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U.S. Department of Energy
100 K Area K Basins
Hanford Site – 100 Area
Benton County, Washington

Amended Record of Decision, Decision Summary and Responsiveness Summary

June, 2005

INTERIM REMEDIAL ACTION RECORD OF DECISION AMENDMENT

DECLARATION

SITE NAME AND LOCATION

U.S. Department of Energy
100 K Area K Basins
Hanford Site - 100 Area
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* (CERCLA), as amended by the *Superfund Amendments and Reauthorization Act of 1986* (SARA), 42 U.S.C. Section 9601; and to the extent practicable, the "National Oil and Hazardous Substances Pollution Contingency Plan" (NCP), 40 *Code of Federal Regulations* (CFR) 300. This ROD Amendment is based on the Administrative Record for the 100-KR-2 Operable Unit, USDOE Hanford Site.

ASSESSMENT OF THE SITE

The response action selected in this ROD Amendment is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment. Such a release, or threat of release may present an imminent and substantial endangerment to public health, welfare, or the environment.

BACKGROUND AND DESCRIPTION OF THE AMENDMENT TO THE REMEDY

In March-April 1999 The U.S. Department of Energy (DOE), the U.S. Environmental Protection Agency (EPA), and the Washington State Department of Ecology (Ecology) signed the K Basins Interim Action ROD. The ROD directed removal of the spent nuclear fuel (SNF), sludge, water, and debris from the two K Basins in Hanford's 100 K Area. The ROD also directed that the basins be decontaminated to the extent necessary to make it safe to drain the water from the basins which is used for shielding and contamination control from radioactivity in the basins.

The amended remedy changes the sludge disposition and how underwater debris is retrieved, treated, and disposed from both the 105-K East and 105-K West Spent Nuclear Fuel (SNF) Basins. These changes will result in increased protection to human health and the environment.

Remedial alternatives evaluated in the K Basins ROD were reviewed previously by the public under the *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA) *of 1980* process in a proposed plan, "*Proposed Plan for the K-Basins Interim Remedial Action*" (DOE/RL-98-71). The remedies selected in the 1999 ROD were: (1) remove the SNF, stabilize the SNF, and place the SNF into interim storage, (2) remove and transfer the sludge to interim storage

without treatment to support final disposal, (3) remove and treat the water from the basins, and (4) remove debris from the basins and dispose on-site or place in storage for later disposal.

This revision does not change the selected remedy for SNF or basin water. The remedy for sludge is modified by including sludge treatment prior to interim storage. The remedy for debris is modified by grouting in place some of the debris remaining in the basins and then removing the debris at the time the basins are removed. Removal of the basins is already required by the 100 Area Remaining Sites ROD signed in 1999.

This ROD amendment requires the sludge be treated and packaged for disposal, and shipped off-Hanford to a national repository. This ROD amendment also amends the remedy for some of the debris which will remain in the basins while they are partially filled with a cement-based grout. The debris grouted in place will be removed in conjunction with removal of the basins.

The original ROD required removal of all the contents of the basins, including the debris, plus some decontamination activities. Another ROD, for the 100 Area Remaining Sites, signed in July 1999, covered many 100 Area waste sites including the K Basins. This Remaining Sites ROD requires removal of the engineered structure of the basins and underlying and adjacent contaminated soil that was contaminated above cleanup levels.

This ROD amendment, by leaving debris in the basins to be removed as part of the engineered structure, results in a portion of the physical work being transferred from the original K Basins ROD to the Remaining Sites ROD. Debris not removed under the direction of this ROD Amendment will be removed in accordance with the Remaining Sites ROD and the Hanford Tri-Party Agreement milestone M-034-32 which requires complete removal of the K East basin by March 2007, and milestone M-034-00Awhich requires complete removal of the K West basin by March 2009.

Section 40 of the *Code of Federal Regulations* (CFR) 300.435(c)(2) (the National Contingency Plan (NCP)); identifies how to address and document changes to the selected remedy after issuance of a ROD. This ROD Amendment, in accordance with the above referenced section, documents fundamental changes to the remedy set forth in the 1999 K Basins ROD. Public participation and documentation procedures have been followed as specified in Section 117 of CERCLA and 40 CFR 300.435(c)(2)(ii).

Amended Sludge Remedy

This ROD Amendment is necessary to support ongoing remediation of the K Basins and management of resulting waste. One of the waste streams resulting from remediation of the K Basins is radioactive sludge that will be treated prior to disposal. The 1999 ROD directed the sludge be removed from the basins and placed in storage pending future treatment, and that treatment was not included within the scope of the 1999 ROD. This ROD Amendment eliminates extended storage of untreated sludge, requires sludge be treated for disposal, and requires that the treated sludge be delivered to a national repository for disposal. This fundamental change in the remedy requires a ROD amendment.

Amended Debris Remedy

The 1999 ROD directed that debris be removed, treated as required, and disposed on-site to the Environmental Restoration Disposal Facility (ERDF) as appropriate. The ROD did not specify the details of debris retrieval, but the anticipated process was to be an item-by-item removal with any treatment done outside of the basin. Some of the debris has and will continue to be removed and managed in that manner. However, this ROD amendment authorizes a large portion of the debris to remain in the basins and encased in grout, to be removed as part of the demolition and removal of the basin structure. Some of the debris is not amenable to the grout in-place remedy, so the original remedy for some debris will still be used. Explicitly identifying the option of grouting in-place prior to removal is not a fundamental change to the original remedy, but is included in this ROD amendment and the preceding feasibility study and proposed plan as a means to better describe and disclose what will be done and to provide specific public comment opportunity.

STATUTORY DETERMINATIONS

Although this ROD Amendment changes components of the remedy selected in the original ROD, the remedy, as modified, continues to be protective of human health and the environment. The remedy, as amended, complies with Federal and state requirements identified in the ROD and supplemented in this ROD amendment that are legally applicable or relevant and appropriate and is cost effective. The remedy, as amended, utilizes permanent solutions to the maximum extent practicable for this site. Treating sludge and debris satisfies the statutory preference for remedies that employ treatment as a principal element for the waste stream.

Because hazardous substances will remain onsite above health-based levels, a review will be conducted at least every five years to ensure that the remedy continues to provide adequate protection of human health and the environment.

Signature sheet for the Amendment to the Record of Decision for the USDOE Hanford Site 100 K Area K Basins between the U.S. Department of Energy and the U.S. Environmental Protection Agency, with concurrence by the Washington State Department of Ecology.

Keith A. Klein
Manager, Richland Operations
U.S. Department of Energy

6/20/05
Date

Signature sheet for the Amendment to the Record of Decision for the USDOE Hanford Site 100 K Area K Basins between the U.S. Department of Energy and the U.S. Environmental Protection Agency, with concurrence by the Washington State Department of Ecology.

Daniel D. Opalski, Director
Office of Environmental Cleanup
U.S. Environmental Protection Agency

6/9/2005
Date

Signature sheet for the Amendment to the Record of Decision for the USDOE Hanford Site 100 K Area K Basins between the U.S. Department of Energy and the U.S. Environmental Protection Agency, with concurrence by the Washington State Department of Ecology.

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

6/15/05
Date

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1 Comments and Responses from a previous public comment period on Hanford Tri-Party Agreement Milestones for the K Basins Sludge and the K Basins cleanup. These were referenced in public comments for for this ROD Amendment. 26

DECISION SUMMARY

1.0 INTRODUCTION

This document presents an Amendment to the Record of Decision (ROD) for the K Basins at the Hanford Site.

Site Name and Location

U.S. DOE Hanford 100 K Area K Basins
Hanford Site - 100 Area
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) is the lead agency. The Washington Department of Ecology (Ecology), as a signatory to the original 1999 K Basins ROD, concurs with this amendment to the K Basins ROD.

Statutory Citation for a ROD Amendment

The K Basins ROD was signed by the EPA, Ecology, and DOE in March-April 1999. In 40 *Code of Federal Regulations* (CFR) 300.435(c)(2), the National Contingency Plan (NCP) provisions are specified for addressing and documenting changes to the selected remedy after issuance of a ROD. This ROD Amendment documents the fundamental changes to the remedy set forth in the 1999 K Basins ROD. Public participation and documentation procedures have been followed as specified in Section 117 of CERCLA and 40 CFR 300.435(c)(2)(ii).

Need for the ROD Amendment

This ROD Amendment is necessary to support ongoing remediation of the K Basins and management of resulting waste. One of the waste streams resulting from remediation of the K Basins is radioactive sludge that needs treatment prior to disposal. The 1999 ROD directed the sludge be removed from the basins and placed in storage pending future treatment. Sludge treatment was not included within the scope of the 1999 ROD. This ROD amendment eliminates extended storage of untreated sludge, requires sludge be treated for disposal, and requires that the treated sludge be delivered to a national repository for disposal. That is a fundamental change in the remedy that requires a ROD amendment. A second significant but non-fundamental change included in this ROD amendment pertains to how contaminated debris will be removed from the K Basins. The 1999 ROD directed that debris be removed, treated as required, and disposed at Hanford to the Environmental Restoration Disposal Facility (ERDF) as appropriate. The ROD did not specify the details of debris retrieval, but the anticipated process was to be an item-by-item removal with any treatment done outside of the basin. Some of the debris has and will continue to be removed and managed in that manner. However, this ROD amendment authorizes a large portion of the below water debris to

remain in the basins and encased in grout, to be removed as part of the demolition and removal of the basin structure.

Public Involvement

A public notice was placed in the *Tri-City Herald* on January 19, 2005, announcing the availability of the proposed plan and administrative record, and the start of the public comment period. On January 18, 2005 approximately 890 copies of a fact sheet describing the amendment proposal were sent out by mail to a Hanford interested mailing list. An electronic mail notification was sent on January 19, 2005 to a Hanford mailing list of 600 individuals. A public comment period was held from January 19, 2005, through February 22, 2005. Public comments were received from three individuals/agencies. Those comments and responses from DOE and EPA are provided in section XI. No requests were received for a public meeting, therefore, no public meeting was held. The proposed amendment was discussed with the Hanford Advisory Board River and Plateau Committee on January 12, 2005. The decision to amend the ROD is based on the Administrative Record for the 100-KR-2 operable unit. The location of the Administrative Record is listed below.

Administrative Record

Technical documentation for this amendment is further supported by information which can be found in the Administrative Record for the 100-KR-2 operable unit. This ROD Amendment is based on, and will become part of, the Administrative Record for 100-KR-2, 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 Prince Millar Library SW Harrison and Park Portland, Oregon 97207-1151	**DOE Richland Public Reading Room** Washington State University, Tri-Cities 100 Sprout Road, Room 101L Richland, Washington 99352

2.0 SITE HISTORY

In 1988, the Hanford Site was scored using the EPA's hazard ranking system. Based on the scoring, the Hanford Site was added to the National Priorities List (NPL) in July 1989 as four sites:

1100 Area, 100 Area, 200 Area, and 300 Area. Each of these areas was further divided into operable units (i.e., a grouping of individual waste units based primarily on geographic area and common waste sources). These operable units contain contamination in the form of hazardous waste, radioactive/hazardous mixed waste, and other CERCLA hazardous substances.

In anticipation of the NPL listing, DOE, EPA, and Ecology entered into the *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) in May 1989. This agreement established a procedural framework and schedule for developing, implementing, and monitoring remedial response actions at Hanford. The Tri-Party Agreement also addresses *Resource Conservation and Recovery Act of 1976* (RCRA) compliance and permitting.

The 100 Area, which encompasses approximately 68 km^2 (26 mi^2) bordering the south shore of the Columbia River, is the site of nine retired plutonium production reactors. Two of the reactors (K-East and K-West) reside in the 100-KR-2 Operable Unit in the 100-K Area. Adjacent to each of these reactors is a spent nuclear fuel (SNF) storage basin (figure 2, 100-KR-2 Operable Unit with K Basins). The contents of those basins are addressed in this ROD amendment.

3.0 REMEDY SELECTED IN THE ROD

The remedial action objectives from the 1999 ROD are unchanged in this amendment. The objectives from the 1999 ROD are reproduced below:

> *The overall purpose of the interim remedial action is to mitigate the potential to release hazardous substances from the K Basins by removing the SNF, debris, sludge, and water from the K Basins, deactivate the basins, and transfer the SNF and waste to facilities that will manage them in a manner that protects human health and the environment. The scope of this interim remedial action does not include final disposition of the basin structures themselves or remediation of the underlying soil or groundwater. Disposition of the basins, contaminated soil, and groundwater has been or will be addressed under other CERCLA actions as described in Section IV. This interim remedial action only addresses the immediate risks associated with the contaminants in the basins. Enforceable Tri-Party Agreement milestones have been established to accomplish this interim remedial action in a safe and expeditious manner. Final cleanup levels appropriate to future use scenarios are beyond the scope of this interim remedial action, and have been or will be set in other CERCLA decision documents.*
>
> *The Remedial Action Objectives are as follows:*
>
> * *Reduce the potential for future releases of hazardous substances from the K Basins to the environment.*
> - *Remove hazardous substances from the K Basins near the Columbia River in a safe and timely manner.*
> - *Provide for safe treatment, storage, and final disposal of the SNF, sludge, water, and debris removed from the K Basins.*
> - *Prevent further deterioration of the SNF.*
> * *Reduce occupational radiation exposure to workers at the basins.*
> * *Address the sludge management concerns identified in Section 5.2.1 of the ROD*

* *Develop the most cost effective site-wide approach, consistent with the CERCLA nine criteria, for treatment, storage, and disposal of sludge.*
* *Treat, store, and/or dispose of sludge soon after removal.*

The remedial action objectives in the 1999 K Basins ROD did not address all the remedial action for the K Basins. Subsequent actions under CERCLA to remediate the basins and releases of hazardous substances to the underlying soil and groundwater will be performed as directed by the Remaining Sites Interim Action ROD.

The selected remedy in the 1999 Interim Remedial Action ROD was to mitigate the potential to release hazardous substances from the two 100-K Area spent nuclear fuel (SNF) storage basins. Completion of this interim remedial action prepares the basins for remediation as waste sites 100-K-42 (K-East Basin) and 100-K-43 (K-West Basin) under the 100 Area Remaining Sites Interim Action ROD (EPA/ROD/R-99-039 approved July 1999). The major components of the selected remedy in the K Basins ROD consisted of the following:

* **Remove SNF from the K Basins**. In the basins, the SNF will be loaded into baskets, the baskets loaded into multi-canister overpacks, removed from the K Basins and transported to the Cold Vacuum Drying (CVD) facility located in the 100 K Area. This interim remedial action will be completed upon receipt at the CVD, although it is expected that the fuel will be dried at the CVD, then transported to the 200 Area of Hanford for underground vault storage at the Canister Storage Building, and ultimately disposed off-Hanford at the national geologic repository.
* **Remove sludge from the K Basins**. The sludge will be separated into transuranic (TRU) and non-TRU fractions as it is removed to the extent practicable.
  - The description in this ROD is based on the assumption that the majority of the sludge will be TRU and will be transferred to a permitted storage and treatment facility in the 200 Area. The interim remedial action will be completed upon receipt at the sludge storage and treatment facility, although it is expected that the TRU sludge will then be managed with other Hanford TRU waste and ultimately disposed off-Hanford at the Waste Isolation Pilot Plant.
  - Non-TRU sludge will be transported to the Environmental Restoration Disposal Facility (ERDF) located in the 200 Area, treated to meet the waste acceptance criteria, and disposed.
* **Treat and remove water from the K Basins**. Water treatment at the K Basins will be done using the Integrated Water Treatment System (IWTS) during operations as well as pre-treatment prior to water removal from the basins. After pre-treatment in the basins the water will be pumped into tanker trucks and transported to the Effluent Treatment Facility (ETF) in the 200 Area. The interim remedial action will be completed upon receipt at the ETF, although it is expected that water will then be further treated at the ETF and disposed at the State Approved Land Disposal Site also located in the 200 Area.
* **Remove debris from the K Basins**. The debris will be treated as needed to meet the waste acceptance criteria of the storage or disposal facility and transported to storage or disposal facilities. Treatment may occur at the K Basins, at a separate debris treatment facility, or at the storage or disposal facility. It is anticipated that most of the waste will be disposed of at the ERDF. Debris that does not meet waste acceptance criteria for ERDF will be stored in an

existing permitted facility in the 200 Area. Debris storage in the 200 Area is beyond the scope of the interim remedial action.

* **Deactivate the basin**. Material removed will be disposed as debris.
* **Institutional Controls**. The DOE will maintain or implement access restrictions to prevent public access until final remedial action is completed.

4.0 BASIS FOR THE DOCUMENT

Since the 1999 ROD, additional information on the treatment requirements for disposal as well as additional information on physical and radiological characteristics of the sludge is now available that makes it efficient to treat the sludge following its removal from the basins to prepare it for disposal at a national repository and to make it less costly to store prior to disposal.

5.0 DESCRIPTION OF THE MODIFIED REMEDY

The remedy is modified for sludge and a portion of the debris in the bottom of the K Basins.

The modified remedy (Alternative 2 in section 6.0) integrates sludge removal and treatment so that treatment occurs earlier than under the prior remedy (Alternative 1 in section V) that placed untreated sludge into interim storage. Sludge Alternative 1 is No Action/No Change (from the existing ROD) and equates to the mandatory No Action alternative for CERCLA evaluation. The modified remedy for sludge could use a combination of the treatment technologies (physical, chemical, thermal, and solidification) that meet treatment performance criteria and were evaluated in the original feasibility study. None of the treatment technologies are eliminated. Further, since 1998, no significant changes to these technologies have been identified so the information and evaluations remain valid. What has changed and provides the impetus for this ROD amendment is that additional information on the treatment requirements for disposal as well as additional information on physical and radiological characteristics of the sludge has become available that makes it efficient to treat the sludge following its removal from the basins to prepare it for disposal at a national repository and to make it safer to store prior to disposal. Safety analyses associated with the interim storage of sludge in an untreated state have shown engineering and administrative controls beyond that originally envisioned would be necessary. The details of the treatment methodology will be provided in the Remedial Design Report/ Remedial Action Work Plan (RDR/RAWP).

5.1 Modified Sludge Remedy

5.1.1 Principal Sludge Treatment Needs

Sludge will require treatment for disposal and for placing it in a safer state for interim storage prior to disposal at a national repository. Treatment must address acceptance criteria for reactive metal, free liquids, hydrogen gas, and radiological dose (for contact handled waste). Two predominant waste treatment criteria must be achieved to prepare the waste for disposal and to place the sludge in a safer configuration are: the waste can contain no drainable liquids and must not generate hydrogen to the extent of requiring stringent engineering and administrative controls. Secondary consideration includes plutonium levels and thermal loading per shipment/shipping container.

Basin sludge is a multiphasic polychlorinated biphenyl (PCB) remediation waste. The original FFS included identification of substantive waste management standards and a risk analysis of air emissions which demonstrated an acceptable basis for a TSCA PCB risk-based disposal approval per 40 CFR 761.61(c). On-site actions subject to TSCA disposal requirements will meet the substantive requirements of a risk-based disposal approval because the activities do not pose an unreasonable risk of injury to health or the environment from PCBs. No sludge treatment performance specifications with respect to PCBs are being established, since the waste acceptance criteria for PCBs at the candidate disposal facilities can be met without treatment, and these facilities meet the substantive requirements for a PCB disposal facility. The DOE is in the process of seeking formal TSCA risk-based disposal approval for treatment of the NLOP sludge at Hanford's T-Plant which is an off-site facility. In another separate action, DOE will seek a risk-based disposal approval for treatment of the remaining sludge when the remedial design for that activity has been approved in the RDR/RAWP if that treatment occurs at an off-site facility.

5.1.2 No Free Liquids

Waste acceptance criteria for disposal facilities typically requires that waste forms contain no free liquids. The baseline plan for sludge preparation for disposal calls for immobilizing waste in grout to bind up free liquid. Other means of elimination or binding free liquids are under consideration and could be employed to meet disposal criteria. Waste loadings of approximately 25% (with 10% or less in some waste drums) are being considered and will meet this criteria as well as radiolytic hydrogen generation and plutonium limit requirements.

5.1.3 Hydrogen Gas Generation

Waste acceptance criteria for disposal facilities and transportation criteria typically contain provisions for only recognizing hydrogen generation from radiolysis. Radiolysis of bound water is expected to be the principal source of hydrogen generation and is controlled by limiting the waste loading and bound water in each package and each shipment. K Basin sludge, as it presently exists, contains a small fraction of uranium metal fines from fuel corrosion that is subject to corrosion in water, which liberates hydrogen as a by-product. In sufficient concentrations, metallic uranium fines also are pyrophoric under certain conditions. To minimize the hazard of hydrogen during interim storage, transportation, and disposal at a national repository, the bulk of the metal fines have to be removed or passivated to suppress the mechanism for hydrogen generation (pyrophoric characteristics). One means of mitigating this hazard is to separate metal fines from the bulk sludge stream, oxidation of those fines, and recombining the oxidized uranium with the bulk sludge stream before solidification.

5.1.4 Plutonium Limits and Dose Considerations

The bulk of the KE and KW sludge is sufficiently rich in fuel corrosion products that producing a CH waste form is highly impractical. The dilution factor required to achieve a waste form with a contact dose of 200 millirem or less produces tens of thousands of waste packages requiring an excessive number of transportation shipments. Package estimates for disposal as RH waste are in the low thousands.

5.1.5 Sludge Treatment

The modified remedy requires the sludge to be treated, packaged for disposal, interim stored pending shipment, and shipped to a national repository for disposal. A portion of the sludge, anticipated to be a small amount if any, following treatment may qualify for disposal at ERDF. If so, that treated sludge will be disposed at ERDF. This ROD amendment does not modify the original remedy to remove the sludge from the basins.

All sludge will be removed and treated at 100 K Area or anther EPA-approved 200 Area facility. The sludge is treated using a combination of treatment technologies (including chemical, physical, thermal, and solidification) as described in the original feasibility study. Treatment technologies include chemical, physical, thermal, and solidification. This alternative commits to performing sludge treatment and establishes a schedule. The details of sludge treatment methodology and schedule will be contained in a modification of the RDR/RAWP for the K Basins. The sludge will be treated to prepare it for disposal at a national repository and to place it in a safer state for interim storage. Treated sludge is shipped to CWC and/or another facility for storage pending shipment to a national repository for disposal. Capacity for short-term, contingency storage of untreated but containerized sludge ('lag storage') may be made available on-Hanford at a 200 Area storage facility while awaiting transfer of sludge to a treatment facility.

5.2 Modified Debris Remedy

The remedy for below water debris is modified such that all the debris is not removed from the basins prior to basin decontamination and water removal. Contaminated debris above and around the basins will be removed as identified in the original 1999 K Basins ROD. Contamination below and adjacent to the basins (such as piping and soil) will still be removed and the debris disposed at ERDF, as selected in the 100 Area Remaining Sites Interim Action ROD. The remedy for below water debris is modified in this ROD amendment in that remaining underwater debris (such as racks, fuel canisters, and processing equipment) in the basins will be size-reduced as necessary and encapsulated in place with cement-based grout. Grouted-in debris and basin structures will be removed simultaneously with the basins. Basin debris will be disposed at ERDF in the 200 Areas (if debris meets disposal criteria for that facility) or to other waste management facilities in the 200 Areas for final treatment and disposal as approved by EPA. The grouting will occur as part of basin deactivation activities and serves two purposes. The primary purpose is to provide radiological shielding from contaminated basin floor surfaces. Secondarily, the grout serves to encapsulate debris that remains in the basins, thereby reducing risk and eliminating the need to remove all underwater debris. The demolition of the basin including the encapsulated debris will be performed as part of remedial actions described in the 100 Area Remaining Sites Interim Action ROD.A treatment plan and disposal schedule for all waste will be included in the RDR/RAWP.

The grout will be installed underwater using grout lances (i.e., pipes positioned vertically into the basin pools that will allow introduction of grout directly to the basins' floor). It is anticipated that 6 feet (1.8 meters) of grout will be necessary in KE Basin. The depth of grout needed for the KW basin has not been determined. Grout will be installed to the level required to cover debris remaining in the basin. The grout will be installed around the racks and debris, encasing these into the grout

block. The four pits and the discharge chute around the perimeter of the basins will be grouted full-depth.

Basin removal, which shall be done in accord with the 100 Area Remaining Sites Interim Action ROD, and as a result of the actions from this ROD amendment, will include removal of the grouted debris. The RDR/RAWP for the Remaining Sites shall be modified accordingly. The Remaining Sites ROD governs the excavation and the removal of the basins and all below-grade structures, including the basin leachate collection systems, and contaminated soil.

A treatment plan and disposal schedule for all wastes will be included in the RDR/RAWP.

6.0 DESCRIPTION OF ALTERNATIVES

6.1 Sludge Alternatives

Sludge Alternative 1 is No Action/No Change (from the existing ROD) and equates to the mandatory No Action alternative for CERCLA evaluation. Alternative 1 requires the sludge be removed from the K Basins. The existing ROD requires the sludge be containerized and placed into storage in the 200 Area to await future treatment.

Sludge Alternative 2 amends the remedy for sludge such that it will be removed from the K Basins, treated and packaged to meet the WAC of the disposal facility as contact and/or remote handled waste. After treatment and temporary storage at Hanford, the treated waste shall be shipped to a national repository for disposal.

6.2 Debris Alternatives

Debris Alternative 1 is No Action/No Change (from the existing ROD) and equates to the mandatory No Action alternative for CERCLA evaluation.

Debris Alternative 2 amends the remedy for debris to allow contaminated debris to remain in the basin and be encased in a grout pour into the bottom of the basin. The debris would be removed as part of the demolition and removal of the basin structure. Alternative 2 is similar to alternative 1 in that after the debris is removed from the basin, it is disposed at ERDF in compliance with the ERDF WAC.

7.0 EVALUATION OF ALTERNATIVES

The National Contingency Plan 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. All remedies must meet the threshold criteria 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 addition, these alternatives are evaluated relative to the Remedial Action Objectives in the ROD. The nine criteria are:

Threshold Criteria
- Overall protection of human health and the environment
- Compliance with Applicable Relevant and Appropriate Requirements (ARARs)

Balancing Criteria
- Long-Term Effectiveness and Permanence
- Reduction of Toxicity, Mobility, or Volume through Treatment
- Short-Term Effectiveness
- Implementability
- Cost

Modifying Criteria
- State of Washington Acceptance
- Community Acceptance

The remedies being compared in this section include two alternatives for sludge--Alternative 1 (No Action/No Change from ROD) and Alternative 2 (Remove, Treat, ship to a national repository for disposal). The debris alternatives compared are Alternative 1 (No Action/No Change from ROD) and Alternative 2 (leave some underwater debris in basins and grout).

7.1 Overall Protection of Human Health and the Environment

Sludge. All evaluated alternatives meet this first criteria by removing sludge from the basins and the proximity of the river. Alternative 1 did not specify treatment and so there is inherent risk associated with transport and interim storage of untreated sludge. Alternative 2 removes sludge from the basins but also provides for sludge treatment and disposal. No alternative satisfied the ROD preference to treat 100 percent of the sludge volume using a single treatment alternative, taking full advantage of economies of scale presented by combining sludge treatment with other large capacity treatment processes under development at Hanford. However, such a sitewide treatment system currently is not available to treat the sludge.

All the sludge handling and treatment actions are planned with appropriate safety precautions such that all the alternatives provide overall protection of human health and the environment. From the perspective of protectiveness, the difference in alternatives results from the difference in how long the safety systems need to be maintained (during storage and treatment).

Debris. Both Alternative 1 and Alternative 2 provide equivalent overall protection of human health and the environment on completion of the remedial action. Both alternatives prepare the basins for

subsequent remedial action in accord with the 100 Area Remaining Sites Interim Action ROD. Both alternatives result in the debris being sent to the same location, namely ERDF.

7.2 Compliance with ARARs

Sludge and Debris. Both alternatives meet ARARs. ARARs are identified in Section IX

7.3 Long-Term Effectiveness and Permanence

Sludge. Sludge Alternative 1 contains uncertainty regarding how long untreated sludge remains in interim storage and when sludge is treated. Although beyond the scope of Alternative 1, it anticipates the future treatment of sludge into a waste form acceptable for disposal, and disposal at a national repository, at which time future long-term effectiveness and permanence for all the alternatives are the same. Alternative 2 eliminates years of storage of untreated sludge and achieves long-term effectiveness and permanence sooner. Treatment and disposal is not included in the Alternative 1 remedy.

Debris. Alternatives 1 and 2 both provide long-term effectiveness. Under both alternatives most if not all the debris ends up disposed in ERDF, though with Alternative 2 some of the debris will be disposed of later as part of disposal of the basin structures.

7.4 Reduction of Toxicity, Mobility, or Volume through Treatment

Sludge. Alternative 1 does not include treatment that would address some of the intrinsic hazards associated with interim storage of untreated sludge but provides a temporary reduction of mobility by storage in containers at a permitted facility at Hanford. Alternative 2 provides for treatment of waste that would address the intrinsic hazards and mobility.

Regarding the statutory preference for treatment, Alternative 1 does not include treatment (though eventual treatment is expected as discussed above). For Alternative 2, treatment and packaging would result in reduced mobility of the contaminants. Materials added to treat the sludge results in a volume increase but surface radiation dose rate will decrease.

Debris. Alternative 1 and Alternative 2 would both address above-water debris in the same manner. However, Alternative 2 leaves contaminated debris in the basin but operates in conjunction with the basin deactivation remedy that grouts the basins and in so doing treats remaining underwater debris by encapsulation in the same grout matrix. Debris in the bottom of the basins is processed differently. Alternative 2 provides more opportunity to shield basin workers from radiation by having much of the debris encased in grout before the shielding water is removed from the basins. Both alternatives end up with debris which has been treated to remove void spaces and the debris disposed in ERDF, so they are similar for this evaluation criteria.

7.5 Short-Term Effectiveness

Sludge. Alternative 1 does not include near-term sludge treatment which results in potential risk from extra handling as part of the storage process. Alternative 2 provides for early treatment of

sludge which reduces waste management risks during storage but introduces risk resulting from the treatment process. Overall the treatment of sludge (Alternative 2) provides better short-term effectiveness in protecting workers, the public, and the environment by minimizing the threat of release from handling and transport of untreated sludge and by providing for earlier sludge treatment for disposal. Alternative 2 expedites when treatment could begin which thereby expedites completion of the project and reduces the time required to meet RAOs.

Debris. Alternative 1 and Alternative 2 both reduce risk to the public and the environment equally from contaminated above-water debris by debris removal and disposal. Alternative 1 exposes workers and the environment to radiological and chemical exposure risks associated with removing, decontaminating, packaging, and transporting underwater debris. Alternative 2 would leave some contaminated debris in the basin thereby eliminating the risk, however, Alternative 2 would leave contaminated debris in the basin longer. Risk would be mitigated by encapsulating the debris in grout in conjunction with basin deactivation.

7.6 Implementability

Sludge. Alternative 1 leaves technical and administrative feasibility issues (e.g., coordination with future treatment and disposal activities) and risks associated with treatment for future consideration/action by not providing for treatment. Alternative 2 provides for treatment of the sludge. Alternative 2 better meets this criterion by beginning sludge treatment earlier. While the treatment processes that will be used are not new technology, the hazards associated with the handling and processing of this waste into a form that is safer, are unique and may require additional characterization data to support the establishment of process operating parameters and preparation of documented safety analyses. While the treatment processes that will likely be used are not new technologies, their use in treating material with the radiological and physical characteristics of this sludge is not common. However, based on tests of sludge and grout mixtures, this material can be successfully treated.

Debris. Alternative 1 requires removal of all basin debris and the technically demanding activities associated with removing, decontaminating, packaging, and transporting large numbers of individual debris pieces in a safe and compliant manner. Alternative 2 leaves substantial quantities of underwater debris in place thereby reducing debris processing activities making this alternative the most technically and administratively feasible alternative. The remaining debris will be grouted in place in conjunction with basin deactivation activities to become an integral portion of the basin structure that will be removed using technically simple mechanical processes and bulk transportation. Addition of grout to the basins does not affect basin removal in any significant way. Alternative 1 and Alternative 2 are the same with regard to above-water debris.

7.7 Cost

Sludge. Sludge retrieval costs are a common element for the new and prior sludge alternative that were identified and evaluated in issuing the ROD in 1999. Sludge cost items identified in the 1999 ROD are as follows:

Sludge Costs Identified in the 1999 ROD

Sludge Item	CERCLA Cost	NON-CERCLA Cost	Total Cost
Sludge Retrieval/Removal (Design/Modification/Construction)	$12.6 M	$7.2 M	$19.9 M
Sludge Retrieval/Removal (Operations)	$6.0 M	$0.0 M	$6.0 M
Sludge Transport/Offloading (Design/Modification/Construction)	$4.6 M	$0.3 M	$4.9 M

Alternative 2 costs for sludge treatment and packaging for off-Hanford Site disposal at a national repository soon after removal are as follows. This estimate contains an uncertainty of +50% to –30%. Actual cost may be more or less depending on the treatment process which will be identified in the RDR/RAWP.

Sludge Treatment Design/Procure	$ 45 million
Sludge Treatment Installation	$ 5 million
Sludge Treatment Operations	$ 8 million
Sludge Container Storage	$ 8 million (based on 2 years of storage)
Sludge Transport costs to treatment facility	$ 42 million
Sludge Contingency	$ 5 million
Total sludge treatment and storage	$ 113 million

Until sludge is transported to the national repository for disposal, interim storage capacity for treated sludge ("lag storage") will be available at a 200 Area storage facility. Extended interim storage will increase the cost of this alternative.

Debris. The cost of removal, treatment, packaging, transport, and storage or disposal of all basin debris under Alternative 1 was calculated to be approximately $19 million. The above-water debris would be removed from the basins under both Alternatives 1 and 2 at an estimated cost of approximately $11 million. The below-water debris that would be left in the basins under Alternative 2 represents the vast majority of the highly contaminated debris. No incremental cost would be added by leaving this debris in place under Alternative 2 because the cost of removing the grouted debris as an integral portion of the basin structure is already incorporated into basin deactivation and removal costs. Debris Alternative 2 would eliminate the cost of piece by piece debris removal, decontamination, packaging, and disposal for a reduction of approximately 100,000 labor hours and an overall cost savings of approximately $8 Million. Consequently, Alternative 2 represents a cost saving while greatly reducing worker exposure. Further, the grouted debris would be removed using mechanical methods and transported in bulk along with basin structures making debris disposal safer, more efficient, and more economical.

7.8 State of Washington Acceptance

Sludge and Debris. The State of Washington concurs with this selected remedy and ROD Amendment.

7.9 Community Acceptance

Sludge and Debris. The community supports the selected remedy. Public comment expressed concern with the lack of specificity on how or where the sludge would be treated, and where the treated sludge would be disposed. But there is community support for near-term treatment of the sludge rather then extended storage of untreated sludge.

7.10 Summary of Comparative Evaluation of Alternatives to CERCLA Nine Criteria

Alternative 1 (No Action/No Change from ROD) for sludge and debris was selected in the 1999 ROD after evaluating the alternatives against the nine criteria. New Sludge Alternative 2 also is protective and complies with ARARs but performs better when evaluated against Alternative 1 using the nine criteria by treating sludge soon after removal and is more cost effective at reducing the costs of interim storage. The new debris Alternative 2 also performs better when evaluated against Alternative 1 using the nine criteria by reducing worker exposure and minimizing waste volume thereby providing the most cost-effective approach for underwater debris. The new alternatives for sludge and debris are an extension of the previous alternatives and have been shown to meet the nine criteria better.

8.0 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)

In general, on-site specific actions must comply with the substantive aspects of ARARs, not with corresponding administrative requirements. That is, permit applications and other administrative procedures are not considered ARARs for actions conducted entirely onsite [40 CFR 300.400(e)].

To-be-considered (TBC) information is non-promulgated advisories or guidance issued by federal or state governments that are not legally binding and do not have the status of ARARs. As appropriate, TBCs should be considered in determining the action necessary for protection of human health and the environment. Requirements drawn from TBCs may be included in the selected alternative. The remedy, as amended herein, results in waste generation and potential for air emissions, thus the key ARARs include waste management standards, standards for controlling emissions to the environment, and environment, safety, and health standards. ARARs in the 1999 ROD remain ARARs in the amended ROD. Additional ARARs resulting from the expanded scope and revisions to the prior selected remedy are identified in Table 1. The ARARs are discussed generally in the following sections and are documented in detail in Table 1.

8.1 Waste Management Standards

The management and disposal of PCB wastes are governed by the *Toxic Substances Control Act* (TSCA) *of 1976*, and regulations at 40 CFR 761. The TSCA regulations contain specific provisions for PCB waste, including PCB waste that contains a radioactive component.

Waste that is designated as LLW that meets ERDF acceptance criteria is assumed to be disposed at ERDF, which is engineered to meet appropriate performance standards under 10 CFR 61. Alternate potential disposal locations may be considered when the remedial action occurs if a suitable and cost effective location is identified. Any potential alternate disposal location will be evaluated

for appropriate performance standards to assure that it is adequately protective of human health and the environment.

Debris waste designated as PCB remediation waste likely will be disposed at ERDF, depending on whether it is LLW and meets the waste acceptance criteria. PCB debris waste that does not meet ERDF waste acceptance criteria shall be retained at a PCB storage area meeting the requirements for TSCA storage and will be transported for future treatment and disposal at an appropriate disposal facility approved by EPA.

The amended remedy shall be performed in compliance with the waste management ARARs. Waste streams shall be evaluated, designated, and managed in compliance with the ARAR requirements. Before disposal, waste shall be managed in a protective manner to prevent releases to the environment or unnecessary exposure to personnel.

The specific requirements pertaining to waste management for this action are in Table 1.

8.2 Standards Controlling Emissions to the Environment

The proposed remedial action alternatives have the potential to generate airborne ambient emissions of both radioactive and criteria/toxic emissions.

The federal Clean Air Act of 1990 and Amendments (42 United States Code 7401 et seq.), and the Washington Clean Air Act (RCW 70.94) require regulation of air pollutants. Under federal implementing regulations, at Title 40 CFR Part 61, Subpart H require that radionuclide airborne emissions from the facility be controlled so as not to exceed amounts that would cause an exposure to any member of the public of greater than 10 millirem per year effective dose equivalent. The same regulation addresses point sources (i.e., stacks or vents) emitting radioactive airborne emissions, requiring monitoring of such sources with a major potential for radioactive airborne emissions, and requiring periodic confirmatory measurement sufficient to verify low emissions from such sources with a minor potential for emissions. Under portions of the state implementing regulations, the federal regulations are incorporated by adoption, and in addition more specifically address control of radioactive airborne emissions [See WAC 246-247-040(3) and –040(4) and associated definitions]. If it is determined that there are requirements for monitoring of minor point sources and fugitive or non-point sources emitting radioactive airborne emissions [WAC 246-247-075(8)], then these will be addressed by sampling the effluent streams and/or ambient air as appropriate.

The federal implementing regulations also contain requirements for managing asbestos material associated with demolition and waste disposal (Title 40 CFR Part 61, Subpart M).

The specific requirements pertaining to radioactive and nonradioactive air emissions for this action are in Table 1.

Table 1. Applicable or Relevant and Appropriate Requirements and To Be Considered Information for K Basins Interim Remedial Action.

ARAR citation	ARAR or TBC	Requirement	Rationale for use
WASTE MANAGEMENT STANDARDS			
Regulations pursuant to the *Toxic Substances Control Act (TSCA)*, 15 USC 2601 et seq			
Polychlorinated Biphenyls Manufacturing, Processing, Distribution in Commerce, and Use Provisions (40 CFR 761)			
PCB Waste Management and Disposal Specific subsections: 40 CFR 761.1(b)(4) 40 CFR 761.50(b)(3) 40 CFR 761.50(b)(7) 40 CFR 761.50(c) 40 CFR 761.61(a)(4) 40 CFR 761.61(c)	ARAR		These regulations are applicable to the onsite storage and disposal of PCB remediation waste which for this remedial action is sludge. In addition, sludge is a multi-phasic waste as described in 40 CFR 761.1(b)(4). The specific identified subsections from 40 CFR 761.50(b) reference the specific sections for management of each PCB waste type. Radioactive PCB waste can be disposed in accordance with the substantive requirements of 40 CFR 761.50(b)(7). PCB remediation waste may be disposed of on site in accordance with substantive requirements of 40 CFR 761.61(c) with EPA approval.
To-Be-Considered pursuant to relevant facility acceptance criteria			
Environmental Restoration Disposal Facility Waste Acceptance Criteria (BHI-00139)	TBC	This document establishes waste acceptance criteria for ERDF.	Waste destined for management at ERDF must meet acceptance criteria to ensure proper disposal.
Contact-Handled Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant (DOE/WIPP-02-3122)	TBC	This document establishes waste acceptance criteria for WIPP	Contact-handled TRU waste destined for management at WIPP must meet acceptance criteria to ensure proper disposal.
Remote-Handled Transuranic Waste Characterization Program Implementation Plan for the Waste Isolation Pilot Plan (DOE/WIPP-02-3214)	TBC	This document establishes waste acceptance criteria for WIPP	Remote-handled TRU waste destined for management at WIPP must meet acceptance criteria to ensure proper disposal.
STANDARDS CONTROLLING EMISSIONS TO THE ENVIRONMENT			
Regulations pursuant to the *Clean Air Act of 1977*, 42 USC 7401, et seq., as amended			
"National Emission Standards for Hazardous Air Pollutants" (40 CFR 61)			
40 CFR 61.92	ARAR	Emissions of radionuclides to the ambient air shall not exceed amounts that would cause any member of the public to receive in any year an effective dose equivalent of 10 mrem/yr.	Substantive requirements of this standard are applicable because this remedial action may include onsite activities such as decontamination and stabilization of contaminated structures, treatment of sludge, and operation of exhausters and vacuums, each of which may provide airborne emissions of radioactive particulates. As a result, requirements limiting emissions apply.
40 CFR 61.93	ARAR	Emissions from major point sources	Substantive requirements of this standard are

ARAR citation	ARAR or TBC	Requirement	Rationale for use
		of airborne radioactive material shall be measured. Measurement techniques may include, but are not limited to, sampling, calculation, smears, or other EPA approved methods for identifying emissions.	applicable because major point source emissions of radionuclides to the ambient air may result from activities performed during the remedial action such as decontamination and stabilization of contaminated structures, treatment of sludge, and operation of exhauster and vacuums. This standard exists to assure compliance with emission standards.
Regulations pursuant to the *Washington Clean Air Act*, RCW 70.94			
Radiation Protection - Air Emissions, (WAC 246-247)			
WAC 246-247-040(3) WAC 246-247-040(4)	ARAR	Emissions shall be controlled to assure emission standards are not exceeded	Substantive requirements of this standard are applicable because fugitive, diffuse, and point source emissions of radionuclides to the ambient air may result from activities performed during the remedial action, such as decontamination and stabilization of contaminated structures, treatment of sludge, and operation of exhauster and vacuums. This standard exists to assure compliance with emission standards.
WAC 246-247-075(8)	ARAR	Emissions from minor point sources and non-point and fugitive sources of airborne radioactive material shall be measured.	Substantive requirements of this standard are applicable because minor point source and fugitive and non-point source emissions of radionuclides to the ambient air may result from activities performed during the onsite remedial action such as decontamination and stabilization of contaminated structures and treatment of sludge. This standard exists to assure compliance with emission standards.
"General Regulations for Air Pollution," (WAC 173-400)			
WAC 173-400-040 WAC 173-400-113	ARAR	Methods of control shall be employed to minimize the release of air contaminants associated with fugitive emissions resulting from materials handling, construction, demolition, or other operations. Emissions are to be minimized through application of best available control technology.	Substantive requirements of these standards are applicable to this remedial action because there may be visible, particulate, fugitive, and hazardous air emissions and odors resulting from decontamination and stabilization or sludge treatment activities. As a result, standards established for the control and prevention of air pollution are applicable.
Controls for New Sources of Air Pollution, (WAC 173-460)			
WAC 173-460-030 WAC 173-460-060 WAC 173-460-070	ARAR	Emissions of toxic air contaminants shall be quantified and ambient impacts evaluated. Best available control technology for toxics shall be used	Substantive requirements of these standards are applicable to this remedial action because there is the potential for toxic air pollutants to become airborne as a result of onsite decontamination and stabilization activities. As a result, standards established for the control of toxic air contaminants are applicable.

ARAR citation	ARAR or TBC	Requirement	Rationale for use
Ambient Air Quality Standards and Emission Limits for Radionuclides, (WAC 173-480)			
WAC 173-480-070-(2)	ARAR	Determine compliance with the public dose standard by calculating exposure at the point of maximum annual air concentration in an unrestricted area where any member of the public may be.	Substantive requirements of this standard are applicable to this remedial action because fugitive, diffuse, and point source emissions of radionuclides to the ambient air may result from activities performed onsite during the remedial action. As a result, compliance with the public dose standard needs to be determined at the required location

9.0 STATUTORY DETERMINATIONS

Although this ROD Amendment changes components of the remedy selected in the original ROD, the 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 and is cost effective. The remedy, as amended, utilizes permanent solutions to the maximum extent practicable for this site. Treating sludge and debris satisfies the statutory preference for remedies that employ treatment as a principal element for the waste stream.

CERCLA Section 104(d)(4) states that where two of more noncontiguous facilities are reasonably related on the basis of geography, or on the basis of the threat or potential threat to the public health or welfare or the environment, the facilities can be treated as one for purposes of CERCLA response actions. The K Basins and ERDF are considered to be onsite for purposes of Section 104 of CERCLA, and waste may be transferred between and managed at these facilities as part of this response action without requiring a permit. Also the K Basins and the CVD facility are considered onsite for sludge treatment. Sludge and associated containers and equipment may be transferred between and managed at these facilities as part of this response action without requiring a permit.

Because hazardous substances will remain onsite above health-based levels, a review will be conducted at least every five years to ensure that the remedy continues to provide adequate protection of human health and the environment.

10.0 DOCUMENTATION OF SIGNIFICANT CHANGES

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

11.0 RESPONSIVENESS SUMMARY

Introduction

This responsiveness summary was prepared in accordance with the requirements of Section 117 of CERCLA, as amended. The purpose of this responsiveness summary is to summarize and respond to public comments on the proposed amendment of the 1999 K Basins ROD. The Proposed Plan for the Amendment, issued on January 29, 2005, identified proposed changes to components of the remedy set forth in the 1999 ROD (EPA/ROD/R10-99/059).

Community Involvement

A public notice was placed in the *Tri-City Herald* on January 19, 2005, announcing the availability of the proposed plan and Administrative Record, and the start of the public comment period. On January 18, 2005 approximately 890 copies of a fact sheet describing the amendment proposal were sent out by mail. An electronic mail notification was sent on January 19, 2005 to 600 individuals. A public comment period was held from January 19, 2005, through February 22, 2005. The fact sheet stated that a public meeting would be conducted if requested. No requests were received for a public meeting, therefore, no public meeting was held. The proposed amendment was discussed with the Hanford Advisory Board River and Plateau Committee on January 12, 2005.

Comments and Responses

Three commenters provided public comments. The comments, along with responses from DOE and EPA, are presented below.

COMMENTER #1:

Comment 1: Looks good.

Response to Comment 1: The Agencies appreciate your time in reviewing and providing comments on the proposed plan.

COMMENTER #2:

Comment 1: Let me say up front that I support the general philosophy of the proposed changes, Alternative 2 (Sludge) and Alternative 2 (Debris). That said, I wish to address the quality and usefulness of the existing Proposed Plan as a decision document and of its supporting FFS Addendum.

Response to Comment 1: Thank you. The Agencies appreciate your support for the approach outlined in the proposed amendment to the record of decision (ROD).

Comment 2: Information is nor provided either on which treatments will be applied to which sludge streams, or on where those treatments will be applied. What the document says, essentially, is: 'We will treat the sludge with some or all of the available treatments, at some undetermined locations, until the waste form is acceptable for disposal in either WIPP or LLW burial. Trust me.' That's not much of a plan upon which to seek comments and approval.

Response to Comment 2: The specificity of which treatments will be applied to what sludge streams and where those treatments will be applied is information from the remedial design phase of the project. These decisions will be documented in the remedial design report/remedial action work plan (RDR/RAWP). These documents will be included as part of the remedial action in the Administrative Record.

The intent of the public comment period was to invite public comment on treatment soon after retrieval versus extended storage of untreated sludge. The Focused Feasibility Study (FFS) contains an evaluation of various treatment technologies that may used on sludge. The FFS and the Addendum to the FFS are part of the Administrative Record. The feasibility study identified that there are treatment technologies that can be used to treat the sludge to meet the waste acceptance criteria of the candidate disposal facilities. Characterization of the sludge has shown that there is variability in physical and radiological properties. Therefore the treatment design will need to be sufficiently robust to handle the variety of sludge, or be adaptable to the various sludge streams. Specific design details are normally established after the Record of Decision (ROD) is issued in the RDR/RAWP. The administrative record contains many documents regarding treatment of one portion of the sludge (from the North Loadout Pit of K East Basin) at Hanford's 200 Area T Plant. The remaining sludge is planned to be consolidated into containers in the K West Basin. There are several documents in the administrative record which present the container storage strategy and a "hose-in-hose" approach to pumping the sludge from the K East basin to the containers in K West. The proposed plan (short-term effectiveness section, pg. 4) states that sludge treatment is anticipated to occur during 2007 and that it would be treated in the 100-K area or at a 200 Area facility.

Comment 3: The problem is exacerbated by the fact that neither the original Focused Feasibility Study (FFS), nor its addendum dealing with the two new alternatives, is available for viewing via the electronic document bases. The author of a document that requires essential references to support the assertions in the document must make sure that those reference reports are readily available to readers. As it is, the reader has no way to read about the evaluations of the various treatment processes proposed for use, nor to determine whether all rational treatment possibilities were considered and evaluated, nor where on the Site the treatment systems might be located. Even after I was able to obtain a hard copy of the Addendum, the topics of how and where were not addressed. Because I could not readily obtain a copy of the original FFS, I don't know how well, or if, those topics were addressed originally. For example, knowing all of the potential problems associated with having uranium metal fines in the sludge, it would seem that calcination of the sludge would be an excellent choice, with the calcined material feeding into the stabilizing process. It might be useful to consider a modified version of Bulk Vit to deal with that remote-handled material, making glass in drums or some other package form that was

suitable for WIPP acceptance. With only the PP and FFS Addendum available to view, I have no idea if such an approach was even considered.

Response to Comment 3: The original Focused Feasibility Study (FFS) for the K Basins Interim Remedial Action (DOE-RL-98-66, rev. 0, April 1999) and the Addendum to the FFS for the K Basins Interim Remedial Action (DOE/RL-98-66, rev. 0, Addendum, January 2005) are contained in the Administrative Record. The Administrative Record was made available for review during the public comment period. The physical location of the Administrative Record was provided in the proposed plan. The address is: 2440 Stevens Place, Room 1101, Richland, Washington 99352. The Administrative Record website where these documents can be electronically accessed (www2.hanford.gov/arpir/) was noted in both the proposed plan and fact sheet.

Sludge treatment alternatives of calcination and vitrification are possible candidates for treating some or all of the K Basin sludge (see table 4-1 of the Addendum to the Focused Feasibility Study) and will be considered in the final technology selection during the remedial design phase of the project. The specificity as to what treatment technology or technologies will be utilized for treating K Basin sludge will be defined and documented in the remedial design report/remedial action work plan.

Comment 4: Similarly, there are no developments of the cost estimates given in either the Proposed Plan or in the Addendum to the FFS. Only top level values are given, with no bases for their values, and no references identified for that information. Perhaps this information was developed in the original FFS, but that information was not readily available. Because there is no definition provided of which and how many treatment processes will be applied to each sludge stream, it would seem impossible to develop a rational estimate of system costs (design, procurement, operations, decontamination/decommissioning) for the various systems postulated to be used. Considering the recent massive escalation of the cost estimates for the Bulk Vitrification Test Program, one has to wonder about the validity of the cost information provided.

Response to Comment 4: The cost estimates in the proposed plan and Addendum to the Focused Feasibility Study (FFS) provide a way to evaluate the relative difference in costs amongst alternatives and to determine overall effectiveness of the alternatives proportional to their costs. The FFS and its Addendum both contain evaluations of the cost differences. The purpose is to see if there is significant economic advantage of one alternative over another. Cost is presented in section 5.2.7 of the FFS Addendum which is in the administrative record.

Comment 5: Not being able to read the original FFS, I could not ascertain whether or not a reasonable variety of techniques were considered for use in decontaminating the basin walls as the water level is lowered. The hydrolaser method is certainly effective, but might be quite slow compared with an underwater mechanical scabbler device in terms of area cleaned per unit time. Perhaps all of these types of questions have been answered, or are intended to be answered

through the final record of decision and the subsequent action plan. However, it is not clear to me that any useful public input is accepted at that stage of the game.

Response to Comment 5: In 2004 the hydrolase method was tested, using the actual equipment, in both a non-radiological underwater environment and in the underwater radiological environment of the 105 K East basin. It was shown to be effective in the following areas: concrete removal capability, efficiency, and minimal impact on basin water clarity. The results of these tests are in the Technology Demonstration Underwater Hydrolasing Phase 0, I, II technical report located in the Administrative Record. The Administrative Record website is <http://www2.hanford.gov/arpir/> or it is physically located at 2440 Stevens Place, Room 1101, Richland, Washington 99352.

Comment 6: It would be helpful to the reader to see a simple table illustrating the relative performances of the various alternatives under each of the nine CERCLA criteria. Rank each alternative under each criterion as 1 (worst), 2 (about equal), and 3 (best), and sum across the criteria to get a simple performance measure. This approach is not very precise, but it is very helpful to better quantify all of the verbiage presented in the text under the CERCLA criteria regarding the cumulative performance of each alternative. Without such types of comparisons of alternatives, it is very difficult to ascertain the true bases for selection of a preferred alternative. Similarly, a table that contains values for the estimated cumulative occupational exposure and for cost for each alternative considered would further support (or make questionable) the chosen preferred alternative.

Response to Comment 6: Only two alternatives are being screened against the CERCLA nine criteria for the change in sludge and debris remedies. These are the previously selected remedy found in the earlier Record of Decision and the new proposed remedy. Section 6 of the Focused Feasibility Study Addendum provides a comparative analysis between the previously selected remedy and the new proposed remedy against the CERCLA nine criteria.

COMMENTER #3:

Comment 1: We appreciate the opportunity to review the proposed plan and apologize that we missed the comment deadline by a day. We trust that our comments will still receive full consideration. Oregon previously reviewed and submitted comments in July 2004 on the "Proposed Changes to K-Basin Sludge and K-Basin Cleanup Milestones" (M-34 and M-16). We refer you to those comments as several are pertinent to this proposed ROD amendment.

Response to Comment 1: We appreciate your time in reviewing and providing comments on this document. Your comments and those provided in July 2004 on the "Proposed Changes to K Basin Sludge and K Basin Cleanup Milestones" (M-34 and M-16) will also be have been fully considered in the development of this amendment to the ROD. The State of Oregon's earlier comments as well as the other public comments and responses to those comments are in the administrative record as document number D6723911. Many of those comments and responses

are relevant to this ROD Amendment. Therefore the comment and response package from the administrative record is included as an attachment to this ROD Amendment.

Comment 2: In general, we are struck by the lack of specifics and clarity contained in this proposed ROD amendment. There is insufficient information and analysis provided for us to fully evaluate the proposal. In addition, there are apparently a number of underlying assumptions being made that are not stated in this document that could potentially have severe implications if they are proven incorrect.

The proposed amendment says that the sludge will now be treated - but gives no specifics about the type of treatment that will be used (other than a range of potential treatment technologies), or where or when this treatment will be done. A reader can infer that the proposed treatment may occur in T plant, which raises some additional questions and concerns as well. The seismic rating of T Plant - particularly the roof panels - may necessitate facility upgrades to meet current nuclear safety standards before this work can be done there. These upgrades may be costly and may argue for using a different or new facility.

Response to Comment 2: The detailed plans for the treatment will be described in the remedial design report/remedial action work plans (RDR/RAWP). The RDR/RAWP is a primary document that will include a schedule. Primary documents and their schedule are enforceable.

The USDOE is committed to removing the sludge and completing the K Basin decommissioning on schedule. If T Plant or any facility is used as part of this effort, it will be funded appropriately. The treatment facility will be identified in the RDR/RAWP. The T Plant is the intended treatment location for sludge from the K East Basins' North Loadout Pit. The treatment location for the remainder of the sludge has not been determined.

The proposed plan (short-term effectiveness section, pg. 4) states that sludge treatment is anticipated to occur during 2007 and that it would be treated in the 100-K area or at a 200 Area facility.

The specificity of which treatments will be applied to what sludge streams and where those treatments will be applied is information from the remedial design phase of the project and will be documented in the RDR/RAWP. These documents will be included as part of the remedial action in the Administrative Record.

The intent of the public comment period was to invite public comment on treatment soon after retrieval versus extended storage of untreated sludge. The Focused Feasibility Study (FFS) contains an evaluation of various treatment technologies that may used on sludge. The FFS and the Addendum to the FFS are part of the Administrative Record. Specific design details are normally established after the Record of Decision (ROD) is issued in the RDR/RAWP. Which treatment will be applied to what sludge stream is a design detail that will be refined and adopted during the hazard and safety analyses that are part of the remedial design phase of the project. Again, these specifics will be established in future revisions to the K Basins RDR/RAWP.

Comment 3: The proposed amendment says that the sludge will be treated and packaged into a waste form that is ready for disposal. However, the amendment fails to identify the disposal site.

The Tri-Parties seem to presume that the sludge is transuranic and will meet waste acceptance criteria for disposal at the Waste Isolation Pilot Plant (WIPP) in New Mexico. We are concerned that if this assumption is wrong, it could result in the waste being orphaned and relegated to indefinite storage at Hanford.

We agree that the sludge appears best suited for treatment as transuranic waste and for disposal at WIPP. However, a case can be made that because the source of much of the sludge is corroded spent fuel, that the waste is ineligible to go to WIPP and must instead go to the national high-level waste repository. In addition, we are concerned that in recent months, the State of New Mexico has actively resisted the prospect of new waste streams going to WIPP.

We request that the final ROD amendment clearly explain how the treated sludge will meet WIPP waste acceptance criteria - if indeed that is the intended destination. If the intent is to send the sludge somewhere else, then that should clearly be explained.

Response to Comment 3: The ROD amendment requires treatment of all the sludge to prepare it for disposal. Because there is some variability in the sludge, the individual sludge streams or batches will be characterized in order to determine the appropriate disposal site. Based on that characterization, sludge treatment will be designed to meet the waste acceptance criteria of the disposal site. Sludge not classified as low-level radioactive waste will be treated, packaged, and disposed offsite at the national repository. The off-Hanford site location(s) for disposal of the sludge, as one composite waste stream or several, in addition to an explanation of how and where the sludge will be treated, will be identified during the remedial design phase of the project and described in the remedial design report/remedial action work plan (RDR/RAWP). The RDR/RAWP will specify the waste acceptance criteria for the selected destination site for all treated sludge.

Comment 4: We have concerns as well about whether the basins themselves and whether all of the debris waste is appropriate for disposal in the Environmental Restoration Disposal Facility (ERDF). The basins and debris contain a large inventory of radioactive cesium and technetium. We are concerned that: 1) high levels of technetium in the concrete may effectively consume ERDF's curie capacity for waste; 2) that some waste may be above the ERDF waste acceptance criteria for transuranic-contaminated waste; and 3) high levels of cesium in the surface layer of the basin may constitute Greater than Category 3 or Greater than Class C waste - both of which are prohibited from disposal in ERDF. Additionally, the curie content of this waste may effectively consume ERDF's available curie capacity for similar waste.

Response to Comment 4: The K Basins waste planned for disposal at ERDF has the potential to contain a large inventory of radionuclides. The K Basins and ERDF staffs are working closely to ensure that the ERDF waste acceptance criteria are met for all waste destined for ERDF.

As with all CERCLA response actions, the wastes generated are required to meet the waste acceptance criteria of the treatment, storage, and/or disposal facility which receives the waste. Waste forms are evaluated against several requirements in the ERDF waste acceptance criteria, one of which is a trigger level for technetium-99 which if exceeded requires a more in-depth assessment against the facility's environmental documentation. If necessary, engineering controls will be applied to prevent/limit the migration potential for technetium-99, e.g. introduce a chemically reducing grout mixture to react with any residual technetium-99 or provide a barrier between the technetium-99 source and the environment at the disposal facility.

The major source of contamination in the basins for a waste to be classified as TRU waste or greater than Class C waste is the basin sludge itself. Controls will be put in place to remove sludge to the maximum extent practicable while assuring that the waste will meet all waste acceptance criteria.

Comment 5: We understand that DOE has proposed that the technetium be considered "encapsulated" by the basin concrete, thereby allowing more technetium into ERDF. We strongly disagree. Technetium (like many anions) is highly mobile and moves relatively freely through concrete unless it is converted to a reduced state. The basin concrete lacks any ability to slow the release of technetium. No credit should be assumed or allowed for "encapsulation" of the technetium in evaluating ERDF's capacity for this waste.

Response to Comment 5: During the remedial design phase, engineering controls will be designed to encapsulate debris waste forms, including reduction of technetium-99, at ERDF to mitigate the hazards from the wastes. The use of these controls will assure the waste forms meet the ERDF waste acceptance criteria. If concrete is used to encapsulate any waste, it will be done in accord with the ERDF waste acceptance criteria.

Comment 6: As far as the transuranic elements in the sludge, the proposal to grout the debris does not assure that plutonium in the sediment or on surfaces will be contained in the grout. Waste which is contaminated at levels between the ERDF waste acceptance criteria limits and the WIPP limit may become orphan waste. Accordingly, assessing the transuranic contamination level by averaging the volume of the grout with the waste should not be allowed, and planning should be done to prevent the generation of orphan wastes.

Response to Comment 6: Controls will be put in place to ensure, prior to grouting, that the waste form meets the ERDF waste acceptance criteria. There will be provision to keep any residual plutonium in the sediment or on surfaces at a level that will not challenge the ERDF waste acceptance criteria, i.e. to NOT create an orphan waste. Grout may be used for dose reduction, contamination control, and void space filling. When this is done, the amount of grout

used will be considered in making a TRU determination based on existing industry conventions. Grout will not be added for the sole purpose of dilution to change the waste category.

Comment 7: For the cesium contaminated basin structures, DOE should consider using extensive hydrolazing to remove the contaminated basin surfaces and route this waste to the vitrification plant for disposal in the high-level waste glass.

Response to Comment 7: Hydrolasing the underwater portions of the 105 K East basin concrete structure is planned because this part of the structure is contaminated with high levels of cesium. If efforts were not made to remove this source term, high radiation levels would exist when the basin water, which is currently providing shielding, is removed. Based on the definition of "high level waste", the waste generated by hydrolasing will not be high-level waste. Depending upon the final waste form, it will most likely be managed as low-level waste or greater than Class C waste as defined in 10CFR61.

Comment 8: Finally, both basins were designed to leak at the major construction joints. The K-East basin was never lined and extensively leaked large volumes of highly contaminated water containing cesium, strontium, tritium, plutonium, americium, uranium and other nuclides. Following removal of the basins, it is essential that the contaminated soil under the basin seams be removed and properly disposed.

Response to Comment 8: The basins were not designed to leak at the major construction joints nor were they designed for a 50+ year service life. The construction joints are however the areas most suspect of past leakage. After removal of the basins, environmental sampling will be done to determine what, if any, cleanup activities should be undertaken. This activity is part of the 100 Area Remedial Action under the 100 Areas Remaining Sites ROD (EPA/ROD/R10-99/039). The schedule for these two activities is found in TPA milestones M-34-32 (*Complete Removal of K East Basin Structure,* by March 31, 2007) and Milestone M-16-57 (*Initiate Soil Remediation at K East Basin,* by April 30, 2007). In the interim, the K East basin discharge chute (location of the construction joint) was completely filled with grout in October 2004. This action isolated the construction joint from basin water. The K West basin discharge chute likewise will be grouted in late 2005.