

**APPENDIX H - SINGLE SHELL TANK WASTE RETRIEVAL CRITERIA PROCEDURE**

**SINGLE SHELL TANK WASTE RETRIEVAL CRITERIA PROCEDURE<sup>1</sup>**

INTRODUCTION

The purpose of this procedure is to establish a means to set, evaluate, and revise criteria for determining the allowable residual waste following waste retrieval operations on the Hanford single shell tanks (SST).

The format for this procedure is to progress through a series of steps as depicted in the generic logic diagram displayed as Figure 1. Each step is briefly outlined and includes elements that constitute completion of the step.

DEFINITION OF TERMS SPECIFIC TO WASTE RETRIEVAL ACTIVITIES:

**Residual Waste:** Tank waste remaining in the tank after all waste retrieval actions have been completed. Some materials may be excluded from residual waste volume calculations, subject to approval in the closure plan.

Step 1 : Establish Goal

This initial step establishes the goal (the standard) for waste retrieval percentage and the method to be used to calculate the allowable residual waste volume following completion of retrieval operations. The calculation method is dependent on the variable to be measured (total tank waste inventory), and closure criteria and strategy. The proposed residual waste volume calculation method is shown in Attachment 1. A retrieval goal has been established as defined in milestone M-45-00.

Step 2 : Evaluate Major Assessment Areas

Once the goal has been established, it is assessed against two major areas, which are:

- a) SST Technology Demonstrations: Demonstrate achievability of waste retrieval goal during tank 241-S-112 (Salt Cake Dissolution), 241-C-106 (Modified Sluicing), 241-C-200 Series (Vacuum Retrieval), and either 241-C-110, 241 C-111, or C-101 using Robotic Technologies + Vacuum Retrieval (Whichever is retrieved first). The effectiveness of the retrieval operation will be determined with a topographical measurement, or other methods defined in the Data Quality Objective (e.g., volume displacement method) of remaining waste in the tank, and a calculation of waste inventory. The inventory calculation will be based on calculated volume of the tank, waste topography measurements with appropriate surveying

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<sup>1</sup> This procedure was originally appended to Change Request M-45-93-01.

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techniques, and include adjustments for any detectable deformities in the tank structure (i.e., liner bulges). This technique will be demonstrated and calibrated in this retrieval demonstration. Prepare input to the retrieval goal evaluation (step 3) to accommodate the retrieval operations and residual measurement demonstrations.

- b) Evaluate regulatory requirements of high-level waste (HLW) disposal from applicable rules, regulations and DOE Orders. Establish an interface with the Nuclear Regulatory Commission (NRC), and reach formal agreement on the retrieval and closure actions for single shell tanks with respect to allowable waste residuals in the tank and soil column. Prepare input to the retrieval goal evaluation (step 3) to accommodate the agreements on allowable residuals.

Step 3 : Tank Retrieval Demonstration Goal Compliance

Perform a joint assessment by DOE and Ecology of the retrieval goal, based on the inputs from Steps 1 and 2. Modify the retrieval goal to match the most restrictive case (i.e., the highest retrieval % requirement).

Step 4 : Tank Farm Retrieval Demonstration(s)

Perform the Tank Farm Retrieval Demonstration(s) on the selected tank farm or initial set of single-shell tanks to be retrieved. Repeat the residual inventory measurement steps identified in the tank retrieval demonstration. Calculate the residual inventory for each tank, based on the formula and procedure in Attachment 1 to this Appendix.

Step 5 : Tank Farm Retrieval Demonstration Goal Compliance

Perform a joint assessment by DOE and Ecology of the retrieval goal, based on the tank farm retrieval demonstration results. Modify the goal to match best available technology. Notify NRC as required for compliance with Nuclear Waste Policy Act. Establish formal criteria for retrieval of waste from the remaining SST's. Finalize closure plans for tank farms and obtain concurrence from regulatory agencies.

Step 6 : SST Retrieval

Proceed with retrieval of waste from the remaining SSTs. The schedule reflects retrieval activities on a tank-by-tank basis. It also allows flexibility to retrieve tanks from various farms if desired to support safety issue resolution, pretreatment or disposal feed requirements, or other priorities. Completion of retrieval will be in accordance with approved closure plans.

Step 7 : Determine Residual Waste Percentage

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The waste residuals are calculated for each tank.

Step 8 : Retrieval Compliance Evaluation

Compare residual waste in each tank with criteria. Document compliance with criteria via notification to appropriate regulatory agencies. If residual complies with criteria, proceed with final closure operations (step 14). If residuals do not comply with criteria, prepare a request for waiver to the appropriate regulatory agency (step 9).

Step 9 : Petition for Regulatory Waiver

An assessment is made as to the applicability of petitioning for regulatory waiver. This requires the review of relevant NRC license issues and possible closure plan modifications. Submit waivers to appropriate regulatory agencies.

Step 10 : Waiver Acceptance

If a waiver is accepted, closure operations for the tank farm is initiated (Step 14). If the waiver is not accepted, additional retrieval operations are required. New technology may be needed (step 11). The waiver evaluation will consider the points on Attachment 2.

Step 11 : Additional Technology Available

A review of alternate technologies will be performed relative to additional waste removal. If additional technologies are available, they will be deployed (step 12) and waste retrieval will resume. If additional technologies are not available, new technologies must be developed and deployed (steps 13 and 14). The tank farm will be held in interim status pending completion of the additional retrieval operations.

Step 12 : Deploy Technology and Perform Additional Retrieval

If additional retrieval technology is available, it is deployed and additional waste retrieval operations are performed. After retrieval operation, the waste residual is again determined (Step 7), followed by the tank goal compliance evaluation (Step 8).

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Step 13 : Develop New Technology

If additional retrieval technology is not available, new technology is to be developed for the residue waste followed by deployment of the technology and additional waste retrieval operations (Step 12). After retrieval operation, the waste residual is again determined (Step 7), followed by the tank goal compliance evaluation (Step 8).

Step 14 : Closure Action

When the tank farm retrieval and waste residual assessment process is complete the closure operations will start. Completion of the retrieval operations will be documented in accordance with the closure plans.

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**Attachment 1**

**WASTE RESIDUAL CALCULATION PROCEDURE, STEP 1**

**Calculate Residual Waste Volume**

1. Calculate Tank Volume
2. Measure/Calculate Waste Inventory via Topographical Mapping and Survey Techniques.
3. Retrieve Waste
4. Repeat Step 2.

**Calculation Method:**

For 75' Diameter Tanks (x), i.e., 100 Series Tanks

$$\begin{aligned}
 \text{xbar gal} &= (100-A)\% \text{ (Total Volume of Waste/133 Tanks)} = \text{Allowable} \\
 &\text{in full diameter tanks} \hspace{10em} \text{Average} \\
 &= (1.00-.99) (4,788,000 \text{ cu ft})/133 = 360 \text{ cu ft.} \text{ Residual} \\
 &\hspace{20em} \text{per Tank}
 \end{aligned}$$

where A% \* = Goal or criteria for waste retrieval percentage.

For Small Diameter Tank (y), e.g., 200 Series Tanks

$$\begin{aligned}
 \text{ybar gal} &= (100-A)\% \text{ (Total Volume of Waste/16 Tanks)} = \text{Allowable} \\
 &\text{in small diameter tanks} \hspace{10em} \text{Average} \\
 &= (1.00-.99) (48,000 \text{ cu ft}/16) = 30 \text{ cu ft} \text{ Residual} \\
 &\hspace{20em} \text{per Tank}
 \end{aligned}$$

where A% \* = Goal or criteria for waste retrieval percentage.

\* Goal is 99% waste retrieval as defined in M-45-00 in equivalent volumetric measures.

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**Attachment 2**

**EXCEPTION TO RETRIEVAL CRITERIA FOR SINGLE-SHELL TANKS**

The DOE shall retrieve tank waste in accordance with criteria defined in milestone M-45-00. This recovery criteria will be applied to each tank on a tank-by-tank basis. If the DOE does not believe that this criteria is achievable for a specific tank, DOE shall submit a request for an exception to EPA and Ecology. The request shall include, at minimum, the following information:

1. The reason DOE does not believe the retrieval criteria can be met.
2. The schedule, using existing technology, to complete retrieval to the criteria - if possible.
3. The potential for future retrieval technology developments that could achieve the criteria, including estimated schedules and costs for development and deployment.
4. The volume of waste proposed to be left in place, and it's chemical and radiological characteristics.
5. Expected impacts to human health and the environment if the residual waste is left in place.
6. Additional information as required by EPA and/or Ecology.

The above information shall be submitted within 120 days of the decision by DOE that continued retrieval actions will not result in further waste removal. Upon receipt, EPA and Ecology shall provide a response within 60 days, in which they will either approve the exception to the criteria, in which case retrieval will be considered complete for the tanks in question, or they will deny the request. If the request is denied the DOE must continue to attempt to retrieve the tank wastes until the criteria is met for the tank, or they may choose to enter into the RCRA dispute resolution procedures of the Agreement. If an exception to the criteria is approved, the closure plan for the SSTs must be modified to address the remaining residual waste.

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**Figure H-1. Process for Assessing Percentage of Waste Retrieved from Waste Retrieval Operations**

