Billing Code: [6450-01-P]

U.S. DEPARTMENT OF ENERGY

Amended Record of Decision: Idaho High-Level Waste and Facilities Disposition Final Environmental Impact Statement REVISED BY STATE 12/21/09

AGENCY: Department of Energy

ACTION: Amended Record of Decision

SUMMARY: The U.S. Department of Energy (DOE) is amending its initial Record of Decision (ROD) published December 19, 2005 (70 *Federal Register* [FR] 75165) (2005 ROD), pursuant to the *Idaho High-Level Waste and Facilities Disposition Final Environmental Impact Statement* (DOE/EIS-0287), issued in October 2002[1](2002 EIS). The State of Idaho was a cooperating agency in the preparation of the EIS. The DOE analyzed two sets of alternatives for accomplishing its proposed actions regarding the Idaho Nuclear Technology and Engineering Center (INTEC) at the Idaho National Laboratory (INL, formerly known as the Idaho National Environmental and Engineering Laboratory): (1) Waste processing alternatives for high-level waste (HLW) calcine and liquid sodium-bearing waste (SBW); and (2) Waste management facility disposition alternatives. Some of the alternatives contained sub-alternatives referred to as "options" in the EIS.

DOE has decided to select hot isostatic pressing (HIP) as the technology to treat calcine to provide a volume reduced monolithic waste form that is suitable for transport outside Idaho, with completion of treatment by a target date of December 31, 2035.

[1] Pursuant to a phased decision strategy described in the initial ROD, DOE has issued an amended ROD on November 28, 2006 (71 FR 68811). This new amended ROD supplements the decisions in the two previous RODs.

DOE has consulted with the State of Idaho on the decision described herein. DOE will continue to consult with the State on the decisions yet to be made on closure of calcine-related facilities.

ADDRESSES: Copies of this Amended ROD will be available on DOE's National Environmental Policy Act (NEPA) web site at: http://www.gc.energy.gov/nepa under DOE NEPA Documents.

FOR FURTHER INFORMATION CONTACT: For further information on this Amended ROD and the Idaho Cleanup Project, contact Nolan R. Jensen, Federal Project Director, U.S. DOE, Idaho Operations Office, 1955 Fremont Avenue, MS 1222, Idaho Falls, ID 83415, telephone: (208) 526-5793.

For general information on DOE's NEPA process, please contact: Carol M. Borgstrom, Director, Office of NEPA Policy and Compliance (GC-54), U.S. DOE, 1000 Independence Avenue, SW., Washington, DC 20585-0103, Telephone: (202) 586-4600 or leave a message at (800) 472-2756.

SUPPLEMENTARY INFORMATION:

I. Background

From 1952 to 1991, DOE and its predecessor agencies reprocessed spent nuclear fuel (SNF) at INTEC, known prior to 1998 as the Idaho Chemical Processing Plant, on the INL Site. Reprocessing operations used solvent extraction systems to remove mostly uranium-235 from SNF. The waste product from the first extraction cycle of the reprocessing operation was liquid HLW mixed with hazardous materials. Subsequent extraction cycles, treatment processes, and follow-on decontamination activities generated additional liquid HLW that was combined to form SBW, which is generally much less radioactive than HLW generated from the first extraction cycle. These liquid wastes were stored in eleven 300,000-gallon below-grade storage tanks. The last campaign of SNF reprocessing at INTEC was in 1991, and HLW

was no longer generated at INTEC after that time. From 1963 to 1998, DOE processed HLW and SBW through a calcination process that converted the liquid waste into a dry powder referred to as calcine. Some SBW was processed by calcination from 1998 to 2000, when a decision to shut down the New Waste Calcining Facility was made.

At present, approximately 4,400 cubic meters of HLW calcine remain stored in six bin sets (a series of reinforced concrete vaults, each containing three to twelve stainless steel storage bins). The stainless steel in the storage bins is highly corrosion resistant, and the bins are designed to be secure for at least 500 years. Based on the analyses summarized in the EIS, DOE has concluded that the calcine stored in the bins poses no significant present hazard to public health or the environment.

As a result of litigation, DOE and the State of Idaho reached an agreement in 1995 referred to as the Idaho Settlement Agreement/Consent Order (Settlement Agreement) that, among other things, requires DOE to "treat all HLW currently at INEL so that it is ready to be moved outside of Idaho for disposal by a target date of 2035." It further requires that a ROD be issued no later than December 31, 2009 establishing a date for completion of the treatment of all calcined waste located at the INL Site by a contemplated target date of December 31, 2035. The Settlement Agreement also requires that DOE submit an application for a RCRA (or statutory equivalent) Part B Permit to the State by December 1, 2012.

DOE issued the *Idaho High-Level Waste and Facilities Disposition Final Environmental Impact Statement* in October 2002, with the State of Idaho as a cooperating agency. The EIS analyzed two sets of alternatives for accomplishing the proposed action relative to calcine:

1. Waste processing alternatives for liquid SBW, including newly generated liquid waste stored in three 300,000 gallon below grade tanks, and solid calcine stored in bin sets at the INTEC on the INL Site; and

2. Facility disposition alternatives for final disposition of facilities directly related to the HLW and SBW Program after its missions are complete, including any new facilities necessary to implement the waste processing alternatives.

In DOE's 2005 ROD, DOE decided to pursue a phased decision-making process regarding the proposed actions in the EIS. DOE also decided, among other things, to treat the remaining liquid SBW using the steam reforming technology and to conduct performance-based RCRA closure of existing facilities directly related to the HLW program at INTEC, excluding the INTEC Tank Farm Facility (TFF) and bin set closure. As a result, DOE is constructing a facility for the purpose of treating and packaging the SBW. This new facility is known as the Integrated Waste Treatment Unit (IWTU).

The 2005 ROD also addressed the plan to issue an Amended ROD in 2006 specifically addressing closure of the TFF as well as an Amended ROD in 2009 addressing the strategy for calcine disposition and bin set closure. In the 2006 Amended ROD (71 FR 68811), DOE decided to conduct performance based closure of the INTEC TFF.

Decisions made in this ROD consider the Administration's intent to terminate ongoing funding for the Yucca Mountain program while evaluating nuclear waste disposal alternatives, as indicated in the Administration's fiscal year 2010 budget request. DOE remains committed to meeting its obligations to manage and ultimately dispose of HLW and spent nuclear fuel. DOE will convene a Blue Ribbon Commission to evaluate alternatives for meeting these obligations. The commission will provide the opportunity for a meaningful dialogue on how best to address this challenging issue and will provide recommendations to DOE that will form the basis for working with the Congress to revise if appropriate the statutory framework for managing and disposing of HLW and spent nuclear fuel. The ultimate

disposition of the calcine HLW, and the applicable waste acceptance criteria, may be affected by the upcoming recommendations of the anticipated Blue Ribbon Commission.

II. Waste Processing Alternatives Analyzed in the EIS

The 2002 EIS analyzed six alternatives for calcine:

- **No Action Alternative**

  Under this alternative, the New Waste Calcining Facility (NWCF) would remain in standby and the calcine would remain in the bin sets indefinitely.

- **Continued Current Operations Alternative**

  Under this alternative, the NWCF would remain in standby pending receipt of a RCRA permit from the State of Idaho and upgrades to air emission controls required by the U.S. Environmental Protection Agency (EPA).

- **Separations Alternative (with three treatment options)**

  This alternative comprises three treatment options, each of which would use a chemical separations process, such as solvent extraction, to divide the calcine into fractions suitable for disposition as either: HLW, transuranic (TRU) waste, or low-level waste, depending on waste characteristics. Separating the radionuclides in the waste into fractions would decrease the amount of HLW, saving space and reducing disposition costs. The three waste treatment options under the Separations Alternative are described below:

  1. The Full Separations Option would separate the radioisotopes in the calcine into high-level and low-level waste fractions. The HLW fraction would be vitrified in a new facility at INTEC,

placed in stainless steel canisters, and stored onsite until shipped to a storage or disposition facility. DOE would dispose of the low-level waste fraction on site, or at an offsite DOE or commercial low-level waste disposal facility.

2. The Planning Basis Option reflects previously announced DOE decisions and agreements with the State of Idaho regarding the management of HLW. It is similar to the Full Separations Option in that, after separations, the HLW fraction would be vitrified in a new facility at INTEC, placed in stainless steel canisters, and stored onsite until shipped to a storage or disposition facility. DOE would dispose of the low-level waste fraction on site, or at an offsite DOE or commercial low-level waste disposal facility.

3. The Transuranic Separations Option would consist of separating the HLW into two fractions. The resulting fractions would be managed as TRU waste and low level waste. The TRU fraction that meets applicable requirements, would be solidified, packaged, and shipped to the Waste Isolation Pilot Plant for disposal. DOE would dispose of the low-level waste fraction on site or at an offsite DOE or commercial low-level waste disposal facility.

- **Non-Separations Alternative (with four treatment options)**

This alternative includes four treatment options for solidifying HLW calcine. The four treatment options are briefly described below:

1. The Hot Isostatic Pressing (HIP) Waste Option under which HLW calcine would be treated in a high pressure, high temperature process that would convert the calcine into a glass-ceramic waste form. The final product would be packaged for storage, transport, and disposition.

2. The Direct Cement Waste Option under which HLW calcine would be retrieved, mixed with cement, poured in stainless-steel canisters, and cured at elevated temperature and pressure. The canisters would be placed in storage for transport and subsequent disposition

3. The Early Vitrification Option would involve vitrifying the HLW calcine into a glass-like solid. The vitrified HLW would be placed in interim storage pending disposition.

4. The Steam Reforming Option includes packaging of HLW calcine without additional treatment for shipment and disposition.

- **Minimum INEEL (now INL) Processing Alternative**

  This alternative would minimize the amount of waste treatment at the INL by using the vitrification facility (Waste Treatment Plant) under construction for the DOE Hanford Site in the State of Washington. The HLW calcine would be placed in shipping containers and sent to the Hanford Site where it would be vitrified.

- **Direct Vitrification Alternative (with two treatment options)**

  This alternative includes two treatment options: Vitrification without Calcine Separations and Vitrification with Calcine Separations. The option to vitrify calcine without separations would be similar to the Early Vitrification Option. The option to vitrify the HLW fraction from calcine separations would be similar to the Full Separations Option. Under the Vitrification with Calcine Separations Option, calcine would be retrieved from the bin sets, and chemically separated into a HLW fraction to be vitrified and a low-level waste (LLW) fraction to be grouted. Under the Vitrification without Calcine Separations Option, calcine would be directly vitrified. Under either option, vitrified HLW would be stored pending disposition.

III. DOE and the State of Idaho Preferred Alternatives Identified in the EIS

The DOE Preferred Alternative identified in the 2002 EIS for waste processing (including calcine) was to implement the proposed action by selecting from among the action alternatives, options, and technologies analyzed in the 2002 EIS. The selection of any one of, or combination of, technologies or options used to implement the proposed action would be based on the performance criteria of technical maturity, environmental health and safety considerations, consideration of public comment, cost, schedule, and programmatic risk. Options excluded from DOE's preferred alternative were storage of calcine in bin sets for an indefinite period of time (analyzed under the Continued Current Operation Alternative), shipment of all calcine to the Hanford Site for treatment (analyzed under the Minimum INEEL [now INL] Processing Alternative), and disposal of mixed LLW at INL (analyzed under multiple alternatives) .

The State of Idaho Preferred Alternative identified in the 2002 EIS for waste processing was the Direct Vitrification Alternative. The State of Idaho preferred vitrification based on the belief that it was the treatment alternative with the lowest technical and regulatory uncertainty for meeting waste removal goals and providing a clear baseline for fulfilling the objectives of removal of waste from Idaho within the timelines envisioned by the Settlement Agreement. The State of Idaho was willing to consider other waste treatment options, if they were comparable or better than the Direct Vitrification Alternative in terms of environmental impact, schedule, and/or cost.

IV. Environmentally Preferable Alternative

In nine of fourteen environmental areas analyzed, the 2002 EIS indicates little or no environmental impact would occur under all of the action alternatives. In the remaining five areas analyzed (air, traffic and transportation, health and safety, waste and materials, and facility accidents), the results indicate that potential short-term impacts from routine exposures would be small and would not differ significantly among action alternatives. Under normal operations, none of the waste processing action alternatives

analyzed in the EIS would result in large short-term or long-term impacts to human health or the environment. Also, none of the action alternatives would result in appreciably different impacts on historic, cultural and natural resources.

Any of the waste treatment alternatives that place the calcine in a waste form suitable for disposition outside of the State of Idaho would be environmentally preferable compared to the No Action and Continued Current Operations Alternatives.

V. Decision

DOE has decided to deploy the HIP technology to cost-effectively treat the calcine waste. This option also presents the flexibility to either:

- Treat calcine in a sealed high temperature and high pressure canning process including the addition of treatment additives necessary to produce a glass-ceramic and volume reduced monolithic waste form; or
- Treat calcine in a sealed high temperature and high pressure canning process without addition of treatment additives resulting in an even greater volume reduction.

The HIP technology deployed for the treatment of HLW calcine also provides the technological capability to further treat the SBW steam-reformed carbonate waste form, should such treatment be necessary in order for this waste to be ready to leave Idaho by 2035 as required by the 1995 Settlement Agreement

Treatment using the HIP technology has been demonstrated to generate a waste form consistent with waste form requirements that are currently specified for the performance of single-phase borosilicate glass being produced at DOE's Defense Waste Processing Facility at the Savannah River Site and to be

produced at the Waste Treatment Plant at DOE's Hanford Site. The use of HIP with the addition of treatment additives will be necessary to eliminate the RCRA hazardous waste characteristics should calcine be dispositioned at a non-RCRA-permitted site outside the State of Idaho[2].

If it is decided to disposition calcine at a RCRA-permitted facility outside the State of Idaho, the use of HIP without addition of treatment additives would cost-effectively reduce the volume of waste even further, resulting in fewer canisters of product to be ultimately shipped for such disposition outside the State of Idaho[3].

DOE's decision will allow DOE to meet the provisions of the Settlement Agreement for the treatment of all calcinated waste and, if applicable, SBW.

To facilitate treatment, DOE has decided to retrieve and pneumatically (forced air through piping) transport the calcine to a surge tank located at the head end of the IWTU at such time as the calcine treatment and packaging process is about to commence. The IWTU facility, after completion of its SBW mission and suitable reconfiguration, will be used to support treatment of the calcine and other wastes and meet associated safety and seismic design basis requirements.

2 Under this treatment option (HIP with additives), an approved delisting petition would be required and any land disposal restrictions would also have to be met.

3 Under this treatment option (HIP without treatment additives), any land disposal restrictions would also have to be met.

In accordance with the Settlement Agreement, DOE will submit a request for a Permit Modification to the Integrated Waste Treatment Unit RCRA Part B Permit no later than December 1, 2012, that will address:

- Calcine retrieval and pneumatic transport of the retrieved calcine to a designed surge tank to be located at the head end of the IWTU facility, and
- HIP treatment/processing of all calcine within a modified IWTU facility.

DOE has consulted with the State of Idaho on the decisions described herein. The State of Idaho concurs with DOE's selection of HIP technology to treat calcine (and concurs that it provides the technological capability to further treat the SBW steam-reformed carbonate waste form, should such treatment be necessary) to produce a glass ceramic and volume reduced monolithic waste form. This treatment appears comparable to single-phase borosilicate glass resulting from vitrification which was Idaho's previous preferred alternative. Idaho prefers the HIP technology with the addition of treatment additives because it is the most likely form to meet current regulatory requirements allowing for disposal outside the State of Idaho. Idaho does not object to the HIP technology without the addition of treatment additives provided the final waste form is eligible for transport outside the State of Idaho for storage or disposition. DOE will continue to consult with the State on the decisions yet to be made concerning the addition of treatment additives for the HIP treatment of the calcine waste.

No environmental impacts resulting from operations under this decision would require specific mitigation measures. DOE will, however, use all practicable means to avoid or minimize environmental harm when implementing the actions described in this amended ROD. Those measures include employing engineering design features to ensure that calcine waste processing via HIP is conducted safely and in accordance with all applicable regulatory requirements. Other measures include maintaining a rigorous

health and safety program to protect workers from radiological and chemical contaminants, monitoring worker and environmental risk, and continuing efforts to reduce generation of wastes. DOE will implement the comprehensive list of standards and requirements to protect workers, the public, and the environment specified in Chapter 6 of the Final EIS, as appropriate.

VI. Basis for Decision

DOE is selecting the HIP technology to treat calcine HLW for a number of reasons. The HIP technology is anticipated to cost-effectively treat the calcine waste, reduce the volume of the waste, and place the waste in a form ready to be moved out of the State of Idaho, consistent with the dates in the Settlement Agreement.

Issued in Washington, D.C., on December 23, 2009

Inés R. Triay
Assistant Secretary for
Environmental Management