

ENGINEERING CHANGE NOTICE

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1. ECN 653786

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ECN

2. ECN Category (mark one) 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"/>	3. Originator's Name, Organization, MSIN, and Telephone No. T. A. Hu, Data Assessment and Interpretation, R2-12, 373-4098	4. USQ Required? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	5. Date 05/24/99	
	6. Project Title/No./Work Order No. Tank 241-B-108	7. Bldg./Sys./Fac. No. 241-B-108	8. Approval Designator N/A	
	9. Document Numbers Changed by this ECN (includes sheet no. and rev.) HNF-SD-WM-ER-674, Rev. 0-C	10. Related ECN No(s). ECNs: 635479, 635506, 649880	11. Related PO No. N/A	

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

13a. Description of Change
 This ECN has been generated in order to update the document to reflect results of recent data/information evaluation.

13b. Design Baseline Document? Yes No

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



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 Single-Shell Tank 241-B-108

T. A. Hu

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

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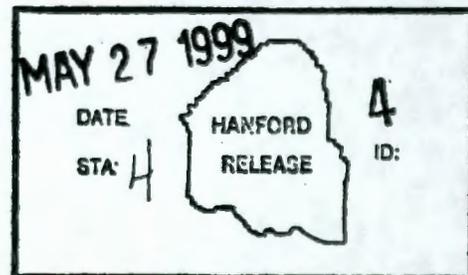
Key Words: Waste Characterization, Single-Shell Tank, SST, Tank 241-B-108, Tank B-108, B-108, B Farm, Tank Characterization Report, TCR, Waste Inventory, TPA Milestone M-44

Abstract: N/A

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2.0 RESPONSE TO TECHNICAL ISSUES

The following four technical issues were identified for tank 241-B-108 in the *Tank Waste Characterization Basis* (Brown et al. 1996):

- **Safety Screening:** Does the waste pose or contribute to any recognized potential safety problems?
- **Hazardous Vapor Safety Screening:** Does a potential exist for worker hazards associated with the toxicity of constituents in tank fugitive vapor emissions?
- **Organic Solvents:** Does an organic solvent pool exist that may cause an organic solvent pool fire or ignition of organic solvents entrained in the waste solids?
- **Historical Model Evaluation:** Does the waste inventory, which is generated by a model based on process knowledge and historical information (Agnew et al. 1997a), represent the current tank waste inventory?

These issues can be evaluated through the DQO process, which provides a systematic planning tool for determining the type, quantity, and quality of data needed to support a decision. The applicable DQOs for the above issues are *Tank Safety Screening Data Quality Objective* (Dukelow et al. 1995), *Data Quality Objective for Tank Hazardous Vapor Safety Screening* (Osborne and Buckley 1995), and *Historical Model Evaluation Data Requirements* (Simpson and McCain 1996). The tank characterization plan (Schreiber and Winkelman 1996) and Sampling and Analysis Plan (SAP) (Hu 1996 and Schreiber 1997) integrate the applicable DQOs and provide the sampling and analysis requirements needed to address the above issues.

Data from the recent analysis of two push mode core samples and the tank headspace flammability measurements provided the means to partially respond to these four issues. Sampling has not been performed to fully resolve the organic solvent issue. The response to these issues is provided in the sections below. Appendix B contains sample and analysis data for tank 241-B-108.

2.1 SAFETY SCREENING

The data needed to screen the waste in tank 241-B-108 for potential safety problems are documented in *Tank Safety Screening Data Quality Objective* (Dukelow et al. 1995). These potential safety problems include exothermic conditions in the waste, flammable gases in the

waste and/or tank headspace, and criticality conditions in the waste. Each condition is addressed separately. Because tank 241-B-108 is not a Watch List tank, the safety screening DQO was the only safety-related DQO associated with this sampling effort.

2.1.1 Exothermic Conditions (Energetics)

The first requirement in the safety screening DQO (Dukelow et al. 1995) is to ensure that tank 241-B-108 does not contain sufficient exothermic constituents to pose a safety hazard. Because of this requirement, energetics in tank 241-B-108 waste were evaluated. It should be noted that segment 2 from cores 172 and 173 was not subdivided into an upper and lower half-segment because less than 24 cm (9.5 in.) of waste was obtained in the segment. In both cases, the entire sample was considered one half-segment and was called the "lower half-segment." Further, the bottom 44.5 cm (17.5 in.) of waste from core 172 and the bottom 60.2 cm (23.7 in.) of waste from core 173 were not obtained. Therefore, the requirement of testing energetics for every 24 cm (9.5 in.) of the sample profile was not met. However, sufficient sample was obtained for safety screening analyses and no further sampling is required to resolve this issue (Reynolds et al. 1999).

The notification limit for energetics is 480 J/g on a dry weight basis. Results of analysis by differential scanning calorimetry (DSC) indicated no exotherms were apparent for any tank 241-B-108 sample (Nuzum 1997). These results are supported by historical documentation, which shows no evidence any exothermic agent should exist in this tank waste. Waste transfer records indicate the major waste type expected in the tank is Bsltk with some 1C waste from the BiPO₄ process in the tank bottom (Agnew et al. 1997b). Neither waste type is expected to have organic or ferrocyanide constituents that possess exothermic behavior.

2.1.2 Flammable Gas

Vapor phase measurements, which were taken in the tank headspace from risers 3, 6, and 7 before the push mode core sampling activity in September 1996, indicated no flammable gas was detected (zero percent of the lower flammability limit [LFL]). Appendix B shows the data from these vapor phase measurements.

2.1.3 Criticality

The criticality safety threshold limit is 1 gram of ²³⁹Pu per liter of waste. As part of the safety screening DQO, the potential for a criticality event in a tank is assessed using the total alpha activity data. The safety screening DQO identifies the total alpha activity safety threshold limit as 1 gram of fissile material per liter of waste. This limit was converted into the laboratory-reported solids units of microcuries per gram by assuming that all fissile

4.0 RECOMMENDATIONS

All tank 241-B-108 analytical results for the safety screening DQO (Dukelow et al. 1995) were well within safety notification limits. Vapor sampling is needed to address the needs of the organic solvent screening issue (Cash 1996). The historical DQO gateway analysis passed, thereby allowing further investigation of the BSltCk waste type. The results of the investigation were mixed. The comparison of the predicted BSltCk composition to the analytical results indicates that BSltCk is present in tank 241-B-108. However, the composite results compared poorly to the HTCE model predictions for several analytes. Furthermore, a characterization best-basis inventory was developed for the tank contents to provide a standard characterization of this waste.

Table 4-1 summarizes the status of the Project Hanford Management Contractor (PHMC) TWRS Program Office review and acceptance of the sampling and analysis results reported in this TCR. All DQO issues that required addressing by sampling and analysis are listed in column 1 of Table 4-1. Column 2 indicates whether the requirements of the DQO were met by the sampling and analysis activities performed and is answered with a "yes" or a "no." Column 3 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 3 indicates acceptance or disapproval of the sampling and analysis information in the TCR. Although the bottom portion of the waste was not sampled, sufficient samples were obtained to resolve safety screening issues for this tank (Reynolds et al. 1999).

Table 4-1. Acceptance of Tank 241-B-108 Sampling and Analysis.

Issue	Sampling and Analysis Performed	TWRS ¹ Program Acceptance
Safety screening DQO	Yes	Yes
Historical evaluation DQO	Yes	Yes
Hazardous vapor DQO	No	n/a
Organic solvent	No	n/a

Note:

¹PHMC 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 outlined in this report are the gateway analysis and the evaluation to determine whether the tank is safe, conditionally safe, or unsafe. Column 1 lists the different evaluations performed in this

report. Columns 2 and 3 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. None of the analyses performed on the push mode core samples indicate any safety or criticality problems.

Table 4-2. Acceptance of Evaluation of Characterization Data and Information for Tank 241-B-108.

Issue	Evaluation Performed	TWRS Program Acceptance ¹
Safety Screening	Yes	Yes
Historical "gateway" analysis	Yes	Yes
Hazardous vapor DQO	No	n/a
Organic solvent	No	n/a

Note:

¹PHMC Program Office

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