# RETRIEVAL, TREATMENT AND DISPOSAL OF TANK WASTE AND CLOSURE OF SINGLE SHELL TANKS (TANK CLOSURE) ENVIRONMENTAL IMPACT STATEMENT

# POST SCOPING ALTERNATIVE SUMMARY

**Effective Date: June 4, 2003**

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## POLICY SUMMARY

| APPROVAL | SIGNATURE | DATE |
|---|---|---|
| Approved by: | Signature on file<br>Leif Erickson, Deputy Manager<br>Office of River Protection | 6/23/2003 |
| Concurred by: | Signature on file<br>Mary Burandt,<br>NEPA Document Manager, ORP | 6/6/2003 |

Retrieval, Treatment, and Disposal of Tank Waste
And Single Shell Tank Closure
(Tank Closure EIS)
Environmental Impact Statement
Post Scoping Alternatives Summary
April 22, 2003

**Background:** On January 8, 2003, the Department of Energy published a Notice of Intent to prepare the *Environmental Impact Statement for Retrieval, Treatment, and Disposal of Tank Waste and Closure of Single-Shell Tanks at the Hanford Site, Richland, Washington Project* (Tank Closure System EIS) (68 FR 1052).

During the 60 day scoping period, which ended March 10, 2003, DOE invited all interested parties to submit comments or suggestions concerning the scope of the issues, alternatives, and environmental impacts to be analyzed within the EIS. The public was also invited to attend scoping meetings, at which both oral and written comments were accepted on the proposed EIS. The purpose of the scoping meetings was to inform the public about the proposed action and the nature and content of the decision-documents to be prepared. These meetings also allowed the public an opportunity to identify, for the record, areas of potential impacts that should be considered by DOE in preparing the EIS. A complete review of the scoping process is defined in *Retrieval, Treatment, and Disposal of Tank Waste and Closure of Single-Shell Tanks (Tank Closure EIS), Environmental Impact Statement, Public Scoping Summary.*

The initial scope of the Tank Closure EIS was provided in the Notice of Intent and at each public scoping meeting. The scope called for consideration of impacts associated with the following proposed alternatives:

- No Action
- Implement the 1997 Record of Decision (With Modifications)
- Landfill Closure of Tank Farms/Onsite and Offsite Waste Disposal
- Clean Closure of Tank Farms/Onsite and Offsite Waste Disposal
- Accelerated Landfill Closure/Onsite and Offsite Waste Disposal
- Landfill Closure/Onsite and Offsite Waste Disposal

### 1.1.1 Public Scoping Process Results

As a result of the scoping meetings there were many changes that were made to the alternatives to reflect comments that were received. By alternative, the major changes were as follows;

- The No Action was modified to address a true no-action rather then the action from the Tank Waste Remediation System Record of Decision;

- The implementation of the 1997 Record of Decision was modified to address the current vitrification capacity of the existing facility;

- The implementation of the 1997 Record of Decision was modified to address the current vitrification capacity supplemented with vitrification;

- A partial tank removal option was added;

- The Landfill Closure/Onsite and Offsite Waste Disposal was modified to address more clearly No Separations with On-site storage and Off-site disposal.

The decisions that are being enabled by the EIS are identified in Attachment 1. The specific alternative changes and definition of the revised alternatives are identified in Attachment 2. .

# Tank EIS – Key Decisions

The goal of the EIS is to identify several points to assist the decision-maker with key programmatic analysis if the following areas; treatment technology, closure and tank management. The benefit of the EIS is to enable actions in each of the 3 areas.

## Treatment Phased Implementation

Key decision: What should "phased implementation" be to treatment of all tank waste.

- Existing Capacity WTP
  Operate to ~2083 for ILAW
- Existing Capacity supplemented with additional ILAW vitrification
  Operate to ~2034
- Existing Capacity WTP, enhanced with phased deployment of supplemental treatment technologies
  Operate to ~2034
  - Enhanced WTP
  - External WTP Treatment (LAW and TRU)
  - Supplemental Technologies

The impact of disposal of a final waste form should be addressed and the relationship to the solid waste EIS.

The supplemental treatment should address performance assumptions that other technologies would be evaluated against as technologies warrant.

## Retrieval and Closure

Key decision: Does the relationship between the amount retrieved and the closure barrier have an impact

Key decision: The impact between closure with all tanks left in place, partial removal of some tanks, and removal of all tanks.

Tanks above refers to the tanks, ancillary equipment and soils depending on the alternative.

- Extent/Approach
  - Clean Closure
  - Partial removal - landfill
  - Landfill with various residuals
  - Barrier( modified RCRA vs Hanford)
- Deployment
  - Assist with interim closure decisions
  - Enable final closure decisions

## Tank Management

Key decision: Infrastructure management decisions to support longer-term activities

Infrastructure can include things like, evaporators, facility replacement, storage space, disposal capacity

- Current Capacity
- Modify Existing
- New Capacity

Changes between alternative 2 and 3

Changes between alternative 4 and 5

Changes between alternatives 3, 4 and 6

Changes within all alternatives

**Attachment 2**

**Revisions to Notice of Intent to Prepare an Environmental Impact Statement for Retrieval, Treatment, and Disposal of Tank Waste and Closure of Single-Shell Tanks (Tank Closure EIS) as a result of public scoping comments.**

DOE proposes to retrieve waste from the 149 SST and 28 DST systems and close the SST tank farms in a manner that complies with Federal and Washington State requirements and protects the human environment. (Closure of the DSTs and closure of the Waste Treatment Plant (WTP) are not part of the proposed action because they are active facilities needed to complete waste treatment. Closure of the DSTs and WTP would be addressed at a later date, after appropriate NEPA analysis.) DOE proposes to immobilize the retrieved waste in the WTP and through supplemental treatment technologies such as bulk vitrification, grout, steam reforming, and sulfate removal, and to package the immobilized waste for offsite shipment and disposal in licensed and/or permitted facilities or disposal onsite.

**Proposed Alternatives**

Each of the six alternatives contains a waste storage, retrieval, treatment, and disposal component. Alternatives 3 through 6 also include a tank closure component.

## 1. No Action

The Council on Environmental Quality NEPA Regulations (40 CFR Parts 1500-1508), and the DOE NEPA Regulations (10 CFR Part 1021) require analysis of a No Action alternative. The no action addresses the no action case from the Tank Waste Remediation System (TWRS) EIS with the past leak inventory added.

**Storage:** DOE would continue to store and monitor waste in the SSTs and DSTs for 100 years. Tanks showing signs of deterioration based on monitoring would be filled with grout or gravel as a corrective action or emergency response.

**Retrieval:** Waste would not be retrieved.

**Treatment:** No vitrification or treatment capacity would be built after 2004. The existing WTP construction would be terminated and the site would be isolated pending some future use. No Immobilized Low Activity Waste (ILAW) or Immobilized High Level Waste (IHLW) would be produced.

**Disposal:** Except for the liquids removed via interim stabilization, the remaining waste in tanks would remain in the tank farm indefinitely. For purposes of analysis, administrative control of the tank farms would end following a 100-year period (2104).

**Closure:** Tank closure would not be addressed; under this alternative. Waste would be left in place indefinitely.

## 2. Implement the TWRS 1997 Record of Decision, with modifications

This alternative has two sub-alternatives with the alternative. This alternative represents the implementation of decisions made in the TWRS ROD and as considered in three supplement analyses completed through 2001. Under this alternative, all waste retrieved from the tanks would be vitrified with the resulting waste product being ILAW or IHLW waste.

**Alternative 2a (6 Metric Tons Glass per day HLW and 30 Metric Tons Glass per day ILAW)**

**Alternative 2b (6 Metric Tons Glass (MTG) per day HLW and 90 MTG per day ILAW)**

**Storage for 2a and 2b:** DOE would continue current waste management operations. No new Double Shell Tanks are required but four Waste Receiving Facilities will be constructed. Replacement Double Shell Tanks will be required, after the existing Double Shell Tanks reach their design life for alternative 2A.

**Retrieval for 2a and 2b:** Waste would be retrieved to the Tri-Party Agreement goal (i.e., residual waste would not exceed 360 cubic feet for 100 series tanks or 36 cubic feet for 200 series tanks, which would correspond to 99% retrieval) using currently available liquid-based retrieval and leak detection systems. Retrieval leak rates for SSTs are assumed.

**Treatment for 2a:** The existing WTP would be used representing 6 MTG HLW and 30 MTG ILAW. Treatment would start in 2009 and both HLW and ILAW treatment would end in 2083. Pretreatment, ILAW and IHLW facilities would need to be replaced after 60 years due to design life constraints. No transuranic (TRU) waste or supplemental LLW treatment capability is provided.

**Treatment 2b:** The existing WTP would be modified to enhance throughput and supplemented with additional vitrification capacity representing 6 MTG HLW and 90 MTG ILAW. Treatment would start in 2009 and complete waste treatment by 2034. No facilities would need to be replaced. No TRU or supplemental LLW treatment capability is provided.

**Disposal 2a and 2b:** Retrieved and treated waste would be disposed of onsite (ILAW) or stored onsite pending disposal at a geologic repository (IHLW).

**Closure 2a and 2b:** Tank closure would not be addressed under this alternative since it was not addressed in the TWRS EIS. For purposes of analysis, administrative control of the tank farms would end following a 100-year period.

## 3.0 Alternative 3b) ILAW Vitrification with Grout Supplemental Technology, Landfill Closure

## Alternative 3a) ILAW Vitrification with Bulk Vitrification Supplemental Technology, Landfill Closure

**Storage 3a and 3b**: DOE would continue current waste management operations using existing storage facilities. IHLW will be stored in Canister Storage Buildings as needed. Shipment to Yucca starts in 2011. No new Double Shell Tanks are required but four Waste Receiving Facilities will be constructed.

**Retrieval 3a and 3b:** Waste would be retrieved to the Tri-Party Agreement goal (i.e., residual waste would not exceed 360 cubic feet for 100 series tanks or 36 cubic feet for 200 series tanks, which would correspond to 99% retrieval) using currently available liquid-based retrieval and leak detection systems. Retrieval leak losses rates for SSTs are assumed.

**Treatment 3a and 3b:** The existing WTP would be used representing 6 MTG HLW and 30 MTG ILAW. Treatment would start in 2009 and both HLW and ILAW treatment would end in approximately 2030.

**3a**: WTP capacity would be supplemented with bulk vitrification treatment capacity to immobilize LLW. Supplemental treatment will occur in both 200 East and 200 West and consist of bulk vitrification. A portion of the tank waste would be designated as TRU waste for disposal.

**3b**: WTP capacity would be supplemented with grout treatment capacity to immobilize LLW instead of a vitrification technology. Supplemental treatment will occur in both 200 East and 200 West and consist of grout. A portion of the tank waste would be designated as TRU waste for disposal.

**Disposal 3a and 3b:** ILAW immobilized via the WTP would be disposed of onsite. IHLW would be stored onsite pending disposal at a national geologic repository. LLW immobilized external to the WTP would be disposed of onsite. TRU waste would be packaged and stored onsite in an existing or new facility pending disposal at the Waste Isolation Pilot Plant (WIPP).

**Closure 3a and 3b:** As operations are completed, SST waste system, waste storage, treatment and disposal facilities at the Hanford Site would be closed as a Resource Conservation and Recovery Act (RCRA) hazardous waste landfill unit under Dangerous Waste Regulations under

WAC 173-303 and DOE Order 435.1, as applicable, or decommissioned (waste treatment facilities under DOE Order 430.1A). The tanks would be filled with materials to immobilize the residual waste and prevent long-term degradation of the tanks and discourage intruder access. Tanks, ancillary equipment, and contaminated soils would be remediated down to 15 feet for B and T tank farms via in-situ remediation or removal. The closed tank systems would be covered with an engineered Modified RCRA Subtitle C barrier.

## 4.0 ILAW Vitrification with Supplemental Technologies and Selective Landfill Closure

**Storage**: DOE would continue current waste management operations using existing storage facilities. IHLW will be stored in Canister Storage Buildings as needed. Shipment to Yucca starts in 2011. No new Double Shell Tanks are required but four Waste Receiving Facilities will be constructed.

**Retrieval:** Waste would be retrieved to a volume corresponding to 99.9 % retrieval. Retrieval using currently available liquid-based retrieval and leak detection systems, with a chemical wash step included. Retrieval leak losses for SSTs are assumed.

**Treatment:** The existing WTP would be used representing 6 MTG per day HLW and 30 MTG per day ILAW. Treatment would start in 2009 and both HLW and ILAW treatment would end in approximately 2030. WTP capacity would be supplemented with additional waste treatment

capacity to immobilize LLW. Supplemental treatment will occur in both 200 East and 200 West and consist of a combination of grout and bulk vitrification. A portion of the tank waste would be designated as TRU waste for disposal.

**Disposal:** ILAW immobilized via the WTP would be disposed of onsite. IHLW would be stored onsite pending disposal at a national geologic repository. LLW immobilized external to the WTP would be disposed of onsite. TRU waste would be packaged and stored onsite in an existing or new facility pending disposal at the Waste Isolation Pilot Plant (WIPP).

**Closure:** As operations are completed, SST waste system, waste storage, treatment and disposal facilities at the Hanford Site, with the exception of B and T tank farms, would be closed as a RCRA hazardous waste landfill unit under Dangerous Waste Regulations under WAC 173-303 and DOE Order 435.1, as applicable, or decommissioned (waste treatment facilities under DOE Order 430.1A). The tanks and ancillary equipment would be filled with materials to immobilize the residual waste and prevent long-term degradation of the tanks and discourage intruder access. The tank systems would be covered with an engineered Modified RCRA Subtitle C barrier. B and T farms will be clean closed by removing the tanks, ancillary equipment and contaminated soil. These tank farms will be backfilled with clean fill.

## 5.0 Accelerated Landfill Closure /Onsite and Offsite Waste Disposal

**Storage:** DOE would continue current waste management operations using existing storage facilities. Four new Double Shell Tanks are required in addition to four Waste Receiving Facilities will be constructed.

**Retrieval**: Waste would be retrieved to the goal of 90% using, currently available liquid-based retrieval and leak detection systems. Retrieval leak losses for SSTs are assumed.

**Treatment:** The WTP represents a 6 MTG per day HLW and a 45 MTG per day ILAW facility. Treatment starts in 2009 and ends in approximately 2024. WTP capacity will be supplemented with sulfate removal. In addition, supplemental treatment will occur in both 200 East and 200 West and consist of a combination of grout and bulk vitrification. A portion of the tank waste would be designated as TRU waste for disposal.

**Disposal:** ILAW immobilized via the WTP would be disposed of onsite. IHLW would be stored onsite pending disposal at the proposed national geologic repository. LLW immobilized external to the WTP would be disposed of onsite. Transuranic waste would be packaged and stored onsite pending disposal at the WIPP.

**Closure:** As operations are completed, SST tank waste system waste storage, treatment, and disposal facilities would be closed as a RCRA hazardous waste landfill unit under Dangerous Waste Regulations under WAC 173-303 and DOE Order 435.1, or decommissioned (waste treatment facilities under DOE Order 430.1A). The tanks would be filled with materials to immobilize the residual waste and prevent long-term degradation of the tanks and discourage intruder access. Tank systems (tanks, ancillary equipment, and soils) would be closed in place and would be covered with the Hanford barrier (i.e., a barrier with performance characteristics that exceed RCRA requirements for disposal of hazardous waste). To support schedule acceleration SST farm system ancillary equipment outside the boundaries of the closure caps will neither be removed nor decontaminated.

## 6.0 Alternative 6a No Separations, Vitrification, Clean Closure

## Alternative b No Separations, Vitrification, Landfill Closure

**Storage 6a and 6b:** DOE would continue current waste management operations using existing storage facilities that would be modified, as needed, to support SST waste retrieval and treatment. New Double Shell Tanks will be required, after the existing Double Shell Tanks reach their design life.

**Retrieval 6a and 6b**: Waste would be retrieved to the goal of 99.9 %, using liquid and non-liquid based retrieval and enhanced leak detection systems, an additional chemical wash step is included.

**Treatment 6a:** WTP capacity consists of five 3 MTG per day HLW melters only (total of 15 MTG per day). Treatment would start in 2009 and would end in approximately 2153. There would be no Pretreatment or LAW Treatment. All waste would be treated and packaged to meet the current geologic repository disposal requirements. No supplemental or TRU treatment is proposed.

**Treatment 6b:** WTP capacity consists of five 3 MTG per day HLW melters only (total of 6 MTG per day). Treatment would start in 2009 and would end in approximately 2153. There would be no Pretreatment or LAW Treatment. All waste will be treated and packaged to meet the current geologic repository disposal requirements. No supplemental or TRU treatment is proposed.

**Disposal 6a and 6b:** HLW canisters would be stored on site pending shipment and disposal at a geologic repository. Shipments are s planned starting in 2011. Those canisters that exceed the

national geologic repository's capacity would be stored onsite in vaults or casks. e Replacement of the canister storage facilities would be required after a 40 year design life.

**Closure 6a:** Clean closure of all SST farms would occur. Tanks, contaminated tank equipment, contaminated ancillary equipment, and contaminated soil would be removed. Tank farms will be back-filled with clean fill to support future unrestricted use.

**Closure 6b:** As operations are completed, SST tank farms would be landfill closed with the residual waste classified as non-HLW. This classification would require revisions to current regulations. Landfill closure would include filling the tanks with material to immobilize the residual waste and prevent long-term degradation of the tanks and discourage intruder access. . At B and T tank farms tanks, ancillary equipment, and contaminated soils would be remediated down to 15 feet via in-situ remediation or removal Remaining ancillary equipment outside the boundaries of the caps will be remediated or removed. Closure would be with a Modified RCRA Subtitle C barrier. Institutional controls would continue for 100 years.