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Proposed Plan for Interim Remedial Measures at the 200-UP-2 Operable Unit, Hanford Site, Richland, Washington

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Richland, Washington

For External Review

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Proposed Plan for Interim Remedial Measures at the 200-UP-2 Operable Unit, Hanford Site, Richland, Washington

Date Published
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Department of Energy
P.O. Box 550
Richland, Washington 99352

For External Review

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DOE/RL-96-31
Draft A

PROPOSED PLAN FOR INTERIM REMEDIAL MEASURES AT THE 200-UP-2 OPERABLE UNIT

Hanford Site, Richland, Washington

DOE, EPA, AND ECOLOGY ARE SEEKING COMMENTS ON THIS PROPOSED PLAN (COMMENTS ARE BEING ACCEPTED FROM _____, 1996 TO _____, 1996)

SUMMARY

This proposed plan identifies the preferred alternative to remediate contaminated soils in the 200-UP-2 Operable Unit in the 200 West Area of the Hanford Site. Liquid waste generated from uranium recovery operations at the U Plant in the 200 West Area was discharged to the soil column, resulting in contamination of soils in the operable unit. While the initial focus of the operable unit investigation was to evaluate potential impacts to groundwater, the results indicate these impacts are negligible. The primary contaminants are immobile radionuclides (i.e., cesium-137, plutonium-239/240, and americium-241) found directly beneath the waste disposal units. Alternatives considered for interim remedial measures at the operable unit include No Action, Surveillance and Maintenance, Void Grout/Biointrusion Barrier/Surveillance and Maintenance, and Void Grout/Excavate/Dispose. The preferred alternative is the Surveillance and Maintenance alternative that provides for continued maintenance of existing soil covers, control of biological contaminant movement through plant uptake and burrowing animals, continued surveillance for contamination spread, and continued access restrictions to prevent exposure to contaminants. This alternative protects human health and the environment, provides long-term effectiveness and permanence, is easily implementable without unnecessarily exposing workers to contaminants, and is the most cost-effective of the evaluated alternatives. The public is invited to review the proposed plan and supporting documents and provide comments on the evaluated alternatives.

INTRODUCTION

This proposed plan identifies the preferred alternative for **interim remedial measures** (IRM) under the ***Comprehensive Environmental Response, Compensation, and Liability Act of 1980*** (CERCLA) for remediation of contaminated soils and structures associated with liquid waste disposal sites at the 200-UP-2 **Operable Unit**, located at the Hanford Site (Figures 1 and 2). It also summarizes other remedial alternatives evaluated for IRMs in this operable unit. The intent of IRMs is to accelerate actions to address contaminated areas that pose potential threats to human health and the environment.

This plan is issued by the Washington State Department of Ecology (Ecology), the state regulatory agency for the site and lead agency for the operable unit; the U.S. Environmental

Technical terms and other text in **bold** face are defined in the glossary at the end of the document.

Figure 1. Hanford Site.

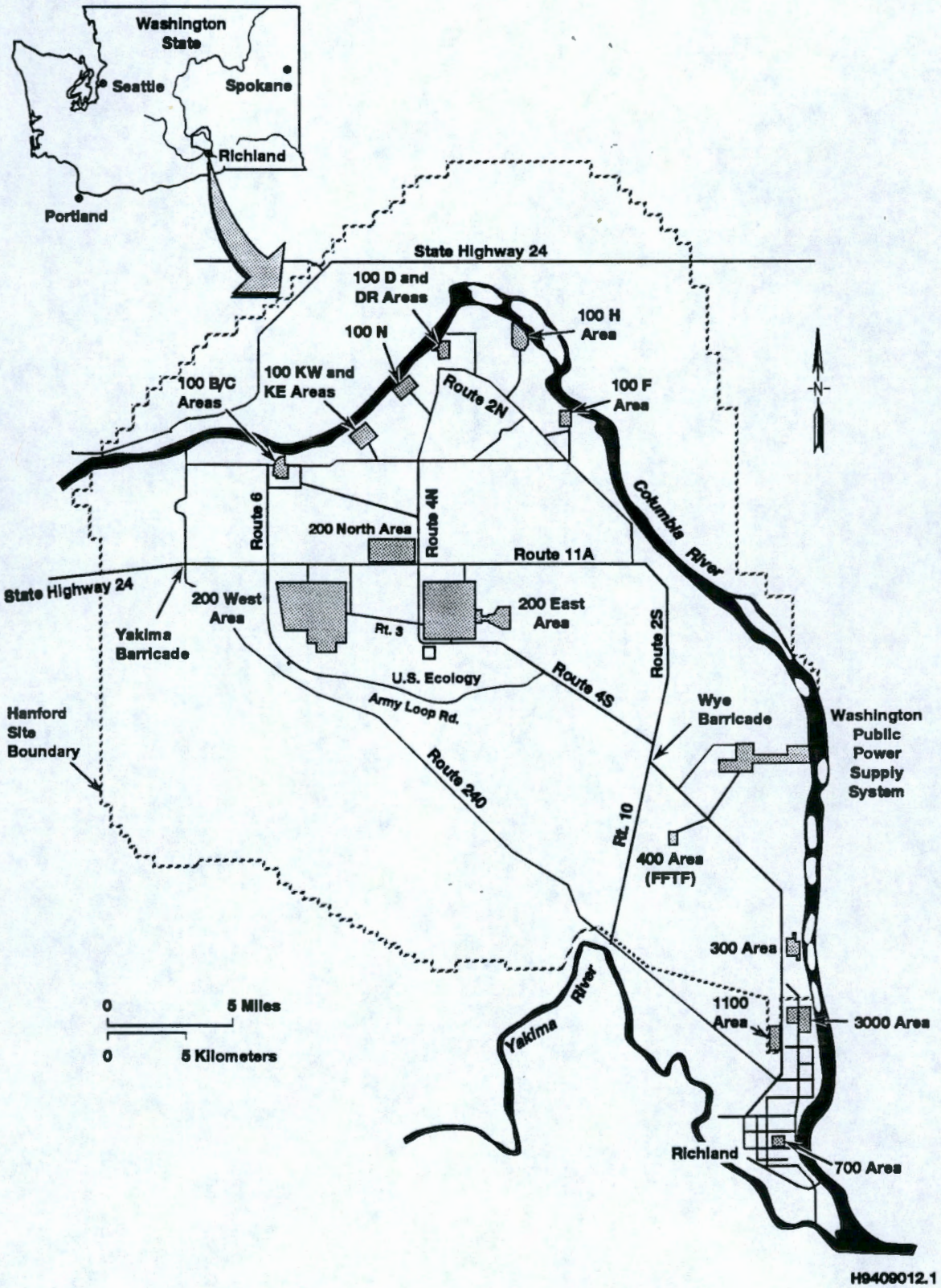
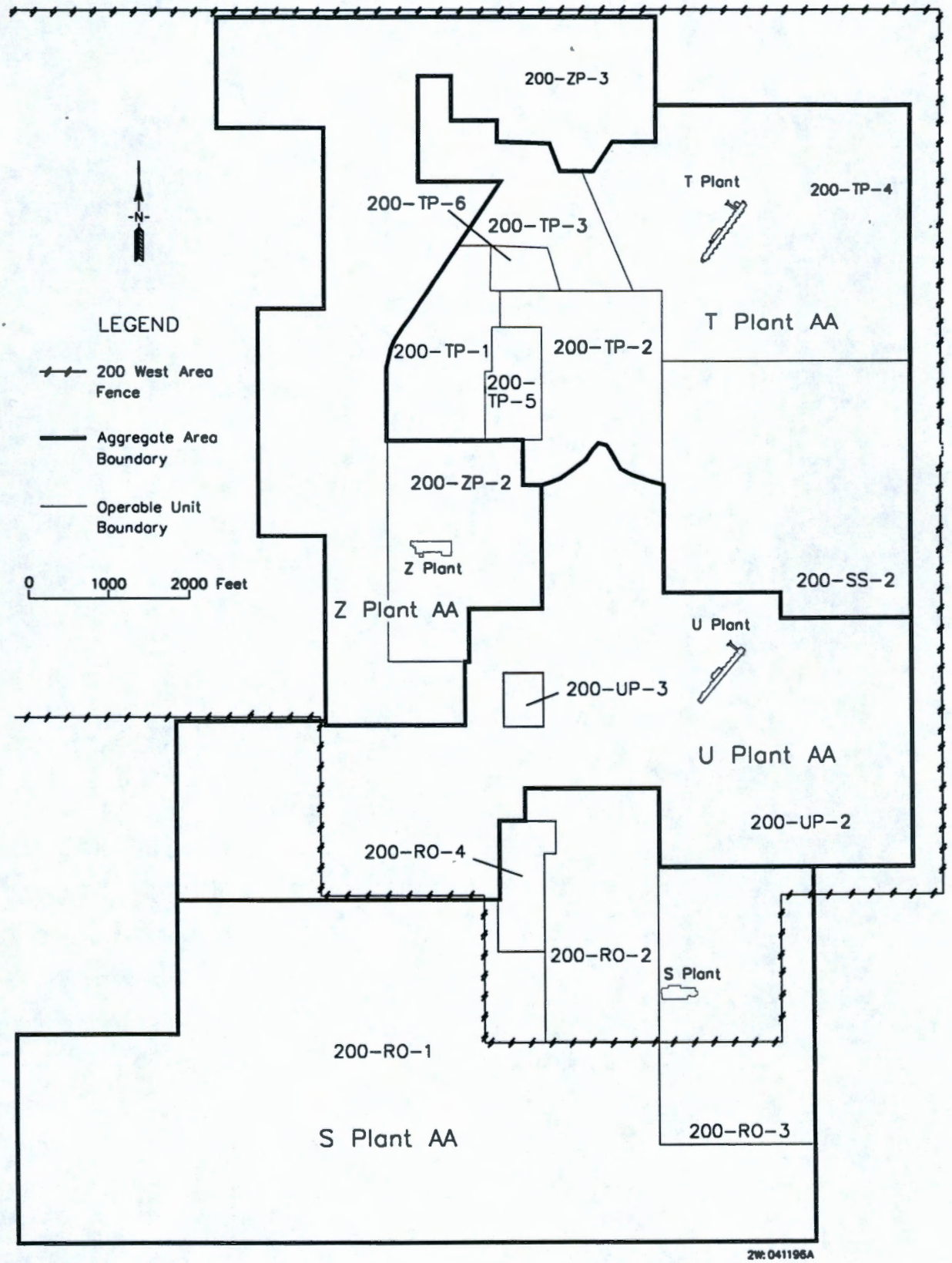


Figure 2. 200 West Area Operable Units and Aggregate Areas.



Protection Agency (EPA), the federal regulatory agency governing site activities; and the U.S. Department of Energy (DOE), the site owner who is conducting investigative and cleanup activities at the Hanford Site. The proposed plan has been developed according to the *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement), using information detailed in the ***Limited Field Investigation** for the 200-UP-2 Operable Unit* (LFI) (DOE-RL-95-13) and the ***Focused Feasibility Study** for the 200-UP-2 Operable Unit* (FFS) (DOE-RL-95-106). Ecology, EPA, and DOE are issuing this proposed plan as part of their public participation responsibilities under Section 117(a) of CERCLA. ***National Environmental Policy Act of 1969*** values have been incorporated into the FFS report.

This document is intended to be a fact sheet for public review that briefly describes the remedial alternatives analyzed, identifies the preferred alternative, and summarizes the information used to recommend the preferred alternative. The LFI and FFS reports and Administrative Record file contain additional sources of information that describe remedial action alternatives. A complete listing of Administrative Record and public information repository locations is provided on page 22.

Public comments are also being solicited in parallel for the *216-U-12 Crib Modified Closure/Postclosure Plan*. The 216-U-12 Crib, located within the boundaries of the 200-UP-2 Operable Unit, is a ***Resource Conservation and Recovery Act of 1976*** (RCRA) disposal site being closed under RCRA. The cleanup alternatives evaluated in the FFS and described in this proposed plan apply to the 216-U-12 Crib. The **Record of Decision** (ROD) for the 200-UP-2 Operable Unit will document the cleanup decision for the crib. This cleanup decision and specific permit conditions will be included in the **Hanford Site Dangerous Waste Permit** through a permit modification. **Modified closure** under the sitewide permit is the closure strategy for the 216-U-12 Crib because heavy metal contaminant concentrations are above ***Model Toxics Control Act*** (MTCA) Method B soil cleanup levels and because **groundwater** is contaminated with nitrates (a contaminant resulting from disposal of RCRA-regulated nitric acid waste). However, these heavy metal contaminant concentrations are not above MTCA Method C industrial soil cleanup levels. The closure/postclosure plan for the 216-U-12 Crib is further defined in Appendix C of the 200-UP-2 FFS and Appendix A of the 200-UP-2 LFI.

Four remedial alternatives were evaluated in the FFS for addressing soil contamination in the 200-UP-2 Operable Unit as follows:

- **No Action** - regulations require this alternative to be evaluated as a baseline; assumes no actions are taken to prevent exposure to contaminants

- **Surveillance and Maintenance** - continued access restrictions and monitoring programs, surveillance and maintenance of existing soil covers, vegetation and burrowing animal control to prevent biological spread of contaminants

- **Void Grout/Biological Barrier/Surveillance and Maintenance** - filling of void spaces in cribs and pipelines to prevent surface **subsidence**, installation of a barrier over contaminated areas to prevent human and biological intrusion, continued surveillance and maintenance activities including access restrictions, monitoring, and surveillance

- **Void Grout/Excavate/Dispose** - filling of void spaces to prevent subsidence, excavation of contaminated soils in the top 3 m (10 ft) of waste sites, disposal of contaminated soils to the **Environmental Restoration Disposal Facility** (ERDF).

The preferred alternative for 200-UP-2 Operable Unit waste sites is the Surveillance and Maintenance Alternative; this is also the preferred alternative for the RCRA 216-U-12 Crib.

The preferred alternative is the initial recommendation of Ecology, EPA, and DOE. Ecology, EPA, and DOE may modify the preferred alternative or select other response actions based on public comments. Therefore, comments on each alternative are welcome. All written comments must be submitted by _____, 1996. After considering all public comments, the remedy selected will be documented in the ROD for the 200-UP-2 Operable Unit. Responses to public comment will be presented in a responsiveness summary that will be part of the ROD. While no public meeting is scheduled, members of the public may request such a meeting by contacting Ms. Joan Bartz of Ecology at the address below or by calling the Hanford Site Cleanup Hotline at 1-800-321-2008. To provide adequate notice for all Hanford Site stakeholders, public meeting requests should be submitted by _____.

Send written comments to:

Ms. Joan Bartz
Washington State Department of Ecology
1315 West Fourth Avenue
Kennewick, Washington 99336-6018
(509) 736-5707

SITE BACKGROUND

The Hanford Site occupies 1,450 km^2 (560 mi^2) of the southeastern part of Washington State north of the confluence of the Yakima and Columbia Rivers (Figure 1). In 1943, when it was constructed, the primary mission of the Hanford Site was the production of plutonium for national defense. Operations at the Hanford Site are now focused on environmental restoration, waste management, and laboratory research.

The Hanford Site is organized into operational areas that include the 100, 200, 300, 400, 600, 700, 1100, and 3000 Areas (Figure 1). The 200 Areas are located near the center of the Hanford Site and encompass the 200 East, 200 West, and 200 North Areas.

Processing plants were constructed in the 200 Areas to recover uranium and plutonium from fuel produced in the 100 Area. The U Plant, located in the 200 West Area, was used for uranium recovery (Figure 2). Some U Plant liquid waste was discharged to the ground in waste disposal sites, contaminating the soils primarily with radionuclides (mainly cesium-137). Some liquid waste from the Z Plant plutonium separation and recovery operations was also discharged to the 200-UP-2 waste disposal sites. This disposal resulted in plutonium-239/240 and americium-241 contamination of soils associated with the ditches carrying waste from Z Plant to the U Plant waste sites. The waste sites associated with the 200-UP-2 Operable Unit include tanks, **cribs**, **french drains**, **reverse wells**, ponds, ditches, trenches, septic tanks and drain fields, retention basins, pipelines, and **unplanned release sites**. The 200-UP-2 Operable Unit waste sites included in this proposed plan are listed in Table 1; locations are shown in Figure 3.

To organize cleanup efforts, the 200 Areas have been divided into 39 source operable units and four groundwater operable units. Operable units are groupings of waste sites based on geographic areas. Operable units associated with individual treatment plants, such as U Plant, have subsequently been grouped together as **aggregate areas** because waste units associated with individual treatment plants have similar waste characteristics. The eight aggregate areas in the 200 Areas serve to accelerate study and remediation of the operable units. Information on the aggregate areas and the associated operable units is compiled in Aggregate Area Management Study (AAMS) reports.

The *U Plant Aggregate Area Management Study Report* (DOE/RL-91-52) evaluated each waste site associated with U Plant operations to determine the potential sources of subsurface soil contamination and potential contributors to groundwater contamination. Waste sites that were not potential threats to groundwater were labeled as low-priority sites and will be addressed in the future. Waste sites that posed a potential groundwater threat were designated as high-priority

Table 1. Description of 200-UP-2 Operable Unit Waste Disposal Sites. (Page 1 of 2)

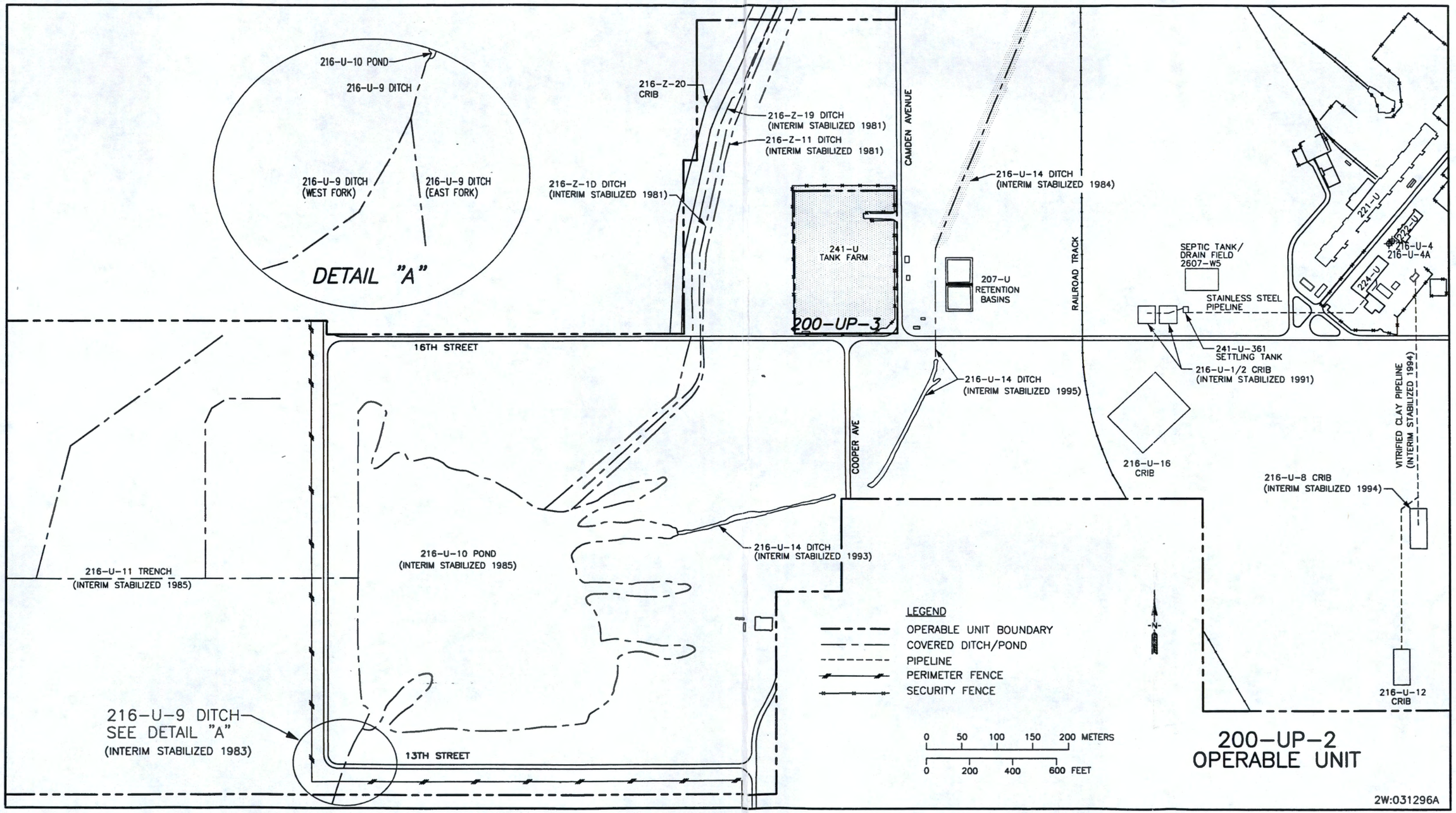
Waste Site	Physical Description of Waste Site	Former Waste-Site Use
216-U-10 Pond[a]	12-ha (30-ac) pond site currently covered with an average of 1.2 m (4 ft) of backfill. The site was deactivated in 1985. Stabilization included moving pond sediments toward the middle of the pond and backfilling with 1.8 to 3 m (6 to 10 ft) of clean material. In 1995, as part of the RARA program, the southern and western edges of the pond were covered with roughly an additional 0.6 m (2 ft) of clean fill to cover surface contamination in these areas.	Received 1.65E11 L (4.3E10 gal) of low-level liquid effluent from plutonium processing facilities from 1944 to 1985; received waste from both U Plant and Z Plant.
216-U-14 Ditch	Liquid effluent disposal ditch of 1,700 m (5,600 ft) in length; average dimensions are 2.4 m (8 ft) bottom width, 8.5 m (28 ft) top width, 1.2 m (4 ft) depth. The surface was stabilized in phases. The most northern section of the ditch (beginning slightly north of the 207-U Retention Basins) was interim stabilized in 1984 as part of the 216-U-10 Pond System Deactivation. It was backfilled with clean fill and revegetated. The southern most section was interim stabilized in 1993. Roughly 0.6 m (2 ft) of gravel/cobble were placed on the surface. The middle section between these two was interim stabilized in 1995 by killing vegetation and backfilling with clean fill. The ditch is posted as "Underground Radioactive Material."	Received waste water from plutonium processing facilities. Reported to have received 570,000 L/day (150,000 gal/day) of laundry waste water. Operated from 1944 and deactivated in stages with total deactivation accomplished in 1995.
216-U-11 Trench	Operated from 1944 to 1957. Originally a 570-m (1,880-ft)-long trench with a 1.5-m (5-ft)-wide bottom. An additional trench was added in 1955 that had a total length of 1,050 m (3,440 ft) and formed a U-shape. A "flood plain" area of roughly 240 by 180 m (800 by 600 ft) was located in the southern portion of the site. This site was interim stabilized in 1957, with portions of this restabilized in 1985 because of surface contamination. It is posted as "Underground Radioactive Material."	Received overflow from 216-U-10 Pond, unknown volume.
Z Ditches 216-Z-1D 216-Z-11 216-Z-19	The longest ditch (216-Z-1D) is 1,300 m (4,300 ft) in length; average bottom width is 1.2 m (4 ft), widest average top width (216-Z-19) is 7.3 m (24 ft), largest average depth (216-Z-19) is 1.2 m (4 ft). The Z Ditches were interim stabilized in stages. The northernmost 525 m (1,700 ft) of the 216-Z-1D Ditch was interim stabilized in 1949 by installing a pipeline. The next 600 m (2,000 ft) were stabilized in 1959. The remainder of the ditch became part of the 216-Z-11 and 216-Z-19 Ditches as they were constructed. The 216-Z-11 Ditch was backfilled in 1971, and the 216-Z-19 Ditch was backfilled in 1981. The entire ditch complex is marked as "Underground Radioactive Material."	These ditches operated from 1944 until 1981. The 216-Z-1D Ditch received roughly 1,000,000 L (260,000 gal) of waste water from Z Plant complex operations. Discharge volumes for 216-Z-11 and 216-Z-19 are unrecorded.
216-U-1 and 216-U-2 Cribs[b]	Each crib has a 3.7- by 3.7- by 1.2-m (12- by 12- by 4-ft) timber structure set 6 m (20 ft) below grade and backfilled. This site was stabilized in 1953 and again in 1991 because of surface contamination problems resulting from 1953 overflow from crib risers.	Operated from 1951 to 1967. Received 46,200,000 L (12,000,000 gal) of waste. Reported to have received 4,000 kg (8,800 lb) of uranium.
216-U-1 and 216-U-2 Stainless Steel Effluent Pipeline	8-cm (3-in.) pipeline from process facilities to 241-U-361 Settling Tank.	Operated from 1951 to 1967.
207-U Retention Basins	Two concrete, lined, open, settling ponds. Two unplanned releases lie north and south of the basins as a result of basin cleanout. Dimensions are 12 by 3 by 2.4 m (40 by 10 by 8 ft). Basins are 32 by 32 by 2 m (106 by 106 by 6.5 ft).	Operated from 1952 to 1994. Received steam condensate and cooling water from $U0_3$ Plant and cooling water from 224-U Building. Effluent was routed from basins to the 216-U-14 ditch.
241-U-361 Settling Tank	The tank is 6 m (20 ft) in diameter and 5.8 m (19 ft) high. The top is 1.8 m (6 ft) below the ground surface. Soil surface was contaminated in 1953 because of overflow from tank vent risers. Soil was consolidated east of the tank and covered with 0.6 m (2 ft) of clean material.	Operated from 1951 to 1967. Received waste from $U0_3$ Plant, 224-U Building, and 276-U. Liquid overflowed into 216-U-1 and 216-U -2 Cribs.

Table 1. Description of 200-UP-2 Operable Unit Waste Disposal Sites. (Page 2 of 2)

Waste Site	Physical Description of Waste Site	Former Waste-Site Use
216-U-8 Crib[c]	Consists of three cascading timber structures, each 4.9 by 4.9 by 3 m (16 by 16 by 10 ft). The crib area is 68 by 34 by 9.5 m (222 by 112 by 31 ft). Historically, there was a surface contamination area (SCA) surrounding the vitrified clay pipeline corridor and the 216-U-8 Crib. In 1995, due to the expansion of the SCA, the SCA encompassing the pipeline corridor was scraped and placed on top of the 216-U-8 Crib. Because activity directly over the pipeline increased as soil was scraped, a cover consisting of 0.6 m (2 ft) of clean fill was placed over the pipeline and the material that had been consolidated on the crib. The cover was vegetated; the crib is part of the RARA monitoring program. The majority of the SCA was eliminated and the crib and the pipeline corridor are marked as "Underground Radioactive Material".	Operated from 1952 to 1960. Received roughly 379,000,000 L (100,000,000 gal) of acidic process condensate from the 221-U and 224-U Buildings and 291-U Stack Drainage System.
216-U-8 Crib VCP	15-cm (6-in.) diameter VCP. 300 m (1,000 ft) in length buried 3 to 3.7 m (10 to 12 ft) bgs. For stabilization information, see 216-U-8 Crib.	Operated from 1952 to 1960.
216-U-12 Crib	Gravel-filled crib 46 by 18 by 4 m (150 by 60 by 13 ft).	RCRA TSD unit. Operated from 1960 to 1988. Received roughly 150,000,000 L (40,000,000 gal) of liquid waste from same sources as the 216-U-8 Crib.
216-U-12 Crib VCP	15-cm (6-in.)-diameter VCP. 120 m (400 ft) in length (from point which is in common with 216-U-8 Crib) buried 3 to 3.7 m (10 to 12 ft) bgs.	Operated same timeframe as 216-U-12 Crib.
216-U-16 Crib VCP	46-cm (18-in.)-diameter VCP, 270 m (900 ft) in length buried 1.8 to 3 m (6 to 10 ft) bgs.	Same as 216-U-16 Crib.

[a]The 216-U-10 Pond is the analogue unit for the 216-U-14 Ditch, Z Ditches, 216-U-11 Trench, and the 207-U Retention Basins.
[b]The 216-U-1 and 216-U-2 Cribs are analogue units for the 241-U-361 Settling Tank and the 216-U-1 and 216-U-2 stainless steel pipelines.
[c]The 216-U-8 Crib is the analogue unit for the 216-U-12 Crib and the 216-U-8, 216-U-12, and 216-U-16 VCP.
VCP = vitrified clay pipeline

Figure 3. 200-UP-2 Operable Unit Waste Sites.



sites. The high-priority sites were grouped based on similarities in waste characteristics. For each high-priority waste group, an analogue (or representative) waste site was selected. The analogue site represents the worst case for contamination in the waste site group. An investigation approach for each analogue waste site was developed to streamline the field characterization effort. Results from the characterization of the analogue waste sites were assumed to apply to the other sites in the analogous group.

The investigation approach for the 200-UP-2 Operable Unit was documented in the *RCRA Facility Investigation/Corrective Measure Study Work Plan for the 200-UP-2 Operable Unit, Hanford Site, Richland, Washington* (DOE/RL-91-19). Specific descriptions of work were developed for each investigation task identified in the work plan (e.g., **vadose zone** boreholes, test pits, surface radiological surveys). The results of the investigation are documented in the *Limited Field Investigation for the 200-UP-2 Operable Unit* (DOE/RL-95-13).

An initial focus of the 200-UP-2 Operable Unit investigation was to evaluate the potential to impact the groundwater beneath the operable unit. Investigation of the vadose zone became a key component of the work and those waste sites that would have the greatest potential to impact the groundwater were identified. While some residual contamination is present in the vadose zone, **RESRAD** modeling documented in the FFS indicates that it will not cause increased groundwater contamination for at least 1,000 years. The depth to groundwater at the operable unit is in excess of 60 m (200 ft). The area is underlain by a caliche layer that tends to retard downward movement of contaminants. Actual evaluation of the groundwater beneath the 200-UP-2 Operable Unit and vicinity will be addressed through the 200-UP-1 Operable Unit decision process. An interim action for the 200-UP-1 Operable Unit is proposed in *Interim Remedial Measure Proposed Plan for the 200-UP-1 Operable Unit* (DOE/RL-95-26).

This proposed plan presents interim actions for the high-priority waste sites recommended in the FFS to remain on the IRM pathway. Table 1 includes information on dimensions and former use of these waste sites. This information is based on historical process knowledge, previous investigations, the LFI, and the FFS undertaken by DOE. The waste-site locations are shown in Figure 3.

Currently, the sites are routinely surveyed and maintained through the facilities associated with the site or through the **Radiation Area Remedial Action** (RARA) program. Ongoing surveillance and maintenance activities are intended to control the exposure to and spread of contamination. Activities include, but are not limited to, radiation surveys, herbicide application, monitoring for collapse potential, and repair or replacement of the soil cover (interim stabilization). The RARA program has performed interim stabilization on some of the 200-UP-2 Operable Unit waste sites, as described in Table 1. Groundwater is currently monitored through the 200-UP-1 Operable Unit CERCLA operations and the RCRA monitoring program.

SUMMARY OF SITE RISK

Potential risks to human health and ecological receptors from contaminated soils in the 200-UP-2 Operable Unit were evaluated in the **qualitative risk assessment** (QRA), conducted as part of the LFI for the 200-UP-2 Operable Unit. The potential risks from exposure to contaminated soil were further evaluated in the FFS.

Human Health - The QRA evaluation of potential risks from contaminated soils identified **contaminants of potential concern**. These are contaminants that could pose a potential threat to human health and the environment under a certain set of conditions that account for the potential future land use, receptors, and exposure pathways for contact with contamination. The QRA used an industrial land-use scenario that assumes non-DOE activities would be conducted at the sites and that industrial workers could potentially be exposed to contaminants. The level of

potential health risks posed by these contaminants differs depending upon the future land use assumed because of differing exposure times associated with the land-use scenarios.

The FFS evaluated the potential risks from the contaminants of potential concern based on a waste-management land use and a comparison to **preliminary remediation goals**. Waste-management land-use is based on recommendations from the **Hanford Future Site Uses Working Group** and on the existence of continuing waste-management activities in the 200 West Area for the foreseeable future (e.g., operation of ERDF and the 241-U Tank Farm). The Future Site Uses Work Group defined waste-management land use as cleanup activities involving the short-term or long-term storage and isolation of existing or newly generated waste, treatment, and final disposal of waste. The DOE is assumed to maintain current access controls for the foreseeable future.

Preliminary remediation goals (Table 2) are preliminary numerical standards based on regulations that are considered protective of human health and the environment. The concentrations of the contaminants of potential concern were compared to the preliminary remediation goals using a waste-management exposure scenario. This comparison results in a reduced list of **contaminants of concern** (COC) that could present a potential risk to workers and the public under this exposure scenario. The resulting radionuclide COC are cesium-137 for most of the sites and americium-241 and plutonium-239/240 for the Z Ditches (see Table 3).

An evaluation of heavy metal contamination was conducted for the 216-U-12 Crib. Two constituents, arsenic and cadmium, were present at concentrations exceeding MTCA Method B soil standards. However, the concentrations of both constituents were below the MTCA Method C soils standards and were determined to be protective of groundwater (see Appendices B and C in the FFS).

Ecological Risks

While potential human health risks will drive the remediation, ecological risks for the waste sites within the 200-UP-2 Operable Unit were estimated by evaluating potential impacts to the Great Basin pocket mouse as an indicator species for other burrowing animals. Risks to the mouse were estimated assuming the food pathway was the primary route of exposure to both radionuclides and inorganic contaminants. An **environmental hazard quotient** (EHQ) equal to or greater than a benchmark of 1.0 was considered to indicate that individual mice may be at risk. While some metal contaminants had EHQs greater than 1.0, the assessment looked only at the individual and not entire populations. Ecological impacts are considered qualitatively in the FFS alternative evaluation, (e.g., ecological transport of contaminants will be controlled as part of remedial actions, thereby improving ecological conditions). Ecological risk will be further considered during evaluation of final remedial actions for the 200 Areas.

SCOPE AND ROLE OF ACTION

This proposed plan presents interim remedial actions to address contaminated soil and structures from the 200-UP-2 Operable Unit waste sites (Table 1). Remedial action objectives for 200-UP-2 are to (1) reduce potential exposure to radionuclides and other contaminants that may exceed acceptable levels consistent with the current and likely near-term exposure scenarios and (2) satisfy closure requirements established in *Washington Administrative Code* 173-303-610 for the 216-U-12 Crib.

The public has provided input on the future use of the 200 Areas through various forums, including the Hanford Future Site Uses Working Group. While the final land use of the 200 Areas has not been established, the likely land-use in the foreseeable future is waste management. If future land-use determinations are inconsistent with the goals presented in this plan, the remedial action objectives and cleanup goals may be revisited.

Table 2. Preliminary Remediation Goals[a].

Radionuclides	Activity at 100 mrem/yr Exposure (pCi/g)
Americium-241	2,200
Cobalt-60	100
Cesium-137	480
Europium-152	240
Europium-154	220
Neptunium-237	840
Plutonium-238	2,600
Plutonium-239/240	2,500
Radium-226	NA
Radium-228	NA
Strontium-90	50,000
Thorium-228	190
Uranium-234	10,000
Uranium-235	1,800
Uranium-238	5,400
Nonradioactive Contaminants of Potential Concern	**MTCA C Industrial Limit (mg/kg)**
PCBs (Arochlor 1260)	17
Arsenic	188
Chromium	17,500

[a]Applies to the top 3 m (10 ft) of soil for radionuclides and nonradionuclides.

Table 3. Waste Site Contaminants of Concern and Doses.

Waste Sites	Contaminants of Concern	Dose[a] (mrem/yr)
216-U-1 and 216-U-2 Cribs, 241-U-361 Settling Tank, pipeline	Cesium-137	740
216-U-8 Crib, 216-U-12 Crib, 216-U-8 VCP, 216-U-12 VCP, and 216-U-16 VCP	Cesium-137	1,464
216-U-10 Pond, 216-U-11 Trench, 216-U-14 Ditch, 207-U Retention Basins	Cesium-137	149
Z Ditches	Americium-241 Plutonium-239/240	52,000

[a]Based on RESRAD calculations assuming waste-management scenario and dose-based exposure limits for the public, based on 10 CFR 835.208 for DOE access-controlled sites. Workers are assumed to be exposed to average contaminant concentrations for 500 hr/yr in the waste and 1,500 hr/yr in a building at the waste site.
VCP = vitrified clay pipeline

Because of the long-lived radionuclides present at some of the waste sites, additional remedial actions may be required for a final action. The evaluation of final remedies will be conducted in accordance with the *Hanford Site Past-Practice Strategy* (DOE/RL-91-40). The final remedy selection process will evaluate remediation on an operable-unit, aggregate-area, or National Priority List site basis and will evaluate all data collected under expedited response actions, LFIs, and IRMs. The final remedy will address all sites not covered through an interim action plus contamination remaining on site after expedited or interim actions.

INTERIM REMEDIAL GOALS

To demonstrate that an action is achieving remedial action objectives, numeric remedial goals are set for the contaminants at levels or concentrations considered protective of human health and the environment. Remediation goals are listed in Table 2 and are based on the following:

- State of Washington MTCA Method C Industrial Soil Cleanup Standards for organic and inorganic chemical constituents

- 100 mrem/yr exposure limit, as identified in 10 Code of Federal Regulations (CFR) 835.208. This regulation establishes dose limits to the public for DOE access-controlled sites; DOE control of the site is assumed for ongoing waste-management activities.

SUMMARY OF CONSIDERED ALTERNATIVES

The FFS evaluated the following alternatives for the 200-UP-2 waste sites:

- No Action
- Surveillance and Maintenance
- **Void Grout** (where applicable)/**Biointrusion Barrier**/Surveillance and Maintenance
- Void Grout (where applicable)/Excavate/ Dispose.

These alternatives are described as follows.

No Action. The National Contingency Plan requires that a "No Action" alternative be evaluated to provide a baseline for comparison of alternatives. The No Action alternative represents a situation where no restrictions, controls, or active measures are applied to the site; none of the currently active institutional controls, such as site security, fencing, and signs would continue. While existing soil covers protect surface exposure, these covers would not be maintained from erosion, cracking, or other deteriorating processes. Biological controls would not be used to control contaminant uptake and movement by plants or animals.

Surveillance and Maintenance. This alternative takes advantage of existing soil covers. Protection is provided from human and biological intrusion through continued institutional controls that restrict access, such as site security, fences, and signs; surface radiation monitoring; inspection and repair of existing covers; control of deep-rooted plants and inhabitation of burrowing animals and nesting insects; cover replacement as required; and monitoring for sites with underground structures that may have subsidence potential. Any waste generated through the surveillance and maintenance activities would be disposed of at ERDF or another appropriate disposal facility. Groundwater monitoring would be coordinated through the associated groundwater operable unit CERCLA operations.

Void Grout (where applicable)/Biointrusion Barrier/Surveillance and Maintenance. This alternative provides protection from human and biological intrusion by installing a biointrusion barrier. This barrier consists of layers of basalt, sand, and gravel to prevent intrusion of plants and animals and to provide a warning barrier against human intrusion. Because protection of groundwater is not an issue for IRMs in this operable unit, surface barriers that impede surface water infiltration are not considered in the detailed analysis. In addition, some of the operable unit waste sites have a history of contamination spread through biological

processes. Therefore, the biointrusion barrier is deemed more appropriate to site conditions. The alternative includes injection of grout into voids created by the crib and pipeline structures, as required, to prevent subsidence, and continued surveillance and maintenance activities, such as site restrictions and fencing. Groundwater monitoring would be coordinated through the associated groundwater operable unit CERCLA activities.

Void Grout (where applicable)/Excavate/ Dispose. This alternative provides protection by removing contaminants. All contaminants exceeding remediation goals in the 0 to 3-m (0 to 10-ft)-exposure zone would be excavated and disposed of in ERDF or another appropriate disposal facility. Sites with potential for subsidence would be void grouted, as necessary. The excavated areas would be backfilled and revegetated.

Investigation-derived waste has been generated by characterization activities in the 200 Area operable units. A common element of each alternative, except the No Action alternative, will be the disposal of this waste at ERDF.

PREFERRED INTERIM REMEDIAL MEASURE

The preferred alternative proposed for the waste sites addressed in this proposed plan, including the RCRA site, is the Surveillance and Maintenance alternative with disposal of investigation-derived waste and waste generated through surveillance and maintenance activities to ERDF. The preferred alternative meets the remedial action objectives under the waste-management exposure scenario by maintaining the protectiveness of existing covers and providing continued institutional controls to prevent access to waste. The preferred alternative provides long-term effectiveness and permanence because the controls are maintained until contaminant concentrations radioactively decay to acceptable levels or until final actions are implemented for those sites that pose a current and long-term risk. The alternative is easily implementable without unnecessarily exposing workers to contaminants in the short term; furthermore, interferences from active facilities and utilities in the operable unit are not an implementability concern for the preferred alternative. The alternative uses Hanford Site proven technologies and equipment to complete the action. The preferred alternative accomplishes these actions in the most cost-effective manner compared to the other alternatives. The preferred alternative is consistent with institutional control requirements for modified closure of the 216-U-12 Crib under RCRA.

EVALUATION OF ALTERNATIVES

The preferred alternative is believed to provide the best balance of tradeoffs among the alternatives with respect to the nine CERCLA evaluation criteria. These criteria fall into three categories. The first two criteria (Overall Protection of Human Health and the Environment and Compliance with **applicable or relevant and appropriate requirements** [ARARs]) are considered threshold criteria and, in general, must be met. The ARARs may be waived in accordance with CERCLA Section 121. The next five criteria are considered balancing criteria, and are used to compare technical and cost aspects of the 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 final criteria will be evaluated after state and public comments have been received.

For the purposes of alternative evaluation, the 200-UP-2 Operable Unit waste sites were grouped into short-lived and long-lived radionuclides sites. Because the majority of contaminants associated with the operable unit are radionuclides, natural radioactive decay is a consideration in evaluating potential future risks and remedial actions. Cesium-137 is the major contaminant at the operable unit; cesium-137 has a half-life of 30 years. This contaminant will decay in the nearterm to acceptable levels. An exception is the

Z Ditches, where plutonium-239 and americium-241 are the major contaminants; both radionuclides have long half-lives: 24,000 and 458 years, respectively. These contaminants will not appreciably decay in the near term. Sites with contaminants that will decay in a relatively short period of time (e.g., cesium-137) may be effectively addressed by an interim action, given DOE will continue control of the 200 Areas for the foreseeable future. These sites include the following:

- 216-U-10 Pond
- 216-U-11 Trench
- 216-U-14 Ditch
- 207-U Retention Basins
- 216-U-8 Crib/Vitrified Clay Pipeline
- 216-U-12 Crib/Vitrified Clay Pipeline
- 216-U-16 Crib/Vitrified Clay Pipeline
- 216-U-1 Crib, 216-U-2 Crib, and Pipeline
- 241-U-361 Settling Tank.

Other sites with long-lived radionuclides will most likely require more permanent long-term solutions at a later date once long-term land use of the 200 Areas is defined. For these sites, interim actions may only be protective in the near term. These sites include the following:

- 216-Z-1D Ditch
- 216-Z-11 Ditch
- 216-Z-19 Ditch.

The FFS compares each alternative to the CERCLA criteria and also compares alternatives against each other. Evaluations were conducted for both short-lived and long-lived radionuclide sites. The FFS evaluated the amount of time required for the radionuclides to decay below levels that would represent a potential future threat to human health or the environment. This evaluation was conducted to evaluate the potential for the IRMs to constitute final actions. The evaluation was based on a potential future cleanup goal (15 mrem/yr dose limit) that could be applicable if the site were used for purposes other than waste management (the current land use scenario assumed for this proposed plan). The final land use has not been established at this time. The 15 mrem/yr dose limit is based on a draft EPA and Nuclear Regulatory Commission standard proposed in the Federal Register, vol. 59, page 43200. Table 4 identifies the concentrations associated with the 15 mrem/yr dose limit and the time required to decay from current maximum concentrations to acceptable concentrations, based on the allowable dose level. The following discussions summarize the comparative analysis for both categories of sites.

SHORT-LIVED RADIONUCLIDE SITES

Overall Protection of Human Health and the Environment. The No Action alternative does not meet this criterion because contaminants could be exposed through erosion or biological intrusion. The Void Grout/Biointrusion Barrier/Surveillance and Maintenance alternative would provide protection by stabilizing and covering waste sites to protect from intrusion. The Void Grout/Excavate/Dispose alternative would provide overall protection by stabilizing the waste sites, as needed, and removing and disposing of contaminated soil above remedial goals at an approved disposal facility. The Surveillance and Maintenance alternative provides adequate protection of human health and the environment by preventing human and biological contact with contaminants. The existing soil covers are protective and continued maintenance will ensure protectiveness.

Compliance with ARARs. The No Action alternative would not meet ARARs. The Surveillance and Maintenance, Void Grout/Biointrusion Barrier/Surveillance and Maintenance, and Void Grout/Excavate/Dispose alternatives meet ARARs. The major ARARs include MTCA and 10 CFR 835. Additional ARARs are discussed in Appendices A and H of the 200-UP-2 FFS.

Long-Term Effectiveness and Permanence. The No Action alternative does not meet remedial objectives because maintenance of existing covers would not be conducted; erosion and biological processes could expose contaminants at unacceptable levels. The Surveillance and

Table 4. 200-UP-2 IRM Candidate Waste Sites Summary.

Waste Site	Contaminants of Concern	15 mrem/yr Level, pCi/g	Years to Decay to 15 mrem/yr[a]
216-U-1 and 216-U-2 Cribs	Cesium-137	72	170
241-U-361 Settling Tank[b]	Cesium-137	72	170
216-U-16 VCP[c]	Cesium-137	72	200
216-U-8 Crib	Cesium-137	72	200
216-U-8 VCP[c]	Cesium-137	72	200
216-U-12 Crib[c]	Cesium-137	72	200
216-U-12 VCP[c]	Cesium-137	72	200
216-U-10 Pond[d]	Cesium-137	72	100
216-U-11 Trench[e]	Cesium-137	72	100
216-U-14 Ditch[e]	Cesium-137	72	100
207-U Retention Basins[d]	Cesium-137	72	100
216-Z-1D Ditch[f]	Americium-241	330	1,400
	Plutonium-239/240	375	285,000
216-Z-11 Ditch[f]	Americium-241	330	1,400
	Plutonium-239/240	375	285,000
216-Z-19 Ditch[d]	Americium-241	330	1,400
	Plutonium-239/240	375	285,000

[a]Values determined using DECAY Software
[b]Assumed analogous to 216-U-1 and 216-U-2 Cribs
[c]Assumed Analogous to 216-U-8 Crib
[d]Includes unplanned releases
[e]Assumed Analogous to 216-U-10 Pond
[f]Assumed Analogous to 216-Z-19 Ditch

Maintenance alternative provides adequate effectiveness and permanence in relation to the established remedial goals by restricting contact with contaminants. Void Grout/Biointrusion Barrier/Surveillance and Maintenance would limit the amount of surveillance and maintenance activities required. The Void Grout/Excavate/ Dispose alternative would provide the greatest long-term effectiveness and permanence because contaminants are removed from the site.

Reduction of Toxicity, Mobility, or Volume. Each alternative results in reduction of toxicity and volume through natural radioactive decay of the contaminants. The Surveillance and Maintenance, Biointrusion, and Excavate/Dispose alternatives all provide mobility reduction through control of biological intrusion.

Short-Term Effectiveness. The lowest short-term risks are associated with the Surveillance and Maintenance alternative because workers and the public are protected from exposure to contaminants through continued institutional controls and soil cover maintenance. Limited risks may be associated with surveillance and maintenance activities; however, these risks can be addressed through proper health and safety controls. The No Action alternative does not include actions that would pose risks to workers or the environment; however, workers could be exposed to contaminants if covers fail or if structures collapse, resulting in release of contaminants to the air or through biological movement of contaminants. The Biointrusion Barrier alternative is slightly less effective in the short term because heavy equipment is required and ecological resources may be disturbed. The Excavate/Dispose alternative represents the lowest short-term effectiveness because of the heavy equipment required and intrusion into the waste.

Implementability. While all the alternatives are implementable, the Biointrusion Barrier and Excavate/Dispose alternatives have lower implementability because of interferences to barrier placement or excavations from utilities and active facilities.

Costs. Table 5 summarizes the costs for the alternatives for each waste sites. Capital costs, operating and maintenance (O&M) costs, and net present worths, based on a 5% discount rate and a 132-year O&M period, were developed using the cost model for the 300-FF-1 Operable Unit feasibility study as a baseline where similar waste sites and alternatives were considered. The No Action alternative has a zero cost because no actions are taken. Total costs for the Surveillance and Maintenance alternatives vary from $22,000 for the 216-U-12 Crib to $2.7 million for the 216-U-10 Pond and 216-U-11 Trench, mainly varying due to waste site size. The Biointrusion Barrier alternative total costs vary from $1 million for the 216-U-12 Crib to $21 million for the 216-U-10 Pond and 216-U-11 Trench. The Excavate/Dispose alternative is the highest cost, varying from $1.5 million for the 216-U-12 Crib to $65 million for the 216-U-10 Pond and 216-U-11 Trench. Size is the major variable in costs within an alternative. Costs for groundwater monitoring are not included; this will be coordinated through the associated groundwater operable unit CERCLA operations.

LONG-LIVED RADIONUCLIDE SITES

Overall Protection of Human Health and the Environment. All alternatives, except No Action, protect human health and the environment during the IRM period upon implementation by minimizing exposure to contaminants. However, because the concentrations of contaminants will remain elevated for thousands of years, future actions may be required. These actions are dependent on land use and cannot be addressed at this time. Potential future actions will be evaluated as part of the final CERCLA process for the 200 Areas.

Compliance with ARARs. The No Action alternative would not meet ARARs. The Surveillance and Maintenance, Void Grout/Biointrusion Barrier/Surveillance and Maintenance, and Void Grout/Excavate/Dispose alternatives meet ARARs in the IRM period. The major ARARs include MTCA and 10 CFR 835.

Table 5. Total Cost Comparison of Alternatives.

Waste Sites	No Action	Surveillance and Maintenance ($)	Void Grout/ Biointrusion Barrier/ Surveillance and Maintenance ($)	Void Grout/ Excavate/ Dispose ($)
216-U-8 Crib/VCP	No cost	63,000	1,700,000	2,400,000
216-U-12 Crib/VCP	No cost	22,000	1,100,000	1,500,000
216-U-10 Pond/ 216-U-11 Trench	No cost	2,700,000	21,000,000	65,000,000
216-U-14 Ditch/ 207-U Retention Basins	No cost	300,000	4,000,000	8,600,000
216-U-1 Crib/ 216-U-2 Crib/ 316-U-361 Settling Tank/216-U-16 VCP	No cost	150,000	2,000,000	4,900,000
216-Z-1D Ditch/ 216-Z-11 Ditch/ 216-Z-19 Ditch	No cost	430,000	5,100,000	8,400,000
TOTAL	No cost	3,700,000	35,000,000	91,000,000

Note: Total cost is net present value, including capital and operating costs, based on a 5% discount rate and an operating and maintenance period of 132 years. Additional cost details are provided in Appendix G of the 200-UP-2 FFS. The No Action alternative assumes no cost because no actions are taken.

Additional ARARs are discussed in Appendices A and H of the FFS.

Long-Term Effectiveness and Permanence. The Excavate/Dispose alternative provides a high degree of long-term effectiveness because contaminants in the 0 to 3-m (0 to 10-ft) zone are removed from the site; however, contaminants below 3 m (10 ft) remain. The Biointrusion Barrier alternative provides for reduced surveillance and maintenance activities, as compared to the Surveillance and Maintenance alternative; however, both are protective in the IRM period. The No Action alternative is not protective because maintenance of the existing covers is not conducted; erosion and biological processes could expose contaminants at unacceptable levels.

Reduction of Toxicity, Mobility, or Volume. None of the alternatives result in near-term reduction of toxicity or volume because no treatment is proposed and the contaminants have long half-lives. The Surveillance and Maintenance, Biointrusion, and Excavate/Dispose alternatives all provide mobility reduction through control of biological intrusion.

Short-Term Effectiveness. The lowest short-term risks are associated with the Surveillance and Maintenance alternative because workers and the public are protected from exposure to contaminants through continued institutional controls and soil cover maintenance. Limited risks may be associated with surveillance and maintenance activities; however, these risks can be addressed through proper health and safety controls. The No Action alternative does not include actions that would pose risks to workers or the environment; however, workers could be exposed to contaminants if covers fail or if structures collapse resulting in release of contaminants to the air or through biological movement of contaminants. Short-term effectiveness for the Biointrusion Barrier alternative is slightly lower because heavy equipment is required and ecological resources may be disturbed. The Excavate/Dispose alternative represents the lowest short-term effectiveness because of the heavy equipment required, potential worker exposure from intrusion into the waste, and the potential for **transuranic** (TRU) concentrations of contaminants.

Implementability. While all the alternatives are implementable, the Biointrusion Barrier and Excavate/Dispose alternatives have lower implementability because of interferences in the operable unit from utilities and active facilities. The implementability of the Excavate/Dispose alternative would be greatly reduced if contaminants at TRU concentrations are present because of increased worker protection requirements, potential remote-handling requirements, and disposal difficulties.

Costs. Costs for these sites are compared in Table 5. Capital costs, O&M costs, and net present worths, based on a 5% discount rate and a 132-year O&M period, were developed using the cost model for the 300-FF-1 Operable Unit feasibility study as a baseline. The No Action alternative has a zero cost because no actions are taken. Total cost for the Surveillance and Maintenance alternative is $430,000. The Biointrusion Barrier alternative total cost is $5.1 million. The Excavate/Dispose alternative has the highest cost of $8.4 million.

Table 4 summarizes the decay times for the maximum concentrations of contaminants in the waste sites considered in this proposed plan. Except for the long-lived radionuclide sites that will not decay for thousands of years (216-Z-1D, -11, and -19), it is conceivable that DOE control will be in place until contaminants naturally decay. This being the case, interim actions implemented to protect the waste-management worker from unacceptable exposures may, in fact, achieve final cleanup goals. The sites with long-lived radionuclides, however, will have to be evaluated in the future with regard to a more permanent, long-term solution.

EVALUATION OF POTENTIAL ENVIRONMENTAL IMPACTS

In addition to evaluating whether the alternatives pose a risk to human and ecological receptors, the different remedial alternatives are compared relative to the potential impacts the action might have on cultural and natural resources, transportation, and regional socioeconomics given the assumed waste-management land use. The evaluation of alternatives also considered avoidance and mitigation of the above impacts, the commitment of resources that may be necessary, and the way the actions at this operable unit relate to actions being planned or executed at other operable units (cumulative impacts).

The levels of impact from the alternatives will vary depending on requirements (such as equipment and services), the need for borrow materials, and people that are needed to support each alternative. Significant impacts are expected to be limited to potential exposure of remediation workers to hazardous or radioactive substances, short-term impacts to wildlife from ground disturbance and construction noise, and the commitment of land used for disposal. The extent of physical disturbance caused by the action was also evaluated because this has a direct relationship to the potential for impacting cultural and natural resources.

The waste sites to be remediated occur within areas previously disturbed by Hanford Site activities, so remediation and revegetation actions will likely result in improving ecological conditions in the area.

EXPLANATION OF CERCLA EVALUATION CRITERIA

1. *Overall Protection of Human Health and the Environment* addresses whether or not a remedial action provides adequate protection, and describes how potential risks posed through each exposure route are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

2. *Compliance with Applicable or Relevant and Appropriate Requirements* addresses whether or not a remedial action will meet all of the ARARs in federal and state environmental statutes or provide grounds for invoking a waiver of the requirements.

3. *Long-Term Effectiveness and Permanence* refers to the magnitude of residual risk and the ability of a remedial action to maintain reliable protection of human health and the environment after remedial goals have been met.

4. *Reduction of Toxicity, Mobility, or Volume Through Treatment* evaluates the anticipated performance of the treatment technologies that may be employed in a remedy.

5. *Short-Term Effectiveness* refers to the speed with which the remedial action achieves protection, as well as the remedy's potential to create adverse impacts on human health and the environment that may result during the construction and implementation period.

6. *Implementability* refers to the technical and administrative feasibility of a remedial action, including the availability of materials and services needed to implement the selected solution.

7. *Cost* evaluates capital, operation, and maintenance costs for each alternative by performing present worth cost analyses.

8. *State Acceptance*, based on review of the remedial investigation and focused feasibility study reports, and the proposed plan, indicates whether the state concurs with, opposes, or has no comment on the preferred interim alternative.

9. *Community Acceptance* assesses the general public response to the proposed plan following a review of the public comments received on the remedial investigation, focused feasibility study, and proposed plan during the public comment period and open community meetings.

ADMINISTRATIVE RECORD

The Administrative Record documents the basis for cleanup decisions. It can be reviewed at the following locations:

U.S. Department of Energy, Richland Operations Office
Administrative Record
2440 Stevens Center Place
Room 1101
Richland, Washington 99352
(509) 376-2530
ATTN: Debbi Isom

U.S. Environmental Protection Agency,
Region 10
1200 6th Avenue
Seattle, Washington 98101
(206) 553-4494
ATTN: Karen Prater

Washington State Department of Ecology
Nuclear and Mixed Waste Library
300 Desmond Drive Southeast
Lacey, Washington 98503
(360) 407-7149
ATTN: Tommie McClure

PUBLIC INFORMATION REPOSITORIES

This proposed plan is available for review at the following Public Information Repositories:

University of Washington
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Portland State University,
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(503) 725-3690
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U.S. Department of Energy, Richland
Public Reading Room
Washington State University, Tri-Cities
100 Sprout Road, Room 130 West
Richland, Washington 99352
(509) 376-8583
ATTN: Terri Traub

SUPPORTING DOCUMENTS

The public are encouraged to review all of the documents at the Administrative Record locations identified previously to gain a better understanding of the 200-UP-2 Operable Unit, including the following:

200-UP-2 Operable Unit Air Monitoring Report, BHI-00035, Rev. 00, Bechtel Hanford, Inc., Richland, Washington.

200-UP-2 Operable Unit Radiological Surveys, WHC-SD-EN-RPT-009, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

216-U-10 Pond and 216-Z-19 Ditch Characterization Studies, WHC-EP-0707, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

Borehole Summary Report for the 200-UP-2 Operable Unit, 200 West Area, BHI-00034, Rev. 1, Bechtel Hanford, Inc., Richland, Washington.

Groundwater Impact Assessment Report 216-U-14 Ditch, WHC-EP-0698, Westinghouse Hanford Company, Richland, Washington.

Groundwater Impact Assessment Report 216-Z-20 Crib, 200 West Area, WHC-EP-0674, Westinghouse Hanford Company, Richland, Washington.

Interim Remedial Measure Proposed Plan for the 200-UP-1 Operable Unit, Hanford, Washington, DOE/RL-95-26, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

Limited Field Investigation for the 200-UP-2 Operable Unit, DOE/RL-95-13, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

RCRA Facility Investigation/Corrective Measures Study Work Plan for the 200-UP-2 Operable Unit, Hanford Site, Richland, Washington, DOE/RL-91-19, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

Surface and Near Surface Field Investigation Data Summary Report for the 200-UP-2 Operable Unit, BHI-00033, Bechtel Hanford, Inc., Richland, Washington.

U Plant Aggregate Area Management Study Report, DOE/RL-91-52, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

Focused Feasibility Study for the 200-UP-2 Operable Unit, DOE/RL-95-106, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

GLOSSARY

Aggregate Area - A grouping of waste sites, waste site areas, or operable units based on process history and waste similarities to streamline investigations, studies, or remedial actions.

Applicable or Relevant and Appropriate Requirements (ARAR) - These are federal and state requirements that apply to cleanup actions under CERCLA.

Biointrusion Barrier - A surface barrier consisting of layers of basalt, sand, and gravel to prevent intrusion from plants and animals.

Comprehensive Environmental Response, Compensation, and Liability Act of 1980 **(CERCLA)** - A federal law that establishes a program enabling the EPA to identify abandoned hazardous waste sites, ensure that they are cleaned up, and allow other government entities to evaluate damages to natural resources. It is also known as the "Superfund Law."

Contaminants of Concern (COC) - Chemical and radioactive contaminants that must be addressed by the interim remedial action, as determined by screening against preliminary remediation goals in the focused feasibility study.

Contaminants of Potential Concern - Chemical and radioactive constituents identified during the qualitative risk assessment as posing an unacceptable risk under an industrial exposure scenario.

Crib - A buried or covered liquid disposal unit, generally constructed of a gravel-filled timber structure or a gravel-filled excavation with a distribution system.

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

Environmental Restoration Disposal Facility (ERDF) - A disposal facility for past-practice contaminated soils and solid waste that will be available in October 1996 at the Hanford Site to support interim remedial measures.

French Drain - A fairly short, large-diameter vertical pipe with a gravel bottom.

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

Groundwater - Underground water that fills pores in soils or openings in rocks to the point of saturation.

Hanford Future Site Uses Working Group - A working group comprised of representatives of interested parties concerned with the cleanup and possible future uses of the Hanford Site. The group was active in 1992 and produced a report identifying possible future site uses and an examination of the cleanup necessary to make those uses possible.

Hanford Site Dangerous Waste Permit - A RCRA permit issued for the Hanford Site to cover closures of RCRA treatment, storage, and disposal units. Sites are included in the permit through scheduled modifications.

Interim Remedial Measure (IRM) - A remedial action that is taken at a site to address one or more, but not necessarily all, of the contamination problems. The remedial action is based on a limited field investigation/focused feasibility study and is selected in a record of decision.

Investigation-derived Waste - Waste, such as drill cuttings, generated during characterization activities.

Limited Field Investigation (LFI) - An investigation effort aimed at obtaining data to support a decision on interim remedial measures.

***Model Toxics Control Act* (MTCA)** - A regulation set forth by the State of Washington that provides risk-based cleanup levels for hazardous materials in the environment that are protective of human health and environment.

Modified Closure - Closure of a RCRA treatment, storage, or disposal unit to levels specified under Method C of 173-240 Washington Administrative Code and as defined in the Hanford Site Dangerous Waste Permit Condition II.K. This condition required institutional controls be provided at the site and that periodic assessments be performed on the effectiveness of the closure.

National Environmental Policy Act of 1969 - An act that declares a national environmental policy and promotes consideration of environmental concerns by federal agencies; it requires evaluation of environmental impacts for any major federal action.

Operable Unit - A subset of a larger CERCLA site; it is typically the subject of operable unit-specific investigations and remedial actions. An operable unit is a grouping of waste sites in the same geographical area that typically have similar waste characteristics.

Preliminary Remediation Goals - Preliminary numerical standards developed from remedial action goals and ARARs. The PRGs are used to screen contaminants and evaluate the ability of alternatives to meet remedial action goals.

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

Radiation Area Remedial Action (RARA) - A program at the Hanford Site that addresses surface contamination through periodic monitoring, surveillance, and interim stabilization activities.

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

***Resource Conservation and Recovery Act of 1976* (RCRA)** - A 1976 Federal law that established a regulatory system to track hazardous substances from the time of generation to disposal. RCRA requires the use of safe and secure procedures in the treatment, transport, storage, and disposal of hazardous waste. RCRA was amended in 1984 by the Hazardous and Solid Waste Amendments. The main purpose is to ensure that solid wastes are managed in an environmentally sound manner.

RESRAD - A computer code developed for DOE to calculate site-specific residual radioactive guidelines.

Reverse Well - Long, narrow pipe inserted deep into the ground to dispose of contaminated liquids.

Subsidence - Collapse of underground void spaces, such as crib structures or pipelines, that result in unstable surface conditions.

Transuranic (TRU) - Refers to elements having atomic numbers greater than that of uranium; high concentrations of TRU contaminants may have special handling and disposal requirements.

Unplanned Release Site - An area associated with an accidental release of contamination.

Vadose Zone - The soil layer below the surface and above the groundwater.

Void Grout - Injection of grout materials into subsurface voids associated with crib and pipeline structures to prevent subsidence.

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