

PROPOSED PLAN FOR THE ENVIRONMENTAL RESTORATION DISPOSAL FACILITY (ERDF) AT THE HANFORD SITE, RICHLAND, WASHINGTON

U.S. ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON STATE DEPARTMENT OF ECOLOGY
U.S. DEPARTMENT OF ENERGY

October 1994

INTRODUCTION

This plan proposes construction and operation of the Environmental Restoration Disposal Facility (ERDF) for disposing waste from cleanup of the Hanford Site. The ERDF is proposed to be a single-trench landfill, capable of receiving only Hanford cleanup waste. The landfill would be closed with a protective cap. The ERDF would include roads, vehicles, a decontamination facility, and other facilities to support waste disposal. The 45-day public comment period is scheduled from October 17 through November 30, 1994.

The cleanup waste will be from the U.S. Department of Energy's (DOE) Hanford Site near Richland, Washington. The waste was released to the environment during plutonium production, fuel extraction, fuel rod fabrication, and nuclear energy research. The work was done at locations called the 100, 200, and 300 Areas, beginning in 1943 and continuing into the 1980's. (Figure 1)

The cleanup waste may include soil, rubble, or other materials contaminated with hazardous (chemical), low-level radioactive, or mixed (combined hazardous chemical and radioactive) wastes removed from the Hanford Site. This proposed action would initially authorize construction and operation of two landfill cells capable of receiving approximately 1 million cubic yards of cleanup waste removed from along the Columbia River on the Hanford Site.

This proposed plan identifies the preferred alternative for construction of the ERDF, a centralized landfill for cleanup waste under the *Comprehensive Environmental*

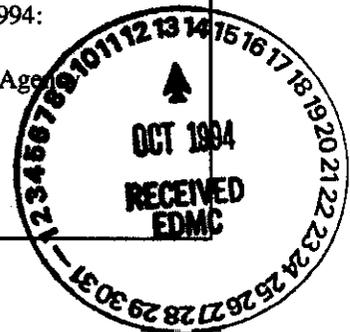
Response, Compensation, and Liability Act of 1980 (CERCLA). All the alternatives evaluated in this plan include the ERDF, except for the no-action alternative.

This plan summarizes information presented in the *Remedial Investigation/Feasibility Study (RI/FS) Report for the Environmental Restoration Disposal Facility* (DOE/RL-93-99 Rev. 1). This plan and the RI/FS report are part of a regulatory package for the ERDF. *National Environmental Policy Act of 1969* (NEPA) values are addressed within the RI/FS. The RI/FS and other documents that support this plan are available in the Administrative Record. The Regulatory Package is available at the Hanford Tri-Party Agreement Public Information Repositories.

This plan encourages public participation in review of the ERDF proposal and design, and is consistent with Section 117(a) of CERCLA, as amended by the *Superfund Amendments and Reauthorization Act of 1986*. The final decision on the proposal will be made in accordance with CERCLA. The proposed action is a preliminary recommendation and may be modified or rejected based on public comments. The public is encouraged to consider and comment on the four alternatives outlined in this plan and described in more detail in the RI/FS document.

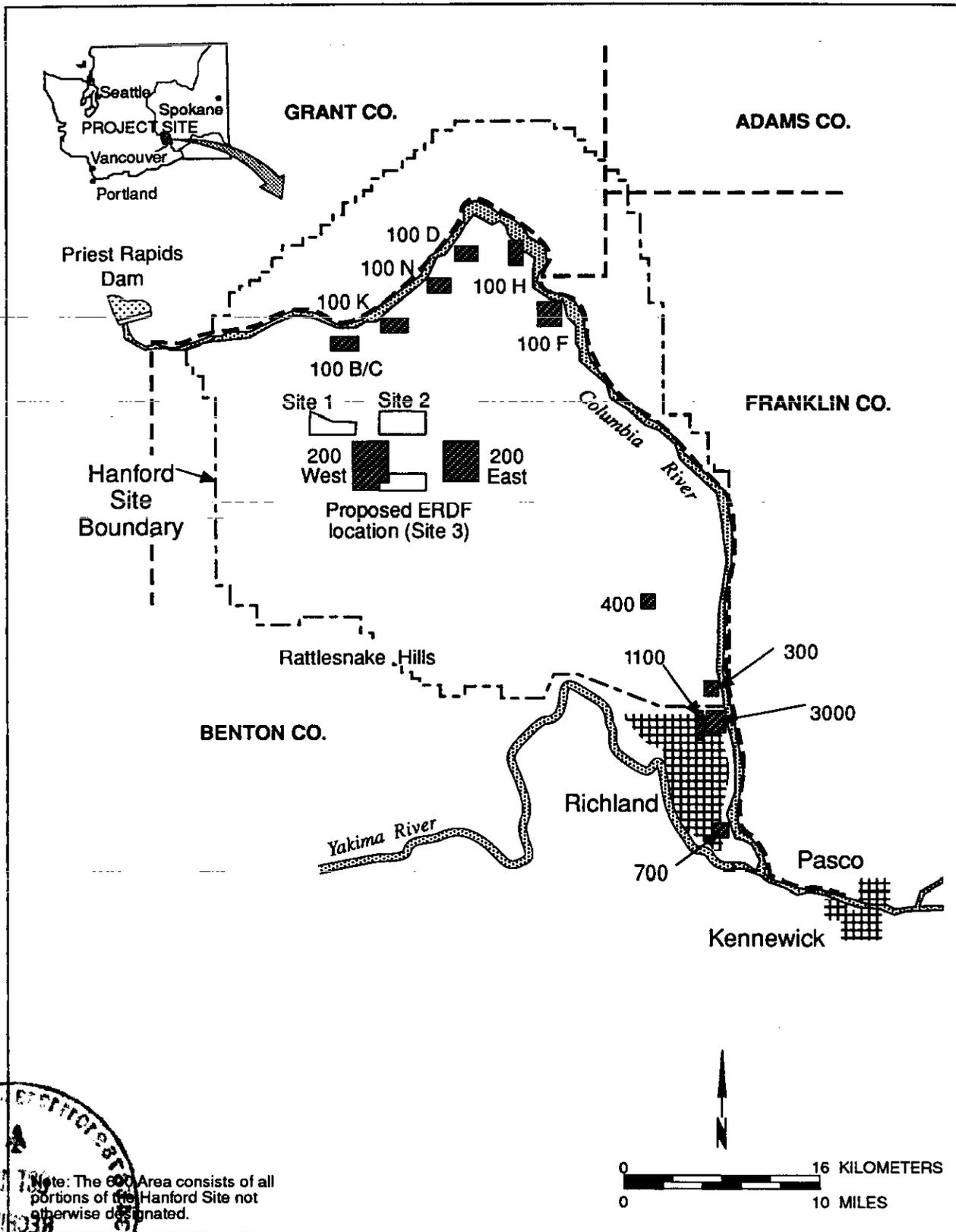
Comments should be sent to the following address before November 30, 1994:

U.S. Environmental Protection Agency
Attn: Pamela Innis
712 Swift Blvd., Suite 5
Richland, Washington 99352
(509) 376-4919



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Figure 1. Hanford Site Map.



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Note: The 600 Area consists of all portions of the Hanford Site not otherwise designated.

Hanford Tri-Party Agreement Public Information Repositories: All documents in the regulatory package are available for review at the following repositories.

Gonzaga University
Foley Center E. 502 Boone
Spokane, Washington
(509) 328-4220 ext. 3125

University of Washington
Suzzallo Library
Government Publications Room
Seattle, Washington 98101
(206) 543-4664

Portland State University
Branford Price Millar Library
Science and Engineering Floor
SW Harrison and Park
Portland, Oregon
(503) 724-4729

Washington State University,
Tri-Cities Extension Center
U.S. DOE Public Reading Room, Room 130
100 Sprout Road
Richland, Washington 99352
(509) 376-8583

Administrative Record: The Administrative Record file, which contains the information used in selection of the proposed alternative, is available at the following locations:

U.S. Department of Energy, Richland
Operations Office
Administrative Record Center
Attn: Debbie Isom
2440 Stevens Center Place
Richland, Washington 99352
(509) 376-2530

EPA Region 10
Superfund Record Center
Attn: Diane Richardson
1200 Sixth Avenue.
Park Place Building, 7th floor
MSIN: HW-074
Seattle, Washington 98101
(206) 553-1847

Washington Department of Ecology
Administrative Record
Attn: Marilyn Smith
719 Sleater-Kinney Road SE
Capital Financial Building, Suite 200
Lacey, Washington 98503-1138
(206) 407-7097

BACKGROUND

Potential Health Risks Along the Columbia River. Currently, contaminated areas along the Columbia River (100 and 300 Areas) at the Hanford Site are not suitable for use by the general public. If this land was released for public use before cleanup, the risks would be considered unacceptable. Cleanup of these areas is required before public use.

Feasibility studies (FS) have been completed for some waste sites. These studies contain a variety of cleanup alternatives, including alternatives that rely on excavation and onsite waste disposal. Excavation and onsite waste disposal is considered a likely option for some waste sites. Therefore, the need for an onsite disposal facility was recognized.

Proposed ERDF Location. As shown in Figure 1, the proposed ERDF site is located between the 200 West and 200 East Areas. The topography of the site is shown in Figure 2.

Placing the ERDF on the Central Plateau would consolidate waste management activities away from the Columbia River at a relatively high ground-surface elevation (with a corresponding greater depth to groundwater). The Hanford Future Site Uses Working Group, which represents federal, state, and local governments, Native American tribes, labor groups, economic development groups, and public interest groups, developed a range of potential future uses for the Hanford Site. A general recommendation by the group was that areas of high future use (e.g., near the Columbia River) be cleaned up, and that the middle of the Central Plateau be designated for waste management.

No known contaminated waste sites have been identified within the proposed ERDF boundaries. However, contaminated groundwater (from discharges of chemical processing wastewater in the 200 West

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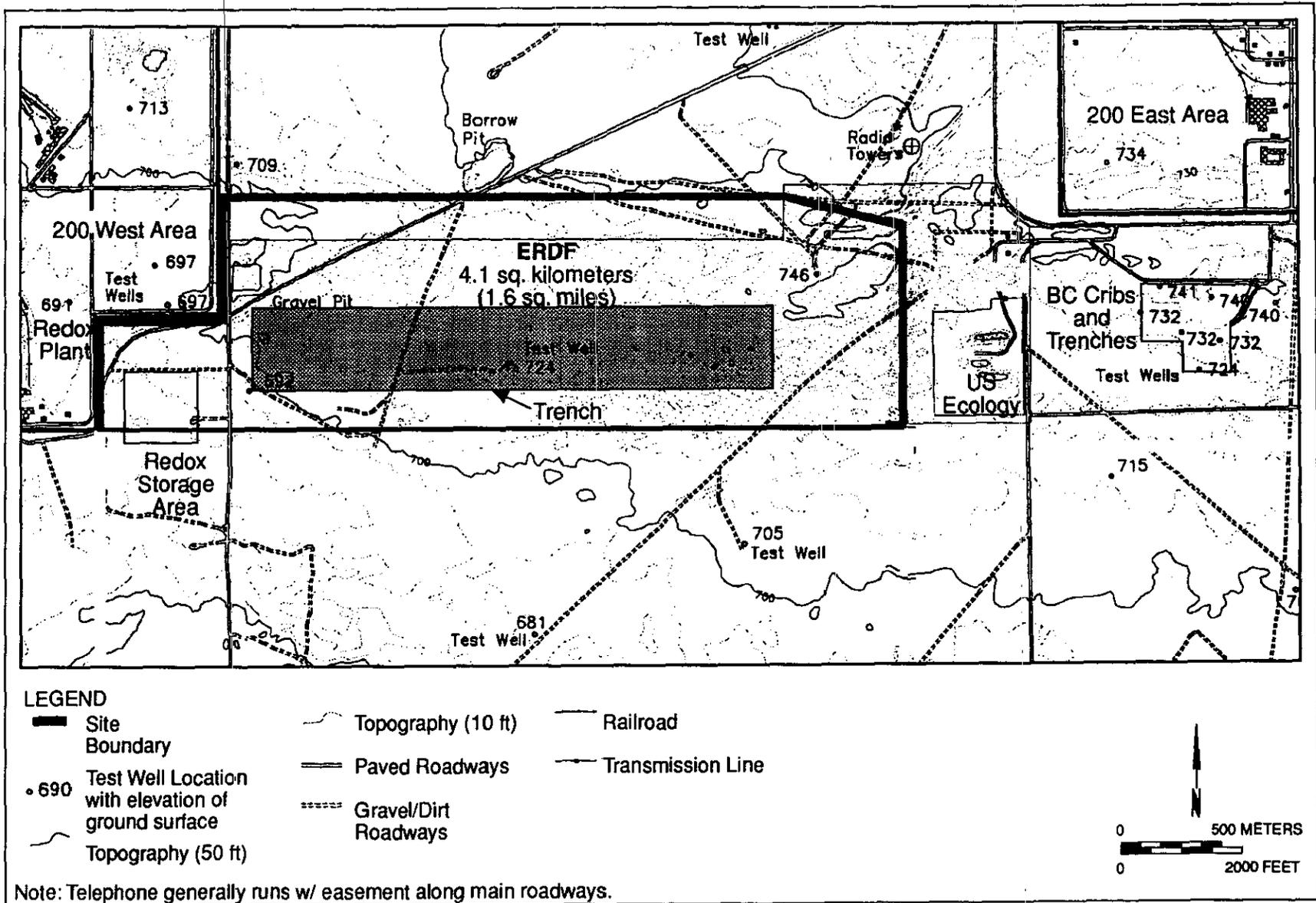


Figure 2. Proposed Location of the ERDF.

Area) has moved beneath the proposed ERDF site. The following contaminants are present in the groundwater at the site: tritium, iodine-129, technetium-99, chloroform, nitrate, chromium, and carbon tetrachloride. The highest contaminant concentrations are generally found near the west end of the proposed ERDF site. Siting of the proposed ERDF would not prevent cleanup of the contaminated groundwater.

Site selection is based on the *Siting Evaluation Report for the Environmental Restoration Disposal Facility* (WHC-SD-EN-EV-009, Revision 2) that evaluated three candidate sites located on the Central Plateau (shown in Figure 1). Each site included at least 10 square kilometers (4 square miles) of contiguous land and at least 5 square kilometers (2 square miles) of nearby contingency space. This land requirement is based on early design assumptions for the ERDF that resulted in increased land use. By improving the trench design and eliminating the contingency space, the ERDF would occupy only 4.1 square kilometers (1.6 square miles). A review of potential sites within the 200 Area was performed. This review indicates that there are no other locations that meet the current size requirement within the waste management area (as recommended by the Hanford Future Site Uses Working Group).

Site selection was based on state and federal requirements. Although the proposed ERDF site (Site 3) includes the largest amount of *shrub-steppe habitat*, this site is the preferred location based on the following:

- Compatibility with the waste management area (as recommended by the Hanford Future Site Uses Working Group)
- Greatest depth to groundwater
- Greatest distance to the Columbia River
- Relatively flat topography (reducing complexity of design and construction)
- Lowest development cost.

Because the siting criteria were evaluated in the siting evaluation report, Sites 1 and 2 were not carried forward for detailed analysis in the RI/FS document.

During the public scoping process, an additional site, the 100-BC control area, was identified as a potential ERDF location. This area has surface radioactive contamination that would require cleanup before

constructing the ERDF. A 2 to 5 year delay in operation of the ERDF could be anticipated with a similar delay in cleanup along the Columbia River if this site is chosen. The primary reasons for the delay result from the need to perform site characterization and cleanup, regulatory evaluation and facility design modifications.

Expected Waste Characteristics. The ERDF is proposed to receive cleanup waste from the 100, 200, and 300 Areas.

The total volume of waste is expected to be less than 21.4 million cubic meters (28 million cubic yards). Final waste volumes will be affected by cleanup levels, land use, and use of treatment technologies, such as soil washing, for volume reduction.

100 Area. The 100 Area wastes include contaminated soil, sediments, sludges, burial ground waste, and demolition debris (e.g., pipe and concrete). The wastes resulted from the operation of the nine water-cooled, plutonium production reactors that were built along the shore of the Columbia River. The primary contaminants are cesium-137, cobalt-60, strontium-90, and chromium.

200 Area. Initially, cleanup of groundwater in the 200 Area will generate small quantities of wastes requiring disposal in the ERDF. In the future, 200 Area wastes could include contaminated soils and debris.

300 Area. Waste types in the 300 Area are similar to those found in the 100 Area. These wastes resulted from the fabrication of nuclear fuel elements, technical support, service support, and research and development activities related to fuel fabrication and reactor testing. The primary contaminants are uranium and copper.

OBJECTIVES

The primary objective of the proposed ERDF is to provide a disposal facility to accept waste removed during cleanup of the Hanford Site, particularly along the Columbia River. In addition, the ERDF would be designed and operated to accomplish the following:

- Prevent unacceptable direct exposure to waste
- Prevent unacceptable contaminant releases to the air

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- Prevent contaminant releases to groundwater above Applicable or Relevant and Appropriate Requirements (ARAR)
- Minimize ecological impacts
- Meet all ARARs.

Definition of ARAR

Applicable or Relevant and Appropriate Requirements (ARAR) are promulgated federal and state requirements or laws (other than CERCLA) that a remedy must attain.

Applicable requirements are cleanup standards that specifically address the site contaminants, location, or remedial action. ARARs address problems or situations sufficiently similar to those encountered at the site.

SUMMARY OF ALTERNATIVES

The following alternatives were carried forward after the CERCLA screening for effectiveness, implementability and cost:

- **Alternative 1 - No Action.** The no-action alternative consists of not constructing a centralized landfill on the Hanford Site to accommodate waste from cleanup of waste sites.
- **Alternative 2 - ERDF with No Liner.** A centralized landfill would be constructed that could dispose of cleanup wastes from waste sites. The landfill would be constructed without a liner.
- **Alternative 3 - ERDF with a Single Composite Liner.** A centralized landfill would be constructed that could dispose of cleanup wastes from waste sites. The landfill would be constructed with a single liner to collect contaminated water (leachate) that may be generated.
- **Alternative 4 - ERDF with a RCRA Double-Composite Liner.** A centralized landfill would be constructed that could dispose of cleanup wastes from waste sites. The landfill would be constructed with a double liner to collect any leachate passing through the first liner. The double liner provides a redundant and more reliable system to protect groundwater than a single liner.

Figure 3 shows a cross-section of the trench showing the different alternatives and liners.

Alternatives 2, 3, and 4 include the construction of a protective cap after the waste has been disposed. The protective cap minimizes the potential for intrusion into the waste and reduces the amount of water flowing through the waste and polluting the groundwater. Because the protective cap is not needed for a number of years, the decision on a specific protective cap is being deferred until that time. It is anticipated that additional research into protective caps may improve current designs. At a minimum, the protective cap will be compliant with the *Resource Conservation and Recovery Act of 1976 (RCRA)*, as shown in Figure 4.

The proposed alternative is Alternative 4 (a double-lined trench with a protective cap that protects groundwater and prevents contact with the waste). This alternative provides the greatest long-term effectiveness and reliability for protection of human health and the environment.

EVALUATION OF ALTERNATIVES

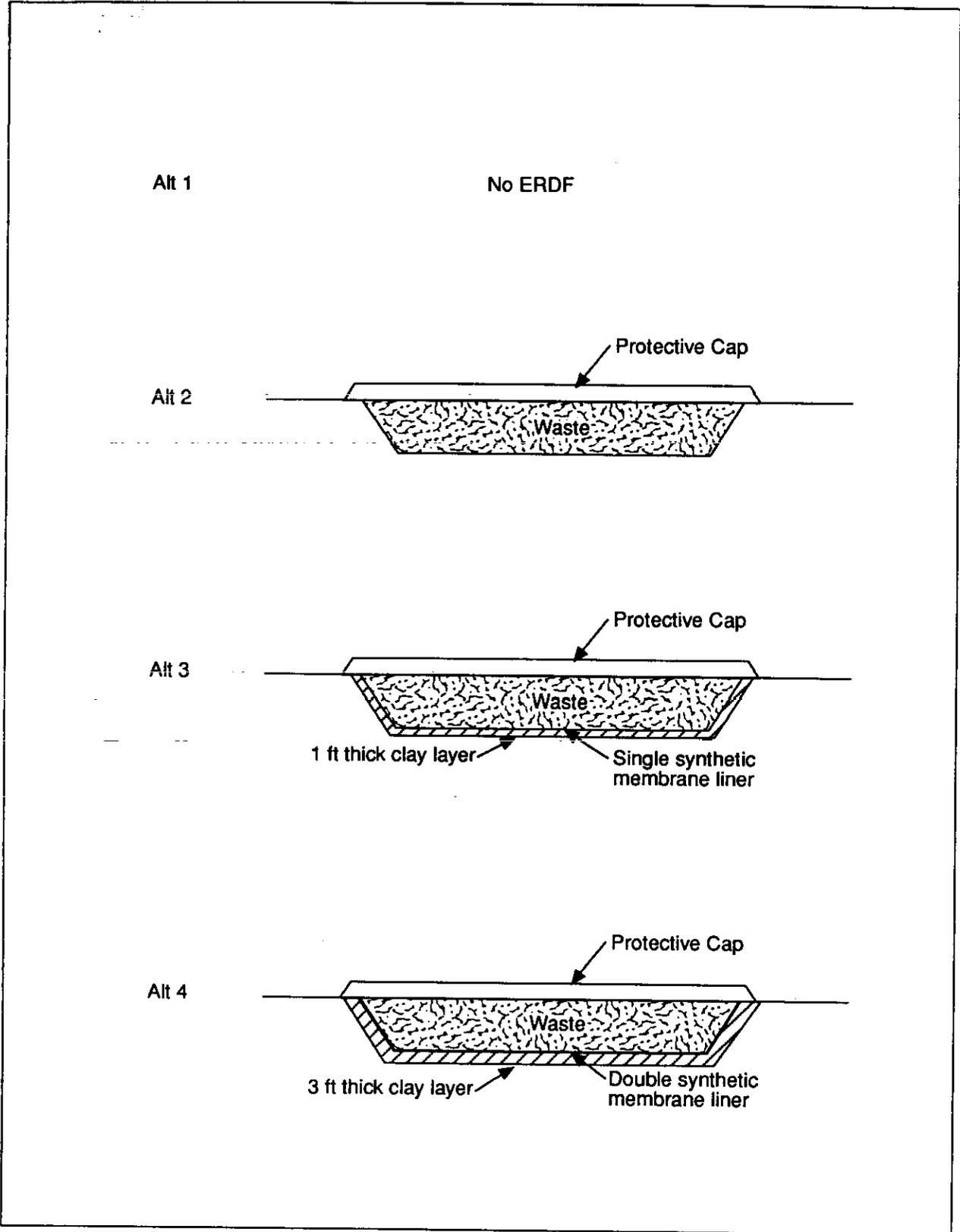
The no-action alternative does not satisfy the overall objective to provide a disposal facility to accept waste removed during cleanup of the Hanford Site, particularly along the Columbia River. For this reason, the no-action alternative is not evaluated further.

The CERCLA provides nine criteria for evaluation of detailed alternatives. Brief descriptions of the criteria are provided in the CERCLA Evaluation Criteria box. The following are summary results of the detailed evaluation of Alternatives 2, 3, and 4 (the centralized landfill alternatives):

1) Overall protection of human health and the environment: All four alternatives satisfy overall protection of human health and the environment. This criterion draws on the assessments of other evaluation criteria, particularly long-term effectiveness and protective permanence, short-term effectiveness, and compliance with ARARs.

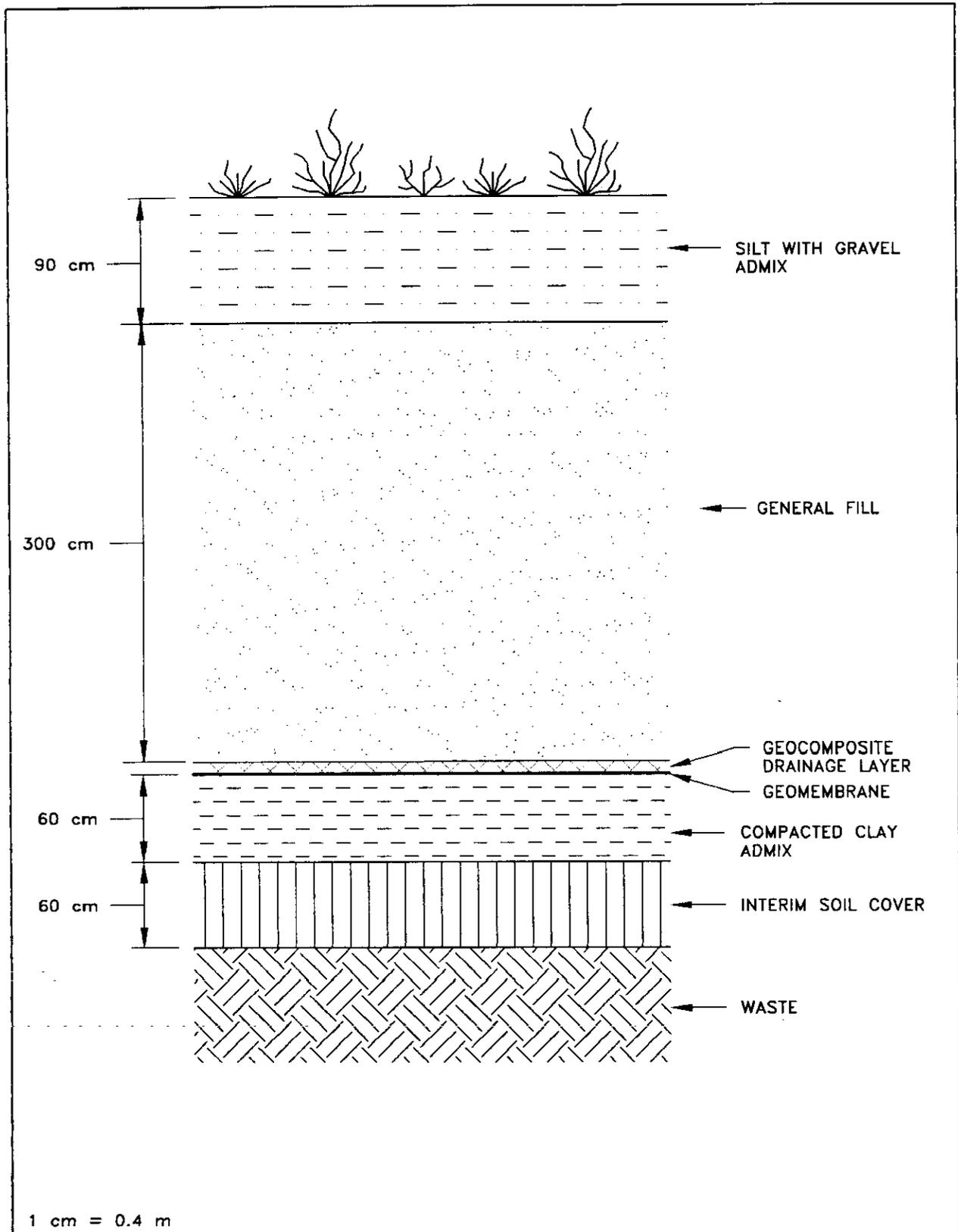
2) Compliance with ARAR: Only Alternative 4 satisfies all ARARs. The most significant ARARs for construction of a dangerous/hazardous waste disposal facility are (a) federal RCRA landfill requirements, (b) Washington State dangerous waste landfill requirements, and (c) land disposal restrictions requirements.

Figure 3. Alternative ERDF Designs.



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Figure 4. Cross Section of the RCRA Surface Barrier.



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CERCLA Evaluation Criteria

1) Overall protection of human health and the environment: Alternatives shall be assessed to determine whether they can adequately protect human health and the environment, in both the short- and long-term, by eliminating, reducing, or controlling exposures. Overall protection of human health and the environment draws on the assessments of other evaluation criteria, especially long-term effectiveness and permanence, short-term effectiveness, and compliance with ARARs.

2) Compliance with ARARs: This criterion addresses whether or not a remedy will meet all of the ARARs of other (nonCERCLA) federal and state environmental laws and/or provides justification for waivers (if necessary).

3) Long-term effectiveness and permanence: Alternatives shall be assessed for the long-term effectiveness and permanence they provide following implementation, along with the degree of certainty that the alternative will prove successful.

4) Reduction of toxicity, mobility, or volume through treatment: This criterion is evaluated based on the anticipated performance of any treatment technologies that may be employed in a remedy.

5) Short-term effectiveness: The short-term impacts of alternatives shall be assessed considering risks that might be posed to the community during implementation of an alternative, potential impacts on workers during remedial action, potential environmental impacts of the remedial action, and time until protection is achieved.

6) Implementability: The ease or difficulty of implementing the alternatives shall be assessed by considering technical difficulties and unknowns associated with the construction and operation of a technology, availability of services and materials, and administrative feasibility.

7) Cost: Costs that should be considered include capital costs, operation and maintenance (O&M) costs, and the *net present value* of capital and O&M costs.

8) State acceptance: Based on the state's review of the final RI/FS report and proposed plan, this criterion is assessed based on whether the state concurs with, opposes, or has no comment on the preferred alternative.

9) Community acceptance: Community acceptance will be assessed in the record of decision (ROD) following a review of the public comments received on the RI/FS report and the proposed plan.

The landfill requirements specify design criteria for landfills including double liners, leachate collection systems, and a protective cap. Alternatives 2 and 3 (no liner or single liner, respectively) would require a CERCLA waiver or a RCRA variance for the liner design.

Land disposal restrictions would be equally applicable for all the alternatives and would be required unless a waiver or a treatability variance is granted through the record of decision for the individual waste sites.

3) Long-term effectiveness and permanence: All four alternatives provide for long-term effectiveness and permanence. However, Alternatives 3 and 4 (single and double liner, respectively) provide an advantage over Alternative 2 (no liner). The single and double liner alternatives allow collection of leachate generated during and after landfill operation. This will reduce the likelihood that leachate may contaminate groundwater. The double liner adds a liner system to collect leachate that passes through the first liner.

All of the alternatives use a protective cap, active institutional controls (fences, signs, patrols), and passive controls (markers and off site records).

In all the alternatives, contaminants are not predicted to reach groundwater within 10,000 years under current climate conditions. Risks after 10,000 years are considered highly uncertain and were not evaluated, given the potential for climatic changes, geologic events, and human activities.

4) Reduction of Toxicity, Mobility, or Volume through Treatment: Alternatives 2, 3, and 4 will comply with RCRA treatment standards. Additionally, cleanup decisions at the waste sites will determine whether actions such as recycling, volume reduction, and treatment are required.

5) Short-Term Effectiveness: Alternatives 2, 3, and 4 are equally effective in the short term. All the alternatives (except Alternative 1) include safety measures (such as dust controls, surface water management, and emergency equipment) to minimize risks during construction and operation of the ERDF. Health risks for ERDF workers, other Hanford Site workers, and the public from exposure to wastes have been evaluated for a variety of conditions, including:

- Normal operating conditions
- A 24-hour period of high winds

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- Rupture of a waste container due to a transportation accident.

In all cases, the potential health risks are considered low.

6) Implementability: All the alternatives can be implemented. Alternative 2, which does not include a liner or leachate collection and treatment, would be the easiest to construct. Alternatives 3 and 4 include the same type of leachate collection, treatment system, and liner materials. However, the secondary liner/leachate collection system in the double liner will increase the difficulty in constructing Alternative 4.

7) Cost: Table 1 provides a summary of costs for the three ERDF alternatives.

Table 1. Cost of Alternatives.

Alternative	Two Cells (millions)	Total Costs (millions)
2 - No liner	\$54	\$575
3 - Single liner	\$62	\$ 660
4 - Double liner	\$65	\$ 750

Total costs assume that the protective cap selected is a RCRA protective cap barrier constructed over the entire facility at a net present value of \$115 million. The cost for constructing the first two cells does not include operation of the trench or costs for protective cap construction.

8) State acceptance: The Washington State Department of Ecology concurs with the proposed alternative.

9) Community acceptance: In December 1993, a notice was issued inviting the public to attend public meetings during January and February 1994 in Seattle and Richland, Washington. These meetings invited early public input to the ERDF proposal. To address the public input received, a responsiveness summary was issued and the regulatory package was revised. Additionally, meetings were held with the Hanford Advisory Board and Natural Resource trustees to discuss the ERDF proposal. Assessment of this criterion will not be completed until comments on the proposed plan are received. Public comments will be considered in remedy selection for the record of decision.

EVALUATION OF ENVIRONMENTAL IMPACTS

The cumulative impacts of past, present, and reasonably foreseeable activities on the Central Plateau have been generally evaluated. It is likely that if all planned projects are eventually implemented on the Central Plateau, there could be incremental impacts to shrub-steppe habitat as well as to air and groundwater.

The Hanford Cultural Resources Laboratory conducted a cultural resources survey at and around the ERDF site during the summer of 1993. The survey identified several sites with minor historic and prehistoric artifacts. None of the sites were considered eligible for the National Register.

Undisturbed shrub-steppe habitat in Eastern Washington is considered priority habitat by Washington State because of its relative scarcity and importance to several plant and animal species of concern that depend on the shrub component (usually sagebrush) for nesting, food, and protection. Ecological surveys have found the ERDF site to be largely undisturbed shrub-steppe habitat that has not sustained significant fire damage. No plants or animals on the federal list of Endangered and Threatened Wildlife and Plants are known to reside on the ERDF site, although several candidate species are known to exist.

Ecological impacts will occur at the ERDF site and at borrow sites for materials used in the liner and cover. These impacts will include destruction of habitat, and displacement and disturbance of wildlife at and near these areas and along transportation routes as a result of noise and human activity. The ERDF will require an irreversible and irretrievable commitment of the following resources:

- Liner material
- Borrow material
- Natural resources
- Building and facility construction materials and energy.

Potential options for mitigation (including restoration, creation or enhancement of similar habitat, or actions to acquire or provide protection for similar habitat) will be evaluated for the ERDF. The mitigation evaluation will assess whether restoration of shrub-steppe habitat or creation of favorable conditions for shrub-steppe habitat is feasible. Possible

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approaches could include seeding, planting nursery stock, or transplanting mature shrubs; each approach would have benefits and drawbacks.

SUMMARY OF THE PROPOSED ALTERNATIVE

The proposed alternative is Alternative 4 (a double-lined trench with a protective cap). This alternative provides the greatest long-term effectiveness and reliability.

It is proposed that the record of decision would approve the ERDF design and authorize construction of the first two cells of the landfill. Each cell would have floor dimensions of 152 m by 152 m (500 ft by 500 ft). The total cost for the first two cells would be \$65,000,000. Expansion beyond two cells would occur if authorized by subsequent decisions or by amending the ERDF ROD, with full public participation.

The proposed ERDF design complies with RCRA landfill requirements for liners and protective caps. As additional information is obtained regarding the quantity and quality of leachate, the need for a double liner may be further evaluated.

As discussed previously, although the protective cap will be designed to limit groundwater impacts, deter

intrusion, and minimize releases, a specific design has not been finalized. Research on protective cap performance is currently ongoing. A thorough evaluation will be conducted as results of the research become available. Because construction will not commence for several years, selection of the protective cap would be inappropriate at this time. Until the evaluation on the protective cap is complete, it is assumed that a RCRA-compliant protective cap will be constructed over the ERDF. Decisions regarding design and construction would be subject to the full public participation process.

Only Hanford Site CERCLA cleanup waste will be accepted at the ERDF. The hazardous/dangerous wastes received at the ERDF will be subject to RCRA requirements. A waiver or treatability variance may be requested in the individual cleanup decisions. The public will have the opportunity to review and comment on any waivers and/or treatability variances during the decision-making process for cleanup of the waste sites.

The public is encouraged to provide comments on this proposed plan and examine all the alternatives considered in the RI/FS for the ERDF. The recommendations provided herein are preliminary and will be finalized when all public comments have been addressed.

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GLOSSARY

Central Plateau: Plateau including the 200 West and 200 East Areas.

CERCLA: *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*--The federal law that addresses cleanup of releases of hazardous substances to the environment.

Dangerous/hazardous waste: Dangerous waste is regulated by the Washington State Department of Ecology under the authority of the federal hazardous waste regulations. Hazardous waste is the term used in the RCRA federal regulations.

DOE: U.S. Department of Energy

Ecology: Washington Department of Ecology

EPA: U.S. Environmental Protection Agency

ERDF: Proposed Hanford Environmental Restoration Disposal Facility

Groundwater: Underground water.

Land Disposal Restrictions: RCRA regulations that provide criteria for disposal of dangerous/hazardous waste in RCRA landfills.

Leachate: The solution formed by the dissolving of waste constituents by infiltrating water.

NEPA: National Environmental Policy Act

RCRA: *Resource Conservation and Recovery Act of 1976*--Establishes requirements for the storage, treatment, and disposal of hazardous wastes.

RI/FS: Remedial Investigation/Feasibility Study

ROD: Record of Decision. A public record that identifies which alternative will be implemented.

Shrub Steppe Habitat: A broad rolling upland flat in semi-arid, desert-like climate dominated by sagebrush with an understory of grasses and other plants.

100-BC Control Area: Surface-contaminated area located south of the 200 East Area and east of the U.S. Ecology. Area surrounds a group of cribs and trenches used for radioactive disposal in the 1950's.

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