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Tank Characterization Report for Single-Shell Tank 241-BX-112

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Abstract: This document summarizes the information on the historical uses, present status, and the sampling and analysis results of waste stored in Tank 241-BX-112. This report supports the requirements of Tri-Party Agreement Milestone M-44-09.

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Tank Characterization Report for Single-Shell Tank 241-BX-112

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EXECUTIVE SUMMARY

This characterization report summarizes information on the historical uses, current status, and sampling and analysis results of waste stored in single-shell tank 241-BX-112. This report supports requirements of *Hanford Federal Facility Agreement and Consent Order* Milestone M-44-09 (Ecology et al. 1996).

Tank 241-BX-112 is located in the Hanford Site 200 East Area BX Tank Farm. The tank went into service in the third quarter of 1951, receiving first-cycle decontamination (1C) waste from B Plant operations. This waste had cascaded to tank 241-BX-112 from tanks 241-BX-110 and 241-BX-111, and the cascade continued until 1953 when all three tanks were filled. In 1954 and 1955, tank 241-BX-112 received supernatant saltcake waste processed at the 242-B Evaporator. In 1964, the tank received supernatant cladding waste from Plutonium-Uranium Extraction operations. The final transfer into the tank was cesium recovery waste from B Plant in 1969. The tank was removed from service in 1978, and was interim stabilized and partial intrusion prevention completed in September 1980.

The tank has an operating capacity of 2,010 kL (530 kgal), and presently contains an estimated 625 kL (165 kgal) of waste believed to consist of 4 kL (1 kgal) of supernatant and 621 kL (164 kgal) of sludge.

Table ES-1. Description and Status of Tank 241-BX-112.

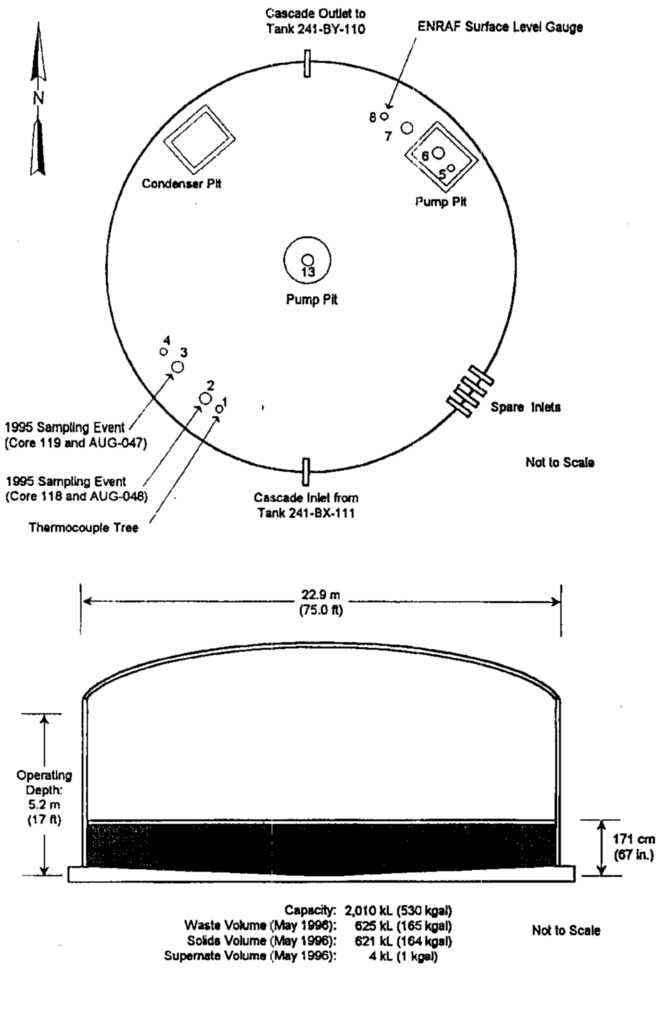
TANK DESCRIPTION	
Type	Single-shell
Constructed	1946-1947
In-service	1951
Diameter	22.9 m (75.0 ft)
Operating depth[1]	5.2 m (17 ft)
Capacity	2,010 kL (530 kgal)
Bottom shape	Dish
Ventilation	Passive
TANK STATUS	
Waste classification	Non-complexed
Total waste volume	625 kL (165 kgal)
Supernatant volume	4 kL (1 kgal)
Sludge volume	621 kL (164 kgal)
Saltcake volume	None
Waste surface level[2]	1.71 m (67 in.)
Temperature (9/74 - 4/96)	9.4 °C (49 °F) to 32 °C (90 °F)
Integrity	Sound
Watch List	None
SAMPLING DATES	
Auger samples/tank headspace flammability Core samples	November 1995 November/December 1995
SERVICE STATUS	
Out of service	1978
Interim stabilized and partially interim isolated	September 1980

Notes:

[1]Measured from the bottom of the tank which is the new baseline.

[2]See Section 2.4.1 for a description of instrumentation changes and rebaselining of the tank. Waste measurements from 1/91 - 12/95 varied from 1.41 m (55.4 in.) to 1.40 m (55.0 in.) using the FIC gauge.

Figure ES-1. Profile of Tank 241-BX-112.



Tank 241-BX-112 was auger sampled in November 1995 and core sampled in November/December 1995 to satisfy the requirements of *Tank Safety Screening Data Quality Objective* (Dukelow et al. 1995) and *Historical Model Evaluation Data Requirements* (Simpson and McCain 1995). The sampling and analyses were performed in accordance with *Tank 241-BX-112 Auger Sampling and Analysis Plan* (Conner 1995) and *Tank 241-BX-112 Push Mode Core Sampling and Analysis Plan* (Conner 1996d). All auger analyses were performed at the Westinghouse Hanford Company 222-S Laboratory, and the core samples were analyzed at the Pacific Northwest National Laboratory 325 Laboratory.

The purpose of the safety screening data quality objective (DQO) is to identify any unknown safety issues and to evaluate a tank for placement on or removal from a Watch List. To accomplish this, the safety screening DQO requires a measurement of the total fuel content of the waste by differential scanning calorimetry, weight percent water by thermogravimetric analysis, bulk density, and total alpha activity by alpha proportional counting. The safety screening DQO also requires a determination of the flammability of the tank headspace gases. To satisfy this requirement, the flammability of the tank headspace was measured as a percentage of the lower flammability limit using a combustible gas meter. The historical DQO required the analysis of metals by inductively coupled plasma spectroscopy, anions by ion chromatography, total organic carbon (TOC), and selected radionuclides. The sampling and analysis plan also required analyses for lithium and bromide to check for contamination of the samples by the hydrostatic head fluid or by the wash water used during sampling operations.

All analyses performed on the waste in tank 241-BX-112 exhibited results well within the limits imposed by the safety screening DQO. The safety screening decision threshold for total alpha activity is 1 g/L, which converts to 41 μCi/g for the solids and 61.5 μCi/mL for the liquids. The calculated overall mean for the solids portion of the tank was 0.181 μCi/g, while the overall mean for the liquid portion was $<$ 0.00200 μCi/mL. All results were below the decision threshold, with the largest of the upper limit to the one-sided 95 percent confidence interval on the mean being 0.336 μCi/g. The safety screening DQO has established a decision threshold of -480 J/g (dry weight basis) for the differential scanning calorimetry analyses; for comparison to this limit, all analytical results were first converted to a dry weight basis. All exothermic results were below the decision threshold, with the largest exotherm upper limit to the one-sided 95 percent confidence interval on the mean being -136 J/g. The weight percent water results were 63.7 percent for the solids and 67.6 percent for the liquids. Finally, the flammability of the tank headspace was 0 percent of the lower flammability limit. Additional measurements were taken for ammonia (125 ppm), oxygen (20.9 percent), and total organic vapor (11.3 ppm).

Core composites were analyzed for TOC. The overall mean TOC result from the core composite analysis was 959 μg C/g, and the highest upper limit to the one-sided 95 percent confidence interval on the mean was 2,500 μg C/g. Comparing these results with the secondary analysis decision limit of the safety screening DQO, the TOC is well below the threshold limit of 30,000 μg C/g (dry weight basis).

Heat is generated in the tanks from radioactive decay. An estimate of the tank heat load, calculated from the analytical data, was found to be 221 W (754 Btu/hr), which is within the operating specification of 11,700 W (40,000 Btu/hr) (Bergmann 1991). Additional estimates of 100 W (342 Btu/hr) (Agnew et al. 1996) and 926 W (3,160 Btu/hr) (Kummerer 1994) were comparable and also below this limit. The tank temperature information indicated that between September 1974 and December 1995, tank temperatures have ranged from 9.4 °C (49 °F) to 32 °C (90 °F). Because the tank exhibits an upper temperature limit, it may be concluded that any heat generated from radioactive sources throughout the year is dissipated.

The historical DQO, through selective tank sampling, attempts to verify the presence of particular waste types by comparing the predicted concentrations of certain analytes (called "fingerprint analytes") with analytical results. Results for the historical comparison showed that this waste type was consistent with the defined waste type 1C.

Based on the evaluation criteria established in the Safety Screening DQO, the waste in tank 241-BX-112 is categorized as safe and may continue to be safety stored without any special action.

The concentrations and tank inventories for the major analytes in the tank waste are summarized in Table ES-2. These inventories are estimates based on the 1995 analytical results.

Table ES-2. Major Analytes.[1] (2 sheets)

Analyte	Mean Solid Concentration	Solid RSD (Mean)	Mean Supernatant Concentration	Supernatant RSD (Mean)	Total Inventory[2]
METALS	μg/g	%	μg/mL	%	kg
Aluminum	13,600	7.1	47.8	8.2	11,100
Bismuth	17,500	5.1	146	26.4	14,200
Calcium	2,510	24.3	< 0.550	n/a	2,040
Chromium	1,290	5.1	355	18.7	1,050
Iron	9,460	7.0	49.1	51.0	7,700
Phosphorus	19,300	3.1	5,350	3.0	15,700
Silicon	8,400	9.5	38.6	1.9	6,830
Sodium	81,800	2.6	77,900	9.4	66,800
ANIONS	μg/g	%	μg/mL	%	kg
Chloride	1,050	7.5	1,380	9.1	860
Fluoride	10,700	21.8	1,350	25.9	8,700
Nitrate	75,100	2.8	98,500	11.2	61,500
Nitrite	25,600	6.0	35,300	10.6	20,900
Phosphate	16,400	8.5	15,700	5.1	13,400
Sulfate	6,480	3.8	7,180	16.4	5,300
RADIO-NUCLIDES	μCi/g	%	μCi/mL	%	Ci
Total alpha	0.179	17.6	< 0.00200	n/a	149
Total beta	58.7	5.7	---	---	47,800
^{137}Cs	49.5	15.1	---	---	40,300
^{90}Sr	5.77	29.5	---	---	4,690

Table ES-2. Major Analytes.[1] (2 sheets)

Analyte	Mean Solid Concentration	Solid RSD (Mean)	Mean Supernatant Concentration	Supernatant RSD (Mean)	Total Inventory[2]
CARBON	**μg C/g**	**%**	**μg C/mL**	**%**	**kg C**
Total carbon	3,030	11.0	---	---	2,460
Total inorganic carbon	2,100	13.7	---	---	1,760
Total organic carbon	959	7.7	---	---	780
PHYSICAL PROPERTIES	**Solid Mean**	**%**	**Supernatant Mean**	**%**	**kg**
Weight percent water	63.7 %	1.32	67.6 %	4.7	5.18E+05
Density	1.31 g/mL	1.5	1.18 g/mL	1.9	n/a

Notes:

n/a = not applicable
RSD = relative standard deviation
--- = data are not requested

[1]Conner (1996c)
[2]Based on a waste tank volume of 625 kL (165 kgal); 621 kL (164 kgal) solids and 4 kL (1 kgal) supernatant.

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LIST OF TERMS

1C	first-cycle decontamination waste
ASTM	American Society of Testing and Materials
ANOVA	analysis of variance
Btu/hr	British thermal units per hour
C	carbon
Ci	curies
Ci/L	curies per liter
cm	centimeters
c/s	counts per second
DL	drainable liquid
DQO	data quality objective
DSC	differential scanning calorimetry
FIC	Food Instrument Corporation
ft	feet
g	grams
gal	gallons
g/L	grams per liter
g/mL	grams per milliliter
GEA	gamma energy analysis
HDW	Hanford Defined Waste
HHF	hydrostatic head fluid
HTCE	Historical Tank Content Estimate
in.	inches
IC	ion chromatography
ICP	inductively coupled plasma spectroscopy
J/g	joules per gram
kg	kilograms
kgal	kilogallons
kL	kiloliters
LEL	lower explosive limit
LFL	lower flammability limit
M	moles per liter
m	meters
mg	milligrams
mL	milliliters
mm	millimeters
mR/hr	milliroentgens per hour
ppm	parts per million
PUREX	Plutonium-Uranium Extraction
QC	quality control
RPD	relative percent difference
RSD	relative standard deviation

LIST OF TERMS (Continued)

SAP	sampling and analysis plan
SMM	supernatant mixing model
SpG	specific gravity
TC	total carbon
TLM	Tank Layer Model
TGA	thermogravimetric analysis
TIC	total inorganic carbon
TOC	total organic carbon
W	watts
WSTRS	Waste Status and Transaction Record Summary
wt%	weight percent
°C	degrees Celsius
°F	degrees Fahrenheit
μCi/g	microcuries per gram
μCi/L	microcuries per liter
μCi/mL	microcuries per milliliter
μeq/g	microequivalents per gram
μg/cc	micrograms per cubic centimeter
μg C/g	micrograms carbon per gram
μg C/mL	micrograms carbon per milliliter
μg/g	micrograms per gram
μg/mL	micrograms per milliliter

1.0 INTRODUCTION

This tank characterization report presents an overview of single-shell tank 241-BX-112 and its waste contents. It provides estimated concentrations and inventories for the waste constituents based on the latest sampling and analysis activities, in combination with background tank information. Tank 241-BX-112 was auger sampled in November 1995 in accordance with *Tank Safety Screening Data Quality Objective* (Dukelow et al. 1995). Auger sampling was performed to break through the suspected surface crust and help prevent plugging of the core sampler bit. The tank did not prove to have as hard a crust as suspected. The tank was then core sampled in November/December 1995 to obtain a vertical profile and to satisfy the requirements of *Historical Model Evaluation Data Requirements* (Simpson and McCain 1995) and the safety screening data quality objective (DQO). The sampling events were governed by *Tank 241-BX-112 Auger Sampling and Analysis Plan* (Conner 1995) and *Tank 241-BX-112 Push Mode Core Sampling and Analysis Plan* (Conner 1996d).

Tank 241-BX-112 is out of service, as are all Hanford Site single-shell tanks, and is categorized as sound. The tank was interim stabilized and partially interim isolated in September 1980. The concentration and inventory values reported in this document reflect the best composition estimates of the waste based on available analytical data and historical models. This report supports the requirements of the *Hanford Federal Facility Agreement and Consent Order* Milestone M-44-09 (Ecology et al. 1996).

1.1 PURPOSE

The purpose of this report is to summarize the information about the use and contents of tank 241-BX-112. When possible, this information will be used to assess issues associated with safety, operational, environmental, and process activities. This report also serves as a reference point for more detailed information about tank 241-BX-112.

1.2 SCOPE

The sampling events were guided by the requirements of two DQOs: the safety screening DQO (Dukelow et al. 1995) and the historical DQO (Simpson and McCain 1995). The objective of the safety screening DQO was to assess the safety of the tank waste and to identify any unknown safety issues associated with the waste. The historical DQO, through selective tank sampling, attempts to verify the presence of particular waste types by comparing the predicted concentrations of certain analytes with analytical results.

All analyses were performed on the samples as directed in the sampling and analysis plans (SAPs). These analyses were differential scanning calorimetry (DSC) to evaluate fuel level and energetics, thermal gravimetric analysis (TGA) to determine moisture content, total alpha activity analysis to evaluate criticality potential, bulk density of solids or specific gravity (SpG) of liquids, metals by inductively coupled plasma spectroscopy (ICP), anions by ion chromatography (IC), total organic carbon (TOC) by hot persulfate, gamma energy analysis (GEA) for ^{137}Cs, total beta and $^{89/90}Sr$ by beta counting, and total uranium by kinetic phosphorescence. Total inorganic carbon (TIC) analysis was also performed incidently with TOC analysis and reported. Combustible gas meter readings of the tank headspace vapors were also taken, as required by the safety screening DQO, to address flammability concerns.

2.0 HISTORICAL TANK INFORMATION

This section describes tank 241-BX-112 based on historical information. The first part details the current condition of the tank. The next part contains discussions of the tank's design, transfer history, and the process sources that contributed to the tank waste, including an estimate of the current contents based on the process history. Events that may be related to tank safety issues, such as potentially hazardous tank contents or off-normal operating temperatures, are included. The final part summarizes available surveillance data for the tank. Solid and liquid level data are used to determine tank integrity (leaks) and to provide clues to internal activity in the solid layers of the tank. Temperature data are provided to evaluate the heat-generating characteristics of the waste.

2.1 TANK STATUS

As of May 31, 1996, tank 241-BX-112 contained an estimated 625 kL (165 kgal) of waste classified as non-complexed (Hanlon 1996). Liquid waste volume was estimated using a combination of a surface level gauge and photographic evaluation. Solid waste volume was estimated using a photographic evaluation method on September 17, 1990. The amounts of various waste phases existing in the tank are presented in Table 2-1.

Table 2-1. Estimated Tank Contents.[1]

Waste Form	Estimated Volume	
	kL	kgal
Total waste	625	165
Sludge	621	164
Saltcake	0	0
Supernatant liquid	4	1
Drainable interstitial liquid	26	7
Drainable liquid remaining	30	8
Pumpable liquid remaining	8	2

Note:

[1]For definitions and calculation methods, refer to Appendix C of Hanlon (1996).

Tank 241-BX-112 is categorized as sound. The tank was removed from service in 1978, with interim stabilization and partial interim isolation completed in September 1980. Tank 241-BX-112 is passively ventilated and is not on any Watch Lists. All monitoring systems were in compliance with documented standards as of May 31, 1996 (Hanlon 1996).

2.2 TANK DESIGN AND BACKGROUND

The 241-BX Tank Farm was constructed from 1946 to 1947 in the 200 East Area. The 241-BX Tank Farm contains twelve 100 series tanks. These tanks have a capacity of 2,010 kL (530 kgal), a diameter of 22.9 m (75.0 ft), and an operating depth of 5.2 m (17 ft). Tank 241-BX-112 began receiving waste in the third quarter of 1951. The 241-BX Tank Farm was designed for non-boiling waste with a maximum fluid temperature of 104 °C (220 °F). A cascade overflow line 76 mm (3 in.) in diameter connects tank 241-BX-112 as third in a cascade series beginning with tanks 241-BX-110 and -111 in the BX Tank Farm and cascading into tank 241-BY-110 in the BY Tank Farm. Each tank in the cascade series is set 30 cm (1 ft) lower in elevation from the preceding tank. The cascade overflow height is approximately 4.9 m (16 ft) from the tank bottom and 600 mm (2 ft) below the top of the steel liner.

The tank has a dished bottom with a 1.2-m (4-ft) radius knuckle. Tank 241-BX-112 was designed with a primary mild steel liner (ASTM A283 Grade C) and a concrete dome with various risers. The tank is set on a reinforced concrete foundation. A three-ply asphalt waterproofing was applied over the foundation and steel tank. Two coats of primer were sprayed on all exposed interior tank surfaces. The tank ceiling dome was covered with three applications of magnesium zincfluorosilicate wash. Lead flashing was used to protect the joint where the steel liner meets the concrete dome. Asbestos gaskets were used to seal the risers in the tank dome. The tank was waterproofed on the sides and top with tar and a welded-wire-reinforced mixture of cement, sand and water, and covered with approximately 2.7 m (9 ft) of overburden.

Tank 241-BX-112 has 9 risers ranging in diameter from 100 mm (4 in.) to 300 mm (12 in.) and a 1.1-m (42-in.) manhole. Table 2-2 shows numbers, diameters, and descriptions of the risers and the inlet, overflow, and spare nozzles. A plan view that depicts the riser configuration is shown as Figure 2-1. Risers 2, 3, 4 and 7 are available for use. Riser 4 is 100 mm (4 in.) in diameter and the other three are 300 mm (12 in.) in diameter. A tank cross-section showing the approximate waste level, along with a schematic of the tank equipment, is shown in Figure 2-2.

Table 2-2. Tank 241-BX-112 Risers.[1,2,3]

Riser Number	Diameter		Description and Comments
	cm	in.	
1	10	4	Thermocouple tree
2	30	12	Spare
3	30	12	Spare
4	10	4	Breather filter/G1 housing
5	10	4	Pit drain, weather covered
6	30	12	Pump, weather covered
7	30	12	B-222 observation port
8	10	4	Food Instrument Corporation level gauge [ENRAF 854[4] ECN-617145 11/09/94]
13	30	12	Saltwell
Nozzle Number	**Diameter**		**Description and Comments**
	cm	**in.**	
N1	8	3	Spare
N2	8	3	Spare
N3	8	3	Spare
N4	8	3	Line V-350
N5	8	3	Overflow
N6	8	3	Inlet

Notes:
[1]Alstad (1993)
[2]Tran (1993)
[3]Vitro Engineering Corporation (1988)
[4]Trademark of ENRAF Corporation, Houston, Texas.

Figure 2-1. Riser Configuration for Tank 241-BX-112.

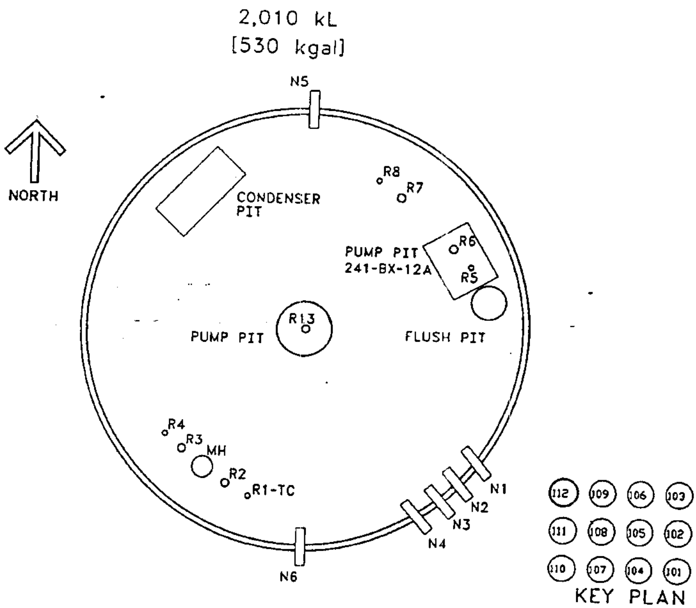
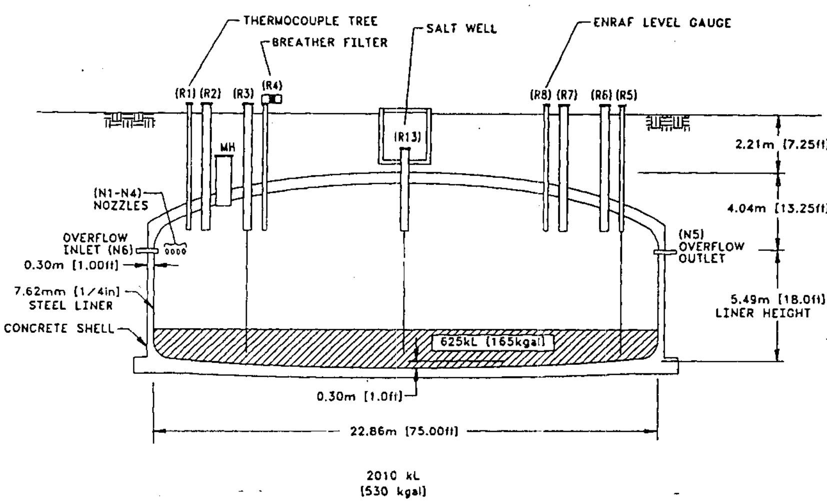


Figure 2-2. Tank 241-BX-112 Cross-Section.



2.3 PROCESS KNOWLEDGE

These sections present the transfer history of tank 241-BX-112. Section 2.3.1 contains a narrative describing the major transfers that involved tank 241-BX-112. Table 2-3 presents the major transfers involving 241-BX-112 receiving waste.

2.3.1 Waste Transfer History

Tank 241-BX-112 began receiving waste cascading from tank 241-BX-111 in the third quarter of 1951. The waste was first-cycle decontamination waste (1C) from B Plant operations. The cascade continued until the first quarter of 1952 when all the tanks in the cascade were filled. During the fourth quarter of 1953, supernatant waste was pumped from tank 241-BX-112 to the 216-B-39 crib. Tank 241-BX-112 received waste in the third quarter of 1954 from a transfer of supernatant waste from tank 241-B-105. Historical records indicate that the waste from tank 241-B-105 was 242-B Evaporator saltcake waste.

In the fourth quarter of 1955, liquid waste was sent to the 242-B Evaporator with the same amount returned as 242-B Evaporator saltcake waste. The next transfer occurred in the fourth quarter of 1964 when supernatant, probably cladding waste from plutonium-uranium extraction (PUREX) operations, was transferred from tank 241-C-102 to tank 241-BX-112. In the first quarter of 1968, tank 241-BX-112 received flush water. In the third quarter of 1968, a supernatant transfer was made to tank 241-BX-106.

Waste from cesium recovery operations in B Plant was received by tank 241-BX-112 during the first quarter of 1969. Waste was transferred from tank 241-BX-112 to tank 241-BY-102 in the third quarter of 1969. The waste appears to have been either evaporator bottoms, ion exchange waste, or a combination of both. Another transfer of waste from tank 241-BX-112 occurred in the second quarter of 1974, with supernatant, presumably evaporator bottoms and/or ion exchange waste, sent to tank 241-BX-105. The second quarter of 1977 had a small transfer of waste to tank 241-A-102 from tank 241-BX-112. Again, the waste involved apparently was evaporator bottoms and/or ion exchange waste.

In the fourth quarter of 1978 tank 241-A-102 again received waste from tank 241-BX-112. The tank was saltwell pumped in the third quarter of 1983. The extracted liquids were pumped to double-shell tank 241-AN-101.

Table 2-3. Summary of Tank 241-BX-112 Waste Input History.[1,2]

Transfer Source	Waste Type Received	Time Period	Estimated Volume	
			kL	kgal
B-Plant / Cascade from 241-BX-111	First-cycle decontamination waste from $BiPO_4$ operations	1951-1953	2,006	530
241-B-105	Supernatant saltcake waste processed in the 242-B Evaporator	1954	269	71
242-B Evaporator	Evaporator saltcake waste from 242-B Evaporator	1955	980	259
241-C-102	Supernatant cladding waste processed in PUREX	1964	375	99
221-B	Cesium recovery waste from B Plant	1969	678	179

Notes:

[1]Agnew et al. (1995)

[2]Waste volumes and types are best estimates based on historical data.

2.3.2 Historical Estimation of Tank Contents

The following is an estimate of the contents in tank 241-BX-112 based on historical transfer data. The estimates have not been validated and thus should be used with caution. The historical data used for the estimate are from *Waste Status and Transaction Record Summary for the Northeast Quadrant* (WSTRS) (Agnew et al. 1995) and *Hanford Tank Chemical and Radionuclide Inventories: HDW Model Rev. 3* (Agnew et al. 1996). Agnew et al. (1996) contains the Hanford Defined Waste (HDW) list, the Tank Layer Model (TLM), the supernatant mixing model (SMM), and the HDW model inventories. The WSTRS is a compilation of available waste transfer and volume status data. The HDW provides the assumed typical compositions for Hanford Site waste types. In most cases, the available data are incomplete, reducing the reliability of the transfer data and the modeling results derived from it. The TLM and SMM takes the WSTRS data, models the waste deposition processes and, using additional data from the HDW (which may introduce more error), generate an estimate of the tank contents. Thus, these model predictions can only be considered estimates that require further evaluation using analytical data.

Based on the HTCE and TLM, tank 241-BX-112 contains a top layer of 4 kL (1 kgal) of supernatant waste, followed by 121 kL (32 kgal) of an unknown waste, and a bottom layer of 500 kL (132 kgal) of 1C waste. A graph representing the estimated waste types and volumes for these layers appears in Figure 2-3. The 1C layer should contain primarily sodium, aluminum, hydroxide, nitrate, nitrite, and phosphate. The 1C layer should also contain small to moderate amounts of calcium, iron, carbonate, sulfate, silicate, bismuth, nitrite, and fluoride. With the amounts of strontium and cesium in this layer, there will be a significant amount of radiological activity. The unknown layer could be 242-B Evaporator saltcake waste, though the exact origin is not fully traceable from the historical data. The specifics on the supernatant waste layer are not well defined, though the wastes should contain similar constituents to the unknown waste layer. Table 2-4 shows an estimate of the expected waste constituents and their concentrations.

Figure 2-3. Tank Layer Model for Tank 241-BX-112.

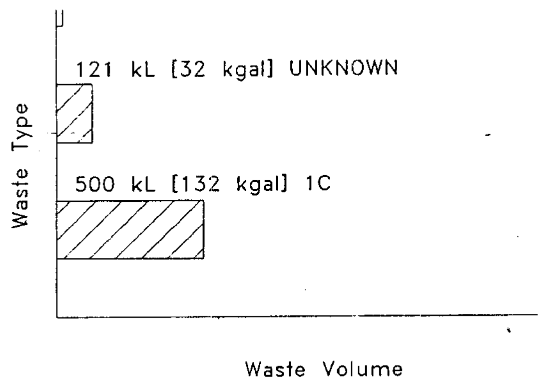


Table 2-4. Tank 241-BX-112 Inventory Estimate.[1,2] (2 sheets)

Total Inventory Estimate			
Physical Properties			
Total solid waste	8.01E+05 kg (165 kgal)		
Heat load	100 W (342 Btu/hr)		
Bulk density	1.28 g/mL		
Water wt%	69.8		
Total organic carbon wt% carbon (wet)	0.00693		
Chemical Constituents	**M**	**ppm**	**kg**
Na^{+}	4.67	83,700	67,100
Al^{3+}	0.740	15,600	12,500
Fe^{3+} (total Fe)	0.183	7,960	6,370
Cr^{3+}	0.00478	194	155
Bi^{3+}	0.0443	7,210	5,780
La^{3+}	2.38E-08	0.00258	0.00207
Hg^{2+}	5.63E-05	8.81	7.05
Zr (as $ZrO(OH)_2$)	0.00637	453	363
Pb^{2+}	7.82E-06	1.26	1.01
Ni^{2+}	0.00265	121	97.1
Sr^{2+}	7.94E-09	5.42E-04	4.34E-04
Mn^{4+}	2.24E-05	0.960	0.769
Ca^{2+}	0.0540	1,690	1,350
K^{+}	0.00552	168	135
OH^{-}	2.88	38,100	30,500
NO_3^{-}	1.06	51,100	40,900
NO_2^{-}	0.266	9,540	7,640
CO_3^{2-}	0.0811	3,790	3,040
PO_4^{3-}	0.976	72,300	57,900

Table 2-4. Tank 241-BX-112 Inventory Estimate.[1,2] (2 sheets)

Chemical Constituents	M	ppm	kg
SO_4^{2-}	0.0707	5,300	4,240
Si (as SiO_3^{2-})	0.0464	1,020	814
F^-	0.184	2,730	2,190
Cl^-	0.0283	780	625
$citrate^{3-}$	1.55E-04	22.8	18.3
$EDTA^{4-}$	1.35E-04	30.2	24.2
$HEDTA^{3-}$	2.13E-04	45.5	36.5
$glycolate^-$	3.84E-04	22.4	18.0
$acetate^-$	1.79E-04	8.25	6.60
$oxalate^{2-}$	2.04E-08	0.00140	0.00112
DBP	1.57E-04	32.5	26.0
Butanol	1.57E-04	9.06	7.26
NH_3	7.08E-04	9.38	7.51
$Fe(CN)_6^{4-}$	0	0	0
Radiological Constituents	**Ci/L**	**μCi/g**	**Ci**
Pu	---	0.0157	0.209 (kg)
U	0.00170 (M)	316 (μg/g)	253 (kg)
Cs	0.0287	22.4	17,900
Sr	0.00386	3.01	2,410

Notes:

[1]These estimates have not been validated and should be used with caution.

[2]Agnew et al. (1996)

2.4 SURVEILLANCE DATA

Tank 241-BX-112 surveillance consists of surface level measurements (liquid and solid) and temperature monitoring inside the tank (waste and headspace). The data provide the basis for determining tank integrity.

Liquid level measurement may indicate if there is a major leak from a tank. Solid surface level measurements provide an indication of physical changes in and consistency of the solid layers of a tank. Tank 241-BX-112 has five drywells, none of which have had readings of greater than 50 c/s background.

2.4.1 Surface Level

The surface level of the waste is monitored daily with an ENRAF system through riser 8. In March of 1996, the level measurement device was changed out and the new surface level from the manual mode ENRAF system was 1.71 m (5.6 ft). The manual ENRAF readings are approximately 34 cm (13.4 in.) higher than the equivalent Food Instrument Corporation (FIC) readings. With the change over to the ENRAF system, the reference point was changed from the side wall of the tank to the bottom center of the dish, thus accounting for 30 cm (12 in.) of the difference. The offer 3.3 cm (1.3 in.) can be attributed to error in the FIC gauge. The maximum allowed deviations from the 1.40-m (55.2-in.) baseline established for tank 241-BX-112 are a 51-mm (2-in.) increase and a 76-mm (3-in.) decrease. The surface level readings during the past three years indicated a decreasing trend during 1993. The surface level ranged between 1.41 m (55.4 in.) and 1.40 m (55.0 in.) from January 1991 to December 1995. In March of 1996, a new measuring device was installed and a new baseline of 1.71 m (67.4 in.) was established. A level reading on April 22, 1996 was 1.71 m (67.37 in.). A graphical representation of the tank volume history is presented in Figure 2-4.

2.4.2 Internal Tank Temperatures

Tank 241-BX-112 has a single thermocouple tree with 14 thermocouples in tank riser 1 to monitor the waste temperature. The design of the thermocouple tree is unclear and the elevations of the individual thermocouples are unknown. No temperature data are available from March 1984 to March 1991. Plots of the individual thermocouple readings can be found in the HTCE supporting document for the BX Tank Farm (Brevick et al. 1994).

The mean temperature data recorded between April 1991 and 1996 were 19 °C (66 °F) with a minimum of 15 °C (60 °F) and a maximum of 22 °C (71 °F). The maximum temperature recorded on April 22, 1996 was 20 °C (68 °F) taken on thermocouple 1 and the minimum temperature recorded was 16 °C (60 °F) on thermocouple 4. A graph of the temperature data is provided as Figure 2-5.

Figure 2-4. Tank 241 BX-112 Level History.

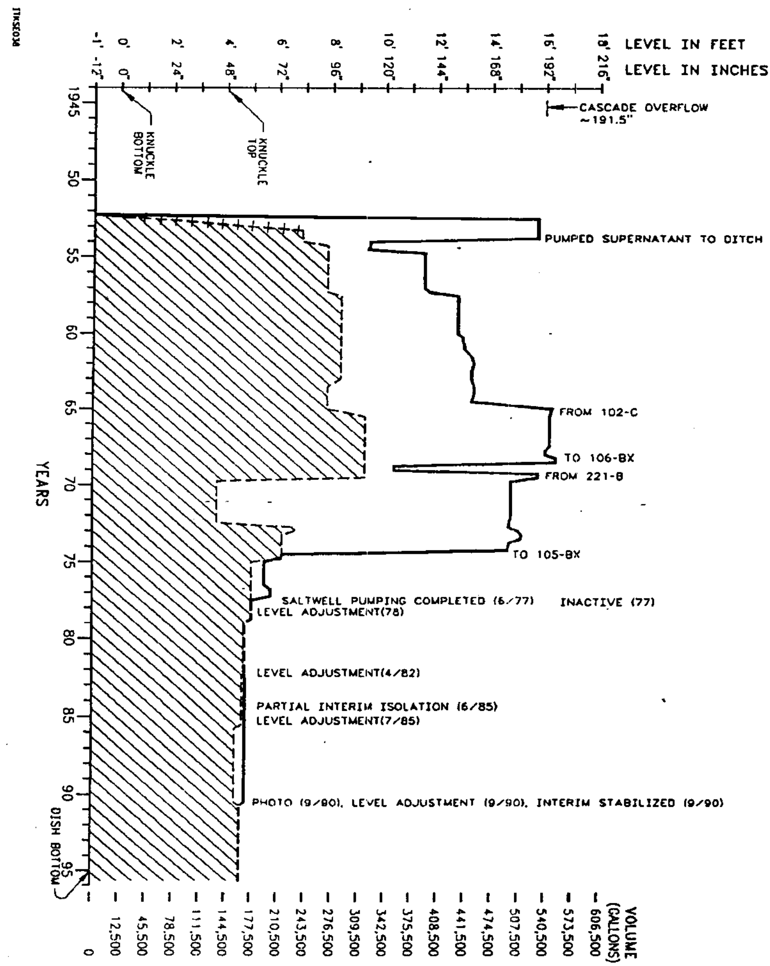
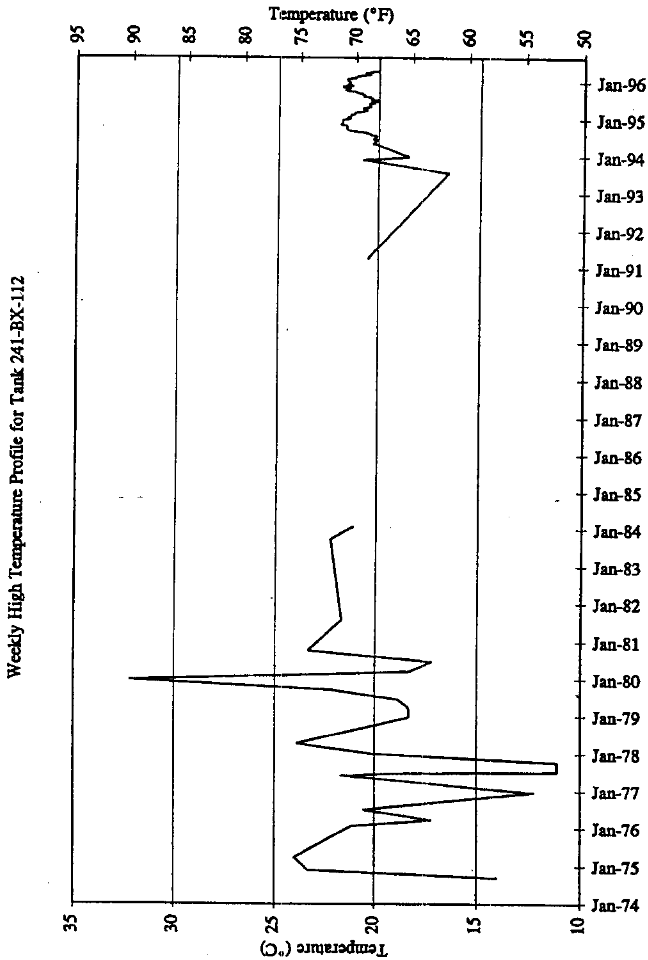


Figure 2-5. Tank 241-BX-112 Weekly High Temperature Plot.

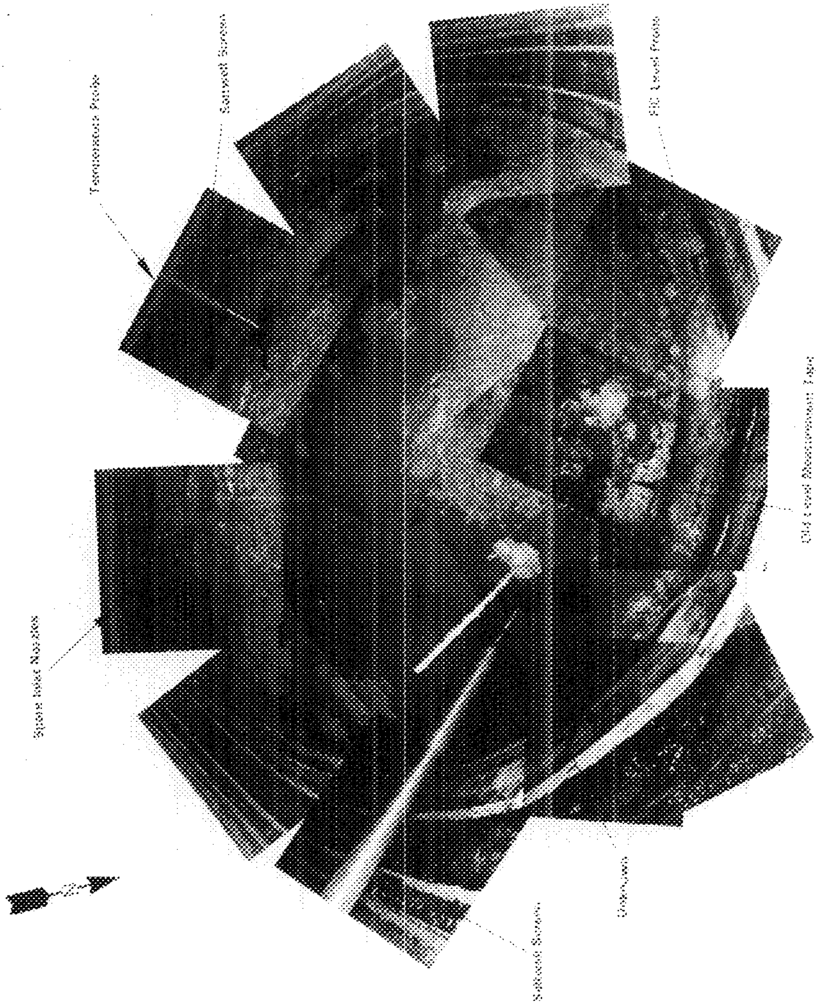


2.4.3 Tank 241-BX-112 Photographs

The 1990 photographic montage of the tank 241-BX-112 interior indicated a gray or brown solid waste intermixed with pools of dark yellow translucent liquid (see Figure 2-6). At the time of the photograph, the tank contained approximately 625 kL (165 kgal) of waste, with a manual FIC gauge surface level reading of 1.4 m (55.3 in.). This photograph should correspond to the current tank contents, because no transfers have taken place since this photograph was taken.

241-BX-112

Figure 2-6. Tank 241-BX-112 Photographic Montage.



3.0 TANK SAMPLING OVERVIEW

This section describes the November and December 1995 sampling and analysis events for tank 241-BX-112. Auger samples and push-mode core samples were taken to satisfy the requirements of the safety screening DQO (Dukelow et al. 1995) and the historical model evaluation DQO (Simpson and McCain 1995). The sampling and analysis were performed in accordance with the *Tank BX-112 Auger Sampling and Analysis Plan* (Conner 1995) and the *Tank BX-112 Push Mode Core Sampling and Analysis Plan* (Conner 1996d). Further discussions of the sampling and analysis procedures can be found in the *Tank Characterization Reference Guide* (DeLorenzo et al. 1994).

Table 3-1 summarizes the sampling mode, applicable DQOs, and sampling and analysis requirements for the sampling events.

Table 3-1. Integrated Data Quality Objective Requirements for Tank 241-BX-112.[1]

Sampling Event	Applicable DQOs	Sampling Requirements	Analytical Requirements
Auger sampling (November 1995)	Safety screening (Dukelow et al. 1995)	Vertical profiles from two widely spaced risers Combustible gas meter	▸ Energetics ▸ Moisture content ▸ Total alpha activity ▸ Bulk density ▸ Headspace gas flammability
Push-mode core sampling (November/ December 1995)	Historical model evaluation (Simpson and McCain 1995) Safety screening (Dukelow et al. 1995)	Minimum of two core samples	▸ Energetics ▸ Moisture content ▸ Total alpha activity ▸ Bulk density ▸ Metals ▸ Anions ▸ Total beta activity ▸ ^{137}Cs ▸ ^{90}Sr ▸ Total uranium ▸ TOC

Note:

[1]Conner (1995, 1996d)

3.1 DESCRIPTION OF SAMPLING EVENT

Two auger samples, 95-AUG-048 and 95-AUG-047, were collected from risers 2 and 3 of tank 241-BX-112 on November 16 and 17, 1995. Two push-mode core samples, 118 and 119, were collected from risers 2 and 3 of tank 241-BX-112 between November 30 and December 27, 1995. A field blank was also obtained with core 119. The auger samples were received and extruded at the Westinghouse Hanford Company 222-S Laboratory in accordance with the auger sample SAP (Conner 1995). Core 118, Segment 1 was received and extruded at the Westinghouse Hanford Company 222-S Laboratory in accordance with the core sample SAP (Conner 1996d). The remainder of the core samples were received and extruded at the Pacific Northwest National Laboratory 325 Laboratory.

In addition, the tank headspace vapors were measured for flammability as required by the safety screening DQO.

3.2 SAMPLE HANDLING

The auger samples were received by the Westinghouse Hanford Company 222-S Laboratory on November 17, 1995 and extruded on November 21, 1995. Core 118, Segment 1 was received by the Westinghouse Hanford Company 222-S Laboratory on December 4, 1995 and extruded on December 19, 1995. The subsamples from this segment were subsequently sent to the 325 Laboratory for analysis. The remainder of the core samples were received by the 325 Laboratory on January 2, 1996 and extruded between January 19 and January 22, 1996.

Only core 118 contained drainable liquid (DL), with the DL in segment 1A probably due to hydrostatic head fluid (HHF) intrusion. Sample recovery was variable, depending on the particular segment. No separable organic layer was observed in any of the segments. The auger and core samples were subsampled at the whole-segment or half-segment level, depending on the amount of material recovered and the appearance of the extruded segments. Core composites were formed for most analytes in accordance with the historical model evaluation DQO. Table 3-2 presents the subsampling scheme, the amount of sample recovered, the dose rates, and a visual description of the sample.

Table 3-2. Subsampling Scheme and Sample Description.[1] (2 sheets)

Segment	Sub-segment	Solids extruded (in.)	Sample Weight (g)	Dose Rate through Drill String (mR/hr)	Description
Auger 95-AUG-048, Riser 2					
n/a	Whole	12	81.3	150	Homogeneous, medium-brown, wet sludge
Core 118, Riser 2					
1	Upper ½	7	164.6	380	Damp, smooth, yellow-green sludge which retained shape
	Lower ½	9	203.7		
1A	Upper ½	11	224.2	250	Light- to medium-brown sludge, 28 mL drainable liquid collected
	Lower ½	3	69.9		
2	Upper ½	9.5	104.5	300	Dark gray/brown, thick material which did not retain shape
	Lower ½	9.5	211.8		
3	Whole	None	242.2	300	Medium brown material which poured, 45.3 mL drainable liquid collected
Auger 95-AUG-047, Riser 3					
n/a	Upper ½	4	45.8	250	Homogeneous, light-brown, wet sludge
	Lower ½	11.5	165.2		
Core 119, Riser 3					
1	Upper ½	9.5	197.4	330	Light- to medium-brown sludge which retained shape
	Lower ½	9.5	164.9		
2	Upper ½	9.5	232.5	280	Light brown sludge which retained shape, smooth texture
	Lower ½	9.5	131.2		

Table 3-2. Subsampling Scheme and Sample Description.[1] (2 sheets)

Segment	Sub-segment	Solids extruded (in.)	Sample Weight (g)	Dose Rate through Drill String (mR/hr)	Description
Core 119, Riser 3					
3	Upper ½	9.5	164.9	300	Light brown sludge which retained shape, smooth texture
	Lower ½	9.5	122.4		
Field Blank	n/a	n/a	313.1	< 0.5	Clear, colorless liquid

Notes:
n/a = not applicable

[1]Conner (1996a, 1996b, 1996c)

3.3 SAMPLE ANALYSIS

As noted in Table 3-1, the safety screening DQO was applied to both the auger and core samples and required analyses for thermal properties by DSC, moisture by TGA, fissile content by total alpha analysis, and bulk density (specific gravity for drainable liquid samples). In addition to the core and auger samples, the flammability of the tank headspace was measured prior to auger sampling. For the core samples, additional analysis were required as described below.

Bromide analysis by IC and lithium analysis by ICP were required by the push-mode SAP to evaluate water wash contamination in the core samples.

Thermogravimetric analysis, DSC, and bulk density analyses were performed on direct subsamples. Solid subsamples were fusion-digested prior to analysis by ICP, alpha counting, beta counting, gamma energy analysis (GEA), and kinetic phosphorescence. Solid subsamples were water-leached prior to IC analysis. Water leaching was also performed on segment 2 and the composites of each core for ICP analysis to satisfy the requirements of the historical model evaluation DQO. Total inorganic carbon (TIC), TOC, and total carbon (TC) analyses were performed using a hot persulfate digestion.

Drainable liquids were analyzed on acidified subsamples or, in the case of IC, on direct subsamples.

Laboratory control checks included, where appropriate, laboratory control standards, matrix spikes, duplicate analyses, and blanks. An assessment of the quality control (QC) procedures and data is presented in Section 5.1.2 of this report.

All reported analyses were performed in accordance with approved laboratory procedures. A list of the sample numbers and applicable analyses is presented in Table 3-3. Table 3-4 displays the analytical procedures by title and number. The only deviation noted by the laboratory was the sample size and volume for the water leaching per procedure PNL-ALO-103.

Table 3-3. Sample Analysis Summary.[1] (2 sheets)

Segment	Sub-Segment	Sample Number	Analyses
Auger 95-AUG-048			
N/A	Whole	S95T003753	Bulk density
		S95T003754	DSC, TGA
		S95T003755	Total alpha activity
Auger 95-AUG-047			
N/A	Upper ½	S95T003745	Bulk density
		S95T003746	DSC, TGA
		S95T003747	Total alpha activity
Auger 95-AUG-047			
N/A	Lower ½	S95T003749	Bulk density
		S95T003750	DSC, TGA
		S95T003751	Total alpha activity
Core 118			
1	Upper ½	96-03366	Bulk density,TGA, DSC, ICP (fusion), IC
	Lower ½	96-03365	Bulk density, TGA, DSC, ICP (fusion), IC, total alpha activity
1A	Upper ½	96-02606	TGA, DSC, ICP (fusion), IC
	Lower ½	96-02605	Bulk density, TGA, DSC, ICP (fusion), IC, total alpha activity
	DL	96-02848	Bulk density, TGA, DSC, ICP, IC, total alpha activity

Table 3-3. Sample Analysis Summary.[1] (2 sheets)

Segment	Sub-Segment	Sample Number	Analyses
2	Upper ½	96-02608	DSC, TGA, ICP (fusion), ICP (water), IC, TIC, TOC, TC, GEA, total beta activity, ^{90}Sr, total U
	Lower ½	96-02607	Bulk density, TGA, DSC, ICP (fusion), ICP (water), IC, TIC, TOC, TC, GEA, total alpha activity, total beta activity, ^{90}Sr, total U
	Lower ½	96-02849	Homogenization test sample. ICP (fusion), GEA
3	Whole	96-02609	Bulk density, TGA, DSC, ICP (fusion), IC, total alpha activity
	DL	96-02850	Bulk density, TGA, DSC, ICP, IC, total alpha activity
Composite	N/A	96-02617	Bulk density, TGA, DSC, ICP (fusion), ICP (water), IC, TIC, TOC, TC, GEA, total alpha activity, total beta activity, ^{90}Sr, total U
Core 119			
1	Upper ½	96-02612	TGA, DSC, ICP (fusion), IC
	Lower ½	96-02611	Bulk density, TGA, DSC, ICP (fusion), IC, total alpha activity
2	Upper ½	96-02614	DSC, TGA, ICP (fusion), ICP (water), IC, TIC, TOC, TC, GEA, total beta activity, ^{90}Sr, total U
	Lower ½	96-02613	Bulk density, TGA, DSC, ICP (fusion), ICP (water), IC, TIC, TOC, TC, GEA, total alpha activity, total beta activity, ^{90}Sr, total U
3	Upper ½	96-02616	TGA, DSC, ICP (fusion), IC
	Lower ½	96-02615	Bulk density, TGA, DSC, ICP (fusion), IC, GEA, total alpha activity
	Lower ½	96-02851	Homogenization test sample. ICP (fusion), GEA
Composite	N/A	96-02618	Bulk density, TGA, DSC, ICP (fusion), ICP (water), IC, TIC, TOC, TC, GEA, total alpha activity, total beta activity, ^{90}Sr, total U
Field Blank	N/A	96-02619	Bulk density, TGA, DSC, ICP, IC, GEA, total alpha activity, total beta activity, ^{90}Sr, total U
Tank Headspace			
N/A	N/A	N/A	Combustible gas meter readings for tank headspace flammability

Notes:
[1]Conner (1996b and 1996c)

Table 3-4. Analytical Procedures.[1]

Analysis	Instrument/ Method	Preparation Procedure	Analytical Procedure[2]
Energetics by DSC	Mettler Perkin-Elmer Seiko	n/a	LA-514-113, Rev. C-1 LA-514-114, Rev. C-1 PNL-ALO-508, Rev. 0
Percent water by TGA	Mettler Perkin-Elmer Seiko	n/a	LA-560-112, Rev. B-2 LA-514-114, Rev. C-1 PNL-ALO-508, Rev. 0
Total alpha activity	Ludlum zinc sulfide scintillation counter	LA-549-141, Rev. D-0 PNL-ALO-115, Rev. 1	LA-508-101, Rev. D-2 PNL-ALO-420, Rev. 1 PNL-ALO-421, Rev. 1
Bulk density	Centrifuge cones and electronic balance	n/a	LA-160-103, Rev. A-7 PNL-ALO-501, Rev. 0
ICP	Jarrell-Ash	PNL-ALO-115, Rev. 1 PNL-ALO-103, Rev. 1	PNL-ALO-211, Rev. 0
IC	Dionex ion chromatograph	PNL-ALO-103, Rev. 1	PNL-ALO-212, Rev. 1
TIC TOC TC	Hot Persulfate/ Coulometry	PNL-ALO-381, Rev. 1	PNL-ALO-381, Rev. 1
GEA	Gamma detector spectrometer	PNL-ALO-115, Rev. 1	PNL-ALO-450, Rev. 1
^{90}Sr	Separation and proportional counter	PNL-ALO-115, Rev. 1	PNL-ALO-433 PNL-ALO-476 PNL-ALO-431
Total beta	Proportional counter	PNL-ALO-115, Rev. 1	PNL-ALO-430 PNL-ALO-431
Total Uranium	Laser fluorimetry	PNL-ALO-115, Rev. 1	PNL-ALO-445
Flammable Gas	Combustible gas meter	n/a	WHC-IP-030, IH 1.4 and IH 2.1

Notes:

n/a = not applicable
Rev. = revision

[1]Conner (1996b and 1996c)

[2]PNL-prefixed procedures are internal procedures of Pacific Northwest National Laboratory, Richland, Washington. Other procedures listed are internal procedures of Westinghouse Hanford Company, Richland, Washington.

3.4 DESCRIPTION OF HISTORICAL SAMPLING EVENT

Historically, single-shell tank waste samples were analyzed to characterize the supernatant, sludge, and/or saltcake in each tank. Data have been compiled for the samples obtained from the late 1950's to the present. There have been two historical samples for tank 241-BX-112 (Bratzel 1980 and Weiss 1990). The following sections discuss the sampling events and analyses for the reported samples. Data generated prior to May 1989 may not be acceptable for some regulatory decisions because of uncertainties in data quality. The data tables are shown in Appendix C.

3.4.1 Sample Handling and Analysis (1979)

A description of the technique used to extract the core sample, obtained in 1979, from tank 241-BX-112 was not available (Horton 1979 and Bratzel 1980). The sludge core sample yielded three segments that measured a total of 81.3 cm (32 in.). Available photographs of the extruded core show the as-extruded sludge material. No further information on sample depth, sample riser, or any techniques for taking the sample, was available.

No specifics were given in the historical literature that indicated how the sample was prepared or tested. Each of the three segments were analyzed for bulk density and percent water. The "as received" sludge solids were 24.0 percent soluble in water, were light yellow in color, and had the consistency of soft putty.

The calculated heat generation for the entire sample was 5.63E-04 watts per liter. Based on a waste volume of 625 kL, this calculates to a total tank heat load of 352 Watts. The thermal analyses showed no exothermic reactions between 25 °C and 500 °C (77 °F and 932 °F).

The samples from tank 241-BX-112 were dissolved in water, with the soluble and insoluble portions analyzed separately. The method of calculation for both the water-soluble and water-insoluble fractions from previous reports was noted as being inconsistent due to differing methods and unit values with respect to either a total composite value or a water-soluble/insoluble fraction weight percent value. The reported weight percent values in the table for this sample in Appendix C were calculated with respect to the total sample weight.

It was noted that many of the physical analyses values were inconsistent with respect to the documented laboratory physical analyses. Many composite physical analyses values were calculated from combined individual segment data rather than by physically analyzing a composite core blend.

The constituents found with the greatest weight percent in the water-soluble portion were sodium, nitrate, and phosphate with lesser amounts of sulfate, fluoride, carbonate, and chloride. The radionuclide with the greatest activity per gram of the sample was cesium, with strontium present in a lesser concentration. The water-insoluble portion contained primarily aluminum, bismuth, sodium, nickel, nitrate, phosphate, and fluoride by weight with lesser concentrations of silicon, mercury, lanthanum, iron, and chromium. Consistent with expected results, cesium and strontium were the radionuclides with the greatest activity per gram of the water-insoluble portion of the sample.

3.4.2 Sample Handling and Analysis (1990)

In 1990 a supernatant sample was extracted from BX-112. The sample was supernatant with no reported solids (Weiss 1996).

Sample analysis indicated the sample contained 74.8 percent water, with a density of 1.20 g/mL and a pH of 10.4. The species present were primarily sodium, nitrate, nitrite, carbonate, and cesium with smaller concentrations of phosphate, sulfate, strontium, and TOC. The sample results are presented in Appendix C.

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4.0 ANALYTICAL RESULTS

This section presents a summary of the analytical results associated with the November 1995 auger sampling and the November/December 1995 core sampling events for tank 241-BX-112. The SAPs (Conner 1995 and 1996d) integrate all documents related to sampling and analytical requirements, including applicable DQOs. All auger samples were analyzed at the Westinghouse Hanford Company 222-S Laboratory, and the core samples were analyzed at the Pacific Northwest National Laboratory 325 Analytical Chemistry Laboratory.

Tabulated locations of analytical results are given in Table 4-1. Comprehensive analytical data are found in Appendix A. Only analyte overall means are reported in Section 4.0. Appendix B contains data for lithium and bromide, the analytes evaluated to gauge the amount of contamination by the HHF or by the wash water used during sampling.

Table 4-1. Analytical Data Presentation Tables.

Data Type	Tabulated Location
Chemical data summary	Table 4-2
DSC exothermic data summary	Table 4-3
Comprehensive analytical data	Appendix A
Wash water contamination check data	Appendix B
Historical sampling data	Appendix C

4.1 DATA PRESENTATION

This section presents a summary of the analytical results associated with the November and December 1995 sampling of tank 241-BX-112. The subsections below provide information about the chemical, physical, vapor, and wash water contamination check data. The data were originally reported in *Final Report for Tank 241-BX-112, Auger Samples 95-AUG-047 and 95-AUG-048* (Conner 1996b), *45-Day Safety Screening Results for Tank 241-BX-112, Push Mode Cores 118 and 119* (Conner 1996a) and *Final Report for Tank 241-BX-112, Push Mode Cores 118 and 119* (Conner 1996c).

4.1.1 Chemical Data Summary

Table 4-2 presents the mean concentration estimates and inventories for the solid and liquid results separately, as well as a total tank inventory based on both waste phases. Data from the auger and core samples were combined to derive the overall concentration means for density, total alpha activity, and weight percent water, while the overall means for all other analytes were calculated from core sample data. The overall means are weighted means, and were calculated by first averaging the individual primary and duplicate results for each subsegment to obtain a subsegment mean. The subsegment means within a given segment were then averaged to obtain a segment mean. Next, the segment means for an individual core were averaged to derive a core mean. Finally, the two core means were averaged to obtain the overall mean. In the case of total alpha, density, and percent water, the core segment 1 mean was averaged with that riser's auger mean to obtain a top segment mean, and then the overall means were averaged as described above. Not all of these steps are necessary for each analyte or each subsegment, but the procedure to be followed is the same. When 50 percent or more of the individual primary/duplicate measurements had detected results, the overall mean was reported as a detected value. Conversely, when results for more than half of the individual primary/duplicate results were non-detected, the overall mean was reported as a less than (<) value. Mean concentrations and inventory estimates are computed using non-detected values as quantitative results and are biased. The magnitude of the bias cannot be estimated. These particular results should be used with caution.

Table 4-2 presents the overall means in columns two and five for the liquid and solid portions of the waste, respectively. The original subsegment analytical data are listed in Appendix A.

Relative standard deviations of the mean (RSD [Mean]), defined as 100 times the standard deviation (of the mean) divided by the tank mean, were calculated using standard analysis of variance (ANOVA) techniques (nested models). They are reported in columns three and six of Table 4-2, and were calculated only for those analytes that had 50 percent or more of their individual primary/duplicate results above the detection limit. If the RSD's are computed using non-detected values, the results are biased. The magnitude of the bias cannot be estimated. Thus, the RSD (mean) estimates and the ANOVA results in which non-detected data were used should be used with caution.

The liquid inventory, presented in column four, was calculated by multiplying the overall mean by the supernatant waste volume (4 kL [1 kgal]), and dividing by a unit conversion factor of 1E+06. The solid inventory, presented in column seven, was calculated by multiplying the overall mean by the solid density (1.31 g/mL) and the solid waste volume (621 kL [164 kgal]), and dividing by a unit conversion factor of 1E+06. Total inventory results are the summation of the liquid and solid inventories, and are listed in column eight.

Table 4-2. Solid Chemical Data Summary for Tank 241-BX-112. (5 sheets)

Analyte	Mean Liquid Concentration	Liquid RSD (Mean)	Liquid Inventory	Mean Solids Concentration	Solids RSD (Mean)	Solids Inventory	Total Inventory
METALS	µg/mL	%	kg	µg/g	%	kg	kg
Aluminum	47.8	8.2	0.191	13,600	7.1	11,100	11,100
Antimony	---	---	---	< 9.29[1]	n/a	< 7.56	< 7.56
Arsenic	< 3.00	n/a	< 0.0120	< 264	n/a	< 215	< 215
Barium	< 0.400	n/a	< 0.00160	< 31.3	n/a	< 25.5	< 25.5
Beryllium	< 0.150	n/a	< 0.000600	< 15.6	n/a	< 12.7	< 12.7
Bismuth	146	26.4	0.584	17,500	5.1	14,200	14,200
Boron	13.0	10.2	0.0521	< 198	n/a	159	159
Cadmium	< 0.550	n/a	< 0.00220	< 59.5	n/a	< 48.4	< 48.4
Calcium	< 9.25	n/a	< 0.0370	2,510	24.3	2,040	2,040
Cerium	< 3.70	n/a	< 0.0148	< 332	n/a	< 270	< 270
Chromium	355	18.7	1.42	1,290	5.1	1,050	1,050
Cobalt	< 1.85	n/a	< 0.00740	< 156	n/a	< 127	< 127
Copper	< 1.85	n/a	< 0.00740	< 156	n/a	< 127	< 127
Dysprosium	< 1.85	n/a	< 0.00740	< 156	n/a	< 127	< 127
Europium	< 3.70	n/a	< 0.0148	< 309	n/a	< 251	< 251
Iron	49.1	51.0	0.196	9,460	7.0	7,700	7,700
Lanthanum	< 1.85	n/a	< 0.00740	< 156	n/a	< 127	< 127

Table 4-2. Solid Chemical Data Summary for Tank 241-BX-112. (5 sheets)

Analyte	Mean Liquid Concentration	Liquid RSD (Mean)	Liquid Inventory	Mean Solids Concentration	Solids RSD (Mean)	Solids Inventory	Total Inventory
METALS	µg/mL	%	kg	µg/g	%	kg	kg
Lead	4.80	n/a	0.0192	< 331	n/a	< 269	< 269
Magnesium	< 3.70	n/a	< 0.0148	370	6.7	301	301
Manganese	< 1.85	n/a	< 0.00740	323	7.1	263	263
Molybdenum	32.6	22.3	0.130	< 92.9	n/a	< 75.6	< 75.6
Neodymium	< 3.70	n/a	< 0.0148	< 309	n/a	< 251	< 251
Nickel	1.80	8.8	0.00720	< 2.76[1]	n/a	< 2.25	< 2.26
Phosphorus	5,350	3.0	21.4	19,300	3.1	15,700	15,700
Potassium	719	11.6	2.87	406[1]	14.8	379	382
Rhodium	< 10.9	n/a	< 0.0436	< 929	n/a	< 756	< 756
Ruthenium	4.98	29.7	< 0.0199	< 309	n/a	< 251	< 251
Selenium	< 3.70	n/a	< 0.0148	< 331	n/a	< 269	< 269
Silicon	38.6	1.9	0.154	8,400	9.5	6,830	6,830
Silver	< 0.550	n/a	< 0.00220	< 46.4	n/a	< 37.7	< 37.7
Sodium	77,900	9.4	312	81,800	2.6	66,500	66,800
Strontium[2]	< 0.550	n/a	< 0.00220	132	4.4	107	107
Tellurium	< 18.5	n/a	< 0.0740	<1,560	n/a	< 1,270	< 1,270
Thallium	< 18.5	n/a	< 0.0740	<1,560	n/a	< 1,270	< 1,270

Table 4-2. Solid Chemical Data Summary for Tank 241-BX-112. (5 sheets)

Analyte	Mean Liquid Concentration	Liquid RSD (Mean)	Liquid Inventory	Mean Solids Concentration	Solids RSD (Mean)	Solids Inventory	Total Inventory
METALS	µg/mL	%	kg	µg/g	%	kg	kg
Titanium	< 0.950	n/a	< 0.00380	< 77.5	n/a	< 63.0	< 63.0
Tungsten	< 18.5	n/a	< 0.0740	< 1,560	n/a	< 1,270	< 1,270
Uranium	546[2]	17.0	2.18	1,040[3]	5.3	846	848
Vanadium	< 0.550	n/a	< 0.00220	< 46.5	n/a	< 37.8	< 37.8
Yttrium	< 0.400	n/a	< 30.9	< 30.9	n/a	< 25.1	< 56.0
Zinc	1.05	23.8	0.00420	< 89.5	n/a	< 72.8	< 72.8
Zirconium	4.43	54.8	0.0177	< 78.1	n/a	< 63.5	< 63.5
ANIONS	µg/mL	%	kg	µg/g	%	kg	kg
Chloride	1,380	9.1	5.52	1,050	7.5	854	860
Fluoride	1,350	25.9	5.40	10,700	21.8	8,700	8,700
Nitrate	98,500	11.2	394	75,100	2.8	61,100	61,500
Nitrite	35,300	10.6	141	25,600	6.0	20,800	20,900
Phosphate	15,700	5.1	62.8	16,400	8.5	13,300	13,400
Sulfate	7,180	16.4	28.7	6,480	3.8	5,270	5,300

Table 4-2. Solid Chemical Data Summary for Tank 241-BX-112. (5 sheets)

Analyte	Mean Liquid Concentration	Liquid RSD (Mean)	Liquid Inventory	Mean Solids Concentration	Solids RSD (Mean)	Solids Inventory	Total Inventory
RADIO-NUCLIDES	µCi/mL	%	Ci	µCi/g	%	Ci	Ci
Total alpha	< 0.00200	n/a	< 1.63	0.179	17.6	147	149
Total beta	---	---	---	58.7	5.7	47,800	47,800
^{241}Am	---	---	---	< 0.167	n/a	< 136	< 136
^{134}Cs	---	---	---	< 0.0378	n/a	< 30.8	<30.8
^{137}Cs	---	---	---	49.5	15.1	40,300	40,300
^{60}Co	---	---	---	< 0.00938	n/a	< 7.63	< 7.63
^{154}Eu	---	---	---	< 0.0286	n/a	< 23.2	< 23.2
^{155}Eu	---	---	---	< 0.127	n/a	< 103	< 103
$^{89/90}$Sr	---	---	---	5.77	29.5	4,690	4,690
Total Carbon	µg C/mL	%	kg	µg C/g	%	kg	kg
Total carbon	---	---	---	3,030	11.0	2,460	2,460
Total organic carbon	---	---	---	959	7.7	780	780
Total inorganic carbon	---	---	---	2,100	13.7	1,760	1,760

Table 4-2. Solid Chemical Data Summary for Tank 241-BX-112. (5 sheets)

Analyte	Mean Liquid Concentration	Liquid RSD (Mean)	Liquid Inventory	Mean Solids Concentration	Solids RSD (Mean)	Solids Inventory	Total Inventory
PHYSICAL PROPERTIES	**Mean Liquid Concentration**	**Liquid RSD (Mean)**	**Liquid Inventory**	**Mean Solids Concentration**	**Solids RSD (Mean)**	**Solids Inventory**	**Total Inventory**
Weight percent water	67.6 %	4.7 %	3,190 kg	63.7 %	1.32	5.15E+05	5.18E+05
Density	1.18 g/mL	1.9	---	1.31 g/mL	1.5	---	---

Notes:

n/a = not applicable

[1]Water leach analysis

[2]ICP

[3]Kinetic phosphorescence

4.1.2 Physical Data Summary

TGA and DSC analyses were performed on the tank 241-BX-112 samples to satisfy the requirements of the safety screening DQO (Dukelow et al. 1995) and the historical DQO (Simpson and McCain 1995). Density determinations were also performed on the samples as mandated by the DQOs.

4.1.2.1 Thermogravimetric Analysis. In a TGA, the mass of a sample is measured while its temperature is increased at a constant rate. Nitrogen is passed over the sample during the heating to remove any released gases. Any decrease in the weight of a sample represents a loss of gaseous matter from the sample either through evaporation or through a reaction that forms gas phase products. The moisture content is estimated by assuming that all TGA sample weight loss up to a certain temperature (determined from the evaluation of the thermogram) is due to water evaporation. Weight percent water by TGA was performed by the 222-S Laboratory using procedures LA-560-112, Rev. B-2 (Mettler) or LA-514-114, Rev. C-1 (Perkin-Elmer), and by the 325 Laboratory using procedure PNL-ALO-508, Rev. 0 (Seiko).

The TGA percent water data for tank 241-BX-112 are presented in Table A-65 of Appendix A. The overall mean percent water for the solids was 63.3 weight percent, and the overall mean for the liquids was 67.6 weight percent.

4.1.2.2 Differential Scanning Calorimetry. In a DSC analysis, heat absorbed or emitted by a substance is measured while the substance is exposed to a linear increase in temperature. While the substance is being heated, a gas such as nitrogen is passed over the waste material to remove any gases being released. The onset temperature for an endothermic (characterized by or causing the absorption of heat) or exothermic (characterized by or causing the release of heat) event is determined graphically. Analyses by DSC were performed by the 222-S Laboratory using either procedure LA-514-113, Rev. C-1 (Mettler) or LA-514-114, Rev. C-1 (Perkin-Elmer), and by the 325 Laboratory using PNL-ALO-508, Rev. 0 (Seiko).

The DSC results are presented in Table A-64 of Appendix A. The sample weight, temperature at maximum enthalpy change, and the magnitude of the enthalpy change are provided for each transition. Only the drainable liquid from core 118 segment 1A exhibited an exothermic transition. All results reported in the table are on a wet weight basis.

For a comparison of the exothermic enthalpy changes with the safety screening and historical decision limit of -480 J/g, the exothermic values were converted to a dry weight basis using the sample weight percent water. After conversion to a dry weight basis, it was determined that none of the results had enthalpy changes exceeding the -480 J/g limit. The upper limit to the one-sided 95 percent confidence interval on the mean for this sample was -136 J/g. Table 4-3 presents the exothermic results for the drainable liquid of core 118 segment 1A, along with the weight percent water for conversion to a dry weight, the converted exothermic value, and the upper limit of the 95 percent confidence interval.

Table 4-3. DSC Exothermic Results and 95 Percent Confidence Interval Upper Limits.[1]

Sample Number	Core: Segment	Sub-Segment	Run	Wet Wt. ΔH J/g	Sample wt% Water %	Dry Wt. ΔH J/g	Mean J/g	95% Confidence Interval Upper Limits J/g
Solids								
96-02848	118: 1A	DL	1	-45.5	64.4	-127.8	-129.0	-136
			2	-46.3		-130.1		

Note:
[1]Conner (1996c)

4.1.2.3 Density. Bulk density measurements were performed by the 222-S Laboratory using procedure LA-160-103, Rev. A-7, and by the 325 Laboratory using PNL-ALO-501, Rev. 0. The mean density of the solids was 1.31 g/mL, while that of the liquid was 1.18 g/mL. The analytical data are presented in Table A-66 of Appendix A.

4.1.3 Tank Headspace Flammability

As discussed in Section 3.1, sampling of the tank 241-BX-112 headspace was performed prior to auger sampling. The safety screening DQO decision limit for flammability gas concentration is 25 percent of the LFL (Dukelow et al. 1995). The combustible gas meter reports results as a percentage of the lower explosive limit (LEL). Because the National Fire Protection Association defines the terms LFL and LEL identically, the two terms are used interchangeably (NFPA 1995). Sampling was done in the tank headspace through riser 3. The flammability of the tank headspace gases was determined to be 0 percent of the LFL, indicating no flammability concerns. During the flammable gas monitoring, the maximum concentrations of oxygen (20.9 percent), total organic vapor (11.3 ppm), and ammonia (125 ppm) were also measured (Conner 1996b).

Shift Operations reported a reading of 90 percent of the LFL from the sample drill string on December 19, 1995. The drill string was purged and sampling continued. It was determined that the high reading was due to an anomalous reading caused by sampling operations, and did not reflect the actual flammability of the tank headspace. Periodic checks were made throughout the sampling event and no other flammable gas readings were observed.

4.1.4 Hydrostatic Head Fluid or Wash Water Contamination Check

The HHF and wash water used during sampling operations contained a target concentration of 0.3 m lithium bromide. Through chemical analyses of the samples for lithium and bromide, as prescribed by the SAP (Conner 1996d), contamination of the samples by the HHF or the wash water could be estimated. The results indicated that there was contamination in two samples of core 118 segment 1A. The TGA results for the drainable liquid and the upper half subsegment were adjusted due to this contamination to obtain a true estimate of the tank moisture concentration (Winkelman 1996). The adjusted TGA results for the drainable liquid and upper half subsegment were 59.1 and 62.1 weight percent water, respectively. The analytical data for lithium and bromide are presented in Appendix B. An overall mean and tank inventory were not calculated for Li and Br because they are not constituents of the tank waste.

5.0 INTERPRETATION OF CHARACTERIZATION RESULTS

The purpose of this chapter is to discuss the overall quality and consistency of the current sampling results for tank 241-BX-112, and to assess and compare these results against historical information and program requirements.

5.1 ASSESSMENT OF SAMPLING AND ANALYTICAL RESULTS

This section evaluates sampling and analysis factors that may impact interpretation of the data. These factors are used to assess the overall quality and consistency of the data and to identify any limitations in the use of the data.

5.1.1 Field Observations

Auger and core samples were taken from risers 2 and 3, which are both on the southwest quadrant of the tank (see Figure ES-1). Risers on the other side of the tank were not available for sampling because of installed equipment. Although the risers 2 and 3 were not as widely spaced as desirable, it was decided that since the waste was expected to be primarily one was type, sampling from them would meet the intent of the safety screening DQO. Because of equipment problems, the drill string was pulled after the sampling of core 118 segment 1. The drill string was reinserted two days later and sampling continued. Hydrostatic head fluid with a lithium bromide tracer was used during the core sampling operation. This activity resulted in the contamination of several core segments. There were no anomalies reported during extrusion.

5.1.2 Quality Control Assessment

The usual quality control assessment includes an evaluation of the appropriate standard recoveries, matrix spike recoveries, duplicate analyses, and blanks that are performed in conjunction with the chemical analyses. All the pertinent quality control tests were conducted on the 1996 core samples, allowing a full assessment regarding the accuracy and precision of the data. The specific criteria for all QC checks were given in the SAP (Conner 1995 and 1996d). Quality control results outside these criteria are identified by superscripts in the Appendix A tables.

The standard and matrix spike recovery results provide an estimate of the accuracy of the analysis. If a standard or spike recovery is above or below the given criterion, then the analytical results may be biased high or low, respectively. The analytical precision is evaluated by the relative percent difference (RPD), which is defined as the absolute value of the difference between the primary and duplicate samples, divided by their mean, multiplied by one hundred.

All standard and matrix spike recoveries were within the SAP defined limits, with the exception of high matrix spike recoveries for the anions. The high recoveries are not expected to affect the data. When the sample concentration is greater than the spike concentration by a factor of four or more, the matrix spike recovery is inconclusive. Three TOC RPD results were moderately outside the SAP specified limits. The poor precision was attributed to sample inhomogeneity. Several analytes by IC and ICP had RPDs outside the defined limits. The poor precision was also attributed to sample inhomogeneity.

Finally, none of the samples exceeded the criterion for preparation blanks; thus, contamination was not a problem for any of the analyses. In summary, the majority of the QC results were within the boundaries specified in the SAP. Although a few were outside their target levels, they were not found to substantially impact either the validity or the use of the data.

5.1.3 Data Consistency Checks

Comparisons of different analytical methods can help assess the consistency and quality of the data. The quantity of data from the core sampling event made possible the calculation of mass and charge balances, as well as a comparison of the ICP phosphorus results with the IC phosphate results. Only the solid portion of the waste was considered in these comparisons because it comprises 99 percent of the total waste.

5.1.3.1 Comparison of Results from Different Analytical Methods. The following data consistency checks compare the results from two different analytical methods. A close comparison strengthens the credibility of both results, whereas a poor comparison brings the reliability of the data into question. All analytical mean results were taken from Table 4-2.

In a check of soluble phosphate, samples prepared by water digestion and analyzed by ICP produced a phosphorus mean of 5,360 μg/g, which converts to 16,400 μg/g of phosphate. The water digestion ICP result agrees very well with the IC phosphate result of 16,400 μg/g. The analytical phosphorus mean of samples prepared by fusion digestion and analyzed by ICP was 19,300 μg/g, which represents total phosphorus. This amount of phosphorus converts to 59,100 μg/g of phosphate. The ICP results indicate that there is substantially more insoluble phosphate than soluble phosphate.

A comparison was also made between the activities of $^{89/90}$Sr and ^{137}Cs with the total beta measurement. The sum of the beta emitters was made as follows:

$$\text{Sum of beta emitters} = (2 * {}^{89/90}\text{Sr} + {}^{137}\text{Cs}).$$

Because $^{89/90}$Sr is in equilibrium with its daughter product ^{90}Y, the $^{89/90}$Sr activity must be multiplied by 2 to account for all of the beta emitters. The comparison is shown in Table 5-1. The activities from the two methods agree closely, indicating that most of the activity has been accounted for.

Table 5-1. Comparison of Total Beta Activity with the Sum of $^{89/90}Sr$ and ^{137}Cs Activities.

Analyte	Overall Mean (μCi/g)	Beta Activities (μCi/g)
$^{89/90}Sr$	5.77	11.5
^{137}Cs	49.5	49.5
Sum of beta emitters		61.0
Total beta activity		58.7
Relative percent difference		3.8%

To evaluate the adequacy of the laboratory homogenization procedure, a sample and duplicate were analyzed from the top and bottom of each homogenized sample of core 118 segment 2 bottom half sludge and core 119 segment 3 bottom half sludge. The RSDs of all tested analytes (Al, Bi, Cr, Fe, Na, P and ^{137}Cs) from ICP and GEA analysis for these samples were less than 6 percent (Conner 1996c). The results indicate that the homogenization processing was effective.

5.1.3.2 Mass and Charge Balances. The principle objective in performing mass and charge balances is to determine if the measurements were self-consistent. In calculating the balances, only analytes listed in Table 4-2 detected at a concentration of 1,000 μg/g or greater were considered.

Table 5-2 presents the cation mass and charge data. Chromium was assumed to be present as $Cr(OH)_3$, while aluminum and silicon were assumed to be present as $Al_2O_3 \cdot SiO_2$. In addition, silicon in the form of SiO_2 is also assumed to be present. Based on the ICP phosphorus and IC phosphate comparison (see Section 5.1.3.1), it was determined that approximately 70 percent of the phosphorus existed in an insoluble form. Phosphorus was assumed to be present as the following insoluble compounds: $BiPO_4$, $FePO_4$, $Ca_3(PO_4)_2$, and Na_3PO_4. The amount of sodium expected as Na_3PO_4 was consistent with the insoluble sodium concentration derived from the difference between the fusion digest sodium mean and the water digest sodium mean. The assumption that all aluminum, bismuth, calcium, iron, and silicon are present as insoluble compounds was supported by the water digest results (within analytical variability).

Because precipitates are neutral species, all positive charge was attributed to the sodium portion existing in soluble form. The anionic analytes listed in Table 5-3 were assumed to be present as sodium salts and were expected to balance the positive charge. The concentrations of cationic species in Table 5-2, the anionic species in Table 5-3, and the percent water were ultimately used to calculate the mass balance. The uncertainty estimates (RSDs) associated with each analyte are also given in the tables. The uncertainty estimates for the cation and anion totals, as well as the overall uncertainty given in Table 5-4, were computed using propagation of errors techniques (Nuclear Regulatory Commission 1988).

Table 5-2. Cation Mass and Charge Data.

Analyte	Concentration (wet weight)		Assumed Species	Concentration of Assumed Species	RSD (Mean)	Charge
	μg/g			μg/g	%	μeq/g
Aluminum	13,600		$Al_2O_3 \cdot SiO_2$	40,800	7.3	---
Bismuth[1]	17,500		$BiPO_4$	25,500	5.1	---
Calcium[1]	2,510		$Ca_3(PO_4)_2$	6,470	24.9	---
Chromium	1,290		$Cr(OH)_3$	2,560	5.0	---
Iron[1]	9,460		$FePO_4$	25,600	7.1	---
Silicon[2]	8,400	7,080	$Al_2O_3 \cdot SiO_2$	see above	8.9	---
		1,320	SiO_2	2,820		
Sodium[1,3]	81,800	10,700	Na_3PO_4	25,400	2.7	---
		71,100	Na^+	71,100		3,090
Total				200,000	2.3	3,090

Note:

[1]A mean of 19,300 μg/g of phosphorus was found in the tank. Of that amount, 5,360 μg/g was assumed to be soluble (see Section 5.1.3.1). The remaining phosphorus was assumed to be present as the insoluble compounds $BiPO_4$, $FePO_4$, $Ca_3(PO_4)_2$, and Na_3PO_4.

[2]All silicon was assumed to be insoluble based on water digest and drainable liquid results.

[3]The amount of soluble sodium present was consistent with the core composite and segment ICP water digest results, and the drainable liquid ICP results.

Table 5-3. Anion Mass and Charge Data.

Analyte	Concentration (wet weight)	Assumed Species	Concentration of Assumed Species	RSD (Mean)	Charge
	μg/g		μg/g	%	μeq/g
Chloride	1,050	Cl^-	1,050	7.5	30
Fluoride	10,700	F^-	10,700	21.8	563
Nitrate	75,100	NO_3^-	75,100	2.8	1,210
Nitrite	25,600	NO_2^-	25,600	6.0	557
Phosphate	16,400	PO_4^{3-}	16,400	8.4	518
Sulfate	6,480	SO_4^{2-}	6,480	3.8	135
TIC	2,100[1]	CO_3^{2-}	10,500	13.7	350
Total			146,000	2.8	3,360

Table 5-4. Mass Balance Totals.

Totals	Concentrations $\mu g/g$	RSD (Mean) %
Total from Table 5-2	200,000	2.3
Total from Table 5-3	146,000	2.8
Water %	637,000	1.32
Grand Total	983,000	1.06

The mass balance was calculated from the formula below. The factor 0.0001 is the conversion factor from $\mu g/g$ to weight percent.

Mass balance = percent water + 0.0001 x {total analyte concentration}
= percent water + 0.0001 x $\{Al_2O_3 \cdot SiO_2 + Cr(OH)_3 + BiPO_4 + FePO_4 + Ca_3(PO_4)_2 + Na_3PO_4 + SiO_2 + Na^+ + Cl^- + F^- + NO_3^- + NO_2^- + CO_3^{2-} + PO_4^{3-} + SO_4^{2-}\}$.

The total analyte concentration calculated from the above equation is 346,000 $\mu g/g$ (wet weight). The mean weight percent water obtained from thermogravimetric analysis reported in Table 4-2 is 63.7 percent, or 637,000 $\mu g/g$. The mass balance resulting from adding the percent water to the total analyte concentration is 98.3 percent (Table 5-4).

The following equations demonstrate the derivation of total cations and total anions, and the charge balance is the ratio of these two values. To derive the results as shown in the equations, all concentrations must first be converted to a $\mu g/g$ basis.

Total cations ($\mu eq/g$) = $[Na^+]/23.0$ = 3,090 $\mu eq/g$

Total anions ($\mu eq/g$) = $[Cl^-]/35.5 + [F^-]/19.0 + [CO_3^{2-}]/30.0 + [NO_3^-]/62.0 + [NO_2^-]/46.0 + [PO_4^{3-}]/31.7 + [SO_4^{2-}]/48.0$ = 3,360 $\mu eq/g$.

The charge balance obtained by dividing the sum of the positive charge by the sum of the negative charge was 0.92.

In summary, the above calculations yield reasonable (close to 1.00 for charge balance and 100 percent for mass balance) mass and charge balance values, indicating that the analytical results are generally self-consistent.

5.2 COMPARISON OF HISTORICAL WITH ANALYTICAL RESULTS

Prior to the 1995 sampling events, the most recent sampling of tank 241-BX-112 was a liquid sample taken in March 1990. The tank waste content has not changed since 1977; as a result, sampling events from 1979 and 1990 may still be representative of the tank waste. Photographs are available showing the three segments obtained in the 1979 sampling event. No other information was available describing the historical sampling events. Analysis results from the 1979 sampling event were reported in August 1979 (Horton 1979). These results were amended in September 1980 (Bratzel 1980). A description of the sludge from the 1979 sample as light yellow in color did not match the majority of the solids in the 1995 samples, which were brown. A color bar was not included in the 1979 hot cell photos; therefore, the color of the material in the pictures should not be trusted. One picture depicted a very grey material. However, core 118 segment 1 was described as yellow-green in color. A comparison between the August 1979 sampling event and the current sampling event appears in Table 5-5. In general, the results compared well, with a few significant differences. Because of the differences in physical appearance and the uncertainty of sampling and analysis methods, this comparison should be used with caution. The results from the historical sampling events are reported in Appendix C for informational purposes only.

5.3 TANK WASTE PROFILE

According to the estimate of Hanlon (1996), the 171 cm (67.4 in.) of waste in tank 241-BX-112 was expected to consist of 4 kL (1 kgal) of supernatant overriding 621 kL (164 kgal) of sludge. The sludge layer includes 26 kL (7 kgal) of drainable interstitial liquid. The TLM estimates (Figure 2-3) were identical to the Hanlon (1996) estimates.

Visual descriptions of the samples indicated that the segments were similar to one another in texture and color. The predominate colors of the segments were gray/brown, with one segment being yellow/green. The texture of the segments varied from smooth wet sludge that retained its shape to thick sludge that poured. The waste descriptions between cores were generally consistent, although drainable liquid was only found in segments 1A and 3 of core 118. The percent water in the solids and drainable liquids portions of the sample were very similar, indicating the solids were close to being saturated. When the drill string was removed after the collection of segment 1, LiBr traced wash water was used to decontaminate the drill string so that it could be removed from the tank. When segment 1A was collected, this wash water is probably the source of the contamination in that sample. The additional water probably caused the creation of drainable liquid in segment 1A. The Li and Br analysis supports this assumption. Small amounts of Li and Br were detected in segment 3 drainable liquid. The drainable liquid in segment 3 could, therefore, also be caused from HHF intrusion. The 1990 photographic montage of the tank interior indicated a gray or brown solid waste intermixed with pools of dark yellow translucent liquid. Based on the predictions by Hanlon (1996) and the TLM, and the physical descriptions of the segments, the tank waste appears to be somewhat homogeneous.

Table 5-5. Comparison of 1979 and 1995 Sampling Events. (2 sheets)

Component	1979 Sample Average	1995 Sample Average
Bulk Density (g/mL)	1.21	1.31
%H_2O	63.0	64.0
Chemical Analysis		
Metals		
Component	1979 Water Soluble Plus Insoluble	1996 Fusion Digest
Al^{3+}	3.9%	1.36%
Bi^{3+}	3.8%	1.75%
Cr^{3+}	0.21%	0.129%
Fe^{2}	0.6%	0.946%
Hg^{2+}	0.01%	NR
La^{3+}	.474%	<0.0156%
Mn^{4+}	.02%	0.0323%
Na^{+}	11.2%	8.18%
Pb^{2+}	< 0.004%	<0.03%
Si^{4+}	2.1%	0.84%
Zr^{4+}	< 0.1%	<0.0078%
Metals		
Component	1979 Water Soluble	1996 Water Digest
Bi^{3+}	0.01%	0.007%
Cr^{3+}	0.01%	0.025%
Na^{+}	5.4%	6.7%
Ni	<0.001%	<0.00026%
Pb^{2+}	< 0.003%	<0.00088%
Si^{4+}	2.1%	0.0071%
Zr^{4+}	< 0.1%	<0.00024%
Carbon		
Component	1980 Data	1996 Coulometry
CO_3	<0.2%	1.05[2]%
TOC	1.0%	0.0959%

Table 5-5. Comparison of 1979 and 1995 Sampling Events. (2 sheets)

Water Digest Analysis		
Anions		
Component	**Water Soluble**	**1996 IC**
Cl	0.252%	0.1%
NO_3	9.2%	7.51%
PO_4^{3-}	11.0%	1.64%
SO_4^{2-}	0.6%	0.65%
F	.26%	1.07%
Radiological Analysis		
Component	**1979**	**1996 Fusion Digest**
U	0.14%	0.104 %
^{239}Pu	.0297%	0.179 μCi/g Total alpha
^{241}Am	2.03E-06%	<0.167 μCi/g
$^{89/90}Sr$	20.5 μCi/g	5.77 μCi/g
^{137}Cs	66.68 μCi/g	49.5 μCi/g

Notes:

NR - Not requested

Due to the lack of QA/QC, 1979 data may be reliable.

[1]Horton (1979) and Bratzel (1980)

[2]Calculated from total inorganic carbon

5.4 COMPARISON OF TRANSFER HISTORY WITH ANALYTICAL RESULTS

The HTCE prediction for the contents of tank 241-BX-112 is shown in Table 5-6 along with the analytical results from the 1995 sampling events. Because the HTCE has not been validated, the comparison is for information purposes only. These results should be used with caution.

Table 5-6. Comparison of Historical Estimates with the 1995 Analytical Results for Tank 241-BX-112.[1,2] (2 sheets)

Analyte	HTCE Estimate[4]	1995 Analytical Result
METALS	μg/g	μg/g
Aluminum	15,600	13,600
Bismuth	7,210	17,500
Calcium	1,690	2,510
Chromium	194	1,290
Iron	7,960	9,460
Manganese	0.960	323
Potassium	168	466
Silicon	1,020	8,400
Sodium	83,700	81,800
ANIONS	μg/g	μg/g
Chloride	780	1,050
Fluoride	2,730	10,700
Nitrate	51,100	75,100
Nitrite	9,540	25,600
Phosphate	72,300	16,400
Sulfate	5,300	6,480
Total organic carbon	69.3	959
Carbonate	3,790	10,500[3]
PHYSICAL PROPERTIES		
Bulk Density	1.28 g/mL	1.31 g/mL
Weight percent water	69.8 %	63.7 %

Notes:

[1]Agnew et al. (1996)
[2]Conner (1996c)
[3]Calculated from TIC
[4]HTCE estimates have not been validated and should be used with caution.

Comparing the HTCE with the analytical values gives varied results. Some analytes are reasonably close in their estimates, while others are very different. In general, most comparisons were of the same order of magnitude.

5.5 EVALUATION OF PROGRAM REQUIREMENTS

The auger and core samples retrieved from tank 241-BX-112 in November and December 1995 were taken to meet the requirements of the safety screening DQO (Dukelow et al. 1995) and the historical DQO (Simpson and McCain 1995). The historical DQO attempts to acquire information through selective tank sampling to quantify the errors associated with the predictions for the waste composition. A discussion of the specific requirements of these DQOs and a comparison of the analytical results to defined concentration limits is presented in this section. Section 5.5.1 details the safety evaluations required by the safety screening DQO, while section 5.5.2 presents the historical model evaluation.

5.5.1 Safety Evaluation

The safety screening DQO (Dukelow et al. 1995) is used to assess the safety of the tank waste and to evaluate the tank for placement on a Watch List or to verify current Watch List status. Of the five primary analyses required by the DQO, three have decision criteria thresholds which, if exceeded, could warrant further investigation to ensure tank safety. These three analyses include DSC to evaluate fuel content, a determination of total alpha activity to evaluate the criticality potential, and a measurement of the flammability of the tank headspace gases. In addition, the historical DQO required samples be analyzed for TOC, which is also a secondary analyte for the safety screening DQO. Table 5-7 lists the applicable safety issues, decision variables and thresholds, and the analytical results from the 1995 sampling events.

The safety screening DQO has established a decision threshold of -480 J/g (dry weight basis) for the DSC analyses; for comparison to this limit, all analytical results were first converted to a dry weight basis. All exothermic results were below the decision threshold, with the largest upper limit to the one-sided 95 percent confidence interval on the mean being -136 J/g.

The potential for criticality can be assessed from the total alpha activity data. The safety screening decision threshold is 1 g/L, which converts to 41 μCi/g (assuming a density of 1.5 μg/cc) for the solids and 61.5 μCi/mL for the liquids. The average solids density is 1.31, which makes this limit conservative. The calculated overall mean for the solids portion of the tank was 0.181 μCi/g, while the overall mean for the liquid portion was $<$ 0.00200 μCi/mL. All results were below the decision threshold, with the largest of the solid sample upper limit to the one-sided 95 percent confidence interval on the mean being 0.336 μCi/g.

Table 5-7. Decision Variables and Criteria for the Safety Screening and Historical Data Quality Objectives.

Issue	Primary Decision Variable	Decision Criteria Threshold	Mean Analytical Result
Ferrocyanide/ Organics	Total fuel content	-480 J/g[1]	No samples exceeded limit; highest 95 percent confidence interval = -145 J/g[1]
Organic[2]	Total organic carbon	30,000 μg/g[1]	No samples exceeded limit; highest 95 percent confidence interval = 2,500 μg C/g[1]
Criticality	Total alpha activity	Solids: 41 μCi/g Liquids: 61.5 μCi/mL	No samples exceeded limit; highest 95 percent confidence interval for the solids = 0.336 μCi/g. All liquid results were below the detection limit.
Flammability	Flammable gas	25 % of the LFL	0 % of the LFL

Notes:
[1]Value is reported on a dry weight basis.
[2]Secondary analyte for safety screening DQO. Reported as required by historical DQO.

The TOC content of the tank was measured, through the analysis of core composites, as required by the historical DQO. The TOC content of segment 2 of cores 118 and 119 was also determined. All TOC results were well below the decision threshold of 30,000 μg C/g (dry weight basis) as outlined in the SAP (Conner 1996d). The overall mean TOC result was 959 μg C/g. The highest upper limit to the one-sided 95 percent confidence interval on the mean was 2,500 μg C/g, which is well below the decision threshold.

Tank headspace flammability is an additional safety screening DQO consideration. The notification limit for headspace flammability is 25 percent of the LFL. The flammability of the tank headspace was 0 percent of the LFL. Additional measurements were taken for ammonia (125 ppm), oxygen (20.9 percent), and total organic vapor (11.3 ppm).

Another factor in assessing tank safety is the heat generation and temperature of the waste. Heat is generated in the tanks from radioactive decay. The total tank heat load estimate from radionuclide data was 221 W (754 Btu/hr) and was calculated as shown in Table 5-8. The HTCE prediction was 100 W (342 Btu/hr) (Agnew et al. 1996), while an estimate based on the tank headspace temperature was 926 W (3,160 Btu/hr) (Kummerer 1994). Data from the 1979 sampling event calculated a heat load of 352 Watts (Bratzel 1980). All of the

Table 5-8. Tank 241-BX-112 Projected Heat Load.[1]

Radionuclide	Specific Activity	Projected Inventory	Decay Heat Generation Rate	Heat Load from Radioactive Decay
	μCi/g	Ci	MW/Ci	W
^{137}Cs	49.5	40,300	4.72	190
$^{89/90}$Sr	5.77	4,690	6.69	31
Total		45,000		221

Note:
[1]Conner (1996c)

estimates are well below the 11,700-W (40,000-Btu/hr) operating specification limit for single-shell tanks (Bergmann 1991). Since an upper temperature limit has been exhibited (Section 2.4.3), it may be concluded that any heat generated from radioactive sources throughout the year is dissipated.

5.5.2 Historical Model Evaluation

The primary objective of the historical DQO is to acquire information through selective tank sampling to quantify the errors associated with predicting tank waste composition based on waste transaction history and waste type compositions (Simpson and McCain 1995). The DQO identifies key waste components and their characteristic concentrations ("fingerprint" analytes) for certain waste types

The first step in the evaluation is to compare the analytical results with DQO-defined concentration levels for the "fingerprint" analytes. This comparison ensures that the predicted waste type may be in the tank and at the predicted location. If the analytical results are ≥ 10 percent of the DQO levels (ratio of 0.1 or more), the waste type and layer identification are considered acceptable for further investigation, and further analyses are requested (Simpson and McCain 1995).

The "fingerprint" analytes for 1C waste are sodium, aluminum, bismuth, phosphate, and percent water. Table 5-9 presents a comparison of the expected and measured concentrations for the 1C waste analytes. Data in Table 5-9 show that the waste in BX-112 is consistent with the 1C waste type. All of the comparisons are above the required ratio of 0.1, indicating that, at this level of evaluation, the waste type prediction is valid, and further analysis on an analyte basis is warranted.

Table 5-9. Tank 241-BX-112 Historical Model Evaluation for 1C Waste.[1]

Fingerprint Analyte	Expected Concentration	Core Composite Concentration	Were All Subsegments ≥ 10 % of Expected Concentration
METALS	µg/g	µg/g	
Aluminum	18,300	13,600	Yes
Bismuth	8,500	17,500	Yes
Sodium	68,000	81,800	Yes
Phosphate	68,600	59,100[2]	Yes
Percent water	65.4	63.6	Yes

Notes:
[1]Conner (1996c)

[2]Calculated from (ICP) fusion total phosphorus results.

The second historical DQO gateway analysis requires that the sample analysis account for greater than 85 percent of the mass of the sample. Analytical results are tabulated on a mass basis in Tables 5-2, 5-3, and 5-4. The summation of analytes listed in Tables 5-2, 5-3, and 5-4 accounts for 98.3 percent of the sample, and passes the gateway test. In accordance with the historical DQO, preliminary data were evaluated and segment 2 of each core was chosen for more extensive analyses (TOC, ICP-water, 90Sr, GEA, total beta, total uranium) because these segments most closely matched the historically predicted composition of 1C waste.

These results have been submitted for statistical evaluation and the results of which will be made available at a future date.

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6.0 CONCLUSIONS AND RECOMMENDATIONS

The waste in tank 241-BX-112 was auger sampled in November 1995 in accordance with the tank safety screening DQO. It was core sampled in November/December 1995 in accordance with *Tank Safety Screening Data Quality Objective* (Dukelow et al. 1995) and *Historical Model Evaluation Data Requirements* (Simpson and McCain 1995). The requirements for the DQOs were integrated into the *Tank 241-BX-112 Auger Sampling and Analysis Plan* (Conner 1995) and *Tank 241-BX-112 Push Mode Core Sampling and Analysis Plan* (Conner 1996d). All auger sample analyses were performed at the Westinghouse Hanford Company 222-S Laboratory, and the core samples were analyzed at the Pacific Northwest National Laboratory 325 Laboratory.

Comparisons were made between the analytical results and the decision thresholds given in the DQOs. The safety screening DQO has established a decision threshold of -480 J/g (dry weight basis) for the DSC analyses; for comparison to this limit, all analytical results were first converted to a dry weight basis. All exothermic results were below the decision threshold, with the largest upper limit to the one-sided 95 percent confidence interval on the mean being -136 J/g. All of the TOC results were below the decision limit of 30,000 μg C/g (dry weight basis). The overall mean TOC result was 959 μg C/g, while the largest upper limit to the one-sided 95 percent confidence interval on the mean was 2,500 μg C/g. The overall solids mean for total alpha activity was 0.181 μCi/g and the overall liquid mean was < 0.00200 μCi/mL. All results were below the decision threshold (41 μCi/g and 61.5 μCi/mL); the largest upper limit to the one-sided 95 percent confidence interval on the mean was 0.336 μCi/g. Finally, the flammability of the tank headspace was 0 percent of the LFL. No safety screening DQO limits were exceeded.

The total tank heat load estimate based on the analytical data was 221 W (754 Btu/hr). The HTCE prediction was 100 W (342 Btu/hr) (Agnew et al. 1996), while an estimate based on the tank headspace temperature was 926 W (3,160 Btu/hr) (Kummerer 1994). All of these estimates are well below the operating specification of 11,700 W (40,000 Btu/hr) (Bergmann 1991). Because the tank exhibits an upper temperature limit, it may be concluded that any heat generated from radioactive sources throughout the year is dissipated.

Finally, several conclusions were drawn from the analytical results. Based on the decision criteria established in the safety screening DQO, the waste in tank 241-BX-112 can be classified as safe and may continue to be safely stored in the tank without special action. The waste in BX-112 has been classified to be primarily of type 1C. In addition, no further characterization efforts are needed at this time. Lastly, there were no unexpected findings that could affect the ability to retrieve and dispose of the waste safely.

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7.0 REFERENCES

Agnew, S. F., J. Boyer, R. Corbin, T. Duran, J. Fitzpatrick, K. Jurgensen, T. Ortiz, and B. Young, 1996, *Hanford Tank Chemical and Radionuclide Inventories: HDW Model Rev. 3*, LA-UR-96-858, Rev. 0, Los Alamos National Laboratory, Los Alamos, New Mexico.

Agnew, S. F., P. Baca, R. Corbin, T. Duran, and K. Jurgensen, 1995, *Waste Status and Transaction Record Summary for the Northeast Quadrant*, WHC-SD-WM-TI-614, Rev. 2, Westinghouse Hanford Company, Richland, Washington.

Alstad, A. T., 1993, *Riser Configuration Document for Single-Shell Waste Tanks*, WHC-SD-RE-TI-053, Rev. 9, Westinghouse Hanford Company, Richland, Washington.

Bergmann, L. M., 1991, *Single-Shell Tank Isolation Safety Analysis Report*, WHC-SD-WM-SAR-006, Rev. 2, Westinghouse Hanford Company, Richland, Washington.

Bratzel, D. R., 1980, *Evaluation of Waste Storage Tank Physical and Chemical Characterization Data*, (Internal letter 65453-80-265 to F. M. Jungfleisch, September 18), Rockwell Hanford Operations, Richland, Washington.

Brevick, C. H., L. Gaddis, and E. Johnson, 1994, *Supporting Document for the Historical Tank Content Estimate for BX Tank Farm*, WHC-SD-WM-ER-311, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

Conner, J. M., 1995, *Tank 241-BX-112 Auger Sampling and Analysis Plan*, WHC-SD-WM-TSAP-051, Rev. 0A, Westinghouse Hanford Company, Richland, Washington.

Conner, J. M., 1996a, *45-Day Safety Screening Results for Tank 241-BX-112, Push-Mode Core Samples 118 and 119*, WHC-SD-WM-DP-170, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

Conner, J. M., 1996b, *Final Report for Tank 241-BX-112, Auger Samples 95-AUG-047 and 95-AUG-048*, WHC-SD-WM-DP-157, Rev. 1, Westinghouse Hanford Company, Richland, Washington.

Conner, J. M., 1996c, *Final Report for Tank 241-BX-112, Push Mode Cores 118 and 119*, WHC-SD-WM-DP-170, Rev. 1, Westinghouse Hanford Company, Richland, Washington.

Conner, J. M., 1996d, *Tank 241-BX-112 Push Mode Core Sampling and Analysis Plan*, WHC-SD-WM-TSAP-063, Rev. 2, Westinghouse Hanford Company, Richland, Washington.

DeLorenzo, D. S., A. T. DiCenso, D. B. Hiller, K. W. Johnson, J. H. Rutherford, D. J. Smith, and B. C. Simpson, 1994, *Tank Characterization Reference Guide*, WHC-SD-WM-TI-648, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

Dukelow, G. T., J. W. Hunt, H. Babad, and J. E. Meacham, 1995, *Tank Safety Screening Data Quality Objective*, WHC-SD-WM-SP-004, Rev. 2, Westinghouse Hanford Company, Richland, Washington.

Ecology, EPA, and DOE, 1996, *Hanford Federal Facility Agreement and Consent Order*, as amended, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington.

Hanlon, B. M., 1996, *Waste Tank Summary Report for Month Ending May 31, 1996*, WHC-EP-0182-99, Westinghouse Hanford Company, Richland, Washington.

Horton, J. E., 1979, *Chemical and Physical Characterization of Core Segments from Tank 112-BX*, (Internal letter 65120-79-122J to D. J. Flesher, August 15), Rockwell Hanford Operations, Richland, Washington.

Kummerer, M., 1994, *Topical Report on Heat Removal Characteristics of Waste Storage Tanks*, WHC-SD-WM-SARR-010, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

NFPA, 1995, *National Fire Codes*, Vol. 10, Section 115, "Laser Fire Protection", National Fire Protection Association, Quincy, Massachusetts.

Nuclear Regulatory Commission, 1988, *Statistical Methods for Nuclear Materials Management*, NUREG-CR-4604, PNL-5849, (C. A. Bennett and W. M. Bowen eds.), U.S. Government Printing Office, Washington, D.C.

Simpson, B. C., and D. McCain, 1995, *Historical Model Evaluation Data Requirements*, WHC-SD-WM-DQO-018, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

Tran, T. T., 1993, *Thermocouple Status Single Shell & Double Shell Waste Tanks*, WHC-SD-WM-TI-553, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

Vitro Engineering Corporation, 1988, *Piping Waste Tank Isolation 241-BX-112*, Drawing H-2-73320, Rev. 3, Vitro Engineering Corporation, Richland, Washington.

Weiss, R. L., 1996, *Analysis of Supernate Sample from 241-BX-112 Sample Number R6042*, WHC-SD-WM-ANAL-051, Westinghouse Hanford Company, Richland, Washington.

Winkelman, W. D., 1996, *Technical Basis and Spreadsheet Documentation for Correcting Waste Tank Core Samples for Water Intrusion Based on an LiBr Tracer*, WHC-SD-WM-CSWD-081, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

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APPENDIX A

ANALYTICAL RESULTS FROM 1995 AUGER AND CORE SAMPLING

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A.0 ANALYTICAL RESULTS FROM 1995 AUGER AND CORE SAMPLING

A.1 INTRODUCTION

Appendix A reports the chemical, radiochemical and physical characteristics of tank 241-BX-112 in table form and in terms of the specific concentrations of metals, ions, radionuclides, and physical properties.

Each data table lists the following: laboratory sample identification, sample origin (core/segment/subsegment), an original and duplicate result for each sample, a sample mean, a mean result for the tank, an RSD (mean), and a projected tank inventory for the particular analyte using the weighted mean and the appropriate conversion factors. Projected tank inventory is not applicable to DSC or density data. The data are listed in standard notation for values greater than 0.001 and less than 100,000. Values outside these limits are listed in scientific notation.

The tables are numbered A-1 through A-66. A description of the units and symbols used in the analyte tables and the references used in compiling the analytical data (Conner 1996c) are found in the List of Terms and Section 7.0, respectively. For a description of the sampling event and information on sampling rationale and locations, see Section 3.0.

A.2 ANALYTE TABLE DESCRIPTION

The "Sample Number" column lists the laboratory sample for which the analyte was measured.

The "Core:Segment" column specifies the core and segment from which each sample was derived.

The "Subsegment" column specifies the segment portion (subsegment) from which the sample was taken. This can be the entire segment (whole), the drainable liquid portion (DL), upper or lower half segment portions, or quarter segment portions (A refers to top quarter, B refers to second quarter).

The "Result" and "Duplicate" columns are self-explanatory. The "Sample Mean" column lists the average of the result and duplicate values. If the result and duplicate values were both detected, or one of the two values is detected and the other non-detected, then the mean is expressed as a detected value. If the result and duplicate values were both nondetected, then the mean is expressed as a nondetected. The result and duplicate values, as well as the result/duplicate means, are reported in the tables exactly as found in the original laboratory data package. The means may appear to have been rounded up in some cases and rounded down in others. This is because the analytical results given in the tables may have fewer significant figures than originally reported, not because the means were incorrectly calculated.

The overall (or analyte concentration) means for the waste in tank 241-BX-112 were calculated as follows:

The individual sample result and duplicate pairs were first averaged to obtain a sample mean. Sample means from the same segment were then averaged to obtain a segment mean, the segment means within a given core were averaged to obtain a core mean, and finally the core means were averaged to obtain the overall mean. In the case of total alpha, density, and percent water, the core segment 1 mean was averaged with the auger mean. Then overall means were averaged as described above. As a note, not all of these steps were necessary for each analyte or for each subsegment, but the procedure to be followed is the same. All values, including those below the detection level (indicated by the less-than symbol, "<"), were utilized in calculating the overall means. If 50 percent or more of all the individual sample and duplicate results were detected, then the overall mean was expressed as a detected value. If less than 50 percent of all the individual results were detected, then the overall mean was expressed as a nondetected value. The incorporation of nondetected results provides the most conservative concentration estimates. Since the use of nondetected data in the mean and inventory estimates causes a high bias in those estimates, those particular results should be used with caution.

The RSD (mean) was computed for applicable analytes using standard ANOVA statistical techniques. Relative standard deviations (of the mean) were calculated for all analytes with "detected" means, including those analytes which contained some nondetected results. Using nondetected results in the mean calculations also required their use in the RSD (mean) calculations. Whereas the use of nondetected results in mean calculations produces a known high bias, using these values in statistical calculations creates an unknown bias. Thus, the RSD (mean) estimates and the ANOVA values in which nondetected results were used should be interpreted with caution.

The "Projected Inventory" is the product of the overall analyte concentration mean, the volume of tank waste (621 kL [164 kgal] for the solids and 4 kL [1 kgal] for the liquids), the density, where applicable (1.31 g/mL for the solids), and the appropriate conversion factors.

The four quality control parameters assessed on the tank 241-BX-112 samples were standard recoveries, spike recoveries, duplicate analyses (RPDs), and blanks. These were summarized in Section 5.1.2. More specific information is provided in the following appendix tables. Sample and duplicate pairs in which any of the QC parameters were outside their specified limits are superscripted in the "Sample Mean" column as follows:

QC:a -- indicates that the standard recovery was below the QC range.
QC:b -- indicates that the standard recovery was above the QC range.
QC:c -- indicates that the spike recovery was below the QC range.
QC:d -- indicates that the spike recovery was above the QC range.
QC:e -- indicates that the RPD was greater than the QC limit range.
QC:f -- indicates blank contamination.

Table A-1. Tank 241-BX-112 Analytical Results: Aluminum. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: fusion digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-03366	118: 1	Upper ½	14,584	15,788	15,186	13,600	7.1	11,100
96-03365		Lower ½	15,313	14,646	14,979			
96-02606	118: 1A	Upper ½	16,087	15,952	16,020			
96-02605		Lower ½	11,261	11,379	11,320			
96-02608	118: 2	Upper ½	10,814	10,955	10,885			
96-02849		Lower ½	13,170	13,608	13,389			
96-02607		Lower ½	12,745	12,628	12,686			
96-02609	118: 3	Whole	12,541	12,479	12,510			
96-02612	119: 1	Upper ½	21,424	22,497	21,961			
96-02611		Lower ½	15,376	14,573	14,974			
96-02614	119: 2	Upper ½	14,157	14,908	14,532			
96-02613		Lower ½	11,599	11,627	11,613			
96-02616	119: 3	Upper ½	9,661	10,167	9,914			
96-02851		Lower ½	10,975	11,675	11,325			
96-02615		Lower ½	11,150	10,569	10,859			
Solids: water digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-02608	118: 2	Upper ½	604	675	640	423	60.4	344
96-02607		Lower ½	730	706	718			
96-02614	119: 2	Upper ½	292	239	266			
96-02613		Lower ½	58	81	69[QC:e]			

Table A-1. Tank 241-BX-112 Analytical Results: Aluminum. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solid composites: fusion			µg/g	µg/g	µg/g	µg/g	%	kg
96-02617	118	N/A	13,428	13,984	13,706	15,000	8.6	12,200
96-02618	119	N/A	16,844	15,700	16,272			
Solid composites: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02617	118	N/A	519	419	469[QC:e]	273	71.5	222
96-02618	119	N/A	66.6	89.1	77.8[QC:e]			
Drainable liquids			µg/mL	µg/mL	µg/mL	µg/mL	%	kg
96-02848	118: 1A	DL	51.8	51.6	51.7	47.8	8.2	0.191
96-02850	118: 3	DL	43.5	44.2	43.9			

Table A-2. Tank 241-BX-112 Analytical Results: Antimony.

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02608	118: 2	Upper ½	< 9.5	< 9.4	< 9.45	< 9.29	N/A	< 7.56
96-02607		Lower ½	< 9.2	< 8.8	< 9.0			
96-02614	119: 2	Upper ½	< 9.7	< 9.3	< 9.5			
96-02613		Lower ½	< 9.1	< 9.3	< 9.2			

Table A-3. Tank 241-BX-112 Analytical Results: Arsenic. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: fusion digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-03366	118: 1	Upper ½	< 160	< 160	< 160	< 264	N/A	< 215
96-03365		Lower ½	< 190	< 190	< 190			
96-02606	118: 1A	Upper ½	< 360	< 270	< 315			
96-02605		Lower ½	< 320	< 230	< 275			
96-02608	118: 2	Upper ½	< 300	< 270	< 285			
96-02849		Lower ½	< 260	< 250	< 255			
96-02607		Lower ½	< 240	< 250	< 245			
96-02609	118: 3	Whole	< 350	< 250	< 300			
96-02612	119: 1	Upper ½	< 260	< 260	< 260			
96-02611		Lower ½	< 220	< 230	< 225			
96-02614	119: 2	Upper ½	< 330	< 280	< 305			
96-02613		Lower ½	< 260	< 280	< 270			
96-02616	119: 3	Upper ½	< 290	< 300	< 295			
96-02851		Lower ½	< 230	< 250	< 240			
96-02615		Lower ½	< 260	< 250	< 255			
Solids: water digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-02608	118: 2	Upper ½	< 7.6	< 7.5	< 7.55	< 7.43	N/A	< 6.04
96-02607		Lower ½	< 7.3	< 7.1	< 7.2			
96-02614	119: 2	Upper ½	< 7.8	< 7.4	< 7.6			
96-02613		Lower ½	< 7.3	< 7.4	< 7.35			

Table A-3. Tank 241-BX-112 Analytical Results: Arsenic. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solid composites: fusion digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02617	118	N/A	< 190	< 170	< 180	< 175	N/A	< 142
96-02618	119	N/A	< 190	< 150	< 170			
Solid composites: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02617	118	N/A	< 7	< 6.9	< 6.95	< 7.03	N/A	< 5.71
96-02618	119	N/A	< 7.2	< 7	< 7.1			
Drainable liquids			µg/mL	µg/mL	µg/mL	µg/mL	%	kg
96-02848	118: 1A	DL	< 2.1	2.1	< 2.1	< 3.00	N/A	< 0.0120
96-02850	118: 3	DL	< 3.9	< 3.9	< 3.9			

Table A-4. Tank 241-BX-112 Analytical Results: Barium. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: fusion digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-03366	118: 1	Upper ½	< 20	26	< 23	< 31.3	N/A	< 25.5
96-03365		Lower ½	< 24	< 24	< 24			
96-02606	118: 1A	Upper ½	< 36	< 27	< 31.5			
96-02605		Lower ½	< 40	< 29	< 34.5			
96-02608	118: 2	Upper ½	< 30	< 27	< 28.5			
96-02849		Lower ½	< 32	< 31	< 31.5			
96-02607		Lower ½	< 30	< 32	< 31			
96-02609	118: 3	Whole	< 44	< 31	< 37.5			
96-02612	119: 1	Upper ½	31	27	29			
96-02611		Lower ½	< 27	< 29	< 28			
96-02614	119: 2	Upper ½	< 33	< 28	< 30.5			
96-02613		Lower ½	< 32	< 36	< 34			
96-02616	119: 3	Upper ½	< 29	< 30	< 29.5			
96-02851		Lower ½	< 29	< 31	< 30			
96-02615		Lower ½	< 33	< 31	< 32			
Solids: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02608	118: 2	Upper ½	< 0.9	< 0.9	< 0.9	< 0.913	N/A	< 0.743
96-02607		Lower ½	< 0.9	< 0.9	< 0.9			
96-02614	119: 2	Upper ½	< 1	< 0.9	< 0.95			
96-02613		Lower ½	< 0.9	< 0.9	< 0.9			

Table A-4. Tank 241-BX-112 Analytical Results: Barium. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solid composites: fusion digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02617	118	N/A	< 24	< 21	< 22.5	< 22.0	N/A	< 17.9
96-02618	119	N/A	< 24	19	21.5			
Solid composites: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02617	118	N/A	< 0.9	< 0.9	< 0.9	< 0.900	N/A	< 0.732
96-02618	119	N/A	< 0.9	< 0.9	< 0.9			
Drainable liquids			µg/mL	µg/mL	µg/mL	µg/mL	%	kg
96-02848	118: 1A	DL	< 0.3	< 0.3	< 0.3	< 0.400	N/A	< 0.00160
96-02850	118: 3	DL	< 0.5	< 0.5	< 0.5			

Table A-5. Tank 241-BX-112 Analytical Results: Beryllium. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: fusion digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-03366	118: 1	Upper ½	< 10	< 10	< 10	< 15.6	N/A	< 12.7
96-03365		Lower ½	< 12	< 12	< 12			
96-02606	118: 1A	Upper ½	< 18	< 14	< 16			
96-02605		Lower ½	< 20	< 15	< 17.5			
96-02608	118: 2	Upper ½	< 15	< 14	< 14.5			
96-02849		Lower ½	< 16	< 15	< 15.5			
96-02607		Lower ½	< 15	< 16	< 15.5			
96-02609	118: 3	Whole	< 22	< 16	< 19			
96-02612	119: 1	Upper ½	< 13	< 13	< 13			
96-02611		Lower ½	< 14	< 14	< 14			
96-02614	119: 2	Upper ½	< 17	< 14	< 15.5			
96-02613		Lower ½	< 16	< 18	< 17			
96-02616	119: 3	Upper ½	< 14	< 15	< 14.5			
96-02851		Lower ½	< 15	< 16	< 15.5			
96-02615		Lower ½	< 17	< 16	< 16.5			
Solids: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02608	118: 2	Upper ½	< 0.5	< 0.5	< 0.5	< 0.488	N/A	< 0.397
96-02607		Lower ½	< 0.5	< 0.4	< 0.45			
96-02614	119: 2	Upper ½	< 0.5	< 0.5	< 0.5			
96-02613		Lower ½	< 0.5	< 0.5	< 0.5			

Table A-5. Tank 241-BX-112 Analytical Results: Beryllium. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solid composites: fusion digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-02617	118	N/A	< 12	< 10	< 11	< 11.0	N/A	< 8.95
96-02618	119	N/A	< 12	< 10	< 11			
Solid composites: water digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-02617	118	N/A	< 0.4	< 0.4	< 0.4	< 0.400	N/A	< 0.325
96-02618	119	N/A	< 0.4	< 0.4	< 0.4			
Drainable liquids			μg/mL	μg/mL	μg/mL	μg/mL	%	kg
96-02848	118: 1A	DL	< 0.1	< 0.1	< 0.1	< 0.150	N/A	< 0.000600
96-02850	118: 3	DL	< 0.2	< 0.2	< 0.2			

Table A-6. Tank 241-BX-112 Analytical Results: Bismuth. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: fusion digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-03366	118: 1	Upper ½	17,575	18,858	18,217	17,500	5.1	14,200
96-03365		Lower ½	17,448	16,877	17,162			
96-02606	118: 1A	Upper ½	14,509	14,369	14,439			
96-02605		Lower ½	14,085	13,993	14,039			
96-02608	118: 2	Upper ½	15,599	15,461	15,530			
96-02849		Lower ½	15,506	15,525	15,515			
96-02607		Lower ½	16,220	15,386	15,803			
96-02609	118: 3	Whole	21,488	21,213	21,351			
96-02612	119: 1	Upper ½	19,292	19,538	19,415			
96-02611		Lower ½	18,907	18,581	18,744			
96-02614	119: 2	Upper ½	16,760	17,691	17,226			
96-02613		Lower ½	17,021	16,836	16,929			
96-02616	119: 3	Upper ½	16,800	17,440	17,120			
96-02851		Lower ½	15,258	15,388	15,323			
96-02615		Lower ½	16,268	15,602	15,935			
Solids: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02608	118: 2	Upper ½	29	49	39[QC:e]	24.9	62.5	20.3
96-02607		Lower ½	60	24	42[QC:e]			
96-02614	119: 2	Upper ½	< 9.7	< 9.3	< 9.5			
96-02613		Lower ½	< 9.1	< 9.3	< 9.2			

Table A-6. Tank 241-BX-112 Analytical Results: Bismuth. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solid composites: fusion digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-02617	118	N/A	17,781	17,950	17,866	18,600	3.8	15,100
96-02618	119	N/A	19,852	18,692	19,272			
Solid composites: water digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-02617	118	N/A	129.5	56	92.7[QC:e]	70.9	30.9	57.7
96-02618	119	N/A	37	61	49[QC:e]			
Drainable liquids			μg/mL	μg/mL	μg/mL	μg/mL	%	kg
96-02848	118: 1A	DL	126.2	125.2	125.7	146	26.4	0.584
96-02850	118: 3	DL	255.6	75.8	165.7			

Table A-7. Tank 241-BX-112 Analytical Results: Boron. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: fusion digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-03366	118: 1	Upper ½	< 99	< 99	< 99	<198	N/A	159
96-03365		Lower ½	< 120	< 120	< 120			
96-02606	118: 1A	Upper ½	< 180	544	362			
96-02605		Lower ½	< 200	< 150	< 175			
96-02608	118: 2	Upper ½	< 150	< 140	< 145			
96-02849		Lower ½	< 160	591	375.5			
96-02607		Lower ½	< 150	< 160	< 155			
96-02609	118: 3	Whole	< 220	< 160	< 190			
96-02612	119: 1	Upper ½	< 130	601	365.5			
96-02611		Lower ½	< 140	< 140	< 140			
96-02614	119: 2	Upper ½	< 170	< 140	< 155			
96-02613		Lower ½	< 160	< 180	< 170			
96-02616	119: 3	Upper ½	< 140	< 150	< 145			
96-02851		Lower ½	199	176	187.5			
96-02615		Lower ½	< 170	< 160	< 165			
Solids: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02608	118: 2	Upper ½	6.0	7.0	6.5	6.13	6.1	4.99
96-02607		Lower ½	6.0	7.0	6.5			
96-02614	119: 2	Upper ½	6.0	6.0	6.0			
96-02613		Lower ½	5.0	6.0	5.5			

Table A-7. Tank 241-BX-112 Analytical Results: Boron. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solid composites: fusion digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-02617	118	N/A	< 120	< 100	< 110	< 109	N/A	< 88.7
96-02618	119	N/A	< 120	< 96	< 108			
Solid composites: water digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-02617	118	N/A	8.0	11.0	9.5[QC:e]	9.00	10.1	7.32
96-02618	119	N/A	10.0	7.0	8.5[QC:e]			
Drainable liquids			μg/mL	μg/mL	μg/mL	μg/mL	%	kg
96-02848	118: 1A	DL	11.8	11.6	11.7	13.0	10.2	0.0521
96-02850	118: 3	DL	14.2	14.5	14.35			

Table A-8. Tank 241-BX-112 Analytical Results: Cadmium. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: fusion digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-03366	118: 1	Upper ½	< 30	< 30	< 30	< 59.5	N/A	< 48.4
96-03365		Lower ½	< 35	< 35	< 35			
96-02606	118: 1A	Upper ½	< 110	< 82	< 96			
96-02605		Lower ½	< 59	< 44	< 51.5			
96-02608	118: 2	Upper ½	< 91	< 82	< 86.5			
96-02849		Lower ½	< 49	< 46	< 47.5			
96-02607		Lower ½	< 44	< 48	< 46			
96-02609	118: 3	Whole	< 66	< 47	< 56.5			
96-02612	119: 1	Upper ½	< 79	82	< 80.5			
96-02611		Lower ½	< 41	< 43	< 42			
96-02614	119: 2	Upper ½	< 100	< 85	< 92.5			
96-02613		Lower ½	< 49	< 53	< 51			
96-02616	119: 3	Upper ½	< 86	< 91	< 88.5			
96-02851		Lower ½	< 44	< 47	< 45.5			
96-02615		Lower ½	< 50	< 47	< 48.5			
Solids: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02608	118: 2	Upper ½	< 1.4	< 1.4	< 1.4	< 1.40	N/A	< 1.14
96-02607		Lower ½	< 1.4	< 1.3	< 1.35			
96-02614	119: 2	Upper ½	< 1.5	< 1.4	< 1.45			
96-02613		Lower ½	< 1.4	< 1.4	< 1.4			

Table A-8. Tank 241-BX-112 Analytical Results: Cadmium. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solid composites: fusion digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-02617	118	N/A	< 35	< 31	< 33	< 32.5	N/A	< 26.4
96-02618	119	N/A	< 35	< 29	< 32			
Solid composites: water digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-02617	118	N/A	< 1.3	< 1.3	< 1.3	< 1.30	N/A	< 1.06
96-02618	119	N/A	< 1.3	< 1.3	< 1.3			
Drainable liquids			μg/mL	μg/mL	μg/mL	μg/mL	%	kg
96-02848	118: 1A	DL	< 0.4	0.4	0.4	< 0.550	N/A	< 0.00220
96-02850	118: 3	DL	< 0.7	< 0.7	< 0.7			

Table A-9. Tank 241-BX-112 Analytical Results: Calcium. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: fusion digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-03366	118: 1	Upper ½	1,001	1,063	1,032	2,510	24.3	2,040
96-03365		Lower ½	1,233	1,030	1,132			
96-02606	118: 1A	Upper ½	1,852	1,534	1,693			
96-02605		Lower ½	2,026	2,934	2,480[QC:f]			
96-02608	118: 2	Upper ½	1,639	1,467	1,553			
96-02849		Lower ½	< 810	< 770	< 790			
96-02607		Lower ½	1,378	6,763	4,071[QC:e]			
96-02609	118: 3	Whole	1,345	1,745	1,545[QC:e]			
96-02612	119: 1	Upper ½	1,573	1,614	1,594			
96-02611		Lower ½	2,520	2,730	2,625			
96-02614	119: 2	Upper ½	1,691	1,481	1,586			
96-02613		Lower ½	9,724	3,338	6,531[QC:e]			
96-02616	119: 3	Upper ½	1,549	1,819	1,684			
96-02851		Lower ½	< 730	< 780	< 755			
96-02615		Lower ½	4,103	5,979	5,041[QC:e]			
Solids: water digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-02608	118: 2	Upper ½	95	103	99	81.0	16.9	65.9
96-02607		Lower ½	49	38	43.5[QC:e]			
96-02614	119: 2	Upper ½	76	80	78			
96-02613		Lower ½	115	92	103.5[QC:e]			

Table A-9. Tank 241-BX-112 Analytical Results: Calcium. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solid composites: fusion digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-02617	118	N/A	1,088	1,102	1,095	1,140	4.1	927
96-02618	119	N/A	1,278	1,089	1,183.5			
Solid composites: water digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-02617	118	N/A	141	103	122[QC:f]	128	6.7	104
96-02618	119	N/A	134	135	134.5			
Drainable liquids			μg/mL	μg/mL	μg/mL	μg/mL	%	kg
96-02848	118: 1A	DL	< 6.5	< 6.5	< 6.5	< 9.25	N/A	< 0.0370
96-02850	118: 3	DL	< 12	< 12	< 12			

Table A-10. Tank 241-BX-112 Analytical Results: Cerium. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: fusion digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-03366	118: 1	Upper ½	< 200	< 200	< 200	< 332	N/A	< 270
96-03365		Lower ½	< 240	< 240	< 240			
96-02606	118: 1A	Upper ½	< 450	< 340	< 395			
96-02605		Lower ½	< 400	< 290	< 345			
96-02608	118: 2	Upper ½	< 380	< 340	< 360			
96-02849		Lower ½	< 320	< 310	< 315			
96-02607		Lower ½	< 300	< 320	< 310			
96-02609	118: 3	Whole	< 440	< 310	< 375			
96-02612	119: 1	Upper ½	< 330	< 330	< 330			
96-02611		Lower ½	< 270	300	< 285			
96-02614	119: 2	Upper ½	< 420	< 350	< 385			
96-02613		Lower ½	333	< 360	346.5			
96-02616	119: 3	Upper ½	< 360	< 380	< 370			
96-02851		Lower ½	< 290	< 310	< 300			
96-02615		Lower ½	< 330	< 310	< 320			
Solids: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02608	118: 2	Upper ½	< 9.5	< 9.4	< 9.45	< 9.29	N/A	< 7.56
96-02607		Lower ½	< 9.2	< 8.8	< 9			
96-02614	119: 2	Upper ½	< 9.7	< 9.3	< 9.5			
96-02613		Lower ½	< 9.1	< 9.3	< 9.2			

Table A-10. Tank 241-BX-112 Analytical Results: Cerium. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solid composites: fusion digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02617	118	N/A	< 240	< 210	< 225	< 220	N/A	< 179
96-02618	119	N/A	< 240	< 190	< 215			
Solid composites: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02617	118	N/A	< 8.7	< 8.6	< 8.65	< 8.75	N/A	< 7.12
96-02618	119	N/A	< 9	< 8.7	< 8.85			
Drainable liquids			µg/mL	µg/mL	µg/mL	µg/mL	%	kg
96-02848	118: 1A	DL	< 2.6	< 2.6	< 2.6	< 3.70	N/A	< 0.0148
96-02850	118: 3	DL	< 4.8	< 4.8	< 4.8			

Table A-11. Tank 241-BX-112 Analytical Results: Chromium. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: fusion digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-03366	118: 1	Upper ½	923	895	909	1,290	5.1	1,050
96-03365		Lower ½	1,373	1,325	1,349			
96-02606	118: 1A	Upper ½	868	870	869			
96-02605		Lower ½	1,216	1,186	1,201			
96-02608	118: 2	Upper ½	1,287	1,268	1,277			
96-02849		Lower ½	1,240	1,236	1,238			
96-02607		Lower ½	1,361	1,326	1,343			
96-02609	118: 3	Whole	1,762	1,750	1,756			
96-02612	119: 1	Upper ½	995	1,010	1,003			
96-02611		Lower ½	1,280	1,214	1,247			
96-02614	119: 2	Upper ½	1,149	1,200	1,174			
96-02613		Lower ½	1,214	1,197	1,206			
96-02616	119: 3	Upper ½	1,253	1,273	1,263			
96-02851		Lower ½	1,253	1,255	1,254			
96-02615		Lower ½	1,320	1,265	1,293			
Solids: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02608	118: 2	Upper ½	274	281	278	254	9.5	205
96-02607		Lower ½	279	279	279			
96-02614	119: 2	Upper ½	225	225	225			
96-02613		Lower ½	234	236	235			

Table A-11. Tank 241-BX-112 Analytical Results: Chromium. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solid composites: fusion digest			**μg/g**	**μg/g**	**μg/g**	**μg/g**	**%**	**kg**
96-02617	118	N/A	1,318	1,335	1,327	1,310	1.2	1,070
96-02618	119	N/A	1,282	1,308	1,295			
Solid composites: water digest			**μg/g**	**μg/g**	**μg/g**	**μg/g**	**%**	**kg**
96-02617	118	N/A	276	271	274	248	10.6	202
96-02618	119	N/A	223	220	221			
Drainable liquids			**μg/mL**	**μg/mL**	**μg/mL**	**μg/mL**	**%**	**kg**
96-02848	118: 1A	DL	291	287	289	355	18.7	1.42
96-02850	118: 3	DL	421	422	421			

Table A-12. Tank 241-BX-112 Analytical Results: Cobalt. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: fusion digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-03366	118: 1	Upper ½	< 99	< 99	< 99	< 156	N/A	< 127
96-03365		Lower ½	< 120	< 120	< 120			
96-02606	118: 1A	Upper ½	< 180	< 140	< 160			
96-02605		Lower ½	< 200	< 150	< 175			
96-02608	118: 2	Upper ½	< 150	< 140	< 145			
96-02849		Lower ½	< 160	< 150	< 155			
96-02607		Lower ½	< 150	< 160	< 155			
96-02609	118: 3	Whole	< 220	< 160	< 190			
96-02612	119: 1	Upper ½	< 130	< 130	< 130			
96-02611		Lower ½	< 140	< 140	< 140			
96-02614	119: 2	Upper ½	< 170	< 140	< 155			
96-02613		Lower ½	< 160	< 180	< 170			
96-02616	119: 3	Upper ½	< 140	< 150	< 145			
96-02851		Lower ½	< 150	< 160	< 155			
96-02615		Lower ½	< 170	< 160	< 165			
Solids: water digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-02608	118: 2	Upper ½	< 4.7	< 4.7	< 4.7	< 4.65	N/A	< 3.78
96-02607		Lower ½	< 4.6	< 4.4	< 4.5			
96-02614	119: 2	Upper ½	< 4.9	< 4.7	< 4.8			
96-02613		Lower ½	< 4.6	< 4.6	< 4.6			

Table A-12. Tank 241-BX-112 Analytical Results: Cobalt. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solid composites: fusion digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02617	118	N/A	< 120	< 100	< 110	< 109	N/A	< 88.7
96-02618	119	N/A	< 120	< 96	< 108			
Solid composites: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02617	118	N/A	< 4.4	< 4.3	< 4.35	< 4.38	N/A	< 3.56
96-02618	119	N/A	< 4.5	< 4.3	< 4.4			
Drainable liquids			µg/mL	µg/mL	µg/mL	µg/mL	%	kg
96-02848	118: 1A	DL	< 1.3	< 1.3	< 1.3	< 1.85	N/A	< 0.0074
96-02850	118: 3	DL	< 2.4	< 2.4	< 2.4			

Table A-13. Tank 241-BX-112 Analytical Results: Copper. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: fusion digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-03366	118: 1	Upper ½	< 99	< 99	< 99	< 156	N/A	< 127
96-03365		Lower ½	< 120	< 120	< 120			
96-02606	118: 1A	Upper ½	< 180	< 140	< 160			
96-02605		Lower ½	< 200	< 150	< 175			
96-02608	118: 2	Upper ½	< 150	< 140	< 145			
96-02849		Lower ½	< 160	< 150	< 155			
96-02607		Lower ½	< 150	< 160	< 155			
96-02609	118: 3	Whole	< 220	< 160	< 190			
96-02612	119: 1	Upper ½	< 130	< 130	< 130			
96-02611		Lower ½	< 140	< 140	< 140			
96-02614	119: 2	Upper ½	< 170	< 140	< 155			
96-02613		Lower ½	< 160	< 180	< 170			
96-02616	119: 3	Upper ½	< 140	< 150	< 145			
96-02851		Lower ½	< 150	< 160	< 155			
96-02615		Lower ½	< 170	< 160	< 165			
Solids: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02608	118: 2	Upper ½	< 4.7	< 4.7	< 4.7	< 4.65	N/A	< 3.78
96-02607		Lower ½	< 4.6	< 4.4	< 4.5			
96-02614	119: 2	Upper ½	< 4.9	< 4.7	< 4.8			
96-02613		Lower ½	< 4.6	< 4.6	< 4.6			

Table A-13. Tank 241-BX-112 Analytical Results: Copper. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solid composites: fusion digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-02617	118	N/A	< 120	< 100	< 110	< 109	N/A	< 88.7
96-02618	119	N/A	< 120	< 96	< 108			
Solid composites: water digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-02617	118	N/A	< 4.4	< 4.3	< 4.35	< 4.38	N/A	< 3.56
96-02618	119	N/A	< 4.5	< 4.3	< 4.4			
Drainable liquids			μg/mL	μg/mL	μg/mL	μg/mL	%	kg
96-02848	118: 1A	DL	< 1.3	< 1.3	< 1.3	< 1.85	N/A	< 0.00740
96-02850	118: 3	DL	< 2.4	< 2.4	< 2.4			

Table A-14. Tank 241-BX-112 Analytical Results: Dysprosium. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: fusion digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-03366	118: 1	Upper ½	< 99	< 99	< 99	< 156	N/A	< 127
96-03365		Lower ½	< 120	< 120	< 120			
96-02606	118: 1A	Upper ½	< 180	< 140	< 160			
96-02605		Lower ½	< 200	< 150	< 175			
96-02608	118: 2	Upper ½	< 150	< 140	< 145			
96-02849		Lower ½	< 160	< 150	< 155			
96-02607		Lower ½	< 150	< 160	< 155			
96-02609	118: 3	Whole	< 220	< 160	< 190			
96-02612	119: 1	Upper ½	< 130	< 130	< 130			
96-02611		Lower ½	< 140	< 140	< 140			
96-02614	119: 2	Upper ½	< 170	< 140	< 155			
96-02613		Lower ½	< 160	< 180	< 170			
96-02616	119: 3	Upper ½	< 140	< 150	< 145			
96-02851		Lower ½	< 150	< 160	< 155			
96-02615		Lower ½	< 170	< 160	< 165			
Solids: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02608	118: 2	Upper ½	< 4.7	< 4.7	< 4.7	< 4.65	N/A	< 3.78
96-02607		Lower ½	< 4.6	< 4.4	< 4.5			
96-02614	119: 2	Upper ½	< 4.9	< 4.7	< 4.8			
96-02613		Lower ½	< 4.6	< 4.6	< 4.6			

Table A-14. Tank 241-BX-112 Analytical Results: Dysprosium. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solid composites: fusion digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-02617	118	N/A	< 120	< 100	< 110	< 109	N/A	< 88.7
96-02618	119	N/A	< 120	< 96	< 108			
Solid composites: water digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-02617	118	N/A	< 4.4	< 4.3	< 4.35	< 4.38	N/A	< 3.56
96-02618	119	N/A	< 4.5	< 4.3	< 4.4			
Drainable liquids			μg/mL	μg/mL	μg/mL	μg/mL	%	kg
96-02848	118: 1A	DL	< 1.3	< 1.3	< 1.3	< 1.85	N/A	< 0.00740
96-02850	118: 3	DL	< 2.4	< 2.4	< 2.4			

Table A-15. Tank 241-BX-112 Analytical Results: Europium. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: fusion digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-03366	118: 1	Upper ½	< 200	< 200	< 200	< 309	N/A	< 251
96-03365		Lower ½	< 240	< 240	< 240			
96-02606	118: 1A	Upper ½	< 360	< 270	< 315			
96-02605		Lower ½	< 400	< 290	< 345			
96-02608	118: 2	Upper ½	< 300	< 270	< 285			
96-02849		Lower ½	< 320	< 310	< 315			
96-02607		Lower ½	< 300	< 320	< 310			
96-02609	118: 3	Whole	< 440	< 310	< 375			
96-02612	119: 1	Upper ½	< 260	< 260	< 260			
96-02611		Lower ½	< 270	< 290	< 280			
96-02614	119: 2	Upper ½	< 330	< 280	< 305			
96-02613		Lower ½	< 320	< 360	< 340			
96-02616	119: 3	Upper ½	< 290	< 300	< 295			
96-02851		Lower ½	< 290	< 310	< 300			
96-02615		Lower ½	< 330	< 310	< 320			
Solids: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02608	118: 2	Upper ½	< 9.5	< 9.4	< 9.45	< 9.29	N/A	< 7.56
96-02607		Lower ½	< 9.2	< 8.8	< 9			
96-02614	119: 2	Upper ½	< 9.7	< 9.3	< 9.5			
96-02613		Lower ½	< 9.1	< 9.3	< 9.2			

Table A-15. Tank 241-BX-112 Analytical Results: Europium. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solid composites: fusion digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02617	118	N/A	< 240	< 210	< 225	< 220	N/A	< 179
96-02618	119	N/A	< 240	< 190	< 215			
Solid composites: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02617	118	N/A	< 8.7	< 8.6	< 8.65	< 8.75	N/A	< 7.12
96-02618	119	N/A	< 9	< 8.7	< 8.85			
Drainable liquids			µg/mL	µg/mL	µg/mL	µg/mL	%	kg
96-02848	118: 1A	DL	< 2.6	< 2.6	< 2.6	< 3.70	N/A	< 0.0148
96-02850	118: 3	DL	< 4.8	< 4.8	< 4.8			

Table A-16. Tank 241-BX-112 Analytical Results: Iron. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: fusion digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-03366	118: 1	Upper ½	11,543	11,839	11,691	9,460	7.0	7,700
96-03365		Lower ½	8,628	8,406	8,517			
96-02606	118: 1A	Upper ½	9,315	9,233	9,274			
96-02605		Lower ½	7,411	7,044	7,227			
96-02608	118: 2	Upper ½	7,508	7,459	7,484			
96-02849		Lower ½	6,711	6,766	6,738			
96-02607		Lower ½	7,351	7,538	7,444			
96-02609	118: 3	Whole	10,079	10,394	10,236			
96-02612	119: 1	Upper ½	13,999	15,269	14,634			
96-02611		Lower ½	10,584	9,772	10,178			
96-02614	119: 2	Upper ½	8,284	8,988	8,636			
96-02613		Lower ½	9,822	9,043	9,432			
96-02616	119: 3	Upper ½	10,447	10,411	10,429			
96-02851		Lower ½	7,753	7,732	7,743			
96-02615		Lower ½	8,384	8,030	8,207			
Solids: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02608	118: 2	Upper ½	9	15	12[QC:e]	8.48	44.5	6.90
96-02607		Lower ½	18	7	12.5[QC:e]			
96-02614	119: 2	Upper ½	< 4.9	< 4.7	< 4.8			
96-02613		Lower ½	< 4.6	< 4.6	< 4.6			

Table A-16. Tank 241-BX-112 Analytical Results: Iron. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solid composites: fusion digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02617	118	N/A	8,955	8,969	8,962	10,300	12.8	8,380
96-02618	119	N/A	11,559	11,605	11,582			
Solid composites: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02617	118	N/A	48.8399	21	34.92[QC:e]	29.2	24.3	23.8
96-02618	119	N/A	17	30	23.5[QC:e]			
Drainable liquids			µg/mL	µg/mL	µg/mL	µg/mL	%	kg
96-02848	118: 1A	DL	24.2	23.9	24.05	49.1	51.1	0.196
96-02850	118: 3	DL	75.2	73	74.1			

Table A-17. Tank 241-BX-112 Analytical Results: Lanthanum. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: fusion digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-03366	118: 1	Upper ½	< 99	< 99	< 99	< 156	N/A	< 127
96-03365		Lower ½	< 120	< 120	< 120			
96-02606	118: 1A	Upper ½	< 180	< 140	< 160			
96-02605		Lower ½	< 200	< 150	< 175			
96-02608	118: 2	Upper ½	< 150	< 140	< 145			
96-02849		Lower ½	< 160	< 150	< 155			
96-02607		Lower ½	< 150	< 160	< 155			
96-02609	118: 3	Whole	< 220	< 160	< 190			
96-02612	119: 1	Upper ½	< 130	< 130	< 130			
96-02611		Lower ½	< 140	< 140	< 140			
96-02614	119: 2	Upper ½	< 170	< 140	< 155			
96-02613		Lower ½	< 160	< 180	< 170			
96-02616	119: 3	Upper ½	< 140	< 150	< 145			
96-02851		Lower ½	< 150	< 160	< 155			
96-02615		Lower ½	< 170	< 160	< 165			
Solids: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02608	118: 2	Upper ½	< 4.7	< 4.7	< 4.7	< 4.65	N/A	< 3.78
96-02607		Lower ½	< 4.6	< 4.4	< 4.5			
96-02614	119: 2	Upper ½	< 4.9	< 4.7	< 4.8			
96-02613		Lower ½	< 4.6	< 4.6	< 4.6			

Table A-17. Tank 241-BX-112 Analytical Results: Lanthanum. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solid composites: fusion			µg/g	µg/g	µg/g	µg/g	%	kg
96-02617	118	N/A	< 120	< 100	< 110	< 109	N/A	< 88.7
96-02618	119	N/A	< 120	< 96	< 108			
Solid composites: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02617	118	N/A	< 4.4	< 4.3	< 4.35	< 4.38	N/A	< 3.56
96-02618	119	N/A	< 4.5	< 4.3	< 4.4			
Drainable liquids			µg/mL	µg/mL	µg/mL	µg/mL	%	kg
96-02848	118: 1A	DL	< 1.3	< 1.3	< 1.3	< 1.85	N/A	< 0.0074
96-02850	118: 3	DL	< 2.4	< 2.4	< 2.4			

Table A-18. Tank 241-BX-112 Analytical Results: Lead. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: fusion digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-03366	118: 1	Upper ½	< 200	< 200	< 200	< 331	N/A	< 269
96-03365		Lower ½	< 240	< 240	< 240			
96-02606	118: 1A	Upper ½	< 450	< 340	< 395			
96-02605		Lower ½	< 400	< 290	< 345			
96-02608	118: 2	Upper ½	< 380	< 340	< 360			
96-02849		Lower ½	< 320	< 310	< 315			
96-02607		Lower ½	< 300	< 320	< 310			
96-02609	118: 3	Whole	< 440	< 310	< 375			
96-02612	119: 1	Upper ½	< 330	< 330	< 330			
96-02611		Lower ½	< 270	< 290	< 280			
96-02614	119: 2	Upper ½	< 420	< 350	< 385			
96-02613		Lower ½	< 320	< 360	< 340			
96-02616	119: 3	Upper ½	< 360	< 380	< 370			
96-02851		Lower ½	< 290	< 310	< 300			
96-02615		Lower ½	< 330	< 310	< 320			
Solids: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02608	118: 2	Upper ½	< 9.5	< 9.4	< 9.45	< 9.29	N/A	< 7.56
96-02607		Lower ½	< 9.2	< 8.8	< 9.0			
96-02614	119: 2	Upper ½	< 9.7	< 9.3	< 9.5			
96-02613		Lower ½	< 9.1	< 9.3	< 9.2			

Table A-18. Tank 241-BX-112 Analytical Results: Lead. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solid composites: fusion			μg/g	μg/g	μg/g	μg/g	%	kg
96-02617	118	N/A	< 240	< 210	< 225	< 220	N/A	< 179
96-02618	119	N/A	< 240	< 190	< 215			
Solid composites: water digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-02617	118	N/A	< 8.7	< 8.6	< 8.65	< 8.75	N/A	< 7.12
96-02618	119	N/A	< 9	< 8.7	< 8.85			
Drainable liquids			μg/mL	μg/mL	μg/mL	μg/mL	%	kg
96-02848	118: 1A	DL	4.8	4.8	4.8	4.80	N/A	0.0192
96-02850	118: 3	DL	< 4.8	< 4.8	< 4.8			

Table A-19. Tank 241-BX-112 Analytical Results: Magnesium. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: fusion digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-03366	118: 1	Upper ½	286	253	269.5	370	6.7	301
96-03365		Lower ½	318	298	308			
96-02606	118: 1A	Upper ½	446	370	408			
96-02605		Lower ½	< 400	< 290	< 345			
96-02608	118: 2	Upper ½	416	404	410			
96-02849		Lower ½	< 320	< 310	< 315			
96-02607		Lower ½	< 300	< 320	< 310			
96-02609	118: 3	Whole	< 440	< 310	< 375			
96-02612	119: 1	Upper ½	442	478	460			
96-02611		Lower ½	293	335	314			
96-02614	119: 2	Upper ½	540	408	474[QC:e]			
96-02613		Lower ½	418	381	399.5			
96-02616	119: 3	Upper ½	410	416	413			
96-02851		Lower ½	< 290	< 310	< 300			
96-02615		Lower ½	351	343	347			
Solids: water digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-02608	118: 2	Upper ½	40	41	40.5	37.9	15.5	30.8
96-02607		Lower ½	25	22	23.5			
96-02614	119: 2	Upper ½	41	44	42.5			
96-02613		Lower ½	45	45	45			

Table A-19. Tank 241-BX-112 Analytical Results: Magnesium. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solid composites: fusion digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02617	118	N/A	289	345	317	311	5.7	253
96-02618	119	N/A	337	273	305			
Solid composites: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02617	118	N/A	47	43	45	46.0	2.3	37.4
96-02618	119	N/A	48	46	47			
Drainable liquids			µg/mL	µg/mL	µg/mL	µg/mL	%	kg
96-02848	118: 1A	DL	< 2.6	< 2.6	< 2.6	< 3.70	N/A	< 0.0148
96-02850	118: 3	DL	< 4.8	< 4.8	< 4.8			

Table A-20. Tank 241-BX-112 Analytical Results: Manganese. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: fusion digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-03366	118: 1	Upper ½	185	207	196	323	7.1	263
96-03365		Lower ½	206	187	196.5			
96-02606	118: 1A	Upper ½	404	306	355[QC:f]			
96-02605		Lower ½	331	294	312.5			
96-02608	118: 2	Upper ½	246	231	238.5			
96-02849		Lower ½	< 267	< 318	< 292.5			
96-02607		Lower ½	259	379	319[QC:e]			
96-02609	118: 3	Whole	439	354	396.5[QC:e]			
96-02612	119: 1	Upper ½	293	265	279			
96-02611		Lower ½	359	365	362			
96-02614	119: 2	Upper ½	303	318	310.5			
96-02613		Lower ½	394	344	369			
96-02616	119: 3	Upper ½	308	378	343			
96-02851		Lower ½	< 218	< 272	< 245			
96-02615		Lower ½	298	401	349.5[QC:e]			
Solids: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02608	118: 2	Upper ½	< 4.7	< 4.7	< 4.7	< 4.65	N/A	< 3.78
96-02607		Lower ½	< 4.6	< 4.4	< 4.5			
96-02614	119: 2	Upper ½	< 4.9	< 4.7	< 4.8			
96-02613		Lower ½	< 4.6	< 4.6	< 4.6			

Table A-20. Tank 241-BX-112 Analytical Results: Manganese. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solid composites: fusion digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-02617	118	N/A	191	187	189	200	5.6	162
96-02618	119	N/A	233	187	210[QC:e]			
Solid composites: water digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-02617	118	N/A	< 4.4	< 4.3	< 4.35	< 4.38	N/A	< 3.56
96-02618	119	N/A	< 4.5	< 4.3	< 4.4			
Drainable liquids			μg/mL	μg/mL	μg/mL	μg/mL	%	kg
96-02848	118: 1A	DL	< 1.3	< 1.3	< 1.3	< 1.85	N/A	< 0.00740
96-02850	118: 3	DL	< 2.4	< 2.4	< 2.4			

Table A-21. Tank 241-BX-112 Analytical Results: Molybdenum. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: fusion digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-03366	118: 1	Upper ½	< 60	< 59	< 59.5	< 92.9	N/A	< 75.6
96-03365		Lower ½	< 71	< 71	< 71			
96-02606	118: 1A	Upper ½	< 110	< 82	< 96			
96-02605		Lower ½	< 120	< 88	< 104			
96-02608	118: 2	Upper ½	< 91	< 82	< 86.5			
96-02849		Lower ½	< 97	< 92	< 94.5			
96-02607		Lower ½	< 89	< 96	< 92.5			
96-02609	118: 3	Whole	< 130	< 93	< 111.5			
96-02612	119: 1	Upper ½	< 79	< 78	< 78.5			
96-02611		Lower ½	< 81	< 86	< 83.5			
96-02614	119: 2	Upper ½	< 100	< 85	< 92.5			
96-02613		Lower ½	< 97	< 110	< 103.5			
96-02616	119: 3	Upper ½	< 86	< 91	< 88.5			
96-02851		Lower ½	< 88	< 93	< 90.5			
96-02615		Lower ½	< 99	< 93	< 96			
Solids: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02608	118: 2	Upper ½	26	26	26	25.5	3.8	20.7
96-02607		Lower ½	27	27	27			
96-02614	119: 2	Upper ½	24	24	24			
96-02613		Lower ½	25	25	25			

Table A-21. Tank 241-BX-112 Analytical Results: Molybdenum. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solid composites: fusion digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02617	118	N/A	< 71	< 63	< 67	< 65.8	N/A	< 53.5
96-02618	119	N/A	< 71	< 58	< 64.5			
Solid composites: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02617	118	N/A	26	25	25.5	24.3	24.3	19.8
96-02618	119	N/A	23	23	23			
Drainable liquids			µg/mL	µg/mL	µg/mL	µg/mL	%	kg
96-02848	118: 1A	DL	25.5	25.1	25.3	32.6	22.3	0.130
96-02850	118: 3	DL	40	39.6	39.8			

Table A-22. Tank 241-BX-112 Analytical Results: Neodymium. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: fusion digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-03366	118: 1	Upper ½	< 200	< 200	< 200	< 309	N/A	< 251
96-03365		Lower ½	< 240	< 240	< 240			
96-02606	118: 1A	Upper ½	< 360	< 270	< 315			
96-02605		Lower ½	< 400	< 290	< 345			
96-02608	118: 2	Upper ½	< 300	< 270	< 285			
96-02849		Lower ½	< 320	< 310	< 315			
96-02607		Lower ½	< 300	< 320	< 310			
96-02609	118: 3	Whole	< 440	< 310	< 375			
96-02612	119: 1	Upper ½	< 260	< 260	< 260			
96-02611		Lower ½	< 270	< 290	< 280			
96-02614	119: 2	Upper ½	< 330	< 280	< 305			
96-02613		Lower ½	< 320	< 360	< 340			
96-02616	119: 3	Upper ½	< 290	< 300	< 295			
96-02851		Lower ½	< 290	< 310	< 300			
96-02615		Lower ½	< 330	< 310	< 320			
Solids: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02608	118: 2	Upper ½	< 9.5	< 9.4	< 9.45	< 9.29	N/A	< 7.56
96-02607		Lower ½	< 9.2	< 8.8	< 9.0			
96-02614	119: 2	Upper ½	< 9.7	< 9.3	< 9.5			
96-02613		Lower ½	< 9.1	< 9.3	< 9.2			

Table A-22. Tank 241-BX-112 Analytical Results: Neodymium. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solid composites: fusion digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02617	118	N/A	< 240	< 210	< 225	< 220	N/A	< 179
96-02618	119	N/A	< 240	< 190	< 215			
Solid composites: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02617	118	N/A	< 8.7	< 8.6	< 8.65	< 8.75	N/A	< 7.12
96-02618	119	N/A	< 9	< 8.7	< 8.85			
Drainable liquids			µg/mL	µg/mL	µg/mL	µg/mL	%	kg
96-02848	118: 1A	DL	< 2.6	< 2.6	< 2.6	< 3.70	N/A	< 0.0148
96-02850	118: 3	DL	< 4.8	< 4.8	< 4.8			

Table A-23. Tank 241-BX-112 Analytical Results: Nickel.

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: water digest			**μg/g**	**μg/g**	**μg/g**	**μg/g**	**%**	**kg**
96-02608	118: 2	Upper ½	< 2.8	< 2.8	< 2.8	< 2.76	N/A	< 2.25
96-02607		Lower ½	< 2.7	< 2.6	< 2.65			
96-02614	119: 2	Upper ½	< 2.9	< 2.8	< 2.85			
96-02613		Lower ½	< 2.7	< 2.8	< 2.75			
Solid composites: water digest			**μg/g**	**μg/g**	**μg/g**	**μg/g**	**%**	**kg**
96-02617	118	N/A	< 2.6	< 2.6	< 2.6	< 2.63	N/A	< 2.14
96-02618	119	N/A	< 2.7	< 2.6	< 2.65			
Drainable liquids			**μg/mL**	**μg/mL**	**μg/mL**	**μg/mL**	**%**	**kg**
96-02848	118: 1A	DL	2	1.7	1.85	1.80	8.8	0.00720
96-02850	118: 3	DL	2.1	< 1.4	1.75			

Table A-24. Tank 241-BX-112 Analytical Results: Palladium.

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02608	118: 2	Upper ½	< 28	< 28	< 28	< 27.6	N/A	< 22.5
96-02607		Lower ½	< 27	< 26	< 26.5			
96-02614	119: 2	Upper ½	< 29	< 28	< 28.5			
96-02613		Lower ½	< 27	< 28	< 27.5			

Table A-25. Tank 241-BX-112 Analytical Results: Phosphorus. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: fusion digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-03366	118: 1	Upper ½	16,096	17,115	16,606	19,300	3.1	15,700
96-03365		Lower ½	21,948	21,208	21,578			
96-02606	118: 1A	Upper ½	21,274	20,108	20,691			
96-02605		Lower ½	17,884	17,869	17,877			
96-02608	118: 2	Upper ½	17,506	17,498	17,502			
96-02849		Lower ½	20,728	20,887	20,808			
96-02607		Lower ½	21,799	21,473	21,636			
96-02609	118: 3	Whole	20,469	20,447	20,458			
96-02612	119: 1	Upper ½	20,050	21,257	20,653			
96-02611		Lower ½	20,043	18,731	19,387			
96-02614	119: 2	Upper ½	18,675	19,127	18,901			
96-02613		Lower ½	17,259	17,061	17,160			
96-02616	119: 3	Upper ½	15,621	16,083	15,852			
96-02851		Lower ½	18,330	18,505	18,418			
96-02615		Lower ½	18,413	17,765	18,089			
Solids: water digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-02608	118: 2	Upper ½	5,391	5,449	5,420	5,360	2.0	4,360
96-02607		Lower ½	5,573	5,435	5,504			
96-02614	119: 2	Upper ½	5,380.43	5,333.72	5,357.07			
96-02613		Lower ½	5,119.48	5,175.45	5,147.46			

Table A-25. Tank 241-BX-112 Analytical Results: Phosphorus. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solid composites: fusion digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02617	118	N/A	20,238	20,521	20,379	20,400	0.5	16,600
96-02618	119	N/A	20,220	20,590	20,405			
Solid composites: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02617	118	N/A	6,016	5,834	5,925	5,800	2.1	4,720
96-02618	119	N/A	5,691	5,673	5,682			
Drainable liquids			µg/mL	µg/mL	µg/mL	µg/mL	%	kg
96-02848	118: 1A	DL	5,553	5,457	5,505	5,350	3.0	21.4
96-02850	118: 3	DL	5,069	5,308	5,188			

Table A-26. Tank 241-BX-112 Analytical Results: Potassium.

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: water digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-02608	118: 2	Upper ½	482	459	470.5	406	14.8	379
96-02607		Lower ½	437	484	460.5			
96-02614		Upper ½	338	349	344			
96-02613		Lower ½	342	354	348			
Solid composites: water digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-02617	118	N/A	474	494	484	447	8.3	364
96-02618	119	N/A	406	413	409.5			
Drainable liquids			μg/mL	μg/mL	μg/mL	μg/mL	%	kg
96-02848	118: 1A	DL	629	642	635	719	11.6	2.87
96-02850	118: 3	DL	778	825	802			

Table A-27. Tank 241-BX-112 Analytical Results: Rhodium. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: fusion digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-03366	118: 1	Upper ½	< 600	< 590	< 595	< 929	N/A	< 756
96-03365		Lower ½	< 710	< 710	< 710			
96-02606	118: 1A	Upper ½	< 1,100	< 820	< 960			
96-02605		Lower ½	< 1,200	< 880	< 1,040			
96-02608	118: 2	Upper ½	< 910	< 820	< 865			
96-02849		Lower ½	< 970	< 920	< 945			
96-02607		Lower ½	< 890	< 960	< 925			
96-02609	118: 3	Whole	< 1,300	< 930	< 1,115			
96-02612	119: 1	Upper ½	< 790	< 780	< 785			
96-02611		Lower ½	< 810	< 860	< 835			
96-02614	119: 2	Upper ½	< 1,000	< 850	< 925			
96-02613		Lower ½	< 970	< 1,100	< 1,035			
96-02616	119: 3	Upper ½	< 860	< 910	< 885			
96-02851		Lower ½	< 880	< 930	< 905			
96-02615		Lower ½	< 990	< 930	< 960			
Solids: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02608	118: 2	Upper ½	< 28	< 28	< 28	< 27.6	N/A	< 22.5
96-02607		Lower ½	< 27	< 26	< 26.5			
96-02614	119: 2	Upper ½	< 29	< 28	< 28.5			
96-02613		Lower ½	< 27	< 28	< 27.5			

Table A-27. Tank 241-BX-112 Analytical Results: Rhodium. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solid composites: fusion digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02617	118	N/A	< 710	< 630	< 670	< 658	N/A	< 535
96-02618	119	N/A	< 710	< 580	< 645			
Solid composites: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02617	118	N/A	< 26	< 26	< 26	< 26.3	N/A	< 21.4
96-02618	119	N/A	< 27	< 26	< 26.5			
Drainable liquids			µg/mL	µg/mL	µg/mL	µg/mL	%	kg
96-02848	118: 1A	DL	< 7.8	< 7.8	< 7.8	< 10.9	N/A	< 0.0436
96-02850	118: 3	DL	< 14	< 14	< 14			

Table A-28. Tank 241-BX-112 Analytical Results: Ruthenium. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: fusion digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-03366	118: 1	Upper ½	< 200	< 200	< 200	< 309	N/A	< 251
96-03365		Lower ½	< 240	< 240	< 240			
96-02606	118: 1A	Upper ½	< 360	< 270	< 315			
96-02605		Lower ½	< 400	< 290	< 345			
96-02608	118: 2	Upper ½	< 300	< 270	< 285			
96-02849		Lower ½	< 320	< 310	< 315			
96-02607		Lower ½	< 300	< 320	< 310			
96-02609	118: 3	Whole	< 440	< 310	< 375			
96-02612	119: 1	Upper ½	< 260	< 260	< 260			
96-02611		Lower ½	< 270	< 290	< 280			
96-02614	119: 2	Upper ½	< 330	< 280	< 305			
96-02613		Lower ½	< 320	< 360	< 340			
96-02616	119: 3	Upper ½	< 290	< 300	< 295			
96-02851		Lower ½	< 290	< 310	< 300			
96-02615		Lower ½	< 330	< 310	< 320			
Solids: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02608	118: 2	Upper ½	< 9.5	< 9.4	< 9.45	< 9.29	N/A	< 7.56
96-02607		Lower ½	< 9.2	< 8.8	< 9.0			
96-02614	119: 2	Upper ½	< 9.7	< 9.3	< 9.5			
96-02613		Lower ½	< 9.1	< 9.3	< 9.2			

Table A-28. Tank 241-BX-112 Analytical Results: Ruthenium. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solid composites: fusion digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-02617	118	N/A	< 240	< 210	< 225	< 220	N/A	< 179
96-02618	119	N/A	< 240	< 190	< 215			
Solid composites: water digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-02617	118	N/A	< 8.7	< 8.6	< 8.65	< 8.75	N/A	< 7.12
96-02618	119	N/A	< 9	< 8.7	< 8.85			
Drainable liquids			μg/mL	μg/mL	μg/mL	μg/mL	%	kg
96-02848	118: 1A	DL	3.4	3.6	3.5	4.98	29.7	0.0199
96-02850	118: 3	DL	6.1	6.8	6.45			

Table A-29. Tank 241-BX-112 Analytical Results: Selenium. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: fusion digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-03366	118: 1	Upper ½	< 200	< 200	< 200	< 331	N/A	< 269
96-03365		Lower ½	< 240	< 240	< 240			
96-02606	118: 1A	Upper ½	< 450	< 340	< 395			
96-02605		Lower ½	< 400	< 290	< 345			
96-02608	118: 2	Upper ½	< 380	< 340	< 360			
96-02849		Lower ½	< 320	< 310	< 315			
96-02607		Lower ½	< 300	< 320	< 310			
96-02609	118: 3	Whole	< 440	< 310	< 375			
96-02612	119: 1	Upper ½	< 330	< 330	< 330			
96-02611		Lower ½	< 270	< 290	< 280			
96-02614	119: 2	Upper ½	< 420	< 350	< 385			
96-02613		Lower ½	< 320	< 360	< 340			
96-02616	119: 3	Upper ½	< 360	< 380	< 370			
96-02851		Lower ½	< 290	< 310	< 300			
96-02615		Lower ½	< 330	< 310	< 320			
Solids: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02608	118: 2	Upper ½	< 9.5	< 9.4	< 9.45	< 9.29	N/A	< 7.56
96-02607		Lower ½	< 9.2	< 8.8	< 9.0			
96-02614	119: 2	Upper ½	< 9.7	< 9.3	< 9.5			
96-02613		Lower ½	< 9.1	< 9.3	< 9.2			

Table A-29. Tank 241-BX-112 Analytical Results: Selenium. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solid composites: fusion digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-02617	118	N/A	< 240	< 210	< 225	< 220	N/A	< 179
96-02618	119	N/A	< 240	< 190	< 215			
Solid composites: water digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-02617	118	N/A	< 8.7	< 8.6	< 8.65	< 8.75	N/A	< 7.12
96-02618	119	N/A	< 9	< 8.7	< 8.85			
Drainable liquids			μg/mL	μg/mL	μg/mL	μg/mL	%	kg
96-02848	118: 1A	DL	< 2.6	< 2.6	< 2.6	< 3.70	N/A	< 0.0148
96-02850	118: 3	DL	< 4.8	< 4.8	< 4.8			

Table A-30. Tank 241-BX-112 Analytical Results: Silicon. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: fusion digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-03366	118: 1	Upper ½	8,896	7,895	8,395.5	8,400	9.5	6,830
96-03365		Lower ½	7,845	7,499	7,672			
96-02606	118: 1A	Upper ½	8,115	23,355	15,735[QC:f]			
96-02605		Lower ½	5,217	5,443	5,330			
96-02608	118: 2	Upper ½	7,944	7,591	7,767.5			
96-02849		Lower ½	7,185	17,719.8	12,452.4			
96-02607		Lower ½	5,613	5,615	5,614			
96-02609	118: 3	Whole	6,814	6,904	6,859			
96-02612	119: 1	Upper ½	8,810	20,364	14,587[QC:e]			
96-02611		Lower ½	6,988	7,076	7,032			
96-02614	119: 2	Upper ½	11,212	9,047	10,129.5[QC:e]			
96-02613		Lower ½	6,785	6,381	6,583			
96-02616	119: 3	Upper ½	8,234	9,217	8,725.5			
96-02851		Lower ½	7,334	8,523	7,928.5			
96-02615		Lower ½	6,094	6,115	6,104.5			
Solids: water digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-02608	118: 2	Upper ½	< 47	< 47	< 47	53.9	12.8	43.8
96-02607		Lower ½	< 46	48	47			
96-02614	119: 2	Upper ½	52	52	52			
96-02613		Lower ½	70	69	69.5			

Table A-30. Tank 241-BX-112 Analytical Results: Silicon. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solid composites: fusion digest			**µg/g**	**µg/g**	**µg/g**	**µg/g**	**%**	**kg**
96-02617	118	N/A	6,784	7,526	7,155	7,910	9.6	6,430
96-02618	119	N/A	9,063	8,286	8,674.5			
Solid composites: water digest			**µg/g**	**µg/g**	**µg/g**	**µg/g**	**%**	**kg**
96-02617	118	N/A	53	60	56.5	71.0	20.4	57.8
96-02618	119	N/A	86	85	85.5			
Drainable liquids			**µg/mL**	**µg/mL**	**µg/mL**	**µg/mL**	**%**	**kg**
96-02848	118: 1A	DL	37.2	38.5	37.85	38.6	1.9	0.154
96-02850	118: 3	DL	38.3	40.4	39.35			

Table A-31. Tank 241-BX-112 Analytical Results: Silver. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: fusion digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-03366	118: 1	Upper ½	< 30	< 30	< 30	< 46.4	N/A	< 37.7
96-03365		Lower ½	< 35	< 33	< 34			
96-02606	118: 1A	Upper ½	< 54	< 41	< 47.5			
96-02605		Lower ½	< 59	< 44	< 51.5			
96-02608	118: 2	Upper ½	< 45	< 41	< 43			
96-02849		Lower ½	< 49	< 46	< 47.5			
96-02607		Lower ½	< 44	< 48	< 46			
96-02609	118: 3	Whole	< 66	< 47	< 56.5			
96-02612	119: 1	Upper ½	< 39	< 39	< 39			
96-02611		Lower ½	< 41	< 43	< 42			
96-02614	119: 2	Upper ½	< 50	< 42	< 46			
96-02613		Lower ½	< 49	< 53	< 51			
96-02616	119: 3	Upper ½	< 43	< 46	< 44.5			
96-02851		Lower ½	< 44	< 47	< 45.5			
96-02615		Lower ½	< 50	< 47	< 48.5			
Solids: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02608	118: 2	Upper ½	< 1.4	< 1.4	< 1.4	< 1.40	N/A	< 1.14
96-02607		Lower ½	< 1.4	< 1.3	< 1.35			
96-02614	119: 2	Upper ½	< 1.5	< 1.4	< 1.45			
96-02613		Lower ½	< 1.4	< 1.4	< 1.4			

Table A-31. Tank 241-BX-112 Analytical Results: Silver. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solid composites: fusion digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-02617	118	N/A	< 35	< 31	< 33	< 32.5	N/A	< 26.4
96-02618	119	N/A	< 35	< 29	< 32			
Solid composites: water digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-02617	118	N/A	< 1.3	< 1.3	< 1.3	< 1.30	N/A	< 1.06
96-02618	119	N/A	< 1.3	< 1.3	< 1.3			
Drainable liquids			μg/mL	μg/mL	μg/mL	μg/mL	%	kg
96-02848	118: 1A	DL	< 0.4	< 0.4	< 0.4	< 0.550	N/A	< 0.00220
96-02850	118: 3	DL	< 0.7	< 0.7	< 0.7			

Table A-32. Tank 241-BX-112 Analytical Results: Sodium. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: fusion digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-03366	118: 1	Upper ½	77,653	77,892	77,773	81,800	2.6	66,500
96-03365		Lower ½	83,721	81,175	82,448			
96-02606	118: 1A	Upper ½	83,988	82,081	83,034			
96-02605		Lower ½	79,354	78,946	79,150			
96-02608	118: 2	Upper ½	80,930	80,424	80,677			
96-02849		Lower ½	80,847	81,786	81,316			
96-02607		Lower ½	86,635	85,146	85,890			
96-02609	118: 3	Whole	91,543	88,718	90,131			
96-02612	119: 1	Upper ½	79,702	82,194	80,948			
96-02611		Lower ½	81,835	76,981	79,408			
96-02614	119: 2	Upper ½	79,442	79,013	79,227			
96-02613		Lower ½	79,391	78,868	79,129			
96-02616	119: 3	Upper ½	77,706	77,857	77,781			
96-02851		Lower ½	78,157	78,764	78,461			
96-02615		Lower ½	76,994	77,010	77,002			
Solids: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02608	118: 2	Upper ½	65,826	67,068	66,447	65,500	0.62	53,300
96-02607		Lower ½	65,262	65,052	65,157			
96-02614	119: 2	Upper ½	64,383.8	64,845.3	64,614.5			
96-02613		Lower ½	65,707.7	66,179.9	65,943.8			

Table A-32. Tank 241-BX-112 Analytical Results: Sodium. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solid composites: fusion digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02617	118	N/A	83,287	84,326	83,807	83,200	0.8	67,700
96-02618	119	N/A	82,427	82,590	82,508			
Solid composites: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02617	118	N/A	68,453	68,108	68,281	67,200	1.6	54,700
96-02618	119	N/A	66,607	65,574	66,091			
Drainable liquids			µg/mL	µg/mL	µg/mL	µg/mL	%	kg
96-02848	118: 1A	DL	71,127	69,956	70,542	77,900	9.4	312
96-02850	118: 3	DL	84,105	86,287	85,196			

Table A-33. Tank 241-BX-112 Analytical Results: Strontium. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: fusion digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-03366	118: 1	Upper ½	110	251	180.5[QC:e]	132	4.4	107
96-03365		Lower ½	129	123	126			
96-02606	118: 1A	Upper ½	122	114	118			
96-02605		Lower ½	110	111	110.5			
96-02608	118: 2	Upper ½	124	122	123			
96-02849		Lower ½	100	100	100			
96-02607		Lower ½	110	120	115			
96-02609	118: 3	Whole	150	149	149.5			
96-02612	119: 1	Upper ½	122	123	122.5			
96-02611		Lower ½	141	134	137.5			
96-02614	119: 2	Upper ½	130	133	131.5			
96-02613		Lower ½	146	131	138.5			
96-02616	119: 3	Upper ½	134	138	136			
96-02851		Lower ½	115	117	116			
96-02615		Lower ½	130	129	129.5			
Solids: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02608	118: 2	Upper ½	< 1.4	< 1.4	< 1.4	< 1.40	N/A	< 1.14
96-02607		Lower ½	< 1.4	< 1.3	< 1.35			
96-02614	119: 2	Upper ½	< 1.5	< 1.4	< 1.45			
96-02613		Lower ½	< 1.4	< 1.4	< 1.4			

Table A-33. Tank 241-BX-112 Analytical Results: Strontium. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solid composites: fusion digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02617	118	N/A	125	126	125.5	134	6.2	109
96-02618	119	N/A	142	142	142			
Solid composites: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02617	118	N/A	< 1.3	< 1.3	< 1.3	< 1.30	N/A	< 1.06
96-02618	119	N/A	< 1.3	< 1.3	< 1.3			
Drainable liquids			µg/mL	µg/mL	µg/mL	µg/mL	%	kg
96-02848	118: 1A	DL	< 0.4	< 0.4	< 0.4	< 0.550	N/A	< 0.00220
96-02850	118: 3	DL	< 0.7	< 0.7	< 0.7			

Table A-34. Tank 241-BX-112 Analytical Results: Tellurium. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: fusion digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-03366	118: 1	Upper ½	< 990	< 990	< 990	< 1,560	N/A	< 1,270
96-03365		Lower ½	< 1,200	< 1,200	< 1,200			
96-02606	118: 1A	Upper ½	< 1,800	< 1,400	< 1,600			
96-02605		Lower ½	< 2,000	< 1,500	< 1,750			
96-02608	118: 2	Upper ½	< 1,500	< 1,400	< 1,450			
96-02849		Lower ½	< 1,600	< 1,500	< 1,550			
96-02607		Lower ½	< 1,500	< 1,600	< 1,550			
96-02609	118: 3	Whole	< 2,200	< 1,600	< 1,900			
96-02612	119: 1	Upper ½	< 1,300	< 1,300	< 1,300			
96-02611		Lower ½	< 1,400	< 1,400	< 1,400			
96-02614	119: 2	Upper ½	< 1,700	< 1,400	< 1,550			
96-02613		Lower ½	< 1,600	< 1,800	< 1,700			
96-02616	119: 3	Upper ½	< 1,400	< 1,500	< 1,450			
96-02851		Lower ½	< 1,500	< 1,600	< 1,550			
96-02615		Lower ½	< 1,700	< 1,600	< 1,650			
Solids: water digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-02608	118: 2	Upper ½	< 47	< 47	< 47	< 46.5	N/A	< 37.8
96-02607		Lower ½	< 46	< 44	< 45			
96-02614	119: 2	Upper ½	< 49	< 47	< 48			
96-02613		Lower ½	< 46	< 46	< 46			

Table A-34. Tank 241-BX-112 Analytical Results: Tellurium. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solid composites: fusion digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02617	118	N/A	< 1,200	< 1,000	< 1,100	< 1,090	N/A	< 887
96-02618	119	N/A	< 1,200	< 960	< 1,080			
Solid composites: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02617	118	N/A	< 44	< 43	< 43.5	< 43.8	N/A	< 35.6
96-02618	119	N/A	< 45	< 43	< 44			
Drainable liquids			µg/mL	µg/mL	µg/mL	µg/mL	%	kg
96-02848	118: 1A	DL	< 13	< 13	< 13	< 18.5	N/A	< 0.0740
96-02850	118: 3	DL	< 24	< 24	< 24			

Table A-35. Tank 241-BX-112 Analytical Results: Thallium. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: fusion digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-03366	118: 1	Upper ½	< 990	< 990	< 990	< 1,560	N/A	< 1,270
96-03365		Lower ½	< 1,200	< 1,200	< 1,200			
96-02606	118: 1A	Upper ½	< 1,800	< 1,400	< 1,600			
96-02605		Lower ½	< 2,000	< 1,500	< 1,750			
96-02608	118: 2	Upper ½	< 1,500	< 1,400	< 1,450			
96-02849		Lower ½	< 1,600	< 1,500	< 1,550			
96-02607		Lower ½	< 1,500	< 1,600	< 1,550			
96-02609	118: 3	Whole	< 2,200	< 1,600	< 1,900			
96-02612	119: 1	Upper ½	< 1,300	< 1,300	< 1,300			
96-02611		Lower ½	< 1,400	< 1,400	< 1,400			
96-02614	119: 2	Upper ½	< 1,700	< 1,400	< 1,550			
96-02613		Lower ½	< 1,600	< 1,800	< 1,700			
96-02616	119: 3	Upper ½	< 1,400	< 1,500	< 1,450			
96-02851		Lower ½	< 1,500	< 1,600	< 1,550			
96-02615		Lower ½	< 1,700	< 1,600	< 1,650			
Solids: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02608	118: 2	Upper ½	< 47	< 47	< 47	< 46.5	N/A	< 37.8
96-02607		Lower ½	< 46	< 44	< 45			
96-02614	119: 2	Upper ½	< 49	< 47	< 48			
96-02613		Lower ½	< 46	< 46	< 46			

Table A-35. Tank 241-BX-112 Analytical Results: Thallium. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solid composites: fusion digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02617	118	N/A	< 1,200	< 1,000	< 1,100	< 1,090	N/A	< 887
96-02618	119	N/A	< 1,200	< 960	< 1,080			
Solid composites: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02617	118	N/A	< 44	< 43	< 43.5	< 43.8	N/A	< 35.6
96-02618	119	N/A	< 45	< 43	< 44			
Drainable liquids			µg/mL	µg/mL	µg/mL	µg/mL	%	kg
96-02848	118: 1A	DL	< 13	< 13	< 13	< 18.5	N/A	< 0.0740
96-02850	118: 3	DL	< 24	< 24	< 24			

Table A-36. Tank 241-BX-112 Analytical Results: Thorium.

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02608	118: 2	Upper ½	< 76	< 75	< 75.5	< 74.3	N/A	< 60.4
96-02607		Lower ½	< 73	< 71	< 72			
96-02614	119: 2	Upper ½	< 78	< 74	< 76			
96-02613		Lower ½	< 73	< 74	< 73.5			

Table A-37. Tank 241-BX-112 Analytical Results: Tin.

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02608	118: 2	Upper ½	< 95	< 94	< 94.5	< 92.9	N/A	< 0.372
96-02607		Lower ½	< 92	< 88	< 90			
96-02614	119: 2	Upper ½	< 97	< 93	< 95			
96-02613		Lower ½	< 91	< 93	< 92			

Table A-38. Tank 241-BX-112 Analytical Results: Titanium. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: fusion digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-03366	118: 1	Upper ½	< 50	< 49	< 49.5	< 77.5	N/A	< 63.0
96-03365		Lower ½	< 59	< 59	< 59			
96-02606	118: 1A	Upper ½	< 89	< 69	< 79			
96-02605		Lower ½	< 99	< 73	< 86			
96-02608	118: 2	Upper ½	< 76	< 68	< 72			
96-02849		Lower ½	< 81	< 77	< 79			
96-02607		Lower ½	< 74	< 80	< 77			
96-02609	118: 3	Whole	< 110	< 78	< 94			
96-02612	119: 1	Upper ½	< 65	< 65	< 65			
96-02611		Lower ½	< 68	< 72	< 70			
96-02614	119: 2	Upper ½	< 84	< 71	< 77.5			
96-02613		Lower ½	< 81	< 89	< 85			
96-02616	119: 3	Upper ½	< 71	< 76	< 73.5			
96-02851		Lower ½	< 73	< 78	< 75.5			
96-02615		Lower ½	< 83	< 78	< 80.5			
Solids: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02608	118: 2	Upper ½	< 2.4	< 2.3	< 2.35	< 2.31	N/A	< 1.88
96-02607		Lower ½	< 2.3	< 2.2	< 2.25			
96-02614	119: 2	Upper ½	< 2.4	< 2.3	< 2.35			
96-02613		Lower ½	< 2.3	< 2.3	< 2.3			

Table A-38. Tank 241-BX-112 Analytical Results: Titanium. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solid composites: fusion digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02617	118	N/A	< 59	< 52	< 55.5	< 54.5	N/A	< 44.3
96-02618	119	N/A	< 59	< 48	< 53.5			
Solid composites: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02617	118	N/A	< 2.2	< 2.1	< 2.15	< 2.18	N/A	< 1.77
96-02618	119	N/A	< 2.2	< 2.2	< 2.2			
Drainable liquids			µg/mL	µg/mL	µg/mL	µg/mL	%	kg
96-02848	118: 1A	DL	< 0.7	< 0.7	< 0.7	< 0.950	N/A	< 0.00380
96-02850	118: 3	DL	< 1.2	< 1.2	< 1.2			

Table A-39. Tank 241-BX-112 Analytical Results: Tungsten. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: fusion digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-03366	118: 1	Upper ½	< 990	< 990	< 990	< 1,560	N/A	< 1,270
96-03365		Lower ½	< 1,200	< 1,200	< 1,200			
96-02606	118: 1A	Upper ½	< 1,800	< 1,400	< 1,600			
96-02605		Lower ½	< 2,000	< 1,500	< 1,750			
96-02608	118: 2	Upper ½	< 1,500	< 1,400	< 1,450			
96-02849		Lower ½	< 1,600	< 1,500	< 1,550			
96-02607		Lower ½	< 1,500	< 1,600	< 1,550			
96-02609	118: 3	Whole	< 2,200	< 1,600	< 1,900			
96-02612	119: 1	Upper ½	< 1,300	< 1,300	< 1,300			
96-02611		Lower ½	< 1,400	< 1,400	< 1,400			
96-02614	119: 2	Upper ½	< 1,700	< 1,400	< 1,550			
96-02613		Lower ½	< 1,600	< 1,800	< 1,700			
96-02616	119: 3	Upper ½	< 1,400	< 1,500	< 1,450			
96-02851		Lower ½	< 1,500	< 1,600	< 1,550			
96-02615		Lower ½	< 1,700	< 1,600	< 1,650			
Solids: water digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-02608	118: 2	Upper ½	< 47	< 47	< 47	< 46.5	N/A	< 37.8
96-02607		Lower ½	< 46	< 44	< 45			
96-02614	119: 2	Upper ½	< 49	< 47	< 48			
96-02613		Lower ½	< 46	< 46	< 46			

Table A-39. Tank 241-BX-112 Analytical Results: Tungsten. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solid composites: fusion digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02617	118	N/A	< 1,200	< 1,000	< 1,100	< 1,090	N/A	< 887
96-02618	119	N/A	< 1,200	< 960	< 1,080			
Solid composites: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02617	118	N/A	< 44	< 43	< 43.5	< 43.8	N/A	< 35.6
96-02618	119	N/A	< 45	< 43	< 44			
Drainable liquids			µg/mL	µg/mL	µg/mL	µg/mL	%	kg
96-02848	118: 1A	DL	< 13	< 13	< 13	< 18.5	N/A	< 0.0740
96-02850	118: 3	DL	< 24	< 24	< 24			

Table A-40. Tank 241-BX-112 Analytical Results: Total Uranium. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: fusion digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-03366	118: 1	Upper ½	< 4,000	< 3,900	< 3,950	< 6,190	N/A	< 5,040
96-03365		Lower ½	< 4,700	< 4,700	< 4,700			
96-02606	118: 1A	Upper ½	< 7,100	< 5,500	< 6,300			
96-02605		Lower ½	< 7,900	< 5,900	< 6,900			
96-02608	118: 2	Upper ½	< 6,100	< 5,400	< 5,750			
96-02849		Lower ½	< 6,500	< 6,200	< 6,350			
96-02607		Lower ½	< 5,900	< 6,400	< 6,150			
96-02609	118: 3	Whole	< 8,800	< 6,200	< 7,500			
96-02612	119: 1	Upper ½	< 5,200	< 5,200	< 5,200			
96-02611		Lower ½	< 5,400	< 5,800	< 5,600			
96-02614	119: 2	Upper ½	< 6,700	< 5,600	< 6,150			
96-02613		Lower ½	< 6,500	< 7,100	< 6,800			
96-02616	119: 3	Upper ½	< 5,700	< 6,100	< 5,900			
96-02851		Lower ½	< 5,800	< 6,200	< 6,000			
96-02615		Lower ½	< 6,600	< 6,200	< 6,400			
Solids: water digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-02608	118: 2	Upper ½	195	216	205.5	< 193	N/A	< 157
96-02607		Lower ½	< 180	202	< 191			
96-02614	119: 2	Upper ½	< 190	< 190	< 190			
96-02613		Lower ½	< 180	< 190	< 185			

Table A-40. Tank 241-BX-112 Analytical Results: Total Uranium. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solid composites: fusion digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02617	118	N/A	< 4,700	< 4,200	< 4,450	< 4,350	N/A	< 3,540
96-02618	119	N/A	< 4,700	< 3,800	< 4,250			
Solid composites: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02617	118	N/A	< 170	< 170	< 170	< 173	N/A	< 141
96-02618	119	N/A	< 180	< 170	< 175			
Drainable liquids			µg/mL	µg/mL	µg/mL	µg/mL	%	kg
96-02848	118: 1A	DL	457	448	453	546	17.0	2.18
96-02850	118: 3	DL	641	637	639			

Table A-41. Tank 241-BX-112 Analytical Results: Total Uranium. (Laser Fluorimetry)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids			µg/g	µg/g	µg/g	µg/g	%	kg
96-02608	118: 2	Upper ½	1,210	1,150	1,180	1,040	5.3	846
96-02607		Lower ½	934	933	933.5			
96-02614	119: 2	Upper ½	1,080	1,060	1,070			
96-02613		Lower ½	969	974	971.5			
Solid composites			µg/g	µg/g	µg/g	µg/g	%	kg
96-02617	118	N/A	979	1,050	1,014.5	1,030	2.3	4.12
96-02618	119	N/A	1,090	1,010	1,050			

Table A-42. Tank 241-BX-112 Analytical Results: Vanadium. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: fusion digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-03366	118: 1	Upper ½	< 30	< 30	< 30	< 46.5	N/A	< 37.8
96-03365		Lower ½	< 35	< 35	< 35			
96-02606	118: 1A	Upper ½	< 54	< 41	< 47.5			
96-02605		Lower ½	< 59	< 44	< 51.5			
96-02608	118: 2	Upper ½	< 45	< 41	< 43			
96-02849		Lower ½	< 49	< 46	< 47.5			
96-02607		Lower ½	< 44	< 48	< 46			
96-02609	118: 3	Whole	< 66	< 47	< 56.5			
96-02612	119: 1	Upper ½	< 39	< 39	< 39			
96-02611		Lower ½	< 41	< 43	< 42			
96-02614	119: 2	Upper ½	< 50	< 42	< 46			
96-02613		Lower ½	< 49	< 53	< 51			
96-02616	119: 3	Upper ½	< 43	< 46	< 44.5			
96-02851		Lower ½	< 44	< 47	< 45.5			
96-02615		Lower ½	< 50	< 47	< 48.5			
Solids: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02608	118: 2	Upper ½	< 1.4	< 1.4	< 1.4	< 1.40	N/A	< 1.14
96-02607		Lower ½	< 1.4	< 1.3	< 1.35			
96-02614	119: 2	Upper ½	< 1.5	< 1.4	< 1.45			
96-02613		Lower ½	< 1.4	< 1.4	< 1.4			

Table A-42. Tank 241-BX-112 Analytical Results: Vanadium. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solid composites: fusion digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02617	118	N/A	< 35	< 31	< 33	< 32.5	N/A	< 26.4
96-02618	119	N/A	< 35	< 29	< 32			
Solid composites: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02617	118	N/A	< 1.3	< 1.3	< 1.3	< 1.3	N/A	< 1.06
96-02618	119	N/A	< 1.3	< 1.3	< 1.3			
Drainable liquids			µg/mL	µg/mL	µg/mL	µg/mL	%	kg
96-02848	118: 1A	DL	< 0.4	< 0.4	< 0.4	< 0.550	N/A	< 0.00220
96-02850	118: 3	DL	< 0.7	< 0.7	< 0.7			

Table A-43. Tank 241-BX-112 Analytical Results: Yttrium. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: fusion digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-03366	118: 1	Upper ½	< 20	< 20	< 20	< 30.9	N/A	< 25.1
96-03365		Lower ½	< 24	< 24	< 24			
96-02606	118: 1A	Upper ½	< 36	< 27	< 31.5			
96-02605		Lower ½	< 40	< 29	< 34.5			
96-02608	118: 2	Upper ½	< 30	< 27	< 28.5			
96-02849		Lower ½	< 32	< 31	< 31.5			
96-02607		Lower ½	< 30	< 32	< 31			
96-02609	118: 3	Whole	< 44	< 31	< 37.5			
96-02612	119: 1	Upper ½	< 26	< 26	< 26			
96-02611		Lower ½	< 27	< 29	< 28			
96-02614	119: 2	Upper ½	< 33	< 28	< 30.5			
96-02613		Lower ½	< 32	< 36	< 34			
96-02616	119: 3	Upper ½	< 29	< 30	< 29.5			
96-02851		Lower ½	< 29	< 31	< 30			
96-02615		Lower ½	< 33	< 31	< 32			
Solids: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02608	118: 2	Upper ½	< 0.9	< 0.9	< 0.9	< 0.913	N/A	< 0.743
96-02607		Lower ½	< 0.9	< 0.9	< 0.9			
96-02614	119: 2	Upper ½	< 1	< 0.9	< 0.95			
96-02613		Lower ½	< 0.9	< 0.9	< 0.9			

Table A-43. Tank 241-BX-112 Analytical Results: Yttrium. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solid composites: fusion digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02617	118	N/A	< 24	< 21	< 22.5	< 22.0	N/A	< 17.9
96-02618	119	N/A	< 24	< 19	< 21.5			
Solid composites: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02617	118	N/A	< 0.9	< 0.9	< 0.9	< 0.900	N/A	< 0.732
96-02618	119	N/A	< 0.9	< 0.9	< 0.9			
Drainable liquids			µg/mL	µg/mL	µg/mL	µg/mL	%	kg
96-02848	118: 1A	DL	< 0.3	< 0.3	< 0.3	< 0.400	N/A	< 0.00160
96-02850	118: 3	DL	< 0.5	< 0.5	< 0.5			

Table A-44. Tank 241-BX-112 Analytical Results: Zinc. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: fusion digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-03366	118: 1	Upper ½	< 40	< 39	< 39.5	< 89.5	N/A	< 72.8
96-03365		Lower ½	< 47	47	47			
96-02606	118: 1A	Upper ½	< 71	< 55	< 63			
96-02605		Lower ½	< 79	< 59	< 69			
96-02608	118: 2	Upper ½	< 61	< 54	< 57.5			
96-02849		Lower ½	< 65	< 62	< 63.5			
96-02607		Lower ½	< 59	< 64	< 61.5			
96-02609	118: 3	Whole	139	136	137.5			
96-02612	119: 1	Upper ½	397	69	233[QC:e]			
96-02611		Lower ½	< 54	< 58	< 56			
96-02614	119: 2	Upper ½	< 67	< 56	< 61.5			
96-02613		Lower ½	< 65	< 71	< 68			
96-02616	119: 3	Upper ½	< 57	< 61	< 59			
96-02851		Lower ½	< 76	< 84	< 80			
96-02615		Lower ½	80	79	79.5			
Solids: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02608	118: 2	Upper ½	< 1.9	< 1.9	< 1.9	< 1.86	N/A	< 1.51
96-02607		Lower ½	< 1.8	< 1.8	< 1.8			
96-02614	119: 2	Upper ½	< 1.9	< 1.9	< 1.9			
96-02613		Lower ½	< 1.8	< 1.9	< 1.85			

Table A-44. Tank 241-BX-112 Analytical Results: Zinc. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solid composites: fusion digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-02617	118	N/A	< 47	47	47	49.0	4.1	39.9
96-02618	119	N/A	54	48	51			
Solid composites: water digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-02617	118	N/A	< 1.7	< 1.7	< 1.7	< 1.73	N/A	< 1.41
96-02618	119	N/A	< 1.8	< 1.7	< 1.75			
Drainable liquids			μg/mL	μg/mL	μg/mL	μg/mL	%	kg
96-02848	118: 1A	DL	0.9	0.7	0.8	1.05	23.8	0.00420
96-02850	118: 3	DL	1.3	1.3	1.3			

Table A-45. Tank 241-BX-112 Analytical Results: Zirconium. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: fusion digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-03366	118: 1	Upper ½	60	69	64.5	< 78.1	N/A	< 63.5
96-03365		Lower ½	< 59	< 59	< 59			
96-02606	118: 1A	Upper ½	< 89	< 69	< 79			
96-02605		Lower ½	< 99	< 73	< 86			
96-02608	118: 2	Upper ½	< 76	< 68	< 72			
96-02849		Lower ½	< 81	< 77	< 79			
96-02607		Lower ½	< 74	< 80	< 77			
96-02609	118: 3	Whole	< 110	< 78	< 94			
96-02612	119: 1	Upper ½	< 65	< 65	< 65			
96-02611		Lower ½	< 68	< 72	< 70			
96-02614	119: 2	Upper ½	< 84	< 71	< 77.5			
96-02613		Lower ½	< 81	< 89	< 85			
96-02616	119: 3	Upper ½	< 71	< 76	< 73.5			
96-02851		Lower ½	< 73	< 78	< 75.5			
96-02615		Lower ½	< 83	< 78	< 80.5			
Solids: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02608	118: 2	Upper ½	< 2.4	< 2.3	< 2.35	< 2.31	N/A	< 1.88
96-02607		Lower ½	< 2.3	< 2.2	< 2.25			
96-02614	119: 2	Upper ½	< 2.4	< 2.3	< 2.35			
96-02613		Lower ½	< 2.3	< 2.3	< 2.3			

Table A-45. Tank 241-BX-112 Analytical Results: Zirconium. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solid composites: fusion digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-02617	118	N/A	< 59	< 52	< 55.5	< 54.5	N/A	< 44.3
96-02618	119	N/A	< 59	< 48	< 53.5			
Solid composites: water digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-02617	118	N/A	3	< 2.1	2.55	< 2.38	N/A	< 1.94
96-02618	119	N/A	< 2.2	< 2.2	< 2.2			
Drainable liquids			μg/mL	μg/mL	μg/mL	μg/mL	%	kg
96-02848	118: 1A	DL	2.1	1.9	2	4.43	54.8	0.0177
96-02850	118: 3	DL	7.7	6	6.85			

Table A-46. Tank 241-BX-112 Analytical Results: Chloride.

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: water digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-03366	118: 1	Upper ½	1,100	1,100	1,100	1,050	7.5	854
96-03365		Lower ½	1,100	1,100	1,100			
96-02606	118: 1A	Upper ½	1,000	1,000	1,000			
96-02605		Lower ½	1,100	1,100	1,100			
96-02608	118: 2	Upper ½	1,200	1,200	1,200			
96-02607		Lower ½	1,100	1,100	1,100[QC:d]			
96-02609	118: 3	Whole	1,100	1,100	1,100			
96-02612	119: 1	Upper ½	1,000	1,000	1,000			
96-02611		Lower ½	1,100	1,100	1,100			
96-02614	119: 2	Upper ½	1,100	1,100	1,100			
96-02613		Lower ½	1,100	1,100	1,100			
96-02616	119: 3	Upper ½	100	1,000	550[QC:e]			
96-02615		Lower ½	1,100	1,100	1,100			
Solid composites: water digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-02617	118	N/A	970	1,100	1,035	1,020	2.8	830
96-02618	119	N/A	1,000	1,000	1,000			
Drainable liquids			μg/mL	μg/mL	μg/mL	μg/mL	%	kg
96-02848	118: 1A	DL	1,200	1,300	1,250	1,380	9.1	5.52
96-02850	118: 3	DL	1,500	1,500	1,500			

Table A-47. Tank 241-BX-112 Analytical Results: Fluoride.

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: water digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-03366	118: 1	Upper ½	8,800	7,000	7,900[QC:e]	10,700	21.8	8,700
96-03365		Lower ½	9,100	8,800	8,950			
96-02606	118: 1A	Upper ½	8,900	9,200	9,050			
96-02605		Lower ½	8,400	8,900	8,650			
96-02608	118: 2	Upper ½	8,300	7,900	8,100			
96-02607		Lower ½	7,400	7,200	7,300[QC:d]			
96-02609	118: 3	Whole	13,500	13,900	13,700			
96-02612	119: 1	Upper ½	10,700	10,500	10,600			
96-02611		Lower ½	10,600	11,500	11,050			
96-02614	119: 2	Upper ½	10,500	10,900	10,700			
96-02613		Lower ½	12,300	13,600	12,950			
96-02616	119: 3	Upper ½	11,200	14,700	12,950[QC:e]			
96-02615		Lower ½	10,700	10,400	10,550			
Solid composites: water digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-02617	118	N/A	9,200	9,300	9,250	10,400	10.9	8,460
96-02618	119	N/A	11,500	11,500	11,500			
Drainable liquids			μg/mL	μg/mL	μg/mL	μg/mL	%	kg
96-02848	118: 1A	DL	1,600	1,800	1,700	1,350	25.9	5.40
96-02850	118: 3	DL	900	1,100	1,000			

Table A-48. Tank 241-BX-112 Analytical Results: Nitrate.

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: water digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-03366	118: 1	Upper ½	67,000	69,000	68,000	75,100	2.8	61,100
96-03365		Lower ½	68,000	69,000	68,500			
96-02606	118: 1A	Upper ½	68,000	67,000	67,500			
96-02605		Lower ½	72,000	72,000	72,000			
96-02608	118: 2	Upper ½	79,000	79,000	79,000			
96-02607		Lower ½	78,000	79,000	78,500[QC:d]			
96-02609	118: 3	Whole	76,000	76,000	76,000			
96-02612	119: 1	Upper ½	71,000	71,000	71,000			
96-02611		Lower ½	79,000	79,000	79,000			
96-02614	119: 2	Upper ½	76,000	77,000	76,500			
96-02613		Lower ½	77,000	78,000	77,500			
96-02616	119: 3	Upper ½	73,000	73,000	73,000			
96-02615		Lower ½	77,000	77,000	77,000			
Solid composites: water digest			μg/g	μg/g	μg/g	μg/g	%	kg
96-02617	118	N/A	67,000	68,000	67,500	67,000	0.7	54,500
96-02618	119	N/A	67,000	66,000	66,500			
Drainable liquids			μg/mL	μg/mL	μg/mL	μg/mL	%	kg
96-02848	118: 1A	DL	82,000	93,000	87,500	98,500	11.2	394
96-02850	118: 3	DL	1.060E+05	1.130E+05	1.095E+05			

Table A-49. Tank 241-BX-112 Analytical Results: Nitrite.

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-03366	118: 1	Upper ½	23,000	24,000	23,500	25,600	6.0	20,800
96-03365		Lower ½	23,000	23,000	23,000			
96-02606	118: 1A	Upper ½	24,000	24,000	24,000			
96-02605		Lower ½	26,000	26,000	26,000			
96-02608	118: 2	Upper ½	28,000	28,000	28,000			
96-02607		Lower ½	28,000	29,000	28,500[QC:d]			
96-02609	118: 3	Whole	28,000	27,000	27,500			
96-02612	119: 1	Upper ½	22,000	22,000	22,000			
96-02611		Lower ½	25,000	25,000	25,000			
96-02614	119: 2	Upper ½	25,000	25,000	25,000			
96-02613		Lower ½	25,000	26,000	25,500			
96-02616	119: 3	Upper ½	24,000	25,000	24,500			
96-02615		Lower ½	26,000	26,000	26,000			
Solid composites: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02617	118	N/A	24,200	24,000	24,100	22,600	6.9	18,400
96-02618	119	N/A	21,000	21,000	21,000			
Drainable liquids			µg/mL	µg/mL	µg/mL	µg/mL	%	kg
96-02848	118: 1A	DL	30,000	33,000	31,500	35,300	10.6	141
96-02850	118: 3	DL	38,000	40,000	39,000			

Table A-50. Tank 241-BX-112 Analytical Results: Phosphate. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-03366	118: 1	Upper ½	15,000	14,000	14,500	16,400	8.5	13,300
96-03365		Lower ½	13,000	13,000	13,000			
96-02606	118: 1A	Upper ½	23,000	27,000	25,000			
96-02605		Lower ½	15,000	15,000	15,000			
96-02608	118: 2	Upper ½	17,000	17,000	17,000			
96-02607		Lower ½	17,000	17,000	17,000[QC:d]			
96-02609	118: 3	Whole	15,000	15,000	15,000			
96-02612	119: 1	Upper ½	32,000	30,000	31,000			
96-02611		Lower ½	13,000	13,000	13,000			
96-02614	119: 2	Upper ½	16,000	16,000	16,000			
96-02613		Lower ½	12,000	12,000	12,000			
96-02616	119: 3	Upper ½	14,000	13,000	13,500			
96-02615		Lower ½	14,000	14,000	14,000			
Solid composites: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02617	118	N/A	15,300	15,000	15,150	15,100	0.5	12,300
96-02618	119	N/A	15,000	15,000	15,000			
Drainable liquids			µg/mL	µg/mL	µg/mL	µg/mL	%	kg
96-02848	118: 1A	DL	15,400	17,600	16,500	15,700	5.1	62.8
96-02850	118: 3	DL	14,400	15,400	14,900			

Table A-51. Tank 241-BX-112 Analytical Results: Sulfate.

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-03366	118: 1	Upper ½	5,000	6,000	5,500	6,480	3.8	5,270
96-03365		Lower ½	6,000	6,000	6,000			
96-02606	118: 1A	Upper ½	6,000	6,000	6,000			
96-02605		Lower ½	6,000	6,000	6,000			
96-02608	118: 2	Upper ½	7,000	7,000	7,000			
96-02607		Lower ½	6,000	7,000	6,500[QC:d]			
96-02609	118: 3	Whole	7,000	7,000	7,000			
96-02612	119: 1	Upper ½	6,000	6,000	6,000			
96-02611		Lower ½	6,000	6,000	6,000			
96-02614	119: 2	Upper ½	7,000	7,000	7,000			
96-02613		Lower ½	6,000	6,000	6,000			
96-02616	119: 3	Upper ½	6,000	7,000	6,500			
96-02615		Lower ½	7,000	7,000	7,000			
Solid composites: water digest			µg/g	µg/g	µg/g	µg/g	%	kg
96-02617	118	N/A	5,900	6,000	5,950	5,980	0.4	4,860
96-02618	119	N/A	6,000	6,000	6,000			
Drainable liquids			µg/mL	µg/mL	µg/mL	µg/mL	%	kg
96-02848	118: 1A	DL	5,600	6,400	6,000	7,180	16.4	28.7
96-02850	118: 3	DL	8,100	8,600	8,350			

Table A-52. Tank 241-BX-112 Analytical Results: Total Carbon.

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids			µg/g	µg/g	µg/g	µg/g	%	kg
96-02608	118: 2	Upper ½	2,480	3,070	2,775[QC:e]	3,030	11.0	2,460
96-02607		Lower ½	3,470	3,090	3,280			
96-02614	119: 2	Upper ½	3,840	3,750	3,795			
96-02613		Lower ½	2,900	1,600	2,250[QC:e]			
Solid composites			µg/g	µg/g	µg/g	µg/g	%	kg
96-02617	118	N/A	2,730	2,830	2,780	2,730	1.7	2,220
96-02618	119	N/A	2,650	2,720	2,685			

Table A-53. Tank 241-BX-112 Analytical Results: Total Inorganic Carbon.

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids			μg/g	μg/g	μg/g	μg/g	%	kg
96-02608	118: 2	Upper ½	1,650	1,930	1,790	2,100	13.7	1,710
96-02607		Lower ½	2,670	2,210	2,440			
96-02614	119: 2	Upper ½	2,760	2,650	2,705			
96-02613		Lower ½	1,840	1,080	1,460[QC:e]			
Solid composites			μg/g	μg/g	μg/g	μg/g	%	kg
96-02617	118	N/A	2,270	2,380	2,325	2,160	7.9	1,760
96-02618	119	N/A	1,970	2,000	1,985			

Table A-54. Tank 241-BX-112 Analytical Results: Total Organic Carbon.

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids			µg/g	µg/g	µg/g	µg/g	%	kg
96-02608	118: 2	Upper ½	830	1,130	980[QC:e]	959	7.7	780
96-02607		Lower ½	1,070	880	975			
96-02614	119: 2	Upper ½	1,080	1,100	1,090			
96-02613		Lower ½	1,060	520	790[QC:e]			
Solid composites			µg/g	µg/g	µg/g	µg/g	%	kg
96-02617	118	N/A	460	450	455	578	21.2	470
96-02618	119	N/A	680	720	700			

Table A-55. Tank 241-BX-112 Analytical Results: (GEA) Americium-241.

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: fusion digest			µCi/g	µCi/g	µCi/g	µCi/g	%	Ci
96-02608	118: 2	Upper ½	< 0.15	< 0.15	< 0.15	< 0.167	N/A	< 136
96-02849		Upper ½	< 0.3	< 0.3	< 0.3			
96-02607[1]		Lower ½	< 0.14	< 0.15	< 0.145			
96-02607[1]		Lower ½	< 0.1	< 0.1	< 0.1			
96-02614	119: 2	Upper ½	< 0.11	< 0.1	< 0.105			
96-02613		Lower ½	< 0.14	< 0.15	< 0.145			
96-02851	119: 3	Upper ½	< 0.3	< 0.3	< 0.3			
96-02615		Lower ½	< 0.09	< 0.09	< 0.09			
Solid composites: fusion digest			µCi/g	µCi/g	µCi/g	µCi/g	%	Ci
96-02617	118	N/A	< 0.2	< 0.1	< 0.15	< 0.123	N/A	< 100
96-02618	119	N/A	< 0.1	< 0.09	< 0.095			

[1] *Two sets of results were reported. No explanation was given for the duplication of sample analysis.*

Table A-56. Tank 241-BX-112 Analytical Results: Cesium-134.

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: fusion digest			µCi/g	µCi/g	µCi/g	µCi/g	%	Ci
96-02608	118: 2	Upper ½	< 0.036	< 0.034	< 0.035	< 0.0378	N/A	< 30.8
96-02849		Upper ½	< 0.06	< 0.06	< 0.06			
96-02607[1]		Lower ½	< 0.033	< 0.035	< 0.034			
96-02607[1]		Lower ½	< 0.03	< 0.03	< 0.03			
96-02614	119: 2	Upper ½	< 0.032	< 0.029	< 0.0305			
96-02613		Lower ½	< 0.033	< 0.033	< 0.033			
96-02851	119: 3	Upper ½	< 0.05	< 0.05	< 0.05			
96-02615		Lower ½	< 0.03	< 0.03	< 0.03			
Solid composites: fusion digest			µCi/g	µCi/g	µCi/g	µCi/g	%	Ci
96-02617	118	N/A	< 0.04	< 0.03	< 0.035	< 0.0325	N/A	< 26.4
96-02618	119	N/A	< 0.03	< 0.03	< 0.03			

[1] *Two sets of results were reported. No explanation was given for the duplication of sample analysis.*

Table A-57. Tank 241-BX-112 Analytical Results: Cesium-137.

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: fusion digest			µCi/g	µCi/g	µCi/g	µCi/g	%	Ci
96-02608	118: 2	Upper ½	62.4	62.9	62.65	49.5	15.1	40,300
96-02849		Upper ½	54.2	53.6	53.9			
96-02607[1]		Lower ½	57	57.2	57.1			
96-02607[1]		Lower ½	54.9	53.7	54.3			
96-02614	119: 2	Upper ½	43.2	44.2	43.7			
96-02613		Lower ½	46.8	47.7	47.25			
96-02851	119: 3	Upper ½	37.9	37.9	37.9			
96-02615		Lower ½	39.7	39.1	39.4			
Solid composites: fusion digest			µCi/g	µCi/g	µCi/g	µCi/g	%	Ci
96-02617	118	N/A	62.8	64.8	63.8	56.5	12.9	46,000
96-02618	119	N/A	48.9	49.5	49.2			

[1] *Two sets of results were reported. No explanation was given for the duplication of sample analysis.*

Table A-58. Tank 241-BX-112 Analytical Results: Cobalt-60.

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: fusion digest			µCi/g	µCi/g	µCi/g	µCi/g	%	Ci
96-02608	118: 2	Upper ½	< 0.015	< 0.014	< 0.0145	< 0.00938	N/A	< 7.63
96-02849		Upper ½	< 0.006	< 0.008	< 0.007			
96-02607[1]		Lower ½	< 0.015	< 0.014	< 0.0145			
96-02607[1]		Lower ½	< 0.003	< 0.002	< 0.0025			
96-02614	119: 2	Upper ½	< 0.011	< 0.011	< 0.011			
96-02613		Lower ½	< 0.016	< 0.017	< 0.0165			
96-02851	119: 3	Upper ½	< 0.006	< 0.007	< 0.0065			
96-02615		Lower ½	< 0.002	< 0.003	< 0.0025			
Solid composites: fusion digest			µCi/g	µCi/g	µCi/g	µCi/g	%	Ci
96-02617	118	N/A	< 0.02	< 0.009	< 0.0145	< 0.0113	N/A	< 9.19
96-02618	119	N/A	< 0.009	< 0.007	< 0.008			

[1] *Two sets of results were reported. No explanation was given for the duplication of sample analysis.*

Table A-59. Tank 241-BX-112 Analytical Results: Europium-154.

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: fusion digest			µCi/g	µCi/g	µCi/g	µCi/g	%	Ci
96-02608	118: 2	Upper ½	< 0.023	< 0.018	< 0.0205	< 0.0286	N/A	< 23.2
96-02849		Upper ½	< 0.03	< 0.02	< 0.025			
96-02607[1]		Lower ½	< 0.024	< 0.026	< 0.025			
96-02607[1]		Lower ½	< 0.05	< 0.05	< 0.05			
96-02614	119: 2	Upper ½	< 0.023	< 0.016	< 0.0195			
96-02613		Lower ½	< 0.027	< 0.03	< 0.0285			
96-02851	119: 3	Upper ½	< 0.02	< 0.02	< 0.02			
96-02615		Lower ½	< 0.04	< 0.04	< 0.04			
Solid composites: fusion digest			µCi/g	µCi/g	µCi/g	µCi/g	%	Ci
96-02617	118	N/A	< 0.02	< 0.02	< 0.02	< 0.0200	N/A	< 16.3
96-02618	119	N/A	< 0.02	< 0.02	< 0.02			

[1] *Two sets of results were reported. No explanation was given for the duplication of sample analysis.*

Table A-60. Tank 241-BX-112 Analytical Results: Europium-155.

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: fusion digest			µCi/g	µCi/g	µCi/g	µCi/g	%	Ci
96-02608	118: 2	Upper ½	< 0.13	< 0.12	< 0.125	< 0.127	N/A	< 103
96-02849		Upper ½	< 0.2	< 0.2	< 0.2			
96-02607[1]		Lower ½	< 0.12	< 0.13	< 0.125			
96-02607[1]		Lower ½	< 0.08	< 0.08	< 0.08			
96-02614	119: 2	Upper ½	< 0.097	< 0.092	< 0.0945			
96-02613		Lower ½	< 0.12	< 0.12	< 0.12			
96-02851	119: 3	Upper ½	< 0.2	< 0.2	< 0.2			
96-02615		Lower ½	< 0.078	< 0.07	< 0.074			
Solid composites: fusion digest			µCi/g	µCi/g	µCi/g	µCi/g	%	Ci
96-02617	118	N/A	< 0.1	< 0.1	< 0.1	< 0.0925	N/A	< 75.2
96-02618	119	N/A	< 0.09	< 0.08	< 0.085			

[1] *Two sets of results were reported. No explanation was given for the duplication of sample analysis.*

Table A-61. Tank 241-BX-112 Analytical Results: Total Beta Activity.

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: fusion digest			µCi/g	µCi/g	µCi/g	µCi/g	%	Ci
96-02608	118: 2	Upper ½	63	63.7	63.35	58.7	5.7	47,800
96-02607		Lower ½	61.6	59.9	60.75			
96-02614	119: 2	Upper ½	52.4	53.5	52.95			
96-02613		Lower ½	57.4	58	57.7			
Solid composites: fusion digest			µCi/g	µCi/g	µCi/g	µCi/g	%	Ci
96-02617	118	N/A	69.7	68.6	69.15	66.4	4.1	54,000
96-02618	119	N/A	63.3	64.1	63.7			

Table A-62. Tank 241-BX-112 Analytical Results: Strontium-90.

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
			µCi/g	µCi/g	µCi/g	µCi/g	%	Ci
Solids: fusion digest								
96-02608	118: 2	Upper ½	4.1	4.17	4.135	5.77	29.5	4,690
96-02607		Lower ½	4.39	3.6	3.995			
96-02614	119: 2	Upper ½	5.87	6.13	6			
96-02613		Lower ½	8.02	9.87	8.945			
Solid composite: fusion digest			µCi/g	µCi/g	µCi/g	µCi/g	%	Ci
96-02617	118	N/A	5.68	4.92	5.3	6.98	24.0	5,680
96-02618	119	N/A	9.69	7.62	8.655[QC:e]			

Table A-63. Tank 241-BX-112 Analytical Results: Total Alpha.

Sample Number	Sample Location	Segment Portion	Result	Duplicate	Sample Mean	Overall Mean	RSD (Mean)	Projected Inventory
Solids: fusion			µCi/g	µCi/g	µCi/g	µCi/g	%	Ci
Riser 2						0.179	17.6	147
S95T003755	AUG-048	Whole	0.183	0.170	0.1765			
96-3365	118: 1	Lower ½	0.182	0.198	0.190			
96-2605	118:1A	Lower ½	0.152	0.156	0.154			
96-2607	118: 2	Lower ½	0.165	0.169	0.167			
96-2609	118: 3	Lower ½	0.179	0.195	0.187			
Riser 3								
S95T003747	AUG-047	Upper 1/2	0.187	0.178	0.1825			
S95T003751		Lower 1/2	0.175	0.219	0.1970			
96-2611	119: 1	Lower ½	0.192	0.184	0.188			
96-2613	119: 2	Lower ½	0.189	0.189	0.189			
96-2615	119: 3	Lower ½	0.161	0.175	0.168			
Solid composites: fusion			µCi/g	µCi/g	µCi/g	µCi/g	%	Ci
96-2617	118	Composite	0.245	0.215	0.230	0.240	4.2	195
96-2618	119	Composite	0.242	0.258	0.250			
Liquids: fusion			µCi/mL	µCi/mL	µCi/mL	µCi/mL	%	Ci
96-2848	118: 1A	DL	< 0.002	< 0.002	< 0.002	< 0.00200	N/A	< 1.63
96-2850	118: 3	DL	< 0.002	< 0.002	< 0.002			

Table A-64. Tank 241-BX-112 Analytical Results: Differential Scanning Calorimetry. (3 sheets)

Sample Number	Core: Segment	Segment Portion	Run	Sample Weight	Transition 1		Transition 2		Transition 3	
Solids				mg	Peak Temp. (°C)	ΔH (J/g)	Peak Temp. (°C)	ΔH (J/g)	Peak Temp. (°C)	ΔH (J/g)
Riser 2										
S95003754[2]	AUG-048	Whole	1	29.92	107	897.6	249	3.8	--	--
			2	27.24	105	1,159	251	3.8	--	--
96-03366[3]	118: 1	Upper ½	1	33.08	100	932.9	250	6.6	--	--
			2	28.95	100	946.8	250	6.6	--	--
96-03365[3]		Lower ½	1	26.43	100	899.8	250	10.7	--	--
			2	29.78	100	901.2	240	10.4	--	--
96-02606[3]	118: 1A	Upper ½	1	12.05	100	1,039	250	17.2	--	--
			2	16.72	90	974.5	240	14.1	--	--
96-02605[3]		Lower ½	1	10.40	80	898.1	250	16.9	--	--
			2	24.72	100	1,141	250	11.8	--	--
96-02608[3]	118: 2	Upper ½	1	9.675	80	1,043	250	18.5	--	--
			2	16.86	90	1,074	250	16.2	--	--
96-02607[3]		Lower ½	1	8.609	80	855.4	250	13.1	--	--
			2	13.54	80	824.3	250	10.8	--	--
96-02609[3]	118: 3	Whole	1	11.61	90	950	250	15.8	--	--
			2	19.34	90	1,072	240	14.5	--	--

Table A-64. Tank 241-BX-112 Analytical Results: Differential Scanning Calorimetry. (3 sheets)

Sample Number	Core: Segment	Segment Portion	Run	Sample Weight	Transition 1		Transition 2		Transition 3	
Riser 3										
S95003746[1]	AUG-047	Upper ½	1	32.49	120	1,464	--	--	--	--
			2	11.16	109	1,391	---	--	--	--
S95003750[1]		Lower ½	1	24.29	114	1,333	--	--	--	--
			2	41.36	124	1,462	--	--	--	--
96-02612[3]	119: 1	Upper ½	1	18.04	90	960.5	140	132.1	270	23.2
			2	16.18	90	835.2	270	39.0	--	--
96-02611[3]		Lower ½	1	16.64	90	1,065	250	11.3	--	--
			2	12.74	90	981.0	270	9.3	--	--
96-02614[3]	119: 2	Upper ½	1	10.10	90	919.6	250	20.0	--	--
			2	13.75	90	1,013	250	17.2	--	--
96-02613[3]		Lower ½	1	14.55	90	1,060	260	9.7	--	--
			2	15.75	90	1,158	280	9.6	--	--
96-02616[3]	119: 3	Upper ½	1	18.62	90	1,154	250	12.5	--	--
			2	11.91	90	1,042	250	10.1	--	--
96-02615[3]		Lower ½	1	15.30	90	1,080	250	6.7	--	--
			2	16.88	90	1,022	250	5.6	--	--
Solid composites										
96-02617[3]	118	N/A	1	8.845	90	707.1	250	15.1	--	--
			2	12.72	90	1,014	250	14.4	--	--
96-02618[3]	119	N/A	1	12.90	90	1,050	250	14.0	--	--
			2	10.16	90	1,002	250	14.4	--	--

Table A-64. Tank 241-BX-112 Analytical Results: Differential Scanning Calorimetry. (3 sheets)

Sample Number	Core: Segment	Segment Portion	Run	Sample Weight	Transition 1		Transition 2		Transition 3	
Liquids				mg	Peak Temp. (°C)	ΔH (J/g)	Peak Temp. (°C)	ΔH (J/g)	Peak Temp. (°C)	ΔH (J/g)
96-02848[3]	118: 1A	DL	1	20.20	90	946.9	230	-45.5	--	--
			2	26.54	100	1,028	240	-46.3	--	--
96-02850[3]	118: 3	DL	1	11.51	80	1,065	150	35.2	230	31.7
			2	18.04	100	1,038	140	48.3	230	37.7

Notes:

[1]Perkin-Elmer
[2]Mettler
[3]Seiko

Table A-65. Tank 241-BX-112 Analytical Results: Weight Percent Water. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result		Duplicate		Sample Mean	Overall Mean	RSD (Mean)
Solids			% H_2O	Temp. Range (°C)	% H_2O	Temp. Range (°C)	% H_2O	% H_2O	%
Riser 2								63.7	1.32
S95003754[2]	AUG-048	Whole	65.42	40-120	65.5	40-120	65.5		
96-03366[3]	118: 1	Upper ½	56.9	30-150	56.1	30-150	56.5		
96-03365[3]		Lower ½	53.7	30-160	54.6	30-150	54.2		
96-02606[3]	118: 1A	Upper ½	66.1	30-130	65.6	30-140	65.9		
96-02605[3]		Lower ½	67.5	30-130	66.9	30-130	67.2		
96-02608[3]	118: 2	Upper ½	67.1	30-110	67.8	30-110	67.5		
96-02607[3]		Lower ½	63.3	30-140	60.7	30-140	62.0		
96-02609[3]	118: 3	Whole	63.9	30-150	66.5	30-140	65.2		
Riser 3									
S95003746[1,4] November	AUG-047	Upper ½	55.59	28-180	62.30	28-160	60.1		
S95003746[1,4] December			60.72	35-150	61.77	35-160			
S95003750[1]		Lower ½	63.37	32-160	63.52	25-180	63.5		
96-02612[3]	119: 1	Upper ½	63.7	30-140	58.7	30-140	61.2		
96-02611[3]		Lower ½	63.7	30-140	66.1	30-150	64.9		
96-02614[3]	119: 2	Upper ½	61.5	30-140	63.5	30-140	62.5		
96-02613[3]		Lower ½	65.7	30-140	64.4	30-150	65.1		
96-02616[3]	119: 3	Upper ½	65.1	30-120	66.0	30-130	65.5		
96-02615[3]		Lower ½	64.0	30-130	65.8	30-140	64.9		

Table A-65. Tank 241-BX-112 Analytical Results: Weight Percent Water. (2 sheets)

Sample Number	Core: Segment	Segment Portion	Result		Duplicate		Sample Mean	Overall Mean	RSD (Mean)
Solid composites									
96-02617[3]	118	N/A	61.3	30-120	61.8	30-120	61.6	63.6	3.1
96-02618[3]	119	N/A	66.5	30-150	64.6	30-150	65.6		
Liquids									
96-02848[3]	118: 1A	DL	63.3	30-150	65.5	30-170	64.4	67.6	4.7
96-02850[3]	118: 3	DL	70.4	30-130	71.1	30-130	70.8		

Notes:
[1]Perkin-Elmer
[2]Mettler
[3]Seiko
[4]Sample was rerun because of poor reproducibility of analytical results.

Table A-66. Tank 241-BX-112 Analytical Results: Density.

Sample Number	Core: Segment	Sub-Segment	Result	Duplicate	Mean	Overall Mean	RSD (mean)
Solids			g/mL	g/mL	g/mL	g/mL	%
Riser 3						1.31	1.5
S95003745	AUG-047	Upper ½	1.350	---	1.350		
S95003749		Lower ½	1.310	--	1.310		
96-02611	119: 1	Lower ½	1.34	1.34	1.34		
96-02613	119: 2	Lower ½	1.25	1.33	1.29		
96-02615	119: 3	Lower ½	1.28	1.28	1.28		
Riser 2							
S95003753	AUG-048	Whole	1.310	--	1.310		
96-02605	118: 1A	Lower ½	1.24	1.28	1.26		
96-03366	118: 1	Upper ½	1.34	1.34	1.34		
96-03365		Lower ½	1.31	1.27	1.29		
96-02607	118: 2	Lower ½	1.31	1.30	1.31		
96-02609	118: 3	Whole	1.27	1.34	1.31		
Solid composites			g/mL	g/mL	g/mL	g/mL	%
96-02617	118	N/A	1.32	1.31	1.31	1.32	0.2
96-02618	119	N/A	1.31	1.32	1.31		
Liquids			g/mL	g/mL	g/mL	g/mL	%
96-02848	118: 1A	DL	1.16	1.16	1.16	1.18	1.9
96-02850	118: 3	DL	1.19	1.22	1.20		

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APPENDIX B

RESULTS OF HYDROSTATIC HEAD FLUID CONTAMINATION CHECK FOR SINGLE-SHELL TANK 241-BX-112

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B.0 RESULTS OF HYDROSTATIC HEAD FLUID CONTAMINATION CHECK FOR SINGLE-SHELL TANK 241-BX-112

B.1 INTRODUCTION AND ANALYTE TABLE DESCRIPTION

Appendix B reports the results of the wash water contamination check for the 1995 core sampling event. Lithium and bromide were measured to detect any contamination of the waste samples by the wash water. Table B-3 provides an analysis of corrected values based on the concentration of Li and Br. For information on how these corrections were calculated, see Winkelman (1996).

The "Sample Number" column in each of the data tables lists the laboratory sample identification number. Sampling rationale, locations, and a description of the sampling event are discussed in Section 3.0.

The "Core:Segment" column specifies the core and segment from which the sample was derived.

The "Subsegment" column specifies the segment portion (subsegment) from which the sample was taken. This can be the entire segment (whole), the drainable liquid portion (DL), upper or lower half segment portions, or quarter segment portions (A refers to top quarter, B refers to second quarter).

The "Result" and "Duplicate" columns are self-explanatory. The "Sample Mean" column lists the average of the result and duplicate values. If the result and duplicate values were both detected, or one of the two values is detected and the other non-detected, then the mean is expressed as a detected value. If the result and duplicate values were both non-detected, then the mean is expressed as non-detected. The result and duplicate values, as well as the result/duplicate means, are reported in the tables exactly as found in the original laboratory data package. The means may appear to have been rounded up in some cases and rounded down in others. This is because the analytical results given in the tables may have fewer significant figures than originally reported, not because the means were incorrectly calculated.

The four quality control parameters assessed on the tank 241-BX-112 samples were standard recoveries, spike recoveries, duplicate analyses (RPDs), and blanks. These were summarized in Section 5.1.2. More specific information is provided in the following appendix tables. Sample and duplicate pairs in which any of the QC parameters were outside their specified limits are superscripted in the "Sample Mean" column as follows:

QC:a -- indicates that the standard recovery was below the QC range.
QC:b -- indicates that the standard recovery was above the QC range.
QC:c -- indicates that the spike recovery was below the QC range.
QC:d -- indicates that the spike recovery was above the QC range.
QC:e -- indicates that the RPD was greater than the QC limit range.
QC:f -- indicates blank contamination.

Table B-1. Tank 241-BX-112 Analytical Results: Lithium.

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean
Solids: fusion digest			µg/g	µg/g	µg/g
96-03366	118: 1	Upper ½	< 60	< 59	< 59.5
96-02606	118: 1A	Upper ½	292	284	288
96-02605		Lower ½	202	188	195
96-03365		Lower ½	< 71	< 71	< 71
96-02608	118: 2	Upper ½	< 91	< 82	< 86.5
96-02849		Upper ½	< 97	< 92	< 94.5
96-02607		Lower ½	< 89	< 96	< 92.5
96-02609	118: 3	Whole	< 130	< 93	< 111.5[QC:e]
96-02612	119: 1	Upper ½	< 79	< 78	< 78.5
96-02611		Lower ½	< 81	< 86	< 83.5
96-02614	119: 2	Upper ½	< 100	< 85	< 92.5
96-02613		Lower ½	< 97	< 110	< 103.5
96-02616	119: 3	Upper ½	115	109	112
96-02851		Upper ½	< 88	< 93	< 90.5
96-02615		Lower ½	< 99	< 93	< 96
Solids: water digest			µg/g	µg/g	µg/g
96-02608	118: 2	Upper ½	37	36	36.5
96-02607		Lower ½	14	14	14
96-02614	119: 2	Upper ½	11	11	11
96-02613		Lower ½	29.1156	29.2615	29.1885
Solid composites: fusion			µg/g	µg/g	µg/g
96-02617	118	N/A	119	119	119
96-02618	119	N/A	< 71	< 58	< 64.5
Solid composites: water digest			µg/g	µg/g	µg/g
96-02617	118	N/A	105.602	106	105.801
96-02618	119	N/A	29.7305	29.3136	29.522
Drainable liquids			µg/mL	µg/mL	g/mL
96-02848	118: 1A	DL	374.8	374.3	374.55
96-02850	118: 3	DL	35.4	36	35.7

Table B-2. Tank 241-BX-112 Analytical Results: Bromide.

Sample Number	Core: Segment	Segment Portion	Result	Duplicate	Sample Mean
Solids: water digest			**µg/g**	**µg/g**	**µg/g**
96-03366	118: 1	Upper ½	< 700	< 700	< 700
96-03365		Lower ½	< 800	< 800	< 800
96-02606	118: 1A	Upper ½	2,500	2,500	2,500
96-02605		Lower ½	1,500	1,400	1,450
96-02608	118: 2	Upper ½	< 800	< 800	< 800
96-02607		Lower ½	< 800	< 800	< 800[QC:d]
96-02609	118: 3	Whole	< 800	< 800	< 800
96-02612	119: 1	Upper ½	< 800	< 800	< 800
96-02611		Lower ½	< 800	< 800	< 800
96-02614	119: 2	Upper ½	< 800	< 800	< 800
96-02613		Lower ½	< 800	< 800	< 800
96-02616	119: 3	Upper ½	1,400	1,300	1,350
96-02615		Lower ½	< 800	< 800	< 800
Solid composites: water digest			**µg/g**	**µg/g**	**µg/g**
96-02617	118	Composite	840	1,000	920
96-02618	119	Composite	< 800	< 700	< 750
Drainable liquids			**µg/mL**	**µg/mL**	**µg/mL**
96-02848	118: 1A	DL	3,800	3,700	3,750
96-02850	118: 3	DL	300	< 300	300

Table B-3. Evaluation of Hydrostatic Head Fluid Intrusion Into BX-112 Samples.

Sample Description	PNNL Sample #	Percent Water (TGA)	Percent of H_2O from HHF		Corrected Moisture Content (based on Br)
			Li	Br	
C118 S1AA	96-02605	67.2	13.8	8.9	n/a
C118 S1AB	96-02606	65.85	20.8	15.7	62.1
C118 Comp	96-02617	61.6	9.2	6.2	n/a
C119 S3B	96-02616	65.6	8.1	8.5	n/a
C118 S1A DL	96-02848	64.4	23.9	20.8	59.1
C119 S3 DL	96-02850	70.8	2.0	1.5	n/a

APPENDIX C

HISTORICAL SAMPLING EVENTS

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C.0 ANALYTICAL RESULTS FROM HISTORICAL SAMPLING EVENTS

Appendix C presents analytical results from the historical sampling events of tank 241-BX-112. Because the tank has been inactive since 1977, results from the sampling events (presented in this appendix) could be representative of the current tank contents. Data from the sampling events have been included in this appendix for informational purposes only. A description of the sampling events can be found in the respective source document, which is listed in the footnotes to each table.

Table C-1. Sample from Tank 241-BX-112[1]. (2 sheets)

Chemical and Physical Characterization of Core Segments			
September 18, 1980			
Received: June 11, 1979			
Physical Data			
Component	**Segment 1**	**Segment 2**	**Segment 3**
Visible	Light yellow in color, having a consistency of soft putty.		
Bulk Density (g/mL)	1.23	1.22	1.21
%H_2O	63.0	62.0	63.0
Chemical Analysis			
Component	**Water Soluble**	**Water Insoluble**	**Lab Unit**
Al^{3+}	NR	3.9	%
Bi^{3+}	< 0.01	3.8	%
Cl^-	0.252	NR	%
CO_3^{2-}	< 0.2	NR	%
Cr^{3+}	0.01	0.2	%
F^-	0.26	1.8	%
Fe^2	NR	0.6	%
Hg^{2+}	NR	0.45	%
Cd^{2+}	NR	< 0.005	%
La^{3+}	NR	0.474	%
Mn^{4+}	NR	0.02	%
Ni^{2+}	< 0.001	4.4	%
Pb^{2+}	< 0.003	NR	%
NO_3^-	9.2	5.0	%
Na^+	5.4	5.8	%
OH^-	pH 7	NR	%
PO_4^{3-}	6.2	4.80	%
SO_4^{2-}	0.55	< 20	%
Si^{4+}	0.08	0.88	%
Zr^{4+}	< 0.1	NR	%
TOC	0.00122	0.00893	g/g

Table C-1. Sample from Tank 241-BX-112[1]. (2 sheets)

Chemical and Physical Characterization of Core Segments			
September 18, 1980			
Received: June 11, 1979			
Radiological Analysis			
Component	Water Soluble	Water Insoluble	Lab Unit
U	7.92E-07	0.00140	g/g
^{239}Pu	2.97E-04	7.46E-06	g/g
^{241}Am	NR	2.03E-08	g/g
$^{89/90}Sr$	0.00319	20.5	μCi/g
^{137}Cs	6.98	59.7	μCi/g

Notes:

NR - Not requested

Due to the absence of QA/QC, data in this table should be used with caution.

[1]Bratzel (1980)

Table C-2. Sample from Tank 241-BX-112[1]. (2 sheets)

Chemical Characterization			
March 16, 1990			
Sample #R6042			
Component	**Concentration**	**Units**	**Wt%**
Physical Data			
Density	1.20	g/mL	---
%H_2O	---	---	74.8
pH	10.4	---	---
Chemical Analysis			
Al	0.00965	M	0.02
Bi	0.00147	M	0.03
Cr	0.00609	M	0.03
Hg	0	M	0.00
K	0.0201	M	0.07
Mo	0.0043	M	0.03
Na	3.46	M	6.69
P	0.123	M	0.32
Sr	5.85e-05	M	0.00
U	0.769	g/L	0.06
Cl	0.052	M	0.16
F	0.0586	M	0.09
NO_2	0.649	M	2.51
NO_3	2	M	10.43
PO_4	0.183	M	---
SO_4	0.0818	M	0.66
OH	0.0732	M	---
CO_3	0.348	M	1.76
TOC	3.73	g/L Carbon	---

Table C-2. Sample from Tank 241-BX-112[1]. (2 sheets)

Chemical Characterization			
March 16, 1990			
Sample #R6042			
Radiological Analysis			
Supernate			
Total alpha	9.48	μCi/L	---
Total beta	69,000	μCi/L	---
^{137}Cs (water)	51,000	μCi/L	---
^{137}Cs (acid)	49,000	μCi/L	---
$^{89/90}$Sr	853	μCi/L	---
$^{239/240}$Pu	11.5	μCi/L	---
^{241}Am	1.2	μCi/L	---

Note:

Due to the absence of QA/QC, data in this table should be used with caution.

[1]Weiss (1990)

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