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ENGINEERING CHANGE NOTICE

Page 1 of 2

1. ECN № 625698

Proj. ECN

2. ECN Category (mark one)	3. Originator's Name, Organization, MSIN, and Telephone No.	3a. USQ Required?	4. Date
Supplemental [] Direct Revision [X] Change ECN [] Temporary [] Standby [] Supersedure [] Cancel/Void []	L. M. Sasaki/Characterization Plans, Coordination and Reports/R2-12/373-1027	[] Yes [X] No	09/11/95
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[] Yes (fill out Blk. 11b) [X] No (NA Blks. 11b, 11c, 11d)	N/A	N/A Cog. Engineer Signature & Date	N/A Cog. Engineer Signature & Date

12. Description of Change

Vapor sampling and gas flammability sections are being incorporated into Sections 3 and 4 of this document. Editorial changes to other sections are also being made.

13a. Justification (mark one)

Criteria Change	[]	Design Improvement	[]	Environmental	[]	Facility Deactivation	[]
As-Found	[]	Facilitate Const	[]	Const. Error/Omission	[]	Design Error/Omission	[X]

13b. Justification Details

Tank vapor flammability assessment is required to satisfy the safety screening requirements for this tank.

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

See attached distribution sheet.

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ENGINEERING CHANGE NOTICE

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15. Design Verification Required	16. Cost Impact				17. Schedule Impact (days)	
	ENGINEERING		CONSTRUCTION			
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[X] No	Savings	[] $	Savings	[] $	Delay	[]

18. Change Impact Review: Indicate the related documents (other than the engineering documents identified on Side 1) that will be affected by the change described in Block 12. Enter the affected document number in Block 19.

SDD/DD	[]	Seismic/Stress Analysis	[]	Tank Calibration Manual	[]
Functional Design Criteria	[]	Stress/Design Report	[]	Health Physics Procedure	[]
Operating Specification	[]	Interface Control Drawing	[]	Spares Multiple Unit Listing	[]
Criticality Specification	[]	Calibration Procedure	[]	Test Procedures/Specification	[]
Conceptual Design Report	[]	Installation Procedure	[]	Component Index	[]
Equipment Spec.	[]	Maintenance Procedure	[]	ASME Coded Item	[]
Const. Spec.	[]	Engineering Procedure	[]	Human Factor Consideration	[]
Procurement Spec.	[]	Operating Instruction	[]	Computer Software	[]
Vendor Information	[]	Operating Procedure	[]	Electric Circuit Schedule	[]
OM Manual	[]	Operational Safety Requirement	[]	ICRS Procedure	[]
FSAR/SAR	[]	IEFD Drawing	[]	Process Control Manual/Plan	[]
Safety Equipment List	[]	Cell Arrangement Drawing	[]	Process Flow Chart	[]
Radiation Work Permit	[]	Essential Material Specification	[]	Purchase Requisition	[]
Environmental Impact Statement	[]	Fac. Proc. Samp. Schedule	[]	Tickler File	[]
Environmental Report	[]	Inspection Plan	[]		[]
Environmental Permit	[]	Inventory Adjustment Request	[]		[]

19. Other Affected Documents: (NOTE: Documents listed below will not be revised by this ECN.) Signatures below indicate that the signing organization has been notified of other affected documents listed below.

Document Number/Revision	Document Number/Revision	Document Number Revision
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20. Approvals

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OPERATIONS AND ENGINEERING		ARCHITECT-ENGINEER	
Cog. Eng. L.M. Sasaki *L.M. Sasaki*	9/18/95	PE	
Cog. Mgr. J.G. Kristofzski *[signature] for JK*	9/18/95	QA	
QA		Safety	
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This report also summarizes two sampling events, an auger sample obtained in March 1995 and vapor samples obtained in September 1994. Total alpha activity, percent water, energetic properties, and vapor flammability were measured in accordance with WHC-SD-WM-SP-004, *Tank Safety Screening Data Quality Objective* (Babad and Redus 1994). In addition, Characterization Plant waste were Engineering and Characterization Process Control requested that measurements of pH, total organic carbon, total inorganic carbon, and bulk density be performed on the auger samples.

The waste subsamples, as measured by differential scanning calorimetry, exhibited no exothermic reactions. The percent water ranged from 15.4 to 33.9 percent for the solids phase of the waste. Values less than 17 percent are below the minimum required by the Tank Safety Screening Data Quality Objective. Proper notifications concerning the low percent water results were made on May 3, 1995 (Sasaki 1995). The total alpha activity ranged from 0.955 to 1.18 μCi/g, well below the maximum limit of 34.4 μCi/g. The maximum total organic carbon value from the drainable liquid phase of the auger sample was 3,990 μg C/g, well below the limit of 30,000 μg C/g specified in WHC-SD-WM-DQO-006, *Data Quality Objective to Support Resolution of the Organic Fuel Rich Tank Safety Issue* (Babad et al. 1994). The maximum weekly temperature readings in the tank since 1974 fluctuate between 13 °C (55 °F) and 44 °C (111 °F). The temperature readings indicate that the heat load in the tank is not excessive and is adequately dissipated. Vapor space analyses indicated flammable components at a concentration of 1.71 percent of the lower flammability limit, well below the notification limit of 25 percent of the lower flammability limit. Details of the vapor sampling and analysis and its interpretation are included in a separate report.

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1.0 INTRODUCTION

This report presents an overview of single-shell tank 241-C-101 and its waste contents. It provides estimated concentrations and inventories for the waste components based on *Historical Tank Contents Estimate for the Northeast Quadrant of the Hanford 200 East Areas*, WHC-SD-WM-ER-349 (Brevick et al. 1995), and results of the most recent sampling event. In March 1995, one auger sample was obtained for analysis in accordance with *Tank Safety Screening Data Quality Objective*, WHC-WM-SD-SP-004 (Babad and Redus 1994). Auger samples from two different risers are required by the Data Quality Objective (DQO) (Babad and Redus 1994), but one of the risers specified in *Tank 241-C-101 Tank Characterization Plan*, WHC-SD-WM-TP-285 (Schreiber 1995), was not available for use when the samples were taken. In September 1994, vapor samples were also obtained; the results are used to address vapor flammability in tank 241-C-101 (Huckaby 1995a).

Tank 241-C-101 entered service in March 1946 as the first tank in a three-tank cascade. The tank began service by receiving metal waste from B Plant. The tank was full by May 1946 and began cascading waste to tank 241-C-102. The remainder of the history of the tank is a series of receipts and transfers, primarily of supernatant. The majority of the waste presently in the tank is composed of metal waste, cladding waste from the Plutonium-Uranium Extraction (PUREX) Facility, and uranium recovery waste. The tank was removed from service in 1976 and was declared an assumed leaker in 1980.

The concentration and inventory values reported in this document reflect the current best estimate of the composition of the waste based on the tank's waste transfer history. The composition is unlikely to change since all supernatant has been removed and the tank has been interim stabilized and has had intrusion prevention completed. This report supports the requirements of the *Hanford Federal Facility Agreement and Consent Order* Milestone M-44-08 (Ecology et al. 1994).

1.1 PURPOSE

The primary purpose of this report is to summarize the information about the use and contents of tank 241-C-101. When possible, this information will be used to assess issues associated with safety, operations, environmental, and process development activities. This report also provides a reference point for more detailed information about tank 241-C-101.

1.2 SCOPE

The auger sample taken in 1995 was obtained in accordance with the *Tank Safety Screening Data Quality Objective* (Babad and Redus 1994). Sampling and analysis activities are focused on either verification of the non-watch list tank status or identification of unknown safety issues associated with the tank. Therefore, weight percent water, energetics,

and total alpha were evaluated. Additional analyses, including determinations of density, pH, total organic carbon (TOC), and total inorganic carbon (TIC), were performed at the request of Characterization Plant Engineering and Characterization Process Control.

The vapor space of the tank was recently sampled. Results of analyses on those samples are contained in Huckaby (1995). The tank vapor space is well below the safety screening flammability notification limits.

3.0 TANK SAMPLING OVERVIEW

This section describes the sampling and analysis events for tank 241-C-101. In March 1995, a 2-segment auger sample was taken to satisfy the requirements of WHC-SD-WM-SP-004, *Tank Safety Screening Data Quality Objective* (Babad and Redus 1994). The sampling and analysis were performed in accordance with WHC-SD-WM-TP-285 (Schreiber 1995). Additional analyses were requested by Characterization Plant Engineering and Characterization Process Control. In September 1994, vapor samples were obtained; the results are used to satisfy the vapor flammability requirement of the Tank Safety Screening DQO. Further discussion of the sampling and analysis procedures can found in WHC-SD-WM-TI-648, *Tank Characterization Reference Guide* (De Lorenzo et al. 1994) and in WHC-SD-WM-ER-430, *Waste Tank Headspace Gas and Vapor Characterization Reference Guide* (Huckaby 1995b).

3.1 DESCRIPTION OF 1995 AUGER SAMPLING EVENT

On March 29, 1995, an auger sample was obtained from riser number 8 of tank 241-C-101. Risers 1 and 8 were scheduled to be used for sampling (Schreiber 1995), but a presampling walkdown of the tank revealed that only riser 8 was available for sampling. Two auger segments, 25.4 cm and 50.8 cm in length, were scheduled to be taken from riser 8, but errors during sampling resulted in the auger penetrating the full depth of the waste. For this reason, any stratification of the waste in the auger sample cannot be assumed to be representative of the waste stratification in the tank (Sasaki 1995).

3.1.1 1995 Auger Sample Handling

The riser 8 auger sample was received by the 222-S Laboratory on March 30, 1995, and extruded on April 14, 1995. The outside of the sample liner and the inside of the shipping cask were found to be contaminated. Special procedures were developed to allow the safe loading of the cask into the hot cell.

The sampler was full of sample material. The sample solids were thick, mud-like, and dark brown in color. The lower flutes of the auger contained waste that was firmly packed and damp. The waste on the upper flutes was drier and contained off-white material mixed in with the dark brown solids. Flutes 1 through 4 contained some crust-like material. Of a total of 592 g of waste, 15.5 g were labeled as crust, 190 g as upper half solids, and 387 g as lower half solids. In addition, 32.2 g of drainable liquid were recovered from the liner. The crust, upper half solids, and lower half solids subsamples were each homogenized prior to analysis.

3.1.2 1995 Auger Sample Analysis

All analyses were performed at the 222-S Laboratory. The crust, upper half solids, and lower half solids subsamples were each analyzed for percent water using TGA, for energetics using DSC, and for fissile content using total alpha analysis. The drainable liquid subsample was similarly analyzed using TGA and DSC, and in addition was analyzed for pH, TOC content and TIC content. Bulk densities were determined on the upper half solids and lower half solids subsamples.

The TGA, DSC, and total alpha analyses were performed to satisfy the safety screening requirements. The TOC, TIC, pH, and bulk density analyses were performed at the request of Characterization Plant Engineering and Characterization Process Control. The pH, TOC, and TIC analyses were requested in order to resolve a reported high carbon dioxide reading in the vapor space of the tank. Bulk densities on the solids subsamples were requested to resolve a question regarding the capacity of the waste transfer cask.

The analytical procedures used for each analysis are identified in Table 3-1. The TGA and DSC analyses were both conducted under a nitrogen blanket, and both used a combination of Mettler and Perkin-Elmer instruments. Total alpha activity was determined using an alpha proportional counter. Before the total alpha analysis could be performed, the solid subsamples had to be dissolved. This was accomplished by fusing the solid aliquot portion (0.2 g - 0.5 g) of the homogenized subsample with potassium hydroxide and dissolving the flux in hydrochloric acid. The TOC values on the drainable liquid subsample were determined using persulfate-ultraviolet oxidation. In this method, the organic carbon is oxidized to carbon dioxide in the presence of ultraviolet light. The sample is then analyzed directly by a nondispersive infrared analyzer, reduced to methane, and measured by a flame ionization detector, or chemically reduced. TIC is determined by subtracting the TOC value from the total carbon value. The total carbon values on the drainable liquid subsample were determined using combustion-infrared analysis. In combustion-infrared analysis, the carbon in the sample is oxidized, aided by a catalyst, then measured by a nondispersive infrared analyzer. Further details on analytical methods can be found in the *Tank Characterization Reference Guide* (De Lorenzo et al. 1994).

Duplicate analyses and appropriate standards, blanks, and spikes were performed for quality control purposes, in accordance with the Tank Characterization Plan (TCP) for tank 241-C-101 (Schreiber 1995). The results of analyses are summarized in Section 4.0. The quality control checks, and their implications on the analytical results, are discussed in Section 5.0.

Table 3-1. Analytical Methods and Procedures.

Analyte	Method	Procedure
Energetics	Differential scanning calorimetry	LA-514-113 (Mettler) LA-514-114 (Perkin-Elmer)
Percent water	Thermogravimetric analysis	LA-560-112 (Mettler) LA-514-114 (Perkin-Elmer)
Total alpha	Alpha proportional counting	LA-508-101
Total organic carbon	Persulfate-ultraviolet oxidation	LA-344-105
Total carbon	Combustion-infrared	LA-622-102
Bulk density	Mass/volume	LO-160-103
pH	pH meter	LA-212-102

3.2 DESCRIPTION OF 1994 VAPOR SAMPLING EVENT

Headspace gas and vapor samples were collected from tank 241-C-101, using the vapor sampling system (VSS) on September 1, 1994. Samples from the tank headspace were withdrawn by a 7.9-m long heated sampling probe mounted in riser 8, and transferred by heated tubing to the VSS sampling manifold. Samples were collected in SUMMA™[1] canisters and sorbent traps. A total of 39 tank air samples and 2 ambient air control samples were collected.

3.2.1 1994 Vapor Sample Handling and Analysis

Tank vapor samples were sent to Pacific Northwest Laboratory (PNL), Oregon Graduate Institute of Science and Technology (OGIST), Oak Ridge National Laboratory (ORNL), and the Westinghouse Hanford Company (WHC) 222-S Laboratory for analysis.

ORNL performed organic vapor analyses. Hydrogen, nitrous oxide, carbon dioxide, carbon monoxide, methane, and total nonmethane organic compounds (TNMOC) analyses were performed by OGIST. PNL performed ammonia, nitrogen dioxide, nitric oxide, water vapor, and organic vapor analyses while WHC performed tritium substituted water vapor analysis.

[1]SUMMA is a trademark of Molectrics Inc., Cleveland, Ohio.

Analyses performed by OGIST are considered "secondary analyses" since at the time of analysis, OGIST did not have a WHC-approved quality assurance project plan (QAPjP). Additional information on vapor sampling and analysis is provided in Huckaby (1995a, 1995b).

4.0 ANALYTICAL RESULTS

4.1 OVERVIEW

The purpose of this section is to summarize the sampling and analytical results from the March 29, 1995 and September 1, 1994 sampling events for tank 241-C-101. This sampling and analysis event was performed for evaluation of safety screening criteria defined in the Tank Safety Screening DQO (Babad and Redus 1994). The DQO stipulates that TGA for weight percent water, DSC for evaluation of fuel content and thermal output, and total alpha analyses for criticality evaluation are required for tank 241-C-101. The DQO also stipulates that the vapor space of the tank should be sampled for flammable gas content.

In addition to the safety screening analyses, bulk density was requested by Characterization Plant Engineering. TOC, TIC, and pH analyses were requested by Characterization Process Control. These analyses, along with the safety screening analysis results reported in WHC-SD-WM-DP-111, *45-Day Safety Screen Results for Tank 241-C-101, Auger Sample 95-AUG-019* (Sasaki 1995), are summarized in the following sections.

4.2 DATA PRESENTATION

4.2.1 Total Alpha

Total alpha measurements were performed on the three samples from riser 8 (crust, upper half of the auger, and lower half of the auger). Each sample was run in duplicate and analyzed for total alpha according to procedure number LA-508-101. The results of these analyses are summarized in Table 4-1.

The fifth column of the table provides the mean of the two runs performed on each portion of the auger sample. The last column of the table provides the simple mean of all the results (i.e., total of all primary and duplicate results divided by the number of results).

Table 4-5. Differential Scanning Calorimetry Results for Tank 241-C-101.

Sample number	Sample location or type	Run	Sample weight (mg)	Transition 1		Transition 2	
				Onset temp (°C)	ΔH (J/g)	Onset temp (°C)	ΔH (J/g)
S95T000823	Crust	1	21.4	36.1	472	261	472
		2	29.6	36.3	474	264	498
S95T000827	Upper ½	1	24.3	101	672	260	476
		2	17.8	35.1	641	258	496
S95T000831	Lower ½	1	29.3	115	787	289	356
		2	29.1	111	801	289	319
S95T000820	Drainable liquid	1	12.4	107	1,500	219	16.0
		2	12.7	107	1,350	219	15.5

ΔH = change in enthalpy.
J = Joules.

4.4 VAPOR FLAMMABILITY

Vapor samples were analyzed by laboratories at PNL, OGIST, ORNL, and WHC. Only results pertaining to vapor flammability are presented in this document; detailed results and discussions are documented in Huckaby (1995a) and are not reproduced here.

Results of hydrogen, ammonia, and total organic analyses are presented in Table 4-6. Ammonia analysis was performed by PNL while the hydrogen and total organic analyses were performed by OGIST. The organic analysis was performed by the U.S. Environmental Protection Agency task order 12 (TO-12) method.

The hydrogen concentration was found to be 436 ppm. Given that the lower flammability limit (LFL) of hydrogen is 4 volume percent (40,000 ppm), the measured 436 ppm of hydrogen corresponds to 1.09 percent of its LFL. The total organic vapor concentration was estimated to be 256 mg/m^3. Given it is reasonably conservative to assume that the LFL of the organic vapor mixture is that of the semivolatile alkanes, or about 46,000 mg/m^3 (Huckaby 1994), the 256 mg/m^3 corresponds to an estimated 0.56 percent of the LFL. The ammonia concentration was 98 ppm. Given that the LFL for ammonia is 150,000 ppm, the 98 ppm of ammonia corresponds to 0.065 percent of the LFL. The hydrogen, organic vapor fuel, and ammonia represent a combined total of 1.71 percent of the LFL, well below the safety screening limit of 25 percent of the LFL. Although the total organic and hydrogen results must be considered "secondary analyses" (because the analyses were performed without a WHC-approved QAPjP), the result of 1.71 percent of the LFL is so far below the safety screening limit that it can be stated that hydrogen, organic vapors, and ammonia do not individually or collectively represent a flammability hazard.

Table 4-6. Vapor Flammability Results for Tank 241-C-101.

Analyte	Sample Type	LFL	Average Concentration	Concentration as % of LFL
H_2	SUMMA™ canister	40,000 ppm	436 ppm	1.09% of LFL
Total Organics	SUMMA™ canister	46,000 mg/m^3	256 mg/m^3	0.56% of LFL
NH_3	acidified carbon sorbent trap	150,000 ppm	98 ppm	0.065% of LFL
Total	---	---	---	1.71% of LFL

LFL = lower flammability limit
m = meter
mg = milligram
ppm = parts per million by volume

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5.5.1 Safety Evaluation

The primary analytical requirements identified in the Tank Safety Screening DQO (Babad and Redus 1994) are energetics, total alpha activity, moisture content, and flammable gas concentration. TOC was analyzed on the drainable liquid sample for tank 241-C-101 at the request of Characterization Process Control. The 1995 auger sampling event failed to meet all the requirements of the Tank Safety Screening DQO. The specific requirement that a horizontal profile of the tank be obtained from the tank from two widely spaced risers was not met. One riser was sampled rather than two, because of a lack of riser availability. One 50.4-cm auger sample was used to sample the entire 76.2-cm waste column, making decisions based on tank stratification difficult or impossible. Table 5-3 lists the DQO-required analytes, their notification limits, and their analytical results.

The waste fuel energy value was determined by DSC. No exotherms were observed on the 1995 auger sample. Another indicator of fuel content is TOC concentration. The analytical TOC result for the drainable liquid was 1,260 μg C/ml, which is well below the Organics Safety Program limit of 30,000 μg C/ml (Babad et al. 1994). The DSC and TOC results indicate that tank 241-c-101 waste does not contain excessive amounts of fuel.

Large amounts of moisture reduce the potential for propagating exothermic reactions in the waste. The percent water content of the waste was determined by TGA. All samples except the original sample of the crust material were above the notification limit of 17 percent. However, the implications for tank safety are probably minimal, given the endothermic DSC results. In addition, the average of the two crust sample analyses was above the notification limit indicating that the original crust analysis may be anomalous.

Another factor in assessing the safety of tank waste is the heat generation and temperature of the waste. Heat is generated in the tanks primarily from radioactive decay. No radiological results were obtained, but the Historical Tank Content Estimate of 11 W (38 British thermal units/hours [Btu/hr]) was well below the 40,000 Btu/hr threshold which separates high heat tanks from low heat tanks (Brevick et al. 1994). Thermocouple readings (Section 2.4.2) indicate that the radioactive decay heat in the tank is adequately dissipated throughout the year.

The potential for criticality can be assessed from the total alpha data. None of the individual subsamples from the 1995 auger sample contained alpha activity greater than 1.37 μCi/g, and the mean result was 1.09 μCi/g. This was well below the notification limit of 1 g/L (or 34.4 μCi/g) as specified in the Tank Safety Screening DQO (Babad and Redus 1994) (see footnote b of Table 5-2).

Tank vapor samples were collected for this tank on September 1, 1994. Details of the sampling and analysis are documented in Huckaby (1995a) and are not reproduced here. The hydrogen, organic vapor fuel, and ammonia represent a combined total of 1.71 percent of the

LFL, well below the safety screening limit of 25 percent of the LFL. At the reported concentrations, organic vapors, hydrogen, and ammonia do not individually or collectively represent a flammability hazard.

Table 5-3. Tank Safety Screening Data Quality Objective Decision Variables and Criteria for Tank 241-C-101.

Safety issue	Primary decision variable	Decision criteria threshold	Analytical value
Ferrocyanide/organic	Total fuel content	481 J/g (115 cal/g) dry weight basis	No exotherms observed
Organic	Percent moisture	17 wt%	10.5 wt%[a]
Criticality	Total alpha	34.4 μCi/g 1 g/L)[b]	1.37 μCi/g[c]
Flammable gas	Flammable gas	25% LFL for all flammable gases	1.71% LFL

[a]Represents the minimum crust result (Table 4-4). The duplicate and rerun results on the crust were 20.4 wt% and 19.8 wt%, respectively.

[b]Although the actual decision criterion listed in the DQO is 1g/L, total alpha is measured in μCi/g rather than g/L. To convert the notification limit for total alpha into a number more readily usable by the laboratory, it was assumed that all alpha decay originates from ^{239}Pu. Using the average bulk density value from Table 4-3 of 1.79 g/ml, the decision criterion may be converted to 34.4 μCi/g as shown:

$$\left(1\frac{g}{L}\right)\left(1\frac{L}{10^3\ mL}\right)\left(\frac{1}{density}\ \frac{mL}{g}\right)\left(\frac{0.0615\ Ci}{1g}\right)\left(\frac{10^6\ \mu Ci}{1\ Ci}\right) = \frac{61.5}{density}\ \frac{\mu Ci}{g}$$

[c]Maximum taken from Table 4-1.</spctable>
</spc>

[d]Vapor space sampling results will be provided in future revisions to this tank characterization report.
J = Joules.

6.0 CONCLUSIONS AND RECOMMENDATIONS

Tank 241-C-101 is a non-watch list tank; is an assumed leaker that was removed from service in 1976. The only recorded sampling events for tank 241-C-101 are a single segment auger sample taken in March of 1995 and tank vapor samples taken in September 1994. The auger sampling event was governed by the Tank Safety Screening DQO (Babad and Redus 1994). A second intended auger sample could not be taken because of an unavailable riser. Analysis of the auger sample taken was directed primarily at safety screening criteria TIC, TOC, pH, and bulk density were also measured to help interpret the origin of high CO_2 concentrations found in the vapor space. The chemical and radiochemical composition of the waste must be estimated solely from tank waste history. During sampling, the 51-cm auger penetrated the entire 76-cm depth of the waste. The waste sample removed with the auger is thus not representative of the vertical disposition of waste in the tank. Because only a single auger sample was taken and because this auger sample is not representative of the vertical disposition of the waste, no conclusions regarding the horizontal or vertical disposition of the waste can be drawn. Should a better understanding of the waste content and disposition be desired, further sampling and analysis should be performed. However, adequate data are available from the 1995 sampling and analysis event to support the current non-watch list status of this tank. The vapor sampling event supports the gas flammability question of the Tank Safety Screening DQO (Babad and Redus 1994).

The 1995 auger sampling did not fully comply with the Tank Safety Screening DQO (Babad and Redus 1994) because a single sample was taken from one riser instead of the required two samples from different risers. The analytical results fell within the safety screening criteria with the exception of an individual result for percent water. However, the rerun of this sample met the criteria. No exothermic reactions were exhibited by the DSC analysis, indicating that the fuel content of the tank is not excessive. The TOC content of the drainable liquid from the 1995 auger sample was found to be well below the safety program limit of 30,000 μg c/mL. In addition, the historical estimate of the tank heat load and tank temperatures do not indicate that excessive heat is being generated in the waste. The DSC results, low TOC results, and tank temperature readings indicate that the potential for runaway reactions in the waste is remote. The single low wt% water result is of low concern given the DSC, TOC, and temperature measurements. The tank vapor flammability, as determined by vapor sample analysis, was found to be 1.71 percent of the LFL, considerably below the safety screening limit.

The tank history indicates that the major waste types present are metal waste uranium recovery waste, and PUREX cladding waste. These waste types are known to have high aluminum, iron, sodium, sulfate, hydroxide, and nitrate. The major radionuclides are cesium and strontium. The water content and bulk density of the waste as estimated from the 1995 analytical data do not compare well with the Historical Tank Content Estimate (Brevick et al. 1994a). The chemical and radiochemical content estimates in the HTCE cannot be validated with the 1995 sample analysis results.

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