, and may have been removed or covered with backfill during the demolition of the 145-F Facility, which was buried in place. (Reference: WIDS)	Soil	Undetermined organic and inorganic chemicals	$73,824
	100-F-25 (146-FR Drywells/ French Drains	There is no evidence of drywells or French drains in the area. The units may have been removed or covered with backfill during removal of the nearby 146-FR slab in 1975. No record of dates or operation, waste type, or quantity. (Reference: WIDS)	Unknown	Undetermined organic and inorganic chemicals	$61,657
	100-F-29 (EAF Process Sewer Pipelines)	This unit contains the many process sewer lines at the Experimental Animal Farm site. When the buildings were removed, the underground lines were left in place. The unit excludes the Reactor and Water Treatment effluent lines. (References: Deford 1994, DOE-RL 1992a)	Concrete, clay, metal	I-131, Sr-90, Cs-137, U-235, U-238, Pu-239/240	$123,105
	100-F-31 (144-F Sanitary Sewer System)	The site is the septic system receiving sanitary sewage from the 144-F Building. Site drawings do not indicate if system also received animal wastes with human wastes. The septic system may have been removed during the D&D of 144-F in 1977. (Reference: WIDS)	Soil	Undetermined radionuclides and inorganic chemicals	$54,785
	100-F-33 (1705-F Fish Farm)	May have received unplanned releases of water containing process effluent from the fish ponds. No releases are known, but the ponds were unlined, unreinforced concrete, and they and their piping may have leaked. Water from the ponds was discharged to the PNL Outfall via the 147-F Pumphouse. The pond structures were removed in 1975 and the site backfilled. (Reference: DOE-RL 1992a)	Soil	Undetermined radionuclides	$49,203
	100-F-34 (Biology Facility French Drain)	Believed to have received waste water from the 1705-F Radiobiology Laboratory or Fish Ponds. The site is a 0.7-m- (29-in.) diameter clay pipe, approximately 0.6 m (2 ft) deep. (Reference: WIDS)	Clay pipe, soil	Undetermined organic and inorganic chemicals	$61,657
	116-F-7 (117-F French Drain)	Received drainage from the confinement exhaust systems filter seal pits in the 117-F Building during 1960-1965. Radionuclides received had a short half-life and have decayed until they are no longer of concern. Site was released from radiation zone status. The piping system contained some asbestos-concrete pipes. (Reference: Deford 1994)	Concrete, asbestos, soil, clay	Undetermined radionuclides	$52,638

Table A-2. Candidate 100 Area Remaining Sites for Plug-in of Remove/Treat/Dispose. (18 Pages)

Operable Unit	Site Name	Current Site Knowledge	Media/ Material	Potential Contaminants	Estimated Cost of Sampling
100-FR-1 (cont.)	116-F-12 (148-F French Drain)	Received an estimated 10,000 L of effluent pump prime water from the lift station between 1944 and 1964. Drain is 0.9-m (36-in.) diameter by 1.8-m (6-ft) deep (constructed of clay or concrete pipe). Liquids discharged to the drain percolated into the soil. Contaminants, if any, are unknown. (Reference: Deford 1994)	Concrete, clay, soil	Undetermined organic and inorganic chemicals	$43,477
	126-F-2 (183-F Clearwells)	Former clearwells for storage of river water being processed for reactor coolant. Partially demolished and used as an inert landfill for disposal of uncontaminated rubble and debris from D&D projects. Dimensions are 229 x 41 x4.6 m deep (751 x 135 x 15 ft deep).	Concrete, Soil	Possible Low-Level Radioactive Waste	$118,194
	128-F-2 (100-F Burning Pit)	Irregularly shaped depression used for burning nonhazardous office waste, vegetation, paint, solvents, and other combustibles. Received some hardware and machinery. The site was buried with clean soil in preparation for drilling test well F5-42 in 1992. Pit was 45.7 x 18.3 x 3 m deep (150 ft x 60 ft x 10 ft deep). (References: Deford 1994, EPA 1996)	Soil	Undetermined organic chemicals	$52,940
	132-F-1 (Chronic Feeding Barn Site)	Feeding Barn was a 455-m^2 (4,900-ft^2) concrete block building with concrete animal pens; main housing facility for sheep and other livestock used in radiological dose studies. The facilities were cleaned out and washed down regularly; drains were connected to sewer 100-F-29. Operated 1950-1980. Demolished sometime after 1980 and buried in place. May still contain residual radiological contamination; there are no records of decommissioning activities. Sampled in 1992 (WHC-SD-EN-TI-128, Rev 0). (References: DOE-RL 1994d, EPA 1996)	Soil, concrete	Sr-90, Cs-137, Pu-239	$57,950
	132-F-3 (115-F Gas Recirculating Facility Site)	Building D&D'd in situ in 1984. ARCL report calculations exist. Dimensions are 53.3 x 30.5 x 4 m deep (175 x 100 x 13 ft deep). The area was covered with clean backfill to an average depth of 2.1 to 2.7 m (7 to 9 ft). Site is now a gravel lot, free of debris. (References: Beckstrom 1984, Deford 1994, DOE-RL 1994d, EPA 1996)	Concrete, metal pipes, soil	H-3, C-14, Co-60, Sr-90, Cs-137	$72,588
	132-F-4 (116-F Reactor Stack Demolition Site)	Stack and foundation were decontaminated, decommissioned, and demolished using explosives in 1983. ARCL report calculations predicted 12.5 mrem/yr exposure using radionuclide assays before decontamination. The burial trench is 61 x 6.1 x 4.6 m deep (200 x 20 x 15 ft deep). Rubble was covered with 1 m (3 ft) of soil. (References: Beckstrom 1984, Deford 1994, EPA 1996)	Concrete	H-3, C-14, other beta and gamma emitting radionuclides	$57,950
	132-F-5 (117-F Filter Building Site)	Received and filtered ventilation air from the work areas of the 105-F Reactor Building and discharged it to the 116-F Stack. Building was decontaminated, decommissioned, and demolished in situ in 1984. ARCL report calculations exist. Rubble was buried under 1 m (3.3 ft) of clean soil. Site dimensions are 18.3 x 12.2 x 8.2 m deep (60 x 40 x 27 ft deep). (References: Deford 1994, EPA 1996)	Concrete	C-14, Co-60, Cs-137, Sr-90, Eu-154, Eu-152	$99,382
	132-F-6 (1608-F Waste Water Pumping Station Site)	Pumped waste water containing trace amounts of low-level radionuclides and decontamination chemicals from drains and sumps in the 105-F Reactor Building into the process effluent pipeline. Dimensions are 15.2 x 15.2 x 10.4 m deep (50 x 50 x 34 ft deep); demolished and buried under 5 m (16 ft) of clean fill. (References: Deford 1994, EPA 1996)	Concrete	H-3, C-14, Co-60, Sr-90, Cs-137, Eu-152, Eu-154, undetermined inorganic chemicals	$128,823
	141-C (Large Animal Barn and Biology Laboratory)	This facility was a steel building on a concrete pad, covering 431 m^2 (4,640 ft^2). The building, concrete foundation, footings, and adjacent contaminated soil were removed and disposed of to the 200 Area Burial Ground. Underground pipes were left in place. Fifty soil samples were taken after demolition was completed to demonstrate release under AEC Regulatory Guide 1.86. (Reference: EPA 1996)	Metal pipes	I-131, Sr-90, Cs-137, Pu-239	$55,803

Table A-2. Candidate 100 Area Remaining Sites for Plug-in of Remove/Treat/Dispose. (18 Pages)

Operable Unit	Site Name	Current Site Knowledge	Media/ Material	Potential Contaminants	Estimated Cost of Sampling
100-FR-1 (cont.)	182-F (182-F Reservoir)	Inert landfill for disposal of debris from D&D projects. Covered with fill from adjacent land. 560 x 309 x 15 ft deep.	Concrete, Soil	Possible Low-Level Radioactive Waste	$123,322
	1607-F3 (124-F-3 Septic System)	Received sanitary sewage from the 182-F Pump Station, 183-F Water Treatment Plant, and 151-F Substation. Reinforced concrete septic tank 2.6 x 1.3 x 3.4 m deep (8.5 x 4.5 x 11 ft deep). The drain field is 244 m^2 (2,624 ft^2). (References: Deford 1994, EPA 1996)	Concrete, clay tile, soil	Undetermined organic and inorganic chemicals	$61,657
	1607-F4 (124-F-4 Septic System)	Received sanitary sewage from the 115-F Gas Recirculation Building. Dimensions of the reinforced concrete septic tank are 1.2 x 0.6 x 2.5 m deep (4 x 2 x 8.3 ft deep). The drain field is 36 m^2 (384 ft^2). (References: Deford 1994, EPA 1996)	Concrete, clay tile, soil	Undetermined organic and inorganic chemicals	$61,657
	1607-F5 (124-F-5 Septic System)	Received sanitary sewage from the 181-F Pumphouse. Dimensions of the reinforced concrete septic tank are 1.2 x 0.6 x 2.5 m deep (4 x 2 x 8.3 ft deep), the drain field is 36 m^2 (384 ft^2). (References: Deford 1994, EPA 1996)	Concrete, clay tile, soil	Undetermined organic and inorganic chemicals	$61,657
	1607-F7 (124-F-7 Septic System)	Received sanitary sewage from the 141-M Building. Dimensions of the septic tank are not known. The drain field is estimated to be 170 m^2 (1,830 ft^2). (References: Deford 1994, EPA 1996)	Unknown	Undetermined organic and inorganic chemicals	$61,657
	UPR-100-F-1 (141-C to 141-M Sewer Line Leak)	Spill of 64,352 L (17,000 gal) of animal pen wash water occurred when a process sewer line from the 141-C Hog Barn plugged and overflowed adjacent to the building in 1971. Spill site, 12.2 x 12.2 m (40 x 40 ft), is located within the permanent protective concrete monuments surrounding the Experimental Animal Farm. (Reference: Deford 1994)	Soil	Sr-90, Pu-239	$49,203
	UPR-100-F-3 (Mercury Spill at 146-F Fish Lab)	Received mercury spilled on the floor of the 146-FR Fish Lab (since demolished). All material was "squeegeed" out the door of the building and was reported to have been cleaned up and removed. Contamination was limited to a 3 x 3 m (10 x 10 ft) area of surface soil near the northeast corner of the building. Building site is now a cobble-covered field. (Reference: Deford 1994)	Soil	Hg	$48,645
100-FR-2 (CERCLA site – EPA lead)	100-F-14 (Vent Pipe)	A 10-cm (4-in.) pipe extends 1 m (3.3 ft) above grade. Ground penetrating radar indicates that the vent is attached to a tank (probably concrete) that received wastes from a nearby demolished carpenter shop. Dimensions unknown. (References: Bergstrom and Mitchell 1995, Deford 1994, EPA 1996)	Metal pipe, concrete	Undetermined organic and inorganic chemicals	$112,225
	100-F-28 (Septic System)	The site is a septic tank and drain field for a small building not near any contaminated facilities. The assumed size of the unit is 18.3 x 18.3 m (60 x 60 ft). (Reference: WIDS)	Unknown	Undetermined organic and inorganic chemicals	$51,350
	118-F-4 (Silica Gel Burial Ground; 115-F Pit)	Received 270 kg (0.3 tons) of silica gel from the 115-F dryer rooms. Silica gel was disposed to a small unlined disposal pit 3 x 3 x 4.6 m deep (10 x 10 x 15 ft deep). The site appears as an open, unvegetated cobble field. (References: Deford 1994, EPA 1996)	Soil, silica gel	Undetermined radionuclides, inorganic and organic chemicals	$68,686
	128-F-1 (Burning Pit)	Used for burning nonradioactive, combustible materials such as an paint waste, office waste, and chemical solvents. Burning pit is 30.5 x 30.5 x 3 m deep (100 x 100 x 10 ft deep). Located east of the 126-F-1 Ash Pit . Operated 1945-1965. Site has been backfilled. (References: Deford 1994; DOE-RL 1992a, 1995b; EPA 1996)	Soil, miscellaneous debris	Undetermined organic and inorganic chemicals	$67,462

Table A-2. Candidate 100 Area Remaining Sites for Plug-in of Remove/Treat/Dispose. (18 Pages)

Operable Unit	Site Name	Current Site Knowledge	Media/ Material	Potential Contaminants	Estimated Cost of Sampling
100-FR-2 (cont.)	128-F-3 (PNL Burning Pit)	Used for burning materials from the Experimental Animal Farm. Shallow pit 30.5 x 30.5 m (100 x 100 ft), 30.5 m (100 ft) east of the 100-F ash pit. Pit was backfilled with coal ash. No records available on materials burned. (References: Deford 1994, EPA 1996)	Ash, soil	Undetermined organic and inorganic chemicals	$80,059
	1607-F1 (124-F-1 Septic System)	Received sanitary sewage from the 1701-F Badge House, 1709-F Fire Station, and 1720-F Administrative Office. The reinforced concrete septic tank is 4.3 x 2.1 x 3.4 m deep (14 x 7 x 11 ft deep). The drain field is 968 m^2 (21,600 ft^2). (References: Deford 1994, EPA 1996)	Concrete, vitrified pipe, soil	Undetermined organic and inorganic chemicals	$51,350
100-HR-1 (CERCLA site – EPA lead)	100-H-3[b] (1716-H Gasoline Storage Tank Site)	Location of a steel underground gasoline storage tank for an automotive service station that operated from 1949-1965. The automotive service area included gas pumps with underground storage tanks and possibly an oil pit. No records could be located to determine whether the fuel tanks have been removed. Dimensions unknown. (Reference: Deford and Einan 1995)	Soil	Petroleum hydrocarbons; Undetermined organic and inorganic chemicals	$55,087
	100-H-4 (1717-H Hot Shop French Drain)	Site of a former maintenance building that was decontaminated and decommissioned in the 1970's. French drain was apparently used for disposal of low-level radioactive materials. Dimensions unknown. (References: Deford and Einan 1995, EPA 1996)	Soil	Undetermined radionuclides and organic chemicals	$70,389
	100-H-7 (French Drain A)	Vertical 0.76-m- (2.5-ft) diameter vitrified clay pipe (length unknown) located 5.5 m (18 ft) east of the 105-H Reactor Building. No record of dates of operation, waste type, or quantity. A 6.3-cm (2.5-in.) steel pipe from the reactor is in line with the drain, suggesting a connection. (References: Deford and Einan 1995, EPA 1996)	Soil, vitrified clay	Undetermined radionuclides	$51,350
	100-H-8 (French Drain B)	Gravel-filled vertical 0.91-m- (3-ft) diameter concrete pipe with a steel cover (length unknown) located 9.1 m (30 ft) east of the 105-H Reactor Building. No record of dates of operation, waste type, or quantity. (References: Deford and Einan 1995, EPA 1996)	Concrete, soil	Undetermined organic and inorganic chemicals	$51,350
	100-H-9 (French Drain C)	Vertical 0.6-m- (2-ft) diameter concrete pipe (length unknown) located 27 m (90 ft) west of the northwest corner of the 105-H Reactor Building. No record of dates of operation, waste type, or quantity. (References: Deford and Einan 1995, EPA 1996)	Concrete, soil	Undetermined organic and inorganic chemicals	$51,350
	100-H-10 (French Drain D)	Vertical 1.2-m- (4-ft) diameter vitrified clay pipe with steel lid (length unknown) located 7.6 m (25 ft) north of the 105-H Reactor Building. No record of dates of operation, waste type, or quantity. (Reference: Deford and Einan 1995)	Concrete, soil	Undetermined organic and inorganic chemicals	$51,350
	126-H-2[a] (183-H Clearwells; Disposal Pit)	Two 228.6 x 41.1 x 5.5 m (750 ft x 135 ft x 18 ft) deep reinforced concrete basins at the site of the former 183-H Water Treatment Facility. The basins were historically used to store clean reactor coolant water. Eastern half currently holds D&D rubble (west half is still intact). Waste from the 183-H Solar Evaporation Basins that was disposed here is suspected of being contaminated with radionuclides. (Reference: Deford and Einan 1995)	Concrete, steel, miscellaneous debris	Undetermined radionuclides and inorganic chemicals	$196,333
	132-H-1 (116-H Reactor Exhaust Stack Burial Site)	Stack and foundation were decontaminated, decommissioned, and demolished using explosives in 1983. ARCL report calculations exist. Low-level smearable contamination was present on concrete at the time of demolition. The burial trench was 67 x 7.6 x 3 m deep (220 x 25 x 10 ft deep). Rubble was covered with 1 m (3 ft) of soil. (References: Deford and Einan 1995, DOE-RL 1995b, EPA 1996)	Concrete	C-14, H-3, Cs-137, Co-60, Eu-152, Eu-154, Eu-155	$57,950

Table A-2. Candidate 100 Area Remaining Sites for Plug-in of Remove/Treat/Dispose. (18 Pages)

Operable Unit	Site Name	Current Site Knowledge	Media/ Material	Potential Contaminants	Estimated Cost of Sampling
100-HR-1 (cont.)	132-H-3 (1608-H Waste Water Pumping Station Site)	Received waste water containing trace amounts of low-level radionuclides and decontamination chemicals from drains and sumps in the 105-H Reactor Building and pumped these wastes into the process effluent pipeline. Dimensions are 11 x 10.4 x 9.7 m deep (36 x 34 x 32 ft deep), buried under clean fill. (References: Deford and Einan 1995, DOE-RL 1995b, EPA 1996)	Concrete, soil	Pb, undetermined radionuclides	$114,413
100-HR-2 (RCRA site – Ecology lead)	128-H-1 (Burning Pit)	Used for burning nonradioactive, combustible materials such as an paint waste, office waste, and chemical solvents. Burning pit is 91.5 x 91.5 x 3 m deep (300 x 300 x 10 ft deep). Pit has been partially backfilled with soil and ash. Some debris remains at the site. (References: Deford and Einan 1995; DOE-RL 1993d, 1994b; EPA 1996)	Soil, miscellaneous debris	Undetermined organic chemicals	$101,919
	128-H-2 (Burning Pit)	Used for burning nonradioactive, combustible materials such as paint waste, office waste, and chemical solvents. Burning pit is 52 x 41.2 m (170 x 135 ft), depth unknown. (References: Deford and Einan 1995; DOE-RL 1993d, 1994b; EPA 1996)	Soil	Undetermined organic chemicals	$68,766
	128-H-3 (100-H Burning Ground #3)	Used for burning nonradioactive, combustible materials such as vegetation, office waste, paint waste, and chemical solvents. Dimensions are approximately 55 x 21 x 1.5 m deep (180 x 70 x 5 ft deep).	Soil	Organic Solvents; Petroleum Hydrocarbons	$65,787
	132-H-2 (117-H Filter Building Site)	Received and filtered ventilation air from the work areas of the 105-H Reactor Building and discharged it to the 116-H Stack. Building was decontaminated, decommissioned, and demolished in situ in 1984. ARCL report calculations exist. Site dimensions are 18.3 x 12.2 x 9.6 m deep (60 x 40 x 32 ft deep). Rubble was buried under 5 m (16 ft) of clean fill. The site also includes the original location of the 116-H-4 Pluto Crib, which was excavated in 1960 and moved to a different location. (References: Deford and Einan 1995, DOE-RL 1993d, EPA 1996)	Concrete	H-3, C-14, Co-60, Cs-137, Sr-90, Eu-152, Eu-154, Pu-239/240	$110,118
	600-151 (Pre-Hanford Dumping Area)	Scattered debris and disturbed vegetation caused by pre-Hanford residents. Under authority of DOE Site Infrastructure Division; EM-70. Dimensions are approximately 244 x 183 x 0.15 m deep (800 x 600 x 0.5 ft deep)	Soil	Probable Pesticides and Petroleum Hydrocarbons	$138,422
	1607-H1[a] (Septic Tank and Drain Field)	Received sanitary sewage from the 151-H and 105-H Buildings at an estimated flow rate of 503 L/day (140 gal/day). The concrete septic tank is 4.6 x 1.7 x 4.4 m deep (15 x 5.5 x 14.5 ft deep); the tile field is reported to be 17.1 x 15.2 m (56 x 50 ft). (References: Deford and Einan 1995, DOE-RL 1994b, EPA 1996)	Concrete, soil, tile	Undetermined organic and inorganic chemicals	$51,350
100-KR-2 (CERCLA site – EPA lead)	100-K-13 (Liquid Waste Site [French Drain])	Used for disposal of "gray water" waste during construction activities. Located west of 166-KW oil storage tank. This isolated French drain is 1.5 m (5 ft) in diameter, constructed of concrete, and 0.5 m (1.5 ft) above grade. The french drain is now (1997) covered by a metal caisson to protect it during construction of a nearby facility. (References: Carpenter and Cote 1994; DOE-RL 1994a, 1995a [Appendix K]; EPA 1996)	Soil, concrete	Undetermined organic and inorganic chemicals	$56,074
	100-K-29 (183-KE Sand-blasting Site)	Red garnet was used as sandblasting grit at this site to clean steel components from the 183-KE settling basins for painting. An area west of the 183-KE water treatment facility approximately 50 x 30 m (160 x 96 ft) is delineated by the presence of red garnet. (References: Carpenter and Cote 1994, DOE-RL 1994a)	Soil, red garnet sandblast grit	Undetermined organic and inorganic chemicals	$70,906

Table A-2. Candidate 100 Area Remaining Sites for Plug-in of Remove/Treat/Dispose. (18 Pages)

Operable Unit	Site Name	Current Site Knowledge	Media/ Material	Potential Contaminants	Estimated Cost of Sampling
100-KR-2 (cont.)	100-K-30 (183-KE Sulfuric Acid Tank Site [West])	Site of a horizontal tank that was used for storage of sulfuric acid for water treatment. Unknown when removed. Concrete bases and aboveground piping for the tank remain in place. The site covers an area 10 x 3.7 m (33 x 12 ft). Depth and type of contamination (if any) is unknown. No information is available regarding disposal of sludge that the tank may have contained. (References: Carpenter and Cote 1994, DOE-RL 1994a, EPA 1996)	Soil, concrete	As, Ba, Cd, Cr, Pb, Hg, Ag, Se, Sulfate	$59,382
	100-K-31 (183-KE Sulfuric Acid Tank Site [East])	Site of a horizontal tank that was used for storage of sulfuric acid for water treatment. Unknown when removed. Concrete bases and aboveground piping for the tank remain in place. The site covers an area 10 x 3.7 m (33 x 12 ft). Depth and type of contamination (if any) is unknown. No information is available regarding disposal of sludge that the tank may have contained. (References: Carpenter and Cote 1994, DOE-RL 1994a)	Soil, Concrete	As, Ba, Cd, Cr, Pb, Hg, Ag, Se, Sulfate	$59,382
	100-K-32 (183-KW Sulfuric Acid Tank Site [East])	Site of a horizontal tank that was used for storage of sulfuric acid for water treatment. Unknown when removed. Concrete bases and aboveground piping for the tank remain in place. The site covers an area 10 x 3.7 m (33 x 12 ft). Depth and type of contamination (if any) is unknown. No information is available regarding disposal of sludge that the tank may have contained. (References: Carpenter and Cote 1994, DOE-RL 1994a, EPA 1996)	Soil, concrete	As, Ba, Cd, Cr, Pb, Hg, Ag, Se, Sulfate	$59,382
	100-K-33 (183-KW Sulfuric Acid Tank Site [West])	Site of a horizontal tank that was used for storage of sulfuric acid for water treatment. Unknown when removed. Concrete bases and aboveground piping for the tank remain in place. The site covers an area 10 x 3.7 m (33 x 12 ft). Depth and type of contamination (if any) is unknown. No information is available regarding disposal of sludge that the tank may have contained. (References: Carpenter and Cote 1994, DOE-RL 1994a, EPA 1996)	Soil, concrete	As, Ba, Cd, Cr, Pb, Hg, Ag, Se, Sulfate	$59,382
	100-K-35 (183-KE Acid Neutralization Pit)	Received sulfuric acid tank transfer and overflow waste for neutralization before draining to the process sewer. The pit is a 2.5 x 2 x 1.5 m (8.3 x 6.3 x 5 ft) deep brick-lined concrete box located adjacent to the west outside wall of the 183-KE water treatment plant building and just north of the chlorine storage building. (References: Carpenter and Cote 1994, DOE-RL 1994a)	Concrete, brick	As, Ba, Cd, Cr, Pb, Hg, Ag, Se, Sulfate	$50,793
	100-K-36 (1706-KE Chemical Storage Facility Dry Well)	Received spillage from transfer of sodium hydroxide and sulfuric acid at the 1706-KE Chemical Storage Facility. The French drain consists of a 0.5 m (18 in) diameter, 1.2 m (4 ft) long vitrified clay pipe. A white crystalline material, believed to be sodium carbonate, can be seen on the drain, which is located east of the 1706-KE Building. (References: Carpenter and Cote 1994, DOE-RL 1994a)	Soil, vitrified clay pipe	Undetermined organic and inorganic chemicals	$52,495
	100-K-46 (119-KE French Drain)	Received sample waste, janitorial waste, and drainage from the evaporative cooler for the 119-KE Sample Building. The 0.3 m (1 ft) diameter French drain was covered with crushed rock after removal of the 130-KE-1 Emergency Diesel Oil Storage Tank. Located about 8 m (24 ft) east of the 105-KE Reactor Building and 3 m (10 ft) south of the 119-KE Sample Building. (References: Carpenter and Cote 1994, DOE-RL 1994a, EPA 1996)	Soil, vitrified clay pipe	Undetermined organic and inorganic chemicals; possible radionuclides	$61,657
	100-K-48[b] (100-KE Oil Contamination Areas)	Site of Bunker C fuel oil spillage from rail car off-loading procedures at the 130-KE-2 (166-KE) oil storage tank. The oil has been absorbed by soil and sand forming a hard asphalt-like covering on the surface.	Soil	Petroleum hydrocarbons; undetermined organic chemicals	$101,919

Table A-2. Candidate 100 Area Remaining Sites for Plug-in of Remove/Treat/Dispose. (18 Pages)

Operable Unit	Site Name	Current Site Knowledge	Media/ Material	Potential Contaminants	Estimated Cost of Sampling
100-KR-2 (cont.)	100-K-49[b] (100-KW Oil Contamination Areas)	Site of Bunker C fuel oil spillage from rail car off-loading procedures at the 130-KW-2 (166-KW) oil storage tank. The oil has been absorbed by soil and sand forming a hard asphalt-like covering on the surface.	Soil	Petroleum hydrocarbons; undetermined organic chemicals	$101,919
	120-KE-3 (183-KE Filter Water Facility Trench, 100-KE-3)	Received sulfuric acid sludge from sulfuric acid storage tanks; sludge contained mercury. The sludge has been removed. The trench was 12.2 m (40 ft) long by 0.9 m (3 ft) wide and 0.9 m (3 ft) deep and lined with sand to allow the sludge water slurry to drain. Operated 1955-1970. (References: Carpenter and Cote 1994; DOE-RL 1994a, 1995a [Appendix K]; EPA 1996)	Soil	As, Ba, Cd, Cr, Pb, Hg, Ag, Se, Sulfate	$43,477
	120-KE-6 (183-KE Sodium Dichromate Tank)	Site of a vertical steel tank 5.8 m (19 ft) in diameter that was used for storage of sodium dichromate solution for water treatment at 183-KE. Unknown when removed. Concrete base and piping for the tank remain in place. No known releases, but residual dichromate possible in soil from years of loading and handling. Operated 1955 to 1971. (References: Carpenter and Cote 1994, DOE-RL 1994a, EPA 1996)	Soil, concrete	Cr	$50,793
	120-KW-5 (183-KW Sodium Dichromate Tank)	Site of a vertical steel tank 5.8 m (19 ft) in diameter that was used for storage of sodium dichromate solution for water treatment at 183-KW. Unknown when removed. Concrete base and piping for the tank remain in place. No known releases, but residual dichromate is possible in the soil because of years of loading and handling. Operated 1955 to 1971. (References: Carpenter and Cote 1994, DOE-RL 1994a, EPA 1996)	Soil, concrete	Cr	$50,793
	128-K-1 (100-K Burning Pit)	Used for burning and disposal of nonradioactive combustible waste such as chemical solvents, office and paint waste. Analogous to waste site 128-H-1. Dimensions are approximately 30 x 30 x 2.4 m deep (100 x 100 x 8 ft deep). (References: Carpenter and Cote 1994)	Soil, Debris	Organic Solvents; Petroleum Hydrocarbons	$65,601
	128-K-2 (100-K Construction Dump & Burning Pit)	Used for burning and disposal of nonradioactive waste. Scrap metal, glass, nonfriable and friable asbestos, and office, laboratory and paint waste are exposed. Dimensions are approximately 244 x 85 x 1.5 m deep (800 x 280 x 5 ft deep). (References: Carpenter and Cote 1994)	Soil, Debris	Organic Solvents; Petroleum Hydrocarbons	$120,098
	130-K-2[b] (1717-K Waste oil storage tank)	Site of a former underground tank that stored used motor oil. Tank was removed in July 1989. No evidence was found to indicate leakage from the tank, as reported in logbook WHC-N-270. Location is adjacent to the 1717-K Building. Operated 1955-1972. (References: Carpenter and Cote 1994, DOE-RL 1994a, EPA 1996)	Soil	Petroleum hydrocarbons; undetermined organic chemicals	$116,233
	130-KE-1 (105-KE Emergency Diesel Oil Storage Tank)	Site of two 7,571-L (2,000-gal) emergency diesel oil storage tanks that were removed in 1992. No evidence of leakage was found. However, insulating material covering the tank exteriors showed detectable radioactive contamination when removed. The contaminated insulating material was disposed with the tanks. Location is adjacent to the 105-KE Reactor ventilation stack. Operated 1955 to 1971. (References: Carpenter and Cote 1994, DOE-RL 1994a, EPA 1996)	Soil	Undetermined radionuclides	$66,539
	130-KW-1 (105-KW Emergency Diesel Oil Storage Tank)	Site of two 7,571-L (2,000-gal) emergency diesel oil storage tanks that were removed in 1992. No evidence of leakage was found. However, radioactive contamination was discovered on the exterior of the tanks. The tanks were disposed as contaminated. The site was cleaned and closed under the Underground Storage Tank Program (no radioactivity was left at the site). Location is adjacent to the 105-KW Reactor ventilation stack. Operated 1955 to 1970. (References: Carpenter and Cote 1994, DOE-RL 1994a, EPA 1996)	Soil	Undetermined radionuclides	$66,539

Table A-2. Candidate 100 Area Remaining Sites for Plug-in of Remove/Treat/Dispose. (18 Pages)

Operable Unit	Site Name	Current Site Knowledge	Media/ Material	Potential Contaminants	Estimated Cost of Sampling
100-KR-2 (cont.)	600-29 (100-K Construction Laydown Area)	46-acre site used as the laydown area for the construction of 105-KE Reactor during 1952-1954. Site contains surface chemical dumping areas with oil-stained soil and distressed vegetation.. (Reference: Carpenter and Cote 1994)	Soil	Undetermined organic chemicals	$257,522
	UPR-100-K-1 (105-KE Fuel Storage Basin Leak)	Received water leaking from cracks in the 105-KE Reactor Fuel Storage Basin. The water is contaminated with radionuclides from accumulated sludge and leaking fuel elements in the Fuel Storage Basin. (References: Carpenter and Cote 1994, DOE-RL 1994a, EPA 1996)	Soil	H-3, C-14, Co-60, Sr-90, Cs-137, Eu-152, Eu-154, U-235, U-238, Pu-238, Pu-239/240	$74,341
100-IU-2 (CERCLA site – EPA lead)	600-5[b] (Waste Oil Dump, Asphalt Heliport)	The site is a circular area of heavy oil or asphalt about 4.6 m (15 ft) in diameter, and a ditch covered with similar material about 7.6 m (25 ft) long, 37 cm (15 in.) wide, and 2.5 cm (1 in.) deep. A 10-cm- (4-in.) diameter pipe is in the center of the pad and flush with the surface. Homestead-type trash is scattered in the area. (References: Carpenter 1995, DOE-RL 1996)	Soil	Petroleum hydrocarbons; undetermined organic chemicals	$52,940
	600-52 (White Bluffs Surface Basin)	This site is a depression, 85 by 40 m (280 by 130 ft), adjacent to the pickling acid crib. Material in the crib may have washed into the depression, although previous sampling in the depression for the pickling acid crib ERA showed no contaminants at levels of concern. The depression may have also been used as a surface drain field for the While Bluffs Ice House. Some demolition debris is in the area. (References: Carpenter 1995; DOE-RL 1996, 1993e)	Soil	Cr, Zn	$81,274
	600-98 (East White Bluffs City Landfill [EWBCL])	Pre-Hanford municipal landfill covered with clean fill. Dimensions are approximately 98 x 61 x 3 m deep (320 x 200 x 10 ft deep).	Soil, Debris	Probable Pesticides and Organic Solvents	$96,591
	600-99 (J.A. Jones #2)	The site contained minor construction debris used by the J.A. Jones construction company, including wood, concrete, and metals. The site was exhumed and contents taken to a 200 Area burial ground in 1971. The dimensions are 9.1 x 9.1 m (30 x 30 ft). (References: Carpenter 1995, DOE-RL 1996)	Soil	Undetermined organic and inorganic chemicals	$55,087
	600-100 (White Bluffs Landfill; alias 600-119)	Pre-Hanford municipal landfill covered with clean fill. Dimensions are approximately 38 x 15 x 3 m deep (125 x 50 x 10 ft deep).	Soil, Debris	Probable Pesticides and Organic Solvents	$55,087
	600-120 (Spare Parts Burn Pit)	The site is a burn pit that was used for industrial and commercial wastes, and has been backfilled with coal ash. Dimensions unknown. (References: Carpenter 1995, DOE-RL 1996)	Ash, soil	Undetermined organic and inorganic chemicals	$112,225
	600-124 (Burn Site and Paint Disposal Area)	The area is littered with debris, such as burned wood, roofing materials, glass, nails, chips of dried paint, and paint cans. (References: Carpenter 1995, DOE-RL 1996)	Soil, miscellaneous debris	Undetermined organic and inorganic chemicals	$126,540
	600-125 (Waste Disposal Trench 1)	Pre-Hanford landfill trench covered with clean fill. Dimensions are approximately 30 x 7.6 x 3 m deep (100 x 25 x 10 ft deep). (Reference: Carpenter 1995)	Soil, Debris	Probable Pesticides and Organic Solvents	$55,087

Table A-2. Candidate 100 Area Remaining Sites for Plug-in of Remove/Treat/Dispose. (18 Pages)

Operable Unit	Site Name	Current Site Knowledge	Media/ Material	Potential Contaminants	Estimated Cost of Sampling
100-IU-2 (cont.)	600-127[b] (Fuel Storage Area)	A low soil berm ~ 55 x 35 m (182 x 116 ft) surrounds two loading docks. The soil is covered by a layer of coal ash. Fuel storage tanks may have been held in this area. The soil under the coal ash and adjacent to the berm is discolored, probably from petroleum contamination (oils and gasoline). (References: Carpenter 1995, DOE-RL 1996)	Soil, ash	Petroleum hydrocarbons; Undetermined organic chemicals	$68,766
	600-128[b] (Oil and Oil Filter Dump Site)	The site, about 2 m (6.6 ft) in diameter, contains oil and oil filters. (References: Carpenter 1995, DOE-RL 1996)	Soil	Petroleum hydrocarbons; Undetermined organic chemicals	$52,940
	600-129 (White Bluffs Dump Site)	Pre-Hanford landfill and community dump site. Dimensions are approximately 201 x 152 x 3 m (660 x 500 x 10 ft deep). (Reference: Carpenter 1995)	Soil, Debris	Probable Pesticides and Organic Solvents	$127,685
	600-131 (Special Fabrication Shop and Warehouse)	The site is the remnants of a fabrication shop, boilerhouse, warehouse, loading dock/well, and water station. The area is graveled and littered with debris. Solvents and oils were typically used in similar facilities. (References: Carpenter 1995, DOE-RL 1996)	Concrete, soil, transite, miscellaneous debris	Undetermined organic and inorganic chemicals	$116,233
	600-132 (Construction Contractor Shop Landfill)	This site is a large (~165 x 112 m [545 x 370 ft]) open-pit landfill that was contaminated and cleaned out. A notation in an old logbook suggests a potential for radioactive wastes (source unknown), but it is unknown if additional characterization work was done. Another employee reported that the site was used for disposal of oils and solvents. (References: Carpenter 1995, DOE-RL 1996)	Soil	Undetermined radionuclides, inorganic and organic chemicals	$145,983
	600-139[b] (Automotive Repair Shop)	The site has scattered debris, such as battery caps, gaskets, oil stains, and lenses from tail lights. Dimensions are about 30 x 20 m (100 x 66 ft). (References: Carpenter 1995, DOE-RL 1996)	Soil, miscellaneous debris	Petroleum hydrocarbons; Undetermined organic chemicals	$55,087
	600-176 (White Bluffs Paint Disposal Area)	Excess paint materials were disposed of by dumping them on the ground. Dried paint chips remain at the site. (References: Carpenter 1995, DOE-RL 1996)	Soil, paint chips	Undetermined organic chemicals	$116,233
	600-181[b] (White Bluffs Oil Dump)	A large quantity of oils have been dumped on the surface in an area about 17 x 15 m (56 x 50 ft). (References: Carpenter 1995, DOE-RL 1996)	Soil	Petroleum hydrocarbons; Undetermined organic chemicals	$52,940
	600-188 (White Bluffs Waste Disposal Trench 2)	The site is an open trench with industrial wastes filling about one-third of the trench. Empty 208-L (55-gal) drums and discolored soil remain in the 90 x 40 m (300 x 132 ft) site. (References: Carpenter 1995, DOE-RL 1996)	Soil, miscellaneous debris	Undetermined organic and inorganic chemicals	$84,679
	600-190 (White Bluffs Warehouse Tar/ Paint Disposal Area)	Tar and paints appear to have been dumped at the site. The site also contains warehouse sites and associated french drains, concrete foundations, valve boxes, and miscellaneous debris. (References: Carpenter 1995, DOE-RL 1996)	Soil, concrete, debris	Undetermined organic chemicals	$116,233

Table A-2. Candidate 100 Area Remaining Sites for Plug-in of Remove/Treat/Dispose. (18 Pages)

Operable Unit	Site Name	Current Site Knowledge	Media/ Material	Potential Contaminants	Estimated Cost of Sampling
100-IU-2 (cont.)	600-201 (White Bluffs Paint and Solid Waste Disposal Site)	The site contains miscellaneous debris such as glass, metal shavings, canvas, and dried paint. (References: Carpenter 1995, DOE-RL 1996)	Soil, miscellaneous debris	Undetermined organic chemicals	$116,233
	628-1 (White Bluffs Burn Pit)	Approximately 1/4 acre has stressed vegetation. The burn pit is covered with sand and gravel. (References: Carpenter 1995, DOE-RL 1996)	Soil	Undetermined organic chemicals	$62,738
100-IU-6 (CERCLA site - EPA lead)	600-3 (Hanford Townsite Dumping Area and Paint Pit)	The site is an old borrow pit, and a large (~490 x 280 m [1,600 x 925 ft]) area of scattered trash. Bulldozer tracks indicate an attempt to bury trash. Parts of the area show signs of burning and stressed vegetation. The site may have been used as railroad maintenance shop disposal yard. (References: Deford 1995, DOE-RL 1996)	Soil, asbestos miscellaneous debris	Undetermined organic and inorganic chemicals	$220,303
	600-107 (Cribs at 213-J&K Gable Mtn Plutonium Storage Vaults)	Two small (2.4 m [8 ft] diameter, 4.6 m [15 ft] deep) gravel-filled concrete culverts on either side of the 213-J and K storage vaults were dug up in 1974 to allow a radiological survey. No contamination was found above background limits, and the excavated material was backfilled. (References: Deford 1995, DOE-RL 1996)	Concrete, soil	Undetermined radionuclides	$51,350
	600-108[a] (213-J and K Gable Mtn Plutonium Storage Vaults)	The reinforced concrete facility was constructed into the side of Gable Mountain. The vaults are used for soil sample storage and seismic testing. The unit is 12.2 x 3.7 x 2.4 m deep (40 x 12 x 8 ft deep). If the vaults were used to store plutonium at all, it is thought to have been only briefly. However, explosives and hardware contaminated with radioactive sodium were stored there. No smearable radioactivity was detected, and the site has been released from radiation zone status. (References: Deford 1995, DOE-RL 1996)	Concrete	Undetermined radionuclides	$55,803
	600-109 (Hanford Trailer Camp Landfill [HTCL])	Domestic landfill for residences of Hanford Site construction workers. No hazardous materials known. Dimensions are approximately 30 x 30 x 2.4 m deep (100 x 100 x 8 ft deep).	Soil, Debris	Probable Pesticides and Organic Solvents	$65,601
	600-110 (Hanford Townsite Landfill [HTL])	Pre-Hanford municipal landfill for the Hanford townsite. No hazardous materials known. Dimensions are approximately 61 x 61 x 3 m deep (200 x 200 x 10 ft deep).	Soil, Debris	Probable Pesticides and Organic Solvents	$82,818
	600-111 (P-11 Critical Mass Laboratory)	The 2.4 x 2.4 m (8 x 8 ft) facility had concrete walls, cover, and base. It was retired in 1951 after a fire in the adjacent 120 Building caused structural damage. The facility was exhumed in 1974. It had received plutonium waste from the 120 Building. A 3.7-m (12-ft) steel pipe rising from a concrete slab remains at the site. (References: Deford 1995, DOE-RL 1996)	Concrete, soil	Undetermined radionuclides	$57,950
	600-202 (Four Burn and Burial Pits)	Four burn and burial pits are arranged in a rectangle, 150 x 75 x 6 to 12 m deep (500 x 250 x 20 to 40 ft deep). Miscellaneous debris, including glass, metal, and porcelain, are evident at the site. (References: Deford 1995, DOE-RL 1996)	Soil, miscellaneous debris	Undetermined organic chemicals	$179,942

Table A-2. Candidate 100 Area Remaining Sites for Plug-in of Remove/Treat/Dispose. (18 Pages)

Operable Unit	Site Name	Current Site Knowledge	Media/ Material	Potential Contaminants	Estimated Cost of Sampling
100-IU-6 (cont.)	600-204 (Hanford Townsite Burn and Burial Trench)	The site was used as a burn pit and possibly burial ground. Miscellaneous debris (metal and glass fragments, fire-scarred rock, and cans) is scattered in the bottom. Site dimensions are approximately 45.8 x 6.1 x 1.2 m deep (150 x 20 x 4 ft deep). (References: Deford 1995, DOE-RL 1996)	Soil, miscellaneous debris	Undetermined organic chemicals	$55,087
	600-205 (Hanford Townsite Landfill 2)	Pre- Hanford municipal landfill for the Hanford townsite. No hazardous materials known. Dimensions are approximately 61 x 30 x 1.5 m deep (200 x 100 x 5 ft deep).	Soil, Debris	Probable Pesticides and Organic Solvents	$69,331
	600-208 (Hanford Construction Camp Boiler House Ponds)	These are liquid waste disposal ponds serving the steam plants for the Hanford Construction Camp. The wastes in the water would have been "industrial and commercial wastes common to the period," which was considered to be mostly water softener brine. The dimensions of the ponds are 18.3 x 6.1 x 1.5 m deep (60 x 20 x 5 ft deep). (References: Deford 1995, DOE-RL 1996)	Soil	Undetermined organic and inorganic chemicals	$43,477
	UPR-600-16 (Fire and Contamination Spread)	A fire during decontamination of the P-11 Facility for plutonium criticality studies spread plutonium contamination throughout the facility. In 1974 the site was decontaminated, demolished and released from radiation zone status. The dimensions provided are 55 x 30.5 m (180 x 100 ft). (References: Deford 1995, DOE-RL 1996)	Soil	Plutonium	$69,188
200-CW-3 (CERCLA site – EPA lead)	216-N-1[c] Cooling Water Pond	Received cooling water from 212-N Building fuel storage basins. Site dimensions are approximately 152 x 30 x 1.8 m deep (.500 x 100 x 6 ft deep).	Soil	Co-60, Sr-90, Cs-137, Eu-155, U-238, Pu-239/240	$49,203
	216-N-2[c] Cooling Water Trench	Received basin water and sludge when the 212-N Building fuel storage basins were drained for special tests in 1947. Site dimensions are approximately 15 x 3 x 2.1 m deep (50 x 10 x 7 ft deep).	Soil	Co-60, Sr-90, Cs-137, Eu-155, U-238, Pu-239/240	$49,203
	216-N-3[c] Cooling Water Trench	Received sludge and residual water from cleanout of 212-N Building fuel storage basins when operations ceased in 1952. Site dimensions are approximately 15 x 6.1 x 1.8 m deep (50 x 20 x 6 ft deep).	Soil	Co-60, Sr-90, Cs-137, Eu-155, U-238, Pu-239/240	$49,203
	216-N-4[c] Cooling Water Pond	Received cooling water from 212-P Building fuel storage basins. Site dimensions are approximately 152 x 61 x 1.8 m deep (.500 x 200 x 6 ft deep).	Soil	Co-60, Sr-90, Cs-137, Eu-155, U-238, Pu-239/240	$82,388
	216-N-5[c] Cooling Water Trench	Received sludge and residual water from cleanout of 212-P Building fuel storage basins when operations ceased in 1952. Site dimensions are approximately 24 x 4.6 x 1.8 m deep (80 x 15 x 6 ft deep).	Soil	Co-60, Sr-90, Cs-137, Eu-155, U-238, Pu-239/240	$49,203
	216-N-6[c] Cooling Water Pond	Received cooling water from 212-R Building fuel storage basins. Site dimensions are approximately 152 x 46 x 1.8 m deep (.500 x 150 x 6 ft deep).	Soil	Co-60, Sr-90, Cs-137, Eu-155, U-238, Pu-239/240	$69,188

Table A-2. Candidate 100 Area Remaining Sites for Plug-in of Remove/Treat/Dispose. (18 Pages)

Operable Unit	Site Name	Current Site Knowledge	Media/ Material	Potential Contaminants	Estimated Cost of Sampling
200-CW-3 (cont.)	216-N-7[c] Cooling Water Trench	Received sludge and residual water from cleanout of 212-R Building fuel storage basins when operations ceased in 1952. Site dimensions are approximately 24 x 4.6 x 1.8 m deep (80 x 15 x 6 ft deep).	Soil	Co-60, Sr-90, Cs-137, Eu-155, U-238, Pu-239/240	$49,203
TOTAL: 161 Remaining Sites for Sampling					$12,288,024

NOTE: See 100 Area Source Operable Unit Focused Feasibility Study (DOE/RL-94-61), Appendix N, Section N5.0, for references cited throughout this table.

[a]This site is an active waste management unit where hazardous substances have been potentially released or a substantial threat of a release of a hazardous substance exists. While these units are currently in service in support of DOE project activities, they are planned to be taken out of service by DOE when the project mission for these units has been completed and addressed by the selected remedy specified in the 100 Area Remaining Sites Interim ROD.

[b]This site is a petroleum site that is being remediated to cleanup standards established in the Model Toxics Control Act Cleanup Regulations (WAC 173-340) and is outside the CERCLA remedy selection process. It is anticipated that this site can be remediated by the Remove, Treat, and Dispose Alternative. However, should petroleum be found at depth in the soil or in groundwater, other remedial alternatives may be selected by the EPA, Ecology, and the DOE.

[c]This site has been determined by the Tri-Parties to have had a process history most closely aligned with liquid waste disposal sites in the 100 Area. Therefore, these units are being addressed by CERCLA with 100 Area waste management units rather than with 200 Area units.

ARCL = Allowable Residual Contamination Level

Figure A-1. 100 Area Remaining Sites in the 100-BC-1 and 100-BC-2 Operable Units.

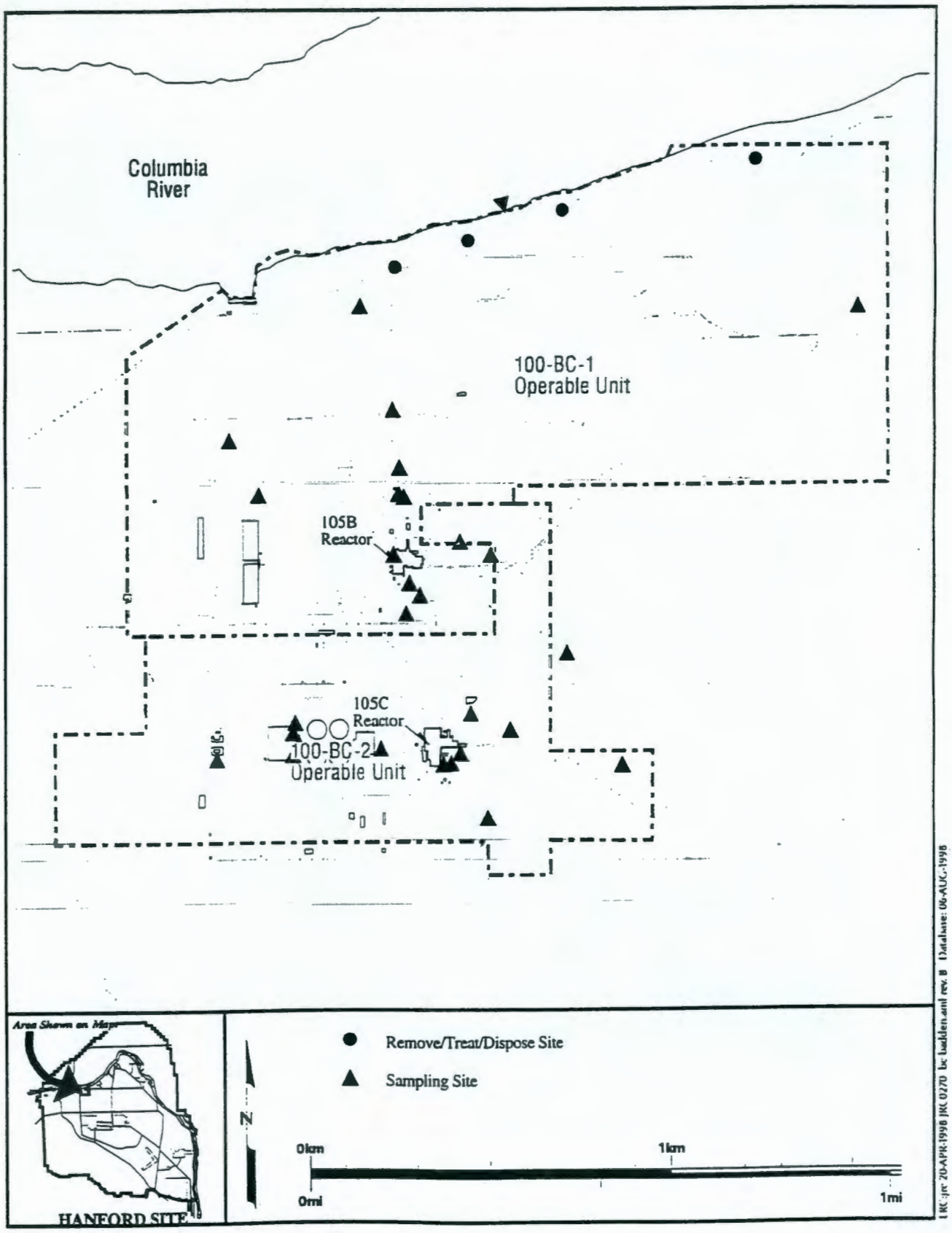


Figure A-2. 100 Area Remaining Sites in the 100-DR-1 and 100-DR-2 Operable Units.

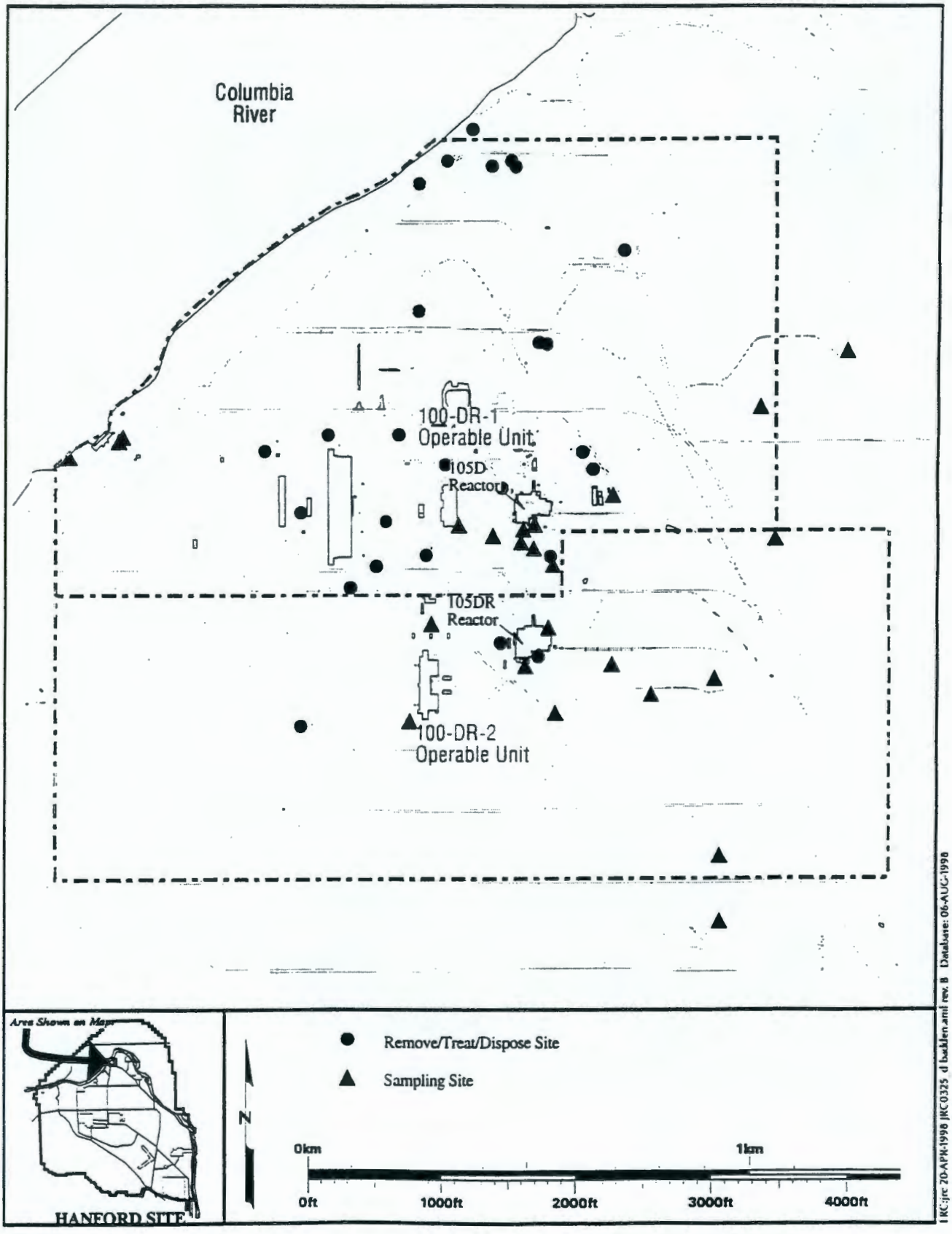


Figure A-3. 100 Area Remaining Sites in the 100-FR-1 and 100-FR-2 Operable Units.

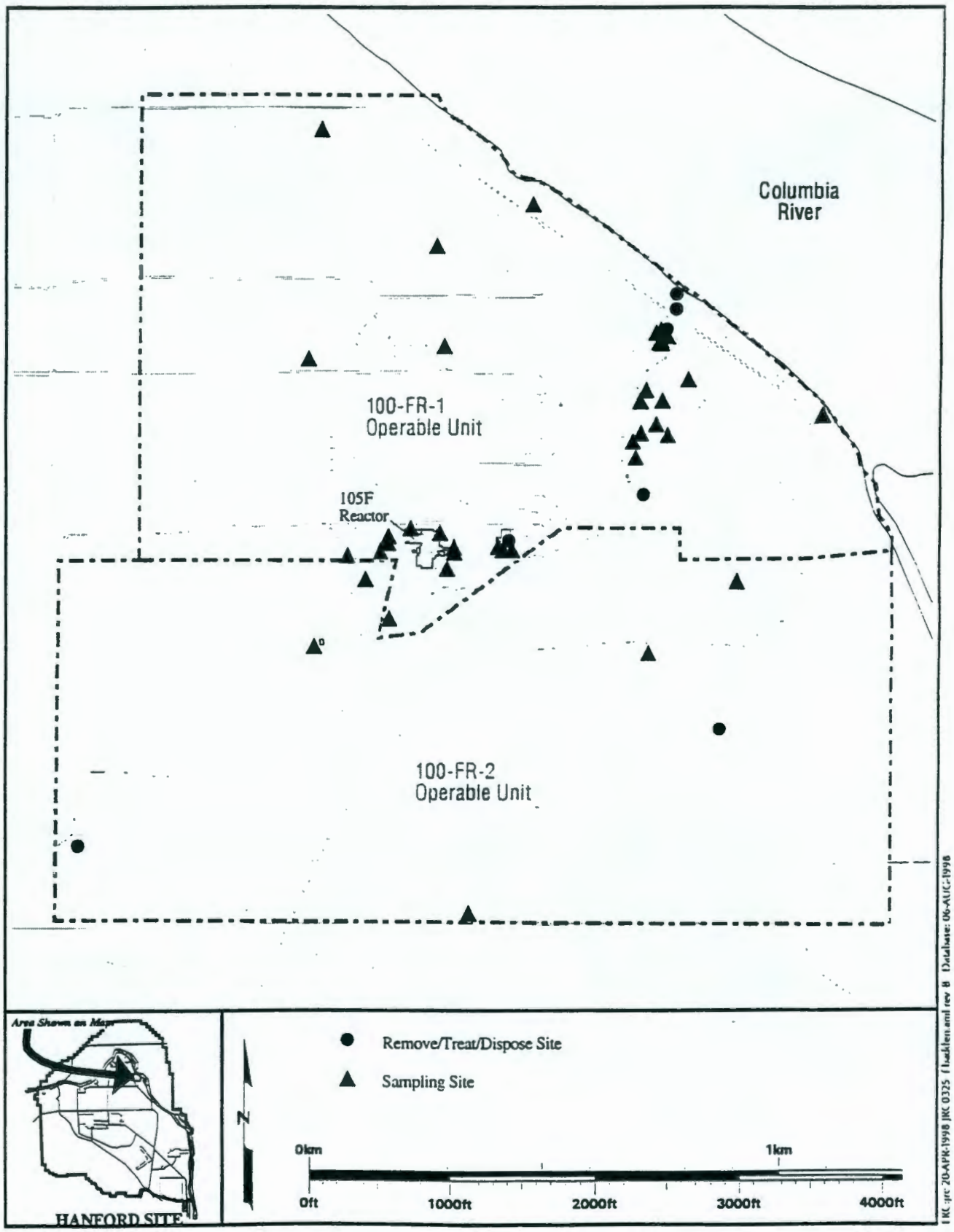


Figure A-4. 100 Area Remaining Sites in the 100-HR-1 and 100-HR-2 Operable Units.

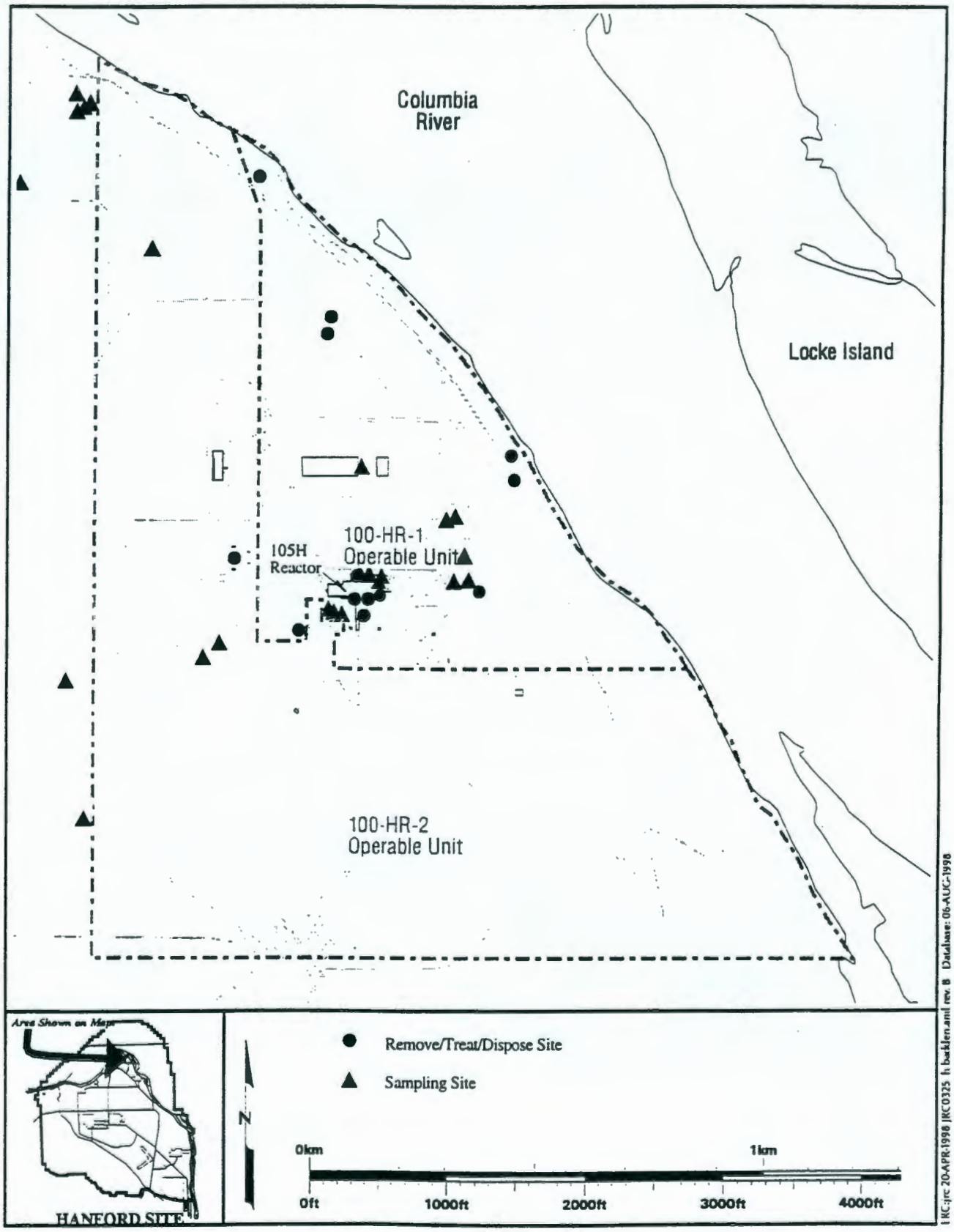


Figure A-5. 100 Area Remaining Sites in the 100-KR-2 Operable Unit.

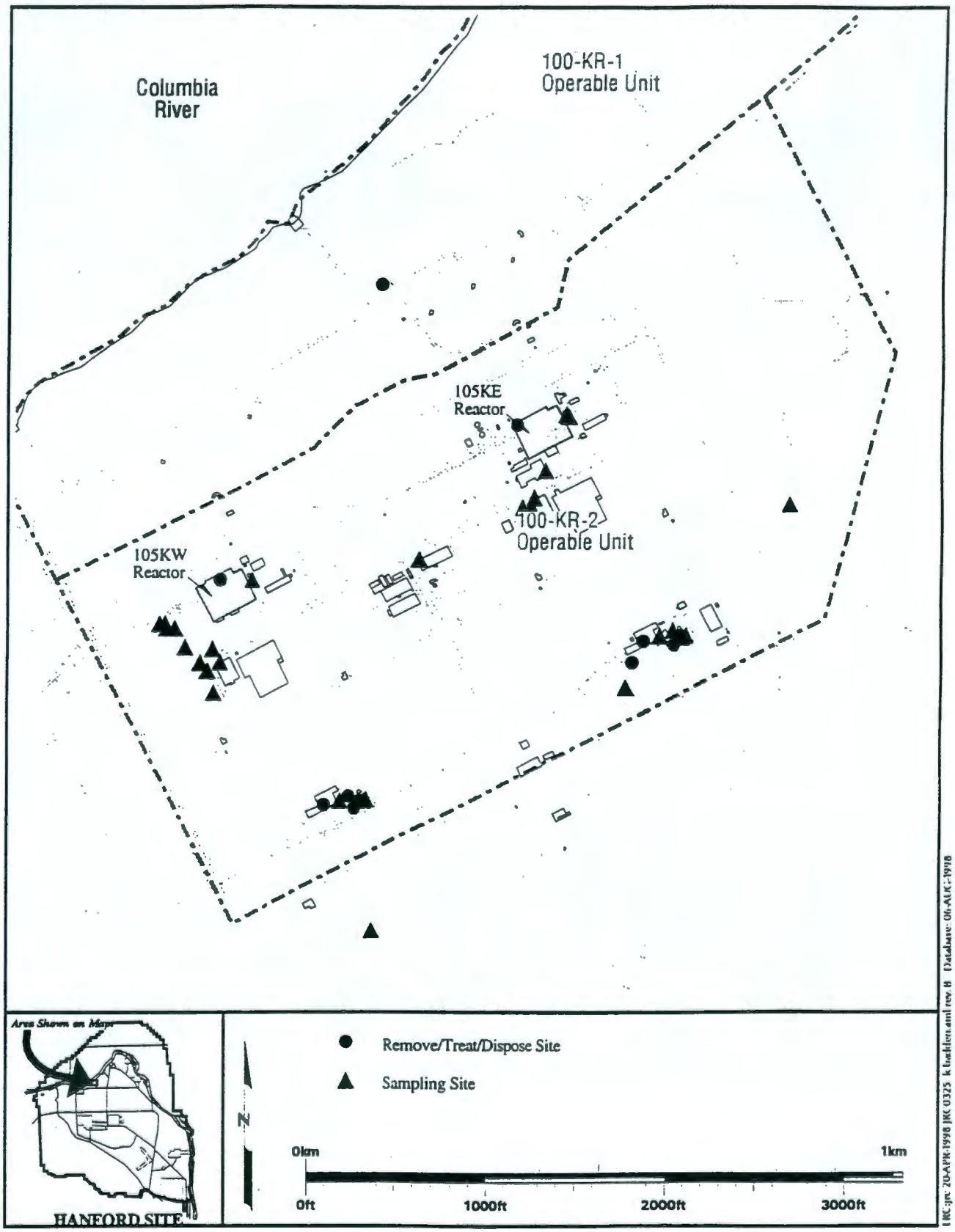


Figure A-6. 100 Area Remaining Sites in the 100-IU-6 Operable Unit.

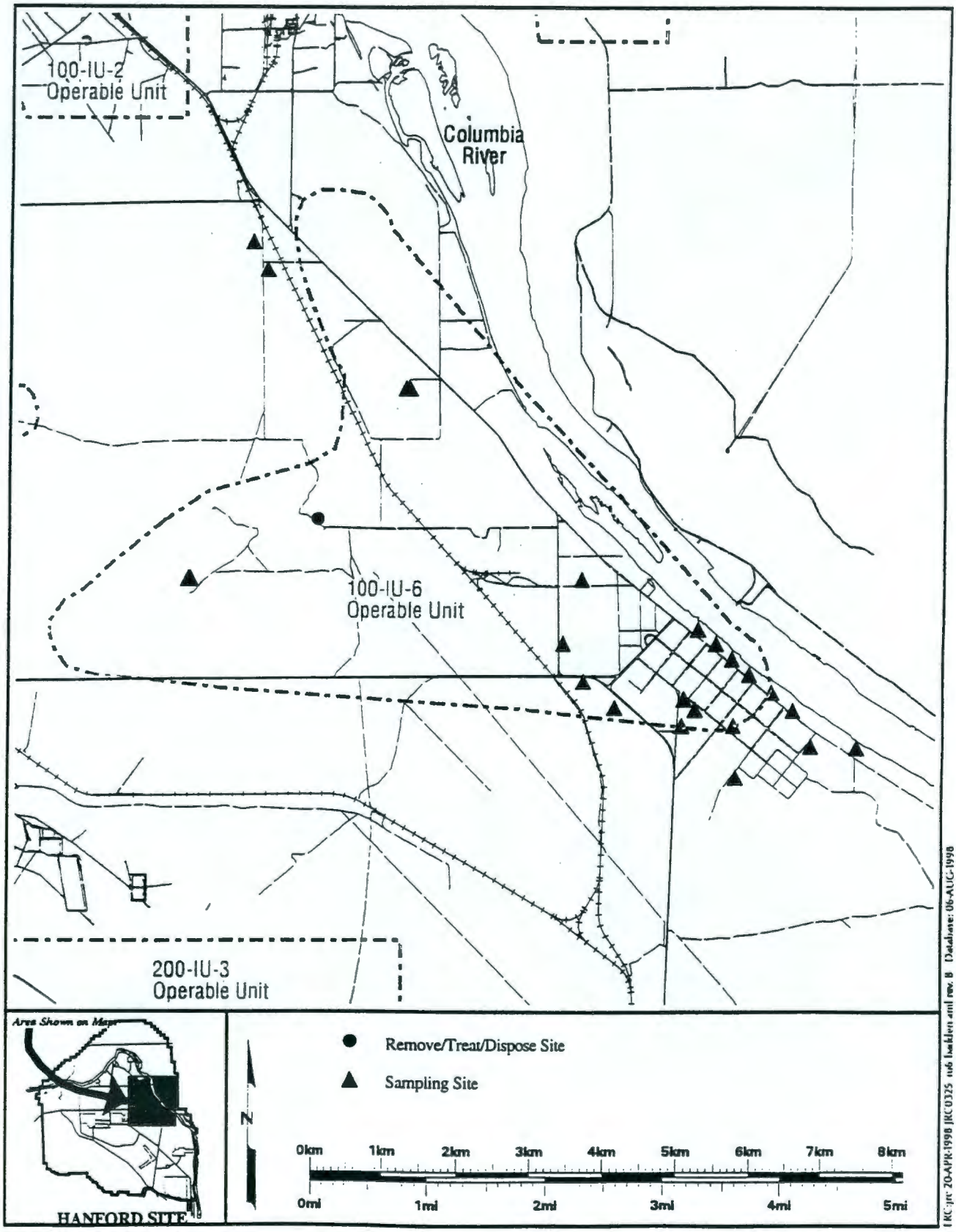


Figure A-7. 100 Area Remaining Sites in the 100-IU-2 Operable Unit.

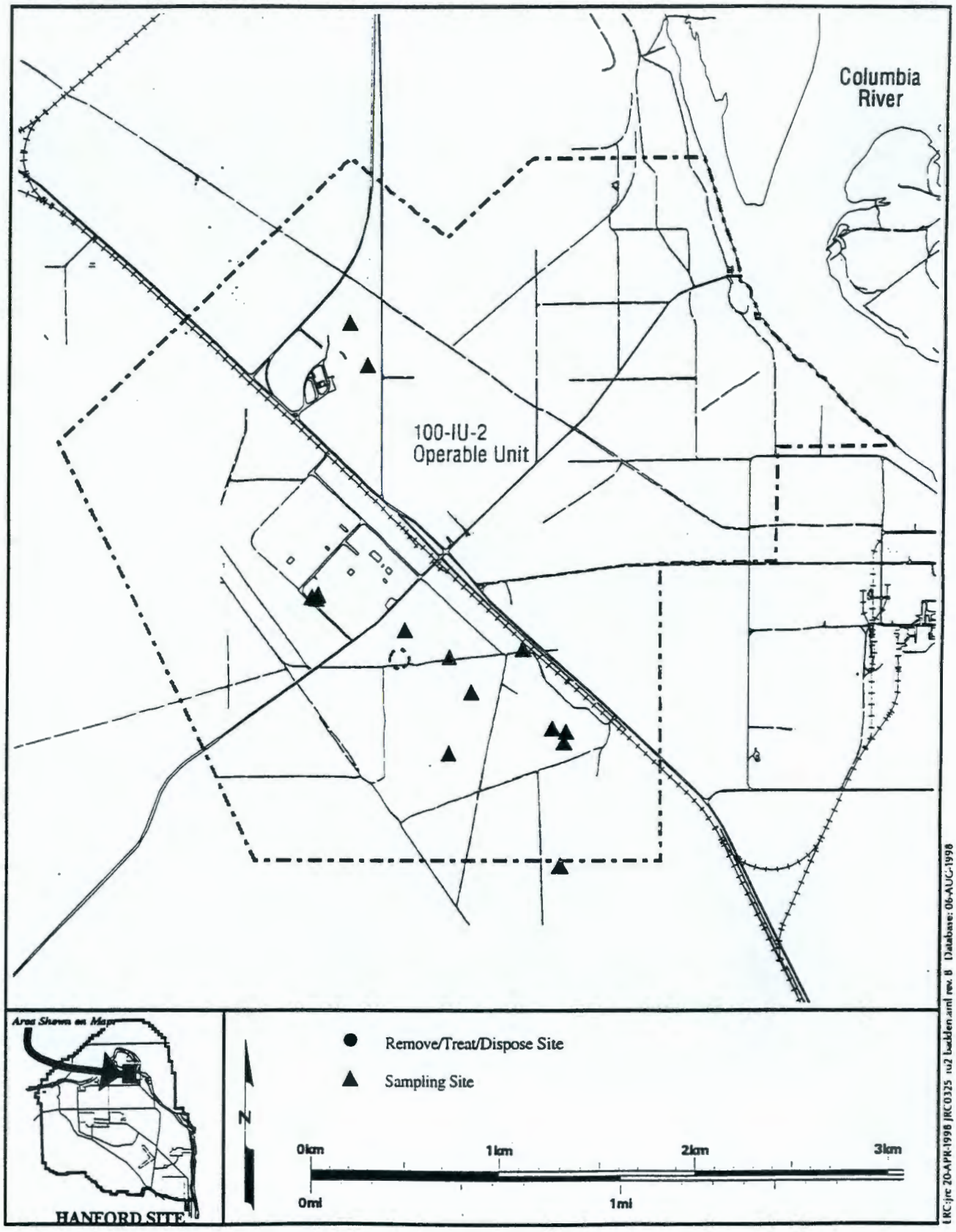
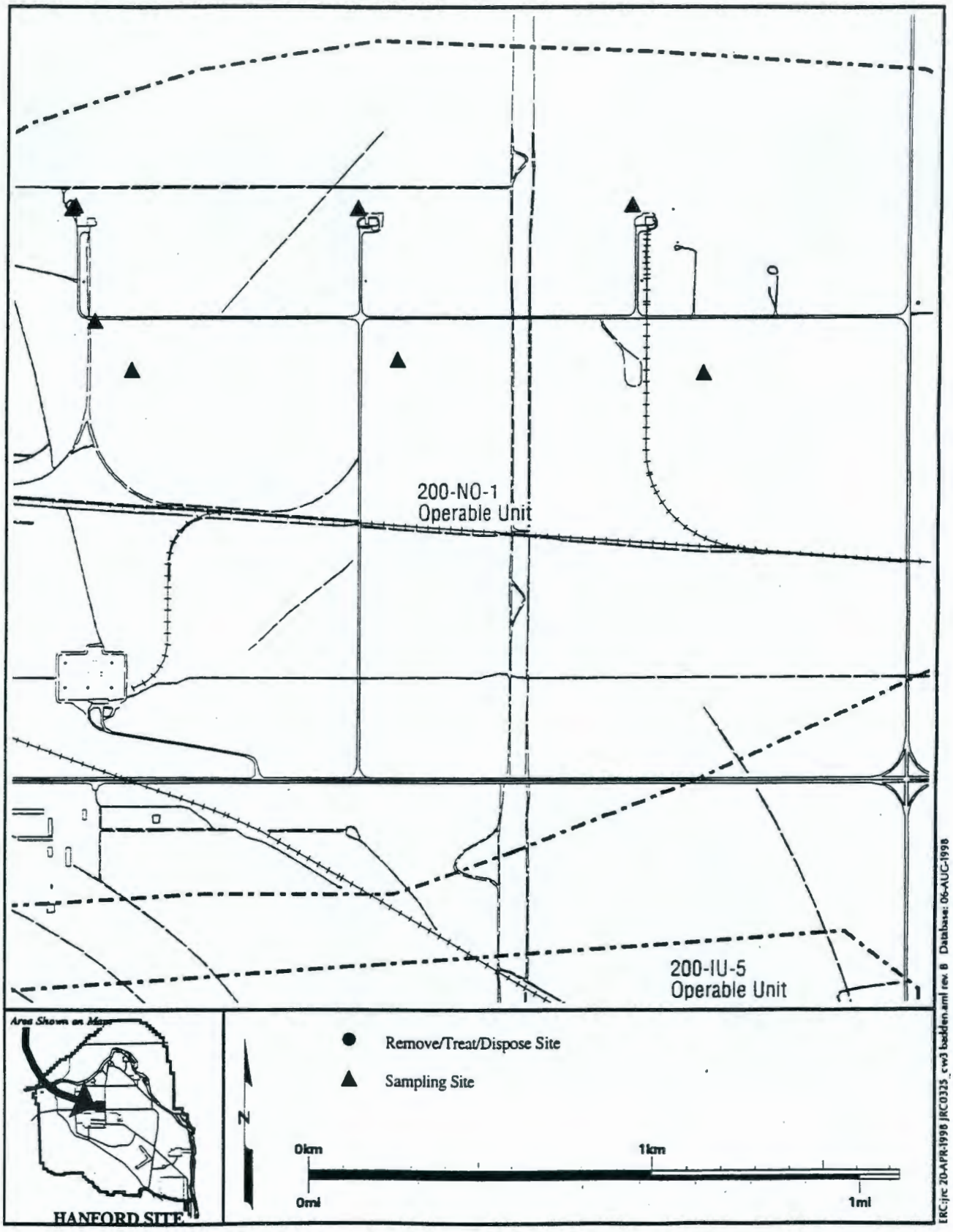


Figure A-8. 100 Area Remaining Sites in the 200-CW-3 Operable Unit.



APPENDIX B

ALTERNATIVES FOR DISPOSAL OF 100 AREA REACTOR BUILDING MATERIALS

ALTERNATIVES FOR DISPOSAL OF 100 AREA REACTOR BUILDING MATERIALS

This analysis evaluates alternative remedial actions under the *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA) for removal and disposal of contaminated materials from the 105-B, 105-D, 105-H, 105-KE and 105-KW reactor buildings. These materials were used during the operation of the reactor facilities or were generated during routine maintenance activities as part of reactor deactivation. Potential contaminants of concern include radioactive isotopes, chromium, lead, polychlorinated biphenyls (PCBs)[1], mercury, miscellaneous oils, cadmium and asbestos. These contaminants are contained within loose or easily removable materials such as miscellaneous equipment, tools, spent high efficiency particulate air filters, pipes, batteries and paint within the reactor buildings. Potential waste types and estimated quantities are identified in Table B-1.

While materials are in storage in the 100 Area reactor buildings, there is low risk of exposure to the public from hazardous substances. However, stored materials require periodic inspections and maintenance to prevent inadvertent releases of contaminants. The inspection and maintenance activities result in a potential exposure to workers. In addition, as long as the waste is in storage, there is the possibility of a release that would threaten public health or the environment. Removal of materials is required to reduce risk to workers, the public, or the environment. The potential exposure and the potential threat of a release from continued storage of these materials justifies the proposed remedial actions.

Remedial alternatives considered for the 100 Area reactor building materials are:

- **No Action** –this alternative would leave contaminated materials in place at the 100 Area reactor buildings

- **Disposal at the Environmental Restoration Disposal Facility (ERDF)** – this alternative would include removal and onsite disposal of materials at the ERDF, which is designed to meet *Resource Conservation and Recovery Act* (RCRA) minimum technological requirements for landfills (double liners, leachate collection systems, leak detection, and final cover)

  Characterization, potential treatment, packaging, and transport of 100 Area reactor building materials would be required for disposal at the ERDF. Materials would be characterized prior to acceptance at the ERDF. When fully characterized, data would be compared against the disposal unit waste acceptance criteria and appropriate waste profiles would be developed demonstrating acceptability. Treatment of materials to meet waste acceptance criteria, such as RCRA land disposal restrictions may be required. It is estimated that 50 percent of the hazardous waste and 50 percent of the mixed waste identified in Table B-1 will require treatment (or a treatability variance) to meet land disposal restrictions. It is anticipated that the majority of these wastes can be treated onsite using a macroencapsulation technology, such as grouting. Should a material not be able to be treated onsite to meet the disposal unit's waste acceptance criteria, it will be sent to an offsite treatment and/or disposal facility. The Environmental Protection Agency will make a determination as to the acceptability of the proposed offsite facility for receipt of the CERCLA waste. Wastes would be packaged in compliance with Department of Transportation and waste management standards prior to transport. Reuse and recycling of materials will be considered where practicable.

Previous CERCLA evaluations that analyzed disposal alternatives for similar Hanford deactivation wastes have concluded that disposal at Hanford units other than the ERDF is not as cost-effective and/or as protective as disposal at the ERDF (BHI 1996a, BHI 1996b, EPA 1996a, EPA 1996b). Hanford disposal units that have been considered include the Low-Level Burial Grounds (LLBG) and the W-025 Mixed

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[1] PCB-contaminated materials are anticipated to be nonradioactive liquids. Offsite treatment and incineration of this waste at a permitted *Toxic Substances Control Act* facility will be required.

Waste Trench. The LLBG are unlined trenches used for the disposal of radioactive low-level waste. The LLBG were determined to be less protective than the ERDF because of the absence of liners, leak detection systems, and leachate collection systems. The W-025 trench is a permitted RCRA-compliant unit and is designed similar to the ERDF. Regarding cost, the ERDF Disposal Alternative was found to be a much less expensive alternative than other Hanford Site disposal units by an order of magnitude ($2,700,000 for the LLBG versus $390,000 for ERDF for 183-H Solar Evaporation Basin waste and $400,000 for the LLBG/W-025 Trench versus $50,000 for ERDF for the 100-N Area waste). Because of these earlier evaluations, disposal of 100 Area Reactor Building materials at other Hanford Site disposal units is not being reanalyzed here. The public is invited to review the evaluations referenced below to obtain further detail regarding other Hanford Site disposal unit alternatives.

The following information provides an analysis of the No Action Alternative versus the ERDF Disposal Alternative evaluated against the nine CERCLA criteria and the *National Environmental Policy Act* (NEPA).

OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

The No Action Alternative would not eliminate, reduce, or control risks to workers, the public, or the environment. Because this alternative does not meet the threshold criterion of protectiveness, it cannot be considered a viable alternative. The ERDF Disposal Alternative provides for disposal in a unit that meets the substantive landfill requirements under RCRA. This unit is double-lined and includes leak detection and leachate collection systems.

COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Key ARARs for removal and disposition of 100 Area reactor building materials include the substantive requirements of the dangerous waste management standards (*Washington Administrative Code* [WAC] 173-303), RCRA land disposal restrictions (40 *Code of Federal Regulations* [CFR] 268), low-level radioactive waste disposal requirements (10 CFR 61), transportation requirements (49 CFR 100 –179), radiation protection standards (10 CFR 835), and air emission standards (40 CFR 61 and WAC 246-247). The No Action Alternative could result in eventual release of hazardous substances into the environment or cause human exposure to contaminants. Therefore, ARARs may not be met with this alternative. The ERDF Disposal Alternative can meet all ARARs associated with disposal of 100 Area reactor building material.

LONG-TERM EFFECTIVENESS AND PERMANENCE

The No Action Alternative provides no controls for long-term effectiveness and permanence. The ERDF Disposal Alternative would provide long-term effectiveness and permanence through disposal of contaminants in a unit designed for 500 years.

REDUCTION OF TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT

The No Action Alternative does not reduce toxicity, mobility, or volume through treatment. The ERDF Disposal Alternative would reduce the toxicity of contaminants in 100 Area reactor building waste through natural attenuation in the soil column, particularly through radioactive decay. The degree of treatment of materials required to meet waste acceptance criteria at either disposal unit would be similar.

SHORT-TERM EFFECTIVENESS

The No Action Alternative would not present short-term risks since no remedial alternatives would be conducted. The ERDF Disposal Alternative would provide adequate short-term protection to human health and the environment. The primary risk to workers would be potential exposure to contaminants during waste handling, transport, and disposal. This would be mitigated by appropriate training, personal protective equipment, and waste handling practices. Either alternative could be implemented immediately.

IMPLEMENTABILITY

The No Action Alternative could be implemented within a short time period and would not present any technical problems. However, it would not be consistent with the Department of Energy's long-range goals for the decontamination and decommissioning of the Hanford Site reactor buildings. The ERDF Disposal Alternative is immediately implementable. The ERDF Record of Decision (ROD) was modified in 1996 by an Explanation of Significant Difference, which stated that decontamination or decommissioning waste, such as 100 Area reactor building material, may be disposed of in the ERDF in accordance with a remedial action ROD or removal action memoranda. The ROD that will be written after public review of this Proposed Plan will serve this purpose.

COST

No costs are associated with the No Action Alternative. The volume of waste is estimated to be 2,045 cubic yards. Costs for disposal at the ERDF are $172,000 for transportation and disposal of low-level waste, mixed waste, hazardous waste, and asbestos. For transportation and offsite treatment and disposal of liquid PCBs, the estimated cost is $24,000. Therefore, the total cost for The ERDF Disposal Alternative is $196,000.

STATE AND COMMUNITY ACCEPTANCE

The state and community have not had an opportunity to formally comment on remedial alternatives. This criterion will be evaluated following completion of the public comment period for this Proposed Plan.

NEPA VALUES

The No Action Alternative would continue to present a risk of direct exposure to both human and ecological receptors. No direct cumulative impacts would result from this alternative. Cumulative impacts from the ERDF Disposal Alternative are not expected to occur due to the relatively low volumes of waste (relative to other Hanford Site waste generating activities) requiring disposal. This alternative would not be expected to significantly affect natural or cultural resources. No new facilities require construction. The work force required for disposal of the wastes would be small and would be drawn from existing work force resources. Socioeconomic impacts from either of the alternatives would be minimal.

RECOMMENDED REMEDIAL ACTION ALTERNATIVE

Based on the evaluation of CERCLA criteria and NEPA values, the preferred alternative for 100 Area reactor building waste is removal, treatment as required, packaging, transport, and disposal of the waste at the ERDF. The ERDF Disposal Alternative minimizes disposal costs while providing a higher degree of protectiveness and effectiveness than would be provided through implementation of the No Action Alternative.

REFERENCES

BHI, 1996a, *Engineering Evaluation/Cost Analysis for Disposal of Structural Concrete and Soil from the 183-H Solar Evaporation Basin*, BHI-00872, August 1996, Bechtel Hanford, Inc, Richland, Washington.

BHI, 1996b, *Engineering Evaluation/Cost Analysis for 100-N Waste*, BHI-00785, August 1996, Bechtel Hanford, Inc, Richland, Washington.

EPA, 1996a, *Action Memorandum: N Area Waste Expedited Response Action Cleanup Plan, U.S. Department of Energy, Hanford Site, Richland, WA*, November 1996, U.S. Environmental Protection Agency, Richland, Washington.

EPA, 1996b, *Action Memorandum: 183-H Solar Evaporation Basin Waste Expedited Response Action Cleanup Plan*, November 1996, U.S. Environmental Protection Agency, Richland, Washington.

Table B-1
100 Area Reactor Building Materials

Operable Unit	Reactor Building	Total Projected Waste Volume (yd^3)	Potential Waste Distribution	
			Waste Type	Yd^3
100-BC-1	105-B	200	Low-Level	130
			Mixed	50
			Hazardous	10
			PCBs	2
			Asbestos	8
100-DR-1	105-D	110	Low-Level	70
			Mixed	30
			Hazardous	10
			PCBs	<1
			Asbestos	<1
100-HR-1	105-H	110	Low-Level	91
			Mixed	5
			Hazardous	5
			PCBs	<1
			Asbestos	4
100-KR-2	105-KE	905	Low-Level	890
			Mixed	5
			Hazardous	8
			PCBs	<1
			Asbestos	2
100-KR-2	105-KW	720	Low-Level	709
			Mixed	<1
			Hazardous	3
			PCBs	1
			Asbestos	7

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