PB95- 964602
EPA/ROD/R10-95/100
February 1995

EPA Superfund Record of Decision:

Hanford 200 Area (USDOE) (O.U. 14) Benton County, WA 1/20/1995

157344

DECLARATION OF THE RECORD OF DECISION

SITE NAME AND LOCATION

USDOE Hanford Environmental Restoration Disposal Facility
Hanford Site
Benton County, Washington

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the USDOE Hanford Site Environmental Restoration Disposal Facility (ERDF), Hanford Site, Benton County, Washington, which was chosen in accordance with the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA), as amended by the *Superfund Amendments and Reauthorization Act of 1986* (SARA), and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the Administrative Record for this site, which is located in 2440 Stevens Center, Richland, Washington.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from the operable units on the Hanford Site, if not addressed by implementing the response action selected in this Record of Decision (ROD), may present an imminent and substantial endangerment to the public health, welfare, or the environment.

DESCRIPTION OF THE SELECTED REMEDY

This ROD addresses the disposal of radioactive, hazardous/dangerous, asbestos, PCB, and mixed wastes resulting from the remediation of operable units within the 100, 200, and 300 Area National Priorities List (NPL) sites of the Hanford Site. The ERDF will minimize migration of contaminants from waste, primarily soils and debris, placed in the facility. The 1100 Area ROD, issued in September 1993, specifies that the waste generated during remediation will be disposed of offsite.

The major components of the selected remedy include the following:

- Initial construction and operation of two disposal cells that are expected to provide an approximate waste disposal capacity of 1.2 million yd^3. These cells will be designed and constructed to RCRA minimum technological requirements (MTRs) (40 CFR Part 264, Subpart N). The decision to expand the landfill in the future will be documented by amending this ROD or as part of the RODs for the Hanford operable units.

- The ERDF site will cover a maximum of 4.1 km^2 (1.6 mi^2) on the Central Plateau, southeast of the 200 West Area and southwest of the 200 East Area. The initial construction of the facility will require 165 acres of this area.

- The ERDF facility will provide sufficient leachate storage capacity to ensure uninterrupted operations, and will comply with 40 CFR Part 264, Subpart N. Leachate collected at the landfill will be managed at the 200 Area Effluent Treatment Facility, located in the 200 East Area, or other approved facility.

- Surface water run-on/run-off will be controlled at the landfill and other areas of the facility that are potentially contaminated. Best management practices to control runoff shall be employed.

- During excavation, suitable soils will be stockpiled at the ERDF site to provide materials for liner systems and for daily interim and closure covers for the landfill. Materials not suitable for construction of the liner and covers will be used for other construction purposes at the Hanford Site to the extent practicable.

- Air monitoring will be accomplished by placement at ERDF of real-time air monitors for radioactive contaminants and air samplers for hazardous and radioactive constituents to detect any offsite migration of contaminants.

- Groundwater monitoring will be performed in accordance with 40 CFR Part 264, Subpart F.

- Appropriate measures to protect facility workers and the public will be employed during ERDF operations including contamination control and dust mitigation, and protection of personnel from industrial hazards presented by ERDF operations. Protective measures shall comply with applicable requirements found in the Occupational Safety and Health Act (OSHA), Washington Industrial Safety and Health Act (WISHA), and other safety regulations or ERDF-specific safety requirements. Energy shall also comply with 40 CFR §300.150.

- The ERDF facility will use existing or planned site transport systems for waste transport. Extension of the Hanford rail line was considered in the RI/FS, but at this time the rail line extension is not considered necessary. As Hanford remediation accelerates, the option might be re-evaluated in the future.

- Waste acceptance criteria shall be developed by DOE, in accordance with applicable or relevant and appropriate requirements (ARARs), risk/performance assessments, ERDF-specific safety documentation, and worker protection requirements. Upon approval by EPA (and consultation with Ecology), these criteria will govern what wastes from the Hanford NPL sites can be placed in the ERDF. No waste may be placed into the ERDF until the waste acceptance criteria have been approved by EPA, and consultation with Ecology. Operable unit-specific waste disposal and treatment decisions will be made as part of the remedy selection and cleanup decision process for each operable unit.

- The ERDF landfill will be closed by placing a modified RCRA-compliant closure cover over the waste. The cover will prevent direct exposure to the waste and includes a vegetated surface layer of fine-grained soils to retain moisture and encourage evapotranspiration, thereby minimizing infiltration and vadose zone transport of contaminants to groundwater. The upper 50 cm (20 in.) of the soil cover system is composed of an admixture of silt and gravels. This layer is intended to both reduce infiltration through the cover and enhance the resistance of the cover to burrowing animals and long-term wind erosion. The RCRA-compliant cover will be modified by providing a total of approximately 15 ft of soil to deter intrusion. It is anticipated that additional research into closure covers may result in site-

specific enhancements to RCRA-compliant designs. Prior to cover construction, closure cover designs will be evaluated and the most appropriate closure cover design will be selected for construction. Construction of the cover will occur on an incremental basis, as the trench is expanded. The design will, at a minimum, comply with applicable RCRA requirements found at 40 CFR Part 264, Subpart N. Basalt from Hanford Site borrow pits will not be required for construction of the ERDF closure cover.

- Institutional controls shall be imposed to restrict public access to the landfill.

- Equipment will be available to transport wastes and operate the ERDF safely.

- Hanford Site infrastructure will be expanded as necessary to support the ERDF. Infrastructure improvements or extensions may include water, sewer, electric power, roads, operations facilities, and a chemical and fuel storage area.

- A decontamination facility will be constructed consisting of, at a minimum, an impervious pad with sump, wash water storage, and secondary containment. Washwater used to decontaminate site equipment shall be managed in compliance with appropriate requirements.

- The detailed design will be submitted to EPA for approval (with consultation with Ecology) prior to construction of the ERDF facility. At a minimum, it will be submitted in two packages to allow for construction in phases.

- An operations plan will be submitted to EPA for approval (with consultation with Ecology) prior to operation of the ERDF facility.

- Mitigation measures to reduce ecological impacts have been incorporated to satisfy the Remedial Action Objectives identified in Section 7(4)(i) through 7(4)(v). In addition, DOE commits to the development and implementation of a Mitigation Action Plan in coordination with the Natural Resource Trustees for additional mitigation measures.

STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, will comply with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost effective. This remedy utilizes permanent solutions to the maximum extent practicable for this site. Treatment of wastes will be addressed in the operable unit decision documents. As a consequence, the statutory preference for treatment as a principal element will be addressed in these future documents rather than in this ROD.

This remedy will result in hazardous substances remaining onsite above health-based levels; therefore, a review will be conducted within 5 years after commencement of this action to ensure that the remedy continues to provide adequate protection of human health and the environment.

The preamble to the NCP clarifies the stated EPA's interpretation that when noncontiguous facilities are reasonably close to one another and wastes at these sites are compatible for a selected treatment or disposal approach, CERCLA Section 104(d)(4) allows the lead agency to treat these related facilities as one site for response purposes and, therefore, allows the lead agency to manage waste transferred

between such noncontiguous facilities without having to obtain a permit. Therefore, the ERDF and the 100, 200, and 300 Area NPL sites are considered to be a single site for response purposes.

Signature sheet for the Record of Decision for the USDOE Hanford Environmental Restoration Disposal Facility Remedial Action between the United States Department of Energy and the United States Environmental Protection Agency, with concurrence by the Washington State Department of Ecology.

John D. Wagoner

John D. Wagoner
Manager, Richland Operations
United States Department of Energy

1/20/95
Date

Signature sheet for the Record of Decision for the USDOE Hanford Environmental Restoration Disposal Facility Remedial Action between the United States Department of Energy and the United States Environmental Protection Agency, with concurrence by the Washington State Department of Ecology.

Chuck Clarke

Chuck Clarke
Regional Administrator, Region 10
United States Environmental Protection Agency

1/20/95
Date

Signature sheet for the Record of Decision for the USDOE Hanford Environmental Restoration Disposal Facility Remedial Action between the United States Department of Energy and the United States Environmental Protection Agency, with concurrence by the Washington State Department of Ecology.

Drusilla Butler

Drusilla Butler
Program Manager, Nuclear Waste Program
Washington State Department of Ecology

1-18-95
Date

CONTENTS

DECLARATION OF THE RECORD OF DECISION i

DECISION SUMMARY 1
- INTRODUCTION 1
- SITE NAME, LOCATION, AND DESCRIPTION 1
- SITE HISTORY AND ENFORCEMENT ACTIONS 5
- HIGHLIGHTS OF COMMUNITY PARTICIPATION 6
- SCOPE AND ROLE OF RESPONSE ACTION WITHIN SITE STRATEGY 8
- SITE CHARACTERISTICS 9
- SUMMARY OF RISK ASSESSMENTS 20
- REMEDIAL ACTION OBJECTIVES 24
- DESCRIPTION OF ALTERNATIVES 26
- SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES 30
- SELECTED REMEDY 37
- STATUTORY DETERMINATIONS 39
- DOCUMENTATION OF SIGNIFICANT CHANGES 46

APPENDIX:
- A DECLARATION OF THE RECORD OF DECISION RESPONSIVENESS SUMMARY A-1

FIGURES:
1. Hanford Site Map 3
2. Location of the Environmental Restoration Disposal Facility 4
3. Topography of the Hanford Site 10
4. Environmental Restoration Disposal Facility Alternatives 28

TABLES:
1. Maximum Concentrations Detected for Radionuclides in 100, 200, and 300 Area Wastes 14
2. Maximum Concentrations Detected for Organic Compounds in 100 and 300 Area Wastes 16
3. Maximum Concentrations Detected and Background Screening for Inorganic and General Chemistry Constituents in 100 and 300 Area Wastes 18

DECISION SUMMARY

INTRODUCTION

The U.S. Department of Energy's (DOE's) Hanford Site was listed on the National Priorities List (NPL) in July 1989 under authorities granted by the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) as amended by the *Superfund Amendments and Reauthorization Act of 1986* (SARA). The Hanford Site was divided and listed as four NPL sites: the 1100 Area, the 200 Area, the 300 Area, and the 100 Area. The 1100 Area ROD, issued in September 1993, specifies that the waste generated during remediation will be disposed of offsite.

Restoration of the CERCLA past-practice sites at the Hanford Site is expected to result in the generation of wastes requiring further management. An Environmental Restoration Disposal Facility (ERDF) has been proposed to serve as the receiving facility for waste generated during remediation of CERCLA past-practice sites. In accordance with Executive Order 12580 (Superfund Implementation) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) and the National Environmental Policy Act (NEPA), the DOE performed a Remedial Investigation/Feasibility Study (RI/FS) for the ERDF.

This Record of Decision (ROD) authorizes the most effective alternative for the design, construction, and operation of the ERDF. The DOE, the U.S. Environmental Protection Agency (EPA), and the Washington State Department of Ecology (Ecology) (the Tri-Parties) anticipate a need for ERDF because of desires expressed by the public to remove waste from sites adjacent to the Columbia River. Remedial evaluations conducted by the operable units must consider various options, with removal and disposal on the Central Plateau being one of several potential remedies.

I. SITE NAME, LOCATION, AND DESCRIPTION

The DOE Hanford Site near Richland, Washington, has been operated by the Federal Government since 1943 for plutonium production for military use and nuclear energy research and development. Past activities released hazardous and radioactive substances to the environment that contaminated soil, air, and groundwater.

Four areas of the Hanford Site (the 100, 200, 300, and 1100 Areas) have been included on the EPA's NPL under CERCLA. Under the *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) signed by Ecology, EPA, and the DOE, more than 1,000 inactive waste disposal and unplanned release sites have been grouped into a number of source and groundwater operable units. An operable unit is a grouping of individual waste units based primarily on geographic area and common waste sources. These operable units contain contamination in the form of hazardous waste, radioactive waste, mixed waste (radioactive and hazardous), and other CERCLA hazardous substances. At the time the original Tri-Party Agreement was written, numerous sites that normally would have been designated CERCLA sites were administratively designated as *Resource Conservation and Recovery Act* (RCRA) past-practice sites. The mechanism for approving disposal of RCRA past-practice remedial waste into the ERDF will be determined by the Tri-Parties. It is recognized by the Tri-Parties that contaminated material from the operable unit remediations and

ERDF operations is eligible for disposal in ERDF, provided the waste acceptance criteria are met and the disposal is in accordance with the legal requirements.

The remedy selection process for remediation of operable units located along the Columbia River is scheduled to commence in January 1995. Based on investigations and public input to date, it is anticipated that the remedies selected for these operable units may include removal of waste from proximity to the Columbia River and isolation of the waste on the Central Plateau.

The ERDF is anticipated to serve as the receiving and disposal facility for most waste generated from response actions where disposal on the Central Plateau is the selected remedy for Hanford Site operable units. It is possible that some waste generated during remediation may not be acceptable for ERDF disposal and will be handled elsewhere (e.g., transuranic waste). Only remediation waste that originates on the Hanford Site will be placed in the ERDF. The remediation waste is expected to consist of hazardous/dangerous, radioactive, mixed waste (containing both hazardous/dangerous and radioactive waste) and minor amounts of polychlorinated biphenyl (PCB) and asbestos waste.

A. LOCATION

The Hanford Site is a 560-mi^2 area located along the Columbia River in southeastern Washington, situated north and west of the cities of Richland, Kennewick, and Pasco, an area commonly known as the Tri-Cities (Figure 1).

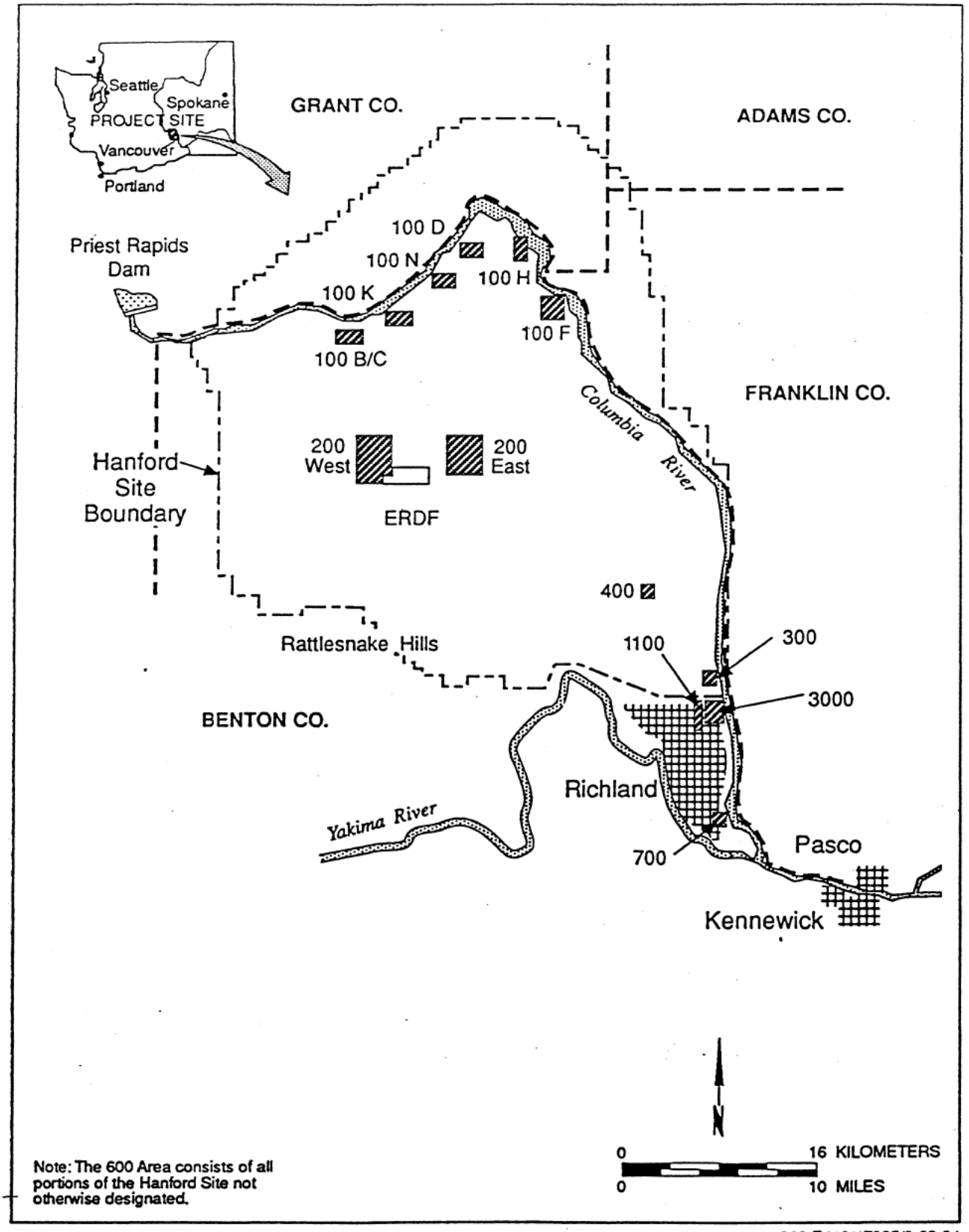
The land surrounding the Hanford Site is used primarily for agriculture and livestock grazing. The major population center near Hanford is the Tri-Cities, with a combined population of nearly 100,000. The southwestern area of Hanford, covering 120 mi^2, is designated as the Fitzner-Eberhardt Arid Land Ecology Reserve and is managed by the DOE for ecological research.

Semi-arid land with a sparse covering of cold desert shrubs and drought-resistant grasses dominates the Hanford Site. Forty percent of the area's average annual 6-1/4 in. of precipitation occurs between November and January. In part due to the semi-arid conditions, no wetlands are contained within the boundaries of the ERDF.

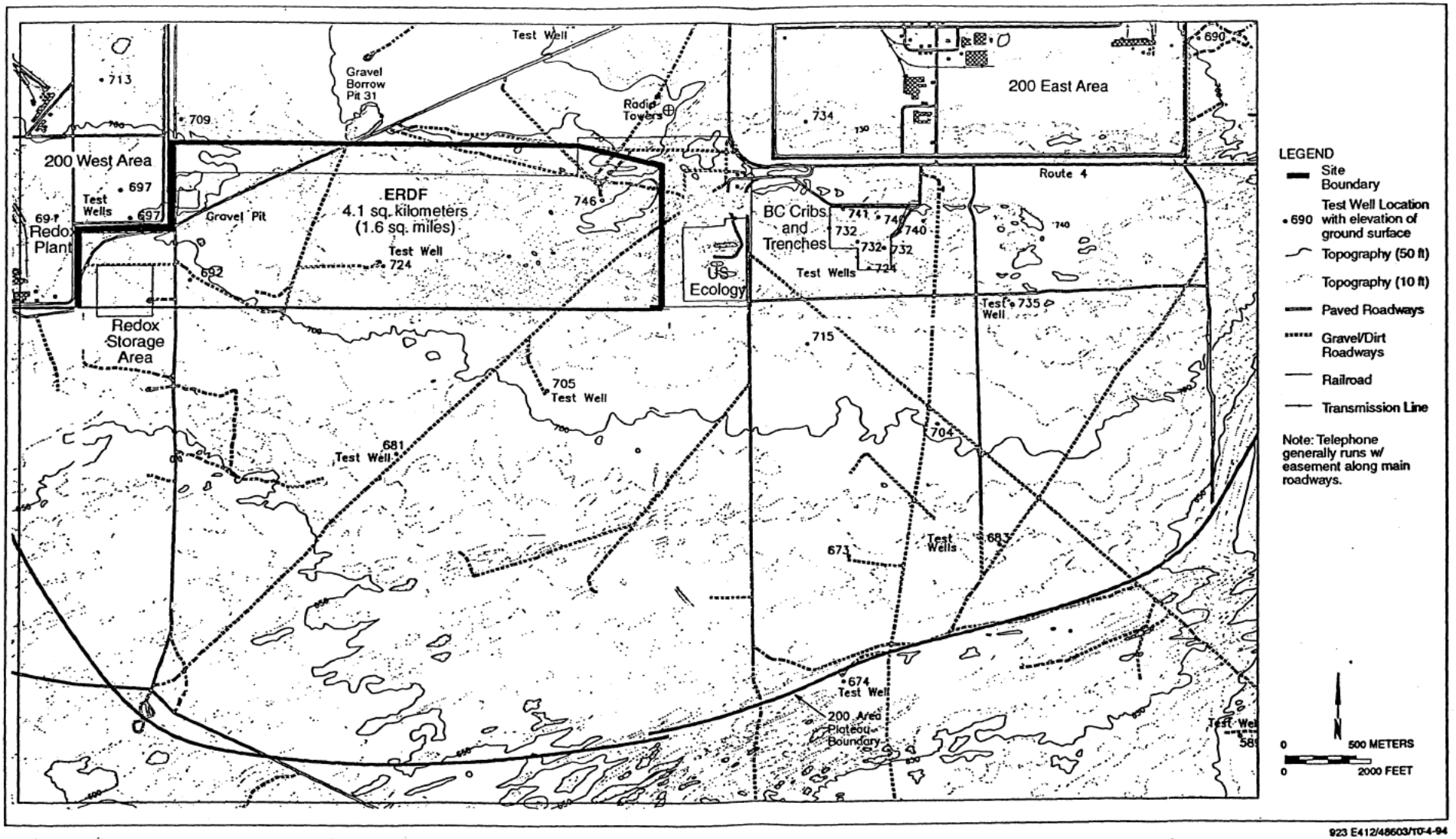
The selected ERDF site covers a maximum of 4.1 km^2 (1.6 mi^2) on the Central Plateau at an elevation of 195 to 226 m (640 to 740 ft) above mean sea level, approximately in the center of the Hanford Site, southeast of the 200 West Area and southwest of the 200 East Area. The primary site encompasses most of the land formerly leased to the State of Washington (Figure 2).

At its nearest point, the Columbia River is located approximately 11.2 km (7.1 mi) from the ERDF location. Other surface water bodies located near the ERDF location include West Lake, approximately 6.4 km (4 mi) north, and Rattlesnake Springs, approximately 6.4 km (4 mi) southwest. The 200 Area is not within the 100-year floodplain of the Columbia River. Groundwater travel times from this area to the Columbia River are greater than 90 years.

Figure 1. Hanford Site Map.



923 E412/47835/8-23-94



923 E412/48603/10-4-94

Figure 2. Location of the Environmental Restoration Disposal Facility.

Site selection is based on the *Siting Evaluation Report for the Environmental Restoration Disposal Facility*, which evaluated three candidate sites located on the Central Plateau. The siting process first applied criteria based on siting requirements from applicable federal and state regulations and DOE Orders, and recommendations for future Hanford Site use from the Hanford Future Site Uses Working Group. The three sites were further evaluated to determine if they met the State siting criteria as specified by the Washington State Dangerous Waste Regulations. The final screening applied criteria derived from DOE orders and from CERCLA. Each site included at least 10 km^2 (4 mi^2) of contiguous land and at least 5 km^2 (2 mi^2) of nearby contingency space.

The land requirement was based on early design assumptions for the ERDF. During the scoping period for the ERDF, the public expressed an interest in reducing the size of the facility in order to minimize the impacts to shrub-steppe habitat. By improving the trench design and eliminating the contingency space, the ERDF would occupy only 4.1 km^2 (1.6 mi^2). A review of potential sites within the 200 Areas was performed. This review indicated that there is no other location that meets the current size requirement within the waste management area as recommended by the Hanford Future Site Uses Working Group.

During the public scoping process, an additional site, the BC control area, was identified as a potential site for the ERDF. This area has surface radioactive contamination that would require cleanup before constructing the ERDF. The site has no particular advantage and, in fact, 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 had been chosen.

Although the chosen ERDF site includes the largest amount of shrub-steppe habitat, this site is the final selected location based on the following:

- Inclusion in the waste management area (as delineated 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.

II. SITE HISTORY AND ENFORCEMENT ACTIONS

The Hanford Site was established during World War II as part of the Army's "Manhattan Project" to produce plutonium for nuclear weapons. Hanford Site operations began in 1943, and DOE facilities are located throughout the Site and the City of Richland. The land that Hanford now occupies was ceded to the U.S. Government in treaties with the Confederated Bands and Tribes of the Yakama Indian Nation and the Confederated Tribes of the Umatilla Indian Reservation in 1855. Certain portions of the Hanford Site are known to have cultural significance and may be eligible for listing in the *National Register of Historic Places*.

In 1988, the Hanford Site was scored using EPA's Hazard Ranking System. As a result of the scoring, the Hanford Site was added to the NPL in July 1989 as four sites (the 1100 Area, the 200 Area, the 300 Area, and the 100 Area). Each of these areas was further divided into operable units (a grouping of individual waste units based primarily on geographic area and common waste sources). These operable units contain contamination in the form of hazardous waste, radioactive/hazardous mixed waste, and other CERCLA hazardous substances.

In anticipation of the NPL listing, DOE, EPA, and Ecology entered into a Hanford Federal Facility Agreement and Consent Order in May 1989. This agreement established a procedural framework and schedule for developing, implementing, and monitoring remedial response actions at Hanford. The agreement also addresses RCRA compliance and permitting.

III. HIGHLIGHTS OF COMMUNITY PARTICIPATION

The Tri-Parties developed a Community Relations Plan (CRP) in April 1990 as part of the overall Hanford Site restoration. The CRP was designed to promote public awareness of the investigations and public involvement in the decision-making process. The CRP summarizes concerns that the Tri-Parties are aware of based on community interviews. Since that time, the Tri-Parties have held several public meetings and sent out numerous fact sheets in an effort to keep the public informed about Hanford cleanup issues. The CRP was updated in 1993 to enhance public involvement. An additional CRP for the ERDF was developed to clarify the regulatory streamlining process and its effects on public involvement.

A public scoping period was held January 10 through February 8, 1994, to solicit input on the proposal to construct a facility on the Central Plateau to receive cleanup wastes. Scoping meetings were held in Richland on January 25, 1994 and Seattle on February 1, 1994. The Focus Sheet and Expanded Public Notice/Washington State Notice of Intent for Corrective Action Management Unit - Hanford Environmental Restoration Disposal Facility were provided at the beginning of the scoping period to provide preliminary information to the public. These documents were available in both the Administrative Record and the Information Repositories maintained at the locations listed below.

Presentations were made to the Hanford Advisory Board on June 2 and July 7, 1994, and the Hanford Advisory Board members provided input on the siting and concept of the facility.

An information focus sheet, which provided a summary of the Proposed Plan and a notification of the comment period, was mailed to the Hanford Tri-Party Agreement mailing list of 1,500 people. Additionally, the Proposed Plan was mailed to interested individuals, Hanford Advisory Board members, the Tribes, and the Hanford Natural Resource Trustees. The final RI/FS Report and Proposed Plan were made available to the public in both the Administrative Record and the Information Repositories maintained at the locations listed below on October 17, 1994:

ADMINISTRATIVE RECORD (Contains all project documents)

U.S. Department of Energy
Richland Operations Office
Administrative Record Center
2440 Stevens Center
Richland, Washington 99352

EPA Region 10
Superfund Record Center
1200 Sixth Avenue
Park Place Building, 7th Floor
Seattle, Washington 98101

Washington State Department of Ecology
Administrative Record
719 Sleater-Kinney Road SE
Capital Financial Building, Suite 200
Lacey, Washington 98503-1138

INFORMATION REPOSITORIES (Contain limited documentation)

University of Washington
Suzzallo Library
Government Publications Room
Mail Stop FM-25
Seattle, Washington 98195

Gonzaga University
Foley Center
E. 502 Boone
Spokane, Washington 99258

Portland State University
Branford Price Millar Library
Science and Engineering Floor
SW Harrison and Park
P.O. Box 1151
Portland, Oregon 97207

DOE Richland Public Reading Room
Washington State University, Tri-Cities
100 Sprout Road, Room 130
Richland, Washington 99352

The notice of the availability of the RI/FS and Proposed Plan was published in the *Hood River News*, the *Seattle Times P/I*, the *Spokesman Review-Chronicle*, the *Tri-City Herald*, and the *Oregonian* on October 16, 1994. The public comment period was held from October 17 through November 30, 1994. In addition, public meetings were held on November 14 in Hood River, Oregon; on

November 15 in Seattle, Washington; on November 16 in Richland, Washington; and on November 30 in Portland, Oregon. Additional advertisements for the public meetings ran in the *Seattle Times P/I,* the *Spokesman Review-Chronicle*, the *Tri-City Herald,* and the *Hood River News* on November 13, and in the *Oregonian* on November 26. At the meetings, representatives from EPA, DOE, and Ecology answered questions about the project.

All verbal comments provided at the public meeting and all submitted written comments are recorded verbatim in the Administrative Record for the ROD. Responses to the public comments received during the public comment period are included in the Responsiveness Summary (Appendix A) and were considered during the development of this ROD. Public comments on the Proposed Plan are annotated to indicate which response in the Responsiveness Summary addresses each comment.

This decision document presents the selected remedial alternative for the ERDF at the Hanford Site, Richland, Washington, chosen in accordance with CERCLA, as amended by SARA, and to the extent practicable, the NCP. The decision for this facility is based on information contained in the Administrative Record.

IV. SCOPE AND ROLE OF RESPONSE ACTION WITHIN SITE STRATEGY

Since the signing of the Tri-Party Agreement in 1989, the Tri-Parties have recognized the need to modify the approach to conducting investigations and studies at Hanford with a goal of maximizing efficiency, optimizing use of limited resources, and achieving cleanup in the earliest possible time frame. To implement this approach, the Tri-Parties jointly developed the *Hanford Site Past-Practice Strategy*. The strategy document describes the concepts and framework for streamlining the investigation and remedial study process in a manner that promotes a "bias-for-action" through optimizing the use of interim remedial actions. The remedy selection process for remediation of operable units located along the Columbia River is scheduled to commence in January 1995. Based on significant public input to date, it is anticipated that the remedies selected for these operable units may include removal of waste from proximity to the Columbia River and isolation of the waste in a central location.

The ERDF is expected to serve as a disposal unit for Hanford remedial waste (primarily soil) for which removal and disposal is the selected remedy. It is anticipated that the ERDF will receive low-level radioactive, hazardous, and mixed waste and small amounts of asbestos and PCB wastes from the 100, 200, and 300 Areas. The total volume of waste is expected to be less than 21.4 million m^3 (28 million yd^3) and is expected to consist of the following: contaminated soil; demolition debris (approximately 65% to 75%); burial ground waste (approximately 15% to 20%); and wastewater pipelines, ancillary equipment, and associated soil contamination (approximately 10% to 15%). The scope of the ERDF ROD is focused on the configuration and location of the landfill (also referred to as the trench), the liner, and the surface cover and the operation and closure requirements.

Information on the supporting facilities, including the transportation system, waste handling equipment and procedures, decontamination, and leachate treatment systems, is also presented. These supporting facilities are not the primary focus of this ROD because they do not significantly affect long-term performance of the facility and are considered design details. They will be fully addressed during remedial design.

This remedy will result in hazardous substances remaining onsite above health-based levels; therefore, a review will be conducted within 5 years after commencement of this action to ensure that the remedy continues to provide adequate protection of human health and the environment.

V. SITE CHARACTERISTICS

A. SITE GEOLOGY AND HYDROLOGY

The Hanford Site is located in the Pasco Basin, a topographic and structural basin situated in the northern portion of the Columbia Plateau. The plateau is divided into three general structural subprovinces: the Blue Mountains, the Palouse, and the Yakima Fold Belt. The Hanford Site is located near the junction of the Yakima Fold Belt and the Palouse subprovinces.

1. Geology

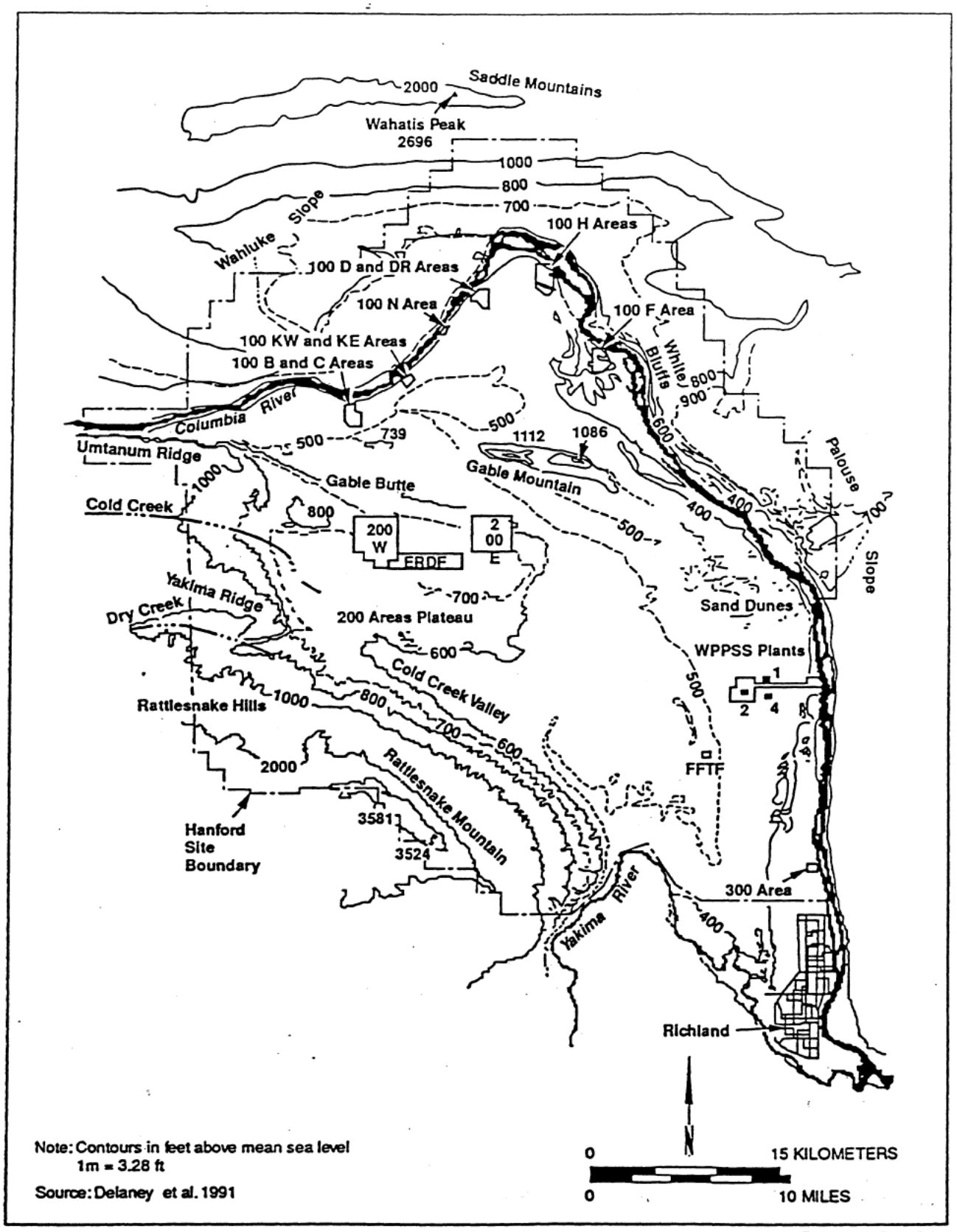
The topography and principal geomorphic features of the ERDF site are shown in Figure 3. The ERDF site is on the south slope of the Cold Creek bar, and the Hanford formation is the principal geologic unit at the surface. Other surficial materials include stabilized dunes and active sand dunes. The site is underlain by 159 to 177 m (521 to 580 ft) of suprabasalt sediments that rest on top of the Elephant Mountain Member of the Columbia River Basalt Group. The Elephant Mountain Member is overlain by gravel unit A, the lower mud sequence, gravel unit E, and the upper unit of the Ringold Formation. Overlying the Ringold Formation in this area is the Plio-Pleistocene unit, early "Palouse" soil, and Hanford formation. The ERDF location is in a transitional zone between stratigraphic characteristics of the 200 West and 200 East Areas. Units present in the western part of the site may not be present in the eastern part because of erosion. The nearest Quaternary faults to the site are located at Gable Mountain approximately 7.1 km (4.4 mi) north of the ERDF site.

The vadose zone beneath the ERDF ranges between 67.7 and 10.5.5 m (222 and 346 ft) thick and consists of the Hanford formation, the Plio-Pleistocene unit, and the upper unit and unit E of the Ringold Formation. Flow characteristics through the vadose zone depend on the properties of particle size and pore size, interconnectiveness of pores, and moisture content, which are all favorable at this site.

2. Groundwater

The suprabasalt aquifers beneath the ERDF site consist of the fluvial sands and gravels of the Ringold Formation and the lower Plio-Pleistocene formation. The silts of the Plio-Pleistocene unit, the upper Ringold unit, and the Ringold lower mud unit may act as aquitards or confining units within the aquifer. The uppermost aquifer beneath the ERDF site is contained primarily within unit E of the Ringold Formation. The lower mud unit of the Ringold Formation is known to occur beneath this aquifer in the western side of the site, but the lateral extent is not known beneath the eastern side of the ERDF. Where the lower mud unit is present, confined aquifer conditions exist in unit A of the Ringold Formation. Units A and E of the Ringold Formation would be combined in a single unconfined aquifer in areas where the lower mud unit is not present. The thickness of the uppermost aquifer beneath the ERDF generally appears to range from 20 to 70 m (65 to 230 ft).

Figure 3. Topography of the Hanford Site.



923 E412/48587/8-25-94

Groundwater levels in the area have risen significantly since the 1950's as a result of wastewater disposal activities conducted in the 200 West Area. The groundwater levels stabilized in the late 1960's and started to decline in the mid-1980's. The groundwater level decrease is probably due to reductions in wastewater disposal occurring in the 200 West Area. Contaminated groundwater from these disposal activities exist beneath the ERDF site. The water table elevation generally ranges from 123 m (405 ft) along the east side of the selected site to 139 m (455 ft) along the west side of the site.

Groundwater flow beneath the ERDF site is predominately from west to east. Saturated hydraulic gradients based on groundwater elevations range from 0.0045 along the northern boundary of the site to 0.0025 along the southern boundary. Limited data are available for aquifer properties of transmissivity and hydraulic conductivity in the aquifer beneath the ERDF site. However, two wells near the site completed to unit E of the Ringold Formation were tested in 1958 and 1973. Transmissivity values of 2,700 m^2/day (29,000 ft^2/day) and 1,950 m^2/day (21,000 ft^2/day) have been measured in nearby wells. Assuming a saturated thickness of 40 m (130 ft), the hydraulic conductivities equal 70 m/day (220 ft/day) and 50 m/day (160 ft/day), respectively.

3. Waste Characteristics

100 Area Waste-Generating Activities. Between 1943 and 1962, nine water-cooled, graphite-moderated plutonium production reactors were built along the shore of the Columbia River upstream from the now-abandoned town of Hanford. Eight of these reactors (B, C, D, DR, F, H, KE, and KW) have been retired from service and will be decommissioned. The ninth reactor, N, was recently shut down and will also be retired. In some of the reactor areas, after the reactor was retired from plutonium production service, the ancillary facilities were used as laboratories for special studies or for storage/treatment purposes.

The principal components of the original eight reactors consisted of the reactor, the reactor cooling water loop, the reactor gas and ventilation system, and the irradiated fuel handling system. During the course of reactor production work, liquid waste disposal sites, solid waste burial grounds, contaminated facilities, and unplanned liquid waste release areas were established.

200 Area Waste-Generating Activities. Historically, the 200 Areas were used for fuel reprocessing, plutonium recovery, and waste management and disposal. Because of significant human health and environmental risks associated with the excavation of the majority of contaminated sites in the 200 Areas, in situ remediation methods may be used for most sites.

300 Area Waste-Generating Activities. Activities in the 300 Area have historically been related primarily to the fabrication of nuclear fuel elements. In addition, many technical support, service support, and research and development activities related to fuel fabrication were carried out. As fuel fabrication activities have decreased with the shutdown of the Hanford Site production reactors, research and development activities in the 300 Area have increased. The newer buildings in the area primarily house laboratory and large test facilities.

Physical Components of 100 Area Waste. The total volume of 100 Area waste potentially to be disposed of in the ERDF is estimated to be approximately 7 million m^3 (9 million yd^3). 100 Area waste includes soil, solid wastes, sediments, and sludges. Solid waste encompasses hard waste, soft waste, demolition waste, and pipes. Soft waste includes collapsed cardboard boxes, paper, rags, clothing, plastic, and miscellaneous trash. Hard waste includes aluminum tubes and spacers, failed steel and stainless steel equipment, timbers, and metal drums. Demolition waste includes concrete

with and without rebar, steel plate, and timbers. Pipes range from 1.3 to 61 cm (1/2 to 24 in.) in diameter. The estimated percentages of the different types of waste are presented below.

Estimated Distribution of Waste in the 100 Area

Source	Volume
Contaminated soil	77%
Solid waste	23%

Physical Components of 200 Area Waste. The total volume of 200 Area waste potentially to be disposed of in the ERDF is estimated to be approximately 5.5 million m^3 (7.2 million yd^3). A breakdown of the components of 200 Area waste that will likely be disposed in the ERDF is presented below. The percentages are based on relative volume estimates. No information is available on physical characterization of 200 Area soils likely to be disposed in the ERDF.

Estimated Distribution of Waste in the 200 Area

Source	Volume
Contaminated soil	75%
Solid waste	25%

Physical Components of 300 Area Waste. The total volume of 300 Area waste potentially to be disposed of in the ERDF has been estimated to be approximately 1.0 million m^3 (1.3 million yd^3). 300 Area waste includes soil and solid wastes. Sites have been grouped into two categories based on similarities of cleanup requirements: (1) contaminated soil and (2) solid waste (e.g., pipelines, burial ground waste).

The components of 300 Area waste are summarized below.

Estimated Distribution of Waste in the 300 Area

Source	Volume
Contaminated soil	47%
Solid waste	53%

Chemical Characteristics. Tables 1 through 3 present the highest soil concentrations found to date during remedial investigations conducted in 100, 200, and 300 Area waste units for radionuclides, organic compounds, and inorganic constituents, respectively. The sampling program (limited field investigation) was conducted to target anticipated areas of maximum soil contamination concentrations. The detected concentrations are likely to bound the majority of the waste and provide a valid basis for planning remediation development and operating activities. These concentrations, when assumed to apply to the total volume of remediation waste, also provide conservative total inventories for evaluation of ERDF operation and performance. It is anticipated that wastes of higher concentration may be encountered during remediation activities and disposed of at ERDF; these will be evaluated on a case-by-case basis to determine if operating procedures need to be adjusted to accommodate them. The tables also list the waste units in which the highest concentrations occurred. Soil concentrations found to date for organic compounds and inorganic constituents for 200 Area wastes are not included in the tables because 200 Area wastes have not been sufficiently characterized.

If the waste concentration exceeded the Hanford soil background concentration, the concentration was considered to be representative of actual contamination and the constituent was retained for further evaluation in the risk assessment. Maximum concentrations detected thus far for chloride, nitrate, and phosphate were less than background concentrations. Therefore, chloride, nitrate, and phosphate were eliminated from further evaluation in the RI/FS. The nitrite plus nitrate concentration was compared to the background 95/95 upper tolerance level for nitrate, and this parameter was also eliminated. All other constituents were retained for further evaluation.

B. CULTURAL RESOURCES

The Hanford Cultural Resources Laboratory (HCRL) conducted a cultural resources survey at and surrounding the ERDF site during the summer of 1993. Several historic and prehistoric isolated artifacts were identified on the ERDF site, but these artifacts do not meet the criteria for listing on the *National Register of Historic Places*. The isolated finds were either collected during the survey or recorded in survey notes. No significant resources were identified at the ERDF site.

A cultural resources survey was also conducted along the proposed route for the railroad line connecting with the ERDF. This survey indicated that the railroad line would cross the White Bluffs Road, a historic feature that is eligible for nomination to the *National Register of Historic Places*. An alternative route was considered that passed through the 200 West Area and crossed the White Bluffs Road in an area that had already been disturbed. This alternative route was dropped from consideration because of safety concerns associated with increased rail traffic in the 200 West Area and three street crossings within the 200 West Area. The rail system was subsequently dropped from consideration because initial waste projections indicate that trucks could handle the load for start-up. As remediation accelerates in the future, should the rail line be determined necessary, the route would be re-evaluated to try to avoid disturbing the intact portions of the White Bluffs Road.

Table 1. Maximum Concentrations Detected for Radionuclides in 100, 200, and 300 Area Wastes. (sheet 1 of 2)

Radionuclide	Maximum Concentration (pCi/g)	Waste Unit
Americium-241	34	116-C-5 Retention Basin
Barium-140	400	116-D-1A Storage Basin Trench No. 1
Beryllium-7	90	116-D-1A Storage Basin Trench No. 1
Carbon-14	640	116-C-5 Retention Basin
Cerium-141	3	116-D-1A Storage Basin Trench No. 1
Cerium-144	0.5	116-D-1A Storage Basin Trench No. 1
Cesium-134	56	116-B-11
Cesium-137	110,000	Process effluent pipeline (BC1)
Chromium-51	3.5	618-5 Burial Ground No. 5
Cobalt-58	14	116-DR-1 Liquid Waste Disposal Trench No. 1
Cobalt-60	11,000	(HR1) Process effluent pipeline (sludge)
Europium-152	29,000	116-B-11
Europium-154	9,200	116-D-7
Europium-155	9,600	Process effluent pipeline (BC1)
Gross alpha	4,450	316-5 3904 Process Waste Trenches
Gross beta	12,210	316-5 3904 Process Waste Trenches
Iron-59	1	116-D-1A Storage Basin Trench No. 1
Manganese-54	0.07	116-D-1A Storage Basin Trench No. 1
Nickel-63	62,000	Process effluent pipeline (BC1)
Plutonium-238	140	Process effluent pipeline (BC1)
Plutonium-239/240	2,800	Process effluent pipeline (BC1)
Potassium-40	33	116-H-7 Retention Basin
Radium-226	42.8	116-D-1A Storage Basin Trench No. 1
Ruthenium-103	1	116-D-1A Storage Basin Trench No. 1
Ruthenium-106	0.8	116-D-1A Storage Basin Trench No. 1
Sodium-22	9.9	116-DR-1 Liquid Waste Disposal Trench No. 1
Strontium-90	2,000	Process effluent pipeline (BC1)
Technetium-99	1.1	116-DR-2 Liquid Waste Disposal Trench No. 2
Thorium-228	17	316-5 3904 Process Waste Trenches
Thorium-232	3.5	316-2 North (new) Pond
Thorium-234	1	116-D-1A Storage Basin Trench No. 1
Tritium	29,000	116-B-5

Table 1. Maximum Concentrations Detected for Radionuclides in 100, 200, and 300 Area Wastes. (sheet 2 of 2)

Radionuclide	Maximum Concentration (pCi/g)	Waste Unit
Uranium-233/234	2,100	618-4 Burial Ground No. 4
Uranium-235	640	316-5 3904 Process Waste Trenches
Uranium-238	9,100	316-5 3904 Process Waste Trenches
Zinc-65	0.3	116-D-1A Storage Basin Trench No. 1
Zirconium-95	0.56	116-H-7 Retention Basin
Uranium (Total)	20,000	316-5 3904 Process Waste Trenches

Table 2. Maximum Concentrations Detected for Organic Compounds in 100 and 300 Area Wastes. (sheet 1 of 2)

Compound	Maximum Concentration (μg/kg)	Waste Unit
VOLATILE ORGANIC COMPOUNDS		
1,2-Dichloroethene (Total)	1,000	316-5W 3904 Process Waste Trenches
1,1,1-Trichloroethane	6	100-D-Pond
1,1,2,2-Tetrachloroethane	3	100-D-Pond
2-Butanone	390	100-D-Pond
2-Hexanone	9	100-D-Pond
4-Methyl-2-Pentanone	11	116-B-2 Storage Basin Trench
Acetone	2,800	UN-100-N-17 Diesel Oil Supply Line Leak
Benzene	190	UN-100-N-17 Diesel Oil Supply Line Leak
Carbon Disulfide	200	116-B-5 Crib
Carbon Tetrachloride	8	116-N-1
Chloroform	80	316-5W 3904 Process Waste Trenches
Ethylbenzene	330	UN-100-N-17 Diesel Oil Supply Line Leak
Methylene Chloride	4,500	316-2 North (new) Pond
Tetrachloroethene	1,100	316-5W 3904 Process Waste Trenches
Toluene	150	316-2 North (new) Pond
Trichloroethene	390	618-4 Burial Ground No. 4
Vinyl Chloride	24	316-5W 3904 Process Waste Trenches
Xylenes (Total)	1,100	130-D-1 Gasoline Storage Tank
SEMIVOLATILE ORGANIC COMPOUNDS		
4-Chloroaniline	6,300	C-Sanitary Trench (300 Area)
1,3-Dichlorobenzene	48	116-DR-1 Liquid Waste Disposal Trench No. 1
1,4-Dichlorobenzene	51	116-N-2 Chemical Waste Storage Tank
2-Methylnaphthalene	13,000	UN-100-N-17
4-Chloro-3-Methylphenol	38	116-DR-1 Liquid Waste Disposal Trench No. 1
4-Methylphenol	1,000	C-Sanitary Trench (300 Area)
Acenaphthene	850	316-5W Process Waste Trenches
Anthracene	6,300	UN-100-N-17
Benzo(a)anthracene	1,800	1607-H-4 Septic Tank Discharge Pipe
Benzo(a)pyrene	27,000	316-5E 3904 Process Waste Trenches
Benzo(b)fluoranthene	2,400	1607-H-4 Septic tank Discharge Pipe
Benzo(g,h,i)perylene	3,700	316-5E 3904 Process Waste Trenches

Table 2. Maximum Concentrations Detected for Organic Compounds in 100 and 300 Area Wastes. (sheet 2 of 2)

Compound	Maximum Concentration (μg/kg)	Waste Unit
SEMIVOLATILE ORGANIC COMPOUNDS (cont.)		
Benzo(k)fluoranthene	760	116-H-1 Liquid Waste Disposal Trench
Benzoic Acid	1,300	316-5E 3904 Process Waste Trenches
Bis(2-ethylhexyl)phthalate	33,000	C-Sanitary Trench (300 Area)
Butylbenzylphthalate	2,600	130-D-1 Gasoline Storage Tank
Carbazole	54	116-D-1B Fuel Storage Basin, Trench No. 2
Chrysene	43,000	316-5E 3904 Process Waste Trenches
Di-n-butylphthalate	5,500	316-5E 3904 Process Waste Trenches
Dibenz(a,h)anthracene	1,700	316-5E 3904 Process Waste Trenches
Dibenzofuran	500	316-5W 3904 Process Waste Trenches
Diethylphthalate	1,000	100-D-Pond
Fluoranthene	2,900	1607-H4 Septic Tank Discharge Pipe
Fluorene	1,700	UN-100-N-17
Indeno(1,2,3-cd)pyrene	1,600	316-5E 3904 Process Waste Trenches
Naphthalene	4,100	UN-100-N-17
N-Nitrosodiphenylamine	1,800	316-5E 3904 Process Waste Trenches
Pentachlorophenol	1,500	316-5E 3904 Process Waste Trenches
Phenanthrene	3,900	316-5W 3904 Process Waste Trenches
Phenol	240	100-D-Pond
Pyrene	12,000	316-5E 3904 Process Waste Trenches
PESTICIDES/AROCLORS		
4,4'-DDD	110	1607-H4 Septic Tank Discharge Pipe
4,4'-DDE	170	100-D-Pond
Aroclor-1248	10,000	316-2 North Process Pond
Aroclor-1254	6,400	190-B
Aroclor-1260	2,300	100-D Pond
Beta-HCH (Beta-BHC)	7.8	116-D-1A Fuel Storage Basin, Trench No. 1
Chlordane, Gamma-	18	1607-H4 Septic Tank Discharge Pipe
Dieldrin	21	116-D-1A Fuel Storage Basin, Trench No. 1
Methoxychlor	83	100-D-Pond
PCBs	19,500	Process Trenches (300 Area)

Table 3. Maximum Concentrations Detected and Background Screening for Inorganic and General Chemistry Constituents in 100 and 300 Area Wastes. (sheet 1 of 2)

Constituent	Maximum Concentration (mg/kg)	Waste Unit	Back-ground (95/95 UTL)[a] (mg/kg)
INORGANIC CONSTITUENTS			
Aluminum	78,400	100-B Pond	15,600
Antimony	18.6	H-2 Septic Tank	NC
Arsenic	62.2	100-D Pond	8.92
Barium	4,260	H-2 Septic Tank	171
Beryllium	4.7	116-H-9 Crib	1.77
Cadmium	28.5	H-2 Septic Tank	NC
Calcium	95,300	316-1 South (old) Pond	23,920
Chromium	2,510	H-2 Septic Tank	27.9
Cobalt	90	116-KW-3B Retention Basin	19.6
Copper	95,300	316-1 South (old) Pond	28.2
Iron	184,000	116-H-9 Crib	39,160
Lead	747	618-4 Burial Ground No. 4	14.75
Magnesium	50,000	116-H-9 Crib	8,760
Manganese	3,050	116-H-9 Crib	612
Mercury	37	H-2 Septic Tank	1.25
Nickel	1,750	316-1 South (old) Pond	25.3
Potassium	13,000	116-H-9 Crib	3,120
Selenium	11	100-B Pond	NC
Silver	362	316-1 South (old) Pond	2.7
Sodium	2,610	618-4 Burial Ground No. 4	1,290
Strontium	31	Process Trenches (previous sampling)	NC
Thallium	5.4	H-2 Septic Tank	NC
Vanadium	389	116-H-9 Crib	111
Zinc	6,160	H-2 Septic Tank	79
GENERAL CHEMISTRY			
Ammonia	138	Drums	28.2
Chloride	194	316-5 3904 Process Waste Trenches	763
Fluoride	40	316-2 North (new) Pond	12
Nitrate	125	316-2 North (new) Pond	199

Table 3. Maximum Concentrations Detected and Background Screening for Inorganic and General Chemistry Constituents in 100 and 300 Area Wastes. (sheet 2 of 2)

Constituent	Maximum Concentration (mg/kg)	Waste Unit	Back-ground (95/95 UTL)[a] (mg/kg)
GENERAL CHEMISTRY (cont.)			
Nitrite	2.9	300 Area Sanitary Sewer System	NC
Phosphate	15	116-KW-3B Retention Basin	16
Sulfate	7,115	H-2 Septic Tank	1,320
Organic Halogen (Total)	7.2	Process Trenches (previous sampling)	NC
Organic Carbon (Total)	43.7	Process Trenches (previous sampling)	NC
Coliform (MPH)	110	Process Trenches (previous sampling)	NC
Nitrate/nitrite	37	116-C-5 Retention Basin	199[b]

[a]95/95 UTL is the 95% upper confidence limit on the 95th percentile. Source: Hanford Site Background Part 1, "Soil Background for Nonradioactive Analytes."

[b]The background concentration for nitrate is used.

NC = not calculated
UTL = upper tolerance level

C. ECOLOGICAL RESOURCES

Ecological surveys of the ERDF site have found it to be largely undisturbed shrub-steppe habitat that has not sustained significant fire damage. The western part of the site is previously disturbed by past Hanford operations and encompasses an old laydown yard, a gravel pit, several drill pads, dirt roads, and several large tanks. Site surveys identified long-billed curlews, sage sparrows, and loggerhead shrikes as nesting in the area. Grasshopper sparrows were present and possibly nesting at the site. Swainson's hawks were observed hunting in the area. Burrowing owls, while not observed during the surveys, have been seen at the site in the past and are presumed to currently inhabit the area.

Mature shrub-steppe provides important habitat for several plant and animal species of concern that depend on the shrub component, usually sagebrush, for nesting, food, and protection. Certain birds rely on sagebrush or bitterbrush for nesting (i.e., sage sparrow, sage thrasher, and loggerhead shrike). Loggerhead shrikes are year-round residents that are present at low densities. Sage sparrows are common summer residents of the Hanford Site that are restricted almost entirely to sagebrush stands. Mature shrub-steppe habitat also provides prime foraging habitat for a variety of raptor species (e.g., the Swainson's hawk). Shrub-steppe habitat available for species of concern on the Hanford Site may become a more critical issue as agricultural, industrial, and urban development decreases the amount of this habitat type in eastern Washington.

The remaining undisturbed shrub-steppe habitat at the Hanford Site is considered priority habitat by the State of Washington because of its relative scarcity and its importance as nesting, breeding, and foraging habitat for sensitive species. No plants or mammals on the federal list of Endangered and Threatened Wildlife and Plants are known to reside or occur on the ERDF site, although several candidate species are known to occur. DOE (in cooperation with the State of Washington Department of Fish and Wildlife and the U.S. Fish and Wildlife Service) is currently developing a biological resources management plan to address potential ecological impacts from activities throughout the Hanford Site.

VI. SUMMARY OF RISK ASSESSMENTS

A. OPERABLE UNIT RISK

Actual or threatened releases of hazardous substances from some operable units on the Hanford Site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to the public health, welfare, or the environment.

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 were released for public use before cleanup, the risks would be considered unacceptable. In the initial stage of assessing risk by performing qualitative risk assessments (QRAs) attempts to estimate the potential future human health and environmental risks that could result if contaminants are not remediated and left in place.

A detailed description of the findings, assumptions, and methods used can be found in the QRA for each operable unit. Currently, there are no residential or recreational users in these areas. Thus, risks estimated in the QRA are not actual risks but, instead, provide estimates of potential future risks if the area were to become utilized.

In preparing the QRA, conservative assumptions were used that weight in favor of protecting human health and the environment (e.g., greater known soil contaminant concentrations found at depth were used as overall soil concentrations). The results of the risk assessment help determine if remedial actions are necessary to protect human health and the environment. The goal of the QRA is to identify high-priority waste sites for expedited response actions and interim remedial measure by estimating a range of risk (very low to high) for the contaminated soils and solid wastes.

The human health risk evaluation used two hypothetical exposure scenarios, frequent and occasional use, to provide estimates of potential future risk that correspond with residential and recreational exposure scenarios defined in the *Hanford Site Risk Assessment Methodology*. The frequent-use scenario assumes a person is exposed to contaminated media every day for each year. The occasional-use scenario assumes a person is exposed to contaminated soil for 7 days each year. The selection of land use (i.e., residential or recreational) is based on probable uses considered for the Hanford Site following environmental restoration. The most probable exposures at the Hanford Site are addressed by the occasional-use exposure scenario. The regulators use the occasional-use scenario at the Hanford Site to make decisions concerning the need for interim remedial measures. Therefore, the results of the occasional-use exposure scenario are discussed in this ROD.

Potential pathways are evaluated as likely routes of human exposure to contaminants. These include soil ingestion, inhalation of fugitive dust, inhalation of volatile organic compounds, and external radionuclide exposure from soils, etc. In these evaluations, the human health evaluation considers carcinogenic and noncarcinogenic contaminants. Some of the completed evaluations have concluded that human health risks are unacceptable for the occasional-use exposure scenario.

An ecological evaluation estimates risk from existing contaminants at the operable unit using selected ecological receptors. An environmental hazard quotient (EHQ) is calculated that estimates risk in a manner similar to the hazard quotient (HQ) used to assess human health risk, except that the EHQ is applied to an ecological receptor exposed to contaminants. Some of the completed evaluations have concluded that ecological risks are unacceptable.

Actual or threatened releases of hazardous substances from some operable units on the Hanford Site if not addressed by implementing the remedial actions selected present a current or potential threat to human health, welfare, or the environment.

B. ERDF RISK

Long-term effectiveness was measured in terms of future risk to human health and the environment and qualitative assessments of reliability. Future risks are associated with soil exposure resulting from intrusion into the facility or exposure to groundwater impacted by migration of contaminants out of the facility. The risks assessment shows that the benefits of protective measures such as passive controls and a barrier that reduces infiltration are accounted for in the analysis. However, it was still assumed that all the waste in the ERDF was characterized by the maximum concentration detected in 100, 200, and 300 Area waste units and thus the results are conservatively biased.

All of the alternatives (except the no-action alternative) include active institutional controls (e.g., fences, signs, patrols), passive institutional controls (e.g., markers and offsite records), and a surface barrier that is at least 4.6 m (15 ft) thick. It is assumed that institutional controls prevent intrusion into the waste for at least 100 years and that passive controls prevent intrusion for 500 years. Furthermore, it is assumed that because the waste is covered with at least 4.6 m (15 ft) of cover materials, intrusion into the waste due to excavation is precluded. Since none of the evaluated modified barriers can prevent penetration by a drilling rig, however, it is reasonable to assume that someone might inadvertently drill through the waste sometime after 500 years. Therefore, soil exposures for both human and ecological health are calculated assuming the 500-year drilling scenario.

The human health risks associated with soil exposure resulting from the 500-year drilling scenario include a total incremental cancer risk (ICR) of 4×10^{-5} (dominated by uranium) and a maximum HQ of 0.03 (associated with copper). These risks are the same for all the alternatives (except no action). The predicted HQ and ICR associated with the 500-year drilling scenario meet the goals established in the Tri-Party Agreement of 1 for HQ and 1×10^{-4} for ICR.

Groundwater impacts were calculated assuming that an engineered barrier is constructed over the facility to minimize infiltration through the waste and maximize the travel time to groundwater. In addition, it was assumed that the waste met the maximum leachate concentration criteria (either with or without treatment) before it was placed in the facility. For alternatives with liners, it was further assumed that all leachate was retained by the high-density polyethylene liner and removed by the leachate collection system for the first 30 years of operation. In addition, the added travel time associated with migration though the clay layer was accounted for in the analysis.

For all the alternatives except the no-action alternative, none of the contaminants are predicted to reach groundwater within 10,000 years under current climate conditions. Risks after 10,000 years are considered highly uncertain given the potential for climatic changes, geologic events, and human activities, and were not evaluated. Groundwater concentrations and associated risks were also predicted assuming that the rainfall rate increased from the current average for Hanford of 18 cm (7 in.) to 40 cm (16 in.) at 100 years. This scenario was intended to represent either a wetter climate or irrigation on top of the ERDF. Although the results of these analyses are intended to demonstrate potential effects associated with climate or land use changes, they should not be considered the most likely scenario. Based on the fate and transport modeling results of the RI/FS, none of the alternatives will allow contaminants to reach groundwater within 10,000 years under current climate conditions. Under the hypothetical wetter climate, all of the alternatives result in a total ICR of 2×10^{-5} and a maximum HQ of 0.8 within 10,000 years. Because leachate collection is assumed to last only 30 years and the rainfall rate does not increase for 100 years, only minor differences in risks and travel times can be attributed to the liners.

1. Ecological Risk

The maximum ecological health risks associated with soil exposure resulting from the 500-year drilling scenario include a total radiological dose of 0.6 rad/day (dominated by uranium) and an EHQ of 12 for copper. The remaining EHQs were less than 0.05. It should be noted that the background concentration of copper in soil (28.2 mg/kg) results in an EHQ of 3, which has not resulted in adverse impact to the environment. It is evident that the environmental exposure analysis results in an overestimate of risk to environmental receptors and it is likely that the intrusion scenario will not

result in adverse impacts to the environment from any potential contaminants disposed in the ERDF. These risks are the same for all the alternatives (except no action).

Ecological risk is expressed in terms of an EHQ (analogous to the human health HQ) for nonradionuclides and radiological dose for radionuclides. The ecological risk assessment predicted EHQs greater than 1 for seven contaminants: benzo(a)pyrene, aluminum, barium, copper, manganese, mercury, and zinc. The total radiological dose after 100 years was predicted to equal 0.8 rad/day (primarily due to cesium-137 and uranium). A dose of 1 rad/day is generally considered acceptable for ecological receptors.

2. Short-Term Worker and Public Risk

Short-term risks associated with construction and operation of the ERDF are evaluated below for the ERDF workers, non-ERDF workers on the Hanford Site, and the public.

ERDF Worker Risk. The evaluation of ERDF worker risk during operation of the ERDF relies on the methods and conclusions provided in the *Source Inventory Development Engineering Study for the Environmental Restoration Disposal Facility*. The report developed contaminant-specific soil concentrations associated with occupational regulatory limits. The exposure pathways evaluated are inhalation of fugitive dust, inhalation of volatile organic compounds, and external exposure to radiation. Therefore, the regulatory limits of interest are those related to occupational air exposure and external radiation dose. Limits for ingestion, dermal absorption, and skin and/or eye contact were not determined because they are not probable exposure pathways. Personnel normally occupying the ERDF trench will include heavy equipment operators and truck drivers. Precautions will be taken to ensure that ERDF employees avoid direct contact with hazardous constituents under normal operating conditions.

This analysis indicates that there are a number of contaminants of potential concern to workers during ERDF operation. These contaminants are alpha-emitting radionuclides (a concern via inhalation) and high-energy gamma emitters (a concern via external exposure).

It is noted that it is not acceptable to expose workers to contaminants at the occupational soil concentration limits. A number of contaminants are known or probable human carcinogens, and it is generally assumed that there is no safe dose that will not elicit a carcinogenic response. Although it is likely that occupational exposure criteria will not be exceeded, the as low as reasonably achievable (ALARA) principle will be practiced.

Physical Hazards to ERDF Workers. Construction and operation of the ERDF will expose workers to physical hazards that can result in accidental injury to workers. The risk associated with these physical hazards can be quantified by multiplying the labor requirements by the injury rate to estimate the expected number of accidents. Injury rates can vary considerably for different activities, and a detailed analysis of physical risk would account for these variations. For purposes of this document, however, a more general approach that treats all labor as general construction activity will be utilized.

Although operation of the ERDF is not truly a construction activity, many of the associated activities are similar to construction. The total number of employees for operation of the ERDF is estimated to be a maximum of 167. Approximately 40 of these jobs are administrative or supervisory in nature

and would entail relatively little physical risk. Assuming 230 work days in a year, the total number of worker days associated with operation of the ERDF is 29,000 days/year. Assuming the facility operates for 25 years, the total number of worker days is 725,000.

Based on statistics from the U.S. Department of Labor, construction workers have a fatality rate of 6×10^{-7} fatalities per person-day and a lost-time injury rate of 2×10^{-4} injuries per person-day. Because fatalities are of most concern, only the fatality rate is used in the evaluations. The estimated number of fatalities for each construction activity and ERDF operation are summarized below.

Estimated Number of Worker Fatalities Due to Physical Hazards

Activity	Worker Days	Estimated Fatalities
Trench excavation	110,000	0.066
Double liner	79,000	0.047
RCRA-compliant cover	27,000	0.016
ERDF operation	725,000	0.44

Risks to Non-ERDF Hanford Workers and the Public. The facility hazard classification provides qualitative evaluations of potential radiological impacts of ERDF operations and accident conditions to non-ERDF Hanford Site workers and the public. The scope of the hazard classification did not include nonradioactive contaminants. The impacts were evaluated for three scenarios: normal operations, abnormal occurrence of continuous strong winds (113 km/h [70 mi/h]) for 24 hours, and a container breach. In all cases, risks were characterized as low.

VII. REMEDIAL ACTION OBJECTIVES

The NCP states that remedial action objectives (RAOs) should reflect the media and contaminants of concern, the exposure pathways, and the remediation goals (40 CFR 300.430(e)(2)(i)).

Remedial action objectives for the ERDF are unusual in that the scope in this instance is limited to the siting and configuration of a waste disposal facility and does not address remediation of specific contaminated sites. Current risks and RAOs for the contaminated sites will be evaluated in the operable unit RI/FSs. The Tri-Parties recognize the concern associated with long-term management of waste. The decision to establish a central disposal facility stems from the concern that current conditions, i.e., numerous uncontrolled waste sites along the Columbia River, are less desirable. The primary objective of the ERDF is to provide a centralized land disposal facility at the Hanford Site for consolidation of remediation wastes found suitable for land disposal. In order to support the siting design of a facility that provides safe disposal of remedial wastes, the following supporting RAOs have been selected.

(1) **Prevent unacceptable direct exposure to waste in accordance with applicable or relevant and appropriate requirements (ARARs) and health-based criteria.** Direct exposure to the types of waste received at the ERDF could result in unacceptable health risks. Direct exposure of workers and biota to waste could occur during operation of the ERDF (i.e., during waste transport and filling operations). Because of access control at the Hanford Site,

the direct exposure pathway does not apply to the public during operations. Once the ERDF is closed, direct exposure to waste is only possible if institutional controls fail and the surface cover is breached.

(2) **Prevent unacceptable contaminant releases to air in accordance with ARARs and health-based criteria.** Inhalation exposure to the types of waste received at the ERDF could result in unacceptable health risks. Similar to the direct exposure pathway, inhalation of waste by workers and biota could occur during operation of the ERDF (i.e., during waste transport and filling operations). Airborne transport of waste off the Hanford Site could result in exposures to the public, but these exposures would be negligible compared with worker risks. Once the ERDF is closed, air releases are only possible if institutional controls fail and the surface cover is breached.

(3) **Prevent contaminant releases to groundwater above ARARs and health-based criteria.** Migration of contaminants through the vadose zone to groundwater could result in unacceptable human exposure to contaminants. This RAO has been acknowledged in the fourth amendment to the Tri-Party Agreement, which states: "the point of [risk] assessment will be the intersection of the groundwater and the vertical line drawn from the edge of the disposal facility". The Tentative Agreement on Tri-Party Agreement Negotiations, which was circulated for public comment in 1993, and formed the basis for the Fourth Amendment to the Tri-Party Agreement, further provided the time of assessment (10,000 years) and the compliance standard (10^{-5} for the first 100 years and 10^{-4} thereafter). Since the risk assessment indicates that the risk associated with the groundwater pathway should remain below 10^{-5} for the first 100 years, the relevant compliance standard is 10^{-4}.

(4) **Minimize Ecological Impacts.** Construction of the ERDF will result in harmful impacts to the ecology of the ERDF site and possibly to the borrow sites (if needed) that provide materials for ERDF construction. Significant value is attached to the ecology at these sites. Mitigation measures to reduce ecological impacts have been incorporated into the alternatives. Potential options for additional mitigation measures will be evaluated by DOE.

Mitigation measures included in the alternatives are (i) clearing of the site in preparation for construction prior to nesting season to ensure that wildlife is not destroyed, only displaced; (ii) constructing the landfill in a sequential fashion on an as-needed basis, which may minimize ultimate habitat loss; (iii) use of the deep area-fill trench configuration to minimize the amount of land disturbed at the ERDF; (iv) initiating site clearing activities in the southern corner, progressing to the north, to buffer the shrub-steppe habitat immediately south of the ERDF site from ongoing construction activities; (v) revegetation. Additional mitigation measures to be evaluated include restoration of the site, creation or enhancement of similar habitat, and actions to acquire or provide protection for similar habitat.

40 CFR Part 300 National Oil and Hazardous Substances Pollution Contingency Plan (NCP) and the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) Determination

CERCLA Section 104(d)(4) states that where two or more noncontiguous facilities are reasonably related on the basis of geography, or on the basis of the threat or potential threat to the public health or welfare or the environment, the President may, at his discretion, treat these related facilities as one for the purposes of this section.

The preamble to the NCP clarifies the stated EPA's interpretation that when noncontiguous facilities are reasonably close to one another and wastes at these sites are compatible for a selected treatment or disposal approach, CERCLA Section 104(d)(4) allows the lead agency to treat these related facilities as one site for response purposes and, therefore, allows the lead agency to manage waste transferred between such noncontiguous facilities without having to obtain a permit. Therefore, the ERDF and the 100, 200, and 300 Area NPL sites are considered to be a single site for response purposes.

The primary ARARs for this facility are listed below.

Resource Conservation and Recovery Act, as amended - Title 42 USC 6901

RCRA regulates the generation, transportation, storage, treatment, and disposal of hazardous waste. Federal regulations promulgated under 40 CFR Part 260 through 268 implement RCRA requirements for disposal facilities including specific design, operation, monitoring, closure, and postclosure care requirements and are considered applicable to the ERDF.

Facilities that treat, store, or dispose of hazardous wastes (treatment, storage, or disposal [TSD] facilities) are covered by 40 CFR Part 264. Subparts A through H are general standards applicable to TSD and Subparts I through DD apply to specific types of treatment, storage, and disposal activities or to specific types of equipment.

Part 268 restricts the land disposal of all hazardous wastes and specifies the treatment standards that must be met before these wastes can be land disposed unless a waiver is granted.

Dangerous Waste Regulations - WAC 173-303

The Washington State Dangerous Waste Regulations implement the federal Hazardous Waste Regulations promulgated pursuant to RCRA as well as requirements of the state Hazardous Waste Management Act, Chapter 70.105 RCW. The regulation establishes requirements for generation, storage, treatment, and disposal of dangerous waste.

VIII. DESCRIPTION OF ALTERNATIVES

A range of alternatives were developed for the ERDF. The key elements of each alternative are described and briefly discussed below. Other than the no-action alternative, all the alternatives rely on a centralized waste management facility at the ERDF location.

Treatment of the incoming waste at the ERDF facility is not included in any of the alternatives. Waste acceptance criteria will be established and approved by EPA prior to operation of the facility. Compliance with ARARs shall be addressed by the generating operable unit for any waste transported to ERDF. All such waste will satisfy the ERDF waste acceptance criteria. Treatment will be considered in the feasibility studies for the individual operable units and will be conducted at the operable units as appropriate.

Institutional controls, dust control, surface water management, transportation, and wastewater treatment are components of all of the alternatives (except no action), and are discussed as common elements. These elements are considered to be necessary for each of these alternatives, but are not expected to affect the relative performance of the alternatives.

In addition to a no-action alternative, nine alternatives were assembled by selecting combinations of cover and liner technologies. The nine alternatives represent combinations of no liner, a single composite liner, and a RCRA minimum technological requirement (MTR) double composite liner, with a low-infiltration soil cover, a modified RCRA-compliant cover, and the Hanford Barrier.

Shallow trench and shallow area-fill designs were eliminated because of their high cost and the large area required to provide sufficient waste capacity. Therefore, each of the nine alternatives is based on the deep area-fill design, which minimizes the area impacted by construction of the facility. The alternatives assembled for evaluation include:

- Alternative 1 - No action
- Alternative 2 - No liner and a low-infiltration soil cover
- Alternative 3 - No liner and a modified RCRA-compliant cover
- Alternative 4 - No liner and a Hanford Barrier
- Alternative 5 - Single composite liner and a low-infiltration soil cover
- Alternative 6 - Single composite liner and a modified RCRA-compliant cover
- Alternative 7 - Single composite liner and a Hanford Barrier
- Alternative 8 - RCRA double composite liner and a low-infiltration soil cover
- Alternative 9 - RCRA double composite liner and a modified RCRA-compliant cover
- Alternative 10 - RCRA double composite liner and a Hanford Barrier.

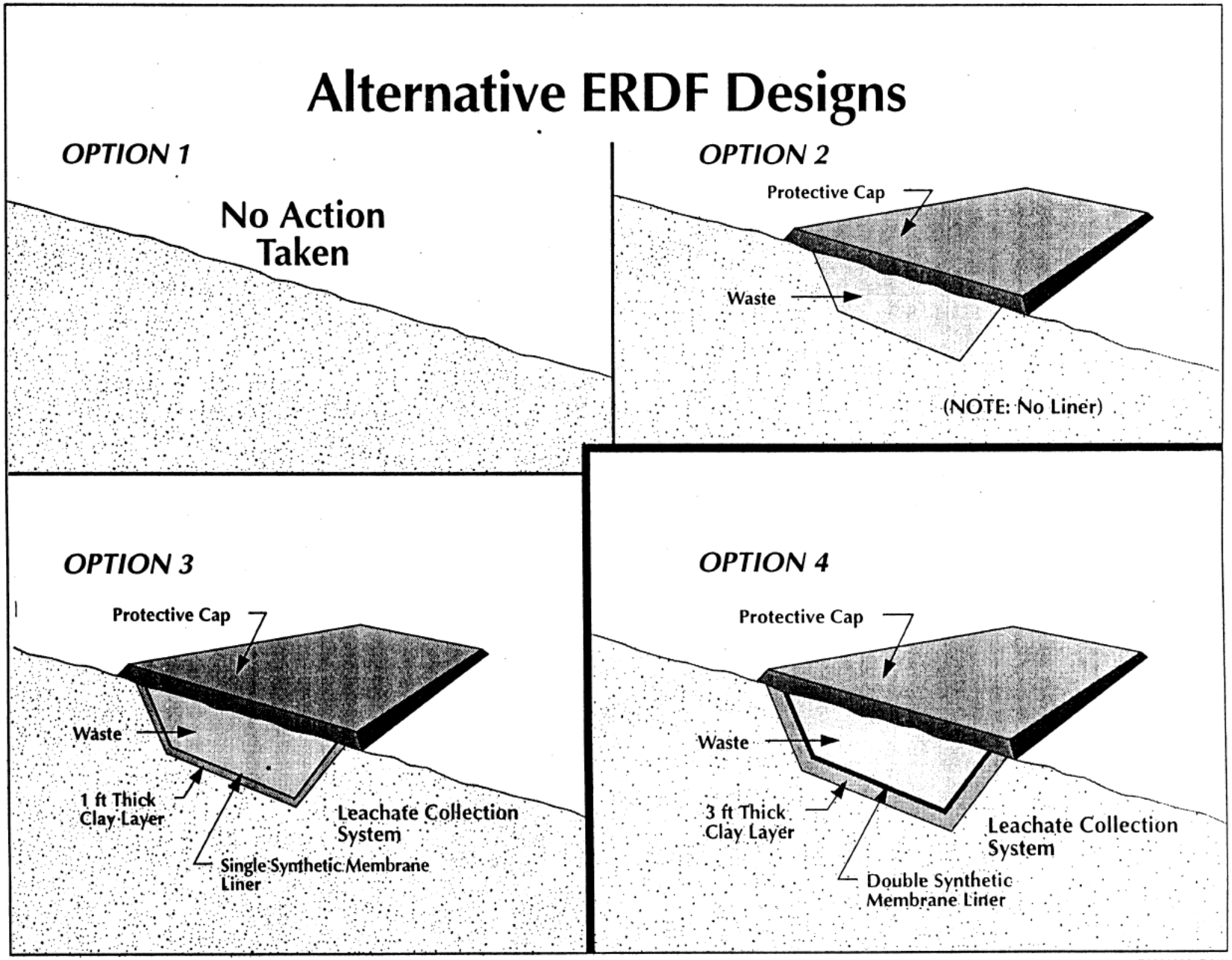
For the purpose of detailed alternative evaluation, it was assumed that a modified RCRA-compliant cover would be used on the ERDF. The modified RCRA-compliant cover consists of a standard RCRA-compliant cover composed of clay, geomembrane material, and soil, with additional soil (approximately 15 ft) added for shielding and intrusion protection. The alternatives with the other cover options were therefore eliminated from further consideration.

The four remaining alternatives listed below were carried through the evaluation utilizing liner technologies in combination with a modified RCRA-compliant cover (see Figure 4).

- Alternative 1 - No action
- Alternative 2 - No liner and a modified RCRA-compliant cover
- Alternative 3 - Single composite liner and a modified RCRA-compliant cover
- Alternative 4 - Double composite liner and a modified RCRA-compliant cover.

ALTERNATIVE 1 - NO ACTION

Evaluation of the no-action alternative is required under CERCLA and the NCP (40 CFR 300.430(e)(6)). The no-action alternative consists of not constructing a centralized waste management unit on the Hanford Site to accommodate remediation waste from Hanford Site past-practice operable units.



E9501029. B&W

Figure 4.

ALTERNATIVE 2 - NO LINER AND THE MODIFIED RCRA-COMPLIANT COVER

This alternative consists of an unlined trench and the modified RCRA-compliant cover. The cover prevents direct exposure to the waste and includes a vegetated surface layer of fine-grained soils to retain moisture and encourage evapotranspiration, thereby minimizing infiltration and vadose zone transport of contaminants to groundwater. The upper 50 cm (20 in.) of the soil cover system is composed of an admixture of silt and gravels. This layer is intended to both reduce infiltration through the cover and enhance the resistance of the cover to burrowing animals and long-term wind erosion.

ALTERNATIVE 3 - SINGLE COMPOSITE LINER AND THE MODIFIED RCRA-COMPLIANT COVER

This alternative consists of a single-composite liner and the modified RCRA-compliant cover. The cover prevents direct exposure to the waste and includes a vegetated surface layer of fine-grained soils to retain moisture and encourage evapotranspiration, thereby minimizing infiltration and vadose zone transport of contaminants to groundwater. The upper 50 cm (20 in.) of the soil cover system is composed of an admixture of silt and gravels. This layer is intended to both reduce infiltration through the cover and enhance the resistance of the cover to burrowing animals and long-term wind erosion. The liner retains leachate within the trench which is then pumped out using a leachate collection system and treated.

ALTERNATIVE 4 - RCRA DOUBLE COMPOSITE LINER AND THE MODIFIED RCRA-COMPLIANT COVER

This alternative consists of a RCRA Subtitle C double-composite liner and the modified RCRA-compliant cover. The cover prevents direct exposure to the waste and includes a vegetated surface layer of fine-grained soils to retain moisture and encourage evapotranspiration, thereby minimizing infiltration and vadose zone transport of contaminants to groundwater. The upper 50 cm (20 in.) of the soil cover system is composed of an admixture of silt and gravels. This layer is intended to both reduce infiltration through the cover and to enhance the resistance of the cover to burrowing animals and long-term wind erosion. The primary liner retains leachate within the trench which is then pumped out using a leachate collection system and treated. A secondary liner and leachate collection system retains any leachate that leaks through the primary leachate collection system and allows it to be pumped out and treated.

COMMON ELEMENTS OF ALTERNATIVES 2, 3, AND 4

Alternatives 2, 3, and 4 include institutional controls, dust control, surface water management, groundwater monitoring, air monitoring, decontamination facilities, waste offloading and transportation, buildings, equipment for internal and external communications, and personnel protection. In addition, all of the alternatives (other than the no-action alternative) utilize a deep, single trench approximately 20 m (70 ft) deep and 300 m (1,000 ft) across at the bottom, which can be expanded when authorized by the EPA to meet Hanford cleanup needs.

Implementation of Alternative 2, 3, or 4 will require an irreversible and irretrievable commitment of resources such as liner material, borrow material, natural resources, building and facility construction

materials, and energy resources. The commitment of resources required to implement each alternative is similar, with the exception of trench liner material. The liner material requirements of Alternative 4 are twice those of Alternative 3, which are greater than Alternative 2 (the no-liner alternative).

Potential environmental impacts to elements such as visual resources, noise, air, water, socioeconomic considerations, indirect impacts, transportation impacts, cumulative impacts, and environmental justice issues were considered in the RI/FS. These elements were determined to be affected in an essentially similar manner for all of the alternatives.

Additionally, each option includes mitigation measures to reduce ecological impacts and an evaluation of additional mitigation options. Further examination of alternative cover designs is also included in the options.

IX. SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

This section summarizes the relative performance of each of the alternatives with respect to the nine criteria identified in the NCP and with respect to the substantive evaluation criteria of NEPA. These criteria fall into three categories: the first two (Overall Protection of Human Health and the Environment and Compliance with ARARs) are considered threshold criteria and must be met. The next five are considered balancing criteria and are used to compare technical and cost aspects of alternatives. The final two criteria (State and Community Acceptance) are considered modifying criteria. Modifications to remedial actions may be made based on state and local comments and concerns. These were evaluated after all public comments were received.

A. THRESHOLD CRITERIA

The remedial alternatives were evaluated in relation to the two threshold criteria: overall protection of human health and the environment and compliance with ARARs. The threshold criteria must be met by the alternatives for further consideration as potential remedies for the ROD.

1. Overall Protection of Human Health and the Environment

Overall protection of human health and the environment addresses whether a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

The no-action alternative provides an environmental baseline against which impacts of the other alternatives can be compared. It is difficult, however, to meaningfully evaluate the no-action alternative against the standard CERCLA criteria of long-term effectiveness and permanence, short-term effectiveness, implementability, and cost. It should be noted that the no-action alternative will not support the removal of contaminants from portions of the Hanford Site (including near the Columbia River) in a timely manner. Existing facilities do not have the capacity required to support projected waste volumes. Therefore, a potential result associated with implementation of the no-action alternative is that source operable units would develop alternatives that are limited to in situ

remedial actions, or excavation and disposal at the operable unit. Furthermore, given the ready availability of a surface water source, and therefore the likelihood of human habitation, the risk of future intrusion into the landfill is greater along the Columbia River than on the Central Plateau. It should also be noted that existing facilities at the Hanford Site do not have the capacity to support the projected waste volumes. For these reasons, the no-action alternative is considered less effective in the long-term than other alternatives.

The no-action alternative could involve use of an offsite waste management facility for disposal of Hanford remediation waste. Use of an offsite waste management facility for permanent disposal is similar in concept to the other waste management facility options discussed above. The offsite facility would probably be a general low-level waste facility serving a state or regional area and would most likely offer similar long-term effectiveness as a centralized Hanford Site waste management facility. The disadvantages of using an offsite waste management facility are as follows.

- Few existing or planned facilities are prepared to accept significant quantities of mixed waste. The nearest existing facility is Envirocare of Utah, Inc., located west of Salt Lake City, Utah, approximately 1,100 km (700 mi) from the Hanford Site.

- The potential for accidental contaminant release over long transportation distances outside of Hanford Site controlled areas presents significantly greater short-term public risk than an onsite waste management facility.

- Public opposition to offsite disposal of Hanford waste is high.

- Transportation distances associated with an offsite facility would be significantly greater than for an onsite facility.

Therefore, while an effective offsite waste management facility could be constructed, this alternative is not retained past the screening stage, based on poor short-term effectiveness, low implementability, and high cost. The no-action alternative was not carried further into the detailed evaluation for the reasons noted above.

All the retained alternatives can satisfy the overall protection of human health and the environment and are carried forward into the detailed evaluation.

2. Compliance with ARARs

CERCLA, as amended by SARA, requires that alternatives for CERCLA sites either comply with federal and state substantive requirements that are applicable to the action being taken or provide grounds for invoking a waiver from such requirements. The actions must also comply with the substantive requirements of laws and regulations that are not directly applicable, but are relevant and appropriate. These are requirements that pertain to situations sufficiently similar to those encountered at a Superfund site, so their use is well suited. Combined, these are referred to as ARARs. State ARARs are limited to those promulgated requirements that are more stringent than federal counterpart requirements, or for which there is no corresponding federal requirement. Compliance with ARARs requires evaluation of the alternatives for compliance with chemical-, location-, and action-specific ARARs or justification for a waiver. Other criteria, advisories, and guidelines were also considered.

The most significant ARARs for construction and operation of a disposal facility receiving hazardous/dangerous waste include federal RCRA landfill requirements specified in 40 CFR Part 264, Washington State dangerous waste landfill requirements specified in WAC 173-303-665, RCRA LDRs specified in 40 CFR Part 268 and WAC 173-303-140, and Toxic Substances Control Act (TSCA) requirements specified in 40 CFR Part 761.

The applicable RCRA landfill requirements include MTRs for landfill liners and covers. The liner requirements call for a double-lined landfill with a leachate collection system. Only alternatives with a RCRA double liner are compliant with this requirement. The alternatives with either no liner or a single liner would require a CERCLA waiver or a RCRA variance for the liner design. The RCRA MTRs for the landfill cover include a requirement that the permeability of the cover be less than or equal to the permeability of the bottom liner. This requirement is satisfied by the flexible membrane liner and clay layer in the RCRA-compliant cover.

Compliance with LDRs would be required unless alternate standards are approved for each individual operable unit via an approved regulatory mechanism such as a CERCLA waiver or a RCRA treatability variance as part of the decision-making process at the individual operable units and documented in those operable unit RODs.

The most significant TSCA requirement is that PCBs greater than 50 mg/kg must be disposed in a lined facility. In order to accept wastes with PCB concentrations greater than 50 mg/kg, alternatives that do not include a liner would require a waiver under CERCLA.

Evaluation of how each alternative complies with ARARs is based on the number of waivers that would likely be required to implement the alternative. Regulations that may require waivers include (1) RCRA MTRs for landfill liners, (2) RCRA MTRs for landfill covers, and (3) TSCA landfill liner requirements. It is expected that Alternatives 2, 3, and 4 will comply with all other ARARs.

Alternative 2. This alternative would require waivers for the RCRA liner MTRs and the TSCA liner requirements.

Alternative 3. This alternative would require waivers for the RCRA liner MTRs.

Alternative 4. This alternative requires no waivers and therefore best meets this criterion.

B. PRIMARY BALANCING CRITERIA

The balancing criteria are used to refine the selection of alternatives. The five balancing criteria are long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; and cost.

3. Long-Term Effectiveness and Permanence

Long-term effectiveness and permanence refers to the magnitude of residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time. Factors that are considered, as appropriate, include the following.

- Magnitude of residual risk remaining from untreated waste or treatment residuals remaining at the conclusion of the activities. Residual risk is associated with migration of contaminants to groundwater and is addressed by predicting the risk via the groundwater pathway for each alternative. Long-term effectiveness and permanence is measured in terms of future groundwater risk and qualitative assessments of liner and cover reliability. Because each of the alternatives will use the modified RCRA-compliant cover, cover reliability does not factor into the ranking of alternatives. Liner reliability is considered least important because the liner is expected to fail over the long-term and does not significantly affect risk estimates. Based on the fate and transport modeling results of the RI/FS, none of the alternatives will allow contaminants to reach groundwater within 10,000 years under current climate conditions. Under the hypothetical wetter climate, all of the alternatives result in a total ICR of 2×10^{-5} and a maximum HQ of 0.8 within 10,000 years. Since all of the alternatives rank equally, this criterion is not evaluated further.

- Adequacy and reliability of controls such as containment systems and institutional controls. This factor addresses the uncertainties regarding long-term protection from residuals, the assessment of the potential need to replace technical components of the alternative, and the potential exposure pathways and risks posed should the remedial action need replacement. This factor is addressed by qualitatively evaluating the durability and redundancy in the liner and cover systems provided by each of the alternatives.

Alternative 2. The no-liner alternative provided the least ability to determine the remedial action's effectiveness and is ranked third for this criterion.

Alternative 3. The single-liner alternative provides the ability to monitor leachate and determine the remedial action's effectiveness. However, it does not provide an indication of liner failure and is ranked second for this criterion.

Alternative 4. The double-liner alternative provides the ability to monitor leachate, the primary liner system, and determine the remedial action's effectiveness. It is ranked first for this criterion.

4. Reduction of Toxicity, Mobility, or Volume through Treatment

This criterion addresses the statutory preference for selection of remedial actions employing treatment technologies that permanently reduce toxicity, mobility, or volume of the hazardous substances as their principal element.

Treatment of the incoming waste at ERDF is not included in the ERDF alternatives. Instead, waste treatment will be considered in the feasibility studies, proposed plans, and the RODs for the individual operable units and will be conducted at the operable units as appropriate. Waste coming to the ERDF shall meet all ARARs and satisfy the waste acceptance criteria.

5. Short-Term Effectiveness

Short-term effectiveness refers to the speed with which the remedial action achieves protection, as well as the remedial action's potential to create adverse impacts on human health and the environment during the construction and implementation period.

The short-term impacts of alternatives are assessed by considering the following.

- Short-term risks that might be posed to the community during implementation of an alternative. Risks to the community during implementation are associated with potential air releases of waste constituents during waste transport and placement. Because operations would be conducted in the same manner for all the alternatives (except the no-action alternative), this criterion will not differentiate between the alternatives. The dust controls included in all the alternatives will be sufficient to protect worker health. Because the ERDF is isolated from the public, public risk is considered negligible compared with worker risk.

- Potential impacts on workers during remedial action and the effectiveness and reliability of protective measures. Risks to workers include both exposure to hazardous and radioactive substances in the waste and physical hazards associated with construction activities and equipment operation. Potential worker exposure to waste contaminants during waste transport and placement would be the same for all the alternatives (except the no-action alternative). Since all the alternatives involve similar types of construction activities, the magnitude of physical hazard associated with an alternative would be approximately proportional to the amount of labor necessary to construct the facility. Generally, the more complex liners and covers require the most labor and thus are expected to produce greater risk to construction workers.

- Potential environmental impacts of the remedial action and the effectiveness and reliability of mitigative measures during implementation. Because all the alternatives (except the no-action alternative) utilize the same trench configuration, environmental impacts at the ERDF are virtually the same.

- Time until protection is achieved. Assuming that all alternatives will result in a facility ready to receive waste by September 1996, this factor would be the same for all the alternatives. As discussed below under the implementability criterion, however, those alternatives that include non-RCRA-compliant liners may require greater technical effort to defend and consequently may take longer to approve.

Given these factors, short-term effectiveness will be measured primarily in terms of the estimated number of fatalities due to physical accidents and the impacted areas at the borrow sites. Worker accidents is weighted less than the other criteria because the differences between the alternatives are relatively minor. Because the construction of a modified RCRA-compliant cover is the same for each alternative, impacts at borrow sites are expected to be identical.

Alternative 2. The estimated worker fatalities for this alternative (0.522) provides the best short-term effectiveness score.

Alternative 3. The estimated worker fatalities for this alternative (0.546) ranks this alternative second in terms of overall short-term effectiveness.

Alternative 4. The estimated worker fatalities for this alternative (0.569), resulting in the third best overall short-term effectiveness score.

6. Implementability

The implementability criterion has three factors requiring evaluation: the technical and administrative feasibility of a remedy, and the availability of materials and services needed to implement the solution.

- Technical feasibility, including technical difficulties and unknowns associated with the construction and operation of a technology, the reliability of the technology, ease of undertaking additional remedial actions, and the ability to monitor the effectiveness of the remedy. In general, all the alternatives are technically feasible. However, certain alternatives that include complex liners are more likely to result in schedule delays. The number of layers in the liner are a relative measure of technical complexity.

- Administrative feasibility, including activities needed to coordinate with other offices and agencies and the ability and time required to obtain any necessary approvals and permits from other agencies (for offsite actions). CERCLA waives administrative requirements (such as permitting) for onsite activities. Because none of the alternatives include offsite transport, treatment, or disposal, this factor is not significant to the detailed evaluation.

- Availability of services and materials, including the availability of adequate offsite treatment, storage capacity, and disposal capacity and services; the availability of necessary equipment and specialists, and provisions to ensure any necessary additional resources; the availability of services and materials; and availability of prospective technologies. The primary differences between the alternatives regarding this factor are related to the types and quantities of materials included in the liners and covers. Off-the-shelf materials or materials that utilize soil excavated at the ERDF are considered easy to obtain.

In summary, the only factor considered significant is technical implementability.

Alternative 2. This alternative has no liner, ranking it first for technical implementability.

Alternative 3. This alternative has a single liner, ranking it second for technical implementability.

Alternative 4. This alternative has a double liner, ranking it third for technical implementability.

7. Cost

Cost includes capital and operation and maintenance costs for a facility of 36 disposal cells (the maximum extent of the ERDF facility over the life of the project). The estimated costs are present-worth costs (capital costs plus annual costs over the life of the project, with a 5% discount rate). Capital costs include design, construction, equipment, buildings, start-up, and contingency costs. Operating and maintenance costs include labor, power, disposal of residuals, administrative, and periodic reviews.

The types of cost factors assessed include the following.

- Capital costs, including both direct and indirect costs. Construction costs for the different liners will vary significantly. Therefore, capital costs will be the primary factor in evaluation of the alternatives. Costs for excavating the trench and constructing facilities will also be determined to provide a perspective on the relative significance of the liner costs.

- Annual operation and maintenance costs. Only costs incurred during operation of the ERDF will be considered. Long-term, postclosure monitoring, and maintenance costs will be relatively small and are not included.

Comparative performance of the alternatives was based on the total net present value of capital and operation and maintenance costs.

Alternative 2. The total net present value for this alternative is $600 million. This alternative is the lowest cost alternative.

Alternative 3. The total net present value for this alternative is $690 million. This alternative is the second lowest cost alternative.

Alternative 4. The total net present value for this alternative is $779 million. This alternative is the most expensive alternative.

C. MODIFYING CRITERIA

The modifying criteria are used in the final evaluation of remedial alternatives. The two modifying criteria are state acceptance and community acceptance. For both of these criteria, the factors considered include the elements of the alternatives supported by the public, the elements of the alternatives not supported by the public, and the elements of the alternatives having strong opposition.

8. State Acceptance

State acceptance indicates whether, based on its review of the final RI/FS Report and Proposed Plan, the State concurs with, opposes, or has no comment on the preferred alternative.

Ecology concurs with the selection of the final remedial alternative described in this ROD with the understanding that the DOE has committed to evaluate mitigation options. Based on that evaluation, Ecology would expect mitigation to occur in a timely manner for habitat losses at ERDF. Ecology has been involved in the development and review of the Remedial Investigation, Feasibility Study, Proposed Plan, and ROD. Ecology comments have resulted in significant changes to these documents.

9. Community Acceptance

Community acceptance refers to the public's support for the preferred alternative and is assessed following a review of the public comments received on the final RI/FS Report and the Proposed Plan.

On November 14, 15, 16, and 30, 1994, public meetings were held to discuss the Proposed Plan for the ERDF. The results of the public meeting and the public comment period indicate general acceptance of the preferred remedial alternative, with some exceptions. Community response to the alternatives is presented in the responsiveness summary, which addresses questions and comments received during the public comment period.

The major concerns expressed during the scoping period for the ERDF focused on minimizing the amount of land used for waste management activities. Commentors requested that previously contaminated areas be considered for siting the ERDF. Several commentors requested that the agencies consider areas that would minimize the impact to mature shrub-steppe habitat.

The agencies responded to these concerns by downsizing the land requirements for the ERDF through the engineering design of a deep area-fill trench. This reduced the land requirements from 6 mi^2 to 1.6 mi^2. Additionally, the initial two cells will be sized to handle remediation requirements for the next 6 years and will be expanded only as needed, thereby minimizing the impact on shrub-steppe habitat. The agencies also conducted an independent siting study that considered a contaminated area for the ERDF location. Due to safety, timing, and cost considerations, the site was not selected.

X. SELECTED REMEDY

On the basis of consideration of the requirements of CERCLA, the detailed analysis of alternatives using the nine CERCLA criteria, NEPA, and public comments, this ROD selects Alternative 4 (a RCRA-compliant double-lined trench with a modified RCRA-compliant cover) at the ERDF location for the disposal of radioactive, hazardous, and mixed wastes resulting from the remediation of operable units within the 100, 200, and 300 Area NPL sites of the Hanford Site. Only remediation wastes from the Hanford NPL sites will be allowed in the ERDF.

Of the alternatives proposed, this ERDF alternative provides the best combination balancing nine CERCLA criteria and ARAR compliance, selection of a protective site, and consideration of Hanford Future Site Uses Working Group and public recommendations. The liner, compliant with RCRA Subtitle C MTRs, will be double lined and equipped with a leachate collection system. This design provides a more reliable system to protect groundwater than a single liner. The chosen ERDF site is above the Columbia River floodplain and distant from the river; of the sites examined, this site is farthest from groundwater and provides the greatest distance from the Columbia River. Finally, constructing the ERDF at the selected site is consistent with the Hanford Future Site Uses Working Group recommendations to consolidate waste management activities on the Central Plateau. The downsized design is consistent with public recommendations to limit the amount of land dedicated to waste management.

The ERDF will be located on the Hanford Site Central Plateau, southeast of the 200 West Area. The site is located within the waste management area as recommended by the Hanford Future Site Uses Working Group, and does not intrude into the recommended buffer zone (see Figure 2).

The ERDF is designed as a single, 70-ft-deep trench consisting of a series of two side-by-side cells, each measuring 500 by 500 ft at the base, with finished wall slope of 3 horizontal to 1 vertical. Two cells are authorized for initial construction, with final dimensions of 1,420 ft wide and 720 ft long at

the lip of the trench. An additional 350 ft will be excavated within the trench footprint to facilitate initial excavation and potential expansion.

The components of the selected remedy include the following.

- Initial construction and operation of two disposal cells that are expected to provide an approximate waste disposal capacity of 1.2 million yd^3. These cells will be designed and constructed to RCRA MTRs (40 CFR Part 264 Subpart N). The decision to expand the landfill in the future will be documented by amending this ROD or within the RODs for the Hanford operable units.

- The ERDF site will cover a maximum of 4.1 km^2 (1.6 mi^2) on the Central Plateau, southeast of the 200 West Area and southwest of the 200 East Area. The initial construction of the facility will cover 165 acres of this area.

- The ERDF facility will provide sufficient leachate storage capacity to ensure uninterrupted operations, complying with 40 CFR Part 264, Subpart N. Leachate collected at the landfill will be managed at the 200 Area Effluent Treatment Facility, located in the 200 East Area, or other approved facility.

- Surface water run-on/run-off will be controlled at the landfill and other areas of the facility that are potentially contaminated. Best management practices to control runoff shall be employed.

- During excavation, suitable soils will be stockpiled at the ERDF site to provide materials for liner systems and for daily interim and closure covers for the landfill. Materials not suitable for construction of the liner and covers will be used for other construction purposes at the facility to the extent practicable.

- Air monitoring will be accomplished by placement at ERDF of real-time air monitors for radioactive contaminants and air samplers for hazardous and radioactive constituents to detect any offsite migration of contaminants.

- Groundwater monitoring will be performed in accordance with 40 CFR Part 264, Subpart F.

- Appropriate measures to protect facility workers and the public will be employed during ERDF operations including contamination control and dust mitigation, and protection of personnel from industrial hazards presented by ERDF operations. Protective measures shall comply with applicable requirements found in the Occupational Safety and Health Act (OSHA), Washington Industrial Safety and Health Act (WISHA), and other safety regulations or ERDF-specific safety requirements. Energy shall also comply with 40 CFR §300.150.

- The ERDF facility will use existing or planned site road systems for waste transport. Extension of the Hanford rail lines was considered in the RI/FS, but at this time the rail line extension is not considered necessary. As Hanford remediation accelerates, the option might be re-evaluated in the future.

- Waste acceptance criteria shall be developed by DOE, in accordance with ARARs, risk/performance assessments, ERDF-specific safety documentation, and worker protection requirements. Upon approval by EPA (and consultation with Ecology), these criteria will

govern what wastes from the Hanford NPL sites can be placed in the ERDF. No waste may be placed into the ERDF until the waste acceptance criteria have been approved by EPA (with consultation with Ecology). Operable unit-specific waste disposal and treatment decisions will be made as part of the remedy selection and cleanup decision process for each operable unit.

- The ERDF landfill will be closed by placing a modified RCRA-compliant closure cover over the waste. The cover will prevent direct exposure to the waste and includes a vegetated surface layer of fine-grained soils to retain moisture and encourage evapotranspiration, thereby minimizing infiltration and vadose zone transport of contaminants to groundwater. The upper 50 cm (20 in.) of the soil cover system is composed of an admixture of silt and gravels. This layer is intended to both reduce infiltration through the cover and enhance the resistance of the cover to burrowing animals and long-term wind erosion. A RCRA-compliant cover generally consists of a layer of clay, geomembrane material, and sand and gravel. The RCRA-compliant cover will be modified by the addition of approximately 15 ft of soil to provide shielding from radioactive material and to deter intrusion. It is anticipated that additional research into closure covers may result in site-specific enhancements to RCRA-compliant designs. Prior to cover construction, closure cover designs will be evaluated and the most appropriate closure cover design will be selected for construction. The design will, at a minimum, comply with applicable RCRA requirements found at 40 CFR Part 264, Subpart N. Basalt from Hanford Site source areas will not be required for construction of the ERDF closure cover.

- Institutional controls shall be imposed to restrict public access to the landfill.

- Equipment will be available to transport wastes and operate the ERDF safely and efficiently

- Hanford Site infrastructure will be expanded as necessary to support the ERDF. Infrastructure improvements or extensions may include water, sewer, electric service, roads, operations facilities, and a chemical and fuel storage area.

- A decontamination facility will be constructed consisting of, at a minimum, an impervious pad with sump, wash water storage, and secondary containment. Washwater water used to decontaminate site equipment shall be managed in compliance with appropriate requirements.

- The detailed design will be submitted to EPA for approval (with consultation with Ecology) prior to construction of the ERDF facility. At a minimum it will be submitted in two packages to allow for construction in phases.

- An operations plan will be submitted to EPA for approval (with consultation from Ecology) prior to operation of the ERDF facility.

- Mitigation measures to reduce ecological impacts have been incorporated to satisfy the Remedial Action Objectives identified in Section 7(4)(i) through 7(4)(v). In addition, DOE commits to the development and implementation of a Mitigation Action Plan in coordination with the Natural Resource Trustees for additional mitigation measures.

XI. STATUTORY DETERMINATIONS

Under CERCLA Section 121, selected remedies must be protective of human health and the environment, comply with ARARs, be cost effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practical. In addition, CERCLA includes a preference for remedies that employ treatment that significantly and permanently reduces the volume, toxicity, or mobility of hazardous wastes as their principal element. The following sections discuss how the selected remedy meets these statutory requirements.

40 CFR Part 300 National Oil and Hazardous Substances Pollution Contingency Plan (NCP) and the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) Determination

CERCLA Section 104(d)(4) states where two or more noncontiguous facilities are reasonably related on the basis of geography, or on the basis of the threat or potential threat to the public health or welfare or the environment, the President may, at his discretion, treat these related facilities as one for the purposes of this section.

The preamble to the NCP clarifies the stated EPA's interpretation that when noncontiguous facilities are reasonably close to one another and wastes at these sites are compatible for a selected treatment or disposal approach, CERCLA Section 104(d)(4) allows the lead agency to treat these related facilities as one site for response purposes and, therefore, allows the lead agency to manage waste transferred between such noncontiguous facilities without having to obtain a permit. Therefore, the ERDF and the 100, 200, and 300 Area NPL sites are considered to be a single site for response purposes under this ROD.

A. PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

The selected remedy protects human health and the environment through isolation of waste away from the groundwater and the Columbia River. Modeling indicates that, at this location, the ERDF design, a double-lined trench with a modified RCRA-compliant cap, will minimize risk to less than 10^{-5} for up to 10,000 years under current climate conditions assuming that the cover remains intact. The trench design provides a more reliable system for the protection of groundwater. The primary liner system provides for collection of leachate generated during operation and after closure. The secondary liner system provides for early detection of leaks from the primary liner and provides for additional collection of leachate. The ERDF design also addresses public concern by minimizing the impact to shrub-steppe habitat. The selected ERDF site is protective of human health and the environment because it is located at the greatest distance from the Columbia River and from groundwater. The surface cover protects human health and the environment by providing a cover that prevents direct exposure to the waste and includes a vegetated surface layer of fine-grained soils to retain moisture and encourage evapotranspiration, thereby minimizing infiltration and vadose zone transport of contaminants to groundwater. Implementation of this remedial action will not pose unacceptable short-term risks toward site workers.

B. COMPLIANCE WITH ARARs

The selected remedy will comply with the federal and state ARARs identified below. It is important to note that as detailed evaluation of ARARs progresses, changes to the ARARs in this ROD may be necessary. Such changes will require an Explanation of Significant Differences or a ROD amendment. The chemical-, action-, and location-specific ARARs for the ERDF are the following:

1. Chemical-Specific ARARs

Resource Conservation and Recovery Act - Title 42 USC 6901 et seq, Subtitle C

The Resource Conservation and Recovery Act (RCRA) regulates the generation, transportation, storage, treatment, and disposal of hazardous waste. These regulations also provide authority for the cleanup of spills and environmental releases of hazardous waste to the environment as a result of past practices. Hazardous waste management regulations promulgated pursuant to RCRA are codified at 40 CFR Part 260 through 268. Washington State Dangerous Waste Regulations implement the federal hazardous waste regulations and are administered by Ecology. Regulations established under RCRA are applicable to the ERDF as chemical-specific ARARs because the facility is expected to receive hazardous waste and operation of the facility may generate hazardous waste.

National Primary and Secondary Ambient Air Quality Standards - 40 CFR Part 50

National primary and secondary ambient air quality standards were established pursuant to the Clean Air Act to protect air quality and maintain public health. The EPA has promulgated national primary air quality standards for six criteria pollutants: sulfur oxides, particulate matter, carbon monoxide, ozone, nitrogen dioxide, and lead. The requirements of this standard are applicable because potential airborne emissions of particulates or lead may result during operation of the facility.

National Emission Standards for Hazardous Air Pollutants - 40 CFR Part 61

The Clean Air Act directs the EPA to develop and periodically revise a list of National Emission Standards for Hazardous Air Pollutants (NESHAPs). Hazardous air pollutants are air contaminants that affect human welfare for which no ambient air quality standard exists. The NESHAPs are promulgated for emissions from specific sources, and only the NESHAPs established for radionuclide emissions from DOE facilities are applicable to the ERDF. The remaining NESHAPs are considered relevant and appropriate to the ERDF if operation of the facility incorporates operations similar to operations associated with the sources identified in the NESHAP.

EPA standards for radionuclide emissions from facilities owned and operated by DOE under 40 CFR 61.90, National Emission Standards for Hazardous Air Pollutants, are applicable because radionuclides will be present in wastes managed at the facility and there is potential for airborne release. The regulation establishes general radiation dose limits to members of the public from radionuclides emitted into the air from DOE facilities. The dose equivalent rate to any member of the public shall not exceed 25 mrem/year to the whole body or 75 mrem/year to any critical organ. Also, no member of the public may receive a continuous exposure, excluding natural background and medical exposure, of more than 100 mrem/year

effective dose equivalent and a noncontinuous exposure of more than 500 mrem/year effective dose equivalent from all sources.

Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings - 40 CFR Part 192

Requirements of 40 CFR Part 192, Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings, are relevant and appropriate requirements to the ERDF because they establish performance standards for radioactive waste disposal facilities. The standard requires that waste disposal facilities be designed for an effective life up to 1,000 years, to an extent reasonably achievable, and in any case, no less than 200 years. This is a design standard, and monitoring after disposal is not required to demonstrate compliance. These requirements are not applicable to the ERDF because the facility is not associated with uranium or thorium milling.

Standards for Protection Against Radiation - 10 CFR Part 20

The NRC Standards for Protection Against Radiation found in 10 CFR Part 20 are relevant and appropriate to the facility because the regulation establishes standards for protection against radiation hazards that may result from occupational exposure or discharges to air and water.

NRC licensed facilities must limit occupational dose to the following:

(1) an annual limit, which is the more limiting of
(i) a total effective dose of 5 rem
(ii) the total dose to any organ or tissue, other than the eye, equal to 50 rem

(2) the annual limits to the lens of the eye, to the skin, and to the extremities, which are:
(i) An eye dose equivalent of 15 rem
(ii) A shallow-dose equivalent of 50 rem to the skin or to any extremity.

Derived air concentration and annual limit on intake values, presented in Table 1 of Appendix B of 10 CFR Part 20, were calculated based upon the occupational dose limits described above. The regulation also describes how to add external and internal doses to calculate the total effective dose equivalent. Dose limits for minors are 10% of the annual dose limits specified for adult workers.

In addition, the licensee must conduct operations so that the total effective dose equivalent to individual members of the public may not exceed 0.1 rem/year. The dose in any unrestricted area from external sources may not exceed 0.002 rem/h. The licensee must survey radiation levels in unrestricted areas and radioactive materials in effluent released to unrestricted areas in order to demonstrate compliance with the dose limits for individual members of the public.

The standard is not applicable to the ERDF because it only applies to operations licensed by the U.S. Nuclear Regulatory Commission.

Toxic Substances Control Act 15 USC 2601 et seq.

TSCA requirements found at 40 CFR Part 761 are applicable to the ERDF because PCBs have been identified as potential contaminants of concern and may be disposed of at the ERDF above the regulated concentration of 50 ppm. This regulation establishes handling, storage, and disposal requirements for wastes with PCB concentrations greater than 50 ppm.

Dangerous Waste Regulations - WAC 173-303

The Washington State Dangerous Waste Regulations implement the federal Hazardous Waste Regulations promulgated pursuant to RCRA. The regulation establishes requirements for generation, storage, treatment and disposal of dangerous waste. General requirements for dangerous waste management facilities are discussed as action-specific ARARs, and requirements for facility siting are presented as location-specific ARARs. However, Section WAC 173-303-070 establishes procedures and methods to determine if solid waste requires management as dangerous waste. These requirements are considered applicable as chemical-specific ARARs to wastes generated at the ERDF. Section WAC 173-303-090 identifies classification of wastes based on specific characteristics such as ignitability, corrosivity, reactivity, and toxicity. Classification of wastes as either dangerous or extremely hazardous is also considered as an applicable chemical-specific ARAR.

State Radiation Protection Standards - Ch. 70.98 RCW

Washington State Radiation Standards (Ch. 70.98 RCW) were developed pursuant to the Atomic Energy Act of 1954 and are implemented in WAC 246-220 through WAC 246-255. Not all the standards in the referenced chapters are specifically applicable to the ERDF, and only the following standards are considered as chemical-specific ARARs. WAC 246-221, Radiation Protection Standards, is applicable because it establishes the maximum allowable radiation dose to individuals in restricted areas, exposure to minors, and permissible levels of radiation from external sources in unrestricted areas. The occupational dose limit for adults, excluding planned special exposures, shall not exceed an annual limit of a total effective dose equivalent equal to 5 rem, or the sum of the deep dose equivalent and the committed dose equivalent to any individual organ or tissue other than the lens of the eye should not exceed 50 rem. An eye dose equivalent of 15 rem is set for exposure to the eye. The shallow dose equivalent for the skin or any extremities is 50 rem. Occupational dose limits for minors are set at 10% of the annual occupational dose limits for adults.

The standard identifies the methods required to demonstrate compliance and provides derived air concentration and annual limit on intake values that may be used to determine an individual's occupational dose limits. Dose limits that individual members of public may receive in unrestricted areas or from radioactive effluent are not to cause an individual continually present in an unrestricted area, to receive from external sources, more than 0.002 rem in an hour or 0.50 rem in a year. Chapter 246-221 also establishes concentration limits in effluent released to unrestricted areas. The WAC 246-247, Radiation Protection - Air Emissions, promulgates air emission limits for airborne radionuclide emissions at the same levels as defined in WAC 173-480, which are consistent with federal NESHAPs. The ambient standard requires that emission of radionuclides to the air must not cause a dose equivalent of 25 mrem/year to the whole body or 75 mrem/year to any critical organ. Radiation protection standards for uranium and thorium milling sites are presented in WAC 246-252 and are not applicable to the ERDF because it was not used for uranium or

thorium milling. However, the regulation is considered relevant and appropriate because it presents specific radiation protection standards for groundwater.

2. Action-Specific ARARs

Resource Conservation and Recovery Act, as amended - Title 42 USC 6901

The Resource Conservation and Recovery Act (RCRA) regulates the generation, transportation, storage, treatment, and disposal of hazardous waste. Federal regulations found at 40 CFR Part 260 through 268 implement RCRA requirements for disposal facilities including specific design, operation, monitoring, closure, and postclosure care requirements and are considered applicable to the ERDF.

Dangerous Waste Regulations - WAC 173-303

The Washington State Dangerous Waste Regulations implement the federal Hazardous Waste Regulations promulgated pursuant to RCRA. The regulation establishes requirements for generation, storage, treatment, and disposal of dangerous waste and are applicable to the ERDF because the facility will accept hazardous/dangerous waste.

3. Location-Specific ARARs

The Endangered Species Act - 16 USC 1531

The Endangered Species Act of 1973 is applicable and must be considered during siting, design, operation, and closure of the ERDF because the Act establishes requirements to protect species threatened by extinction and habitats important to their survival.

Dangerous Waste Regulations, Siting Criteria - WAC 173-303-282(6) and (7)

The substantive siting criteria in WAC 173-303-282 are relevant and appropriate to the ERDF because the facility will manage hazardous waste.

Radioactive Waste, Licensing Land Disposal - WAC 246-250-300

Substantive requirements established for licensing land disposal facilities for radioactive waste are relevant and appropriate to the ERDF because Section WAC 246-250-300 identifies criteria and considerations used to evaluate site suitability for land disposal of low-level waste. The requirements of this regulation are not applicable to the ERDF because the regulation only addresses land disposal of radioactive wastes received from others. The ERDF will manage only low-level waste resulting from Hanford Site remediation.

4. **Other Criteria, Advisories, or Guidance to be Considered for this Remedial Action (TBCs)**

Radiation Protection of the Public and Environment - DOE Order 5400.5

Site Selection - DOE-RL Order 4320.2C

Hanford Future Site Uses Working Group Recommendations

Radiation Protection for Occupational Workers - DOE Order 5480.11

Radioactive Waste Management - DOE Order 5820.2A

Chapter III of DOE Order 5820.2A requires that low-level waste management practices limit external exposure to radioactive material released to the environment to levels that will not result in an effective dose equivalent to any member of the public in excess of 25 mrem/year and that any air release meet the emission limits specified in 40 CFR Part 61. The DOE Order also specifies radiation exposure be limited to ALARA. Low-level waste disposal systems must be capable of limiting the effective dose equivalent received by inadvertent intruders into the disposal system after institutional controls cease, to not more than 100 mrem/year or 500 mrem for a single acute exposure.

The DOE Order also specifies that material with transuranic waste concentrations greater than 100 nCi/g shall be managed as transuranic waste. Transuranic wastes will not be disposed of at the ERDF.

C. COST EFFECTIVENESS

The selected remedy provides overall effectiveness proportional to its increased cost. The cost for the RCRA double-lined facility appears to be higher than for the other alternatives, but the other alternatives may not comply with the minimum technology requirements.

D. UTILIZATION OF PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT TECHNOLOGIES TO THE MAXIMUM EXTENT PRACTICABLE

Alternative 4 is considered the best solution because it meets the minimum requirement for landfill design without having to apply a ARAR waiver option. Over the long term, this alternative is expected to perform effectively. Input from the public indicates that this is the most acceptable design alternative. The selected remedy is protective of human health and the environment, will comply with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost effective.

The selected remedy utilizes permanent solutions practicable for this site. This action provides a landfill for Hanford remediation waste, and alternative treatment technologies were not utilized for this action. Waste coming to the ERDF shall meet all ARARs and satisfy the waste acceptance criteria. Waste treatment is considered in the feasibility studies, proposed plans, and RODs for the individual operable units and will be conducted at the operable units as appropriate. Alternative treatment technologies shall be used in remedial decisions for the Hanford Site where practicable.

E. PREFERENCE FOR TREATMENT AS A PRINCIPAL ELEMENT

This remedy utilizes permanent solutions to the maximum extent practicable for this site. Treatment of wastes will be addressed in the operable units decision documents. As a consequence, the statutory preference for treatment as a principal element will be addressed in these future documents rather than in this ROD.

XII. DOCUMENTATION OF SIGNIFICANT CHANGES

DOE and EPA reviewed all written and verbal comments submitted during the public comment period. Upon review of these comments, it was determined that no significant changes to the selected remedy, as originally identified in the Proposed Plan, were necessary.

APPENDIX A

DECLARATION OF THE RECORD OF DECISION
RESPONSIVENESS SUMMARY

USDOE HANFORD ENVIRONMENTAL RESTORATION DISPOSAL FACILITY

RESPONSIVENESS SUMMARY

The U.S. Department of Energy (DOE), the U.S. Environmental Protection Agency (EPA), and the State of Washington Department of Ecology (Ecology) (the agencies) held a public comment period from October 17, 1994 through November 30, 1994 for interested parties to comment on the Environmental Restoration Disposal Facility (ERDF) Proposed Plan. The Plan presents the preferred alternative for waste management of Hanford remedial waste. The primary supporting document is the Remedial Investigation/Feasibility Study for the Environmental Restoration Disposal Facility (Rev. 1).

Public meetings were held in Hood River, Oregon on November 14; in Seattle, Washington on November 15; in Richland, Washington on November 16; and in Portland, Oregon on November 30 to describe the waste disposal technologies that were evaluated and to present the agencies' preferred alternative for the ERDF.

A responsiveness summary is required by the *Comprehensive Environmental Restoration, Compensation, and Liability Act* (CERCLA) for the purpose of providing the agencies and the public with a summary of citizens comments and concerns about the site, as raised during the public comment period, and the agencies' response to those comments and concerns.

I. RESPONSIVENESS SUMMARY OVERVIEW. This section briefly describes the background of the Hanford Site and the ERDF and outlines the preferred alternatives for the ERDF.

II. BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS. This section provides a brief history of community interest and concerns regarding the ERDF.

III. SUMMARY OF MAJOR QUESTIONS AND COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND THE AGENCIES' RESPONSES TO THOSE COMMENTS. This section summarizes both oral and written comments submitted to the agencies at the public meeting and the public comment period, and provides the agencies' responses to those comments.

IV. REMAINING CONCERNS. This section discusses community concerns that the agencies should be aware of as they prepare to undertake remedial design and remedial action for the ERDF.

I. RESPONSIVENESS SUMMARY OVERVIEW

SITE BACKGROUND

In 1988, the Hanford Site was scored using EPA's Hazard Ranking System. As a result of the scoring, the Hanford Site was added to the National Priority Listing (NPL) in July 1989 as four sites (the 1100 Area, the 200 Area, the 300 Area, and the 100 Area). Each of these areas was further divided into operable units (a grouping of individual waste units based primarily on geographic area and common waste sources). These operable units contain contamination in the form of hazardous waste, radioactive/hazardous mixed waste, and other CERCLA hazardous substances.

The ERDF will serve as a management unit for the majority of waste (primarily soil) excavated during remediation of waste management sites on the Hanford Facility. The scope of the ERDF Record of Decision (ROD) is focused on the location and configuration of the landfill (also referred to as the trench), the liner, and the surface cover. Summary information on the supporting facilities, including the transportation system, waste handling equipment and procedures, decontamination, and leachate treatment system, is also presented. They will be fully addressed during remedial design.

SUMMARY OF ERDF PREFERRED ALTERNATIVE

On the basis of consideration of the requirements of CERCLA, the detailed analysis of alternatives using the nine CERCLA criteria, the evaluation criteria of NEPA, and public comments, DOE, EPA, and Ecology have determined that Alternative 4 (Resource Conservation and Recovery Act {RCRA} double composite liner and the RCRA-compliant cover) is the most appropriate remedial action for the ERDF for the Hanford Site.

This alternative consists of a deep single trench approximately 20 m (70 ft) deep and 300 m (1,000 ft) across at the ERDF location with a double-composite liner and, at minimum, a RCRA-compliant cover. The cover prevents direct exposure to the waste and includes a vegetated surface layer to uptake water and fine-grained soils to retain moisture and encourage evaporation, thereby minimizing the quantity of water able to reach the waste. Evaluation of alternative covers that will comply with ARAR and increase performance will continue. The minimum cover design includes an admixture of silt and gravels in the top 50 cm (20 in). This layer is intended to both reduce infiltration through the cover and to enhance the resistance of the cover to burrowing animals and long-term wind erosion. In the double liner system the first liner collects leachate, water which passes through the waste and is contaminated. This leachate is then pumped from the trench and treated. A second liner below the first collects any leachate that has leaked from the first liner.

The alternative includes a leachate collection and recovery system, institutional controls, surface water management, decontamination facilities, waste offloading and transportation, buildings, , equipment for internal and external communications, personnel protection and mitigation measures to reduce ecological harm.

II. BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS

A public scoping period was held January 10 through February 8, 1994 to solicit input on the proposal to build a facility to receive cleanup wastes. Individual scoping meetings were held in Pasco on January 25 and Seattle on February 1. The Focus Sheet and Expanded Public Notice/Washington State Notice of Intent for Corrective Action Management Unit - Hanford Environmental Restoration Disposal Facility were provided during the onset of the scoping period to provide available preliminary information to the public. These documents were made available in both the Administrative Record and the Information Repositories.

Additional presentations were made to the Hanford Advisory Board, the Confederated Tribes of the Umatilla Indian Reservation, the Confederated Tribes and Bands of the Yakama Indians, and the Hanford Natural Resource Trustee Council. Many of the concerns expressed by these groups were addressed within the RI/FS and Proposed Plan for the ERDF.

The major concerns expressed during the scoping period for the ERDF focused on minimizing the amount of land used for waste management activities. Commentors requested that previously contaminated areas be considered for siting the ERDF. Several commentors requested that the agencies consider areas that would minimize the impact to mature shrub-steppe habitat.

The agencies responded to these concerns by down-sizing the land requirements for the ERDF through the engineering design of a deep area-fill trench. This reduced the land requirements from 6 mi^2 to 1.6 mi^2. Additionally, the approved trench will be sized to handle remediation requirements for the next 6 years and will be expanded only as needed, thereby minimizing the impact on shrub-steppe habitat. The agencies also conducted an independent siting study considering a contaminated area for the ERDF. Due to safety, timing and cost considerations, the site was not evaluated further.

III. SUMMARY OF MAJOR QUESTIONS AND COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND THE AGENCIES' RESPONSES TO THOSE COMMENTS

Written and oral comments received during the public comment are presented in this section . The person and group affiliation providing the comment is also identified. Responses follow each comment or a series of comments. The comment responses often reference the *Remedial Investigation and Feasibility Study for the Environmental Restoration Disposal Facility*, Rev. 1.

Transcripts of the Fall 1994 public meetings are available for viewing in the Administrative Record.

A. GENERAL

Comment 1. A member of the general public noted that while the Washington DOE, USEPA, and USDOE presented a plan for storage and further cleanup, it appears that they are very slow in constructing and getting into operation that vital plant/storage facility. (name)

Response: While it may seem as though the initial planning and public involvement phases of the ERDF were time consuming, these are vital steps in the process. The ERDF will be ready to accept cleanup waste in September 1996, the projected date for the start of continuous and substantial cleanup of the Hanford Site. A RCRA-permitted facility is available at Hanford for smaller quantities of cleanup waste generated prior to time.

Comment 2. A member of the general public commented that they strongly agree that mixed, hazardous, and radioactive waste should be buried in the same place. This simplifies the disposal process.

Response: Thank you for the comment.

Comment 3. A member of the general public commented that the idea of disposing Hanford wastes at landfills outside Hanford is ludicrous. The ERDF should be the choice if all precautions at the site and monitoring are in place from day one and a law is in place that states only Hanford site past-practice wastes go into this landfill.

Response: The ERDF is authorized under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). By law, only waste generated during CERCLA cleanup actions at the Hanford site can be placed in this facility. Additionally, all applicable requirements will be followed for environmental monitoring of the facility.

Comment 4. Larry Penberthy of Penberthy Electromelt International, Inc. stated that the proposal to landfill hazardous (chemical), low-level radioactive, and mixed wastes is a bad idea, landfills for hazwaste have gone out of style. If this project is carried out, the net result will be another Superfund site, hugely expensive to clean up. The far superior way to handle these wastes is to use a Penberthy "Pyro-Converter" furnace which includes a pool of molten glass kept hot electrically.

Response: It is not feasible to glassify large volumes of Hanford waste. However, treatment options such as vitrification are and will continue to be evaluated during the feasibility studies for individual cleanup actions. It is expected that significant quantities of cleanup wastes will require a disposal facility if waste sites adjacent to the Columbia River are to be restored.

Comment 5. Columbia River United commented: We understand that the ERDF is definitely an onsite facility, but I'll play the devil's advocate and ask how could we get around that? We could get around it by having a closure of one of the cells, say in 10 years, and then they could go out for a permit again, do an EIS or EA on it, and possibly if the public didn't really care, or if the whole way to do business changed, we were back into the closed-door policy, which I don't think will ever happen, they could possibly bring in outside waste. So one thing we want to make sure from the public's concern is, this is a dump for Hanford, it is for cleaning up the site.

Response: Under the current regulatory framework, the use of the ERDF would be limited to CERCLA cleanup wastes from the Hanford Site. Any significant changes or future decisions will require public input.

Comment 6. The Coho Coalition commented: "I think, first of all, something really unfair has happened to the public, and that is that we are not really talking about cleanup. The DOE is not talking about cleanup; it's talking about a more effective way to treat and store wastes for the country and possibly from other parts of the world. We don't know yet. I know they said that this was only Hanford waste, but that was only for the disposal facility. We have to keep that in mind. And I think that it is really unfair that they haven't made that very clear to the public.

But I am totally against tearing down the buildings. Our group is not so sure that we think that we should be worried about the soil, tearing up the soil and bringing it to another area. The Hanford Site has been used for all kinds of dumping for years. The river has been dumped in for years. We shouldn't be surprised the figures that we are seeing now. I imagine that they were much higher many years ago. I think we should not try and put anything dangerous near the river that we know that there are underground streams that are going to carry it into the river. We need to be concerned about that. Maybe that is why we need the disposal facility to keep some of this stuff away from the river, but I am very much against removing the soil that is already there, spending the time and the money to do that to put it into this facility. I think that a lot of the buildings we are talking about are not in the 100 Areas but in other areas of tearing down and removing. We could consider using those buildings for storing drums, other kinds of materials. I don't think because they are contaminated we should be tearing them down."

Response: Each building is evaluated for potential uses, including waste storage, before demolition. However, the majority of buildings have been there for many years and, in most cases, have outlived their usefulness. Removal of contaminated soil is only recommended after an evaluation is made of the risk posed by leaving it in place. Only after the risk is shown to be unacceptable and public comment on the remedy sought, will a cleanup decision be made.

Comment 7. "The Yakama ERWM Program is not convinced that this ERDF proposal adequately protects the health and safety of all people. The lack of protection of human and health safety over an extended period of time is very disturbing to us. Present ERDF planning and structure has the effect of putting real hazard management responsibilities on future generations. This responsibility is made more difficult through the below ground disposal option exercise for the facility. Now in addition to finding adequate management techniques our children and their children must also disinter the wastes that they wish to treat."

Response: The Tri-Parties recognize the problem of long term management of waste. The decision to establish a central disposal facility stems from the idea that the current condition, i.e., numerous uncontrolled waste sites along the Columbia River, is much less desirable. Consolidation of waste into a central facility that is well marked and obviously incongruent to the surrounding environment will help deter inadvertent subsurface intrusion. The physical act of disinterring the waste material is technically feasible even by today's standards and, hopefully, will only improve. The primary obstacle to a more suitable option than land disposal is the development of a practical treatment alternative for the type of waste projected. An above ground storage/disposal facility does not appear practical considering safety, technology, and cost implications. The disinterment process would not be significantly different for an above or below ground facility.

Comment 8. A member of the general public commented: "Well, I've been out there a long time and she's talked about a place to bury stuff. At East and West there's two big tunnels, concrete cover on them, you could bury a lot of stuff. Cover taken off and they got about 4 ft of soil on top of them. Up at Gable Mountain, the Indians had Gable Mountain filled back in again, and up there we have

holes 400 ft deep and one hole 1,000 ft deep and equipment to drop the capsules in there and release them. I know it would take a lot of years, I don't know of any reason why that can't be used to take and put dry waste, a lot of dry waste down there. They were down 400 feet and that was a big hole. So there's another place a lot of stuff could be put."

Response: Proposals have been made with regard to using various onsite facilities for disposal of waste; thus far, no place has had the necessary capacity (even when combined) to accommodate the waste volume expected.

Comment 9. A Hanford Watch Representative commented: "We support wholeheartedly Oregon Department of Energy Representative Dirk Dunning's comments tonight that we see that there is a crucial need for the ERDF landfill, but we feel that Dirk has hit upon some really important elements that this hasn't been done in the most efficient and most conscientious manner and that we would like this whole thing relooked at in an as expedient way as possible. Our group is interested in the wastes at Hanford having a home there. We are really supportive of not having other wastes brought into that landfill. We're going to have enough of those issues to face in this nation with the spent fuel and other things like that. I also would like to say that we support wholeheartedly that in the redeciding or redesigning or relooking at ERDF we too support the trustees must be made a part of the decision in the planning and construction of this. That is paramount otherwise the trust continues to erode between us and the Department of Energy and the agencies involved."

Response: The Tri-Parties will not consider resiting of ERDF. We feel that resiting will have unacceptable delays and would pose an unacceptable threat to the environment. The ERDF would dispose of wastes generated from cleanup on the Hanford Site. The Tri-Parties will coordinate mitigation actions with the trustees.

Comment 10. A Hanford Watch Representative commented: "If we say yes, we want this landfill, the one with the double-lined trench and the cap, is there going to be money for it or is this once again been a pipe dream?"

Response: Current funding levels support the construction of the double-lined landfill.

Comment 11. The Oregon Department of Energy commented: "In touring the site on Monday, one of the things that was impressive about the old growth sage and the road that had been cut through was the very large piles of tumbleweed that had built up along it even though there's been no traffic on that road yet. And one of the concerns I have is particularly associated with ERDF, since it's a larger perimeter area that's going to be involved is it poses a fairly large jeopardy for fire to this very pristine habitat. And I think that's something both for ERDF and for the road and any other areas bordering those facilities needs to be very carefully considered and preventive measures be put in place to ensure that doesn't happen."

Response: The Hanford Site has a tumbleweed control program to remove and dispose of tumbleweeds that accumulate along fencelines and other barriers. The facility operator will be responsible for fire prevention activities within the fenced portion of the ERDF site. Additionally, water service for fire control is being extended to the ERDF site as a precautionary measure.

Comment 12. A member of the general public commented: "I want to address the issue of limiting this to Hanford waste only. I think that the whole thing that is happening at Hanford has to be looked at as a whole, not just in some little narrow areas here and there. Because what's happening there is

like some person digging a ditch in one side and they're shoveling the dirt out while at the same time somebody's behind them shoveling dirt right back into it again. So it never really gets anywhere because this program you're talking about here tonight is not operating in a vacuum or hermetically sealed box where it's just happening all by itself separately. I don't really see how you can keep talking about environmental restoration without addressing the continued additions of great volumes of various radioactive materials such as the Trojan Power Plant remains, medical science waste and foreign wastes, etc., that will be coming in the future. In reality when you think about it, what is going to happen in the future? Hanford is the only place to put a lot of this stuff. You either have to leave it where it is or put it some place and where else is stuff going to go, radioactive stuff. There's just no where else basically because either the other areas don't want it or don't have any ability to take care of it except Hanford. I really think that you need to plan for this and not just figure it out as it comes up. Each episode at a time."

Response: The purpose of the ERDF project is to make available a disposal facility to accept cleanup wastes from the Hanford Site. Other programs within the DOE are exploring disposal alternatives for other radioactive wastes.

B. ALTERNATIVES

Comment 1. One member of the general public commented that alternative plan 4 should be adopted at the ERDF site at Hanford.

Response: Thank you for the comment.

Comment 2. One member of the general public commented that they agree that the ERDF should be constructed, and that the proposed alternative, use of a double RCRA liner, is the best choice.

Response: Thank you for the comment.

C. REGULATORY PROCESS

Comment 1. A member of the general public commented that they strongly agree that only the requirement of CERCLA should be used for this project. By not trying to apply RCRA or the State Environmental Policy Act (SEPA), resources can be spent on facility construction (versus) paperwork.

Response: Thank you for the comment.

D. SITING OF THE ERDF

Comment 1. A member of the general public commented that they agree with the proposed size and location of the ERDF.

Response: Thank you for the comment.

Comment 2. The Confederated Tribes of the Umatilla Indian Reservation (CTUIR) commented that the siting of the ERDF was a decision that DOE made internally, without consulting with affected Indian tribes or natural resource trustees, and without public involvement. This was simply improper.

Virtually all ERDF impact decisions derive from the choice of site. DOE has made the most important decision behind closed doors and then allows everybody else to argue about how it will be implemented. This is a sham of tribal consultation or public involvement.

DOE has no excuse for excluding tribes, trustees and the public from the siting decision. If the RI/FS were an EIS, it would have to include alternative sites.

We agree that for practical reasons it is pointless for DOE to try to go back and undo the harm this time. They have forced the tribes, trustees, and public into the position that if we protest this violation of our rights, we force delay in the remediation of the Columbia River area. That result is even more intolerable than being barred from the ERDF siting decision. Nevertheless, DOE should not conclude that it is acceptable practice to play these sorts of political games with consulting governments. DOE failed to perform proper process and to consult with the CTUIR regarding siting. We ask that DOE admit as much in its response to comments.

We also ask that DOE commit in writing to work closely with the CTUIR and other tribes and trustees to plan the location and impact of future projects in the Central Plateau before making effectively irreversible decisions. This need is particularly critical in the 200 Areas, where siting decisions about a variety of facilities are essentially being made in an uncoordinated manner within DOE, and without consultation with tribes and other trustees.

We urge DOE to begin, with the full participation of tribes and trustees, a comprehensive planning process for the location of future DOE facilities at Hanford. These decisions directly affect the CTUIR's treaty rights and the potential liability of DOE to the natural resource trustees. As the ERDF and the 240 Road Access Extension decisions demonstrate, DOE is currently making these decisions with essentially no consideration of the impacts of these decisions to natural resources or treaty rights. This is an unacceptable practice, and should be reformed immediately.

Response: It seemed most effective to rely on the ERDF siting evaluation report to describe siting alternatives rather than reproducing the document in the RI/FS, which is already rather voluminous. Based on comments received from the public during the scoping process, the proposed site was down-sized from 6 mi^2 to 1.6 mi^2 and moved north into an area that the State of Washington had leased from DOE for industrial and waste management purposes. In this way the ERDF is entirely encompassed within the waste management area identified by the Hanford Future Sites Uses Working Group (HFSUWG).

It is true that when the initial siting evaluation was performed, the Indian tribes were not directly consulted. However, site selection was considered and commented on during scoping. Based on scoping, another site was considered. An evaluation for this site was completed but the site was not chosen.

DOE recognizes that the tribes and natural resource trustees have a role to play in future siting decisions. There are efforts underway to open the Hanford site evaluation process to include affected Indian tribes and other interested parties. To that end, DOE is developing a comprehensive land and facility policy that provides a basis for ecosystem-based land-use plan accomplished with tribal and trustee involvement. The end goal of land management policies at Hanford is to avoid impacts to natural resources and to evaluate mitigation options for those impacts that are unavoidable.

Comment 3. CTUIR commented that under typical National Environmental Policy Act analysis, the scope of alternatives is based upon the purpose and need for the proposed action. In the case of ERDF, the purpose and need statement is found at section 1.2 of the RI/FS and is reprinted in the NEPA Roadmap. The purpose of the ERDF is "to support the . . . removal of contaminants from portions of the Hanford Site in a timely manner . . . ." The need is "to support the disposition of contaminants during restoration activities on the Hanford Site." This is a well-drafted purpose and need statement, reflecting the true priorities for the ERDF. Nothing in this purpose and need statement, however, places any practical limit on the location of the ERDF site. This purpose and this need cannot be used as a basis for limiting the proposed action and alternatives to only one site.

Response: It is true that the purpose and need statement does not limit the location of the facility (other than an implicit assumption that it not be located near the Columbia River). The criteria to be most protective of human health and the environment and to keep the facility on the central plateau within the squared-off boundaries of the 200 Areas significantly limits siting options. The Tri-Parties believe that the site chosen is most favorable for long-term protectiveness, consolidating waste management activities, and to support environmental remediation activities.

Comment 4. CTUIR commented: We also could find no analysis in the RI/FS that identifies why the rail spur is being constructed where it is. The map at 9F-1 (in the RI/FS) indicates that there are much shorter routes that might well avoid destroying as many natural resources as the proposed route does. Why is not the rail line going to be attached to one of the nearby spurs in the 200 West Area?

Response: It should be noted that the project has been modified to exclude construction of the rail at this time. Instead, waste will be delivered to the facility in tractor-trailers over the Hanford road system. The rail spur was not attached to one of the nearby spurs in the 200 West Area because:

- **The alignment of the rail through 200 West Area would adversely affect existing area operations, would require rail crossings at Beloit Avenue, 23rd Street, and 27th Street, which would create unacceptable train-vehicle safety hazards.**

- **Much of the acreage located inside the 200 West Area would be fragmented by the rail line and unavailable for waste management activities (thus requiring location elsewhere on the Hanford Site).**

Any future rail proposal would require a NEPA analysis and decision.

Comment 5. CTUIR, Oregon Department of Energy, and U.S. Department of Interior - U.S. Fish and Wildlife commented that the ERDF facility is proposed to be sited in the middle of the last of the high-quality shrub-steppe habitat at Hanford. This habitat is home to at least 11 species of special concern. Washington State identified this habitat of particular importance for preservation.

We were not formally notified and consulted in their Trustee roles for the planned activities as required by the Comprehensive Environmental Response, Compensation and Liability Act. When we learned of the Tri-Parties' plans, we requested the Tri-Parties present their plans to and consult with us. The presentation by the Tri-Parties raised even more serious questions about the siting process.

When we suggested it might be necessary for the Tri-Parties to reopen the siting process, the Tri-Parties responded that reopening the siting process would delay opening of ERDF and cleanup of the 100 Areas by 2 years, and could possibly jeopardize funding of Hanford cleanup by Congress.

This placed us in a completely unacceptable position. If we actively object to and oppose the siting process, we will be blamed for delaying and jeopardizing the whole cleanup. If we do not object, by omission we allow the destruction of a large area of rare habitat needed by the Loggerhead Shrike, the Sage Sparrow, the Whiptail Snake, and eight other species of concern.

In our role as Natural Resource Trustees, we cannot endorse the Tri-Parties plans. At the same time, we cannot reasonably oppose the ERDF facility without placing other habitat and human health in further jeopardy.

It is absolutely vital that the U.S. Department of Energy, Washington State Department of Ecology, and the U.S. Environmental Protection Agency not allow a repeat of this error. The Trustees must be made an active part of all planning that could result in impacts to the ecosystems and species at Hanford.

Response: The siting process has obviously been less than satisfactory to the concerned parties. The Tri-Parties have, however, attempted to incorporate into the siting decision the multitude of values expressed over the course of the environmental restoration process. The Tri-Parties recognize that the natural resource trustees are concerned about siting decisions that have major land use implications. To that end, DOE is developing a plan to involve all Natural Resource Trustees and affected Tribes in siting decisions.

Comment 6. CTUIR, Oregon Department of Energy, and U.S. Department of Interior - U.S. Fish and Wildlife commented that the process used to site the ERDF is unacceptable. The following are several specific areas where the RI/FS and the Siting Evaluation Report (SER) for the Environmental Restoration Disposal Facility fall short.

The SER is based on an early design assumption of a 6-mi^2 site. Only areas with a contiguous 6 mi^2 were evaluated in the SER. The ERDF as currently proposed will occupy an area of up to 1.6 mi^2. The dramatic de-sizing of the facility has not resulted in a re-evaluation of potential sites. This issue is only superficially addressed in the RI/FS's Fig. 1-3. The figure is limited to the Hanford Future Site Uses Working Group (HFSUWG) "exclusive" zone and assumes large tracts of land are unusable. The figure has no accompanying explanation or references.

The SER does not allow for consideration of areas placed in reserve for other purposes. The Tank Waste Remediation System (TWRS) plans place off-limits three large areas. Only one of these will be needed for TWRS. The siting of facilities must be coordinated, but should not be limited in this way.

The northwest corner of the 200 West Area was not considered because it was placed in reserve for a potential National low-level and mixed waste repository. This is completely unacceptable. Hanford uses must be given first priority over uses from offsite. It is particularly unacceptable that ERDF be sited in an area of such important habitat when another similar disposal facility is reserving space in an area of lower habitat value which is entirely within the fence line of the 200 West area.

The HFSUWG placed a high priority on limiting waste management activities to within the fence line of the 200 Areas, and only expanding into the area between the 200 Areas if there was not enough

room inside the fence line. In the opinion of the Trustees, siting of a national repository on the Hanford site should not be considered until siting for all Hanford needs is done.

The SER uses as one of its central assumptions the HFSUWG recommendation to "Use the Central Plateau wisely for waste management." However, the SER does not address another recommendation of the HFSUWG, to "Do no harm during cleanup or with new development." Included in that finding is a statement that "habitat should be protected as cleanup and future development proceeds."

Response: As is evident from the comments, the issue of siting is complex and controversial. The siting evaluation was re-visited when the facility land requirements were down-sized from 6 mi^2 to 1.6 mi^2. It was determined that unless down-sizing was far more significant (less than 1 mi^2), there was only one additional site readily available on the Central Plateau within the area defined by the Hanford Future Sites Uses Working Group for waste management. A siting evaluation was performed for this additional site (the BC Control Area). This additional site was not chosen because of its current contaminated condition and other difficulties.

In considering future land use requirements of projects such as the new tank farms, it is DOE's position that it would be irresponsible not to consider the acreage requirements of these proposed projects. The siting process considered the desires expressed by numerous parties to expedite Hanford cleanup in a safe and cost effective manner.

Comment 7. Columbia River United commented: The other question came up that in the selection of the site, there were four proposed areas, and the one in between 200 West and 200 East Areas was chosen. But after doing some investigation, we found that the northwest corner of the 200 Area was basically not even being considered. And we wondered why. We found that there's a possible proposed national low-level mixed waste disposal facility that's going in there potentially. It's proposed, and I don't know if this is something that's outdated.

Response: The 200 West Area was considered both early and late in the siting process and was eliminated as a candidate site for reasons other than those stated in the comment. The overriding consideration has centered around the ability to expand the facility as needed. The volumes of waste are very imprecisely estimated because they rely on knowledge that is not currently available, for example: the extent of contamination of the numerous waste units; the final land-use designation which will determine the extent of removal actions needed; the practical application of waste reduction technologies. All these factors contribute to the ultimate size of the ERDF and make it imperative that the site chosen be cost effective and avoid having to re-site and move the facility at each expansion.

Comment 8. The U.S. Department of the Interior commented that: Habitat was only summarily considered in the SER's Site Selection section. The SER lays out seven criteria derived from USDOE orders. Habitat is discussed briefly in the Site Acceptability and Potential Consequences section, and the currently proposed site is found to be the least desirable. Within the site evaluation, sites are only qualitatively compared. No attempt is made to rank or weigh the seven criteria. While habitat quality varies greatly between the sites, other criteria such as Topography and Geology do not significantly differ. In future site evaluations, habitat quality should be carefully considered, and the criteria should be addressed in proportion to their potential significance.

Response: In earlier revisions of the Siting Evaluation Report the ranking criteria were weighted. Comments from internal and external reviewers took exception to weighting and felt it was not justified, and the evaluation was subsequently redone.

At three of the four candidate sites, habitat quality does not differ significantly, particularly since the ERDF has been moved as far north as possible to avoid native habitat. On the other candidate site with less valuable habitat, topographic as well as geologic considerations (e.g., depth to groundwater, general stratigraphy) contributed significantly to a lower preference for that site. Topography, geology, and geohydrology are most favorable at the preferred ERDF site. For the future, DOE is developing an ecosystem-based land-use plan.

Comment 9. The Yakama Nation ERWM Program recognizes the reevaluation which has reduced the proposed site from the original 6 mi^2 to the current 1.6 mi^2.

Response: Thank you for the comment.

Comment 10. The Yakama Indian Nation commented: In addition to human and health and safety issues, we're disturbed that there appears to be a limited commitment to the mandate to not cause additional disturbance during remediation activities. The ERDF represents a nearly 2-mi^2 disturbance to the environment. If the area currently targeted for the ERDF is covered with old growth sagebrush, this is a unique shrub-steppe community that is quite sensitive to perturbation. Old growth sage represents the habitat for a number of both mammalian and avian species. We feel that natural resources are at risk if the Hanford mission has indeed shifted to environmental considerations then activities should not pose a greater risk to sensitive resource areas.

Response: The proposed ERDF site is composed of a mix of habitat types, ranging from mature shrub-steppe habitat at the eastern end, to previously disturbed areas, such as the REDOX lay-down yard, at the western end. DOE intends to limit disturbance during environmental remediation as much as possible, but we must expect difficult trade-offs between competing priorities in the future. Because of the long-lived nature of the radiological contaminants, DOE must take a long-term view of the situation when weighing the positive and negative aspects. There will be disturbance of existing habitat at the ERDF site. However, DOE intends to minimize that disturbance to the extent possible, and to mitigate for those losses that cannot be avoided.

E. MITIGATION

Comment 1. The Lower Columbia Basin Audubon Society representative commented: We're very concerned that the restoration and mitigation is not going to happen. We've got the north slope as our example of how it's done. I don't want to just stand here and criticize the Department of Energy, the Corps of Engineers. What we want is the north slope to be restored and we want the ERDF area to be, the minimal amount of habitat to be disturbed. Keep it at the very minimum and then after the job is done, get in there and restore it. Now you just told us that we're only going to be disturbing 165 acres over the next 5 years. I think right now, we need to start mitigating for the entire 1.6 mi^2 so that these species have a place to migrate to. I don't think it's of any value to go in there and just rip up all this habitat and then a couple of years later go over a mile and try to start reestablishing. It takes time for these native grasses and shrub steppe, sagebrush to mature. So we need to get in and do it as early as possible. We're off to a bad start. I hope we can turn that around. Thank you.

Comment 2. CTUIR commented: We simply wish to emphasize that, for decisions to be made in a cooperative and trusting environment, DOE must be willing to disclose information, consult fully, and make real commitments -- even, sometimes, commitments that go beyond the bare minimum that the

law requires. Is DOE willing to make such commitments? In the case of mitigation for impacts from the construction of ERDF, DOE has made no commitments, only promises to examine the issue further. The CTUIR can put little faith in such nice-sounding but non-binding words.

As steward of Hanford's natural resources, as the agency that manages the CTUIR's trust resources at Hanford, and as a natural resource trustee for Hanford, DOE has a duty to manage Hanford's natural resources wisely and to conserve those resources. If DOE is going to irreversibly commit natural resources at Hanford, it should also commit to fully mitigate those impacts. That commitment should be made in concrete terms by which DOE's performance of its commitment can be measured. That commitment should also be made in good faith consultation with the tribes and the other natural resource trustees. We request that DOE, in compliance with its own NEPA mitigation policy, begin discussion with the tribes and other trustees of concrete mitigation plans for impacts associated with the ERDF project. We further urge that DOE commit to fully mitigate for ERDF impacts, and that the goal of these discussions be concrete, measurable, enforceable commitments by DOE that are designed to fully mitigate these impacts.

Response: DOE commits to minimizing habitat loss to the extent possible. This project was downsized in part to minimize habitat disturbance. We recognize that the shrub-steppe vegetation community plays an increasingly important role within the Columbia Basin, because this habitat is rapidly shrinking elsewhere in the region. In addition to minimization, DOE intends to evaluate mitigation options for the loss of habitat on the ERDF site, in coordination with the Natural Resource Trustees.

Comment 3. The Trustees commented that mitigation for impacts to natural resources is required under several statutes. ERDF is part of a series of CERCLA hazardous substance response actions, and as such, restoration of natural resources injured by the construction and operation of ERDF is required under CERCLA Natural Resource Damage Assessment (NRDA) provisions. NEPA requires agencies preparing EISs to address appropriate mitigation measures (40 CFR 1502.14f, 1502.16h, 1505.2d, and 1508.25b). USDOE regulations also require a mitigation plan to be developed (10 CFR part 1021.331). Finally, USDOE, as a federal land manager, has stewardship responsibilities for natural resources.

Mitigation under both CERCLA and NEPA includes, in order of preference:

a) Avoiding the impact altogether by not taking a certain action or parts of an action

b) Minimizing impacts by limiting the degree of magnitude of the action and its implementations

c) Rectifying the impact by repairing, rehabilitating, or restoring the affected natural resources

d) Reducing or eliminating the impact over time by preservation and maintenance operations during the life of action

e) Compensating for the impact by replacing or providing substitute resources.

The ERDF siting process did not consider impacts to habitat, and those impacts were not avoided or minimized. Compensatory mitigation for habitat destruction must be provided.

The RI/FS identifies development of a mitigation evaluation (page 9-31) but contains no commitment to actually perform mitigation for habitat destroyed by the proposed project. USDOE must fully

commit to mitigating for habitat destruction in both the RI/FS and in the Record of Decision (ROD) to ensure funding will be appropriate and guaranteed for implementation of the mitigation actions. The NRTC also recommends preparation and submission of a mitigation evaluation and implementation plan be identified as an enforceable interim Tri-Party Agreement (TPA) milestone.

The RI/FS identifies habitat removal as an irreversible and irretrievable commitment of resources. The Natural Resource Trustee Council (NRTC) strongly recommends that any onsite natural resources that are identified as irreversible and irretrievable commitments should be fully mitigated for. The habitat impacts associated with the McGee Ranch "borrow" site are not well documented in the RI/FS. Because a "borrow" site for basalt has not yet been identified, these habitat impacts cannot be documented. This lack of information will be an impediment to creating an adequate mitigation evaluation.

The mitigation evaluation should be developed concurrently with this environmental planning process and comprise an integral part of it. The benefits of mitigation planning early in the planning process include a more efficient and cost effective cleanup. The NRTC is concerned that delaying development of the mitigation evaluation until after the ROD is signed may result in an ineffective plan which is not supported by adequate funding, staffing or support.

The ERDF RI/FS mentions the Hanford sitewide mitigation plan, but does not clarify whether mitigation for natural resources impacts will occur as part of the sitewide plan or as a project specific plan. The sitewide mitigation plan is in an early draft stage. The NRTC supports the sitewide mitigation plan as the most effective method to protect, preserve, and enhance habitat and other natural resource values, and supports ensuring ERDF mitigation measures are consistent with the sitewide plan. However, if the sitewide plan does not go forward, the ERDF mitigation plan must compensate for natural resource impacts as an independent plan.

If USDOE chooses to address ERDF mitigation under the sitewide plan before the sitewide plan has received official sanction, a legally binding commitment between USDOE and the Trustees will be required prior to issuance of the ROD to ensure ERDF mitigation. Even though a sitewide mitigation plan for the Hanford site is being developed, this does not remove the need to conduct site-specific analysis to determine mitigation needs and requirements for individual projects. The October 26 draft of the plan states that it is not intended to provide specifications and procedures on conducting habitat improvements or protection for specific projects.

Mitigation for adversely impacted resources must be based not only on the amount of habitat lost, but also on habitat quality and value. For example, linear disturbances such as the proposed rail line will fragment blocks of habitat. Figure 9-1 shows that two substantial blocks of habitat will be fragmented by the rail line: between the north border of the proposed ERDF site and route 3, and between the north border of the 200 West Area and route 11A. Linear fragmentation of shrub-steppe habitat allows the spread of noxious weeds into relatively pristine or intact habitats. Other more subtle impacts may also occur.

Similarly, the value of McGee Ranch as a habitat corridor between Hanford and the Yakima Training Center, two large areas of relatively undisturbed shrub-steppe habitat, must be assessed and mitigated for. As the borrow site for basalt barrier material has not yet been identified, it is not clear what additional habitat values may need to be considered.

Mitigation for habitat loss requires long-term planning. The NRTC makes the following recommendations:

1. Native seeds and nursery stock are very limited. There will be competition for available stocks from other Hanford and non-Hanford projects. To make this volume of material available in a timely manner, planning and propagation should start as soon as possible.

2. USDOE should begin immediately to develop the needed nurseries and seed stocks to allow this habitat restoration/improvement to occur as soon as possible. We suggest USDOE develop a long-term contract for the construction and management of a native species nursery to provide revegetation material on a sitewide basis.

3. Ensuring revegetation success is crucial to the successful mitigation of habitat values. Monitoring of the mitigation site for a minimum of 10 years is recommended, and funding should be identified to support this effort.

Response: DOE is committed to the preparation and implementation of a Mitigation Action Plan for mitigation of the ERDF. The development of this plan will be coordinated with the Hanford Natural Resource Trustee Council. Although DOE agrees that concrete habitat mitigation commitments are necessary, it will be difficult to commit to specific mitigation measures at this time, because the technical needs and criteria of the surface cover are not yet identified, and because the final size of the ERDF landfill will depend entirely on the decisions made at the source operable units in the future. Because of these uncertainties, the Mitigation Action Plan will probably be periodically revised and supplemented, as additional engineering and biological data become available.

Comment 4. The Oregon Department of Energy commented: In particular, a number of things in the ERDF gave us a lot of concern. One of them has to do with the point that has already been mentioned a little bit about the NRDA provisions under the Superfund law. There are provisions within that are going to be problematic in the future because the costs associated with this facility are not just the costs of today. There are also the costs associated with the damage done to the habitat where this facility is going to be placed.

Response: Thank you for the comment.

Comment 5. The Coho Coalition commented: I would like to comment on restoring the area for environmental beautification. A lot of this is a waste of time. This area is never going to be considered an area where people can come and where it is going to be clean. This area is being cleaned up for treatment and storage of wastes. The money that we spend to try and clean something up, to beautify it for the public, is a waste.

Response: It is accurate to note that the area cannot be restored to the exact condition it was in before it was used for nuclear fuel production and fabrication. However, great strides can be made to restore and enhance the area for general use by future generations.

F. WASTE ACCEPTANCE CRITERIA FOR THE ERDF

Comment 1. Columbia River United commented that the waste selection criteria must be designed to limit the total amount of waste. Emphasis must be put on waste reduction/compaction and recycling. The goal must be to limit the overall size of ERDF.

Columbia River United also questioned "Is cleanup going to be digging up the whole site, just take a backhoe, dig it up, put it in a truck and dump it in the ground and put a big mound out there, who knows how big and how long and how high, and that's cleanup? or is cleanup really going to be finding the best available technologies, reducing the actual waste that we're burying and do the best available job with the best minds out there... So in the waste criteria selection we want to make sure that they utilize the best available technologies to limit the amount of waste they have and also to recycle or reuse anything that can be used out there and we have to be involved with that process to make sure that they do it."

Response: New and innovative technology identification is a key element to the remediation selection process. Treatability studies are being carried out to explore waste minimization possibilities. These technologies will be evaluated, if applicable, in the Focused Feasibility Studies for each operable unit cleanup. Remedy selection will be made in the Record of Decision for the individual operable unit cleanups. ERDF will accept the waste if it is identified in these RODs for disposal at ERDF.

Comment 2. The Trustees commented that the radioactive and hazardous wastes from the 100 Area cleanup will continue to pose a threat to people and the ecosystem for so long as they remain dangerous. Many of the radioactive materials released in the 100 Areas have extremely long half-lives. Many of the hazardous materials are extremely persistent.

Closure of ERDF must protect the Tribal Treaty rights of the Confederated Tribes and Bands of the Yakama Indian Nation, the Confederated Tribes of the Umatilla Indian Reservation and the Nez Perce Tribe.

Response: ERDF will be closed with, at a minimum, a RCRA-compliant cover. This cover is protective of human health and the environment and will allow limited uses of the site following closure.

Comment 3. A member of the general public commented that "Mixed waste generated in the state of Washington should be allowed to be buried in this landfill. There currently is no other way to dispose of this waste, and the quantity (volume) from onsite and offsite generators would be orders of magnitude smaller than that generated during Hanford cleanup activities. It would not be cost effective to build another pit in the state to dispose of these wastes. A new pit would probably be located on the reservation anyway, adding millions of dollars of new permitting and administrative costs. These mixed wastes, just like the Hanford wastes, would have to meet RCRA requirements, such as treatment standards."

Response: Under the current regulatory framework, the use of the ERDF would be limited to wastes generated from cleanup under CERCLA on the Hanford Facility. Public comments to date have expressed a strong desire that ERDF be limited to accept only wastes generated from Hanford cleanup efforts.

Comment 4. Columbia River United commented that "The regulators need to tell the public what they propose to do with the soil that does not meet the current Curie [radioactive] content of ERDF. CRU feels that this is one factor that has not been discussed and is a critical part of the entire site remediation. Are the regulators proposing to build another site that will store this HOT soil until further remediation can be done?" —

Response: High-level wastes, transuranic wastes, and wastes exceeding the Class C (Greater Than Class C, or GTCC) limit as defined in 10 CFR 61.55 will not be disposed of in the ERDF, as they are not acceptable for near-surface disposal. If encountered, these wastes would be treated and/or stored until such time that an appropriate disposal facility becomes available. There is likely to be little or no soils that exceed an activity level that would necessitate disposal elsewhere. Low level wastes classified as Class A or Class C, using criteria defined in 10 CFR 61.55, are acceptable for disposal in the ERDF.

Comment 5. Columbia River United commented: "For the environmental restoration disposal facility, as I stated earlier, the public must be involved in the waste criteria selection set for this site. We hope this will limit the size and materials buried in this landfill and assure waste reduction, and we want to make sure all possible available technologies assured the lowest amount of waste and that recycling of any items out there that we can use for something else be looked at and actually be done."

Comment 6. Heart of America Northwest commented: We want to ensure that strict acceptance criteria are in place. We also want to have some public input into that process. We feel it is important enough for the public to be able to work with you on that and give you input on it.

Response: Waste acceptance criteria are fundamentally dictated by state and federal regulations as well as DOE Orders. The regulations limit ERDF waste acceptability primarily in the areas of chemical concentration, radioactivity level, treatment standards, and waste form. The generation of the waste at remediation sites must be where the decisions concerning waste reduction, innovative technologies, recycling, etc., are made. Public input into those decisions will be sought during public involvement periods for the operable units.

Comment 7. Heart of America Northwest commented: "I know that there is also a possibility that there will be a Resource Conservation and Recovery Act permit applied for by this facility, which may not be limited to only Hanford waste at some future date. I just want to put on record that we are very concerned about offsite waste. I am also concerned about what I have understood is the potential for proposal for a new disposal facility for offsite waste in the north corner of the 200 West Area. That is a serious concern, especially since stakeholders have said repeatedly that they do not want offsite waste. I realize it is DOE's plan to start playing a shell game with DOE's waste from INEL and Rocky Flats, etc. But we don't accept the premise that just because we are large we should take all of their stuff."

Response: Under the current regulatory framework, the use of the ERDF would be limited to wastes that are generated from cleanup under CERCLA on the Hanford Facility. There are currently no plans to permit the facility under RCRA.

Comment 8. A member of the general public commented: "I want to say that I am glad that you have made a commitment not to accept waste from outside of the Hanford Site; everybody agrees that would be a bad idea. Obviously you have to make some commitments to that in writing that you are going to stick to."

Response: Thank you for the comment.

Comment 9. Heart of America Northwest on ERDF. We are concerned that the waste acceptance criteria very explicitly include Washington Sate's management priorities as treatment standards. Washington state has in its law a set of waste management priorities that say you don't landfill unless

you can treat and have attempted to treat, and this is very important that we insist that these be followed. Now, a second concern that rises from that is the fact that you said in the presentation either Norm or Pam that ERDF would follow Washington State laws, but and that you would not accept any extremely hazardous wastes which is a Washington State term for a certain level of toxicity. And you wouldn't accept transuranic waste, etc. I am concerned that apparently there is an effort to place a low-level waste dump at Hanford or expand the current site to include both Hanford and non-Hanford low-level wastes. What is very disturbing to us is that the Westinghouse Hanford Company has been using our tax dollars to lobby for an end to the regulation that creates the extremely hazardous waste category in Washington State law. They have been lobbying to lower to 10% of the current standard what is a dangerous waste. That would mean that 90% of the wastes that are now expected to be dug up to go into ERDF because of their toxicity levels would suddenly be reclassified as low-level wastes only and they'd be free to go from a RCRA-compliant double-lined trench. We are glad that you are choosing that option and now they'd be going instead to simple "random" disposal in unlined trenches with no leachate collection system, no monitoring requirements, and no regulator oversight by Ecology or EPA. And we are very concerned about that and we would like a response on the record as to why Westinghouse Hanford Company has been allowed to lobby for those two changes on our federal tax dollar, which we understand is illegal. Secondly, we would like responses to what the impacts would be of eliminating EHW as a category and lower the toxicity level to 10% of what it is currently is for dangerous waste in terms of protection of human health and the environment as we cleanup Hanford and dig up soils that we need to dig up and remove."

Response: The ERDF will be a landfill that is regulated by the CERCLA, and as such, it is subject to applicable or relevant and appropriate requirements (ARARs). The Resource Conservation and Recovery Act (RCRA) and Washington State's Dangerous Waste Regulations (WAC 173-303) will be the primary regulations under which the ERDF will be operated. WAC 173-303 contains the management priorities to which you allude. The applicability of these standards will be evaluated and determined in the feasibility studies, proposed plans and RODs for the OUs.

The Low-level Burial Grounds (LLBG) on the Hanford Site is a RCRA landfill that has interim status. The LLBG dispose of low-level waste from other DOE sites and defueled submarine reactor compartments. As a CERCLA landfill, the ERDF cannot accept waste from outside the Hanford Facility. The Hanford Facility is defined in the Hanford Facility RCRA Permit.

The assertion that "...90% of the wastes that are now expected to be dug up to go into ERDF because of their toxicity levels would suddenly be reclassified as low level wastes only..." appears to assume that 100% of the wastes to be generated by ER remedial actions would be otherwise classified as EHW; in fact little of the remedial waste to be generated by remedial actions is anticipated to be EHW. Instead, the majority of the waste is expected to be Category A or Class 1 LLW, which will be excavated, transported, and disposed of in bulk form in the ERDF. Given that little of the remedial waste is anticipated to be classified as EHW, the impact on the ERDF of redefinition of the EHW levels as noted in the comment would be negligible; very little remedial waste would be impacted.

Comment 10. The Yakama Indian Nation commented: "Waste acceptance criteria are being formulated. We would support criteria that meet the nuclear waste policy act 500-year past closure requirements. We're opposed to the long-term reliance on institutional controls for safety and health assurance. Aside from a lower long-term effectiveness, such policy is against the nuclear waste policy act, which calls for unrestricted use of a site after 500 years past closure."

Response: It is assumed that institutional controls (such as, deed restrictions, fences, etc) will prevent intrusion into the waste for at least 100 years and that passive controls (such as, markers, barrier, etc) will prevent intrusion for 500 years. Furthermore, it is assumed that because the waste is covered with at least 4.6 m (15 ft) of cover materials, inadvertent intrusion into the waste due to excavation is minimized. Since none of the evaluated barriers can prevent penetration by a drilling rig, however, it is reasonable to assume that someone might inadvertently drill through the waste sometime after 500 years. The likelihood that someone will drill through the waste is not addressed.

Comment 11. A member of the general public commented: "I also must admit that I am a little bit skeptical when I hear some assurances that all of this business is going to be for Hanford waste only. This particular project might be. But next year when the nuclear waste policy act is opened up, there may be a lot of political pressures that change the whole scene and everyone I think has to be very vigilant and take on all kinds of possibilities that might happen. I think the public is a little bit skeptical when we see so many problems coming from what we had thought was being handled before by smart scientists and planners in the government. We would like to see comprehensive coordinated plan."

Response: Thank you for your comment. DOE at Hanford is integrating the Tank Waste program tasks and the Environmental Restoration Program. Hanford is one of 26 sites that will be further evaluated for a possible mixed waste disposal facility for the disposal of treatment residues. No decisions have been made at this time and public participation will be solicited.

G. FACILITY DESIGN

Comment 1. A Hanford Watch Representative commented: "We still have the question of the mis-definition of low-level and high-level in this country. You say high-level and transuranic waste will not go into this landfill, only low-level waste. Some low-level waste is much more toxic, much more radioactive, and much more long-lived than some of the high-level and transuranic wastes. I have a concern about that because this waste will be in that landfill beyond its operational time, beyond the 30 years. And I know that there are enough life forces going on in this planet right now that there's going to be some leakage, so that's a real concern for me."

Response: The liner and leachate collection system for a landfill trench is only expected to function for the operating life and the postclosure care period. The postclosure monitoring will end when it is demonstrated that no leachate is being generated. The cover placed over the landfill at the time of closure is designed to prevent water from entering the landfill and generating leachate. The long-term prevention of leakage is based upon the cover preventing water from entering the landfill such that there will be no liquid to leak. Long-term ground water monitoring of the closed landfill will be implemented in accordance with RCRA requirements.

Comment 2. One member of the general public commented that "They don't agree that the decision for the type of protective cap needs to be decided before construction or use of the pit begins. It will take several years to build and load some waste into the pit. By then, studies should be complete and the best cap for the pit can be chosen."

Response: The RCRA-compliant cover is currently considered the minimum required to be protective of human health and the environment. Additional options may be evaluated prior to construction of the cover.

Comment 3. Heart of America Northwest commented: "I want to ensure that there is plenty of monitoring around this facility, that there is air monitoring and other monitoring to make sure that nothing goes offsite that you are all now thinking will not go off the site."

Comment 4. A member of the general public commented: "I am concerned about how you are going to do monitoring at the site. I was asking somebody about monitoring and nobody seemed to know about that. Monitoring is obviously been a serious problem (the high-level waste tanks). I think that we need to learn from that example and make this a safe facility."

Columbia River United commented: The only way that you can assure worker and public safety is to monitor with Continuous Air Monitors (CAMs). These monitors must be installed at all remediation sites and ERDF. To do anything less is putting the workers and the public at risk. We must keep in mind that worker safety is a number one priority.

Response: Continuous Air Monitors will be installed and operated as a part of the site's operational safety procedures. Currently existing groundwater monitoring system will document conditions prior to accepting waste at the facility and a RCRA compliant system will continue to monitor groundwater during operation.

A member of the general public had the following written facility design comments:

Comment 5. The clay liner is shown in plans as only 3 ft thick. Clay liners built for regular solid waste (household garbage) landfills are usually 5 ft thick. I think the ERDF liner should be thicker for this massive landfill.

With the clay content of the liner being only 9% with a total thickness of 36 in., this means that if the compacted clay were separated as a pure layer (separated from 91% sand) it would be about 4-1/4 in. thick. The remaining sand would be 31.75 in. thick. This amounts to being a very thin skim coating of a clay layer to contain 70 ft of waste materials, and;

A thicker liner with a higher clay content would provide for more chemisorption capacity. I think that 4-1/4 in. of clay will not have enough chemisorption capacity for 70 ft. of overlaying waste materials should failure of the plastic liners occur. Moreover, I would like to see a clay subliner installed which is adequate to contain through sorption, the fullest capacity (or ability to sorb) as much of the radionuclides and chemical contaminates present in the completed landfill as possible. Because of even the slight chance that the pump and treat leachate collection could terminate in the future of the landfill should be designed to take care of its self in the absence of human caretakers, and itself prevent dispersion of radionuclides and dangerous chemicals into the environment (or biosphere), rather than reliance upon indefinitely being pumped out.

Sodium bentonite is used as a sealing liner for landfills because it swells up greatly in size (or volume) with the absorption of pure water. Sodium bentonite mined from certain deposits will swell up to 20 x (time) the original dry size after saturation with pure water.

Response: The liner system is not intended to provide long-term containment of waste. It is only intended to collect leachate during the period when waste is being emplaced and for the

first few years after closure. After this time, the permanent closure cover will limit infiltration of surface water to the waste. As required by EPA regulations (RCRA Subtitle C), the closure cover will have a permeability less than or equal to that of the liner. Thus, the long-term performance of the ERDF will be controlled by the cover, not the liner system. Likewise, long-term performance of the ERDF does not rely upon ongoing leachate pumping.

The compacted admix layer is 3 ft thick in accordance with EPA RCRA Subtitle C and Washington Department of Ecology requirements for hazardous waste landfills. The ERDF has a double-liner system with a lower composite liner. Based on the analytical work underlying the EPA requirements as well as experience at other hazardous waste landfills, this liner system is expected to contain leachate with a high degree of reliability. It is true that some municipal waste landfills have clay liners that are thicker than 5 ft; these are often located in areas underlain by natural clay deposits. On the other hand, many municipal waste landfills have clay liners thinner than 3 ft, and often do not have two geomembrane liners as does the ERDF. Comparison of ERDF and municipal waste landfills should consider all liner system components.

Comment 6. As shown in plan drawings for the ERDF, the terms "compacted clay liner" are used. However, the completed liner will actually consist of 91% sand and 9% sodium bentonite clay mineral (by wt.). The term clay as used by geologist, mineralogist, and soil scientist is applied to geologic materials composed of at least 51% clay content. Therefore, the term clay cannot be properly applied to describe the liner as shown in plan drawings. The proper term should be sand liner, or sand-clay liner.

Response: The term "compacted admix" is now being used on the ERDF drawings.

Comment 7. Sodium bentonite clay used in the liner may be chemically altered over time with resulting degradation of its sealing performance.

Response: As noted above, long-term performance of the ERDF will be controlled by the cover, not the liner system.

Comment 8. Sodium bentonite is used in all the liners and containment barriers at Hanford. Sodium bentonite is also named Na montmorillonite, Wyoming bentonite, high yield bentonite, and Western bentonite. Sodium bentonite is a member of the smectite group of minerals. The other montmorillonite clay minerals being calcium bentonite (Ca montmorillonite, non-swelling bentonite, southern bentonite, and fullers earth), magnesium montmorillonite (saponite, armargosite), potassium montmorillonite (metabentonite), and lithium montmorillonite (hectorite). The structure of these clay minerals are extremely microscopically small aluminum silicate sheets with sodium, calcium, magnesium, iron, potassium, lithium, and other elements may be present. The particular montmorillonite mineral being named for the element which is dominant over the others as the principal exchangeable cation. The chemical and physical properties are determined by the cations present. The chemical and physical properties have a great variation between group members. The montmorillonites (or bentonites) are the best clays to use for sealing or liner applications because they are the least permeable to water. Also, these clays have a strong property of chemisorption, which is the ability to bond substances to the surface and between the silicate sheets of the clay minerals crystals. The sorption property will attract certain atoms, molecules, and even small particles like a magnet by electrostatic and other atomic forces and coat the clay crystals with a layer called the Stern layer. The sorption property will extract (or filter) certain dangerous chemicals and radionuclides as they very slowly percolate through the sand-clay liner in solution with water. The other clay minerals

kaolinite and illite are much more permeable to water, and have weak to very weak sorption properties.

Response: When performance of the ERDF was analyzed, no credit was taken for permanent adsorption of contaminants by the clays in the admix, only for a slight retardation. Therefore, the geochemical properties of the admix are not relied upon for performance of the ERDF.

Comment 9. The swelling of the clay effectively seals pores in the sand-clay liner, and forms a very tight low permeability material. The sand in the liner is to provide physical stability and densification. The sand-clay mixture will compact easily whereas a purer clay is difficult to compact into a dense layer (or liner). The sand stabilized against extrusion (flow or displacement) from the weight of the overlaying waste and landfill liner cap. If pure clay were used for the liner, it will become plastic due to its rheological properties with the addition of enough water, and could flow or be displaced. A compacted dense sand-clay mixture of less than 10% sodium bentonite will not flow under pressure. Pure sodium bentonite saturated with pure water behaves rheologically as a watery gel, with strong lubricating properties. Also, hydration pressures in montmorillonites may reach 2000 psi., because of these reasons the clay content for sodium bentonite - sand liners cannot exceed 10% or so.

Response: Thank you for the comment.

Comment 10. Sodium bentonite does not swell (or expand) to the same volume in solutions of chemicals such as acids, alkalies, and saline solutions. The swell may be greatly reduced. Sodium bentonite does not swell in organics (such as oil), unless it is specially treated, as organoclay (organic clad clay). Bentonite clays are also subject to ionic exchange. The principal exchangeable cations can be removed and replaced by other cations present in solution, when the clay is placed into the solution.

Response: Thank you for the comment.

Comment 11. I read in Hanford literature regarding a previously completed sodium bentonite liner that it would take "50 years for the waste water to pass through the liner". The liner was constructed (or built) to the same thickness (3 ft.) and permeability ($1 \times 10_{-7}$ cm/sec) specifications as the proposed ERDF landfill. Therefore, the liners are somewhat permeable, albeit slowly.

My point is that should something happen to human caretakers of the ERDF, so that the pump-and-treat leachate collection system would become abandoned, then chemicals in the waste will be passing through the liner. In a long time period the leakage will be significant. The chemicals and alkaline metals in the waste will interact with the sodium bentonite. The chemicals will cause shrinking to occur in the bentonite by reducing its swelling or expansion, and that will cause an increase in permeability. Moreover, the actual clay mineral will likely be altered chemically into another montmorillonite clay mineral by cationic exchange with cations present in solution from the overlaying waste. Sodium cations may be leached by acidic or alkaline solutions and replaced by other metal cations, this too will cause an increase in permeability, because sodium bentonite has the highest swell volume of the montmorillonites, and when altered to another montmorillonite it may be a low or non-swelling type (it may become a none-swelling clay).

Response: The admix for ERDF will contain a nominal 12% bentonite by dry weight. This same mixture was used at a smaller landfill on the Hanford Site and had excellent strength and constructability characteristics. It also had a permeability of 1×10^{-8} cm/sec with pure water, 10

times lower than the RCRA requirement of 1 x 10^{-7} cm/sec. Because of the same concerns raised by the reviewer, this admix was also tested using a synthetic leachate containing the chemical compounds expected at the landfill, which will have a waste stream similar to ERDF. For this testing, the admix was also irradiated to check the effects of radionuclides. Even under these conditions, the permeability of the admix remained under 1 x 10^{-7} cm/sec. The protective cap is relied on for long-term prevention of leachate.

Comment 13. If I may make a suggestion, I would like to see a non-swelling bentonite used in the liner. Non-swelling bentonite such a calcium bentonite, and nontronite (iron aluminum silicate) have chemical and physical properties that may be better in a liner application. The iron content helps bonding of certain radionuclides to the clay crystals. Calcium bentonites from certain deposits also have a high iron content. The impermeability of calcium bentonite will not be adversely affected by acidic and saline solutions as will sodium bentonite. Acidic solutions will remove some of the calcium cations, however, in doing so the edges of the sheet structure will be expanded around the edges and cause a slight swelling to occur. The slight swelling will tighten up the sand-clay mix resulting in decreased permeability. Saline solutions will further disperse any calcium bentonite clay aggregates to smaller particles which will cause a slight swelling, to seal up the liner. Note that this is the opposite effect as compared to sodium bentonite, which becomes more permeable when exposed to the same chemicals. Calcium bentonite or nontronite would have to be added in higher percentages to the sand to achieve the same impermeability (up to 30%). The greater amount of clay would provide for more sorption capacity. Calcium bentonite bonds the sand together more strongly than sodium bentonite in the moist state. Much more calcium bentonite may be added to the sand and still be stable against flow or extrusion. The clay is also less sensitive to the amount of water needed for compaction during the building (construction process).

Calcium bentonite liners (or sorptive barrier technology liners) are used at chemical plants in Texas, Mississippi, Florida, South Carolina, and elsewhere. A hazardous waste landfill in South Carolina uses such a liner and cap, and not only to contain the waste but for backfilling around the waste containers in order to provide a sorptive medium for dangerous chemicals.

Sodium bentonite has been a standard at Hanford for years. I think that the ERDF is moving ahead too fast for construction under the "lets get the cleanup going" attitude. This is one area where more time should be taken to test the liner materials performance over time before completing the main landfill at Hanford, its too big to not have as good as possible.

Response: As part of the liner design for the completed, smaller landfill project at Hanford, a calcium bentonite from a commercial source in the Ephrata, Washington, area was tested. An admixture containing 10% Ephrata bentonite had a permeability of about 5 x 10^{-5} cm/sec, well outside of the minimum requirements. It was decided that even if sufficiently low permeability could be achieved with this material, a very large percentage of bentonite would be required. Due to potential problems with strength, workability, and higher costs resulting from use of a higher percentage of bentonite, the Ephrata bentonite was considered an unattractive alternative. See information noted above.

Comment 14. Finally, if I may, I would like to outline a recent incident regarding plastic pipes in analogy to liners. I saw a report on CBS news about plastic water pipes. The pipe has become brittle due to exposure to chlorine in city water supplies. The pipe was in service for about 15 years, and then the pipes began to crack or split open. Water damage was estimated to be 800 million dollars in homes and buildings all over the U.S. The plastic in the pipes was made by major chemical manufacturers who have been in business for a long time.

Response: Comment noted.

H. DUST MITIGATION

Comment 1. Columbia River United commented that "One of the things that we will have to be shown to agree that the ARARs are being met are that adequate controls are being made to control the spread of contaminated dirt. And the issue of continuous air monitors was mentioned. I believe those will not be CAMs, but will instead be air samplers. CAMs do have an instantaneous response. If you set up air samplers, though, generally those results are not back for a week or so, basically after the fact.

Dust mitigation as we mentioned before is another concern. We hope that the workers aren't out there working in high wind conditions breathing in the dust that's contaminated. We want to make sure that they use the best available technologies for remediation and burial and dust mitigation. The question tonight was about continuous air monitors. Now we know that they're actually proposing not to use continuous air monitors and we're going to request that they do use continuous air monitors at the burial site.

Response: Continuous Air Monitors (CAMs) will be installed to monitor air emissions for worker and public safety. Because of the large area to be cleared and the generally dry and windy climate, DOE recognizes the particular importance of dust control at the ERDF site. Specific dust mitigation options such as water sprays, binders, and uncontaminated operational covers on emplaced wastes will be employed during construction and operation of the ERDF to prevent spread of contamination and to protect worker safety. Please refer to the responses below for more information.

Comment 2. Columbia River United commented that dust mitigation must be done with the best available technology. The Hanford Site is extremely dry and is noted to have very high winds. The Dust Mitigation Study (DSM) has some erroneous assumptions about the threshold velocities for ERDF. The threshold wind speeds of 36 mph for untreated ERDF soil and 42 to 53 mph for treated ERDF soil does not even come close to protecting the workers. It is amazing to find out that when Wal-Mart was under construction, the stop worker order was in place at winds much lower. The DSM gives no recommendation as far as work stoppage in relation to wind speeds. The DSM does not take into consideration all the different contaminated sites across the Hanford complex that will be excavated. There is no mention of how we will protect the workers and public from these excavations. More work needs to be done on a comprehensive Dust Mitigation Strategy to assure worker and public strategy.

Response: There may be some misunderstanding about the report. The report shows (on fig. 5-1) that the threshold velocity for untreated soil varies from 11 mph to 36 mph depending on the soil type and conditions and that the threshold velocity for treated soil varies from 42 mph to 53 mph depending on soil type. Dust emissions can vary greatly depending on the moisture of the soil, particle size, silt content, presence of binding agents, and initial suspension by outside forces other than wind (such as machinery). Consequently, comparisons of observed dust emissions at the Wal Mart construction may not be comparable to some of the cases evaluated in the report. The Wal Mart site was a shallow excavation using heavy equipment that stirred up the eolian deposits of fine sand. The eolian soil at the Wal Mart site is anticipated to be quite different from the coarse gravelly soils that would be more typical of the waste coming to the ERDF. It would be reasonable to expect that the eolian soil of the Wal Mart site would be

associated with dust emissions at relatively low wind speeds (such as the 11 mph from fig. 5-1), whereas coarse, clean gravels would not emit dust even up to 36 mph. Some of the computations shown in the report are for undisturbed conditions (fig. 5-2, Open Area Wind Erosion), while others are for situations where heavy equipment would initially suspend dust particles (fig. 5-4, Particle Emissions from Dumping Operations, and fig. 5-5, Particulate Emissions from Dozer Operations). The threshold values shown for fig. 5-1 and probably for the range indicated by your comment (42 -53 mph) are for undisturbed conditions that are not comparable to the Wal Mart conditions with its heavy equipment operation. Better comparisons to the Wal Mart conditions would be made from fig. 5-4 and fig. 5-5.

Because of the large area to be cleared and the generally dry and windy climate, DOE recognizes the particular importance of dust control at the ERDF site. Specific dust mitigation options such as maintaining moist conditions (sprinkler irrigation), adding binding agents to form larger particles (that are to heavy to be suspended/carried far), and covering the waste as it is placed (with stabilizing chemicals or clean soil) are being evaluated for their usefulness during construction and operation of the ERDF. The ultimate method or combination of methods for controlling dust will consider the range of soils and conditions (undisturbed and heavy equipment operations) that will be present at the facility. Once the methodology of controlling dust is decided upon, then operational safety limits tailored for that specific method will be developed.

Comment 3. Columbia River United commented: We also were looking at it (siting) in the Hanford Advisory Board. We learned from one of the people out there that his preference was the northern site because the northern site didn't have as much light sand and soft silty stuff that would fly around when you start cleaning it up, start digging the hole, and start burying it, and that brought up the question about what are we going to do for dust mitigation. The winds blow from anywhere (between) 5 mph to 50-60 mph out there; what are we going to do for mitigation to protect the workers, protect the people offsite.

Response: Upon completion of excavation and construction of the drainage layers, the facility will be covered with an operational layer of native soils, which will be treated with a soil binder for purposes of dust control. When the facility is operational, wastes will be covered with clean soils as they are emplaced, and dust control measures will be employed to limit generation of airborne dust. For these reasons the nature of soils on the ERDF site are of concern primarily during the construction phase and become less of a concern when the facility is completed and operational. For a more complete discussion of the dust control measures to be employed, please refer to the comment responses above.

I. CONSULTATION WITH THE CTUIR

The CTUIR had the following comments:

Comment 1 The ERDF staff are to be commended for promptly consulting with the CTUIR early in the scoping process for the ERDF. Moreover, the ERDF staff provided us with all drafts of ERDF-related documents at the same time they were sent to the regulators. Despite the CTUIR's committed involvement in Hanford matters, DOE still fails to send us many documents -- particularly documents concerning the 100 Areas -- in anything approaching a timely manner. The ERDF staff have shown that timely consultation with tribes is not some sort of indecipherable mystery. We appreciate their professionalism.

Response: Thank you for the comment.

Comment 2. Nevertheless, we are aware that many natural resource trustees were not consulted in a timely manner. We assume that the ERDF staff's consultation with the CTUIR was based more on DOE's duty to consult with affected Indian tribes (under the federal trust responsibility to tribes) than on the CTUIR's status as a natural resource trustee. Of course, this does not explain the fact that the Nez Perce were not consulted at the same time the CTUIR was. Nevertheless, in the wake of various trustees' (valid) criticism of DOE's failure to involve them in a timely manner, we did not want to lose sight of the fact that the ERDF staff did at least meet with CTUIR staff early in the process and get documents to us at the appropriate time.

Response: Thank you for the comment.

Comment 3. As for consultation over the siting of the ERDF, we agree with the other trustees that we all should have been consulted about alternative sites, and that alternative sites should have been analyzed in the RI/FS.

Response: It seemed most effective to rely on the ERDF siting evaluation report rather than reproducing the document in the RI/FS, which is already rather voluminous. Alternate sites were analyzed in the Siting Evaluation Report (WHC-SD-EN-EV-009, Rev. 2), which is cited in the ERDF RI/FS.

J. INTEGRATION OF NEPA EIS COMPONENTS INTO THE ERDF CERCLA RI/FS

Comment 1. The CTUIR commented that generally speaking, DOE has done a good job of integrating all of the components of an EIS into the ERDF RI/FS. Unfortunately, the *content* of those components is sometimes sorely lacking. We address the key failings of the planning process for ERDF later in this letter. Nevertheless, as far as fulfilling the Tri-Parties' goal of producing an RI/FS that was embellished to include most EIS *components*, DOE has succeeded in doing that.

Response: Thank you. We appreciate your effort to provide supportive as well as critical comments.

Comment 2. The Oregon Department of Energy commented: There were comments within the Remedial Investigation Feasibility Study document, which is the basic work document for this, that indicate that there's Natural Resources being committed and that therefore it's just assumed there will be mitigation, but that mitigation will be included in some sort of a sitewide restoration plan. The way that this entire document came about we definitely feel does not cause it to be equivalent to what's required in the National Environmental Policy Act for the performance of a environmental impact statement. This remedial investigation/feasibility study is not a good substitute, the process is not equivalent, and the damages caused by it are damages that will have to be mitigated and compensated for at some time in the future.

Response: Thank you. We appreciate your effort to provide supportive as well as critical comments. The intent of the regulatory package for the ERDF was to provide an integration of NEPA values within CERCLA documentation. The DOE has committed to the development and implementation of a Mitigation Action Plan, in coordination with the Natural Resource Trustee council.

Comment 3. Heart of America Northwest commented: Let me just say that (NEPA/ CERCLA integration) was something that the State Advisory Council and the Oregon Waste Board and citizen groups encouraged integration of the two. I am not sure that it has worked perfectly. I mean the biggest difficulty is that under NEPA, the number one value is to produce the readable document and I am not sure we met that, quite honestly, in terms of value.

Response: Thank you for the comment. The RI/FS is admittedly technically oriented and voluminous.

Comment 4. Heart of America Northwest commented: NEPA requires that you address the cumulative impacts and the impacts of related actions in the one document for the action you're proposing this landfill. Since the lead agency is the Department of Energy taking the action, which apparently has plans or is considering other actions that are related that would bring similar wastes from all over the country, perhaps the world, to landfills at Hanford including, we've just learned, defense low-level wastes to be brought to the region including wastes under the federal facility compliance act from other nuclear weapons sites. Therefore, whether or not these wastes are off limits to ERDF, you must fully disclose what those wastes are, where they are going, what the cumulative risks and impacts are. This is what would be required under the NEPA. I know that EPA and Ecology may have trouble obtaining this information as it has been closely held. I would suggest that you must force the Department of Energy to fully disclose this information otherwise we cannot meet the promise that everything that would be covered under NEPA would be covered under the ERDF CERCLA documents, and it is imperative that the public see what the Department of Energy is considering to bring into another landfill at Hanford.

Response: The cumulative impacts section of the RI/FS (9.4.10) included a discussion of potential impacts from the Low-Level Burial Grounds, located in 200 East and 200 West Areas. These Burial Grounds accept low-level waste from other DOE sites and defueled submarine reactor compartments. Hanford is one of 26 sites that will be further evaluated for a possible mixed waste disposal facility for the disposal of treatment residues. No decisions have been made at this time and public participation will be solicited.

K. "NEPA ROADMAP"

Comment 1. The CTUIR commented that the NEPA Roadmap is a remarkable document. It contains a generally forthright and comprehensible discussion of the EIS and RI/FS processes, their similarities and differences, and an index for finding EIS components within the RI/FS. DOE has attempted the index idea before, most notably in the RI/FS for the 1100-EM-1 Operable Unit (OU) and the LFI/FFS for the other three 1100 OUs. The NEPA index to these documents was a dismal failure, precisely because those CERCLA documents had not been enhanced to contain NEPA elements. By comparison, the ERDF Roadmap is very well done. DOE deserves credit for this accomplishment.

Response: Thank you. We appreciate your effort to provide supportive as well as critical comments.

L. JUDICIAL REVIEW

The CTUIR had the following comments:

Comment 1. CTUIR staff have some extremely serious concerns, nonetheless, about DOE's (and EPA's) intention to completely discard formal compliance with NEPA on CERCLA projects. As we said, DOE has done a fine job on the ERDF "NEPA Roadmap," and on integrating most NEPA components into the RI/FS. Nevertheless, the ERDF is a high-profile project. As this is the "pilot project" for the concept of subsuming the NEPA process into CERCLA, DOE could be expected to do a good job on the integration of NEPA and CERCLA this time. We are concerned, however, that in future, less high-profile projects, DOE will not integrate EIS components into RI/FSs with as much attention to detail as DOE has shown this time. In the past, when DOE/RL has written run-of-the-mill NEPA documents (such as the EA for the 240 Road Access Extension), the CTUIR has often found them to be poorly crafted and legally inadequate. Considering DOE/RL's general poor track record on NEPA documents, CTUIR staff are concerned that in future projects the standard for the "integrated" NEPA/CERCLA process will be much lower.

Response: DOE intends to substantially comply with NEPA. In other words, DOE will meet all significant requirements of a non-administrative nature. In the future, DOE hopes to continue to produce high quality documents.

Comment 2. Moreover, since DOE has done a generally good job, this time, of integrating NEPA and CERCLA elements in one document, we are left wondering why DOE has parted from its prior policy of producing a single document and calling it an "EIS - RI/FS" (See DOE Order 5400.4 § 7(d).). It appears that the only thing DOE gains from not calling the ERDF planning document an "EIS - RI/FS" is that DOE avoids any threat of judicial review under NEPA. This is an improper motivation for DOE. Judicial review is an extremely valuable process that protects those who would otherwise be improperly ignored. It protects entities with less power and forces discipline upon agencies that might otherwise show contempt for the law or for tribes and the public. Does DOE believe that accountability for its actions is a bad thing? If not, then why is DOE trying to avoid accountability?

Response: In June 1994, the Secretarial Policy for NEPA was issued, which commits the DOE to rely on the CERCLA process for review of actions to be taken under CERCLA. Under this policy, we will continue to incorporate NEPA values such as analysis of cumulative, offsite, ecological, and socioeconomic impacts, to the extent practicable. This is consistent with guidance from the Council on Environmental Quality (CEQ) (40 CFR 1502.25). This policy resulted from negotiations between EPA, CEQ, DOE, the U.S. Department of Justice, and others. The EPA expressed concerns about separate implementation of NEPA for CERCLA actions because of apparent unnecessary duplication of analyses and potential delay of project implementation, such as might be caused by judicial review. Congress has clearly expressed the intent in the CERCLA statute that cleanup not be delayed due to litigation prior to cleanup.

Comment 3. The usual complaint (raised by DOE and DOJ in recent litigation) about judicial review is that it can cause delay. Delay is, sometimes, the price of justice. Yet we can see in the example of ERDF that entities do not always seek judicial review even when they have cause to. Any citizen of the U.S. could file suit against DOE under NEPA for DOE's failure to perform and EIS for the ERDF. Citizens may also be able to sue claiming that DOE has not complied with legal requirements concerning the siting and licensing of a low level nuclear waste disposal facility. Tribes could sue DOE under the federal trust responsibility to Indian tribes for DOE's failure to consult with them about siting. The natural resource trustees could file suit against DOE for its failure to consult with them before making the siting decision. Yet no one has filed any suits to delay the ERDF on any of these grounds, precisely because everybody recognizes that in <u>this</u> case, delay is unacceptable. Does DOE have so little respect for tribes, states, and the public that it expects them to file reckless suits?

Response: DOE, EPA and Ecology appreciate the cooperative attitudes that have been evidenced by all of the interested parties who have participated in the reviews and discussions of the ERDF Proposed Plan and related documentation. DOE, EPA and Ecology feel that the decision reached in the ROD is supported by the record, and hope that any remaining concerns can be resolved through continued discussions, without the need for litigation. With regard to any issues that cannot be so resolved, judicial review will be available. Congress did not preclude judicial review of issues under CERCLA, it merely required that such review be postponed until implementation of the selected remedy. The CERCLA statutory bar on pre-enforcement review of cleanup actions is a matter that only the courts can decide and interpret.

Comment 4. Moreover, judicial review is not a process that is outside of reasonable control. Every decision in a judicial review case is made by a federal judge. Judges have enormous discretion to dismiss cases that they feel are frivolous or unjustified. Indeed, the usual response to a complaint calling for judicial review, is for the defending agency to seek dismissal of the claim. This process is designed to filter out the merely delaying or "political" lawsuit very early in the process, before the suit can cause significant delays. Defendants can even file their own motions, seeking to impose *financial penalties* against those who file frivolous lawsuits. Judicial review is not a process that takes place irrationally or on "autopilot." So why does DOE fear this process? Does DOE distrust the judgment of federal judges? Or does DOE itself believe that its actions are often illegal or inadequate? Isn't DOE seeking to avoid judicial review precisely because it knows its actions often fail to live up to the minimum standards of the law, and because it wants to avoid being accountable when it breaks the law?

Response: DOE and EPA agree that judgements of the federal judiciary should be accorded respect and deference. Federal courts have uniformly held that judicial review of issues under CERCLA must await implementation of the remedy. Courts have held that the legislative history of CERCLA is clear, and that in balancing the right to review a potentially inadequate or flawed response plan with the interest in implementing prompt cleanup of hazardous waste sites, Congress gave priority to prompt cleanup. Neither EPA nor DOE can change CERCLA, only Congress can amend the statute. In making this decision, Congress apparently intended both to facilitate prompt cleanup action and to give some deference to the judgement of EPA, which it created to protect the public interest in enforcing federal environmental laws. In reaching the decision that is reflected in the ERDF ROD, EPA, DOE and Ecology are not turning a deaf ear to the needs and desires of interested parties and the public: significant considerations have been incorporated into the final decision based on input from these parties. For example, the location selected was consistent with criteria developed by the Future Site uses Working Group, the size of the facility was reduced to minimize the area disturbed, construction will commence on an extremely expedited schedule to assure that surface disturbance activities occur outside of sensitive nesting time periods.

Comment 5. Another concern that is sometimes raised about performing both NEPA and CERCLA is that doing so creates redundant paperwork and process. Yet the ERDF project shows this need not be the case. Moreover, DOE has produced EIS -- RI/FSs in the past under its former policy, with apparently little difficulty. DOE even has a headquarters-based NEPA office that provided guidance for the production of these documents. We cannot see how DOE achieves any significant reduction in paperwork or process by discarding NEPA.

Response: DOE has not discarded NEPA. Instead DOE has incorporated the substantive evaluation of NEPA elements into the CERCLA documentation. This approach is consistent

with the DOE NEPA policy, streamlines the procedural aspects, reduces redundant analyses, saves paper, and allows for a single, integrated decision.

Comment 6. The history of DOE's interaction with the people it is supposed to serve is a history of DOE erecting walls to accountability. One by one, those walls have been pulled down by the states, tribes and the public, only to have DOE erect new ones in their place. CTUIR staff are concerned that DOE's attempt to escape from judicial review is simply a repeat of this familiar theme. There may be some compelling procedural reasons for preferring the CERCLA RI/FS process over the NEPA EIS process. The NEPA Roadmap describes some of these. But as long as the CERCLA process leaves DOE essentially unaccountable for its actions, we cannot support a wholesale abandonment of NEPA.[1]

Response: In CERCLA remediations, DOE analyzes alternatives and suggests a remedy, but the regulatory agencies are responsible for choosing the remedial action to be implemented. Neither DOE nor the regulatory agencies are left unaccountable for their actions by the CERCLA process. It is true under the CERCLA statute, Congress has determined that citizen suits must await implementation of the selected remedy, however, the tribes and the public has significant opportunity for meaningful impacts on this remedy selection process.

M. ECOLOGICAL IMPACTS OF CONNECTED ACTIONS AT QUARRY SITES

Comment 1. The CTUIR commented that the RI/FS places no limit on where basalt quarry sites might be. Use of existing quarries or development of new quarries are connected actions to the ERDF project. Yet the RI/FS makes no attempt to describe the ecological impacts of those quarries. Further, the RI/FS makes no attempt to describe the transportation corridors or the ecological impacts of that transportation. From a NEPA standpoint, this is inadequate as a disclosure of affected environment and as a description of impacts to that environment. DOE should fully evaluate these issues in the RI/FS, and the CTUIR should be consulted about these decisions.

Response: The requirements for the surface cover have not yet been developed in detail. At this time, a RCRA-compliant cover has been selected for the closure of the ERDF, which does not include the use of basalt. To the extent practical, materials excavated from the ERDF site during construction will be used to construct the ERDF cover.

N. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Comment 1. The CTUIR commented: Because the tribes and trustees were not allowed to participate in the single most important decision concerning the site -- its location -- we can hardly be bound by DOE's decision to commit the resources at the ERDF site, "borrow" sites, and transportation corridors. This is the most glaringly obvious in the case of the basalt quarry site, the location of which, if a quarry is even required, is nevertheless undisclosed.

---

[1]Judicial review under the citizen suit provision of CERCLA is essentially a chimera, since § 113(h) bars review until after the remedial action is complete -- far too late for a plaintiff to have any meaningful impact on the remediation.

Response: Because the ERDF cover design does not specify a basalt biointrusion layer, or any other basalt layer, there is no need at this time to develop a source of basalt, or a basalt quarry, to support construction or closure of the ERDF. For this reason, no location for potential borrow sites are identified or proposed. Tribal and public participation will be invited at the time that a need for borrow sites is identified.

Comment 2. The CTUIR commented: CERCLA § 107(f) exempts a PRP from natural resource damages if the damages are identified as an irreversible and irretrievable commitment of resources in an EIS or comparable planning document and if various other conditions are met. This provision assumes that the EIS (or comparable environmental analysis) was performed properly. As the single most important decision concerning the ERDF was made without our participation, we must conclude that the commitment of resources was performed improperly. If it is true that the RI/FS process typically handles such decisions less rigorously than the EIS does, that only indicates that the RI/FS is not a comparable environmental analysis to an EIS.

Response: Evaluation of alternative sites has been an ongoing process in response to facility redesign and comments received from the public scoping meetings and from Hanford Site trustees. As noted in your previous comments, the analysis of issues in the RI/FS substantially complies with the requirements of NEPA. The DOE therefore believes that the ERDF RI/FS is an environmental analysis comparable to an EIS for the purposes of irreversible and irretrievable commitments of resources and that identification of such commitment was proper and appropriate.

The Oregon Department of Energy had the following comment:

Comment 3. In Section 9.3.17 the RI/FS makes a sweeping claim for irreversible and irretrievable commitment of resources. This claim abrogates USDOEs duties as a Trustee and as a land and resource Steward. Additionally, this claim may be invalid because:

1. The siting process for ERDF failed to consider reasonable alternatives. The original facility size was predicated on a simple shallow burial. This did not comply with USDOE orders, or with prior guidance from the Future Site Use Working Group. When public demands caused the Tri-Parties to change the design of the facility and reduced its area from six square miles to 1.6 square miles, siting was not reconsidered.

2. The siting process relies on treating ERDF as a CERCLA facility. It is not clear this is allowable. The wastes intended to be placed in this facility are from remote sites in the 100 Areas. Based on guidance in CERCLA, it appears ERDF should have been sited using a full NEPA process rather than the CERCLA RI/FS process, including licensing under the Atomic Energy Act.

The CERCLA RI/FS process used for ERDF is significantly different from the NEPA process. The public involvement process was inadequate and judicial review is not allowed.

4. USDOE is required under CERCLA and DOE orders to mitigate for ecological damage. The irreversible and irretrievable claim is very broad. The mitigation measures identified in the RI/FS are all future actions with no detail provided and no detailed plans provided.

USDOE should at a minimum commit to:

1. Minimize the ecological harm done at ERDF, at the borrow material sources and along the transport routes to each of these locations.

2. Replace the destroyed habitat with sufficient new or upgraded existing habitat adjoining the remaining high shrub-steppe habitat to offset the harm done.

3. Work closely with Trustees from the earliest moment on future projects to avoid these problems and to protect and preserve the remaining habitat.

4. A comprehensive process to protect species of concern and habitat at Hanford.

Since the Tribes and Trustees were not allowed to participate in the important siting decisions for ERDF, we cannot be bound by USDOE's decision to commit the resources at ERDF, the borrow sites or the transportation corridors.

Response: Following the CERCLA process for documenting the irreversible and irretrievable commitment of resources does not abrogate DOE's duties as a trustee and as a land and resource steward. The siting evaluation report evaluated multiple sites. When the facility was down-sized the siting evaluation was reconsidered. Because this is an on-site facility, licensing is not required. The CERCLA RI/FS process substantially complies with NEPA. DOE intends to perform mitigation as required and to minimize ecological harm. Methods for mitigation will be analyzed and the tribes will have an opportunity to participate.

The U.S. Department of the Interior - U.S. Fish and Wildlife Service had the following comment:

Comment 4. The RI/FS claims irreversible and irretrievable commitment of habitat and other natural resources for areas which have either not been identified (basalt borrow site), or for areas which have not been specifically identified and habitat value has not been assessed (McGee Ranch borrow site). The Service strongly objects to these actions and considers the claims to be inappropriate and unethical. This claim abrogates USDOE's duties as a Trustee and as a land and resource Steward.

It is not clear whether alternative borrow sites for fine material were considered. The Service strongly recommends that this be done. McGee Ranch may be in a critical location to provide a wildlife corridor between Hanford and the Yakima Training Center. Thus, while the habitat quality at McGee Ranch may not particularly high, its location value to wildlife and populations of plants and animals may be very high, and the impacts created by a borrow site may be essentially unmitigatable.

Response: The discussion about use of borrow sites is preliminary. At the time that a need for a borrow site is identified, all required evaluations will be performed in consultation with appropriate entities.

O. MINES, BASALT, AND GABLE MOUNTAIN

The CTUIR had the following comments:

Comment 1. We sincerely request that the Tri-Parties refrain from referring to mines and quarries as "borrow" sites. Does DOE have any intention to return this material to these sites some day? Of course not. This material is not being borrowed, it is being taken – taken with often extreme ecological impacts. Stone, once quarried, cannot be made whole again.

Response: The use of the term "borrow sites" in relation to mines and quarries is legitimate, and its use is not in any way intended to imply that any given source area, once mined, will be somehow reconstructed.

Comment 2. Also, please do not respond that this euphemism is somehow "customary" in the mining industry. The fact that others lie does not change the lie. Calling these mines "borrow" sites is deceptive and dishonest. Such jargon and euphemism needlessly defeats the tribes' and the public's need for clear, frank, honest discussion of issues and impacts.

Response: In using the term "borrow pits," DOE did not mean to be deceptive or dishonest. The term is clearly defined in Webster's Ninth New Collegiate Dictionary as "an excavated area where material has been dug for use as fill at another location."

Comment 3. In our scoping meeting with ERDF project staff, we repeatedly emphasized the importance of protecting Gable Mountain and other basalt outcrops (such as Gable Butte) on the Hanford site. Gable Mountain is of great religious importance to CTUIR members. The CTUIR can be expected to zealously oppose any impact to Gable Mountain. Other basalt outcrops are also of religious importance.

Response: DOE understands the importance of basalt outcrops to the CTUIR and other tribes. This is one reason that the preferred action (which requires no basalt) was chosen.

Comment 4. In addition, rock outcrops are a habitat feature that provides unique services to a variety of species. Once these geomorphic features are destroyed, they cannot be restored artificially.

Response: Thank you for the comment. Current design does not include the use of rock outcrops.

Comment 5. For these reasons, we urge that the protective cap for the ERDF be constructed without basalt. Either the modified Hanford barrier should be used, or stone should be derived from the process described below.

Response: Current design does not include the use of basalt.

Comment 6. The Hanford site is composed mostly of stone. The ERDF area is no exception. It is underlaid by many feet of Pleistocene flood deposits. Much of the material removed in the construction of the trench will be stone. If a crushed stone layer is needed for a biotic intrusion barrier in the ERDF cap, then this stone should be used. Simply sieve the appropriate-sized stone from the soil, crush it, and use it in place of the "crushed basalt" layer. Properly processed, this local stone should perform well as a biotic barrier.

Response: In fact, locally excavated materials will be utilized to the extent feasible in the construction of the ERDF cover layer. And, as noted above, closure of the ERDF site is planned to be accomplished using a RCRA-compliant cover, which will not require the use of basalt riprap.

Comment 7. This process should be less expensive than quarrying, involve no transportation costs and quarrying costs, and wholly avoid ecological impacts at yet-to-be-proposed quarry sites and along transportation routes. It should also render a crushed stone material that is adequate for the engineering needs of the cap. Please respond specifically to this proposal.

Response: Please note the comment response above.

P. DOE PROMISES TO THE CTUIR CONCERNING GABLE MOUNTAIN

The CTUIR had the following comments:

Comment 1. On at least two separate occasions, at the July NRTC meeting with ERDF staff (on the day of the NRTC tour of ERDF sites), and at the September ERDF meeting between the NRTC and the Tri-Parties, ERDF project staff made oral promises to CTUIR staff that Gable Mountain would not be used as a quarry site for ERDF basalt. We took a good measure of relief from these promises, and publicly stated our gratitude and pleasure at this result. As this is an issue of great importance to the CTUIR, we expected this oral promise to be reflected in writing in the RI/FS. Unfortunately, no such promise is made in the RI/FS. Indeed, the RI/FS leaves open any possibility concerning quarry sites for basalt. So now we must ask, is DOE going to keep its commitment to the CTUIR, that Gable Mountain will not be used as a quarry site for basalt? Please respond in writing.

Response: The current design does not include the use of basalt, which encompasses Gable Mountain.

Comment 2. DOE often says to tribes and the public "Trust us." Consider the discussion, above, concerning judicial review. Of course, based on past actions, tribes and the public have little reason to trust DOE. Yet, that does not stop DOE from coming back time and time again demanding our trust. This Gable Mountain basalt issue is but the smallest of examples of why DOE cannot be trusted. Despite our repeated statements to DOE about the importance of Gable Mountain, and despite promises by DOE that it would protect Gable, DOE has failed to put the least assurance about the future of Gable Mountain in this document.

Response: Comment noted. When evaluating remedial alternatives, DOE has a responsibility to evaluate reasonable alternatives and to justify the exclusion of certain alternatives from further consideration.

Q. ERDF ECOLOGICAL RISK ASSESSMENT EVALUATION

The Trustees had the following comments:

Comment 1. The goal of the ERDF baseline risk assessment is to evaluate the likelihood that adverse ecological effects may occur if organisms are exposed to contaminants that may be disposed in the facility. The goal of baseline risk assessment per 40 CFR 300.43 (e) (2) (i) (G) is to characterize current and likely future ecological risk attributable to releases of contaminants, especially when sensitive habitats and critical habitats of species protected under ESA may be impacted. The Hanford Site Natural Resource Trustees have evaluated the ERDF ecological risk assessment and, as such, have the following comments:

<u>General Response:</u>

EPA, Ecology, and DOE share the Trustees concerns regarding potential ecological effects and have made a conscientious effort to evaluate and mitigate these effects to the extent possible given the scope of this effort and the desire to remediate areas along the Columbia River. The

relatively simple ecological risk assessment provided in Chapter 6 demonstrates that unacceptable ecological risk would result if the wastes to be received at the ERDF *were released to the environment*. This conclusion would not be altered if a more complex risk assessment were conducted. Based on the conclusions of the risk assessment, *the proposed remedial alternative is designed to prevent release of waste to the environment*, thereby eliminating ecological risk associated with the waste. Furthermore, the report acknowledges that physical ecological impacts (i.e., stressors) will occur at the ERDF site due to construction. These impacts have been explicitly evaluated as part of the short-term effectiveness criteria (see Section 9.2) and significant design modification have been implemented to minimize the size of the facility and the magnitude of the impacts. For example, the trench design has been deepened to minimize the impacted surface area. As stated in Section 9.4.2, habitat value will be assessed before the start of construction, and impacts will be mitigated based on the ecological value of the habitat disturbed.

Comment 1.a. In general, the ERDF risk assessment should have been conducted consistent with the Hanford Site Risk Assessment Methodology (HSRM). In the case of ERDF, it appears that portions of the Risk Assessment (RA) are not complete.

Response: The reviewer is correct that the ERDF risk assessment is not entirely consistent with the HSRAM methodology, primarily because the HSRAM methodology was not intended for the unique situation at the ERDF. Whereas the HSRAM provides guidance for evaluating existing environmental contaminants (primarily to determine if cleanup action is warranted), the ERDF risk assessment (Chapter 6) was conducted to determine the need for a engineered barrier over a *proposed* landfill. The results of the risk assessment demonstrated that unacceptable risks to human and ecological receptors would occur if exposure to materials intended for ERDF was not prevented (i.e., by an adequate barrier). This conclusion is already adequately documented in existing operable unit remedial investigation reports.

Comment 1.b. Problem formulation should examine the nature of the contamination for potentially impacted habitats and/or ecosystems. ERDF RA indicated that this assessment does not evaluate impacts to populations or the ecosystem, rather, it assesses one ecological receptor, the Great Basin pocket mouse. For this type of risk assessment, it may be more appropriate to assess 2 or 3 receptors at the trophic level. Further, the RI/FS states that it does not use the pocket mouse as a surrogate for any other receptor.

Response: Chapter 6 provides adequate evidence that unacceptable ecological risks would occur if exposure to ERDF wastes were to occur. As a result, the remedial alternatives are designed to prevent such exposure. Expanding the risk assessment to include higher trophic levels would not change this conclusion or the barrier designs.

Comment 1.c. Problem formulation should examine the stressors, not only chemical, and radionuclide, but also physical, which would examine changes to natural conditions, such as habitat alteration. This risk assessment does not attempt to assess the physical conditions.

Response: The report acknowledges that physical ecological impacts (i.e., stressors) will occur at the ERDF site due to construction. However, it is beyond the scope of this report to compare the impact of leaving contaminants in their current locations (the no action alternative) with the impact of physical stressors associated with ERDF construction. In addition, each of the alternatives (except the no-action alternative) are sufficiently similar that an evaluation of physical stressors could not be used to rank the alternatives.

Comment 1.d. Problem formulation should examine indirect as well as direct effects associated with the release of contaminants. ERDF RA does not attempt to address the indirect effects associated with the contaminant release.

Response: A conclusion of Chapter 6 is that the remedial alternatives need to be designed to prevent exposure to contaminants intended for disposal in ERDF. Increasing the scope of the risk assessment is unnecessary because it will not change this conclusion.

Comment 1.e. Problem formulation should identify ecosystems potentially at risk, including critical and sensitive habitats located on, adjacent to, or near the hazardous substance release site of interest. ERDF RA does not acknowledge that mature shrub is a priority habitat for several candidate species that could potentially be impacted either directly or indirectly.

Response: Mature shrub habitat is identified as a priority habitat at and near the ERDF in the RI/FS Sections 2.8.1.1, 2.8.2, and 9.4.2. Impacts on this habitat are a primary concern for this project and have been explicitly addressed as a decision criteria for the remedial alternatives. The issue of mitigation of these impacts has been fully acknowledged in Section 9.4.11.

Comment 1.f. Endpoint selection may not be adequate. Given there are candidate species to be considered, a second type of indicator species should have been assessed.

Response: The agencies believe that the endpoint selection is adequate for the purposes to evaluating the impact of contaminants (see response to comment 1b). Similarly, it is unnecessary to expand the scope of the risk assessment to evaluate the impact of physical stressors (see response to comment 1c).

Comment 1.g. The Risk Summary is not clear. This should pull the components of the assessment together into a meaningful discussion of ecological significance, including the nature and magnitude of the effects, spatial and temporal patterns of the effects, and potential recovery. It's not clear what the magnitude of effects are, but there is an indication that there would be significant risk to the environment (should be more clear) based primarily on heavy metal concentrations and a potential hazard to wildlife receptors (should be more specific) due to ingestion. It does not discuss potential recovery due to the impacts.

Response: The reviewer is correct that "there is an indication that there would be significant risk to the environment" if ecological receptors were allowed to be exposed to ERDF wastes. As a result of this conclusion, remedial alternative barriers are designed to prevent exposure. Refinement of the risk assessment is unnecessary because it will not alter the barrier designs.

Comment 2. The Yakama Indian Nation commented: Intrusion scenarios in the ERDF plan are optimistic at best. At no point is the potential for inadvertent intrusion as to the drilling of a well considered. Since the current proposal does call for the placement of a layer of top soil over the facility, it is reasonable to assume that at some point past closure, the land would be utilized due to the obviously arid nature of this region utilization of the land would presumably require a water source such as a well. Some intrusion scenario based on this assumption is logical. That is what would happen if some future resident wishes to drill a well on top of what is currently known as the environmental restoration disposal facility. We see a very real need for consideration of such a potential and we do recognize the difficulty in identifying a solution for this scenario.

Response: Section 6.3 of the RI/FS extends the risk assessment for current exposure to soils to determine the risks associated with the 500-year drilling scenario. This scenario is considered a reasonable soil exposure scenario for all the remedial alternatives (except no action). The alternatives evaluated include active institutional controls (e.g., fences, signs, patrols), passive controls (e.g., markers and offsite records), and a surface barrier that is at least 4.6 m (15 ft) thick. It is assumed that institutional controls prevent intrusion into the waste for at least 100 years and that passive controls prevent intrusion for 500 years. Furthermore, it is assumed that because the waste is covered with at least 4.6 m (15 ft) of cover materials, intrusion into the waste due to excavation is precluded. Since none of the evaluated barriers can prevent penetration by a drilling rig, however, someone might inadvertently drill through the waste sometime after 500 years. The human health risks associated with soil exposure resulting from the 500-year drilling scenario include a total incremental cancer risk (ICR) of 4×10^{-5} (dominated by uranium) and a maximum HQ of 0.03 (associated with copper). These risks are the same for all the alternatives (except no action). The predicted HQ and ICR associated with the 500-year drilling scenario meet the goals established in the Tri-Party Agreement of 1 for HQ and 1×10^{-4} for ICR. The likelihood that someone will drill through the waste is not addressed.

The U.S. Department of Interior - Fish and Wildlife Service (the Service) had the following comments:

Comment 3. The RI/FS considers the human health risk assessment in much greater detail than the ecological risk assessment. This discrepancy in effort is inappropriate. Likely future scenarios suggest very little use of the site by humans, while buffer zones, mitigation banking, and other land uses are likely to retain high quality habitat around the 200 Area, resulting in a much greater potential for exposure of nonhuman organisms. Ecological risk assessment should be given at least as much, if not more, consideration than human health risk assessment.

Response: EPA, Ecology, and DOE share these concerns regarding potential ecological effects and have made a conscientious effort to evaluate and mitigate these effects to the extent possible given the scope of this effort and the desire to remediate areas along the Columbia River. Furthermore, it is acknowledged that the ecological risk assessment is based on oversimplified assumptions regarding the receptor species and exposure scenario. However, this approach utilized in the RI/FS is appropriate considering the goals of the risk assessment; that is, to determine the need for an engineered barrier to eliminate biointrusion and/or waste release to the surface. The relatively simple ecological risk assessment provided in Chapter 6 demonstrates that unacceptable ecological risk would result if the wastes to be received at the ERDF *were released to the environment.* This conclusion would not be altered if a more complex risk assessment were conducted. Based on the conclusions of the risk assessment, *the proposed remedial alternative is designed to prevent biointrusion and release of waste to the environment,* thereby eliminating ecological risk associated with the waste. Although a more detailed ecological risk assessment may be more accurate, it would not alter the conclusions of this report or the proposed landfill design.

Comment 4. The Service considers the ecological risk assessment to be inappropriate and incomplete for the following reasons:

Comment 4a Risk to aquatic organisms when potentially contaminated groundwater discharges into the Columbia River was not assessed.

Response: An unstated assumption is that protection of human health from exposure via a hypothetical residential drinking water well at the ERDF edge will result in adequate protection

of all receptors at the Columbia River. Qualitatively, dilution, decay, and degradation would occur, and support the assumption of adequate protection at the Columbia River. It is worth noting that the ERDF concept supports the TPA goal of removal of contaminants from portions of the Hanford Site, especially near the Columbia River, as a means of reducing the likelihood of exposure.

Comment 4b. Risk to terrestrial organisms during the several decades of the active phase of the landfill when contaminated materials would be exposed and fugitive dust would be likely was not assessed.

Response: As summarized in Section 9.4.7 of the ERDF RI/FS, potential risks to workers associated with releases during operations are expected to be low and within acceptable limits. These risks are expected to be low even with relatively conservative assumptions regarding the concentration of airborne particulates. In practice, stringent dust control measures will be implemented to minimize dust releases far below the conservative assumptions in the analysis. Given that any ecological receptors will receive much less exposure than workers, ecological risk assessment is not warranted. Exposure to contaminants by ecological receptors during active phases of the ERDF could occur, but this exposure is not expected to result in unacceptable risks due to the implementation of dust mitigation measures and daily covers over the waste.

Comment 4c. Use of the human health screening process to determine contaminants of potential concern for ecological risk assessment (page 5-1, paragraph 4 and pages 6-25, paragraph 6) is not appropriate; exposure scenarios and contaminant sensitivities between humans and wildlife are substantially different.

Response: The document, as well as other remedial investigation reports, provide adequate evidence that unacceptable ecological risks would exist if exposure were allowed to occur. As a result, an ERDF barrier would be designed to prevent such exposure. Expanding the scope of the risk assessment would not change this conclusion.

Comment 4d. Potential impacts based on cumulative exposure to several contaminants was not assessed.

Response: See above responses.

Comment 4e. Ecological risk assessment based on individuals of a single species is not appropriate. If just a single species is used, the RI/FS should be appropriately characterize the information presented as the "Great Basin Pocket Mouse Risk Assessment:, and not as an "Ecological Risk Assessment".

Response: See above responses. (specifically 1b.)

Comment 5. The Service considers the risk assessment using the Great Basin pocket mouse to be flawed and based on faulty assumptions. It is stated on page 5-1, paragraph 4 that animal studies are expected to be generally applicable to the pocket mouse. This statement is misleading. The pocket mouse is fairly unique among mammals in having an extremely efficient metabolism, require no drinking water and excreting highly concentrated urine. The pocket mouse also spends a significant portion of time hibernating or estivating. Thus, uptake, eliminations, and exposure rates are likely to be different from laboratory animals which are provided continually with water and live at a constant temperature, and different from standard man (page 6-29, paragraph 2). The unique aspects of pocket

mouse life history should be discussed, and should be taken into account when creating exposure models such as those on pages 6-28 and 6-29.

Response: As discussed above, it is acknowledged that the ecological risk assessment is based on oversimplified assumptions regarding the receptor species and exposure scenario. However, this approach utilized in the RI/FS is appropriate considering the goals of the risk assessment; that is, to determine the need for an engineered barrier to eliminate biointrusion and/or waste release to the surface.

Comment 6. The exposure scenario of the pocket mouse, which limited the exposure to dietary exposure from seeds, is not appropriate. Additional factors should be included in the exposure scenario. Because the pocket mouse is a burrowing animal, soil exposure will make up a substantial portion of total exposure, including increased dermal exposure from living underground, increased ingestion exposure from grooming, and increased inhalation exposure from dust associated with digging. Although soil exposure from radionuclides was assessed, it was not clear which of the above factors were included. Also, regarding plant uptake of contaminants, it is not clear why plant uptake by deposition was not considered (page 6-27, paragraph 5); this statement should be justified.

Response: See response to comments 1 and 5 above.

Comment 7. Throughout the Ecological Risk Assessment section, lack of specific information upon which to base risk assessment assumptions is frequently mentioned. The Hanford cleanup is a long term project. The Service strongly recommends that the necessary studies be conducted to obtain ecological and contaminant exposure and sensitivity information on the Great Basin pocket mouse and several other key species so that ecological risk can be adequately assessed in the future.

Response: See above responses.

R. CONTAMINANT FATE AND TRANSPORT

Comment 1. The Trustees commented: Section 4.1.1 describes the conceptual model used. The description notes that the mechanisms: controlling contaminant fate and transport in the vadose zone are highly coupled, unsteady, and non-linear. Furthermore, the hydrogeologic strata are heterogeneous and anisotropic.

It then describes the conceptual model as assuming "the media are homogeneous and isotropic", "the flow is plug flow in both the vadose zone and saturated zone", and "constituent release form ERDF is controlled by either solubility or partitioning between the waste and pore water."

It is clear the conceptual model bears little or no relation to the actual conditions. There is no data provided to justify the model selected as being in any way representative of the actual conditions. There is no analysis or data provided to show that bounding conditions exist which would allow the use of such a simplified model.

Response: See general and specific responses noted below.

The CTUIR had the following comments:

Comment 2. By DOE's own admission, quoted above, the design of the model bears little relation to the reality of the site. As a result, CTUIR technical staff view the extensive results and additional assumptions outlined in Appendix A to be a house of cards.

Response: See general and specific responses noted below.

Comment 3. Simplistic and unrealistic assumptions about homogeneous hydrogeologic conditions, vertical-only flow paths, and the physical and chemical behavior of only single contaminants make it highly doubtful that:

1) a complete range of contaminants of concern has been identified,

2) identified infiltration characterization and subsurface behavior are representative,

3) interactive effects of contaminants or critical conditions such as Ph, discontinuous caliche layers, or bedding have been adequately accommodated,

4) contaminant mixing or transport processes are as simplistic as portrayed, and

5) calculated travel times are anything but meaningless when they are assumed to vary only in proportion to vadose zone thickness.

Response: See general and specific responses noted below.

Comment 4. We find additional reason to doubt the accuracy of the model and assumptions when we review the summary tabulation of potential groundwater contaminants identified through this modeling (Table 4-11). This table indicates *identical* travel times for such physically and chemically diverse constituents as radionuclides, heavy metals, and selected anions. Such an implausible result is highly suspect, and would, by itself, call the model into question.

Response: See general and specific responses noted below.

Comment 5. These deficiencies indicate to CTUIR staff that the adopted modeling approach, combined, as it is, with too many unrealistic assumptions, fails to serve its stated goal of "identify[ing] groundwater contaminants, perform[ing] contaminant screening, and evaluat[ing] alternative ERDF designs" (Section 4.1).

Moreover, despite the foregoing quote, Section 4.1 does not apply the results of the modeling to "evaluat[ion of] alternative ERDF designs."

Given these deficiencies, CTUIR technical staff conclude that the model used for evaluating the ERDF proposal -- and the data generated by that model -- is of little value.

Response: See general and specific responses noted below.

Comment 6. The CTUIR staff request that before further steps on the design of the ERDF are completed, a more representative model should be developed that represents field conditions more realistically and that is designed specifically to evaluate barrier and subsurface characteristics and develop appropriate engineering design criteria. The results of the new modeling will be essential for

informed decision making concerning engineering and design of the ERDF, including but not limited to the Remedial Design portion of the project.

General Response

The predictive fate and transport model for the site is based on a parametric approach that utilizes empirically-based parameters that are relatively easy to measure instead of a mechanistic approach that would rely on physically-based parameters that are highly variable and difficult to measure. Although relatively simple, the parametric approach has experimental analogs (such as lysimeter observations, laboratory column testing, and field measurements of plume migration) that demonstrate a good comparison between the conceptual model and actual conditions. In contrast with the reviewer's comments, the simple parametric approach utilized for this analysis is solidly based on direct field and laboratory observations. The primary parameters (including infiltration rate, moisture content, and soil/water partitioning coefficient) are relatively easy to measure and have a relatively low degree of variability.

The reviewer appears to be recommending a mechanistic approach that relies on physically-based parameters such as unsaturated hydraulic conductivity (which can vary over many orders of magnitude with very small changes in moisture content or soil texture). Such an approach is not possible given the current state-of-the-art. Although we know that unsaturated fate and transport is complex, the scientific community has not yet developed the conceptual understanding, tools, and data to simulate this complex process.

Understanding the physical mechanisms of unsaturated flow and transport is important in terms of furthering our understanding of contaminant fate and transport; DOE and others have supported such research for many years. As a result, a review of the literature will provide many examples of physically-based models for simulating unsaturated fate and transport. Careful review of these models will reveal that they are not useful for practical application for a variety of reasons, including one or more of the following:

1) **the model focuses on specific segments of the process and does not address the entire system;**

2) **the model requires extensive data that are not possible to collect for a field application;**

3) **the model requires vast computing resources and thus is not feasible for field applications that include large variable model domains, multiple constituents, and long time frames.**

Specific Responses:

Re: Contaminants of Concern. The analysis considered every constituent that has been identified as a potential constituent of concern at the Hanford Site. Risk associated with the ERDF will be driven by constituents that are mobile, long-lived, and toxic. Furthermore, constituents that are found in groundwater beneath the waste units are likely to be potential contaminants of concern. The modeling results were compared with a qualitative evaluation of these factors to ensure that no potential contaminants of concern were overlooked. Therefore, given the limits of our knowledge and experience at Hanford and other sites, we can state with confidence that the list of potential constituents of concern is complete.

Re: Infiltration characterization and subsurface behavior. Due to lysimeter studies and observation of existing contaminant plumes, the Hanford Site has many field analogs for infiltration and subsurface fate and transport. The modeling parameters relied on these data to the extent possible and the results are consistent with these observations.

Re: Geochemical interaction and stratigraphic conditions. The complex geochemical interactions and other chemistry factors cited by the reviewer have been identified as potentially important factors under certain conditions. In particular, low-pH or high-organic contents found in some of the waste streams in the 200 Area can significantly increase the migration rate of some radionuclides and metals. However, chemical conditions in the waste and below the ERDF are expected to be characteristic of the 100 and 300 Areas, which are neutral pH and low organic content. Based on observations of plume migration in the 100 and 300 Areas, the geochemical interactions and chemistry factors cited by the reviewer are second-order considerations that would not significantly impact the results.

Re: Stratigraphic layering and mixing. Stratigraphic layering can impact groundwater migration by inducing horizontal migration and impacting vertical migration and mixing. These effects are more important in cases where the modelled facility received liquid effluent and infiltration rates were quite high. Given the low rates of infiltration (i.e., similar or less than background) these effects were considered relatively unimportant and were incorporated into the model using a parametric approach.

Re: Travel times. The comment suggests that travel times were only a function of vadose zone thickness and that all the constituents have identical travel times. As described in Appendix A, travel times were a function of vadose zone thickness, infiltration rate, and retardation (as well as other minor parameters. Furthermore, although *some* of the constituents have identical travel times, in general they are divided into a range of travel times ranging from completely mobile (the same migration rate as water transport) to highly immobile (up to 100,000 times slower than water transport).

Re: Evaluation of alternative ERDF designs. Alternative ERDF designs are not evaluated in Section 4. They are evaluated in Section A.4 and the results are summarized in Section 9.5.

IV. REMAINING CONCERNS

Issues and concerns that the Tri-Parties were unable to address in detail during remedial planning activities include the following:

- **Mitigation** - A mitigation action plan will be prepared to address mitigation requirements for the ERDF. The Hanford Natural Resource Trustees will be consulted in development of this plan.

- **Waste Acceptance Criteria** - Several public interest groups requested that the public have an opportunity to provide input into the development of waste acceptance criteria. EPA is committed to providing interested parties a copy of the draft waste acceptance criteria for the ERDF when it becomes available.

- **Tribal Cultural Resource Review** - The CTUIR and Yakama Indian Nation requested the opportunity to perform a cultural resource review of the ERDF site prior to construction. DOE is in consultation with the Tribes concerning this issue.

RESPONSIVENESS SUMMARY
LIST OF COMMENTORS

Written Comments

(b) (6)

Ephrata, Washington 98823-1920

Gregory deBruler
Columbia River United
P.O. Box 912
Bingen, Washington 98605

United States Department of the Interior
Fish and Wildlife Service
David C. Frederick
3704 Griffin Lane SE, Suite 102
Olympia, Washington 98501-2192

U.S. Fish and Wildlife Service
Liz Block
P.O. Box 1157
Moses Lake, Washington 98837

(b) (6)

Edmonds, Washington 98020

Oregon Department of Energy
Mary Lou Blazek
Nuclear Waste Program
625 Marion Street NE
Salem, Oregon 97310

Oregon Department of Energy
Dirk Dunning
625 Marion Street NE
Salem, Oregon 97310

Confederated Tribes of the Umatilla Indian Reservation (CTUIR)
Michael Farrow
Department of Natural Resources
P.O. Box 638
Pendleton, Oregon 97801

(b) (6)

Seattle, Washington 98168

(b) (6)

Vancouver, Washington 98684

(b) (6)

The Dalles, Oregon 97058

(b) (6)

Port Orchard, Washington 98366

(b) (6)

Port Orchard, Washington 98366

Penberthy Electromelt International, Inc
Larry Penberthy
631 South 96th Street
Seattle, Washington 98108

Formal Comments During Public Meetings

Al Conklin
Washington Department of Health
P.O. Box 47827
Olympia, WA 98504

Greg deBruler
Columbia River United
P.O. Box 912
Bingen, WA 98605

Pat Herbert
Coho Coalition
P.O. Box 95966
Seattle, WA

Cindy Sarthou - Staff Attorney
Gerald Pollet - Executive Director
Heart of America Northwest
1305 4th Avenue
Cobb Building, Suite 208
Seattle, WA 98101

(b) (6)

Seattle, WA 98136

Patrice Kent
Yakama Indian Nation
Environmental Restoration Waste Management Program
2802 Main Street
Union Gap, WA 98903

P.O. Box 151
Toppenish, Yakama Nation 98948

Rick Leaumont
Lower Columbia Basin Audubon Society
9016 Sunset Trail
Pasco, WA 99301

(b) (6)

Page Knight
Hanford Watch
2285 SE Cypress
Portland, OR 97214

(b) (6)

Portland, OR 97225