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EPA Superfund
Record of Decision Amendment:

Hanford Site - 100 Area (USDOE)
100-BC-1, 100-DR-1, & 100-HR-1 OUs
Benton County, WA
4/4/1997

157901

United States Environmental Protection Agency
Region X
1200 Sixth Avenue
Seattle, Washington 98101

U.S. Department of Energy
Hanford Site - 100 Area
Benton County, Washington

Amended Record of Decision
Decision Summary and Responsiveness Summary

March 1997

Signature sheet for the Amendment to the Record of Decision for the USDOE Hanford 100-BC-1, 100-DR-1, and 100-HR-1 Operable Unit Interim Remedial Actions 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

Date 4/4/97

Signature sheet for the Amendment to the Record of Decision for the USDOE Hanford 100-BC-1, 100-DR-1, and 100-HR-1 Operable Unit Interim Remedial Actions 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

Date 4-4-97

Signature sheet for the Amendment to the Record of Decision for the USDOE Hanford 100-BC-1, 100-DR-1, and 100-HR-1 Operable Unit Interim Remedial Actions between the United States Department of Energy and the United States Environmental Protection Agency, with concurrence by the Washington State Department of Ecology.

Michael Wilson
Program Manager, Nuclear Waste Program
Washington State Department of Ecology

Date 3/31/97

DECLARATION OF THE RECORD OF DECISION

SITE NAME AND LOCATION

USDOE Hanford 100 Area
Hanford Site
Benton County, Washington

STATEMENT OF BASIS AND PURPOSE

This Record of Decision (ROD) Amendment has been developed in accordance with the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*, as amended by the *Superfund Amendments and Reauthorization Act of 1986*, 42 U.S.C. Section 9601 et. seq, and to the extent practicable, the *National Oil and Hazardous Substances Pollution Contingency Plan*, 40 Code of Federal Regulations Part 300. This ROD Amendment is based on the Administrative Record for the 100 Area.

The State of Washington concurs with the ROD Amendment.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from the waste sites, if not addressed by implementing the response actions selected in the ROD, as amended by this ROD Amendment, may present an imminent and substantial threat to human health, welfare, or the environment.

DESCRIPTION OF THE AMENDMENT TO THE REMEDY

This decision document changes components of the selected interim remedial action for the Hanford 100 Area radioactive liquid effluent disposal sites and clarifies the role of revegetation of remediated sites with respect to the completion of the remedial actions. The Interim Remedial Action ROD for the 100 Area radioactive liquid effluent disposal sites signed in September 1995 selected excavation, treatment as necessary or appropriate, and onsite disposal for 37 waste sites in the 100-BC-1, 100-DR-1 and 100-HR-1 Operable Units at an estimated cost of $491 million. This amendment increases the scope of the selected remedy to include 34 additional sites in the 100 Area that received similar waste discharges and reduces the overall estimated cost for the remedial action to $194 million for 71 sites. This amendment also recognizes the results of the soil volume reduction treatability studies that indicate soil washing for volume reduction is not cost effective. Therefore, this treatment step will no longer be retained as an option for the 100 Area radioactive liquid effluent disposal sites. This amendment also clarifies that revegetation of remediated waste sites will be addressed using the guidance provided in the current Mitigation Action Plan titled *Mitigation Action Plan for Liquid Waste Sites in the 100-BC-1, 100-DR-1, and 100-HR-1 Operable Units*. Those activities will provide overall environmental benefit to the site, but are not part of, or necessary, for the completion of the

selected remedial action. All other elements of the selected remedy as set forth in the ROD are unchanged.

DECLARATION

Although this ROD Amendment changes components of the remedy selected in the Interim Remedial Action ROD, the interim remedy as modified continues to be protective of human health and the environment. The remedy as amended complies with Federal and state requirements that are legally applicable or relevant and appropriate to the remedial action and is cost effective. The remedy as amended continues to utilize permanent solutions and alternative treatment technologies to the maximum extent practicable for this site. However, because treatment of the principal threats of the sites was not found to be practicable, this amended interim remedy does not satisfy the statutory preference for treatment of a principal element.

Because this remedy will result in hazardous substances remaining on site above health-based levels, a review will be conducted every five years after the commencement of remedial actions to ensure that the remedy continues to provide adequate protection of human health and the environment.

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DECISION SUMMARY

USDOE Hanford 100 Area
Record of Decision Amendment

INTRODUCTION

This document presents an amendment to the Interim Remedial Action Record of Decision (ROD) for the 100-BC-1, 100-DR-1, and 100-HR-1 Operable Units at the Hanford Site.

Site Name and Location

100 Area National Priorities List (NPL) Site, Hanford Federal Facility, Benton County, Washington.

Lead and Support Agencies

The lead regulatory agency for this action is the U.S. Environmental Protection Agency (EPA). The U.S. Department of Energy (DOE) and the Washington Department of Ecology (Ecology) both concur with the need and justification to change the number of waste sites to be remediated, to reduce the cost estimates for this project, and to no longer retain the treatment option of soil washing for volume reduction. The three agencies (the Tri-Parties) participated jointly in the decision and preparation of this document.

Statutory Citation for a ROD Amendment

The Interim Remedial Action ROD was signed by the EPA, Ecology, and the DOE in September 1995. The *National Oil and Hazardous Substances Pollution Contingency Plan* (NCP), 40 Code of Federal Regulations (CFR) 300.435(c)(2), provides for addressing and documenting changes to the selected remedy after issuance of a ROD. This ROD Amendment documents changes to the remedy set forth in the Interim Remedial Action ROD. Public participation and documentation procedures have been followed as specified at 40 CFR 300.435(c)(2)(ii).

Need for the ROD Amendment

This amendment is necessary for the following reasons:

- The scope of the remedial action has been expanded to include 34 additional sites within the 100 Area. These sites received similar discharges of radioactive liquid effluent as the original 37 high-priority waste sites presented for remediation in the September 1995 Interim Remedial Action ROD. The additional sites pose a similar level of risk to human health and the environment that also requires remediation. The additional sites are in the 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-1, 100-HR-1, 100-KR-1, and 100-KR-2 Operable Units and are identified in Appendix A.

The estimated cost of remediation and disposal of wastes and contaminated soils from the 34 additional sites at the Environmental Restoration Disposal Facility (ERDF) is $112 million. The ERDF is a *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA) disposal facility in the Hanford 200 Area that began accepting wastes from the 100 Area cleanups in July 1996. The ERDF is designed and operated to meet the substantive requirements of the *Resource Conservation and Recovery Act* (RCRA).

- Cost evaluations during remedial design for the original 37 sites identified significant opportunities for streamlining and coordination of remediation activities. Those evaluations, together with lessons learned from demonstration projects and an expedited response action (ERA), resulted in reductions to cost estimates for remediation of 100 Area waste sites. The most significant areas identified for cost savings included reduction in contaminated soil volume estimates and reduction in sampling and analysis costs. In addition, treatment for volume reduction prior to disposal is no longer being considered. Therefore, that cost element has been dropped from the cost estimates. Finally, the actual costs of disposal at the ERDF are lower than initially estimated due to competitive bidding among commercial firms. Preliminary cost estimates for the 37 radioactive liquid waste sites in the Interim Remedial Action ROD totaled $491 million. The current cost estimate for the same 37 waste sites is $82 million.

- The completion of pilot-scale treatability studies for soil washing to reduce contaminated soil volumes has shown this treatment process is not cost effective. Therefore, it will no longer be retained as a treatment option for soil volume reduction prior to disposal.

Tables 1 and 2 present a summary of the scope and cost changes from the September 1995 ROD and this proposed amendment.

Public Involvement

A newspaper notice was placed in the *Tri-City Herald* on December 15, 1996, announcing the availability of the proposed amendment and the start of the public comment period. Approximately 1,366 copies of a fact sheet were mailed out to individuals and organizations on the "Highly Interested" mailing list for the Hanford Site. A public comment period was held from December 16, 1996, through January 15, 1997. No requests were received for a public meeting; therefore, no public meeting was held. The proposed amendment was discussed with the Hanford Advisory Board Environmental Restoration Committee at meetings held in July and August 1996. The decision to amend the Interim Remedial Action ROD is based on the administrative record for the 100 Area. Locations where the administrative record may be found are listed below.

Administrative Record

This ROD Amendment will become part of the Administrative Record for Hanford 100 Area, as required by 40 CFR 300.825(a)(2), and will be available to the public at the following locations:

ADMINISTRATIVE RECORD (Contains all project documents)

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

INFORMATION REPOSITORIES (Contain limited documentation)

University of Washington, Suzzallo Library
Government Publications Room
Seattle, Washington 98195

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

Portland State University, Branford Price Millar Library
SW Harrison and Park
Portland, Oregon 97207

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

SITE HISTORY

The Hanford 100 Area lies at the north end of the Hanford Site in Benton County, Washington State, along the southern shoreline of the Columbia River as shown in Figure 1. The 100 Area NPL Site is composed of six non-contiguous reactor areas containing the nine retired plutonium production reactors and their ancillary facilities. Large amounts of cooling water flowed through the reactor cores and became contaminated with radionuclides and other waste. Soil and underlying groundwater were contaminated when cooling water was disposed in cribs and trenches and leaked from water transfer systems. Solid wastes contaminated with radionuclides were buried in unlined trenches.

An Interim Remedial Action ROD was issued in September 1995 for the 100-BC-1, 100-DR-1, and 100-HR-1 Operable Units to address actual or threatened releases at radioactive effluent disposal sites. The Interim Remedial Action ROD identified 37 high-priority waste sites that had

received liquid radioactive effluent discharges. The selected remedy for the 37 sites is to remove, treat as appropriate or required, and dispose of the wastes on site. Full-scale cleanup of the 100-BC-1 Operable Unit began in July 1996 and in the 100-DR-1 Operable Unit in December 1996. Cleanup in the 100-HR-1 Operable Unit is scheduled to begin by September 30, 1998.

REMEDY SELECTED IN THE ROD

As discussed in the previous paragraph, the September 1995 Interim Remedial Action ROD identified 37 high-priority waste sites that had received liquid radioactive effluent discharges. The selected interim remedy for the 37 sites is to remove, treat as appropriate or required, and dispose of the waste in the ERDF. The selected remedy relies on the Plug-In Approach for selection of the same remedy at multiple similar or "analogous" sites within the 100 Area. A standard remedy is selected that applies to a given set of circumstances rather than to a specific waste site. The approach combines historical information on former process operations with limited field investigation information of the nature and extent of contamination to determine the analogous nature of individual waste sites. This allows the EPA, Ecology, and DOE to select and implement remedial actions at similar waste sites without expending resources to further characterize analogous sites across the 100 Area.

The implementation of the selected interim remedy generally includes the following steps:

- Remove contaminated soil, structures, and debris from 100 Area source waste sites using the "Observational Approach." The Observational Approach utilizes analytical screening during remediation to guide the extent of excavation. Remediation proceeds until it can be demonstrated through a combination of field screening and confirmational sampling that cleanup goals have been achieved.

- Treat the waste as required to meet applicable waste disposal criteria.

- Dispose of contaminated materials at ERDF.

- Backfill excavated areas and revegetate.

The extent of remediation will take into account appropriate site-specific factors including reduction of risk by decay of short-lived (half-life of less than 30.2 years) radionuclides, protection of human health and the environment, remediation costs, sizing of the ERDF, worker safety, presence of ecological and cultural resources, the use of institutional controls, and long-term monitoring costs. The DOE will control access to and use of the Hanford Site for the duration of the cleanup. Institutional controls and long-term monitoring will be required for sites where wastes are left in place. Wastes will continue to be present in the 100 Area until final remediation objectives are achieved and a final ROD is issued.

DESCRIPTION OF THE MODIFIED REMEDY

The cleanup goals for the September 1995 Interim Remedial Action ROD and this amendment are to remediate liquid radioactive waste disposal sites to levels that will not preclude any future uses, to protect groundwater in the 100 Area, and to protect the Columbia River. Many of the provisions of the interim remedy as described in the September 1995 Interim Remedial Action ROD and this amendment are the same. The significant differences addressed in this amendment to the September 1995 Interim Remedial Action ROD for the original 37 high-priority sites are explained in the following sections.

Additional Radioactive Liquid Source Waste Sites

Additional radioactive liquid source waste sites exist at the 100 Area NPL Site that are analogous to those in the 100-BC-1, 100-DR-1, and 100-HR-1 Operable Units selected for the Interim Remedial Action ROD. The boundaries of the remedial action have been expanded to include 34 additional sites within the 100 Area that received discharges of radioactive liquid effluent similar or identical to those which were received by the original 37 high-priority waste sites of the Interim Remedial Action ROD. It was concluded that the 34 additional sites warrant interim remedial action based on the Plug-In Approach because they all received similar historical discharges of liquid radioactive effluent and the available limited field investigation results indicate elevated risk levels comparable to those of the original 37 high-priority sites.

Information concerning the additional sites in the 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-1, 100-HR-1, 100-KR-1, and 100-KR-2 Operable Units is summarized in Appendix A. An analogous site for each of the 34 additional sites is presented from the list of 37 high-priority sites included in the Interim Remedial Action ROD.

Appendix A also presents information on waste site profiles for the additional 34 radioactive liquid waste sites, including volumes, nominal site dimensions, anticipated or known contaminants, and estimated remediation costs. Estimated remediation costs for the 34 additional 100 Area radioactive liquid waste sites total $112 million.

Reductions to Cost Estimates for Remediation of 100 Area Waste Sites

The EPA, Ecology, and DOE identified significant opportunities for streamlining and coordination of remediation activities during remedial design for the original 37 waste sites. An ERA was conducted in the 100-BC-1 Operable Unit to address uncertainties in remedial design planning and to initiate remedial action on 100 Area source waste sites. Lessons learned from this ERA, revised cost modeling assumptions, and a reevaluation of site-specific analytical data resulted in more accurate development of cost estimates and reductions to cost estimates for remediation of 100 Area waste sites. It was determined that less material will need to be removed during remediation than originally planned, that significantly fewer samples and analyses will be needed for confirmation of cleanup, and that disposal costs will be significantly lower than originally anticipated.

The preliminary cost estimate for the selected interim remedial action (remove, treat as appropriate or required, and dispose) for the original 37 sites was $491 million. Use of less conservative assumptions and refining of the data inputs to the cost estimating model software has reduced this estimate to $82 million. Remediation costs for the total 71 radioactive liquid waste sites of the Interim Remedial Action ROD and this amendment are projected to be $194 million.

Elimination of Soil Washing Treatment Step for Volume Reduction

The soil washing treatment step for volume reduction will no longer be retained as a treatment option prior to disposal. The completion of pilot-scale treatability studies for soil washing to reduce contaminated soil volumes has shown this process is not cost effective for the liquid radioactive effluent disposal sites in the 100 Area. A report was published in November 1995 that presents the results of the treatability studies[1].

Revegetation of Remediated Areas

The revegetation of the additional remediated waste sites will be addressed using the guidance provided in the current Mitigation Action Plan titled *Mitigation Action Plan for Liquid Waste Sites in the 100-BC-1, 100-DR-1, and 100-HR-1 Operable Units*. This document was developed in coordination with the Hanford Trustees through the Hanford Natural Resource Trustee Council. The implementation of activities outlined in the document will provide overall environmental benefit to the Site. The revegetation activities are not part of the remedial action because they are not a feature necessary for the effective performance and completion of the selected remedial action. However, revegetation activities will be conducted following the completion of remedial action activities.

EVALUATION OF ALTERNATIVES

The NCP establishes nine criteria for evaluating remedial action alternatives. These criteria are divided into three categories of weighted importance, which include threshold, balancing, and modifying criteria. Overall protection and compliance with applicable or relevant and appropriate requirements (ARARs) (unless specifically waived) are threshold criteria that all remedies must meet to be considered. The seven balancing and modifying criteria help describe relative differences between the alternatives. A discussion of the original remedy and the modified remedy relative to the nine criteria evaluation is required by CERCLA. In this section, the addition of 34 sites, the reduction in overall cost estimates, and the elimination of soil washing as a volume reduction option are compared to the original remedy, relative to the nine criteria.

It is important to note that the additional sites for cleanup are very similar to the sites selected in the original Interim Remedial Action ROD. These types of waste sites have been evaluated in a

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[1]Belden, R. D., *100 Areas Soil Washing Tradeoff Study*, BHI-00624, Rev. 0, November 1995, Bechtel Hanford, Inc, Richland, Washington.

feasibility study report that supports the cleanup actions. Another key point is that the evaluations that support the initial cleanup decision still hold and do not change.

Threshold Criteria

1. Overall Protection of Human Health and the Environment

Both the existing Interim Remedial Action ROD and this amendment meet the threshold criterion of protection of human health and the environment. The approach to remediation of contaminated sites, as well as the cleanup goals, are the same for both. A key provision of the remediation goal to protect human health is the proposed standard to limit radiation dose from contaminated sites to 15 mrem/yr above natural background levels.

2. Compliance with Federal or State Environmental Standards (ARARs)

The existing Interim Remedial Action ROD and this amendment will both comply with ARARs. The key ARARs are the *Model Toxics Control Act* for metals and organics in soils, *Safe Drinking Water Act* maximum contaminant levels for groundwater, and *Clean Water Act* criteria for the Columbia River.

Balancing Criteria

3. Long-Term Effectiveness and Permanence

The existing Interim Remedial Action ROD and this amendment have the same approach to remediation of the waste sites and the same remediation goals. Therefore, both will result in permanent protection of human health and the environment after cleanup goals are met. The remediation of 34 additional sites will increase the overall long-term effectiveness of the remedy in the 100 Area.

4. Reduction of Toxicity, Mobility, and Volume Through Treatment

The existing Interim Remedial Action ROD and this amendment have the same approach to remediation of the waste sites and the same remediation goals. The completion of soil reduction treatment studies has shown that volume reduction is not cost effective for the liquid radioactive waste disposal sites. However, treatment to meet Land Disposal Restrictions prior to disposal in the ERDF may be required at some sites.

5. Short-Term Effectiveness

The existing Interim Remedial Action ROD and this amendment have the same approach to remediation of the waste sites. Both are similar with respect to meeting this criterion. However, the proposed amendment will add additional sites for remediation, which will increase the overall amount of time for completion of the remediation. No significant worker exposure concerns are expected that cannot be addressed through common remediation practices.

6. Implementability

The existing Interim Remedial Action ROD and this amendment have the same approach to remediation of the waste sites. Therefore, both are essentially the same with respect to meeting this criterion. The addition of 34 more sites will allow for better long-term planning of remedial action construction, transportation, and disposal activities.

7. Cost

The Interim Remedial Action ROD estimated cost of remediation of the original 37 sites was $491million. The updated estimate for those 37 sites is $82 million. This amendment would also add 34 more sites at an estimated cost of $112 million. This amendment represents an 83% reduction in the estimated cost for the original 37 sites, and a 60% total reduction from the September 1995 ROD. The Tri-Parties will continue to work towards further streamlining activities in order to focus resources on cleanup.

Modifying Criteria

8. State Acceptance

The State of Washington has concurred with this proposed amendment.

9. Community Acceptance

Newspaper notices, a fact sheet, and a proposed plan were issued on December 15, 1996. One comment was received during the 30-day public comment period. That comment was in support of the proposed amendment and is included in the Responsiveness Summary that is included as Appendix B of this amendment.

RCRA PAST-PRACTICE OPERABLE UNIT REQUIREMENTS

Waste sites in the 100-DR-2 Operable Unit are included in this action. Wastes from remediation of this RCRA past-practice unit can be disposed of at the ERDF according to the provisions made in the August 1, 1996, Explanation of Significant Differences (ESD) for the January 20, 1995, ERDF ROD. No redesignation of regulatory pathway from RCRA Past Practice (RPP) to CERCLA Past Practice (CPP) is required prior to disposal of wastes from this operable unit at ERDF. However, the ERDF ESD does require that all waste be the subject of a CERCLA decision document prior to disposal at the ERDF.

To meet applicable requirements of both CERCLA and RCRA while avoiding unnecessary duplication, the regulatory agencies will take the following steps for RPP waste that is to be disposed at the ERDF. The lead regulatory agency will prepare a CERCLA decision document following the CERCLA public involvement process that will authorize the selected response action. This ROD amendment meets this requirement for the RPP sites addressed herein.

In addition, Ecology will modify the Hanford Site-Wide RCRA Permit at the next scheduled modification. This modification will incorporate by reference the CERCLA remedy selection decision documents into the RCRA permit for purposes of satisfying corrective action requirements of WAC 173-303-646. Because the public received notice of the proposed remedy under CERCLA and was provided with an opportunity to comment, Ecology intends to use the Class I permit modification procedures for such changes, unless other changes being made at the same time require that Class II or Class III permit modification procedures be used instead. Specifically, a chapter will be added in Part IV of the Dangerous Waste portion of the RCRA permit for each RPP operable unit that is being addressed. Each chapter will incorporate by reference the documents upon which the CERCLA decision document was based, the CERCLA decision document, and any remedial design and/or remedial action documents. The schedule for completion shall be as specified in the approved CERCLA remedial design report. The Hanford Site-Wide RCRA Permit will be modified again by removing each of these chapters after the area addressed by the chapter has been deleted from the NPL and no further action is required, including institutional controls or monitoring. Again, Ecology intends to use the Class I permit modification procedures when removing these chapters, unless other changes being made at the same time require that Class II or Class III permit modification procedures be used instead. NPL deletion will occur only after applicable CERCLA requirements, including public involvement, have been met.

The Tri-Party Agreement recognizes the similarity of the RPP and CPP processes, and their common objective of protecting human health and the environment from potential releases of hazardous substances, wastes, or constituents. The regulatory conditions, such as ARARS, controlling remediation should remain similar and consistent in implementation whether a waste site is designated as RPP or CPP.

STATUTORY DETERMINATIONS

Considering the new information that has been developed and the broadening of the scope of cleanup activities, the EPA and Ecology believe that the amended interim remedy (remove, treat as required, and dispose) remains protective of human health and the environment, complies with Federal and state requirements that are applicable or relevant and appropriate to this remedial action, and is cost-effective. The addition of 34 analogous sites to the original 37 high-priority radioactive liquid waste sites selected for remediation in the September 1995 Interim Remedial Action ROD does not change the applicability of statutory requirements. The remediation project will continue to utilize permanent solutions to the maximum extent practicable for 100 Area source waste sites. However, because treatment of the principal threats of the sites was not found to be practicable, this amended interim remedy does not satisfy the statutory preference for treatment of a principal element.

Table 1. Cost Estimates From the September 1995 Interim Action ROD.

Number of Sites	Volume for Disposal	Cost of Site Remediation ($ million)	Cost of Disposal ($ million)	Total ($ million)
37	1,685,000 LCY*	$361	$130	$491

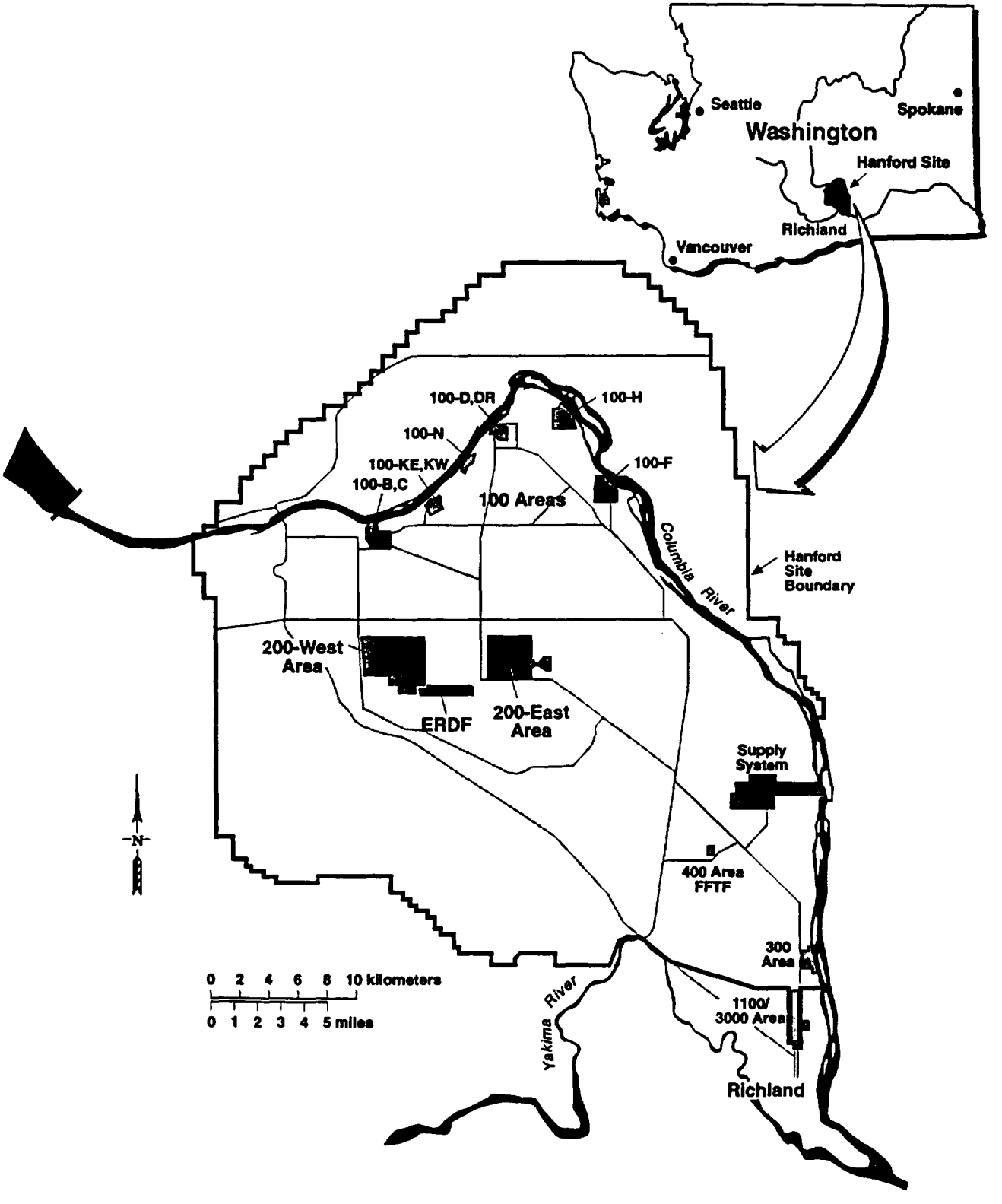
* *Loose Cubic Yards*

Table 2. Amended Cost Estimates.

Number of Sites	Volume for Disposal (LCY*)	Cost of Site Remediation ($ million)	Cost of Disposal ($million)	Total ($ million)
37-Initial	535,000	$49	$33	$82
34-Additional	668,000	$71	$41	$112
71-Total	1,203,000	$120	$74	$194

* *Loose Cubic Yards*

Figure 1. Map of The Hanford Site Showing the Reactors in the 100 Area and ERDF.



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APPENDIX A

ADDITIONAL 100 AREA RADIOACTIVE LIQUID WASTE SITES

Table A-1. Additional 100 Area Radioactive Liquid Waste Sites. (sheet 1 of 7)

Operable Unit	Site Name	Current Site Knowledge	Media/ Material	Contaminants of Potential Concern	Estimated Volume for Disposal (LCY [a])	Estimated Cost of Site Remediation ($ in 000's)	Estimated Cost of Disposal ($ in 000's)	Estimated Total Cost ($ in 000's)	Analogous Site [b]
100-BC-2	116-C-2A Pluto Crib	Received contaminated effluent from 116-C-2C Pluto Crib Sand Filter. Site is an unlined earthen structure 6.9 m by 4.7 m by 1.5 m deep with 5.7 m clean fill.	Timbers, Soil	C-14, Sr-90, Cadmium	7,439	$2,799	$459	$3,258	116-B-3 Pluto Crib
	116-C-2B/C Pluto Crib Pump Station/ Sand Filter	Received process effluent from C Reactor contaminated during fuel element cladding failures. Site is a pump station 4.6 m by 4.6 m by 9.1 m deep connected to an open-bottomed concrete box 12.7 m by 5.5 m by 5.6 m deep.	Concrete, Steel, Soil	Co-60, Sr-90, Cs-137, Eu-152, Pu-238, Pu-239/240	(Included with 116-C-2A)	(Included with 116-C-2A)	(Included with 116-C-2A)	(Included with 116-C-2A)	116-B-3 Pluto Crib
100-DR-1	116-D-3 French Drain	Received radioactive and hazardous liquid wastes from 108-D Maintenance Shop and Cask Decontamination Pad. Site is a 0.9-m-diameter gravel-filled pit 1.5 m deep.	Soil	Undetermined radionuclides	36	$82	$2	$84	116-B-4 French Drain
100-DR-2	116-DR-3 Storage Basin Trench	Received radioactive sludge and water from the 105-DR Fuel Storage Basin. Site is an unlined trench 18 m by 12 m by 3.1 m deep covered with clean fill.	Soil	Tritium, Co-60, Sr-90, Cs-137, Eu-152, Eu-154, Pu-238, Pu-239/240	1,099	$204	$68	$272	116-D-1A Fuel Storage Basin Trench
	116-DR-4 Pluto Crib	Received DR Reactor process effluent contaminated during fuel element cladding failures. Site is an unlined trench 3.1 m by 3.1 m by 3.1 m deep.	Timbers, Soil	Co-60, Sr-90, Cs-137, Eu-152, Eu-155, Pu-239/240	160	$155	$10	$165	116-D-2A Pluto Crib

Table A-1. Additional 100 Area Radioactive Liquid Waste Sites. (sheet 2 of 7)

Operable Unit	Site Name	Current Site Knowledge	Media/ Material	Contaminants of Potential Concern	Estimated Volume for Disposal (LCY [a])	Estimated Cost of Site Remediation ($ in 000's)	Estimated Cost of Disposal ($ in 000's)	Estimated Total Cost ($ in 000's)	Analogous Site [b]
100-DR-2 (cont.)	116-DR-6 Liquid Disposal Trench	Received process effluent from DR Reactor released during effluent system maintenance and process upgrades. Site is an unlined trench 15.2 m by 3.1 m by 3.1 m deep covered with clean fill.	Soil	Undetermined radionuclides	491	$97	$30	$127	116-DR-1 Process Effluent Disposal Trench
100-FR-1	UPR-100-F-2 Basin Leak Ditch (100-F-3)	Unplanned releases of process effluent from the north end of the 107-F Retention Basin. Site is a ditch approximately 30 m by 6.1 m by 4.6 m deep covered with clean fill.	Soil	Co-60, Sr-90, Cs-137, Eu-152	6,389	$880	$394	$1,274	116-B-1 Process Effluent Disposal Trench
	100-F-19 Process Effluent Pipelines	Transported process effluent from the F Reactor to the retention basins and outfall structures. Does not include process sewer or other pipelines.	Concrete, Steel, Soil	Co-60, Cs-137, Eu-152, Eu-155	28,301	$4,230	$1,745	$5,975	100-BC Process Effluent Pipelines
	108-F French Drain (100-F-15)	Received condensate from 108-F Biology Laboratory hoods. Site is a 1.2-m-diameter gravel-filled concrete pipe extending to an unknown depth.	Concrete, Steel	Pu-238, Pu-239/240	2	$92	$0	$92	116-B-4 French Drain
	116-F-1 Process Effluent Disposal Trench	Received process effluent from F Reactor, 190-F Building, and 116-F-14 Retention Basin, plus decontamination wastes from the 189-F Building. Site is an unlined trench 914 m by 12 m by 3 m deep.	Soil	C-14, Co-60, Sr-90, Cs-137, Eu-152, Eu-154, Lead, Zinc	5,111	$528	$315	$843	116-B-1 Process Effluent Disposal Trench

Table A-1. Additional 100 Area Radioactive Liquid Waste Sites. (sheet 3 of 7)

Operable Unit	Site Name	Current Site Knowledge	Media/ Material	Contaminants of Potential Concern	Estimated Volume for Disposal (LCY [a])	Estimated Cost of Site Remediation ($ in 000's)	Estimated Cost of Disposal ($ in 000's)	Estimated Total Cost ($ in 000's)	Analogous Site [b]
100-FR-1 (cont.)	116-F-2 Process Effluent Disposal Trench	Received process effluent from F Reactor, 190-F Building, and 116-F-14 Retention Basin, plus decontamination wastes from the 189-F Building. Site consists of three unlined trenches connected together.	Steel, Soil	C-14, Co-60, Sr-90, Cs-137, Eu-152, Eu-154, Chromium, Cadmium	2,556	$359	$158	$517	116-B-1 Process Effluent Disposal Trench
	116-F-3 Fuel Storage Basin Trench	Received process effluent and sludge from the F Reactor fuel storage basin. Site is an unlined trench 30 m by 6.1 m by 2.4 m deep.	Soil	Eu-152, Barium, Chromium, Lead, Mercury	3,067	$361	$189	$550	116-B-2 Fuel Storage Basin Trench
	116-F-4 Pluto Crib	Site was excavated as part of a treatability study in 1993. Contaminated soil was disposed at ERDF in 1996. Verification sampling may be required to confirm that the site meets cleanup goals.	Soil	Tritium, Co-60, Sr-90, Cs-137, Eu-152, Eu-154, Eu-155, Pu-238, Pu-239/240	0	$49	$0	$49	116-B-3 Pluto Crib
	116-F-5 Ball Washer Crib	Received wastes from decontamination of F Reactor equipment. Site is a below-ground structure approximately 4.6 m by 4.6 m by 3 m deep.	Concrete, Steel, Soil	Sr-90, Cs-137, Eu-154, Eu-155	1,208	$376	$74	$450	116-B-3 Pluto Crib
	116-F-6 Liquid Waste Disposal Trench	Received process effluent diverted during maintenance shutdowns of F Reactor. Site is an unlined trench 91 m by 30.5 m by 3.1 m deep.	Soil	Co-60, Sr-90, Cs-137, Eu-152, Eu-154, Chromium, Lead	27,408	$2,762	$1,690	$4,452	116-B-1 Process Effluent Disposal Trench

Table A-1. Additional 100 Area Radioactive Liquid Waste Sites. (sheet 4 of 7)

Operable Unit	Site Name	Current Site Knowledge	Media/ Material	Contaminants of Potential Concern	Estimated Volume for Disposal (LCY [a])	Estimated Cost of Site Remediation ($ in 000's)	Estimated Cost of Disposal ($ in 000's)	Estimated Total Cost ($ in 000's)	Analogous Site [b]
100-FR-1 (cont.)	116-F-9 PNL Animal Waste Leach Trench	Received radioactively contaminated wash and waste water from animal pens. Site consists of two unlined trenches connected together.	Soil	C-14	13,289	$1,116	$820	$1,936	116-B-1 Process Effluent Disposal Trench
	116-F-10 French Drain	Received water and nitric acid from decontamination of F Reactor fuel element spacers. Site is a 1-m-diameter gravel-filled tile pipe 2 m deep.	Tile, Steel, Soil	Co-60, Sr-90, Cs-137, Eu-152, Eu-154, Eu-155, Pu-238, Pu-239/240	3	$92	$0	$92	116-B-4 French Drain
	116-F-11 Cushion Corridor French Drain	Received radioactive liquids from decontamination of F Reactor equipment. Site is a 0.9-m-diameter gravel-filled tile pipe extending to an unknown depth.	Tile, Steel, Soil	Tritium, Co-60, Sr-90, Cs-137, Eu-152, Eu-155, Pu-238, Pu-239/240	92	$133	$6	$139	116-B-4 French Drain
	116-F-14 Retention Basins	Received process effluent from F Reactor. Site is a reinforced rectangular concrete retention basin approximately 415 m by 110 m by 7.3 m deep.	Concrete, Steel, Soil	Co-60, Sr-90, Cs-137, Eu-152, Eu-154, Pu-239/240, Chromium, Cadmium	50,449	$3,793	$3,111	$6,904	116-B-11 Retention Basin
100-FR-2	126-F-1 Powerhouse Ash Pit	Contains coal ash and soil radioactively contaminated by leakage from the F Reactor process effluent line. Site is an irregular area approximately 335 m by 145 m by 6.1 m deep.	Coal Ash, Soil	Co-60, Sr-90, Cs-137, Eu-152, Eu-154, Chromium	290,243	$32,978	$17,899	$50,877	116-B-1 Process Effluent Disposal Trench
100-HR-1	100-H-5 Sludge Burial Trench	Received sludge from the 116-H-7 Retention Basins. Site is a 45.7-m by 4.6-m by 4.6-m-deep trench covered to grade with 1.5 m of clean fill.	Soil	Co-60, Sr-90, Cs-137, Eu-152, Eu-154, Pu-238, Pu-239/240	1,267	$213	$78	$291	116-B-13 Sludge Trench

Table A-1. Additional 100 Area Radioactive Liquid Waste Sites. (sheet 5 of 7)

Operable Unit	Site Name	Current Site Knowledge	Media/ Material	Contaminants of Potential Concern	Estimated Volume for Disposal (LCY [a])	Estimated Cost of Site Remediation ($ in 000's)	Estimated Cost of Disposal ($ in 000's)	Estimated Total Cost ($ in 000's)	Analogous Site [b]
100-HR-1 (cont.)	100-H-17 Overflow	Two acres flooded by H Reactor process effluent from 1608-H Liquid Waste Disposal Trench. Site is bounded on the north by the trench and on the east, west, and south by railroad tracks. Site is covered with clean fill.	Soil	Tritium, Co-60, Sr-90, Cs-137, Eu-152, Eu-154, Eu-155, Pu-239/240, Chromium	26,833	$1,943	$1,655	$3,598	116-B-1 Process Effluent Disposal Trench
	116-H-3 French Drain	Received radioactively contaminated water and nitric acid from decontamination of H Reactor equipment. Site consists of two 0.9-m-diameter gravel-filled clay pipes extending to an unknown depth.	Tile, Steel, Soil	Tritium, Co-60, Sr-90, Cs-137, Eu-152, Eu-154, Pu-238, Pu-239/240, Chromium	234	$187	$14	$201	116-B-4 French Drain
100-KR-1	100-KR-1 Process Effluent Pipelines	Transported process effluent from KE and KW Reactors to the retention basins, trenches, and outfall structures. Does not include process sewer or other pipelines.	Concrete, Steel, Soil	Co-60, Sr-90, Cs-137, Eu-152, Eu-155	6,040	$3,272	$372	$3,644	100-BC Process Effluent Pipelines
	116-K-1 Crib	Received process effluent from KE and KW Reactors. Site consists of a crib area 61 m by 61 m surrounded by an earthen embankment extending 6.1 m above the crib bottom.	Soil	Co-60, Sr-90, Cs-137, Eu-152, Eu-154, Pu-239/240	10,229	$857	$631	$1,488	116-B-1 Process Effluent Disposal Trench
	116-K-2 Process Effluent Trench	Received process effluent from KE and KW Reactors. Site consists of an unlined trench 1,250 m by 13.7 m by 7.6 m deep that has been covered with clean fill.	Soil	Co-60, Sr-90, Eu-152, Eu-154, Pu-239/240, Chromium, Mercury	84,984	$6,953	$5,241	$12,194	116-B-1 Process Effluent Disposal Trench

Table A-1. Additional 100 Area Radioactive Liquid Waste Sites. (sheet 6 of 7)

Operable Unit	Site Name	Current Site Knowledge	Media/ Material	Contaminants of Potential Concern	Estimated Volume for Disposal (LCY [a])	Estimated Cost of Site Remediation ($ in 000's)	Estimated Cost of Disposal ($ in 000's)	Estimated Total Cost ($ in 000's)	Analogous Site [b]
100-KR-1 (cont.)	116-KE-4 Retention Basin	Received process effluent from KE Reactor. Site of three tanks 76.2 m diameter by 7.62 m high that were removed during 1994-1995. Leakage contaminated the soil beneath the tanks.	Concrete, Steel, Soil	Co-60, Sr-90, Eu-152, Eu-154, Pu-239/240, Chromium	48,060	$2,634	$2,964	$5,598	116-B-11 Retention Basin
	116-KW-3 Retention Basin	Received process effluent from KW Reactor. Site of three tanks 76.2 m diameter by 8.8 m high that were removed during 1994-1995. Leakage contaminated the soil beneath the tanks.	Concrete, Steel, Soil	Co-60, Sr-90, Eu-152, Eu-154, Pu-239/240, Chromium	47,890	$2,714	$2,953	$5,667	116-B-11 Retention Basin
100-KR-2	100-K-1 French Drain	Received radioactive effluent from 119-KW Sample Building. Site consists of a 0.3-m-diameter gravel-filled concrete pipe extending to an unknown depth.	Soil	Co-60, Sr-90, Cs-137, Eu-152, Eu-154, Pu-238, Pu-239/240	2	$110	$0	$110	116-B-4 French Drain
	116-KE-1 Condensate Crib	Received condensate from KE Reactor gas purification system. Site is a cobble-filled crib 12.2 m by 12.2 m by 7.9 m deep.	Concrete, Steel, Soil	Tritium, C-14	137	$139	$8	$147	116-B-3 Pluto Crib
	116-KW-1 Condensate Crib	Received condensate from KW Reactor gas purification system. Site is a cobble-filled crib 12.2 m by 12.2 m by 7.9 m deep.	Concrete, Steel, Soil	Tritium, C-14, Co-60, Sr-90, Cs-137, Eu-154, Eu-155, U-238	137	$139	$8	$147	116-B-3 Pluto Crib
	116-KE-2 Waste Crib	Received liquid waste from KE Reactor effluent test loop. Site is a wooden crib structure 4.9 m by 4.9 m by 9.8 m deep.	Timbers, Soil	Tritium, C-14	384	$477	$24	$501	116-B-3 Pluto Crib

Table A-1. Additional 100 Area Radioactive Liquid Waste Sites. (sheet 7 of 7)

Operable Unit	Site Name	Current Site Knowledge	Media/ Material	Contaminants of Potential Concern	Estimated Volume for Disposal (LCY [a])	Estimated Cost of Site Remediation ($ in 000's)	Estimated Cost of Disposal ($ in 000's)	Estimated Total Cost ($ in 000's)	Analogous Site [b]
100-KR-2 (cont.)	116-KE-3 French Drain	Received overflow from KE Reactor fuel storage basin. Site is a 6.1-m- diameter drain field with a 0.2-m-diameter perforated steel pipe 23.8 m deep.	Steel, Soil	Co-60, Sr-90, Cs-137, Eu-152, Eu-155, Pu-239/240	34	$141	$2	$143	116-B-4 French Drain
	116-KW-2 French Drain	Received overflow from KW Reactor fuel storage basin. Site is a 6.1-m- diameter drain field with a 0.2-m- diameter perforated steel pipe 23.8 m deep.	Steel, Soil	Co-60, Sr-90, Cs-137, Eu-152, Eu-155, Pu-239/240	34	$140	$2	$142	116-B-4 French Drain
Totals					664,408	$71,005	$40,922	$111,927	

[a] Loose Cubic Yards
[b] Also see Table 6 of the September 1995 ROD for a more complete description of analogous sites in the 100-BC-1, 100-DR-1, and 100-HR-1 Operable Units.

APPENDIX B
RESPONSIVENESS SUMMARY

U.S. Department of Energy
Hanford Site - 100 Area
Benton County, Washington
Amended Record of Decision

INTRODUCTION

This responsiveness summary meets the requirements of Section 117 of the *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA) as amended. The purpose of this responsiveness summary is to summarize and respond to public comments on the proposed amendment for the September 1995 Record of Decision (ROD) for the Hanford 100-BC-1, 100-DR-1 and 100-HR-1 Operable Units. The proposed amendment, issued on December 15, 1996, presented for public comment proposed changes to components of the remedy set forth in the September 1995 ROD.

The Tri-Parties announced the issuance of the proposed plan in the community newspaper. A 30-day comment period was provided for the public to read the proposed plan, review documents in the administrative record, and submit written comments. No request was made for a public meeting; therefore, no meeting was held. The proposed amendment was to add 34 more sites for remediation, lower the overall cost, and drop the treatment option of soils washing for volume reduction, and clarify the role of revegetation of waste site after remediation.

COMMUNITY INVOLVEMENT

The proposed amendment was presented to the Hanford Advisory Board, Environmental Restoration Committee in July and August 1996.

COMMENTS AND RESPONSES

One comment was received during the public comment period. That comment supports the proposed amendment.