DOE/RL-2004-48
Revision 1

Proposed Plan for An Amendment to the K Basins Interim Remedial Action Record of Decision

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

United States
Department of Energy
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PROPOSED PLAN FOR AN AMENDMENT TO THE K BASINS INTERIM REMEDIAL ACTION RECORD OF DECISION

Hanford Site, Richland, Washington

EPA AND DOE ANNOUNCE PROPOSED PLAN

INTRODUCTION

The U.S. Environmental Protection Agency (EPA), the Washington State Department of Ecology (Ecology), and the U.S. Department of Energy (DOE) (hereinafter referred to as the Tri-Parties) are proposing an amendment to the **K Basins Interim Remedial Action Record of Decision** (K Basins ROD) for cleanup activities in the 100-K Area of the Hanford Site near Richland, Washington. EPA and DOE are issuing this proposed plan as part of their public participation responsibilities under 40 *Code of Federal Regulations* (CFR) 300.430(f)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

This **Proposed Plan**[1] recommends changes to the current K Basins ROD. The recommended changes affect **sludge** disposition, and underwater **debris** retrieval, treatment, and disposal from the 105-K East and 105-K West Spent Nuclear Fuel Basins. These proposed 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 ROD were: (1) remove the **spent nuclear fuel** (SNF), stabilize the SNF, and place the SNF into interim storage, (2) remove and transfer the sludge to interim storage, (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 proposed revision would not change the selected remedy for SNF or basin water. The remedy for sludge would be modified by including sludge treatment prior to interim storage. The remedy for debris would be 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.

[1]Technical terms in bold are defined in the Glossary.

MARK YOUR CALENDAR

A public comment period will be held from January 19, 2005 to February 22, 2005. The public is invited to comment on the proposal concerning K Basin sludge removal, treatment, and disposal and management of underwater debris. No public meetings are scheduled at this time. A public meeting will be held if requested by February 10, 2005. To request a public meeting, contact Larry Gadbois at (509) 376-9884.

The Proposed Plan is issued by the EPA and DOE. These agencies encourage you to comment during the public comment period on the alternatives for the K Basins interim remedial action described in this Proposed Plan. Based on new information or public comments, EPA and DOE could modify the preferred alternative or select the other alternative. The decision reached will be announced to the public and will include a summary of responses to significant comments submitted by the public. All submitted written comments will be placed in the Administrative Record for K Basins.

To request a public meeting in your area contact:

Larry Gadbois
U.S. Environmental Protection Agency
712 Swift Boulevard, Suite 5
Richland, WA 99352
Fax: (509) 376-2369
e-mail: gadbois.larry@epa.gov

Written comments should be submitted by February 22, 2005 to Larry Gadbois. For additional information please call the Hanford Cleanup Toll-Free Line at 1-800-321-2008.

The EPA and DOE are proposing to revise the interim remedy for K Basins sludge and debris such that DOE would (1) treat the sludge before transfer to an interim storage location and subsequent disposal off the Hanford Site and (2) not remove all underwater K Basins debris but leave some debris in place and encapsulate the debris in grout. The public

is encouraged to comment on the alternatives in this Proposed Plan for sludge and debris treatment and disposal. Additional detail on the alternatives for sludge and debris are found in the ***Focused Feasibility Study*** *Addendum for the K Basins Interim Remedial Action* (DOE/RL-98-66) and other documents contained in the Administrative Record for the K Basins (the location is listed on page 7). The public is encouraged to review these other documents to gain a better understanding of the basins and the environmental problems. Written comments on this Proposed Plan must be submitted by February 22, 2005 (box on previous page). Responses to significant comments will be presented in a responsiveness summary that will be part of the K Basins Interim Remedial Action ROD Amendment.

BACKGROUND

The K Basins are located in the northern part of the Hanford Site next to the Columbia River (Figure 1). The two rectangular concrete basins are about 38 meters (125 feet) long and 20 meters (67 feet) wide. Each basin is filled with 5 meters (16 feet) of water to provide a radiation shield for facility workers and to minimize the release of radioactive particles to the air. The SNF in the basins is in the form of fuel rods made of uranium surrounded by a protective **cladding** of metal. The SNF was not designed to be stored for long periods underwater, and some of the cladding is damaged. Because of cracks in the cladding, uranium contained in the SNF has corroded and became radioactive sludge. This sludge was in the SNF canisters and some sludge still remains on the basin floors mixed with sand and debris.

All of the original SNF inventories from the K Basins have been removed as of October 2004.

The K East Basin leaked approximately 15 million gallons of contaminated water to the soil over several years in the 1970s. Another 90,000 gallons leaked in early 1993. The basin has been repaired in order to reduce the potential of any future leakage

The K Basins sludge is contaminated with **hazardous substances** including radionuclides, such as uranium, plutonium, cesium, and tritium, and polychlorinated biphenyls (PCBs). Transuranic waste has special waste disposal requirements. The scope of the previous ROD was retrieval and transfer of sludge to interim storage prior to final treatment and disposal. This proposed amendment would add treatment and shipment off the Hanford Site for disposal.

Actual or threatened releases of the hazardous substances at the K Basins, if not addressed by the preferred alternative or one of the other alternatives considered, could present a current or potential threat to public health or the environment.

DESCRIPTION OF THE PREFERRED ALTERNATIVE

The preferred alternative for sludge is treatment and packaging prior to off the Hanford Site disposal (Figure 2). All sludge will be treated using a hybrid of treatment technologies previously identified in the original *Proposed Plan of K Basins Interim Remedial Actions*. The preferred management of debris is to grout some of the underwater debris in place. This debris will then be included in the demolition waste that will be generated from the subsequent removal and disposal of the basin structure. Basin demolition is planned to occur closely after the removal of the basin water. This demolition waste will be disposed on-site in the 200 Areas, likely anticipated to be the Environmental Restoration Disposal Facility (ERDF).

SUMMARY OF REMEDIAL ALTERNATIVES

The objective of sludge treatment is to treat and package the sludge into a waste form that is ready for final disposal. The remedy selected in the ROD was to remove and interim store the sludge before treatment and final disposal. Some factors that make sludge management particularly complex are concerns regarding the potential for **criticality**, the high radiological activity, the presence of reactive metals with the ability to generate hydrogen gas, waste storage and disposal acceptance criteria, and engineering and administrative controls to assure the safety of the workers and public.

The objective of debris removal is to enhance worker safety and reduce potential emissions from the basins. In addition debris removal will also assist basin demolition by removing items from the basins that may interfere with demolition activities.
The K Basins Interim Remedial Action Focused Feasibility Study Addendum identifies the following alternatives for treatment of sludge.

- Sludge Alternative No. 1: Current Approach in ROD - About 50 m^3 of sludge are removed from the basins and transferred to a permitted storage and treatment facility in the 200 Area for future treatment.

Sludge Alternative No. 2. The preferred alternative is to remove the sludge and then treat and package the sludge for off the Hanford Site disposal. The sludge will be treated to meet waste acceptance criteria for disposal off the Hanford Site and will be stored at Hanford pending shipment off the Hanford Site. The treatment technologies include chemical, physical, thermal, and/or solidification. The treatment process facility will be located at the 100-K Area or a 200 Area facility. The feasibility study addendum evaluated and analyzed how these treatment technologies will be applied to the different sludge waste streams. The details of sludge treatment methodology will be contained in a modification of the current remedial design report and remedial action work plan for this action.

The most likely initial sludge stream for treatment is the 105-K East North Loadout Pit sludge which may be managed as a treatability study. Most of this sludge stream would be removed and transported to T Plant in the 200 Area, treated by solidification, and transported to the Central Waste Complex for interim storage to await final transport and disposal off the Hanford Site. If not treated as the initial stream, the sludge will be transferred to KW Basins with the other KE Basins sludge.

The K Basins Focused Feasibility Study Addendum identified the following alternatives for management of underwater debris.

- Debris Alternative No. 1: Current Approach in ROD - Both above-water debris and underwater debris are removed from the K Basins. Debris is treated, as necessary, to meet the waste acceptance criteria for disposal at Hanford. Any TRU waste or TRU mixed waste is packaged for interim storage for eventual processing and disposal off the Hanford Site.

- Debris Alternative No. 2: Grout some underwater debris in place - Above-water debris will be managed as described in Alternative 1. Some underwater debris, including racks, steel canisters, and processing equipment, will be size-reduced, as necessary and grouted in-place. The grouted in-place debris and basin structures are removed simultaneously during basin demolition. The grouted debris considered low-level waste or mixed waste is disposed on-site. Any TRU waste or TRU mixed waste is packaged for interim storage for eventual processing and disposal off the Hanford Site.

CERCLA EVALUATION CRITERIA

The alternatives are evaluated against nine CERCLA criteria as detailed below:

Overall Protection. The sludge alternatives protect human health and the environment by removing hazardous substances from the K Basins with subsequent relocation to protective facilities. Sludge removal allows for the reduction of the potential for future hazardous substance releases from the basins. Alternative 2 is more protective than Alternative 1 because a more stable and less mobile waste form is achieved in a reduced time period.

All of the debris management alternatives protect human health and the environment. Alternative 2 enhances the overall protectiveness by using grout to shield workers and reduce radiological exposure as compared with Alternative 1.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs). The sludge and debris alternatives meet ARARs. No waivers from ARARs are anticipated to be necessary to implement any of the alternatives.

Long-Term Effectiveness and Permanence. The sludge alternatives (1 and 2), and debris alternatives (1 and 2) provide a high degree of long-term effectiveness. Sludge Alternative 2 achieves long-term effectiveness in a shorter period than Alternative 1. Treatment achieves a stable, less mobile waste form and this alternative includes provisions for the treated sludge to be shipped for disposal off the Hanford Site. Treatment and disposal eliminates the need for long-term engineered controls at K Basins and other 200 Areas waste management facilities.

The contaminants associated with the debris are immobilized in a timely fashion and eventual removal expedited because of the basin structure removal.

Reduction of Toxicity, Mobility, or Volume Through Treatment. All of the sludge alternatives provide a reduction of toxicity and mobility. Alternative 2 is more protective than Alternative 1 because a more stable and less mobile waste form is achieved sooner. For debris management, Alternative 2 reduces the mobility by treatment through encapsulation (grouting).

Short-Term Effectiveness. All of the sludge and debris alternatives have the potential to affect the public and on-site workers through airborne releases during removal and treatment activities. None of the alternatives are expected to pose significant risks, and air emission control systems are required to minimize impacts.

Workers also could be affected by radiation exposure and industrial hazards during the CERCLA remedial actions for sludge treatment and debris management. The alternatives are not expected to have significantly different risks. Engineering controls (such as shielding and remote operations), administrative controls, monitoring, and personal protective equipment are used to minimize risks to workers. If Alternative 2 is selected sludge treatment is anticipated to occur during 2007, whereas under Alternative 1 sludge treatment would be many years later.

Implementability. All the sludge and debris alternatives can be implemented. Each of the sludge treatment and debris management alternatives can be implemented with existing technology.

Costs. The total estimated cost for the CERCLA action for treatment and disposal of sludge is $68 million which is similar to the previous estimate. The cost of debris management, consisting of debris removal and grouting, is estimated to be $9 million which is a reduction in cost.

Washington State Acceptance. The State supports the preferred alternative per their approval of Tri-Party Agreement Change No. M-34-04-01.

Community Acceptance. Community acceptance is evaluated after all public comments on this Proposed Plan are received.

SUMMARY OF PREFERRED ALTERNATIVE

This proposed plan is being issued by the Tri-Parties and recommends modification of two components of the remedy described in the K Basins Interim Remedial Action ROD which will promote Hanford Site cleanup activities as follows:

1. In addition to sludge removal, as documented in the K Basins ROD, the Tri-Parties also recommend treatment. Treatment would be performed to meet acceptance criteria and all other requirements associated with interim storage and final disposal facilities off the Hanford Site. A hybrid of several treatment technologies offers the greatest opportunity for a simple and cost-effective process. Sludge Alternative 2 is preferred because this alternative will require that the sludge be treated, and packaged for disposal instead of being removed and interim stored as untreated sludge.

2. The Tri-Parties recommend improving the management of the underwater debris by leaving some underwater debris in place and grouting the debris as described in Alternative No. 2. This method provides greater protection to the workers and the public from the potential contamination pathways and allows for faster basin remediation.

The public is invited to comment on the alternatives including the preferred alternative to amend the K Basins Interim Action remedies.

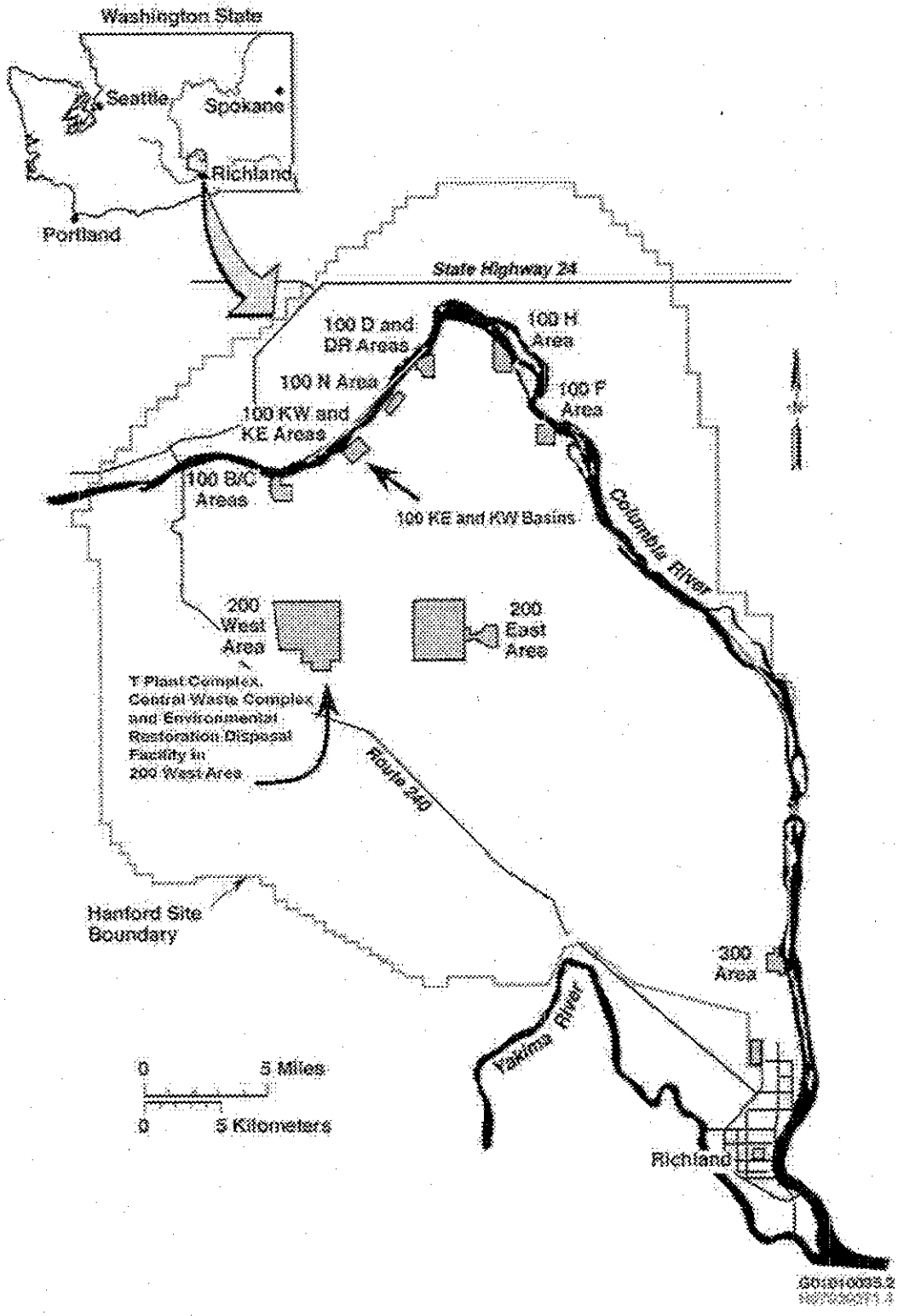

Figure 1. Hanford Site Showing K Basins.

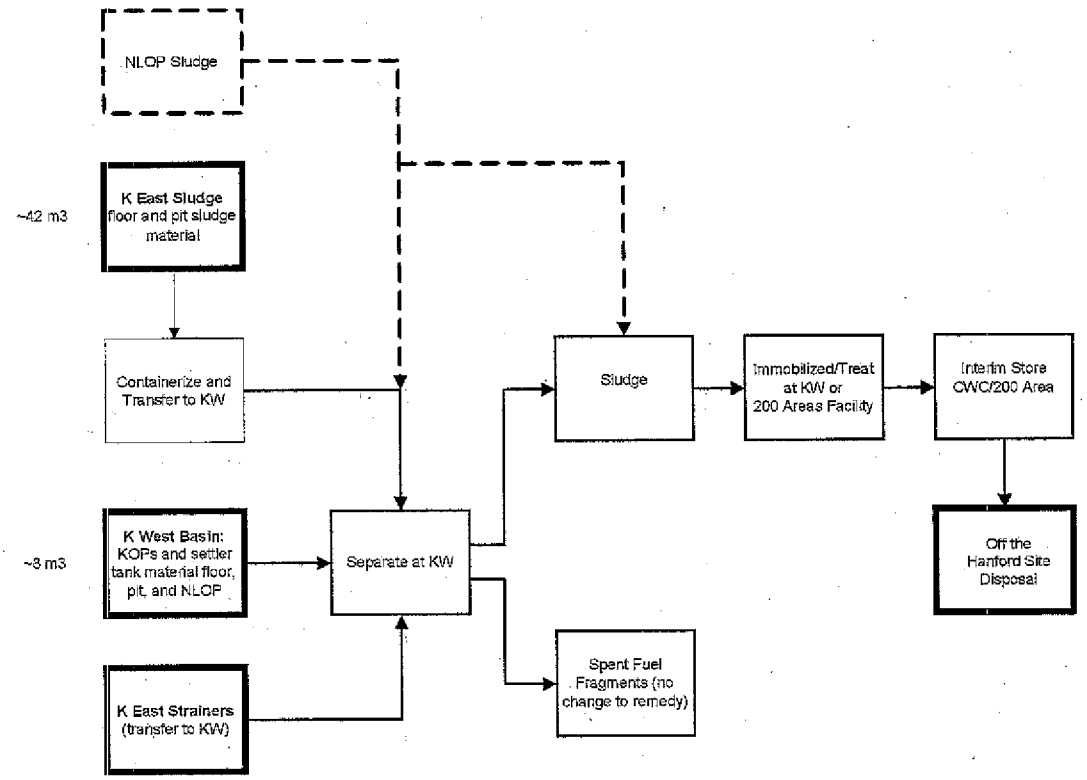

Figure 2. Sludge Management Process.

EXPLANATION OF CERCLA EVALUATION CRITERIA

1. *Overall Protection of Human Health and the Environment* is the primary objective of the remedial action and addresses whether a remedial action provides adequate overall protection of human health and the environment. This criterion must be met for a remedial alternative to be eligible for consideration.
2. *Compliance with Applicable or Relevant and Appropriate Requirements* addresses whether a remedial action will meet all of the applicable or relevant and appropriate requirements and other federal and Washington State environmental statutes, or provides grounds for invoking a waiver of the requirements. This criterion must be met for a remedial alternative to be eligible for consideration.
3. *Long-Term Effectiveness and Permanence* refers to the magnitude of residual risk and the ability of a remedial action to maintain long term reliable protection of human health and the environment after remedial goals have been met.
4. *Reduction of Toxicity, Mobility, or Volume Through Treatment* refers to an evaluation of the anticipated performance of the treatment technologies that may be employed in a remedy. Reduction of toxicity, mobility, and/or volume contributes toward overall protectiveness.
5. *Short-Term Effectiveness* refers to evaluation of the speed with which the remedy achieves protection. It also refers to any potential adverse effects on human health and the environment during the construction and implementation phases of a remedial action.
6. *Implementability* refers to the technical and administrative feasibility of a remedial action, including the availability of materials and services needed to implement the selected solution.
7. *Cost* refers to an evaluation of the capital, operation and maintenance, and monitoring costs for each alternative.
8. *Washington State Acceptance* indicates whether Washington State concurs with, opposes, or has no comment on the preferred interim alternative based on review of the focused feasibility study and the proposed plan.
9. *Community Acceptance* assesses the general public response to the Proposed Plan, following a review of the public comments received during the public comment period and open community meetings. The remedial action is selected only after consideration of this criterion.

SUPPORTING DOCUMENTS	ADMINISTRATIVE RECORD
K Basins Interim Remedial Action Record of Decision DOE-98-66, Rev. 0, *Addendum to the Focused Feasibility Study for the K Basins Interim Remedial Action*	The Administrative Record can be reviewed at the following location: Lockheed Martin Services, Inc. Administrative Record 2440 Stevens Center Place, Room 1101 Richland, Washington 99352 http://www2.hanford.gov/arpir/ 509/376-2530 ATTN: Debbi Isom

POINTS OF CONTACT	INFORMATION REPOSITORIES
U.S. Department of Energy Representative Paul M. Pak, A5-16 U.S. Department of Energy, Richland Operations Office P.O. Box 550 Richland, Washington 99352 Paul_M_Pak@rl.gov 509-376-4798 U.S. Environmental Protection Agency Representative (Region 10) Larry Gadbois Project Manager 712 Swift Blvd, Suite 5 Richland, Washington 99352 509/376-9884	This Proposed Plan is available for viewing at the following public information repositories: University of Washington, Suzzallo Library Government Publications Room Box 3529000 Seattle, Washington 98195 206/543-4664 ATTN: Eleanor Chase Gonzaga University, Foley Center Tri-Party Information Repository E. 502 Boone Spokane, Washington 99258 509/323-3834 ATTN: Linda Pierce Portland State University, Branford Price Millar Library Science and Engineering Floor Tri-Party Information Repository SW Harrison and Park Portland, Oregon 97207-1151 503/725-4126 ATTN: Judy Andrews U.S. DOE Richland Public Reading Room Washington State University, Tri-Cities Consolidated Information Center, Room 101L 2770 University Drive Richland, Washington 99352 509/372-7443 ATTN: Janice Pathree

GLOSSARY

The first usage of technical terms and other specialized text in this Proposed Plan is shown in bold in the document and defined as follows.

Applicable or relevant and appropriate requirements (ARAR) - Cleanup standards, standards of control, and other environmental protection requirements based on federal or state law that address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, or that address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well-suited to the particular site.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 – A federal law, also known as 'Superfund', that provides a framework to deal with releases or threatened releases of any 'hazardous substance' to the environment and provides for control and cleanup of hazardous substances to protect human health and the environment.

Cladding – The outer layer of spent nuclear fuel, usually made of aluminum, stainless steel, or zirconium alloy.

Criticality – An uncontrolled nuclear chain reaction which releases a high amount of radiation.

Debris – Objects such as metal containers, equipment, tools, and structural materials no longer needed.

Environmental Restoration Disposal Facility (ERDF) – A large landfill located near the 200 West Area of the Hanford Site used to dispose of non-liquid radioactive and mixed waste from CERCLA cleanups. The facility meets current radioactive and mixed waste design standards.

Focused feasibility study – An engineering study for a CERCLA site that evaluates a limited number of remedial alternatives for cleaning up contaminants.

Hazardous substances – Chemical substances and radionuclides as defined in section 101 of CERCLA that could pose a threat to human health or the environment.

Interim remedial action - A remedial action taken at a site to address one or more of the contamination problems, but that is not considered a final action for the site. For example, the K Basins interim remedial action addresses cleanout of the basins but does not address soil or groundwater contamination under the basins. (Soil and groundwater are addressed under separate CERCLA actions.)

Mixed waste – Waste that contains both dangerous waste subject to regulation under the Washington State Hazardous Waste Management law and radioactive material subject to regulation under the *Atomic Energy Act of 1954*. Dangerous waste is waste that, because of its source or characteristics, has been determined by Washington State to require controlled management to protect the public and environment.

Proposed plan – A fact sheet that summarizes the remedial alternatives analyzed in a feasibility study and presents the alternatives, including a preferred alternative, for public review and comment.

Record of decision (ROD) – A public document that records the final decision regarding a proposed action. This term is used in both CERCLA and NEPA processes. Under CERCLA, a ROD is a public document that records the decision regarding an interim or final action. Under NEPA, a record of decision is a public document that records the decision resulting from an environmental impact statement. In either case, the record of decision is based on information and technical analyses that take into consideration public comments and community concerns.

Remedial Design Report/Remedial Action Work Plan (RDR/RAWP) – A document that contains specific details for implementing the remedy selected in the ROD amendment.

Sludge – A mixture of very small solid particles and water.

Spent nuclear fuel (SNF) – Nuclear fuel exposed to a form of radiant energy in a reactor and now is highly radioactive.

Toxic Substances Control Act (TSCA) of 1976 – A federal law that controls the manufacture, use, storage, and disposal of certain toxic substances including PCBs.

Transuranic isotopes – Radionuclides with an atomic number greater than uranium and a half-life greater than 20 years.