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**ENGINEERING CHANGE NOTICE**

**0050774**

1: ECN **653569**

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Proj.  
ECN

<b>2. ECN Category (mark one)</b> Supplemental <input type="checkbox"/> Direct Revision <input checked="" type="checkbox"/> Change ECN <input type="checkbox"/> Temporary <input type="checkbox"/> Standby <input type="checkbox"/> Supersedure <input type="checkbox"/> Cancel/Void <input type="checkbox"/>	<b>3. Originator's Name, Organization, MSIN, and Telephone No.</b> Jim G. Field, Data Assessment and Interpretation, R2-12, 376-3753	<b>4. USQ Required?</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<b>5. Date</b> 05/24/99	
	<b>6. Project Title/No./Work Order No.</b> Tank 241-AP-103	<b>7. Bldg./Sys./Fac. No.</b> 241-AP-103	<b>8. Approval Designator</b> N/A	
	<b>9. Document Numbers Changed by this ECN (includes sheet no. and rev.)</b> HNF-SD-WM-ER-359, Rev. 1-B	<b>10. Related ECN No(s).</b> ECNs: 635416, 635519, 634675	<b>11. Related PD No.</b> N/A	

<b>12a. Modification Work</b> <input type="checkbox"/> Yes (fill out Blk. 12b) <input checked="" type="checkbox"/> No (NA Blks. 12b, 12c, 12d)	<b>12b. Work Package No.</b> N/A	<b>12c. Modification Work Complete</b> N/A	<b>12d. Restored to Original Condition (Temp. or Standby ECN only)</b> N/A
Design Authority/Cog. Engineer Signature & Date		Design Authority/Cog. Engineer Signature & Date	

**13a. Description of Change** **13b. Design Baseline Document?**  Yes  No

This ECN has been generated in order to update the document to reflect results of recent data/information evaluation.

Replace pages: 2-1 through 2-4, 4-1, 4-2, 5-1 and 5-2.

**14a. Justification (mark one)**

Criteria Change <input checked="" type="checkbox"/>	Design Improvement <input type="checkbox"/>	Environmental <input type="checkbox"/>	Facility Deactivation <input type="checkbox"/>
As-Found <input type="checkbox"/>	Facilitate Const <input type="checkbox"/>	Const. Error/Omission <input type="checkbox"/>	Design Error/Omission <input type="checkbox"/>

**14b. Justification Details**

A tank characterization report page change revision is required to reflect the results of recent evaluation of data/information pertaining to adequacy of tank sampling for safety screening purposes (Reynolds et al. 1999, Evaluation of Tank Data for Safety Screening, HNF-4217, Rev. 0, Lockheed Martin Hanford Corporation, Richland, Washington).

**15. Distribution (include name, MSIN, and no. of copies)**

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# Tank Characterization Report for Double-Shell Tank 241-AP-103

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Lockheed Martin Hanford Corp., Richland, WA 99352  
U.S. Department of Energy Contract 8023764-9-K001

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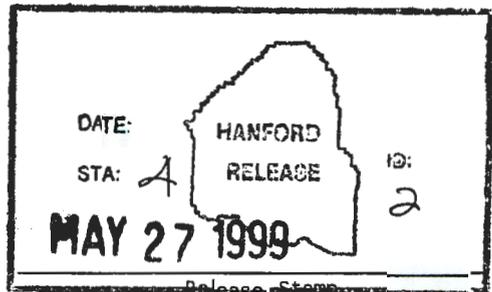
Key Words: Waste Characterization, Double-Shell Tank, DST, Tank 241-AP-103, Tank AP-103, AP-103, AP Farm, Tank Characterization Report, ICR, Waste Inventory, TPA Milestone M-44

Abstract: N/A

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## 2.0 RESPONSE TO TECHNICAL ISSUES

The technical issue identified for tank 241-AP-103 (Brown et al. 1995) is:

- Does the waste pose or contribute to any recognized potential safety problems? Data from the recent analysis of grab samples, as well as available historical information, provided the means to respond to this issue. This response is detailed in the following sections. See Appendix B for sample and analysis data for tank 241-AP-103.

Before the 1994 transfer, evaporator DQOs and compatibility DQOs also applied to tank 241-AP-103. However, compatibility DQOs no longer apply because compatibility analyses were completed and approved prior to the tank transfer. The evaporator DQO does not currently apply because no additional waste is currently available for transfer to the 242-A Evaporator. As a result, these issues are not addressed by this report.

### 2.1 SAFETY SCREENING

The data needed to screen the waste in tank 241-AP-103 for potential safety problems are documented in *Tank Safety Screening Data Quality Objective* (Dukelow et al. 1995). These potential safety problems are exothermic conditions in the waste, flammable gases in the waste and/or tank headspace, and criticality conditions in the waste. Each of these conditions is addressed separately below.

#### 2.1.1 Exothermic Conditions (Energetics)

The first requirement outlined in the safety screening DQO (Dukelow et al. 1995) is to ensure that there are not enough exothermic constituents (organic or ferrocyanide) to cause a safety hazard. Because of this requirement, energetics in the tank 241-AP-103 waste were evaluated. The threshold limit for energetics is 480 J/g on a dry weight basis. There were no exothermic reactions detected in any of the samples (WHC 1992).

#### 2.1.2 Flammable Gas

Determination of the tank headspace flammability was not required when the tank was sampled in 1991. However, the concentration of flammable gases in the tank headspace is anticipated to be close to "zero" because of the low levels of radionuclides and organic compounds in the tank, and because the tank is actively ventilated.

### 2.1.3 Criticality

The safety threshold limit for criticality is 1 g  $^{239}\text{Pu}$  per liter of waste. Assuming that all alpha activity is from  $^{239}\text{Pu}$  and assuming a density of 1.5 g/mL or less, 1 g/L of  $^{239}\text{Pu}$  is greater than or equal to 41  $\mu\text{Ci/g}$  of alpha activity. A composite sample was obtained from the grab samples and was analyzed for  $^{239/240}\text{Pu}$ . The composite results were well below this limit, with a result of  $< 0.00697 \mu\text{Ci/L}$  ( $< 6.97\text{E-}06 \mu\text{Ci/g}$ ). Therefore, criticality is not an issue for this tank. Because the results were below analytical detection limits, a 95 percent confidence interval was not calculated.

## 2.2 OTHER TECHNICAL ISSUES

The determination of total organic carbon (TOC) is used to evaluate the fuel content of the tank waste. Although not required as a primary analyte by the current safety screening DQO, TOC was a required analyte of the 1991 samples. The TOC results were evaluated to the decision limits of the safety screening DQO (Dukelow et al. 1995). All results were below the action limit of 30,000  $\mu\text{g/g}$  (dry weight basis), with a dry weight mean of 6,470  $\mu\text{g/g}$ .

A factor in assessing tank safety is heat generation from radioactive decay. The tank heat load calculated from the best-basis inventory data of Section 3 was 2.41 W (8.22 Btu/hr) (Table 2-1). The Agnew et al. (1996) estimate of heat load was 434 W (1,480 Btu/hr). These estimates are well below the 20,500-W (70,000-Btu/hr) operating specification limit for double-shell tanks (Harris 1994).

Table 2-1. Tank 241-AP-103 Radionuclide Inventory and Projected Heat Load.

Radionuclide	Projected Inventory (Ci)	Decay Heat Generation Rate (W/Ci)	Decay Heat Generation (W)
$^{137}\text{Cs}$	472	0.00472	2.23
$^{89/90}\text{Sr}$	0.175	0.00669	0.00117
$^{99}\text{Tc}$	358	5.01E-04	0.179
Total Watts			2.41

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### 2.3 SUMMARY

Most of the tank contents were transferred during April and May of 1994 leaving only 87 kL (23 kgal) of waste. Grab samples taken in September/November 1991 to address potential safety issues showed that no primary analyte exceeded safety decision threshold limits (Table 2-2).

Table 2-2. Summary of Safety Screening Results.

Issue	Sub-issue	Result
Safety	Fuel content/ Energetics	No exotherms observed in any sample.
	Criticality	All analyses well below 41 $\mu\text{Ci/g}$ (safety screening limit) and 0.810 $\mu\text{Ci/g}$ (waste compatibility limit).
	Flammable gas accumulation	Vapor measurement not performed. However, the concentration of flammable gases in the tank head space is expected to be close to "zero" because of active ventilation and low levels of radionuclides and organics in the tank.

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**4.0 CONCLUSIONS AND RECOMMENDATIONS**

Tank 241-AP-107 was characterized based on grab samples obtained in September/November 1991. The samples were obtained to satisfy safety and operations issues in support of the 94-1 Evaporator campaign, and meet most of the current safety DQOs.

All analytical results for the safety screening DQO were well within the safety notification limits. Although tank headspace flammability was not measured, the tank is actively ventilated, with no evidence of flammable gas accumulation based on low radionuclide and organic concentrations. Therefore, the safety screening issue was sufficiently addressed for this tank (Reynolds et al. 1999).

Analytical results from the 1991 sampling event were used to determine the best-basis inventory for the tank contents.

Table 4-1 summarizes the status of TWRS Program review and acceptance of the sampling and analysis results reported in this tank characterization report. All DQO issues required to be addressed by sampling and analysis are listed in column one of Table 4-1. The second column indicates whether the requirements of the DQO were met by the sampling and analysis activities performed. The third column indicates concurrence and acceptance by the program in TWRS that is responsible for the DQO that the sampling and analysis activities performed adequately meet the needs of the DQO. A "yes" or "no" in column three indicates acceptance or disapproval of the sampling and analysis information presented in the TCR. If the results/information have not yet been reviewed, "N/R" is shown in the column. If the results/information have been reviewed, but acceptance or disapproval has not been decided, "N/D" is shown in the column.

Table 4-1. Acceptance of Tank 241-AP-103 Sampling and Analysis.

Issue	Evaluation Performed	TWRS <sup>1</sup> Program Acceptance
Safety Screening DQO	Yes	Yes

Notes:

<sup>1</sup>Project Hanford Management Contract (PHMC) TWRS Program Office

Table 4-2 summarizes the status of TWRS Program review and acceptance of the evaluations and other characterization information contained in this report. The evaluations specifically outlined in this report are the best-basis inventory evaluation and the evaluation to determine whether the tank is safe, conditionally safe, or unsafe. Column one lists the different evaluations performed in this report. Columns two and three are in the same format as Table 4-1. The manner in which concurrence and acceptance are summarized is also the same as that in Table 4-1.

Table 4-2. Acceptance of Evaluation of Characterization Data and Information for Tank 241-AP-103.

Issue	Evaluation Performed	TWRS Program Acceptance
Safety Screening DQO	Yes	Yes

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## 5.0 REFERENCES

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## DISTRIBUTION SHEET

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