Sta.4.②

AUG 20 1997

ENGINEERING DATA TRANSMITTAL

1. EDT 617664

2. To: (Receiving Organization) Distribution	3. From: (Originating Organization) Data Assessment and Interpretation	4. Related EDT No.: N/A
5. Proj./Prog./Dept./Div.: Tank 241-AN-104/Waste Management/DAI/Process Engineering	6. Design Authority/ Design Agent/Cog. Engr.: T. A. Hu	7. Purchase Order No.: N/A
8. Originator Remarks: This document is being released into the supporting document system for retrievability purposes.		9. Equip./Component No.: N/A
		10. System/Bldg./Facility: 241-AN-104
11. Receiver Remarks: For release.	11A. Design Baseline Document? [] Yes [X] No	12. Major Assm. Dwg. No.: N/A
		13. Permit/Permit Application No.: N/A
		14. Required Response Date: 05/08/97

15. DATA TRANSMITTED

(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	(F) Approval Designator	(G) Reason for Transmittal	(H) Originator Disposition	(I) Receiver Disposition
1	HNF-SD-WM-ER-690	N/A	0	Tank Characterization Report for Double-Shell Tank 241-AN-104	N/A	2	1	1

16. KEY

Approval Designator (F)	Reason for Transmittal (G)		Disposition (H) & (I)	
E, S, Q, D or N/A (see WHC-CM-3-5, Sec.12.7)	1. Approval 2. Release 3. Information	4. Review 5. Post-Review 6. Dist. (Receipt Acknow. Required)	1. Approved 2. Approved w/comment 3. Disapproved w/comment	4. Reviewed no/comment 5. Reviewed w/comment 6. Receipt acknowledged

17. SIGNATURE/DISTRIBUTION
(See Approval Designator for required signatures)

(G) Reason	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN	(G) Reason	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN
		Design Authority				1	1	R.J. Cash	[signature]	8/19/97	S7-14
		Design Agent				1	1	N.W. Kirch	[signature]	8/19/97	R2-11
2	1	Cog. Eng. T.A. Hu	[signature]	8/19/97		X 2	1	J.G. Kristofzski	[signature]	8/19/97	R2-12
2	1	Cog. Mgr. K.M. Hall	Kathleen M. Hall	8/19/97			8/19/97				
		QA									
		Safety									
		Env.									

18.	19.	20.	21. DOE APPROVAL (if required)
A.E. Young [signature] 5-8-97 Signature of EDT Originator / Date	N/A Authorized Representative for Receiving Organization / Date	K.M. Hall [signature] 8/20/97 Design Authority/ Cognizant Manager / Date	Ctrl. No. [] Approved [] Approved w/comments [] Disapproved w/comments

Tank Characterization Report for Double-Shell Tank 241-AN-104

T. A. Hu
Lockheed Martin Hanford Corp., Richland, WA 99352
U.S. Department of Energy Contract DE-AC06-87RL10930

EDT/ECN: EDT-617664 UC: 2070
Org Code: 74620 Charge Code: N4G4C
B&R Code: EW 3120074 Total Pages: 312

Key Words: Waste Characterization, Double-Shell Tank, DST, Tank 241-AN-104, Tank AN-104, AN-104, AN Farm, Tank Characterization Report, TCR, Waste Inventory, TPA Milestone M-44

Abstract: This document summarizes the information on the historical uses, present status, and the sampling and analysis results of waste stored in Tank 241-AN-104. This report supports the requirements of the Tri-Party Agreement Milestone M-44-10.

Release Approval 8/20/97 Date

DATE: HANFORD RELEASE ID: 2
STA: 4
AUG 20 1997
Release Stamp

Approved for Public Release

Tank Characterization Report for Double-Shell Tank 241-AN-104

T. A. Hu
Lockheed Martin Hanford Corporation

L. W. Shelton, Jr.
Numatec Hanford Corporation

T. L. Welsh
B&W Protec, Inc.

Date Published
August 1997

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Project Hanford Management Contractor for the
U.S. Department of Energy under Contract DE-AC06-96RL13200

CONTENTS

CONTENTS (Continued)

CONTENTS (Continued)

LIST OF FIGURES

LIST OF TABLES

LIST OF TABLES (Continued)

LIST OF TABLES (Continued)

LIST OF TABLES (Continued)

LIST OF TABLES (Continued)

LIST OF TABLES (Continued)

LIST OF TABLES (Continued)

LIST OF TERMS

ANOVA	analysis of variance
Btu/hr	British thermal units per hour
CI	confidence interval
cm	centimeter
DQO	data quality objective
DSC	differential scanning calorimetry
ft	feet
ft^2	square feet
ft^3	cubic feet
GEA	gamma energy analysis
g	gram
g C/L	grams of carbon per liter
g/cm^3	grams per cubic centimeter
g/L	grams per liter
g/mL	grams per milliliter
HDW	Hanford defined waste
IC	ion chromatography
ICP	inductively coupled plasma spectroscopy
in.	inch
J/g	joules per gram
kg	kilogram
kgal	kilogallon
kL	kiloliter
kW	kilowatt
LFL	lower flammability limit
LH	lower half
LL	lower limit
m	meter
m^2	square meters
m^3	cubic meters
M	moles per liter
mL	milliliter
mg	milligram
mm	millimeter
mR/hr	millirems per hour
NA	not available
n/a	not applicable
NR	not reported

LIST OF TERMS (Continued)

PHMC	Project Hanford Management Contractor
ppm	parts per million
PUREX	Plutonium Uranium Extraction (Plant)
QC	quality control
REML	restricted maximum likelihood estimation methods
RGS	retained gas sampler
RPD	relative percent difference
SMM	supernatant mixing model
SMMA2	A solid layer of A2 waste calculated by the SMM model where A2 is the concentrate of the 1981 to 1988 Evaporator Campaign
SpG	specific gravity
TCR	tank characterization report
TGA	thermogravimetric analysis
TIC	total inorganic carbon
TLM	tank layer model
TOC	total organic carbon
TWRS	Tank Waste Remediation System
UH	upper half
UL	upper limit
VFI	void fraction instrument
W/Ci	watts per curies
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	microgram
μg/mL	micrograms per milliliter
μgC/g	micrograms of carbon per gram
μg/g	micrograms per gram
μmole/L	micromole per liter

1.0 INTRODUCTION

A major function of the Tank Waste Remediation System (TWRS) is to characterize wastes in support of waste management and disposal activities at the Hanford Site. Analytical data from sampling and analysis, along with other available information about a tank, are compiled and maintained in a tank characterization report (TCR). This report and its appendixes serve as the TCR for double-shell tank 241-AN-104.

The objectives of this report are: 1) to use characterization data in response to technical issues associated with tank 241-AN-104 waste and 2) to provide a standard characterization of this waste in terms of a best-basis inventory estimate. Section 2.0 summarizes the response to technical issues, Section 3.0 provides the best-basis inventory estimate, Section 4.0 makes recommendations regarding safety status and additional sampling needs. The appendixes contain supporting data and information. This report also supports the requirements of the *Hanford Federal Facility Agreement and Consent Order* (Ecology et al. 1996), Milestone M-44-10.

1.1 SCOPE

The characterization information in this report originated from sample analyses and known historical sources. Although only the results of recent sample events will be used to fulfill the requirements of the data quality objectives (DQOs), other information can be used to support (or question) conclusions derived from these results. Appendix A provides historical information about tank 241-AN-104 including surveillance information, records pertaining to waste transfers and tank operations, and expected tank contents derived from a process knowledge model. Appendix B summarizes the recent sampling events (see Table 1-1), vapor sniff test results, and sample data obtained before 1989, and the sampling results. The results of the 1996 sampling events, reported in the 222-S Laboratory data package (Steen 1997), satisfied the data requirements specified in the tank sampling and analysis plan for this tank (Winkleman 1996). Also seven segments from the 1996 core sampling are selected as retained gas samples. From the study of retained gas samples, tank gas composition and quantities of the retained gas are estimated by Shekarriz et al. (1997). Appendixes B and C report the statistical analysis and numerical manipulation of data used in issue resolution. Appendix D contains the evaluation to establish the best basis for the inventory estimate. Appendix E is a bibliography resulting from an in-depth literature search of all known information sources applicable to tank 241-AN-104 and its respective waste types. The reports listed in Appendix E can be found in the Tank Characterization Safety and Resource Center.

Table 1-1. Summary of Recent Sampling.

Sample/Date[1]	Phase	Location	Segmentation	% Recovery
Core 164: total of 21 segments sampled. Segment 6 and 21 failed. 8/8/96 to 8/16/96	Solid liquid and retained gas	Riser 12A	Solid in half segment, liquid as whole. Retained gas sampler in segment 18.	Most segments are 100% recovered except segment 2, 3, 4, 10, and 18 ranged 79% and 99%.
Core 163: total of 21 segments sampled. 9/9/96 to 9/11/96	Solid liquid and retained gas	Riser 10A	Solid in half segment. liquid as whole and retained gas segment 3, 13, 15, 17, 19, and 21.	There are 11 segments with 100% recovery. The rest of the segments ranged from 83% and 94% except segment 1 is 12%.
Vapor sample 9/9/96 to 9/9/96	Gas	Tank headspace, risers 12A and 10A, 6.1 m (20 ft) below top of risers.	n/a	n/a

Notes:

n/a = not applicable

[1]Dates are in the month/day/year format.

1.2 TANK BACKGROUND

Tank 241-AN-104 is located in the 200 East Area AN Tank Farm on the Hanford Site. The tank went into service in 1982 and received water. The tank received double-shell slurry feed waste from tank 241-AW-102 in the fourth quarter of 1982 and the first quarter of 1984. In the fourth quarter of 1983, the tank received PUREX waste. In the first quarter of 1984, waste was sent to tanks 241-AZ-102 and 241-AN-105. In the third quarter of 1984, 82 kgal of flush water was added to the tank, and waste was sent to tank 241-AN-103. From the fourth quarter to the second quarter of 1985, the tank received double-shell slurry feed waste from tank 241-AW-102 via the evaporator (Agnew et al. 1997b). The last transfer for this tank was a small amount of flush water added in 1996.

Table 1-2 summarizes a description of tank 241-AN-104. The tank has an operating capacity of 4,390 kL (1,160 kgal) and contains an estimated 3,994 kL (1,055 kgal) of double-shell slurry feed waste (Hanlon 1997). This tank is still active and when waste transfers take place, the data shown here will be changed. The tank is on the Flammable Gas Watch List (Public Law 101-510).

Table 1-2. Description of Tank 241-AN-104.

TANK DESCRIPTION	
Type	Double-shell
Constructed	1980 to 1981
In-service	1982
Diameter	22.9 m (75.0 ft)
Operating depth	10.7m (35 ft)
Capacity	4,390 kL (1,160 kgal)
Bottom shape	Flat
Ventilation	Active
TANK STATUS	
Waste classification	Double-shell slurry feed[1]
Total waste volume	3,994 kL (1,055 kgal)
Supernatant volume[2]	2,273 kL (600.5 kgal)
Saltcake volume[2]	21 kL (5.5 kgal)
Sludge volume	1700 kL (449 kgal)
Drainable interstitial liquid volume	182 kL (48 kgal)
Waste surface level (May 31, 1997)	974 cm (383.6 in.)
Temperature (March 1994 to May 1997)	21.7°C (71.06°F) to 51.2 °C (126.16 °F)
Integrity	Sound
Watch List	Flammable gas
SAMPLING DATE	
Core samples and tank headspace flammability	August/September 1996
SERVICE STATUS	
Active[3]	1982 to present

Notes:

[1]Double-shell slurry feed is waste that exceeds the sodium aluminate saturation boundary in the evaporator without exceeding the receiver tank composition limit. This waste contains less than 10 g/L organic and is considered noncomplexed waste.

[2]Based on extrusion results of 1996 core samples (see Appendix D).

[3]The data shown in the table will be changed when waste transfer occurs.

2.0 RESPONSE TO TECHNICAL ISSUES

Four technical issues have been identified for tank 241-AN-104 (Brown et al. 1997). They are:

- Safety screening: Does the waste pose or contribute to any recognized potential safety problems?
- Flammable gas: Data from the core samples are needed to provide an understanding of the tank contents so that 1) insight may be obtained on the mechanisms for gas generation, retention, and release; 2) models of waste behavior can be developed to support safety analysis and development of mitigation methods; 3) simulants for waste studies can be developed; and 4) modeling of the gas releases and subsequent potential for ignition in the headspace can be performed to support hazard analyses.
- Organic solvents screening: Does an organic solvent pool exist that may cause a fire or ignition or organic solvents in entrained waste solids?
- Privatization: Do the September 1996 core samples taken from tank 241-AN-104 and the subsequent laboratory analysis meet the needs of the privatization low-activity waste DQO (Jones and Wiemers 1996)?

The tank 241-AN-104 characterization plan (Winkelman 1996b) and the analysis plan (Winkleman 1996a) integrate all applicable DQOs and describe the sampling and analysis used to address the above issues. Data from the recent analysis of two core samples, tank headspace flammability measurements, and historical information were the means used to respond to the issues. This response is described in the sections below. For sample and analysis data for tank 241-AN-104, see Appendix B.

2.1 SAFETY SCREENING

The data needed to screen tank 241-AN-104 waste for potential safety problems is documented in *Tank Safety Screening Data Quality Objective* (Dukelow et al. 1995). The potential safety problems include exothermic conditions in the waste, flammable gases in the waste and/or tank headspace, and criticality conditions in the waste. Each condition is addressed separately.

2.1.1 Exothermic Conditions (Energetics)

The first requirement outlined in Dukelow et al. (1995) is to ensure there are not sufficient exothermic constituents in tank 241-AN-104 to cause a safety hazard. Because of this requirement, energetics in tank 241-AN-104 waste were evaluated. The safety screening DQO required that solid samples be tested for energetics every 24 cm (9.5 in.) to determine whether the energetics exceed the safety threshold limit.

Historically, evidence exists showing exothermic behavior in the waste. Waste transfer records indicate the major waste type expected in the tank is double-shell slurry feed (Agnew et al. 1997b). The waste types are expected to have organic constituents (Sasaki 1984). A sample analysis taken in 1984 also showed evidence of exotherms (Mauss 1984).

The 1996 sampling results obtained using differential scanning calorimetry (DSC) indicated that exotherms were well below notification limits of 480 J/g on a dry weight basis with the maximum value of 175 J/g (Steen 1996). Furthermore, the upper limits (UL) of the one-sided 95 percent confidence interval (CI) for the DSC results were below notification limit except for one sample from segment 16, upper half of core 163. The DSC results in the dry weight basis of this sample and a duplicate are 204 and 62.8 J/g, and the resulting UL of the one-sided 95 percent CI is 579 J/g. Because the DSC results of the sample and a duplicate are well below the criteria of 480 J/g on a dry weight basis, no rerun was performed on this sample. These results suggest that no energetic concern exists in this tank for the waste. However, the waste does generate and retain flammable gases which are released episodically at various intervals (see Section 2.2).

2.1.2 Flammable Gas

Vapor phase measurements, which were taken in the tank headspace during the core sampling in September 1996, indicated 0.013 percent of the lower flammability limit (LFL). This value is well below the concern level of 25 percent LFL. Appendix B provides data from these vapor phase measurements. Data obtained from on-line gas monitors are summarized in Section 2.2.

2.1.3 Criticality

The safety threshold limit is 1 g ^{239}Pu per liter of waste. Assuming all alpha is from ^{239}Pu, with a maximum density of 1.76 g/mL for salt slurry, the safety threshold limit is equivalent to 34.9 μCi/g of salt slurry and 61.5 μCi/mL of liquid of alpha activity. The core samples were analyzed according to Dukelow et al. (1995).

Waste samples were tested for total alpha activity for each core sample. Concentrations in all samples were well below this limit with the maximum value of 0.0558 μCi/g. Additionally, as required by the DQO, the UL of the one-sided 95 percent CI for these results was less than 37 μCi/g with the maximum value of 0.0849 μCi/g. Appendix C describes the method used to calculate confidence limits. The data show that no criticality concern exists for the waste in this tank.

2.2 FLAMMABLE GAS TANK SAFETY EVALUATION

The purpose of the flammable gas tank safety evaluation is to obtain data to support tank behavior models needed for making safety analyses, to support evaluations of mechanisms for gas production and release, and to develop mitigation methods (McDuffie and Johnson 1995). These data needs were met by the 1996 core sampling event which included the analytical results of core segments samples in the solid/liquid phase (Steen 1997), the retained gas composition and quantities (Shekarriz et al. 1997) from core segments of the retained gas sampler (RGS), and by tank headspace monitoring data (Wilkins et al. 1997). Using analytical data and available models, a calculation was carried out on the hydrogen release rate at steady state on the tank headspace (Hu 1997) to evaluate the flammable gas hazard at various ventilation rates for all double-shell tanks.

In the RGS study (Shekarriz et al. 1997), the total volume of gas in the vapor phase is 212 m^3 with 163 m^3 dissolved in the liquid phase. The three major gases in the vapor phase are hydrogen (98.6 m^3), nitrogen (69.9 m^3), and nitrous oxide (40.5 m^3). About 143 m^3 of ammonia is dissolved in the liquid phase, and 0.048 m^3 in the vapor phase. The remaining gases include methane and other hydrocarbons. For detailed gas compositions in tank 241-AN-104, see Appendix B.

The extraction results of RGS segments (Shekarriz et al. 1997) show the insoluble gases were retained primarily in the lower, nonconvective layer. Based on the estimated solubilities and RGS measurements of gas concentrations, about 5.7 percent by volume (in-situ) of the nonconvective layer was filled with free gas, and 0.5 percent by volume (in-situ) of the convective (upper) layer was filled with free gas. The void fractions calculation, based on RGS data, were in close agreement with the void fraction instrument (VFI) results for all segments except segment 21 which had no VFI data. The maximum void fraction measured with RGS was approximately 13.3 percent from segment 21 of core 163. The x-ray imaging method provides an estimate of waste density for the RGS segments. The density is 1.41 g/mL for the supernatant layer, and 1.72 to 2.09 g/mL in the nonconvective layer.

Waste level drops in tank 241-AN-104 were observed in past years (Reynolds 1994) indicating the gas release behavior for this tank. Recently, a standard hydrogen monitoring system was installed in the tank, and the hydrogen concentrations of several gas release events have been recorded subsequently. The maximum hydrogen concentration (Wilkins et al. 1997) of the gas release events were 3,000 ppm on November 6, 1994, 2,088 ppm on November 16, 1995, 480 ppm on August 3, 1995, 3,200 ppm on October 2, 1995, 1,000 ppm on October 5, 1995, 5,000 ppm on October 8, 1995 and 6,109 ppm on May 3, 1996. No concentrations reached 25 percent of LFL which is equivalent to a hydrogen concentration of 9,300 ppm. Although gas release events were observed, no net waste level increases have been noticed in the past three years.

Based on the study of real waste samples and waste simulants (Pederson and Bryan 1996), three major mechanisms are identified that generate the hydrogen gas: radiolysis of water and organic compounds, chemical reaction (thermolysis), and corrosion of carbon steel. According to the calculation of Hu (1997), the hydrogen generation rate for tank 241-AN-104 is 242 L per day: 71 percent from radiolysis, 17 percent from thermolysis, and 12 percent from corrosion. In the calculation, the analytical results (Steen 1997) of total organic carbon (TOC), NO_3, NO_2, Al, heat load (radionuclide inventory), bulk density, and moisture content are used to determine the hydrogen generation rate. This model-derived hydrogen generation rate agrees reasonably with the field-data derived hydrogen generation rate of 178 L per day.

If active ventilation is lost, Hu (1997) shows that it takes 59 days to reach 25 percent of the LFL in the headspace, and the hydrogen concentration can reach as high as 3.8 percent. The evaluation also shows the required minimum ventilation rate is 0.63 cubic feet per minute to keep the headspace below the 25 percent LFL.

2.3 ORGANIC SOLVENTS SCREENING

The data required to support the organic solvent screening issue are documented in the Defense Nuclear Facility Safety Board 93-5 implementation plan (DOE-RL 1996). A new DQO is currently being developed to address the organic solvent issue. In the interim, tanks are to be sampled for total nonmethane hydrocarbon to determine whether an organic extractant pool greater than 1 m^2 (10.8 ft^2) exists (Cash 1996). The purpose of this assessment is to ensure that an organic solvent pool fire or ignition of organic solvents cannot occur. Vapor analyses for total nonmethane organic hydrocarbon have not been conducted. Vapor samples are scheduled for fiscal year 1999. However, the size of the organic extractant pool will be estimated and reported by the Organic Safety Project, based on the sniff test TOC results, the tank headspace temperature, and tank ventilation rate.

2.4 PRIVATIZATION

Tank 241-AN-104 is in the scope of the privatization low-activity waste DQO (Jones and Wiemers 1996). However, sampling was performed before this DQO was issued. The sampling and analytical results are being assessed by the privatization program to determine whether the 1996 core sampling results meet the needs of the privatization low-activity waste DQO. Results will be reported in a future revision to this report or additional sampling and analyses may be required.

2.5 OTHER TECHNICAL ISSUES

A factor in assessing tank safety is the heat generation and temperature of the waste. Heat is generated in the tanks from radioactive decay. An estimate of the tank heat load can be calculated based on the results from the 1996 sample event. The heat load value calculated was 11.5 kW (39,150 Btu/hr) (see Table 2-1). The heat load estimate, based on the tank process history, was 6.5 kW (22,200 Btu/hr) (Agnew et al. 1997a). The heat load estimate, based on the tank headspace temperature, was 11.7 kW (40,000 Btu/hr) (Kummerer 1995). These estimates are well below the maximum heat load of 20.5 kW (70,000 Btu/hr) allowed for double-shell tanks (Heubach 1996).

Table 2-1. Heat Load for Tank 241-AN-104 Based on Radionuclide Content.

Radionuclide[1]	Specific Activity	Projected Inventory	Decay Heat Rate	Heat Load[2]
	μCi/mL	Ci	W/Ci	W
^{137}Cs	470	2,320,000	0.00473	10,972
$^{89/90}Sr$	7.42	93,800	0.00669	628
Total				11,600

Notes:

[1]Includes daughter radionuclides.

[2]Only analytes contributing to the heat generation rate above 100 W are included.

2.6 SUMMARY

The results of all analyses performed to address potential safety issues showed that no primary analyte exceeded safety decision threshold limits. The analyses for flammable gas was completed to support tank behavior models needed for making safety analyses, to support evaluations of mechanisms for gas production and release, and to obtain data to develop mitigation methods. Table 2-2 shows the results of the analyses.

Table 2-2. Summary of Safety Screening and Historical Flammable Gas.

Issue	Sub-issue	Result
Safety screening	Energetics	All exothermic reaction were well below 480 J/g in dry weight basis. Highest 95% CI UL = 579 J/g because of the high RPD of the sample and duplicate results of 204 and 62.8 J/g.
	Flammable gas	Vapor measurement was reported at 0.013% of LFL (combustible gas meter).
	Criticality	All analyses were well below 39.5 μCi/g total alpha (within 95% confidence limit on each sample).
Flammable gas	Mechanism of gas generation, retention, and released	Preliminary assessments of flammable gas generation, retention, and release mechanisms; and waste behavior modeling results are reported in Meyer et al. (1997)
	Waste behavior model	Additional evaluations to assess potential impacts and waste behavior in tank 241-AN-104 are in progress.
	Simulant development	n/a
	Model to support hazard analysis	Being developed.
Organic solvent	Total nonmethane hydrocarbon	Evaluation in progress is based on TOC sniff test results.
Privatization	Low-activity waste	Results of 1996 core sample are being evaluated to determine whether they meet the needs of privatization.

3.0 BEST-BASIS STANDARD INVENTORY ESTIMATE

Information about the chemical and/or physical properties of tank wastes is used to perform safety analyses, engineering evaluations, and risk assessments associated with waste management activities, as well as to address regulatory issues. Waste management activities include overseeing tank farm operations and identifying, monitoring, and resolving safety issues associated with these operations and with the tank wastes. Disposal activities involve designing equipment, processes, and facilities for retrieving wastes and processing the wastes into a form that is suitable for long-term storage.

Chemical inventory information generally is derived using two approaches: 1) component inventories are estimated using the results of sample analyses, and 2) component inventories are predicted using a model based on process knowledge and historical information. The most recent model was developed by the Los Alamos National Laboratory (Agnew et al. 1997a). Information derived from these two approaches is often inconsistent. An effort is underway to provide waste inventory estimates that will serve as standard characterization information for the waste management activities (Hodgson and LeClair 1996). As part of this effort, an evaluation of available chemical information for tank 241-AN-104 was performed that included:

- Steen (1997) and Appendix B of this report, which provides characterization results from the September 1996 core sampling event.

- A feed projection document that supported grout treatment facility studies provides estimates of the waste in tank 241-AN-104 based on 242-A Evaporator slurry product data (Hendrickson 1994).

- The Hanford defined waste (HDW) model document (Agnew et al. 1997a) provides tank content estimates in terms of component concentrations and inventories.

Inventories based on the September 1996 sampling event should serve as the basis for the best-estimate inventory to tank 241-AN-104 for the following reasons:

1. The September 1996 sampling event provides the most recent data for the waste.

2. Estimates based on 242-A Evaporator product sample data agrees with the September 1996 analytical data.

3. The HDW model estimates, although in reasonable agreement with the sampling data, do not agree as closely with the evaporator product data.

Tables 3-1 and 3-2 show the best-basis inventory estimates for tank 241-AN-104. Radionuclide values are decayed to January 1, 1994. The HDW model inventories for radionuclides were used when no sample data were available

Table 3-1. Best-Basis Total Inventory Estimates for Nonradioactive Components in Tank 241-AN-104 as of May 31, 1997.[1] (2 sheets)

Analyte	Total Inventory (kg)	Basis (S, M, C or E)[2]	Comment
Al	143,000	S	
Bi	<667	S	
Ca	<855	S	
Cl	29,900	S	
TIC as CO_3	210,000	S	
Cr	5,190	S	
F	2,160	S	
Fe	<395	S	
K	24,900	S	
La	<334	S	
Mn	<74.6	S	
Na	1.19E+06	S	
Ni	<226	S	
NO_2	448,000	S	
NO_3	680,000	S	
OH	650,000	C	sample-based = 255,000
Pb	<382	S	
PO_4	17,100	S	
Si	1,590	S	
SO_4	37,100	S	
Sr	<66.7	S	
TOC	18,700	S	
U_{TOTAL}	<3,340	S	

Table 3-1. Best-Basis Total Inventory Estimates for Nonradioactive Components in Tank 241-AN-104 as of May 31, 1997.[1] (2 sheets)

Analyte	Total Inventory (kg)	Basis (S, M, C or E)[2]	Comment
Zr	64.2	S	
% water	48.4	S	
Density, g/mL	1.45	S	

Note:

[1]The tank is active. Waste transfers will change tank contents.

[2]S = sample-based; M = HDW model-based; C = calculated by charge balance and includes oxides as hydroxides, not including CO_3, NO_2, NO_3, PO_4, SO_4, and SiO_3; E = engineering assessment-based

Table 3-2. Best-Basis Inventory Estimates for Radioactive Components in Tank 241-AN-104 as of May 31, 1997 (Decayed to January 1, 1994).[1] (2 sheets)

Analyte	Total Inventory (Ci)	Basis (S, M, or E)[2]	Comment
^{3}H	43.3	S	Slurry/crust only
^{14}C	104	M	
^{59}Ni	5.61	M	
^{60}Co	<149	S	
^{63}Ni	552	M	
^{79}Se	11.3	M	
^{90}Sr	93,800	S	
^{90}Y	93,800	S	Referenced to ^{90}Sr
^{93}Zr	55.3	M	
^{93m}Nb	40.2	M	
^{99}Tc	345	S	
^{106}Ru	0.0323	M	
^{113m}Cd	290	M	
^{125}Sb	745	M	
^{126}Sn	17.2	M	
^{129}I	<7.53	S	
^{134}Cs	123	M	
^{137}Cs	2.32E+06	S	
^{137m}Ba	2.20E+06	S	Referenced to ^{137}Cs
^{151}Sm	40,000	M	
^{152}Eu	14.5	M	
^{154}Eu	<676	S	
^{155}Eu	<4,730	S	
^{226}Ra	4.63E-04	M	
^{227}Ac	0.00286	M	
^{228}Ra	1.03	M	

Table 3-2. Best-Basis Inventory Estimates for Radioactive Components in Tank 241-AN-104 as of May 31, 1997 (Decayed to January 1, 1994).[1] (2 sheets)

Analyte	Total Inventory (Ci)	Basis (S, M, or E)[2]	Comment
^{229}Th	0.0239	M	
^{231}Pa	0.0128	M	
^{232}Th	0.109	M	
^{232}U	3.17	M	
^{233}U	12.1	M	
^{234}U	3.59	M	
^{235}U	0.140	M	
^{236}U	0.193	M	
^{237}Np	<30.7	S	
^{238}Pu	7.97	M	
^{238}U	3.86	M	
$^{239/240}$Pu	9.70	S	
^{241}Am	<50.0	S	Slurry = 9.04 Ci
^{241}Pu	664	M	
^{242}Cm	0.524	M	
^{242}Pu	0.00306	M	
^{243}Am	0.00124	M	
^{243}Cm	<0.48	S	
^{244}Cm	<12.0	S	

Note:

[1]The tank is active. Waste transfers will change tank contents.

[2]S = composite sample-based, no segment data, M = HDW model-based, E = engineering assessment-based

This page intentionally left blank.

4.0 RECOMMENDATIONS

All analytical results for the safety screening DQO (Dukelow et al. 1995) were well within the safety notification limit. The exotherms were well below the threshold of 480 J/g on a dry weight basis with a maximum value of 175 J/g. The vapor phase measurement in tank headspace indicated 0.013 percent of LFL, well below the flammability concern level of 25 percent. The maximum value of total alpha is 0.0808 μCi/g for solids, well below the criticality criteria of 34.9 μCi/g. The sampling and analysis activities for tank 241-AN-104 have met all the requirements for the flammable gas tank safety DQO (McDuffie and Johnson 1995). Other documents that have addressed the flammable gas safety issues include the following: the 1996 core sampling analytical results in solid and liquid phases (Steen 1997), the 1996 core sampling RGS results for the gas phase (Shekarriz et al. 1997), tank headspace monitoring data (Wilkins et al. 1997), studies of the gas generation mechanism by Meyer et al. (1997) and Pederson and Bryan (1996), and a calculation of hydrogen generation rate in steady state (Hu 1997). Additional evaluation of RGS results and the flammable gas issue to determine the safety status of the tank are in progress. To address the organic solvents screening issue (DOE-RL 1996), the Organic Safety Project will estimate the size of the organic safety extractant pool. Vapor analyses for total nonmethane organic hydrocarbon have not been conducted.

Table 4-1 summarizes the status of the Project Hanford Management Contractor (PHMC) TWRS Program review and acceptance of the sampling and analysis results reported in this TCR. Column 1 of Table 4-1 lists all DQO issues required to be addressed by sampling and analysis. Column 2 indicates whether the requirements of the DQO were met by the sampling and analysis activities performed and is answered with a "yes" or a "no." Column 3 indicates concurrence and acceptance by the program in PHMC TWRS that is responsible for the DQO that the sampling and analysis activities performed adequately meet the needs of the DQO. A "yes" or "no" in column 3 indicates acceptance or disapproval of the sampling and analysis information presented in the TCR. If the results/information have not been reviewed, "N/R" is shown; if the results/information have not been determined, "N/D" is shown.

Table 4-1. Acceptance of Tank 241-AN-104 Sampling and Analysis.

Issue	Sampling and Analysis Performed	Program[1] Acceptance
Safety screening DQO	Yes	Yes
Flammable Gas Tank Safety Program	Yes	Yes
Organic solvents screening	No	No
Privatization low-activity waste DQO[2]	N/D	N/D

Notes:
[1]PHMC TWRS
[2]Jones and Wiemers (1996)

Table 4-2 summarizes the status of the PHMC TWRS Program review and acceptance of the evaluations and other characterization information contained in this report. The evaluations outlined in this report required to determine whether the tank is safe, conditionally safe, or unsafe. Column 1 lists the evaluations performed in this report. Columns 2 and 3 are in the same format as Table 4-1. The manner in which concurrence and acceptance are summarized is also the same as that in Table 4-1.

Table 4-2. Acceptance of Evaluation of Characterization Data and Information for Tank 241-AN-104.

Issue	Evaluation Performed	Program[1] Acceptance
Safety categorization	No	N/D
Flammable Gas Tank Safety Program	In progress	N/D
Organics solvents screening	No	No
Applicability of privatization data	In progress	N/D

Note:
[1]PHMC TWRS

The waste in tank 241-AN-104 should be monitored continuously because it generates and retains gases that are released episodically at various intervals. The safety of operations that will retrieve and dispose of the waste have not been assessed. Vapor samples to further assess the organic solvent screening issue are scheduled for Fiscal Year 1999. No additional liquid and solid characterization efforts are needed at this time.

5.0 REFERENCES

Agnew, S. F., J. Boyer, R. A. Corbin, T. B. Duran, J. R. Fitzpatrick, K. A. Jurgensen, T. P. Ortiz, and B. L. Young, 1997a, *Hanford Tank Chemical and Radionuclide Inventories: HDW Model Rev. 4*, LA-UR-96-3680, Los Alamos National Laboratory, Los Alamos, New Mexico.

Agnew, S. F., R. A. Corbin, T. B. Duran, K. A. Jurgensen, T. P. Ortiz, and B. L. Young, 1997b, *Waste Status and Transaction Record Summary WSTRS Rev. 4*, LA-UR-97-311, Rev. 0, Los Alamos National Laboratory, New Mexico.

Brown, T. M., J. W. Hunt, and L. J. Fergestrom, 1997, *Tank Characterization Technical Basis*, HNF-SD-WM-TA-164, Rev. 3, Lockheed Martin Corp. for Fluor Daniel Hanford Inc., Richland, Washington.

Cash, R. J., 1996, *Scope Increase of "Data Quality Objective to Support Resolution of the Organic Complexant Safety Issue" Rev. 2*, (internal memorandum 79300-96-029 to S. J. Eberlein, July 12), Westinghouse Hanford Company, Richland, Washington.

DOE-RL, 1996, *Recommendation 93-5*, DOE/RL-94-0001, Rev. 1, U.S. Department of Energy, Richland Operations, 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., 1997, *Waste Tank Summary Report for Month Ending May 31, 1997*, WHC-EP-0182-109, Lockheed Martin Corp. for Fluor Daniel Hanford Inc., Richland, Washington.

Heubach, E. C., 1996, *Double-Shell Tank Interim Operational Safety Requirements*, WHC-SD-WM-OSR-016, Rev. 0E, Westinghouse Hanford Company, Richland Washington.

Hendrickson, D. W., 1994, *Grout Treatment Facility Waste Feed Projections*, WHC-SD-WM-TI-528, Rev. 1, Westinghouse Hanford Company, Richland, Washington.

Hodgson, K. M., and M. D. LeClair, 1996, *Work Plan for Defining a Standard Inventory Estimate for Wastes Stored in Hanford Site Underground Tanks*, WHC-SD-WM-WP-311, Rev. 1, Lockheed Martin Hanford Corp. for Fluor Daniel Hanford, Inc., Richland, Washington.

Hu, T. A., 1997, *Calculations of Hydrogen Release Rate at Steady State for Double-Shell Tanks*, HNF-SD-WM-CN-117, Rev. 0, Lockheed Martin Hanford Corp. for Fluor Daniel Hanford, Inc., Richland, Washington.

Jones, T. E., and K. D. Wiemers, 1996, *Data Requirments for TWRS Privatization Characterization of Potential Low-Activity Waste Feed*, WHC-SD-WM-SP-023, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

Kummerer, M., 1995, *Heat Removal Characteristics of Waste Storage Tanks*, WHC-SD-WM-SARR-010, Rev. 1, Westinghouse Hanford Company, Richland, Washington.

Mauss, B. M., 1984, *Chemical Compositions of 102-AY, 101-AW, 105-AN, and 104-AW*, (letter 65453-84-348 to E. G. Gratny, November 9), Rockwell Hanford Operation, Richland, Washington.

McDuffie, N. G., and G. D Johnson, 1995, *Flammable Gas Tank Safety Program: Data Requirements for Core Sample Analysis Developed Through the Data Quality Objectives (DQO) Process*, WHC-SD-WM DQO-004, Rev. 2, Westinghouse Hanford Company, Richland, Washington.

Meyer, P. A., L. R. Pederson, M. E. Brewster, C. W. Steward, S. A. Bryan, G. Terrones, and G. Chen, 1997, *Gas Retention and Release Behavior in Hanford Double-Shell Waste Tanks*, PNNL-11536, Rev. 1, Pacific Northwest National Laboratory, Richland, Washington.

Pederson, L. R., and S. A. Bryan, 1996, *Status and Integration of Studies of Gas Generation in Hanford Wastes*, PNNL-11297, Rev. 0, Pacific Northwest National Laboratory, Richland, Washington.

Public Law 101-510, 1990, "Safety Measures for Waste Tanks at Hanford Nuclear Reservation," Section 3137 of *National Defense Authorization Act for Fiscal Year 1991*.

Sasaki, L. M., 1984, *Results of Organic Analysis of Double-Shell Slurry*, (letter 65611-84-053 to D. J. Fisher, April 5), Rockwell Hanford Operation, Richland, Washington.

Shekarriz, A., D. R. Rector, N. S. Cannon, L. A. Mahoney, B. E. Hey, M. A. Chieda, C. G. Linshooten, J. M. Bates, F. J. Reitz, R. E. Bauer, and E. R. Siciliano, 1997, *Composition and Quantities of Retained Gas Measured in Hanford Waste Tanks 241-AW-101, A-101, AN-105, AN-104, and AN-103*, PNNL-11450, Rev. 1, Pacific Northwest National Laboratory, Richland, Washington.

Steen, F. H., 1996, *Tank 241-AN-104, Cores 163 and 164, Analytical Results for The 45-Day Report,* HNF-SD-WM-DP-226, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

Steen, F. H., 1997, *Tank 241-AN-104, Cores 163 and 164 Analytical Results for the Final Report*, HNF-SD-WM-DP-266, Rev. 1A, Rust Federal Service of Hanford, Inc. for Fluor Daniel Hanford, Inc., Richland, Washington.

Wilkins, N. E., R. E. Bauer, and D. M. Ogden, 1997, *Results of Vapor Space Monitoring of Flammable Gas Watch List Tanks*, HNF-SD-WM-TI-797, Rev. 1, Lockheed Martin Hanford Corp. for Fluor Daniel Hanford, Inc., Richland, Washington.

Winkelman, W. D., 1996a, *Tank 241-AN-104 Push Mode Core Sampling and Analysis Plan,* WHC-SD-WM-TSAP-086, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

Winkelman, W. D., 1996b, *Tank 241-AN-104 Tank Characterization Plan,* WHC-SD-WM-SD-TP-384, Rev. 3, Westinghouse Hanford Company, Richland, Washington.

This page intentionally left blank.

APPENDIX A

HISTORICAL TANK INFORMATION

This page intentionally left blank.

APPENDIX A

HISTORICAL TANK INFORMATION

Appendix A describes tank 241-AN-104 based on historical information. For this report, historical information includes information about the fill history, waste types, surveillance, or modeling data about the tank. This information is necessary for providing a balanced assessment of sampling and analytical results.

This appendix contains the following information:

- **Section A1.0**: Current status of the tank, including the current waste levels as well as the stabilization and isolation status of the tank.
- **Section A2.0**: Information about the tank design.
- **Section A3.0**: Process knowledge of the tank, that is, the waste transfer history and the estimated contents of the tank based on modeling data.
- **Section A4.0**: Surveillance data for tank 241-AN-104 including surface-level readings, temperatures, and a description of the waste surface based on photographs.
- **Section A5.0**: References for Appendix A.

Historical sampling results (results from samples obtained before 1989) are provided in Appendix B.

A1.0 CURRENT TANK STATUS

As of May 31, 1997, tank 241-AN-104 contained an estimated 3,994 kL (1,055 kgal) of waste classified as double-shell slurry feed (Hanlon 1997). Liquid waste volumes are estimated using a combination of a level measurement gauge and a manual tape. The solid waste volumes are estimated using a sludge level measurement device. The solid waste volume was last updated on March 31, 1997. Table A1-1 shows the estimated volumes of the waste phases in the tank.

Tank 241-AN-104 is categorized as sound and is actively ventilated. The tank is classified as a concentrated waste holding tank. The tank is on the Flammable Gas Watch List (Hanlon 1997). All monitoring systems were in compliance with documented standards as of May 31, 1997 (Hanlon 1997).

Table A1-1. Tank Contents Status Summary as of May 31, 1997.[1,2]

Waste Type	kL (kgal)
Total waste	3,994 (1,055)
Supernatant liquid	2,273 (600.5)
Double-shell slurry	0 (0)
Sludge	1,700 (449)
Saltcake	21 (5.5)
Drainable interstitial liquid	182 (48)
Drainable liquid remaining	2,476 (654)
Pumpable liquid remaining	2,392 (632)

Notes:
[1]Hanlon (1997)
[2]The tank is still active and waste transfers that occur will change the tank inventory.

A2.0 TANK DESIGN AND BACKGROUND

The 241-AN Tank Farm was constructed in 1980 to 1981 in the 200 East Area. The tank farm contains seven double-shell tanks. These tanks have a capacity of 4,391 kL (1,160 kgal) and a diameter of 23 m (75 ft). These tanks were designed to hold boiling waste with a maximum design temperature of 177 °C (350 °F) (Brevick et al. 1997).

Tank 241-AN-104 was constructed with a primary carbon steel liner (heat-treated and stress-relieved), a secondary carbon steel liner (not heat-treated), and a reinforced concrete shell. The bottom of the primary liner is 13 mm (0.5 in.) thick, the lower portion of the sides is 19 mm (0.75 in.) thick, the upper portion of the sides is 13 mm (0.5 in.) thick, and the dome liner is 9.5 mm (0.375 in.) thick. The secondary liner is 9.5 mm (0.375 in.) thick. The concrete walls are 450 mm (1.5 ft) thick and the dome is 380 mm (1.25 ft) thick (Brevick et al. 1997). The tank has a flat bottom. The bottoms of the primary and secondary liners are separated by an insulating concrete layer. There is a grid of drain slots in the concrete foundation beneath the secondary steel liner. The grid's function is to collect waste that may leak from the tank and divert it to the leak detection well.

Tank 241-AN-104 has 22 risers, ranging in diameter from 100 mm (4 in.) to 1.1 m (42 in.), which access the tank and 37 risers which access the annulus. Table A2-1 shows numbers, diameters, and descriptions of the risers (annular risers not included). Figure A2-1 shows the riser configuration. Risers 125 (10A), 131 (15A), and 155 (21A) (each 100 mm [4 in.] in diameter) and riser 127 (21A) (300 mm [12 in.] in diameter) are available for use (Lipnicki 1997). Figure A2-2 is a tank cross section showing the approximate waste level and a schematic of tank equipment.

Table A2-1. Tank 241-AN-104 Risers.[1, 2, 3]

Old Riser Number	New Riser Number	Diameter (in.)	Description and Comments
1A	102	4	Sludge measurement port
1B	103	4	Sludge measurement port (12 in. cover)
1C	101	4	Sludge measurement port
2A	104	4	Liquid level, level indicating transmitter
3A	015	12	Supernatant pump, central pump pit
4A	106	4	Thermocouple tree
5A	108	42	Manhole
5B	107	42	Manhole
7A	112	12	Spare (12 in. cover)
7B	111	12	Tank ventilation
10A[4]	125	4	Spare
11A	126	42	Slurry distributor, central pump pit
12A[4]	127	12	Observation port, spare
13A	128	4	Tank pressure
14A	129	4	Supernate return, central pump pit
15A[4]	131	4	Spare (12 in. cover)
15B	130	4	High liquid-level sensor
16A	134	4	Sludge measurement port
16B	132	4	Sludge measurement port
16C	133	4	Sludge measurement port
21A[4]	155	4	Spare
22A	156	4	Sludge measurement port

Notes:

[1]Salazar (1994)
[2]Tran (1993)
[3]WHC (1992)
[4]Indicates risers tentatively available for sampling (Lipnicki 1997).

Figure A2-1. Riser Configuration for Tank 241-AN-104.

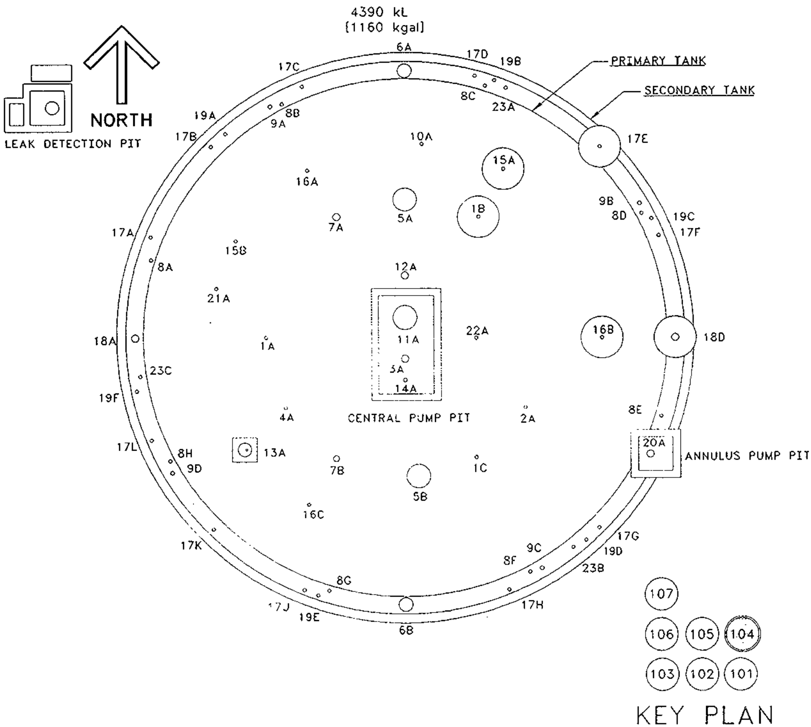
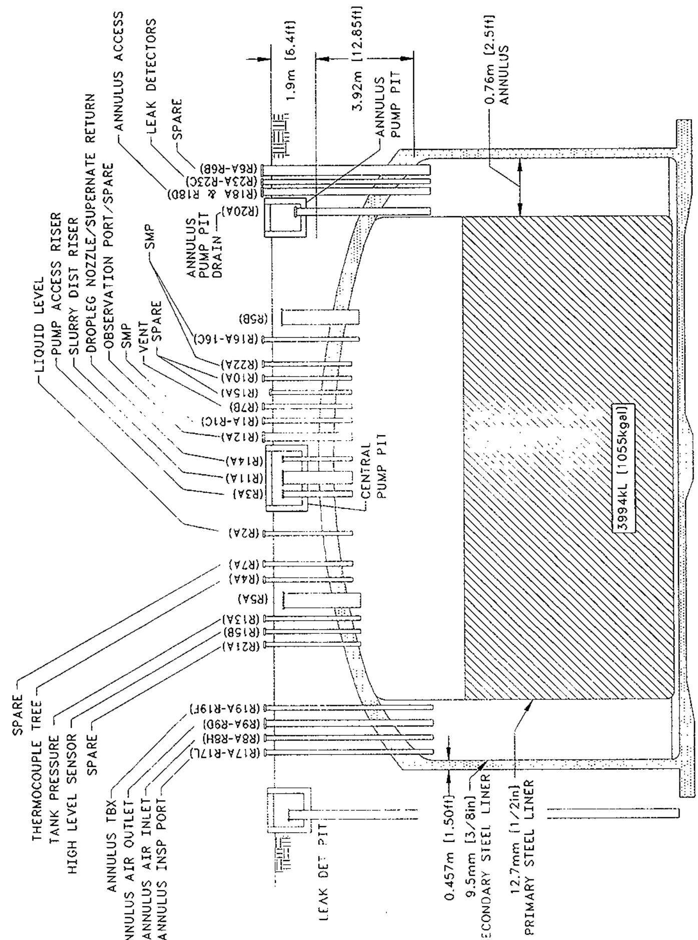


Figure A2-2. Tank 241-AN-104 Cross Section and Schematic.



A3.0 PROCESS KNOWLEDGE

The following sections 1) provide information about the waste transfer history of tank 241-AN-104, 2) describe the process wastes that were transferred, and 3) provide an estimate of current tank contents based on waste transfer history.

A3.1 WASTE TRANSFER HISTORY

Table A3-1 summarizes the waste transfer history of tank 241-AN-104 (Agnew et al. 1997b). Tank 241-AN-104 received flush water in the second quarter of 1982, then received dilute noncomplexed waste from tank 241-AW-102 in the fourth quarter of 1982. The tank received waste from miscellaneous PUREX streams in the fourth quarter of 1983. Waste from the tank was sent to tanks 241-AZ-102 and 241-AN-105 in the first quarter of 1984. Also during that time, tank 241-AN-104 received additional dilute noncomplexed waste from tank 241-AW-102.

In the third quarter of 1984, the tank received 82 kgal of flush water from miscellaneous sources, and waste was sent to tank 241-AN-103. Tank 241-AW-102 sent dilute noncomplexed waste to tank 241-AN-104 during the fourth quarter of 1984 and the second quarter of 1985. Flush water from miscellaneous sources was added to the tank. From the second quarter of 1982 to the present, waste level changes have occurred because of gas generation and venting in the waste.

Table A3-1. Tank 241-AN-104 Major Waste Transfers.[1, 2, 3]

Transfer Source	Transfer Destination	Waste Type	Time Period	Estimated Waste Volume	
				kiloliters	kilogallons
241-AW-102		DN	1982	4,206	1,111
PUREX		PXMSC	1983	19	5
	241-AZ-102	DN	1984	-2,158	-570
	241-AN-105	DN	1984	-1,889	-499
241-AW-102		DN	1984	1,098	290
	241-AN-103	DN	1984	-731	-193
241-AW-102		DN	1984	2,650	700
241-AW-102		DN	1985	458	121
Miscellaneous sources		Flush water	1996	8	2

Notes:

DN = Dilute noncomplexed waste (that is, contains no complexants) defined as waste with TOC <1wt% (10 g/L)

PXMSC = Dilute noncomplexed waste from miscellaneous PUREX streams

[1]Agnew et al. (1997b)

[2]Because only major transfers are listed, the sum of these transfers will not equal the current tank waste volume.

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

A3.2 HISTORICAL ESTIMATION OF TANK CONTENTS

The historical transfer used for this estimate are from the following sources:

- *Waste Status and Transaction Record Summary for the Northeast Quadrant* (WSTRS) (Agnew et al. 1997b). WSTRS is a tank-by-tank quarterly summary spreadsheet of waste transactions.

- *Hanford Tank Chemical and Radionuclide Inventories: HDW Model Rev. 4* (Agnew et al. 1997a) This document contains the Hanford defined waste (HDW) list, the supernatant mixing model (SMM), and the tank layer model (TLM).

    - The HDW list which is comprised of approximately 50 waste types defined by concentrations for major analytes/components for sludge and supernatant layers.

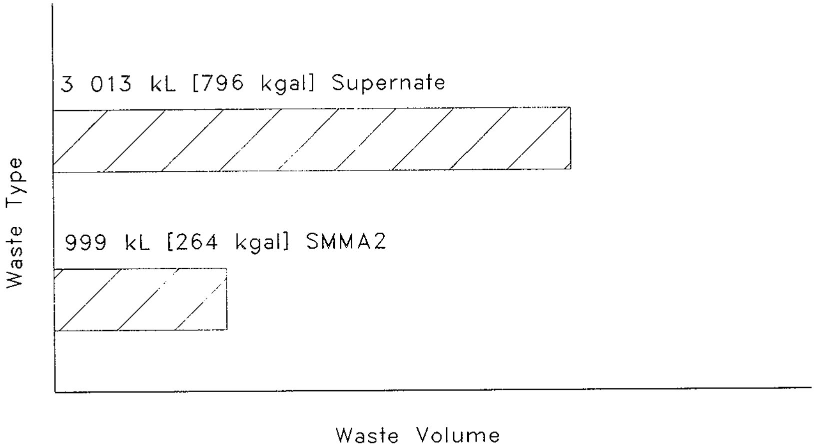
    - Tank layer model (TLM). The TLM defines the sludge and saltcake layers in each tank using waste composition and waste transfer information.

    - Supernatant mixing model (SMM). This is a subroutine within the HDW model that calculates the volume and composition of certain supernatant blends and concentrates.

Using these records, the TLM defines the sludge and saltcake layers in each tank. The SMM uses information from both the WSTRS and the TLM to describe the supernatants and concentrates in each tank. Together, the WSTRS, TLM, and SMM determine each tank's inventory estimate. These model predictions are considered estimates that require further evaluation using analytical data.

Based on the TLM and SMM, tank 241-AN-104 contains 4,012 kL (1,060 kgal) of waste comprised of a bottom solids layer of 999 kL (264 kgal) of concentrated supernatant solids waste (SMMA2) and 3,013 kL (796 kgal) of supernatant liquid above the surface of the solid waste. As of May 31, 1997, the tank contains a bottom sludge layer, a middle supernatant layer, and a top crust layers with a volume of 1,700 kL (449 kgal), 2,273 (600.5 kgal), and 21 kL (5.5 kgal), respectively. This historical estimate is for information only. Figure A3-1 is a graphical representation of the estimated waste types and volumes for each tank layer. Table A3-3 provides an estimate of the expected waste constituents and concentrations.

Figure A3-1. Tank Layer Model.[1]



[1]This historical estimate does not reflect the current volume of sludge and supernatant. It should be used for information only.

Table A3-2. Historical Tank Inventory Estimate.[1, 2] (2 sheets)

Physical Properties				-95 CI	+95 CI
Total waste	5.89E+06 (kg)	(1.06E+03 kgal)	----	----	----
Heat load	6.06 (kW)	(2.07E+04 Btu/hr)	----	5.54	6.58
Bulk density[3]	1.47 g/cm^3	----	----	1.43	1.51
Water wt%[3]	42.8	----	----	40.1	45.3
TOC wt% C (wet)[3]	1.05	----	----	0.666	1.44
Chemical Constituents	***M***	**ppm**	**kg**	**-95 CI (*M*)**	**+95 CI (*M*)**
Na^+	11.1	1.73E+05	1.02E+06	10.2	12.0
Al^{3+}	1.26	2.31E+04	1.36E+05	1.08	1.33
Fe^{3+} (total Fe)	9.06E-03	343	2.02E+03	8.19E-03	9.92E-03
Cr^{3+}	8.91E-02	3.14E+03	1.85E+04	7.92E-02	9.83E-02
Bi^{3+}	9.49E-04	134	793	8.90E-04	1.01E-03
La^{3+}	1.27E-05	1.19	7.04	9.38E-06	1.60E-05
Hg^{2+}	9.15E-06	1.25	7.34	7.76E-06	9.43E-06
Zr (as $ZrO(OH)_2$)	7.49E-04	46.3	273	4.22E-04	8.29E-04
Pb^{2+}	9.48E-04	133	785	7.49E-04	1.15E-03
Ni^{2+}	5.71E-03	227	1.34E+03	5.56E-03	5.83E-03
Sr^{2+}	0	0	0	0	0
Mn^{4+}	6.70E-03	250	1.47E+03	4.54E-03	8.55E-03
Ca^{2+}	3.19E-02	868	5.11E+03	2.97E-02	3.41E-02
K^+	0.100	2.65E+03	1.56E+04	5.45E-02	0.148
OH^-	7.38	8.51E+04	5.02E+05	6.50	7.99
NO_3^-	3.71	1.56E+05	9.19E+05	3.49	3.93
NO_2^-	1.72	5.35E+04	3.16E+05	1.39	1.97
CO_3^{2-}	0.504	2.05E+04	1.21E+05	0.434	0.564
PO_4^{3-}	0.115	7.42E+03	4.37E+04	9.01E-02	0.140
SO_4^{2-}	0.210	1.37E+04	8.08E+04	0.173	0.238
Si (as SiO_3^{2-})	6.10E-02	1.16E+03	6.85E+03	5.30E-02	6.88E-02

Table A3-2. Historical Tank Inventory Estimate.[1, 2] (2 sheets)

Physical Properties				-95 CI	+95 CI
F^-	9.99E-02	1.29E+03	7.59E+03	5.28E-02	0.116
Cl^-	0.190	4.56E+03	2.69E+04	0.168	0.206
$C_6H_5O_7^{3-}$	2.61E-02	3.34E+03	1.97E+04	2.21E-02	3.00E-02
$EDTA^{4-}$	2.12E-02	4.14E+03	2.44E+04	6.95E-03	3.56E-02
$HEDTA^{3-}$	3.78E-02	7.02E+03	4.14E+04	9.34E-03	6.67E-02
glycolate$^-$	0.142	7.22E+03	4.25E+04	8.90E-02	0.195
acetate$^-$	1.46E-02	584	3.44E+03	1.15E-02	1.94E-02
oxalate^{2-}	1.66E-05	0.991	5.84	1.48E-05	1.84E-05
DBP	1.97E-02	2.81E+03	1.65E+04	1.68E-02	2.41E-02
butanol	1.97E-02	989	5.83E+03	1.68E-02	2.41E-02
NH_3	0.206	2.37E+03	1.40E+04	4.68E-02	0.371
$Fe(CN)_6^{4-}$	0	0	0	0	0

Notes:

[1]Unknowns in tank solids inventory are assigned by the TLM.
[2]Historical data is not validated and should be used with caution.
[3]Water wt% derived from the difference of density and total dissolved species.

A4.0 SURVEILLANCE DATA

Tank 241-AN-104 surveillance includes surface level measurements (liquid and solid) and temperature monitoring inside the tank (waste and headspace). The tank annulus is equipped with leak-detection instrumentation consisting of continuous air monitors and conductivity probes (Johnson 1995). Surveillance data provide the basis for determining tank integrity.

For double-shell tanks, the leak detection instruments are the primary means of detecting a leak from the primary tank; liquid-level measurements may be used to confirm a possible leak detected by the annulus instruments (Johnson 1995). Solid surface level measurements can indicate physical changes and consistency of the solid layers.

A4.1 SURFACE LEVEL READINGS

A Food Instrument Corporation gauge was used to monitor the waste surface level in tank 241-AN-104 through riser 2A in the automatic mode until July 31, 1995, and in the manual mode until May 25, 1995. A manual ENRAF[1] system began recording on August 4, 1995. On May 31, 1997, the waste surface level was 9.76 m (383.81 in.) as measured by the ENRAF™ system. Figure A4-1 is a level history graph of the volume measurements.

A4.2 INTERNAL TANK TEMPERATURES

Tank 241-AN-104 has a single thermocouple tree, located in riser 4A, with 18 thermocouples to monitor the waste temperature. Temperature data recorded from March 14, 1994, through October 24, 1996, were obtained from the Surveillance Analysis Computer System (LMHC 1997) for all thermocouples. The average temperature of the Surveillance Analysis Computer System data is 42.7 °C (108.9 °F), the minimum is 31.8 °C (89.2 °F), and the maximum is 51.2 °C (124.2 °F). The average temperature of the these data over the last year (October 1995 through October 1996) was 41.3 °C (106.4 °F), the minimum was 31.8 °C (89.2 °F), and the maximum was 50.1 °C (122.2 °F). The maximum temperature on October 24, 1996, was 46.7 °C (116.1 °F) on thermocouple 4, and the minimum was 35.2 °C (95.4 °F) on thermocouple 18. Thermocouple 4 is located in the waste, and thermocouple 18 is in the headspace. Figure A4-2 is a graph of the weekly high temperatures. Plots of the individual thermocouple readings can be found in the *Supporting Document for the Historical Tank Content Estimate for AN Tank Farm* (Brevick et al. 1997).

The tank has a multifunctional instrument tree with 22 thermocouples located in riser 15A. Temperature data from June 10, 1996 to the present is recorded manually weekly and ranges from 31.7 °C (89.1 °F) to 47.2 °C (116.9 °F) with average around 42.3 °C (108.2 °F).

[1]ENRAF is a trademark of the ENRAF Corporation, Houston, Texas.

Figure A4-1. Tank 241-AN-104 Level History.

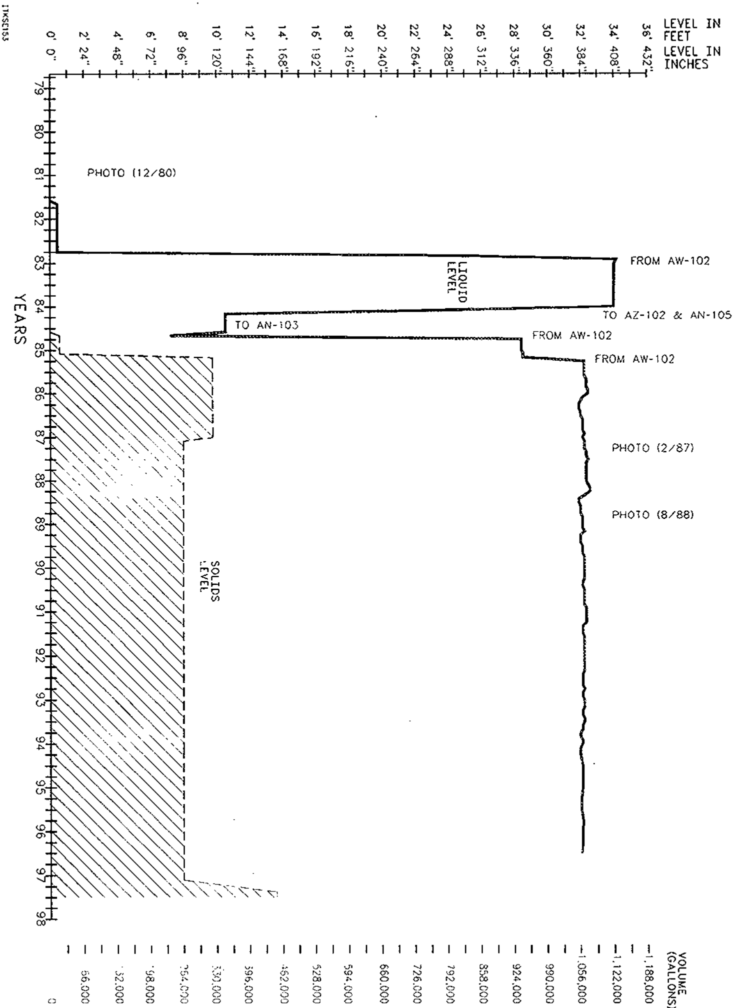


Figure A4-2. Tank 241-AN-104 Weekly High Temperature Plot.

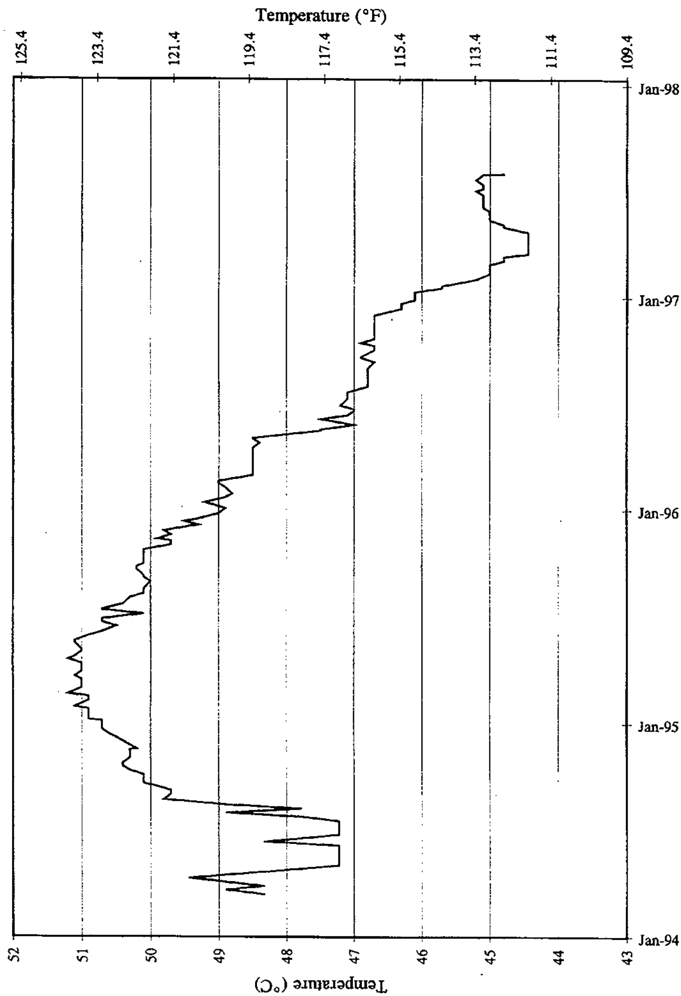
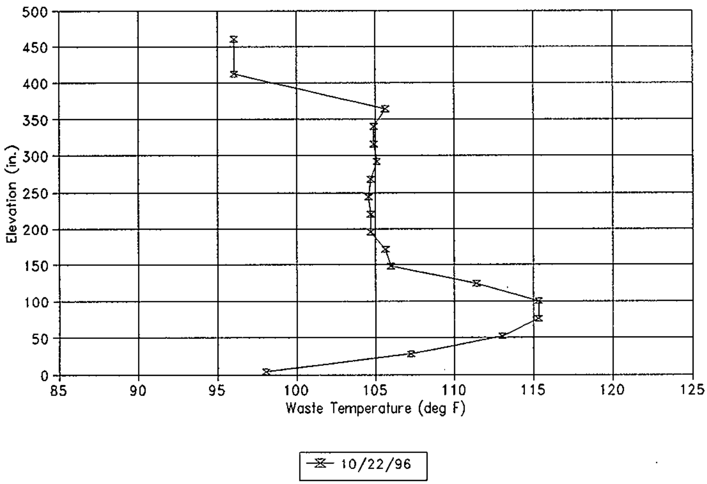


Figure A4-3 shows a typical temperature profile of tank AN-104 from riser 4A (October 22, 1996. The temperature profile indicates the nonconductive sludge layer (the curve line below the elevation of 190 in.) and the convective supernatant layer (the straight line between 190 and 380 in.). This is roughly consistent with observations from the sample extrusion results (see Table B1-2) where segments 13 to 21 are sludge and segments 2 to 12 are supernatant. The top segment is crust. Notice the temperature is lower on the top and bottom of the sludge layer because of the thermal dissipation by the supernatant and the tank bottom heat sink.

Figure A4-3. Tank 241-AN-104 Temperature Profile - Riser 4A.



A4.3 TANK 241-AN-104 PHOTOGRAPHS

A video camera is located in riser 5B. A video (Harding 1996) was recorded in February 27, 1996, that shows the waste surface cover with light brown, cream-colored crust with small pools of dark liquid scattering around. A lot of these liquid pools are formed because of the pipe line breaking through.

A5.0 APPENDIX A REFERENCES

Agnew, S. F., J. Boyer, R. A. Corbin, T. B. Duran, J. R. Fitzpatrick, K. A. Jurgensen, T. P. Ortiz, and B. L. Young, 1997a, *Hanford Tank Chemical and Radionuclide Inventories: HDW Model Rev. 4*, LA-UR-96-3860, Rev. 0, Los Alamos National Laboratory, Los Alamos, New Mexico.

Agnew, S. F., P. Baca, R. A. Corbin, T. B. Duran, and K. A. Jurgensen, 1997b, *Waste Status and Transaction Record Summary, (WSTRS), Rev. 4*, LA-UR-97-311, Rev. 0, Los Alamos National Laboratory, Los Alamos, New Mexico.

Brevick, C. H., J. L. Stroup, and J. W. Funk, 1997, *Supporting Document for the Historical Tank Content Estimate for AN Tank Farm*, HNF-SD-WM-ER-314, Rev. 1, Fluor Daniel Northwest, Inc. for Fluor Daniel Hanford, Inc., Richland, Washington.

Hanlon, B. M., 1997, *Waste Tank Summary Report for Month Ending May 31, 1997*, HNF-EP-0182-110, Lockheed Martin Hanford Corp. for Fluor Daniel Hanford, Inc., Richland, Washington.

Harding, R. H., 1996, "AN-103, 104, and 105 Tank Surface Scan," Videograph 200-1470, Westinghouse Hanford Company, Richland, Washington.

Johnson, M. G., 1995, *Technical Bases for Leak Detection Surveillance of Waste Storage Tanks*, WHC-SD-WM-TI-573, Rev. 1, Westinghouse Hanford Company, Richland, Washington.

Lipnicki, J., 1997, *Waste Tank Risers Available for Sampling*, HNF-SD-WM-TI-710, Rev. 4, Lockheed Martin Hanford Corp. for Fluor Daniel Hanford, Inc., Richland, Washington.

LMHC, 1997, SACS: Surveillance Analysis Computer System. In: SQL Server/Visual Basic (Mainframe). Available: HLAN, Lockheed Martin 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.

Salazar, B. E., 1994, *Double-Shell Underground Waste Storage Tanks Riser Survey*, WHC-SD-RE-TI-093, Rev. 4, Westinghouse Hanford Company, Richland, Washington.

WHC, 1992, *Piping Plan Tank AN-104*, Drawing H-2-71994, Rev. 8, Westinghouse Hanford Company, Richland, Washington.

This page intentionally left blank.

APPENDIX B

SAMPLING OF TANK 241-AN-104

This page intentionally left blank.

APPENDIX B

SAMPLING OF TANK 241-AN-104

Appendix B provides sampling and analysis information for each known sampling event for tank 241-AN-104, and it assesses the core sample results.

- **Section B1.0**: Tank Sampling Overview
- **Section B2.0**: Analytical Results
- **Section B3.0**: Assessment of Characterization Results
- **Section B4.0**: References for Appendix B

Future sampling of tank 241-AN-104 will be appended to the above list.

B1.0 TANK SAMPLING OVERVIEW

This section describes the August/September 1996 sampling and analysis events for tank 241-AN-104. Core samples were obtained to satisfy the requirements of the *Tank Safety Screening Data Quality Objective* (Dukelow et al. 1995) and the *Flammable Gas Safety Program: Data Requirements for Core Sample Analysis Developed through the Data Quality Objectives (DQO) Process* (McDuffie and Johnson 1995). The sampling and analyses were performed according to the *Tank 241-AN-104 Push Mode Core Sampling and Analysis Plan* (Winkleman 1996a). The plan required that 4.0 liters of supernatant from the tank be obtained as part of the push mode core sampling event. The sample will be used to support the privatization initiative. Two supernatant samples were obtained from this tank in 1984 (Jansky 1984b) to support Evaporator Campaign Run 84-5. One supernatant sample was obtained in August 1984 to support Evaporator Campaign Run 85-3.

B1.1 DESCRIPTION OF 1996 SAMPLING EVENT

Twenty push mode core segments were removed from tank 241-AN-104 riser 12A (core 164) between August 8, 1996, and August 14, 1996. The segments were received by the 222-S Laboratory between August 16, 1996, and August September 17, 1996. Segment 18 was sampled using the RGS and extruded by the Process Chemistry and Statistical Analysis Group. Segment 21 was not recovered from the tank because of a broken sampler.

The second core, consisting of 21 push mode core segments, was removed from tank 241-AN-104 riser 10A (core 163) between September 9, 1996, and September 12, 1996. Segments were received by the 222-S Laboratory between September 12, 1996, and September 27, 1996. Selected segments (3, 13, 15, 17, 19, and 21) were sampled using the RGS and extruded by the Process Chemistry and Statistical Analysis Group.

A field blank was provided to the 222-S Laboratory with core 164. It underwent the same analysis as the drainable liquid as instructed by Winkleman (1996a).

A lithium bromide solution, used as hydrostatic head fluid (HHF) during sampling, was provided to the 222-S Laboratory with core 164. It underwent inductively coupled plasma spectroscopy (ICP) and ion chromatography (IC) analyses as instructed by Winkleman 1996a).

Safety screening analyses included the following: total alpha to determine criticality, DSC to determine the fuel energy value, and thermogravimetric analysis (TGA) to determine the total moisture content. In addition, combustible gas meter readings in the tank headspace were performed to measure flammability. The current revision of the safety screening DQO also requires bulk density measurements.

Tank 241-AN-104 also was evaluated for the Flammable Gas Safety Project. The specified analyses included the following: DSC, TGA, bulk density, viscosity, void fraction, total inorganic carbon (TIC) TOC, formate, oxalate, ICP, IC, and radiochemistry.

Table B1-1 summarizes the sampling and analytical requirements of the safety screening and flammable gas DQOs.

Table B1-1. Integrated Data Quality Objective Requirements for Tank 241-AN-104.[1]

Sampling Event	Applicable DQOs	Sampling Requirements	Analytical Requirements
Core sampling	Safety screening	Core samples from a minimum of two risers separated radially to the maximum extent possible.	▸ Energetics ▸ Moisture content ▸ Total alpha
	Flammable gas	At least one complete core	▸ Energetics ▸ Moisture content ▸ Bulk density ▸ Viscosity ▸ Void fraction ▸ TIC/TOC ▸ Formate ▸ Oxalate ▸ OH ▸ ICP ▸ IC ▸ Radiochemistry
Combustible gas meter reading	Safety screening	Measurement in a minimum of one location within tank headspace.	▸ Flammable gas concentration
Vapor	Organic solvent screening[2]	Steel canisters	▸ Organic vapor

Notes:

[1]Winkleman (1996a)

[2]Sampling for organic solvent screening has not been performed.

B1.2 SAMPLE HANDLING OF THE 1996 SAMPLING EVENT

The core samples were shipped to the 222-S Laboratory for subsampling and analysis. Samples were assigned LABCORE numbers and were subjected to visual inspection for color, clarity, and solids content. The radiation dose rate on contact was also measured. The salt slurry samples were divided into upper half (UH) and lower half (LH) segments. The material was homogenized and subsampled for laboratory analyses and archiving. A subsample of each half-segment was recombined and subsampled for core composite analyses. Table B1-2 provides the subsampling scheme and sample description for cores 163 and 164.

Table B1-2. Sample Receipt and Extrusion Information for Tank 241-AN-104. (7 sheets)

Sample Id	Core: Segment	Date Sampled[1] Received Extruded	Dose Rate (mR/hr)	Solid/ Liquid Recovered (g)	Sample Description
Core 163 (from riser 10A)					
96-397	163:1	9/9/96 9/17/96 9/25/96	40	S: 22.3 L: 0.0	There was <5 mLs of drainable liquid, which was not retained. The liquid was green in color and opaque. Extruded approximately 1 in. of solids. The solids were gray in color and the texture resembled a wet salt.
96-398	163:2	9/9/96 9/17/96 9/25/96	2,500	S: 28.8 L: 361.7	Collected approximately 250 mLs of drainable liquid. The liquid was green in color and opaque. Extruded approximately 1 in. of solids. The solids were gray to white in color and the texture resembled a salt slurry.
96-399	163:3	9/9/96 9/12/96 n/a	2,500	n/a	This segment was sampled using the RGS and extruded by the Process Chemistry and Statistical Analysis Group.
96-400	163:4	9/9/96 9/17/96 9/25/96	2,500	S: 0.0 L: 385.0	Collected approximately 260 mLs of drainable liquid. The liquid was green in color and opaque. The only solids present were those in the drainable liquid.
96-401	163:5	9/9/96 9/26/96 10/21/96	2,200	S: 0.0 L: 399.4	Collected approximately 260 mLs of drainable liquid. The liquid was yellow in color and opaque. The only solids present were those in the drainable liquid.
96-402	163:6	9/10/96 9/26/96 10/10/96	2,700	S: 0.0 L: 373.8	Collected approximately 260 mLs of drainable liquid. The liquid was greenish yellow in color and opaque. The only solids present were those in the drainable liquid.

Table B1-2. Sample Receipt and Extrusion Information for Tank 241-AN-104. (7 sheets)

Sample Id	Core: Segment	Date Sampled[1] Received Extruded	Dose Rate (mR/hr)	Solid/ Liquid Recovered (g)	Sample Description
Core 163 (from riser 10A) (Cont'd)					
96-397	163:1	9/9/96 9/17/96 9/25/96	40	S: 22.3 L: 0.0	There was <5 mLs of drainable liquid which was not retained. The liquid was green in color and opaque. Extruded approximately 1 in. of solids. The solids were gray in color and the texture resembled a wet salt.
96-404	163:8	9/10/96 9/20/96 9/26/96	2,300	S: 0.0 L: 390.6	Collected approximately 260 mLs of drainable liquid. The liquid was yellow in color and clear. The only solids present were those in the drainable liquid.
96-405	163:9	9/10/96 9/20/96 9/26/96	2,400	S: 0.0 L: 384.1	Collected approximately 260 mLs of drainable liquid. The liquid was yellow in color and clear. The only solids present were those in the drainable liquid.
96-406	163:10	9/10/96 9/26/96 10/21/96	2,200	S: 0.0 L: 390.0	Collected approximately 260 mLs of drainable liquid. The liquid was yellow in color and opaque. The only solids present were those in the drainable liquid.
96-407	163:11	9/10/96 9/26/96 10/25/96	2,400	S: 0.0 L: 363.1	Collected approximately 260 mLs of drainable liquid. The liquid was yellow in color and opaque. The only solids present were those in the drainable liquid.
96-408	163:12	9/10/96 9/26/96 10/30/96	2,400	S: 78.0 L: 222.3	Collected approximately 210 mLs of drainable liquid. The liquid was green in color and opaque. Extruded approximately 5 in. of solids. The solids were green/white in color and the texture resembled a salt slurry.

Table B1-2. Sample Receipt and Extrusion Information for Tank 241-AN-104. (7 sheets)

Sample Id	Core: Segment	Date Sampled[1] Received Extruded	Dose Rate (mR/hr)	Solid/ Liquid Recovered (g)	Sample Description
Core 163 (from riser 10A) (Cont'd)					
96-409	163:13	9/11/96 9/12/96 n/a	1,900	n/a	This segment was sampled using the RGS and extruded by the Process Chemistry and Statistical Analysis Group.
96-410	163:14	9/11/96 9/26/96 10/25/96	2,500	S: 325.6 L: 43.7	Collected approximately 30 mLs of drainable liquid. The liquid was yellow gray in color and opaque. Extruded approximately 17 in. of solids. The solids were gray in color and the texture resembled a salt slurry.
96-411	163:15	9/11/96 9/12/96 n/a	2,500	n/a	This segment was sampled using the RGS and extruded by the Process Chemistry and Statistical Analysis Group.
96-412	163:16	9/11/96 9/20/96 9/26/96	2,200	S: 398.4 L: 0.0	No drainable liquid. Extruded approximately 19 in. of solids. The solids were gray in color and the texture resembled a wet salt. The solids were subsampled in two jars.
96-413	163:17	9/9/96 9/17/96 n/a	2,000	n/a	This segment was sampled using the RGS and extruded by the Process Chemistry and Statistical Analysis Group.
96-414	163:18	9/11/96 9/26/96 10/30/96	1,900	S: 405.7 L: 0.0	No drainable liquid. Extruded approximately 16.5 in. of solids. The solids were light gray/green in color and the texture resembled a moist salt. The solids were subsampled in two jars.
96-415	163:19	9/11/96 9/12/96 n/a	1,800	n/a	This segment was sampled using the RGS and extruded by the Process Chemistry and Statistical Analysis Group.

Table B1-2. Sample Receipt and Extrusion Information for Tank 241-AN-104. (7 sheets)

Sample Id	Core: Segment	Date Sampled[1] Received Extruded	Dose Rate (mR/hr)	Solid/ Liquid Recovered (g)	Sample Description
Core 163 (from riser 10A) (Cont'd)					
96-416	163:20	9/11/96 9/27/96 10/2/96	n/a	S: 388.1 L: 0.0	No drainable liquid. Extruded approximately 18 in. of solids. The solids were gray in color and the texture resembled a salt slurry. The solids were subsampled in two jars.
96-417	163:21	9/9/96 9/17/96 n/a	n/a	n/a	This segment was sampled using the RGS and extruded by the Process Chemistry and Statistical Analysis Group.
Core 164 (from riser 10A)					
96-418	164:1	8/8/96 8/23/96 8/28/96	2,500	S: 35.4 L: 282.6	Collected approximately 230 mLs of drainable liquid. The liquid was yellowish green in color and opaque. Extruded approximately 2 in. of solids. The solids were white to gray in color and the texture resembled a salt slurry.
96-419	164:2	8/8/96 8/23/96 8/28/96	2,300	S: 0.0 L: 369.7	Collected approximately 250 mLs of drainable liquid. The liquid was yellow in color and opaque. The only solids extruded were those in the drainable liquid.
96-420	164:3	8/8/96 8/23/96 8/28/96	2,300	S: 0.0 L: 385.9	Collected approximately 255 mLs of drainable liquid. The liquid was yellow in color and opaque. The only solids extruded were those in the drainable liquid.
96-421	164:4	8/8/96 8/26/96 8/28/96	2,200	S: 0.0 L: 409.6	Collected approximately 310 mLs of drainable liquid. The liquid was yellow in color and opaque. The only solids present were those in the drainable liquid.

Table B1-2. Sample Receipt and Extrusion Information for Tank 241-AN-104. (7 sheets)

Sample Id	Core: Segment	Date Sampled[1] Received Extruded	Dose Rate (mR/hr)	Solid/ Liquid Recovered (g)	Sample Description
Core 164 (from riser 10A) (Cont'd)					
96-422	164:5	8/8/96 9/3/96 9/9/96	2,200	S: 0.0 L: 436.5	Collected approximately 315 mLs of drainable liquid (L1). The liquid was yellow in color and opaque. The only solids extruded were those in the drainable liquid.
96-423	164:6	8/8/96 8/26/96 8/29/96	33	S: 0.0 L: 0.0	No drainable liquid or solids. Sample failure.
96-424	164:7	8/8/96 8/26/96 8/29/96	2,500	420.6 S: 0.0 L: 420.6	Collected approximately 310 mLs of drainable liquid. The liquid was yellow in color and opaque. The only solids extruded were those in the drainable liquid.
96-425	164:8	8/9/96 9/3/96 9/9/96	2,700	S: 0.0 L: 418.0	Collected approximately 285 mLs of drainable liquid. The liquid was yellow in color and opaque. The only solids extruded were those in the drainable liquid.
96-426	164:9	8/9/96 9/3/96 9/9/96	2,700	S: 0.0 L: 413.1	Collected approximately 300 mLs of drainable liquid. The liquid was yellow in color and opaque. The only solids present were those in the drainable liquid.
96-427	164:10	8/9/96 9/6/96 9/11/96	2,700	S: 0.0 L: 367.2	Collected approximately 245 mLs of drainable liquid. The liquid was yellow in color and opaque. The only solids present were those in the drainable liquid.
96-428	164:11	8/9/96 8/23/96 8/29/96	2,800	S: 0.0 L: 422.1	Collected approximately 315 mLs of drainable liquid. The liquid was yellow in color and opaque. The only solids present were those in the drainable liquid.

Table B1-2. Sample Receipt and Extrusion Information for Tank 241-AN-104. (7 sheets)

Sample Id	Core: Segment	Date Sampled[1] Received Extruded	Dose Rate (mR/hr)	Solid/ Liquid Recovered (g)	Sample Description
Core 164 (from riser 10A) (Cont'd)					
96-429	164:12	8/13/96 8/23/96 8/29/96	2,000	S: 0.0 L: 413.8	Collected approximately 305 mLs of drainable liquid. The liquid was green in color and opaque. The only solids present were those in the drainable liquid.
96-430	164:13	8/13/96 8/23/96 8/29/96	2,500	S: 92.4 L: 311.4	Collected approximately 230 mLs of drainable liquid. The liquid was green in color and opaque. Extruded approximately 9 in. of solids. The solids were gray to white in color and the texture resembled a salt slurry.
96-431	164:14	8/13/96 9/6/96 9/11/96	2,500	S: 361.6 L: 0.0	No drainable liquids. Extruded approximately 17 in. of solids. The solids were gray in color and the texture resembled a salt slurry. The solids were subsampled in two jars.
96-432	164:15	8/13/96 9/6/96 9/11/96	2,500	S: 369.5 L: 0.0	No drainable liquids. Extruded approximately 19 in. of solids. The solids were gray in color and the texture resembled a salt slurry. The solids were subsampled in two jars.
96-433	164:16	8/13/96 9/6/96 9/12/96	2,200	S: 391.8 L: 0.0	No drainable liquids. Extruded approximately 19 in. of solids. The solids were gray in color and the texture resembled a wet salt. The solids were subsampled in two jars.

Table B1-2. Sample Receipt and Extrusion Information for Tank 241-AN-104. (7 sheets)

Sample Id	Core: Segment	Date Sampled[1] Received Extruded	Dose Rate (mR/hr)	Solid/ Liquid Recovered (g)	Sample Description
Core 164 (from riser 10A) (Cont'd)					
96-434	164:17	8/14/96 9/6/96 9/12/96	1,500	S: 392.3 L: 0.0	No drainable liquids. Extruded approximately 19 in. of solids. The solids were dark gray in color and the texture resembled a wet salt. The solids were subsampled in three jars for upper half and lower half segment, and shear strength study.
96-435	164:18	8/14/96 8/16/96 n/a	2,000	n/a	This segment was sampled using the RGS and extruded by the Process Chemistry and Statistical Analysis Group.
96-436	164:19	8/14/96 9/6/96 9/12/96	1,000	S: 399.5 L: 0.0	No drainable liquids. Extruded approximately 19 in. of solids. The solids were gray in color. The lower half texture resembled a wet salt which was 9.5 in.; the upper half resembled a salt slurry which was also 9.5 in. The solids were subsampled in two jars.
96-437	164:20	8/14/96 9/17/96 9/25/96	2,300	S: 408.0 L: 0.0	No drainable liquids. Extruded approximately 19 in. of solids. The solids were gray in color and the texture resembled a moist salt. The solids were subsampled in two jars.
96-438	164:21	8/14/96	n/a	n/a	Sampling failure.
Field blank	164:FB	8/16/96 9/17/96 9/24/96	<0.5	S: 0.0 L: 268.2	Collected approximately 250 mLs of drainable liquid. The liquid was clear and colorless. No solids were present.

Notes:

L = liquid S = solid

[1]Dates are provided in the month/day/year format.

B1.3 SAMPLE ANALYSIS OF 1996 SAMPLING EVENT

The analyses performed on the core samples were limited to those required by the safety screening and the flammable gas DQOs (McDuffie and Johnson 1995). The safety screening DQO (Dukelow et al. 1995) required analyses for thermal properties by DSC, moisture content by TGA, and content of fissile material by total alpha activity analysis. The flammable gas DQO required a full set of analytes be analyzed by IC, ICP, TOC, TIC, and various radionuclides.

Differential scanning calorimetry and TGA were performed on 8.665-mg to 45.550-mg samples. Quality control (QC) tests included performing the analyses in duplicate and using standards. Moisture content was also measured by a gravimetric method.

Total alpha activity measurements were performed on samples that had been fused in a matrix of potassium hydroxide and dissolved in acid. The resulting solution was dried on a counting planchet and counted in an alpha proportional counter. Quality control tests included standards, spikes, blanks, and duplicate analyses.

Ion chromatography was performed on samples that had been prepared by water digestion. Quality control tests included standards, spikes, blanks, and duplicate analyses. The sampling and analysis plan (Winkelman 1996a) required the full suite of IC analytes be measured.

Inductively coupled plasma spectrometry was performed on samples that had been prepared by a fusion procedure, followed by dissolution in acid. Quality control tests included standards, blanks, spikes, and duplicate analyses. The sampling and analysis plan required the full suite of ICP elements be analyzed.

All analyses were performed in accordance with approved laboratory procedures. Table B1-3 lists sample numbers and applicable analyses. Table B1-4 lists sample preparation procedure numbers and analysis procedure numbers.

B1.4 DESCRIPTION OF HISTORICAL SAMPLING EVENT

Analyses of two sampling events for tank 241-AN-104 were obtained from historical records. The dates of these events were January 18, 1985, and July 2, 1984. An aliquot from a tank 241-AN-104 sample was analyzed then mixed with waste from tank 241-AW-102 to determine waste compatibility for use in the 242-A Evaporator (Mauss and Jansky 1985). A sample of tank 241-AN-104 waste was analyzed after being stored at elevated temperatures for a period (Jansky 1984a). The sample contained approximately 10 percent white granular solids when received. An aliquot was stored at 40 °C for two weeks to note changes in volume percent settled solids, but none were observed. The aliquot was centrifuged and the supernate and solids prepared for analysis. Table B2-6 shows the analytical results. No information was available regarding sample handling for this tank. The reason for the sampling was to support the 242-A Evaporator Campaign.

Table B1-3. Tank 241-AN-104 Summary of Sample Analyses. (7 sheets)

Sample Portion	Segment Number	Sample Number	Analyses
Core 163 (from riser 10A)			
Whole (liquid)	2	S96T005256	Alpha radiation, TGA, SpG, ICP, DSC, IC
	4	S96T005260	Alpha radiation, TGA, SpG, ICP, DSC, IC
	5	S96T005527	Alpha radiation, TGA, SpG, ICP, DSC, IC
	6	S96T005554	Alpha radiation, TGA, SpG, ICP, DSC, IC
	7	S96T005255	Alpha radiation, DSC/TGA, SpG, ICP, IC
	8	S96T005257	Alpha radiation, TGA, SpG, ICP, DSC, IC
	9	S96T005258	Alpha radiation, TGA, SpG, ICP, DSC, IC
	10	S96T005528	Alpha radiation, TGA, SpG, ICP, DSC, IC
	11	S96T005739	Alpha radiation, DSC/TGA, SpG, ICP, IC
	12	S96T005766	Alpha radiation, DSC/TGA, SpG, ICP, IC
	14	S96T005741	Alpha radiation, DSC/TGA, SpG, ICP, IC
Upper half solid sample	14	S96T005728	Bulk density
		S96T005743	DSC/TGA
		S96T005747	ICP
		S96T005749	ICP
		S96T005751	IC
	16	S96T005226	Bulk density
		S96T005271	TGA, DSC
		S96T005293	ICP
		S96T005294	ICP
		S96T005295	IC
	18	S96T005769	Bulk density
		S96T005772	TGA, DSC

Table B1-3. Tank 241-AN-104 Summary of Sample Analyses. (7 sheets)

Sample Portion	Segment Number	Sample Number	Analyses
Core 163 (from riser 10A)			
Upper half solid sample	18	S96T005777	ICP
		S96T005778	ICP
		S96T005779	IC
	20	S96T005548	DSC/TGA
		S96T005552	Bulk density
		S96T005556	ICP
		S96T005557	ICP
		S96T005558	IC
Lower half solid sample	1	S96T005269	DSC/TGA
		S96T005284	Alpha, ICP
		S96T005287	ICP
		S96T005290	IC
	2	S96T005270	DSC/TGA
		S96T005285	Alpha, ICP
		S96T005288	ICP
		S96T005291	IC
	12	S96T005768	Bulk density
		S96T005771	TGA, DSC
		S96T005780	Alpha, ICP
		S96T005782	ICP
		S96T005784	IC
	14	S96T005729	Bulk density
		S96T005744	DSC/TGA
		S96T005748	Alpha, ICP

Table B1-3. Tank 241-AN-104 Summary of Sample Analyses. (7 sheets)

Sample Portion	Segment Number	Sample Number	Analyses
Core 163 (from riser 10A) (Cont'd)			
Lower half solid sample	14	S96T005750	ICP
		S96T005752	IC
	16	S96T005227	Bulk density
		S96T005272	TGA, DSC
		S96T005286	Alpha, ICP
		S96T005289	ICP
		S96T005292	IC
	18	S96T005770	Bulk density
		S96T005773	TGA, DSC
		S96T005781	Alpha, ICP
		S96T005783	ICP
		S96T005785	IC
	20	S96T005549	DSC/TGA
		S96T005553	Bulk density
		S96T005559	Alpha, ICP
		S96T005560	ICP
		S96T005561	IC
Core 164 (from riser 12A)			
Whole	Solid core composite	S96T005970	Bulk density
		S96T005972	TIC/TOC, TGA, DSC
		S96T005975	$^{239/240}$Pu Alpha, GEA, Te, $^{89/90}$Sr U, ^{99}Tc, ^{241}Am, $^{243/244}$Cm, Total beta
		S96T005976	ICP
		S96T005977	^{129}I, Cr+6, OH, IC, ^{3}H

Table B1-3. Tank 241-AN-104 Summary of Sample Analyses. (7 sheets)

Sample Portion	Segment Number	Sample Number	Analyses
Core 164 (from riser 12A) (Cont'd)			
Whole	Liquid core composite	S96T005978	Alpha radiation, TIC/TOC, DSC/TGA
		S96T005979	Alpha radiation, ICP, GEA, IC
		S96T005980	$^{239/240}Pu$, ^{237}Np, ^{241}Am, Cr+6, Sr
		S96T005981	Uranium gross (Kinetic Phosphoresence), OH direct, SpG
		S97T000022	^{129}I, Te
		S97T000389	Scintillation
	1	S96T004774	Alpha radiation, TGA, SpG, ICP, DSC, IC
	2	S96T004778	Alpha radiation, TGA, SpG, ICP, DSC, IC
	3	S96T004779	Alpha radiation, TGA, SpG, ICP, DSC, IC
	4	S96T004780	Alpha radiation, TGA, SpG, ICP, DSC, IC
	5	S96T004976	Alpha radiation, TGA, SpG, ICP, DSC, IC
	7	S96T004781	Alpha radiation, TGA, SpG, ICP, DSC, IC
	8	S96T004977	Alpha radiation, TGA, SpG, ICP, DSC, IC
	9	S96T004978	Alpha radiation, DSC/TGA, TGA, SpG, ICP, IC
	10	S96T004979	Alpha radiation, DSC/TGA, SpG, ICP, IC
	11	S96T004782	Alpha radiation, TGA, SpG, ICP, DSC, IC
	12	S96T004783	Alpha radiation, DSC/TGA, SpG, ICP, IC
	13	S96T004784	Alpha radiation, DSC/TGA, SpG, ICP, IC
	HHF Blank	S96T004916	ICP, IC
	Field Blank	S96T005253	Alpha radiation, DSC/TGA, SpG, ICP, IC
Upper half solid sample	14	S96T004965	Bulk density
		S96T004984	DSC/TGA
		S96T005035	ICP
		S96T005042	ICP

Table B1-3. Tank 241-AN-104 Summary of Sample Analyses. (7 sheets)

Sample Portion	Segment Number	Sample Number	Analyses
Core 164 (from riser 12A) (Cont'd)			
Upper half solid sample	14	S96T005067	IC
	15	S96T004968	Bulk density
		S96T004986	TGA, DSC
		S96T005036	ICP
		S96T005061	ICP
		S96T005071	IC
	16	S96T004970	Bulk density
		S96T004988	TGA, DSC
		S96T005037	ICP
		S96T005062	ICP
		S96T005072	IC
	17	S96T004971	Bulk density
		S96T004990	TGA, DSC
		S96T005038	ICP
		S96T005063	ICP
		S96T005073	IC
	19	S96T004973	Bulk density
		S96T004992	DSC/TGA
		S96T005039	ICP
		S96T005064	ICP
		S96T005074	IC
	20	S96T005222	Bulk density
		S96T005249	DSC/TGA
		S96T005281	ICP
	20	S96T005282	ICP
		S96T005283	IC

Table B1-3. Tank 241-AN-104 Summary of Sample Analyses. (7 sheets)

Sample Portion	Segment Number	Sample Number	Analyses
Core 164 (from riser 12A) (Cont'd)			
Lower half solid sample	1	S96T004772	DSC/TGA
		S96T004795	Alpha, ICP
		S96T004797	ICP
		S96T004799	IC
		S97T000648	IC
	13	S96T004771	Bulk density
		S96T004773	DSC/TGA
		S96T004796	Alpha, ICP
		S96T004798	ICP
		S96T004800	IC
		S97T000649	IC
	14	S96T004966	Bulk density
		S96T004985	DSC/TGA
		S96T005030	Alpha, ICP
		S96T005040	ICP
		S96T005065	IC
	15	S96T004967	Bulk density
		S96T004987	TGA, DSC
		S96T005032	Alpha, ICP
		S96T005043	ICP
		S96T005068	IC
Lower half solid sample	16	S96T005033	Alpha, ICP
		S96T004969	Bulk density
		S96T004989	TGA, DSC
		S96T005044	ICP
		S96T005069	IC

Table B1-3. Tank 241-AN-104 Summary of Sample Analyses. (7 sheets)

Sample Portion	Segment Number	Sample Number	Analyses
Core 164 (from riser 12A) (Cont'd)			
Lower half solid sample (Cont'd)	17	S96T004972	Bulk density
		S96T004991	TGA, DSC
		S96T005031	Alpha, ICP
		S96T005041	ICP
		S96T005066	IC
	19	S96T004974	Bulk density
		S96T004993	DSC/TGA
		S96T005034	Alpha, ICP
		S96T005045	ICP
		S96T005070	IC
	20	S96T005223	Bulk density
		S96T005250	DSC/TGA
		S96T005278	Alpha, ICP
		S96T005279	ICP
		S96T005280	IC

Notes:

SpG = specific gravity
GEA = gamma energy analysis

Table B1-4. Analytical Procedures.

Analysis	Sample Portion	Preparation[1] Procedure	Analysis Procedure
DSC	Solid/liquid	n/a	LA-514-114 Rev. C-1 LA-514-113 Rev. C-1
TGA	Solid/liquid	n/a	LA-514-114 Rev. C-1 LA-560-112 Rev. B-1
Bulk density	Solid	n/a	LO-160-103 Rev. B-0
SpG	Liquid	n/a	LA-510-112 Rev. C-3
Uranium	Solid/liquid	LA-549-141 Rev. F-0	LA-925-009 Rev. A-1
IC	Solid/liquid	LA-504-101 Rev. E-0	LA-533-105 Rev. D-1
ICP	Solid/liquid	LA-505-159 Rev. D-0 LA-549-141 Rev. F-0	LA-505-151 Rev. D-3 LA-505-161 Rev. B-1
OH-	Solid/liquid	LA-504-101 Rev. E-0	LA-211-102 Rev. C-0
TIC/TOC	Solid/liquid	n/a	LA-342-100 Rev. D-0
Cr(VI)	Solid/liquid	LA-504-101 Rev. E-0	LA-265-101 Rev. B-0
TOC	Liquid	n/a	LA-344-105 Rev. D-1
^{3}H	Solid/liquid	LA-504-101 Rev. E-0	LA-218-114 Rev. B-0
^{129}I	Solid/liquid	LA-504-101 Rev. E-0	LA-378-103 Rev. C-0
^{99}Tc	Solid/liquid	LA-549-141 Rev. F-0	LA-438-101 Rev. D-2
^{237}Np	Solid/liquid	LA-549-141 Rev. F-0	LA-933-141 Rev. H-1
Total alpha/ total beta	Solid/liquid	LA-549-101 Rev. F-0	LA-508-101 Rev. D-2
GEA	Solid/liquid	LA-549-101 Rev. F-0	LA-548-121 Rev. E-0
$^{241}Am/^{244}Cm$	Solid/liquid	LA-549-101 Rev. F-0	LA-953-103 Rev. B-0
^{90}Sr	Solid/liquid	LA-549-141 Rev. F-0	LA-220-101 Rev. D-1
^{239}Pu	Solid/liquid	LA-549-101 Rev. F-0	LA-943-128 Rev. B-0

Note:

[1]Procedures are listed for solid sample preparation. Liquid samples are direct samples.

B2.0 ANALYTICAL RESULTS

B2.1 OVERVIEW

This section summarizes the sampling and analytical results associated with the August/September 1996 core samples and two historical samples from tank 241-AN-104. Table B2-1 shows the location and analytical results associated with this tank. Steen (1997) documents the detailed analytical results of solid and liquid phase samples from the 1996 core sampling, and Shekarriz et al. (1997) documents detailed retained gas sample results from 1996 core sampling. Sections B2.2 through B2.5 discuss the analyses and analytical results, and Section B2.6 tabulates all analytical measurements for 1996 core samples in the solid and liquid phase.

Table B2-1. Analytical Presentation Tables.

Analysis	Table Number
Concentration of retained gas sample	B2-2
Gas inventories of RGS	B2-3
Waste density of RGS	B2-4
Vapor sampling results (sniff data)	B2-5
Historical sampling results (1984 and 1985)	B2-6
Cations analysis (ICP)	B2-7 through B2-43
Anions analysis (IC)	B2-44 through B2-53
Hexavalent chromium (Cr VI)	B2-54
TIC/TOC and OH	B2-55 through B2-56
Thermodynamic analyses (DSC and TGA)	B2-57 and B2-58
Density and specific gravity (bulk density/specific	B2-59
Total alpha activities and total beta	B2-60 through B2-61
$^{89/90}$Sr	B2-62
Radionuclides by GEA	B2-63 through B2-67
Total uranium and $^{239/240}$Pu	B2-68 and B2-69
Radionuclides of ^{131}I, ^{3}H, ^{237}Np, ^{99}Tc	B2-70 through B2-73
Radionuclides by alpha energy analysis	B2-74 through B2-75

B2.2 SOLID AND LIQUID SAMPLES RESULTS FROM 1996 CORE SAMPLING

The analysis of core samples in solid and liquid phase from the 1996 push mode sampling were performed in 222-S Laboratory. The analysis results are discussed in sections below.

B2.2.1 Inorganic Analyses

The ICP and IC analyses were performed for anions and cations, respectively. A table for each analysis is provided. In each table, the "Mean" column is the average of result and duplicate values. All values were average including those below the detection level (denoted by the less-than symbol, "<"). If both sample and duplicate values were nondetected, the mean is expressed as a nondetected value. If one value was detected, but the other was not, the mean is expressed as a detected value. If both values were detected, the mean is expressed as a detected value.

B2.2.1.1 Inductively Coupled Plasma. The ICP analyses were performed according to procedures LA-505-161, Rev. B-1 or LA-505-151, Rev. D-3 depending on the ICP instrument used. A full suite of analytes was reported. Phosphorus was analyzed as a cross check for the phosphate results reported from IC analyses. The liquid subsamples were prepared for analysis by an acid adjustment of the direct subsample. Solid subsamples were prepared for analysis by performing an acid digest and a fusion. The solid core composite sample was prepared by fusion, water, and acid digestion before analysis.

Although a full suite of analytes were reported on the core samples, the analytes of interest were Li, Na, Al, Cr, Ca, Fe, K, U, Zn, Zr, Ba, Si, B, Bi, Mn, Ni. These were evaluated against the QC requirements. Lithium was required to evaluate contamination by HHF and/or wash water used during sampling. The remaining analytes of interest are requested by the flammable gas DQO. Additional ICP data were collected on an opportunistic basis (Kristofzski 1996) and are reported without the QC evaluation. The potassium and nickel results for ICP fusion analyses should be disregarded because the samples were prepared in a nickel crucible by fusion using potassium hydroxide.

B2.2.1.2 Ion Chromatography. The IC analyses were performed on direct subsamples of liquid samples. The solid subsamples were prepared for analysis by performing a water digest. Samples for IC were performed in duplicate according to procedure LA-533-105, Rev. D-1. All analytes reported by the IC instrument were requested.

High RPDs (>20 percent) were reported for several analytes and can be attributed to sample inhomogeneity. Spike recoveries outside of the required range (75 percent to 125 percent) were reported for acetate, Cl^-, F^-, NO_2^-, and NO_3^- ions. The chemist noted that the spike failures were caused by matrix interferences from organic acids. Bromide was detected in 22 of 51 subsamples submitted for analysis and indicated HHF intrusion into the samples. The standard recoveries for IC analysis were within the required limits.

B2.2.1.3 Chromium VI (CrVI). The Cr(VI) analyses were performed on direct liquid core composite subsamples. The solid core composite subsamples were prepared for analysis by performing a water digest. The standard recoveries, spike recoveries, and RPDs for this analysis were within required limits. The Cr(VI) results are 200 μg/g and 212.5 μg/mL for solids and liquids, respectively.

B2.2.2 Total Inorganic Carbon/Total Organic Carbon

The TIC/TOC by persulfate/coulometry analyses were performed on the core composite samples. No result exceeded the TOC notification limit of 30,000 μgC/g. Low concentrations of TIC and TOC were noted in some preparation blanks; however, the levels of contamination were inconsequential when compared to the result of the sample and do not impact sample data quality. The results shows one high RPD (TOC on a liquid sample) and one low spike (TIC on a solid sample). The TIC values were 14,650 μg/g for solids and 2,165 μg/mL for liquids. The TOC results were 4,625 μg/g for solids and 3,405 μg/mL for liquids.

B2.2.3 Hydroxide

The hydroxide analyses were performed on direct liquid core composite subsamples and the field blank. The solid core composite subsamples were prepared for analysis by performing a water digest. The standard recoveries and RPDs for this analysis were within the required limits. The hydroxide results are 37,150 μg/g for solids and 70,900 μg/mL for liquids.

B2.2.4 Thermodynamic Analyses

As required by the safety screening (Dukelow et al. 1995) and flammable gas DQOs (McDuffie and Johnson 1995), TGA and DSC were performed on the solids and liquids.

B2.2.4.1 Thermogravimetric Analysis. Thermogravimetric analysis measures the mass of a sample while its temperature is increased at a constant rate. Nitrogen is passed over the sample during heating to remove any released gases. Any decrease in the weight of a sample during TGA represents a loss of gaseous matter from the sample 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 (typically 150 to 200 °C) is caused by water evaporation. The temperature limit for moisture loss is chosen by the operator at an inflection point on the TGA plot. Other volatile matter fractions can often be differentiated by inflection points as well. Tank 241-AN-104 samples were analyzed by TGA using procedure LA-514-114, Rev. D-0 on a Perkin-Elmer[1] TGA 7 instrument, or

[1]Perkin-Elmer is a trademark of Perkins Research & Manufacturing Company, Incorporated, Canoga Park, California.

procedure LA-560-112, Rev. B-1 on a Mettler[2] TG 50 instrument. All samples exhibited a large weight loss between the ambient temperature and 200 °C (392 °F). The weight percent water values were between 47.35 and 52.44 for liquid samples, and 36.54 and 51.34 for solid samples. The standard recoveries and RPDs for this analysis were within the required limits.

B2.2.4.2 Differential Scanning Calorimetry. In a DSC analysis, heat absorbed or emitted by a substance is measured while the temperature of the sample is heated at a constant rate. Nitrogen is passed over the sample material to remove any gases being released. The onset temperature for an endothermic or exothermic event is determined graphically. The DSC analyses for tank 241-AN-104 were performed using procedure LA-514-113, Rev. C-1 on a Mettler™ DSC 20 instrument or procedure LA-514-114, Rev. D-0 on a Perkin-Elmer™ DSC 7 instrument. The highest individual sample or duplicate exothermic results for liquids and solids were 39.3 and 106.6 J/g, respectively. The exothermic results of solid core composite samples were 101 and 105 J/g.

Most of transitions 1 and 2 represent endothermic events, both of which are caused by water evaporation. High RPDs (>20 percent) in the exotherms were reported for both liquid and solid subsamples. The observed exotherm results were far below the threshold of 480 J/g, and no reruns were requested. The standard recoveries for this analysis were within the required limits.

B2.2.5 Density and Specific Gravity

Bulk density measurements were performed on all solid subsegments except segments 1 and 2 of core 163 and segment 1 of core 164. In these cases, the degree of recovery for solid samples were insufficient to perform the analysis. The subsegment-level results for salt slurry densities ranged from 1.52 to 1.76 g/mL with mean of 1.60 g/mL. The specific gravity measurements for liquid samples ranged from 1.34 to 1.49 with mean of 1.40.

B2.2.6 Radionuclide Analysis

B2.2.6.1 Total Alpha. Total alpha activity analyses were performed on direct liquid core composite subsamples and the field blank. The solid core composite subsamples were prepared for analysis by performing a fusion digest in duplicate. The highest results were 0.0259 μCi/mL and 0.0808 μCi/g for liquids and solids, respectively. High RPD (>20 percent) were reported for the solid core composite subsamples and can be attributed to sample inhomogeneity. No reruns were requested because of low alpha activity in the samples. The standard recoveries and spike recoveries for this analysis were within the required limits (Steen 1997).

[2]Mettler is a trademark of Mettler Instrument Corporation, Anaheim, California.

B2.2.6.2 Total Beta. Total beta activity analyses were performed on direct liquid core composite subsamples. The solid core composite subsamples were prepared for analysis by performing a fusion digest in duplicate. The standard recoveries, spike recoveries, and RPDs for this analysis were within the required limits. The sample results are 400 μCi/g for solids and 509 μCi/mL for liquids.

B2.2.6.3 Strontium 90. Strontium 90 analyses were performed on direct liquid core composite subsamples. The solid core composite subsamples were prepared for analysis by performing a fusion digest. The standard recoveries and RPDs for this analysis were within the required limits. Strontium 90 analytical results are 34.25 μCi/g for solids and 0.338 μCi/g for liquids.

B2.2.6.4 Gamma Energy Analysis. Gamma energy analysis, procedure number LA-548-121, was used to measure the activity of ^{137}Cs, ^{241}Am, $^{154/155}$Eu and ^{60}Co. The GEA analyses were performed on direct liquid core composite subsamples and the field blank. The solid core composite subsamples were prepared for analysis by performing a fusion digest in duplicate. All results were below detection limit except ^{137}Cs, which was 349.2 μCi/g for solids and 570 μCi/mL for liquids.

Actual detection limits for GEA analyses are not currently available. The latest GEA software does not currently report a minimum detectable activity. If an analysis is reported as "less than," the value reported is the detection limit.

B2.2.6.5 Total Uranium. Uranium analyses were performed on direct liquid core composite subsamples. The solid core composite subsamples were prepared for analysis by performing a fusion digest. The standard recoveries, spike recoveries, and RPDs for this analysis were within the required limits. Total uranium analytical results were 180.5 μg/g and 3.68 μg/mL for solids and liquids, respectively.

B2.2.6.6 Plutonium. The $^{239/240}$Pu analyses were performed on direct liquid core composite subsamples. The solid core composite subsamples were prepared for analysis by performing a fusion digest. The standard recoveries and RPDs for this analysis were within the required limits. Plutonium analytical results were 0.00365 μCi/g for solids and below the detection limit of 1.75E-04 μCi/mL for liquids.

B2.2.6.7 Iodine 129. The ^{129}I analyses were performed on direct liquid core composite subsamples and the field blank. The solid core composite subsamples were prepared for analysis by performing a water digest. Iodine analytical results were 2.075E-04 μCi/g for solids and below the detection limit of 2.7E-03 μCi/mL for liquids.

B2.2.6.8 Neptunium ^{237}Np. The ^{237}Np analyses were performed on direct liquid core composite subsamples and the field blank. The solid core composite subsamples were prepared for analysis by performing a water digest. The standard recoveries and RPDs for this analysis were within required limits. Neptunium analytical results were below the detection limit of 0.0116 μCi/g for solids and 2.97E-05 μCi/mL for liquid.

B2.2.6.9 Tritium ^3H. The ^3H analyses were performed on direct liquid core composite subsamples and the field blank. The solid core composite subsamples were prepared for analysis by performing a water digest. Tritium analytical results were 0.01 μCi/g for solids and 1.5E-03 μCi/mL for liquids.

B2.2.6.10 Technetium ^{99}Tc. The ^{99}Tc analyses were performed on direct liquid core composite subsamples and the field blank. The solid core composite subsamples were prepared for analysis by performing a fusion digest in duplicate. Technetium analytical results are 0.13 μCi/g for solids and 2.195E-04 μCi/mL for liquids.

B2.2.6.11 Alpha Energy Analyses. The analyses were performed for ^{241}Am and $^{243/244}$Cm. The ^{241}Am analyses were performed on direct liquid core composite subsamples and the field blank. The solid core composite subsamples were prepared for analysis by performing a fusion digest in duplicate. High RPDs were reported for the solid core composite samples. This can be attributed to the heterogenous nature of the samples. No rerun was requested because of the low americium activity in the samples. The standard recoveries for this analysis were within the required limits. Americium analytical results were 0.0192 μCi/g for solids and below the detection limit of 3.470E-04 μCi/mL for liquid.

The $^{243/244}$Cm analyses were performed on direct liquid core composite subsamples and the field blank. The solid core composite subsamples were prepared for analysis by performing a fusion digest in duplicate. The RPDs for this analysis were within the required limits. Curium analytical results were below the detection limits of 0.00388 μCi/g for solids and 3.47E-04 μCi/mL for liquid.

B2.3 RETAINED GAS SAMPLE RESULTS FORM 1996 CORE SAMPLING

Seven segments from 1996 push mode core samples were selected as retained gas samples for the gas composition and quantities study of tank retained gas.

B2.3.1 Retained Gas Concentration

The extraction results show insoluble gases were primarily retained in the lower, nonconvective layer. Based on the estimated solubilities and RGS measurements of gas concentrations, approximately 5.7 percent by volume (in-situ) of the nonconvective layer was filled with free gas, and 0.5 percent by volume (in-situ) of the convective (upper) layer was free gas. The calculated hydrogen inventory in both phases of the nonconvective and convective layers of tank 241-AN-104 is 102 m^3 (3,600 ft^3) based on integrated RGS measurements.

Table B2-2 shows the estimated concentrations of the insoluble/low-solubility and soluble gases obtained from the RGS in tank 241-AN-104. No correction for air entrainment has been made in the data. Such a correction would consist of removing all the O_2 and Ar and subtracting (3.71 x O_2) from the N_2, consistent with the molar N_2/O_2 ratio in atmospheric air. The measurements of ammonia concentration must be regarded as lower bounds (probably by a factor of 2 to 3) because they do not account for ammonia lost to condensation in the RGS system.

Table B2-2. Concentrations of Gas Constituents from the Retained Gas Sampler in Tank 241-AN-104.[1, 2]

Gas	Core 163 (riser 10A)[3]					Core 164 (riser 12A)
	Segment 3	Segment 13	Segment 15	Segment 17	Segment 21	Segment 18
Insoluble/low solubility Gas (μmoles/liter of waste)						
N_2	550±70	790±60	1,190±90	2850±200	2,900±200	2,100±70
H_2	76±10	520±40	1,520±110	1000±70	6,100±300	2,200±80
N_2O	72±10	200±20	430±40	530±40	4,000±20	760±30
O_2	100±20	76±6	58±4	290±20	48±6	79±3
CH_4	4.9±1.1	14±2	32±5	51±6	77±9	50±5
Ar	7±1	8.4±0.7	9.0±0.8	20±2	140±10	21±1
Other Nit. O_x	1.5±0.6	2.3±1.3	0.4±0.3	0.3±0.3	4.5±2.3	0.5±0.4
C_2H_x	1.2±0.4	6.0±1.9	14±3	22±3	11±3	21±2
C_3H_x	0.68±0.26	1.3±0.4	2.2±0.7	3.5±0.8	8.8±3.2	3.8±0.8
Other Hyd.	3.3±0.8	9.8±2.2	21±4	28±5	20±4	29±3
Soluble Gas[4] (μmoles/liter of liquid waste)						
NH_3	1,100±700	2,200±1,300	2,500±500	1,800±400	1,300±400	3,700±6,100

Notes:

[1]Shekarriz et al. (1997)

[2]The tank is active. Waste transfers will change tank contents.

[3]The data from segment 19 could not be used because of a valving problem in the extrusion procedure.

[4]Ammonia values are expected to be one-half to one-third of the actual in-tank value because these values do not account for ammonia in the condensate in the collector side of the RGS system.

B2.3.2 Retained Gas Inventory

Retained gas measurement results show three major constituents in the vapor phase of the nonconvective and convective layers: 33 mol% nitrogen, 46 mol% hydrogen, and 19 mol% nitrous oxide. The remainder of the gas is ammonia, methane, and other hydrocarbons. The measured local ammonia concentrations ranged from 1,100 to 3,700 umole/L of waste, more than 99.9 percent of which is dissolved in the liquid. Integrating local concentrations leads to a total amount (if it were vapor, which is improbable) of approximately 140 m^3 (4,900 ft^3) of ammonia at standard temperature and pressure.

Table B2-3 lists gas inventories for the nonconvective (sludge and crust layer) and convective layer (supernatant layer).

Table B2-3. Gas Inventory in Tank 241-AN-104 at Standard Temperature and Pressure.[1, 2, 3] (2 sheets)

Gas	Volume in Gas/Vapor Phase m^3 (*M%*)	Volume Dissolved in Liquid Phase m^3 (*M%*)
Nonconvective Layer (sludge and crust layer)		
Ammonia	0.046±0.046 (0.02%)	89±76 (86.8%)
Nitrogen	63±8.5 (31.2%)	0.86±0.12 (0.8%)
Hydrogen	96±12 (47.3%)	2.2±0.3 (2.2%)
Nitrous Oxide	40±5.1 (19.8%)	10±1.4 (10.1%)
Methane	1.8±0.3 (0.9%)	0.043±0.007 (0.04%)
C_2H_x [4]	0.6±0.13 (0.3%)	0
C_3H_x [4]	0.16±0.05 (0.1%)	0
Other [4]	0.94±0.22 (0.5%)	0
Total	202±26	103±78
Convective Layer (supernatant layer)		
Ammonia	0.002±0.001 (0.02%)	54±35 (90.8%)
Nitrogen	6.9±3.1 (65.6%)	1.3±0.6 (2.2%)
Hydrogen	2.6±0.43 (25.1%)	1.1±0.2 (1.8%)
Nitrous Oxide	0.47±0.08 (4.5%)	3.0±0.5 (5.1%)
Methane	0.18±0.04 (1.7%)	0.06±0.01 (0.1%)
C_2H_x [4]	0.059±0.023 (0.6%)	0

Table B2-3. Gas Inventory in Tank 241-AN-104 at Standard Temperature and Pressure.[1, 2, 3] (2 sheets)

Gas	Volume in Gas/Vapor Phase m^3 (*M*%)	Volume Dissolved in Liquid Phase m^3 (*M*%)
C_3H_x [4]	0.033±0.013 (0.3%)	0
Other [4]	0.24±0.07 (2.3%)	0
Total	10±3.8	60±36

Notes:

[1]Shekarriz et al. (1997)

[2]The error bands in the table represent the uncertainty that carries through from instrument error and uncertainty in layer interface location. Temporal and lateral variability are not included, and the resulting inventories may not be conservative.

[3]The tank is active. Waste transfers will change tank contents.

[4]These gases were assumed to be entirely insoluble.

The gas inventories listed in Table B2-3 were calculated from RGS data with corrections for entrained air; these agree with the inventories calculated from the VFI data by Stewart et al. (1996).

B2.3.3 Waste Density

Table B2-4 lists waste density, bulk density, and specific gravity from a non-RGS segment. The waste density for RGS was determined by the X-ray imaging method (Shekarriz et al. 1997). The X-ray imaging result of RGS for solid samples are about 5 percent to 20 percent higher than the solid density of the non-RGS segment at the same approximate depth of waste.

Table B2-4. Comparison of Bulk Density for the Retained Gas Sampler and Non-Retained Gas Sampler Segments for Tank 241-AN-104.[1]

X-Ray Imaging Results[2]		Bulk Density and Specific Gravity Results from the 222-S Laboratory[3]			
Core: Segments	Mean Density (g/mL)	Core: Segments	Density (g/mL)	Core: Segments	Density (g/mL)
163:3	1.41	163:4 (Liquid)	1.38	164:4 (Liquid)	1.41
163:13	1.79	163:12 (Solid)	1.76	164:13 (Solid)	1.53
163:15	1.72	163:14 (Solid)	1.63	164:15 (Solid)	1.56
163:17	2.09	163:16 (Solid)	1.57	164:17 (Solid)	1.54
163:19	1.74	163:18 (Solid)	1.65	164:19 (Solid)	1.57
163:21	1.85	163:20 (Solid)	1.64	164:20 (Solid)	1.60

Notes:
[1]The tank is active. Waste transfers will change tank contents.
[2]Shekarriz et al. (1997)
[3]See Table B2-59. Solid density is the mean of the upper and lower segment.

B2.4 1996 HEADSPACE VAPOR MEASUREMENT

During August and September 1996, tank headspace gas samples were obtained from tank 241-AN-104. These measurements supported the safety screening DQO (Dukelow et al. 1995). The vapor phase screening was taken to assess flammability issues. The vapor phase measurements were obtained 20 ft below risers 10A and 12A in the headspace of the tank, and results were obtained in the field (that is, no gas sample was sent to the laboratory for analysis).

Table B2-5. Tank 241-AN-104 Vapor Sampling Results.[1]

Measurement	Sample
Total Organic Carbon	9.0 parts per million by volume (ppmv)
Lower explosive limit	0.013 percent of the lower explosive limit
Oxygen	21.0 percent
Ammonia	100 ppmv

Note:
[1]The tank is active. Waste transfers will change tank contents.

B2.5 HISTORICAL SAMPLE RESULTS

Table B2-6 shows the results of the July 1984 (Jansky 1984a) and January 1985 (Mauss and Jansky 1985) sampling events. Tank 241-AN-104 was used as a receiver tank for the 242-A Evaporator. The samples were analyzed for specific constituents, and the results showed high concentrations of aluminum, hydroxide, nitrate, and nitrite. Sodium was found in high concentration in the second sampling event. These data have not been validated and should be used with caution.

Table B2-6. Tank 241-AN-104 Sampling Results for July 1984 and January 1985.[1] (2 sheets)

	July 1984[2]		January 1985[3]
Components	Supernate	Solids	Supernate
Physical Data			
Specific gravity	1.464		1.38[4]
Bulk density[5]		1.76	
Chemical Analysis			
Na	NA		11.22*M*
Al	1.81*M*		1.56*M*
Cr^{+3}	0.013*M*		NA
$Fe^{+2,3}$	0.0002*M*		NA
K^+	NA		0.18*M*
Cl^-	NA		0.17*M*
NO_3^-	2.72*M*	29%	3.00*M*
NO_2^-	1.87*M*	35%	1.96*M*
CO_3^{2-}	0.28*M*	33%	0.32*M*
SO_4^{2-}	0.016*M*		0.025*M*
PO_4^{3-}	0.007*M*		0.020*M*
OH^-	4.00*M*		3.98*M*
TOC	3.830 g C/L		2.88*M*[6]

Table B2-6. Tank 241-AN-104 Sampling Results for July 1984 and January 1985.[1] (2 sheets)

Components	July 1984[2] Supernate	July 1984[2] Solids	January 1985[3] Supernate
Radiological Analysis			
Pu	0.168 μg/mL		NA
^{90}Sr	1.27 μCi/mL		0.778 μCi/mL
^{241}Am	11.4 μCi/mL		NA
^{137}Cs	624 μCi/mL		593 μCi/mL

Notes:

NA = not available

[1]Pre-1989 analytical data have not been validated and should be used with caution.
[2]Jansky (1984a)
[3]Mauss and Jansky (1985)
[4]Estimated values
[5]Bulk density of centrifugal solids
[6]The unit is probably g C/L.

B2.6 ANALYTICAL DATA TABLES FROM 1996 SAMPLING

For most analyses (except for some physical and rheological measurements), the data tables consist of six columns. The first column lists the sample number. For each primary/duplicate pair, the sample number is for the primary result. The second column lists the core from which the samples were derived. The third column lists the sample portion from which the aliquots were taken. The final three columns display the primary and duplicate analytical values and a mean for each sample/duplicate pair.

The four QC parameters assessed in conjunction with tank 241-AN-104 samples were standard recoveries, spike recoveries, duplicate analyses (RPDs), and blanks. The QC criteria specified in Winkleman (1996a) for the safety screening DQO were 90 to 110 percent recovery for standards and spikes and ≤10 percent for RPDs. The only QC parameter, for which limits are not specified in Winkelman, is blank contamination. The limits for blanks are in guidelines followed by the laboratory, and all data results in this report have met those guidelines. Sample and duplicate pairs, in which any QC parameter was outside the limits, are footnoted in the sample mean column of the data summary tables with an a, b, c, d, e, or f as follows:

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

Table B2-7. Tank 241-AN-104 Analytical Results: Aluminum (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005287	163:1	Lower half	20,900	20,600	20,750[QC:c]
S96T005288	163:2	Lower half	17,100	17,500	17,300[QC:d]
S96T005782	163:12	Lower half	21,200	20,100	20,650
S96T005749	163:14	Upper half	20,000	20,500	20,250
S96T005750		Lower half	21,300	21,500	21,400
S96T005294	163:16	Upper half	18,600	19,600	19,100
S96T005289		Lower half	19,500	20,700	20,100[QC:d]
S96T005778	163:18	Upper half	17,800	18,000	17,900
S96T005783		Lower half	17,900	17,300	17,600
S96T005557	163:20	Upper half	17,500	17,900	17,700
S96T005560		Lower half	18,800	15,300	17,050[QC:c,e]
S96T004797	164:1	Lower half	20,300	20,500	20,400[QC:d]
S96T004798	164:13	Lower half	21,800	23,100	22,450[QC:d]
S96T005042	164:14	Upper half	21,700	21,700	21,700
S96T005040		Lower half	22,300	22,700	22,500
S96T005061	164:15	Upper half	21,000	21,300	21,150
S96T005043		Lower half	21,200	20,900	21,050
S96T005062	164:16	Upper half	23,800	24,000	23,900
S96T005044		Lower half	22,400	22,300	22,350
S96T005063	164:17	Upper half	22,700	23,900	23,300
S96T005041		Lower half	21,800	21,900	21,850[QC:d]
S96T005064	164:19	Upper half	20,900	21,700	21,300
S96T005045		Lower half	22,800	22,800	22,800
S96T005282	164:20	Upper half	20,200	21,000	20,600
S96T005279		Lower half	19,000	21,400	20,200[QC:c]
S96T005976	Core 164	Composite	20,600	20,900	20,750[QC:a]

Table B2-7. Tank 241-AN-104 Analytical Results: Aluminum (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion			µg/g	µg/g	µg/g
S96T005284	163:1	Lower half	21,700	20,300	21,000
S96T005285	163:2	Lower half	16,100	13,800	14,950
S96T005780	163:12	Lower half	21,500	21,700	21,600
S96T005747	163:14	Upper half	20,200	20,000	20,100
S96T005748		Lower half	21,000	21,100	21,050
S96T005293	163:16	Upper half	19,500	20,400	19,950
S96T005286		Lower half	21,000	18,800	19,900
S96T005777	163:18	Upper half	25,900	18,900	22,400[QC:e]
S96T005781		Lower half	21,400	22,600	22,000
S96T005556	163:20	Upper half	21,700	17,500	19,600[QC:e]
S96T005559		Lower half	16,700	21,400	19,050[QC:e]
S96T004795	164:1	Lower half	22,800	22,000	22,400
S96T004796	164:13	Lower half	23,000	21,800	22,400
S96T005035	164:14	Upper half	22,400	20,200	21,300
S96T005030		Lower half	22,900	21,800	22,350
S96T005036	164:15	Upper half	22,200	22,600	22,400
S96T005032		Lower half	21,700	21,400	21,550
S96T005037	164:16	Upper half	23,400	22,900	23,150
S96T005033		Lower half	22,700	22,700	22,700
S96T005038	164:17	Upper half	22,600	22,300	22,450
S96T005031		Lower half	20,400	21,700	21,050
S96T005039	164:19	Upper half	20,800	19,900	20,350
S96T005034		Lower half	21,600	21,000	21,300
S96T005281	164:20	Upper half	17,400	17,300	17,350
S96T005278		Lower half	19,800	19,200	19,500

Table B2-7. Tank 241-AN-104 Analytical Results: Aluminum (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			μg/mL	μg/mL	μg/mL
S96T005256	163:2	Liquid	37,500	40,600	39,050
S96T005260	163:4	Liquid	40,200	37,500	38,850[QC:c]
S96T005527	163:5	Liquid	37,300	36,800	37,050[QC:c]
S96T005554	163:6	Liquid	38,700	38,400	38,550
S96T005255	163:7	Liquid	41,000	43,200	42,100[QC:d]
S96T005257	163:8	Liquid	36,800	37,700	37,250
S96T005258	163:9	Liquid	39,200	37,500	38,350
S96T005528	163:10	Liquid	35,400	35,900	35,650
S96T005739	163:11	Liquid	37,400	37,200	37,300
S96T005766	163:12	Liquid	40,400	40,000	40,200
S96T005741	163:14	Liquid	37,300	37,100	37,200
S96T004774	164:1	Liquid	40,600	41,500	41,050[QC:d]
S96T004778	164:2	Liquid	35,400	41,600	38,500
S96T004779	164:3	Liquid	40,600	39,600	40,100
S96T004780	164:4	Liquid	37,300	38,300	37,800[QC:d]
S96T004976	164:5	Liquid	40,100	37,800	38,950[QC:c]
S96T004781	164:7	Liquid	36,900	38,000	37,450[QC:d]
S96T004977	164:8	Liquid	43,500	37,200	40,350[QC:c]
S96T004978	164:9	Liquid	41,100	34,700	37,900
S96T004979	164:10	Liquid	38,700	37,200	37,950
S96T004782	164:11	Liquid	36,500	38,500	37,500[QC:d]
S96T004783	164:12	Liquid	39,000	43,400	41,200
S96T004784	164:13	Liquid	36,200	38,000	37,100[QC:d]
S96T005979	Core 164	Composite	42,500	40,900	41,700[QC:c]

Table B2-8. Tank 241-AN-104 Analytical Results: Antimony (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005287	163:1	Lower half	<22.7	<23.6	<23.15
S96T005288	163:2	Lower half	<26.6	<22.5	<24.55
S96T005782	163:12	Lower half	<27.4	<27.7	<27.55
S96T005749	163:14	Upper half	<26.9	<26.2	<26.55
S96T005750		Lower half	<27.5	<27.1	<27.3
S96T005294	163:16	Upper half	<24.8	<22.2	<23.5
S96T005289		Lower half	<27.9	<25.6	<26.75
S96T005778	163:18	Upper half	<28.9	<27.3	<28.1
S96T005783		Lower half	<28.5	<28.3	<28.4
S96T005557	163:20	Upper half	<22.8	<24.1	<23.45
S96T005560		Lower half	<26.5	<22.4	<24.45
S96T004797	164:1	Lower half	<28.1	<28.3	<28.2
S96T004798	164:13	Lower half	<29	<28.6	<28.8
S96T005042	164:14	Upper half	<28.5	<28.8	<28.65
S96T005040		Lower half	<28.6	<28.2	<28.4
S96T005061	164:15	Upper half	<29	<28.8	<28.9
S96T005043		Lower half	<27.8	<28.6	<28.2
S96T005062	164:16	Upper half	<90.4	<89.6	<90
S96T005044		Lower half	<88.5	<90	<89.25
S96T005063	164:17	Upper half	<83.6	<85.7	<84.65
S96T005041		Lower half	<91.5	<90.7	<91.1
S96T005064	164:19	Upper half	<90.8	<92.1	<91.45
S96T005045		Lower half	<87	<86.4	<86.7
S96T005282	164:20	Upper half	<23.6	<21.6	<22.6
S96T005279		Lower half	<27.2	<22.7	<24.95
S96T005976	Core 164	Composite	<23.9	<23.9	<23.9

Table B2-8. Tank 241-AN-104 Analytical Results: Antimony (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion			µg/g	µg/g	µg/g
S96T005284	163:1	Lower half	<1,120	<1,120	<1,120
S96T005285	163:2	Lower half	<1,070	<1,150	<1,110
S96T005780	163:12	Lower half	<1,130	<1,140	<1,135
S96T005747	163:14	Upper half	<1,340	<1,350	<1,345
S96T005748		Lower half	<1,120	<1,160	<1,140
S96T005293	163:16	Upper half	<1,060	<1,140	<1,100
S96T005286		Lower half	<1,190	<1,100	<1,145
S96T005777	163:18	Upper half	<1,230	<1,190	<1,210
S96T005781		Lower half	<1,280	<1,280	<1,280
S96T005556	163:20	Upper half	<1,110	<1,160	<1,135
S96T005559		Lower half	<1,170	<1,170	<1,170
S96T004795	164:1	Lower half	<1,230	<1,210	<1,220
S96T004796	164:13	Lower half	<1,240	<1,240	<1,240
S96T005035	164:14	Upper half	<1,220	<1,240	<1,230
S96T005030		Lower half	<1,230	<1,220	<1,225
S96T005036	164:15	Upper half	<1,210	<1,180	<1,195
S96T005032		Lower half	<1,180	<1,200	<1,190
S96T005037	164:16	Upper half	<1,150	<1,100	<1,125
S96T005033		Lower half	<1,150	<1,120	<1,135
S96T005038	164:17	Upper half	<1,160	<1,140	<1,150
S96T005031		Lower half	<1,310	<1,300	<1,305
S96T005039	164:19	Upper half	<1,170	<1,200	<1,185
S96T005034		Lower half	<1,280	<1,300	<1,290
S96T005281	164:20	Upper half	<1,030	<1,110	<1,070
S96T005278		Lower half	1,220	1,590	1,405[QC:c]

Table B2-8. Tank 241-AN-104 Analytical Results: Antimony (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
S96T005256	163:2	Liquid	<36.1	<36.1	<36.1
S96T005260	163:4	Liquid	<36.1	<36.1	<36.1
S96T005527	163:5	Liquid	<36.1	<36.1	<36.1
S96T005554	163:6	Liquid	<36.1	<36.1	<36.1
S96T005255	163:7	Liquid	<36.1	<36.1	<36.1
S96T005257	163:8	Liquid	<36.1	<36.1	<36.1
S96T005258	163:9	Liquid	<36.1	<36.1	<36.1
S96T005528	163:10	Liquid	<36.1	<36.1	<36.1
S96T005739	163:11	Liquid	<36.1	<36.1	<36.1
S96T005766	163:12	Liquid	<36.1	<36.1	<36.1
S96T005741	163:14	Liquid	<36.1	<36.1	<36.1
S96T004774	164:1	Liquid	<72.1	<72.1	<72.1
S96T004778	164:2	Liquid	<72.1	<72.1	<72.1
S96T004779	164:3	Liquid	<72.1	<72.1	<72.1
S96T004780	164:4	Liquid	<36.1	<36.1	<36.1
S96T004976	164:5	Liquid	<36.1	<36.1	<36.1
S96T004781	164:7	Liquid	<36.1	<36.1	<36.1
S96T004977	164:8	Liquid	<36.1	<36.1	<36.1
S96T004978	164:9	Liquid	<36.1	<36.1	<36.1
S96T004979	164:10	Liquid	<36.1	<36.1	<36.1
S96T004782	164:11	Liquid	<36.1	<36.1	<36.1
S96T004783	164:12	Liquid	<36.1	<36.1	<36.1
S96T004784	164:13	Liquid	<36.1	<36.1	<36.1
S96T005979	Core 164	Composite	<72.1	<72.1	<72.1

Table B2-9. Tank 241-AN-104 Analytical Results: Arsenic (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005287	163:1	Lower half	<37.9	<39.3	<38.6
S96T005288	163:2	Lower half	<44.3	<37.5	<40.9
S96T005782	163:12	Lower half	<45.7	<46.1	<45.9
S96T005749	163:14	Upper half	<44.8	<43.6	<44.2
S96T005750		Lower half	<45.9	<45.2	<45.55
S96T005294	163:16	Upper half	<41.3	<37	<39.15
S96T005289		Lower half	<46.4	<42.6	<44.5
S96T005778	163:18	Upper half	<48.1	<45.4	<46.75
S96T005783		Lower half	<47.4	<47.2	<47.3
S96T005557	163:20	Upper half	<38	<40.1	<39.05
S96T005560		Lower half	<44.2	<37.3	<40.75
S96T004797	164:1	Lower half	<46.9	<47.1	<47
S96T004798	164:13	Lower half	<48.4	<47.7	<48.05
S96T005042	164:14	Upper half	<47.4	<48	<47.7
S96T005040		Lower half	<47.7	<47	<47.35
S96T005061	164:15	Upper half	<48.3	<48	<48.15
S96T005043		Lower half	<46.4	<47.7	<47.05
S96T005062	164:16	Upper half	<151	<149	<150
S96T005044		Lower half	<147	<150	<148.5
S96T005063	164:17	Upper half	<139	<143	<141
S96T005041		Lower half	<152	<151	<151.5
S96T005064	164:19	Upper half	<151	<153	<152
S96T005045		Lower half	<145	<144	<144.5
S96T005282	164:20	Upper half	<39.3	<36.1	<37.7
S96T005279		Lower half	<45.4	<37.8	<41.6
S96T005976	Core 164	Composite	<39.8	<39.8	<39.8[QC:a]

Table B2-9. Tank 241-AN-104 Analytical Results: Arsenic (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion			µg/g	µg/g	µg/g
S96T005284	163:1	Lower half	<1,870	<1,870	<1,870
S96T005285	163:2	Lower half	<1,790	<1,910	<1,850
S96T005780	163:12	Lower half	<1,880	<1,900	<1,890
S96T005747	163:14	Upper half	<2,240	<2,250	<2,245
S96T005748		Lower half	<1,870	<1,930	<1,900
S96T005293	163:16	Upper half	<1,770	<1,900	<1,835
S96T005286		Lower half	<1,990	<1,830	<1,910
S96T005777	163:18	Upper half	<2,050	<1,980	<2,015
S96T005781		Lower half	<2,130	<2,140	<2,135
S96T005556	163:20	Upper half	<1,850	<1,940	<1,895
S96T005559		Lower half	<1,950	<1,950	<1,950
S96T004795	164:1	Lower half	<2,040	<2,010	<2,025
S96T004796	164:13	Lower half	<2,060	<2,070	<2,065
S96T005035	164:14	Upper half	<2,040	<2,060	<2,050
S96T005030		Lower half	<2,050	<2,040	<2,045
S96T005036	164:15	Upper half	<2,010	<1,970	<1,990
S96T005032		Lower half	<1,970	<2,000	<1,985
S96T005037	164:16	Upper half	<1,920	<1,830	<1,875
S96T005033		Lower half	<1,910	<1,870	<1,890
S96T005038	164:17	Upper half	<1,930	<1,900	<1,915
S96T005031		Lower half	<2,180	<2,170	<2,175
S96T005039	164:19	Upper half	<1,940	<2,000	<1,970
S96T005034		Lower half	<2,140	<2,170	<2,155
S96T005281	164:20	Upper half	<1,720	<1,850	<1,785
S96T005278		Lower half	<1,890	<1,930	<1,910

Table B2-9. Tank 241-AN-104 Analytical Results: Arsenic (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
S96T005256	163:2	Liquid	<60.1	<60.1	<60.1
S96T005260	163:4	Liquid	<60.1	<60.1	<60.1
S96T005527	163:5	Liquid	<60.1	<60.1	<60.1
S96T005554	163:6	Liquid	<60.1	<60.1	<60.1
S96T005255	163:7	Liquid	<60.1	<60.1	<60.1
S96T005257	163:8	Liquid	<60.1	<60.1	<60.1
S96T005258	163:9	Liquid	<60.1	<60.1	<60.1
S96T005528	163:10	Liquid	<60.1	<60.1	<60.1
S96T005739	163:11	Liquid	<60.1	<60.1	<60.1
S96T005766	163:12	Liquid	<60.1	<60.1	<60.1
S96T005741	163:14	Liquid	<60.1	<60.1	<60.1
S96T004774	164:1	Liquid	<120	<120	<120
S96T004778	164:2	Liquid	<120	<120	<120
S96T004779	164:3	Liquid	<120	<120	<120
S96T004780	164:4	Liquid	<60.1	<60.1	<60.1
S96T004976	164:5	Liquid	<60.1	<60.1	<60.1
S96T004781	164:7	Liquid	<60.1	<60.1	<60.1
S96T004977	164:8	Liquid	<60.1	<60.1	<60.1
S96T004978	164:9	Liquid	<60.1	<60.1	<60.1
S96T004979	164:10	Liquid	<60.1	<60.1	<60.1
S96T004782	164:11	Liquid	<60.1	<60.1	<60.1
S96T004783	164:12	Liquid	<60.1	<60.1	<60.1
S96T004784	164:13	Liquid	<60.1	<60.1	<60.1
S96T005979	Core 164	Composite	<120	<120	<120

Table B2-10. Tank 241-AN-104 Analytical Results: Barium (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005287	163:1	Lower half	<18.9	<19.6	<19.25
S96T005288	163:2	Lower half	<22.2	<18.7	<20.45
S96T005782	163:12	Lower half	<22.8	<23	<22.9
S96T005749	163:14	Upper half	<22.4	<21.8	<22.1
S96T005750		Lower half	<23	<22.6	<22.8
S96T005294	163:16	Upper half	<20.6	<18.5	<19.55
S96T005289		Lower half	<23.2	<21.3	<22.25
S96T005778	163:18	Upper half	<24.1	<22.7	<23.4
S96T005783		Lower half	<23.7	<23.6	<23.65
S96T005557	163:20	Upper half	<19	<20.1	<19.55
S96T005560		Lower half	<22.1	<18.7	<20.4
S96T004797	164:1	Lower half	<23.4	<23.5	<23.45
S96T004798	164:13	Lower half	<24.2	<23.8	<24
S96T005042	164:14	Upper half	<23.7	<24	<23.85
S96T005040		Lower half	<23.9	<23.5	<23.7
S96T005061	164:15	Upper half	<24.2	<24	<24.1
S96T005043		Lower half	<23.2	<23.9	<23.55
S96T005062	164:16	Upper half	<75.3	<74.7	<75
S96T005044		Lower half	<73.7	<75	<74.35
S96T005063	164:17	Upper half	<69.7	<71.4	<70.55
S96T005041		Lower half	<76.2	<75.6	<75.9
S96T005064	164:19	Upper half	<75.6	<76.7	<76.15
S96T005045		Lower half	<72.5	<72	<72.25
S96T005282	164:20	Upper half	<19.7	<18	<18.85
S96T005279		Lower half	<22.7	<18.9	<20.8
S96T005976	Core 164	Composite	<19.9	<19.9	<19.9[QC:a]

Table B2-10. Tank 241-AN-104 Analytical Results: Barium (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion			µg/g	µg/g	µg/g
S96T005284	163:1	Lower half	<937	<936	<936.5
S96T005285	163:2	Lower half	<894	<956	<925
S96T005780	163:12	Lower half	<940	<950	<945
S96T005747	163:14	Upper half	<1,120	<1,130	<1,125
S96T005748		Lower half	<934	<963	<948.5
S96T005293	163:16	Upper half	<887	<949	<918
S96T005286		Lower half	<993	<917	<955
S96T005777	163:18	Upper half	<1,030	<992	<1,011
S96T005781		Lower half	<1,060	<1,070	<1,065
S96T005556	163:20	Upper half	<924	<968	<946
S96T005559		Lower half	<977	<973	<975
S96T004795	164:1	Lower half	<1,020	<1,000	<1,010
S96T004796	164:13	Lower half	<1,030	<1,040	<1,035
S96T005035	164:14	Upper half	<1,020	<1,030	<1,025
S96T005030		Lower half	<1,020	<1,020	<1,020
S96T005036	164:15	Upper half	<1,000	<983	<991.5
S96T005032		Lower half	<987	<1,000	<993.5
S96T005037	164:16	Upper half	<961	<915	<938
S96T005033		Lower half	<957	<933	<945
S96T005038	164:17	Upper half	<966	<949	<957.5
S96T005031		Lower half	<1,090	<1,080	<1,085
S96T005039	164:19	Upper half	<972	<1,000	<986
S96T005034		Lower half	<1,070	<1,090	<1,080
S96T005281	164:20	Upper half	<860	<925	<892.5
S96T005278		Lower half	<943	<966	<954.5

Table B2-10. Tank 241-AN-104 Analytical Results: Barium (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			μg/mL	μg/mL	μg/mL
S96T005256	163:2	Liquid	<30.1	<30.1	<30.1
S96T005260	163:4	Liquid	<30.1	<30.1	<30.1
S96T005527	163:5	Liquid	<30.1	<30.1	<30.1
S96T005554	163:6	Liquid	<30.1	<30.1	<30.1
S96T005255	163:7	Liquid	<30.1	<30.1	<30.1
S96T005257	163:8	Liquid	<30.1	<30.1	<30.1
S96T005258	163:9	Liquid	<30.1	<30.1	<30.1
S96T005528	163:10	Liquid	<30.1	<30.1	<30.1
S96T005739	163:11	Liquid	<30.1	<30.1	<30.1
S96T005766	163:12	Liquid	<30.1	<30.1	<30.1
S96T005741	163:14	Liquid	<30.1	<30.1	<30.1
S96T004774	164:1	Liquid	<60.1	<60.1	<60.1
S96T004778	164:2	Liquid	<60.1	<60.1	<60.1
S96T004779	164:3	Liquid	<60.1	<60.1	<60.1
S96T004780	164:4	Liquid	<30.1	<30.1	<30.1
S96T004976	164:5	Liquid	<30.1	<30.1	<30.1
S96T004781	164:7	Liquid	<30.1	<30.1	<30.1
S96T004977	164:8	Liquid	<30.1	<30.1	<30.1
S96T004978	164:9	Liquid	<30.1	<30.1	<30.1
S96T004979	164:10	Liquid	<30.1	<30.1	<30.1
S96T004782	164:11	Liquid	<30.1	<30.1	<30.1
S96T004783	164:12	Liquid	<30.1	<30.1	<30.1
S96T004784	164:13	Liquid	<30.1	<30.1	<30.1
S96T005979	Core 164	Composite	<60.1	<60.1	<60.1

Table B2-11. Tank 241-AN-104 Analytical Results: Beryllium (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005287	163:1	Lower half	<1.89	<1.96	<1.925
S96T005288	163:2	Lower half	<2.22	<1.87	<2.045
S96T005782	163:12	Lower half	<2.28	<2.3	<2.29
S96T005749	163:14	Upper half	<2.24	<2.18	<2.21
S96T005750		Lower half	<2.3	<2.26	<2.28
S96T005294	163:16	Upper half	<2.06	<1.85	<1.955
S96T005289		Lower half	<2.32	<2.13	<2.225
S96T005778	163:18	Upper half	<2.41	<2.27	<2.34
S96T005783		Lower half	<2.37	<2.36	<2.365
S96T005557	163:20	Upper half	<1.9	<2.01	<1.955
S96T005560		Lower half	<2.21	<1.87	<2.04
S96T004797	164:1	Lower half	<2.34	<2.35	<2.345
S96T004798	164:13	Lower half	<2.42	<2.38	<2.4
S96T005042	164:14	Upper half	<2.37	<2.4	<2.385
S96T005040		Lower half	<2.39	<2.35	<2.37
S96T005061	164:15	Upper half	<2.42	<2.4	<2.41
S96T005043		Lower half	<2.32	<2.39	<2.355
S96T005062	164:16	Upper half	<7.53	<7.47	<7.5
S96T005044		Lower half	<7.37	<7.5	<7.435
S96T005063	164:17	Upper half	<6.97	<7.14	<7.055
S96T005041		Lower half	<7.62	<7.56	<7.59
S96T005064	164:19	Upper half	<7.56	<7.67	<7.615
S96T005045		Lower half	<7.25	<7.2	<7.225
S96T005282	164:20	Upper half	<1.97	<1.8	<1.885
S96T005279		Lower half	<2.27	<1.89	<2.08
S96T005976	Core 164	Composite	<1.99	<1.99	<1.99[QC:a]

Table B2-11. Tank 241-AN-104 Analytical Results: Beryllium (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion			µg/g	µg/g	µg/g
S96T005284	163:1	Lower half	<93.7	<93.6	<93.65
S96T005285	163:2	Lower half	<89.4	<95.6	<92.5
S96T005780	163:12	Lower half	<94	<95	<94.5
S96T005747	163:14	Upper half	<112	<113	<112.5
S96T005748		Lower half	<93.4	<96.3	<94.85
S96T005293	163:16	Upper half	<88.7	<94.9	<91.8
S96T005286		Lower half	<99.3	<91.7	<95.5
S96T005777	163:18	Upper half	<103	<99.2	<101.1
S96T005781		Lower half	<106	<107	<106.5
S96T005556	163:20	Upper half	<92.4	<96.8	<94.6
S96T005559		Lower half	<97.7	<97.3	<97.5
S96T004795	164:1	Lower half	<102	<100	<101
S96T004796	164:13	Lower half	<103	<104	<103.5
S96T005035	164:14	Upper half	<102	<103	<102.5
S96T005030		Lower half	<102	<102	<102
S96T005036	164:15	Upper half	<100	<98.3	<99.15
S96T005032		Lower half	<98.7	<100	<99.35
S96T005037	164:16	Upper half	<96.1	<91.5	<93.8
S96T005033		Lower half	<95.7	<93.3	<94.5
S96T005038	164:17	Upper half	<96.6	<94.9	<95.75
S96T005031		Lower half	<109	<108	<108.5
S96T005039	164:19	Upper half	<97.2	<100	<98.6
S96T005034		Lower half	<107	<109	<108
S96T005281	164:20	Upper half	<86	<92.5	<89.25
S96T005278		Lower half	<94.3	<96.6	<95.45

Table B2-11. Tank 241-AN-104 Analytical Results: Beryllium (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
S96T005256	163:2	Liquid	<3	<3	<3
S96T005260	163:4	Liquid	<3	<3	<3
S96T005527	163:5	Liquid	<3	<3	<3
S96T005554	163:6	Liquid	<3	<3	<3
S96T005255	163:7	Liquid	<3	<3	<3
S96T005257	163:8	Liquid	<3	<3	<3
S96T005258	163:9	Liquid	<3	<3	<3
S96T005528	163:10	Liquid	<3	<3	<3
S96T005739	163:11	Liquid	<3	<3	<3
S96T005766	163:12	Liquid	<3	<3	<3
S96T005741	163:14	Liquid	<3	<3	<3
S96T004774	164:1	Liquid	<6	<6	<6
S96T004778	164:2	Liquid	<6	<6	<6
S96T004779	164:3	Liquid	<6	<6	<6
S96T004780	164:4	Liquid	<3	<3	<3
S96T004976	164:5	Liquid	<3	<3	<3
S96T004781	164:7	Liquid	<3	<3	<3
S96T004977	164:8	Liquid	<3	<3	<3
S96T004978	164:9	Liquid	<3	<3	<3
S96T004979	164:10	Liquid	<3	<3	<3
S96T004782	164:11	Liquid	<3	<3	<3
S96T004783	164:12	Liquid	<3	<3	<3
S96T004784	164:13	Liquid	<3	<3	<3
S96T005979	Core 164	Composite	<6	<6	<6

Table B2-12. Tank 241-AN-104 Analytical Results: Bismuth (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005287	163:1	Lower half	<37.9	<39.3	<38.6
S96T005288	163:2	Lower half	<44.3	<37.5	<40.9
S96T005782	163:12	Lower half	<45.7	<46.1	<45.9
S96T005749	163:14	Upper half	<44.8	<43.6	<44.2
S96T005750		Lower half	<45.9	<45.2	<45.55
S96T005294	163:16	Upper half	<41.3	<37	<39.15
S96T005289		Lower half	<46.4	<42.6	<44.5
S96T005778	163:18	Upper half	<48.1	<45.4	<46.75
S96T005783		Lower half	<47.4	<47.2	<47.3
S96T005557	163:20	Upper half	<38	<40.1	<39.05
S96T005560		Lower half	<44.2	<37.3	<40.75
S96T004797	164:1	Lower half	<46.9	<47.1	<47
S96T004798	164:13	Lower half	<48.4	<47.7	<48.05
S96T005042	164:14	Upper half	<47.4	<48	<47.7
S96T005040		Lower half	<47.7	<47	<47.35
S96T005061	164:15	Upper half	<48.3	<48	<48.15
S96T005043		Lower half	<46.4	<47.7	<47.05
S96T005062	164:16	Upper half	<151	<149	<150
S96T005044		Lower half	<147	<150	<148.5
S96T005063	164:17	Upper half	<139	<143	<141
S96T005041		Lower half	<152	<151	<151.5
S96T005064	164:19	Upper half	<151	<153	<152
S96T005045		Lower half	<145	<144	<144.5
S96T005282	164:20	Upper half	<39.3	<36.1	<37.7
S96T005279		Lower half	<45.4	<37.8	<41.6
S96T005976	Core 164	Composite	<39.8	<39.8	<39.8[QC:a]

Table B2-12. Tank 241-AN-104 Analytical Results: Bismuth (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion			µg/g	µg/g	µg/g
S96T005284	163:1	Lower half	<1,870	<1,870	<1,870
S96T005285	163:2	Lower half	<1,790	<1,910	<1,850
S96T005780	163:12	Lower half	<1,880	<1,900	<1,890
S96T005747	163:14	Upper half	<2,240	<2,250	<2,245
S96T005748		Lower half	<1,870	<1,930	<1,900
S96T005293	163:16	Upper half	<1,770	<1,900	<1,835
S96T005286		Lower half	<1,990	<1,830	<1,910
S96T005777	163:18	Upper half	<2,050	<1,980	<2,015
S96T005781		Lower half	<2,130	<2,140	<2,135
S96T005556	163:20	Upper half	<1,850	<1,940	<1,895
S96T005559		Lower half	<1,950	<1,950	<1,950
S96T004795	164:1	Lower half	<2,040	<2,010	<2,025
S96T004796	164:13	Lower half	<2,060	<2,070	<2,065
S96T005035	164:14	Upper half	<2,040	<2,060	<2,050
S96T005030		Lower half	<2,050	<2,040	<2,045
S96T005036	164:15	Upper half	<2,010	<1,970	<1,990
S96T005032		Lower half	<1,970	<2,000	<1,985
S96T005037	164:16	Upper half	<1,920	<1,830	<1,875
S96T005033		Lower half	<1,910	<1,870	<1,890
S96T005038	164:17	Upper half	<1,930	<1,900	<1,915
S96T005031		Lower half	<2,180	<2,170	<2,175
S96T005039	164:19	Upper half	<1,940	<2,000	<1,970
S96T005034		Lower half	<2,140	<2,170	<2,155
S96T005281	164:20	Upper half	<1,720	<1,850	<1,785
S96T005278		Lower half	<1,890	<1,930	<1,910

Table B2-12. Tank 241-AN-104 Analytical Results: Bismuth (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			μg/mL	μg/mL	μg/mL
S96T005256	163:2	Liquid	<60.1	<60.1	<60.1
S96T005260	163:4	Liquid	<60.1	<60.1	<60.1
S96T005527	163:5	Liquid	<60.1	<60.1	<60.1
S96T005554	163:6	Liquid	<60.1	<60.1	<60.1
S96T005255	163:7	Liquid	<60.1	<60.1	<60.1
S96T005257	163:8	Liquid	<60.1	<60.1	<60.1
S96T005258	163:9	Liquid	<60.1	<60.1	<60.1
S96T005528	163:10	Liquid	<60.1	<60.1	<60.1
S96T005739	163:11	Liquid	<60.1	<60.1	<60.1
S96T005766	163:12	Liquid	<60.1	<60.1	<60.1
S96T005741	163:14	Liquid	<60.1	<60.1	<60.1
S96T004774	164:1	Liquid	<120	<120	<120
S96T004778	164:2	Liquid	<120	<120	<120
S96T004779	164:3	Liquid	<120	<120	<120
S96T004780	164:4	Liquid	<60.1	<60.1	<60.1
S96T004976	164:5	Liquid	<60.1	<60.1	<60.1
S96T004781	164:7	Liquid	<60.1	<60.1	<60.1
S96T004977	164:8	Liquid	<60.1	<60.1	<60.1
S96T004978	164:9	Liquid	<60.1	<60.1	<60.1
S96T004979	164:10	Liquid	<60.1	<60.1	<60.1
S96T004782	164:11	Liquid	<60.1	<60.1	<60.1
S96T004783	164:12	Liquid	<60.1	<60.1	<60.1
S96T004784	164:13	Liquid	<60.1	<60.1	<60.1
S96T005979	Core 164	Composite	<120	<120	<120

Table B2-13. Tank 241-AN-104 Analytical Results: Boron (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005287	163:1	Lower half	155	171	163
S96T005288	163:2	Lower half	200	182	191
S96T005782	163:12	Lower half	109	95.8	102.4
S96T005749	163:14	Upper half	86.2	89.4	87.8
S96T005750		Lower half	104	97.3	100.65
S96T005294	163:16	Upper half	164	145	154.5
S96T005289		Lower half	217	166	191.5[QC:c]
S96T005778	163:18	Upper half	124	104	114
S96T005783		Lower half	95.8	85	90.4
S96T005557	163:20	Upper half	167	167	167
S96T005560		Lower half	168	156	162
S96T004797	164:1	Lower half	146	120	133
S96T004798	164:13	Lower half	153	126	139.5
S96T005042	164:14	Upper half	119	133	126
S96T005040		Lower half	119	134	126.5
S96T005061	164:15	Upper half	158	128	143[QC:c]
S96T005043		Lower half	147	127	137
S96T005062	164:16	Upper half	141	114	127.5[QC:c]
S96T005044		Lower half	136	115	125.5
S96T005063	164:17	Upper half	142	121	131.5
S96T005041		Lower half	126	122	124
S96T005064	164:19	Upper half	147	133	140
S96T005045		Lower half	120	131	125.5
S96T005282	164:20	Upper half	170	160	165
S96T005279		Lower half	176	185	180.5
S96T005976	Core 164	Composite	133	158	145.5

Table B2-13. Tank 241-AN-104 Analytical Results: Boron (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion			µg/g	µg/g	µg/g
S96T005284	163:1	Lower half	<937	<936	<936.5
S96T005285	163:2	Lower half	<894	<956	<925
S96T005780	163:12	Lower half	<940	<950	<945
S96T005747	163:14	Upper half	<1,120	<1,130	<1,125
S96T005748		Lower half	<934	<963	<948.5
S96T005293	163:16	Upper half	<887	<949	<918
S96T005286		Lower half	<993	<917	<955
S96T005777	163:18	Upper half	<1,030	<992	<1,011
S96T005781		Lower half	<1,060	<1,070	<1,065
S96T005556	163:20	Upper half	<924	<968	<946
S96T005559		Lower half	<977	<973	<975
S96T004795	164:1	Lower half	<1,020	<1,000	<1,010
S96T004796	164:13	Lower half	<1,030	<1,040	<1,035
S96T005035	164:14	Upper half	<1,020	<1,030	<1,025
S96T005030		Lower half	<1,020	<1,020	<1,020
S96T005036	164:15	Upper half	<1,000	<983	<991.5
S96T005032		Lower half	<987	<1,000	<993.5
S96T005037	164:16	Upper half	<961	<915	<938
S96T005033		Lower half	<957	<933	<945
S96T005038	164:17	Upper half	<966	<949	<957.5
S96T005031		Lower half	<1,090	<1,080	<1,085
S96T005039	164:19	Upper half	<972	<1,000	<986
S96T005034		Lower half	<1,070	<1,090	<1,080
S96T005281	164:20	Upper half	<860	<925	<892.5
S96T005278		Lower half	<943	<966	<954.5

Table B2-13. Tank 241-AN-104 Analytical Results: Boron (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			μg/mL	μg/mL	μg/mL
S96T005256	163:2	Liquid	65.8	68.6	67.2
S96T005260	163:4	Liquid	70.1	63.4	66.75
S96T005527	163:5	Liquid	61.2	58.2	59.7
S96T005554	163:6	Liquid	64	61.9	62.95
S96T005255	163:7	Liquid	67	71.3	69.15
S96T005257	163:8	Liquid	66.1	66.1	66.1
S96T005258	163:9	Liquid	67	65.2	66.1
S96T005528	163:10	Liquid	60.9	63.4	62.15
S96T005739	163:11	Liquid	63.7	60.9	62.3
S96T005766	163:12	Liquid	59.1	64	61.55
S96T005741	163:14	Liquid	64	62.8	63.4
S96T004774	164:1	Liquid	67.8	67.9	67.85
S96T004778	164:2	Liquid	<60.1	65.1	<62.6
S96T004779	164:3	Liquid	68.6	64.2	66.4
S96T004780	164:4	Liquid	65.4	65.1	65.25
S96T004976	164:5	Liquid	67.7	65.7	66.7
S96T004781	164:7	Liquid	65.4	67.1	66.25
S96T004977	164:8	Liquid	70.1	62.2	66.15
S96T004978	164:9	Liquid	68	55.2	61.6[QC:e]
S96T004979	164:10	Liquid	64.8	63.6	64.2
S96T004782	164:11	Liquid	63.9	66.2	65.05
S96T004783	164:12	Liquid	67.1	69.2	68.15
S96T004784	164:13	Liquid	61.3	65.9	63.6
S96T005979	Core 164	Composite	<60.1	<60.1	<60.1

Table B2-14. Tank 241-AN-104 Analytical Results: Cadmium (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005287	163:1	Lower half	7.21	7.39	7.3
S96T005288	163:2	Lower half	3.61	4.27	3.94
S96T005782	163:12	Lower half	8.01	7.97	7.99
S96T005749	163:14	Upper half	7.14	7.06	7.1
S96T005750		Lower half	8.41	7.92	8.165
S96T005294	163:16	Upper half	14.7	11.3	13[QC:c]
S96T005289		Lower half	12.6	9.98	11.29[QC:c]
S96T005778	163:18	Upper half	6.47	7.24	6.855
S96T005783		Lower half	6.13	6.48	6.305
S96T005557	163:20	Upper half	10.6	10.5	10.55
S96T005560		Lower half	11	9.74	10.37
S96T004797	164:1	Lower half	4.34	4.69	4.515
S96T004798	164:13	Lower half	24	25.5	24.75
S96T005042	164:14	Upper half	11.7	11.8	11.75
S96T005040		Lower half	6.52	6.52	6.52
S96T005061	164:15	Upper half	9.28	8.68	8.98
S96T005043		Lower half	15.2	15.1	15.15
S96T005062	164:16	Upper half	<7.53	<7.47	<7.5
S96T005044		Lower half	<7.37	7.87	<7.62
S96T005063	164:17	Upper half	9.61	8.82	9.215
S96T005041		Lower half	13.6	11.8	12.7
S96T005064	164:19	Upper half	9.64	9.6	9.62
S96T005045		Lower half	11	11.6	11.3
S96T005282	164:20	Upper half	15.6	12.4	14[QC:c]
S96T005279		Lower half	12.3	7.83	10.065[QC:c]
S96T005976	Core 164	Composite	13.2	12.6	12.9[QC:a]

Table B2-14. Tank 241-AN-104 Analytical Results: Cadmium (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion			µg/g	µg/g	µg/g
S96T005284	163:1	Lower half	<93.7	<93.6	<93.65
S96T005285	163:2	Lower half	<89.4	<95.6	<92.5
S96T005780	163:12	Lower half	<94	<95	<94.5
S96T005747	163:14	Upper half	<112	<113	<112.5
S96T005748		Lower half	<93.4	<96.3	<94.85
S96T005293	163:16	Upper half	<88.7	<94.9	<91.8
S96T005286		Lower half	<99.3	<91.7	<95.5
S96T005777	163:18	Upper half	<103	<99.2	<101.1
S96T005781		Lower half	<106	<107	<106.5
S96T005556	163:20	Upper half	<92.4	<96.8	<94.6
S96T005559		Lower half	<97.7	<97.3	<97.5
S96T004795	164:1	Lower half	<102	<100	<101
S96T004796	164:13	Lower half	<103	<104	<103.5
S96T005035	164:14	Upper half	<102	<103	<102.5
S96T005030		Lower half	<102	<102	<102
S96T005036	164:15	Upper half	<100	<98.3	<99.15
S96T005032		Lower half	<98.7	<100	<99.35
S96T005037	164:16	Upper half	<96.1	<91.5	<93.8
S96T005033		Lower half	<95.7	<93.3	<94.5
S96T005038	164:17	Upper half	<96.6	<94.9	<95.75
S96T005031		Lower half	<109	<108	<108.5
S96T005039	164:19	Upper half	<97.2	<100	<98.6
S96T005034		Lower half	<107	<109	<108
S96T005281	164:20	Upper half	<86	<92.5	<89.25
S96T005278		Lower half	<94.3	<96.6	<95.45

Table B2-14. Tank 241-AN-104 Analytical Results: Cadmium (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			μg/mL	μg/mL	μg/mL
S96T005256	163:2	Liquid	<3	<3	<3
S96T005260	163:4	Liquid	<3	<3	<3
S96T005527	163:5	Liquid	<3	<3	<3
S96T005554	163:6	Liquid	<3	<3	<3
S96T005255	163:7	Liquid	<3	<3	<3
S96T005257	163:8	Liquid	<3	<3	<3
S96T005258	163:9	Liquid	<3	<3	<3
S96T005528	163:10	Liquid	<3	<3	<3
S96T005739	163:11	Liquid	<3	<3	<3
S96T005766	163:12	Liquid	<3	<3	<3
S96T005741	163:14	Liquid	<3	<3	<3
S96T004774	164:1	Liquid	<6	<6	<6
S96T004778	164:2	Liquid	<6	<6	<6
S96T004779	164:3	Liquid	<6	<6	<6
S96T004780	164:4	Liquid	<3	<3	<3
S96T004976	164:5	Liquid	<3	<3	<3
S96T004781	164:7	Liquid	<3	<3	<3
S96T004977	164:8	Liquid	<3	<3	<3
S96T004978	164:9	Liquid	<3	<3	<3
S96T004979	164:10	Liquid	<3	<3	<3
S96T004782	164:11	Liquid	<3	<3	<3
S96T004783	164:12	Liquid	<3	<3	<3
S96T004784	164:13	Liquid	<3	<3	<3
S96T005979	Core 164	Composite	<6	<6	<6

Table B2-15. Tank 241-AN-104 Analytical Results: Calcium (ICP) (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005287	163:1	Lower half	170	161	165.5
S96T005288	163:2	Lower half	255	101	178[QC:e]
S96T005782	163:12	Lower half	133	125	129
S96T005749	163:14	Upper half	133	135	134
S96T005750		Lower half	151	146	148.5
S96T005294	163:16	Upper half	257	218	237.5
S96T005289		Lower half	244	197	220.5[QC:e]
S96T005778	163:18	Upper half	271	273	272
S96T005783		Lower half	288	286	287
S96T005557	163:20	Upper half	359	343	351
S96T005560		Lower half	296	244	270
S96T004797	164:1	Lower half	143	132	137.5
S96T004798	164:13	Lower half	278	288	283
S96T005042	164:14	Upper half	188	197	192.5
S96T005040		Lower half	165	149	157
S96T005061	164:15	Upper half	170	179	174.5
S96T005043		Lower half	238	230	234
S96T005062	164:16	Upper half	<151	166	<158.5
S96T005044		Lower half	172	161	166.5
S96T005063	164:17	Upper half	162	181	171.5
S96T005041		Lower half	217	205	211
S96T005064	164:19	Upper half	224	263	243.5
S96T005045		Lower half	178	204	191
S96T005282	164:20	Upper half	499	286	392.5[QC:e]
S96T005279		Lower half	385	329	357
S96T005976	Core 164	Composite	269	218	243.5[QC:a,e]

Table B2-15. Tank 241-AN-104 Analytical Results: Calcium (ICP) (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion			µg/g	µg/g	µg/g
S96T005284	163:1	Lower half	<1,870	<1,870	<1,870
S96T005285	163:2	Lower half	<1,790	<1,910	<1,850
S96T005780	163:12	Lower half	<1,880	<1,900	<1,890
S96T005747	163:14	Upper half	<2,240	<2,250	<2,245
S96T005748		Lower half	<1,870	<1,930	<1,900
S96T005293	163:16	Upper half	<1,770	<1,900	<1,835
S96T005286		Lower half	<1,990	<1,830	<1,910
S96T005777	163:18	Upper half	<2,050	<1,980	<2,015
S96T005781		Lower half	<2,130	<2,140	<2,135
S96T005556	163:20	Upper half	<1,850	<1,940	<1,895
S96T005559		Lower half	<1,950	<1,950	<1,950
S96T004795	164:1	Lower half	<2,040	<2,010	<2,025
S96T004796	164:13	Lower half	<2,060	<2,070	<2,065
S96T005035	164:14	Upper half	<2,040	<2,060	<2,050
S96T005030		Lower half	<2,050	<2,040	<2,045
S96T005036	164:15	Upper half	<2,010	<1,970	<1,990
S96T005032		Lower half	<1,970	<2,000	<1,985
S96T005037	164:16	Upper half	<1,920	<1,830	<1,875
S96T005033		Lower half	<1,910	<1,870	<1,890
S96T005038	164:17	Upper half	<1,930	<1,900	<1,915
S96T005031		Lower half	<2,180	<2,170	<2,175
S96T005039	164:19	Upper half	<1,940	<2,000	<1,970
S96T005034		Lower half	<2,140	<2,170	<2,155
S96T005281	164:20	Upper half	<1,720	<1,850	<1,785
S96T005278		Lower half	<1,890	<1,930	<1,910

Table B2-15. Tank 241-AN-104 Analytical Results: Calcium (ICP) (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			μg/mL	μg/mL	μg/mL
S96T005256	163:2	Liquid	<60.1	<60.1	<60.1
S96T005260	163:4	Liquid	<60.1	<60.1	<60.1
S96T005527	163:5	Liquid	<60.1	<60.1	<60.1
S96T005554	163:6	Liquid	<60.1	<60.1	<60.1
S96T005255	163:7	Liquid	<60.1	<60.1	<60.1
S96T005257	163:8	Liquid	<60.1	<60.1	<60.1
S96T005258	163:9	Liquid	<60.1	<60.1	<60.1
S96T005528	163:10	Liquid	<60.1	<60.1	<60.1
S96T005739	163:11	Liquid	<60.1	<60.1	<60.1
S96T005766	163:12	Liquid	<60.1	<60.1	<60.1
S96T005741	163:14	Liquid	<60.1	<60.1	<60.1
S96T004774	164:1	Liquid	<120	<120	<120
S96T004778	164:2	Liquid	<120	<120	<120
S96T004779	164:3	Liquid	<120	<120	<120
S96T004780	164:4	Liquid	<60.1	<60.1	<60.1
S96T004976	164:5	Liquid	<60.1	<60.1	<60.1
S96T004781	164:7	Liquid	<60.1	<60.1	<60.1
S96T004977	164:8	Liquid	<60.1	<60.1	<60.1
S96T004978	164:9	Liquid	<60.1	<60.1	<60.1
S96T004979	164:10	Liquid	<60.1	<60.1	<60.1
S96T004782	164:11	Liquid	<60.1	<60.1	<60.1
S96T004783	164:12	Liquid	<60.1	<60.1	<60.1
S96T004784	164:13	Liquid	<60.1	<60.1	<60.1
S96T005979	Core 164	Composite	<120	<120	<120

Table B2-16. Tank 241-AN-104 Analytical Results: Cerium (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005287	163:1	Lower half	<37.9	<39.3	<38.6
S96T005288	163:2	Lower half	<44.3	<37.5	<40.9
S96T005782	163:12	Lower half	<45.7	<46.1	<45.9
S96T005749	163:14	Upper half	<44.8	<43.6	<44.2
S96T005750		Lower half	<45.9	<45.2	<45.55
S96T005294	163:16	Upper half	<41.3	<37	<39.15
S96T005289		Lower half	<46.4	<42.6	<44.5
S96T005778	163:18	Upper half	<48.1	<45.4	<46.75
S96T005783		Lower half	<47.4	<47.2	<47.3
S96T005557	163:20	Upper half	<38	<40.1	<39.05
S96T005560		Lower half	<44.2	<37.3	<40.75
S96T004797	164:1	Lower half	<46.9	<47.1	<47
S96T004798	164:13	Lower half	<48.4	<47.7	<48.05
S96T005042	164:14	Upper half	<47.4	<48	<47.7
S96T005040		Lower half	<47.7	<47	<47.35
S96T005061	164:15	Upper half	<48.3	<48	<48.15
S96T005043		Lower half	<46.4	<47.7	<47.05
S96T005062	164:16	Upper half	<151	<149	<150
S96T005044		Lower half	<147	<150	<148.5
S96T005063	164:17	Upper half	<139	<143	<141
S96T005041		Lower half	<152	<151	<151.5
S96T005064	164:19	Upper half	<151	<153	<152
S96T005045		Lower half	<145	<144	<144.5
S96T005282	164:20	Upper half	<39.3	<36.1	<37.7
S96T005279		Lower half	<45.4	<37.8	<41.6
S96T005976	Core 164	Composite	<39.8	<39.8	<39.8[QC:a]

Table B2-16. Tank 241-AN-104 Analytical Results: Cerium (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion			µg/g	µg/g	µg/g
S96T005284	163:1	Lower half	<1,870	<1,870	<1,870
S96T005285	163:2	Lower half	<1,790	<1,910	<1,850
S96T005780	163:12	Lower half	<1,880	<1,900	<1,890
S96T005747	163:14	Upper half	<2,240	<2,250	<2,245
S96T005748		Lower half	<1,870	<1,930	<1,900
S96T005293	163:16	Upper half	<1,770	<1,900	<1,835
S96T005286		Lower half	<1,990	<1,830	<1,910
S96T005777	163:18	Upper half	<2,050	<1,980	<2,015
S96T005781		Lower half	<2,130	<2,140	<2,135
S96T005556	163:20	Upper half	<1,850	<1,940	<1,895
S96T005559		Lower half	<1,950	<1,950	<1,950
S96T004795	164:1	Lower half	<2,040	<2,010	<2,025
S96T004796	164:13	Lower half	<2,060	<2,070	<2,065
S96T005035	164:14	Upper half	<2,040	<2,060	<2,050
S96T005030		Lower half	<2,050	<2,040	<2,045
S96T005036	164:15	Upper half	<2,010	<1,970	<1,990
S96T005032		Lower half	<1,970	<2,000	<1,985
S96T005037	164:16	Upper half	<1,920	<1,830	<1,875
S96T005033		Lower half	<1,910	<1,870	<1,890
S96T005038	164:17	Upper half	<1,930	<1,900	<1,915
S96T005031		Lower half	<2,180	<2,170	<2,175
S96T005039	164:19	Upper half	<1,940	<2,000	<1,970
S96T005034		Lower half	<2,140	<2,170	<2,155
S96T005281	164:20	Upper half	<1,720	<1,850	<1,785
S96T005278		Lower half	<1,890	<1,930	<1,910

Table B2-16. Tank 241-AN-104 Analytical Results: Cerium (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			μg/mL	μg/mL	μg/mL
S96T005256	163:2	Liquid	<60.1	<60.1	<60.1
S96T005260	163:4	Liquid	<60.1	<60.1	<60.1
S96T005527	163:5	Liquid	<60.1	<60.1	<60.1
S96T005554	163:6	Liquid	<60.1	<60.1	<60.1
S96T005255	163:7	Liquid	<60.1	<60.1	<60.1
S96T005257	163:8	Liquid	<60.1	<60.1	<60.1
S96T005258	163:9	Liquid	<60.1	<60.1	<60.1
S96T005528	163:10	Liquid	<60.1	<60.1	<60.1
S96T005739	163:11	Liquid	<60.1	<60.1	<60.1
S96T005766	163:12	Liquid	<60.1	<60.1	<60.1
S96T005741	163:14	Liquid	<60.1	<60.1	<60.1
S96T004774	164:1	Liquid	<120	<120	<120
S96T004778	164:2	Liquid	<120	<120	<120
S96T004779	164:3	Liquid	<120	<120	<120
S96T004780	164:4	Liquid	<60.1	<60.1	<60.1
S96T004976	164:5	Liquid	<60.1	<60.1	<60.1
S96T004781	164:7	Liquid	<60.1	<60.1	<60.1
S96T004977	164:8	Liquid	<60.1	<60.1	<60.1
S96T004978	164:9	Liquid	<60.1	<60.1	<60.1
S96T004979	164:10	Liquid	<60.1	<60.1	<60.1
S96T004782	164:11	Liquid	<60.1	<60.1	<60.1
S96T004783	164:12	Liquid	<60.1	<60.1	<60.1
S96T004784	164:13	Liquid	<60.1	<60.1	<60.1
S96T005979	Core 164	Composite	<120	<120	<120

Table B2-17. Tank 241-AN-104 Analytical Results: Chromium (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			μg/g	μg/g	μg/g
S96T005287	163:1	Lower half	1,200	1,150	1,175
S96T005288	163:2	Lower half	728	716	722
S96T005782	163:12	Lower half	1,220	1,180	1,200
S96T005749	163:14	Upper half	1,050	1,080	1,065
S96T005750		Lower half	1,260	1,240	1,250
S96T005294	163:16	Upper half	2,270	1,860	2,065
S96T005289		Lower half	1,970	1,630	1,800
S96T005778	163:18	Upper half	987	1,010	998.5
S96T005783		Lower half	1,020	1,010	1,015
S96T005557	163:20	Upper half	1,470	1,450	1,460
S96T005560		Lower half	1,390	1,120	1,255[QC:c,c]
S96T004797	164:1	Lower half	778	783	780.5
S96T004798	164:13	Lower half	3,490	3,680	3,585
S96T005042	164:14	Upper half	1,790	1,770	1,780
S96T005040		Lower half	1,040	1,040	1,040
S96T005061	164:15	Upper half	1,360	1,390	1,375
S96T005043		Lower half	2,340	2,260	2,300
S96T005062	164:16	Upper half	1,240	1,370	1,305
S96T005044		Lower half	1,310	1,290	1,300
S96T005063	164:17	Upper half	1,490	1,620	1,555
S96T005041		Lower half	2,120	2,150	2,135
S96T005064	164:19	Upper half	2,030	2,090	2,060
S96T005045		Lower half	1,860	2,120	1,990
S96T005282	164:20	Upper half	2,380	2,000	2,190
S96T005279		Lower half	1,770	1,170	1,470[QC:c]
S96T005976	Core 164	Composite	2,100	1,890	1,995[QC:a]

Table B2-17. Tank 241-AN-104 Analytical Results: Chromium (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion			µg/g	µg/g	µg/g
S96T005284	163:1	Lower half	1,440	1,270	1,355
S96T005285	163:2	Lower half	683	606	644.5
S96T005780	163:12	Lower half	1,250	1,220	1,235
S96T005747	163:14	Upper half	1,210	1,070	1,140
S96T005748		Lower half	1,480	1,220	1,350
S96T005293	163:16	Upper half	2,240	2,180	2,210
S96T005286		Lower half	1,610	1,770	1,690
S96T005777	163:18	Upper half	1,370	1,110	1,240[QC:e]
S96T005781		Lower half	1,220	1,310	1,265
S96T005556	163:20	Upper half	3,040	1,380	2,210[QC:e]
S96T005559		Lower half	1,100	3,010	2,055[QC:e]
S96T004795	164:1	Lower half	1,870	1,780	1,825
S96T004796	164:13	Lower half	3,590	3,580	3,585
S96T005035	164:14	Upper half	827	776	801.5
S96T005030		Lower half	1,020	998	1,009
S96T005036	164:15	Upper half	1,360	1,490	1,425
S96T005032		Lower half	2,440	2,420	2,430
S96T005037	164:16	Upper half	1,400	1,240	1,320
S96T005033		Lower half	1,250	1,310	1,280
S96T005038	164:17	Upper half	1,350	1,470	1,410
S96T005031		Lower half	2,050	2,040	2,045
S96T005039	164:19	Upper half	1,980	1,910	1,945
S96T005034		Lower half	1,860	1,880	1,870
S96T005281	164:20	Upper half	1,410	1,140	1,275[QC:e]
S96T005278		Lower half	1,850	1,800	1,825

Table B2-17. Tank 241-AN-104 Analytical Results: Chromium (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
S96T005256	163:2	Liquid	332	359	345.5
S96T005260	163:4	Liquid	348	328	338
S96T005527	163:5	Liquid	326	321	323.5
S96T005554	163:6	Liquid	337	336	336.5
S96T005255	163:7	Liquid	358	377	367.5
S96T005257	163:8	Liquid	317	327	322
S96T005258	163:9	Liquid	341	327	334
S96T005528	163:10	Liquid	308	315	311.5
S96T005739	163:11	Liquid	324	323	323.5
S96T005766	163:12	Liquid	358	354	356
S96T005741	163:14	Liquid	344	343	343.5
S96T004774	164:1	Liquid	345	349	347
S96T004778	164:2	Liquid	291	340	315.5
S96T004779	164:3	Liquid	341	330	335.5
S96T004780	164:4	Liquid	333	339	336
S96T004976	164:5	Liquid	358	338	348
S96T004781	164:7	Liquid	323	334	328.5
S96T004977	164:8	Liquid	374	322	348
S96T004978	164:9	Liquid	349	298	323.5
S96T004979	164:10	Liquid	332	319	325.5
S96T004782	164:11	Liquid	321	333	327
S96T004783	164:12	Liquid	343	381	362
S96T004784	164:13	Liquid	326	341	333.5
S96T005979	Core 164	Composite	365	357	361

Table B2-18. Tank 241-AN-104 Analytical Results: Cobalt (ICP), (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005287	163:1	Lower half	<7.57	<7.86	<7.715
S96T005288	163:2	Lower half	<8.87	<7.49	<8.18
S96T005782	163:12	Lower half	<9.14	<9.22	<9.18
S96T005749	163:14	Upper half	<8.95	<8.72	<8.835
S96T005750		Lower half	<9.18	<9.04	<9.11
S96T005294	163:16	Upper half	<8.25	<7.4	<7.825
S96T005289		Lower half	<9.29	<8.52	<8.905
S96T005778	163:18	Upper half	<9.62	<9.09	<9.355
S96T005783		Lower half	<9.48	<9.45	<9.465
S96T005557	163:20	Upper half	<7.59	<8.02	<7.805
S96T005560		Lower half	<8.85	<7.46	<8.155
S96T004797	164:1	Lower half	<9.38	<9.42	<9.4
S96T004798	164:13	Lower half	<9.68	<9.53	<9.605
S96T005042	164:14	Upper half	<9.49	<9.59	<9.54
S96T005040		Lower half	<9.55	<9.4	<9.475
S96T005061	164:15	Upper half	<9.66	<9.6	<9.63
S96T005043		Lower half	<9.28	<9.55	<9.415
S96T005062	164:16	Upper half	<30.1	30	<30.05
S96T005044		Lower half	32.7	47.3	40[QC:c]
S96T005063	164:17	Upper half	35.1	36.6	35.85
S96T005041		Lower half	52.2	44.9	48.55
S96T005064	164:19	Upper half	49.3	<30.7	<40[QC:c]
S96T005045		Lower half	47.3	<28.8	<38.05[QC:c]
S96T005282	164:20	Upper half	<7.86	<7.21	<7.535
S96T005279		Lower half	<9.07	<7.55	<8.31
S96T005976	Core 164	Composite	<7.95	<7.96	<7.955[QC:a]

Table B2-18. Tank 241-AN-104 Analytical Results: Cobalt (ICP), (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion			µg/g	µg/g	µg/g
S96T005284	163:1	Lower half	<375	<374	<374.5
S96T005285	163:2	Lower half	<358	<382	<370
S96T005780	163:12	Lower half	<376	<380	<378
S96T005747	163:14	Upper half	<448	<451	<449.5
S96T005748		Lower half	<373	<385	<379
S96T005293	163:16	Upper half	<355	<380	<367.5
S96T005286		Lower half	<397	<367	<382
S96T005777	163:18	Upper half	<410	<397	<403.5
S96T005781		Lower half	<426	<428	<427
S96T005556	163:20	Upper half	<370	<387	<378.5
S96T005559		Lower half	<391	<389	<390
S96T004795	164:1	Lower half	<409	<402	<405.5
S96T004796	164:13	Lower half	<412	<415	<413.5
S96T005035	164:14	Upper half	<408	<412	<410
S96T005030		Lower half	<410	<407	<408.5
S96T005036	164:15	Upper half	<402	<393	<397.5
S96T005032		Lower half	<395	<401	<398
S96T005037	164:16	Upper half	<384	<366	<375
S96T005033		Lower half	<383	<373	<378
S96T005038	164:17	Upper half	<386	<379	<382.5
S96T005031		Lower half	<437	<434	<435.5
S96T005039	164:19	Upper half	<389	<400	<394.5
S96T005034		Lower half	<427	<435	<431
S96T005281	164:20	Upper half	<344	<370	<357
S96T005278		Lower half	<377	<387	<382

Table B2-18. Tank 241-AN-104 Analytical Results: Cobalt (ICP), (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			μg/mL	μg/mL	μg/mL
S96T005256	163:2	Liquid	<12	<12	<12
S96T005260	163:4	Liquid	<12	<12	<12
S96T005527	163:5	Liquid	<12	<12	<12
S96T005554	163:6	Liquid	<12	<12	<12
S96T005255	163:7	Liquid	<12	<12	<12
S96T005257	163:8	Liquid	<12	<12	<12
S96T005258	163:9	Liquid	<12	<12	<12
S96T005528	163:10	Liquid	<12	<12	<12
S96T005739	163:11	Liquid	<12	<12	<12
S96T005766	163:12	Liquid	<12	<12	<12
S96T005741	163:14	Liquid	<12	<12	<12
S96T004774	164:1	Liquid	65.6	62.1	63.85
S96T004778	164:2	Liquid	54.8	66.5	60.65
S96T004779	164:3	Liquid	64.5	63.7	64.1
S96T004780	164:4	Liquid	<12	<12	<12
S96T004976	164:5	Liquid	<12	<12	<12
S96T004781	164:7	Liquid	<12	<12	<12
S96T004977	164:8	Liquid	<12	<12	<12
S96T004978	164:9	Liquid	<12	<12	<12
S96T004979	164:10	Liquid	<12	<12	<12
S96T004782	164:11	Liquid	<12	<12	<12
S96T004783	164:12	Liquid	<12	<12	<12
S96T004784	164:13	Liquid	<12	<12	<12
S96T005979	Core 164	Composite	75.2	67.3	71.25

Table B2-19. Tank 241-AN-104 Analytical Results: Copper (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005287	163:1	Lower half	4.7	4.12	4.41
S96T005288	163:2	Lower half	<4.43	<3.75	<4.09
S96T005782	163:12	Lower half	<4.57	<4.61	<4.59
S96T005749	163:14	Upper half	<4.48	<4.36	<4.42
S96T005750		Lower half	<4.59	<4.52	<4.555
S96T005294	163:16	Upper half	4.69	4.02	4.355
S96T005289		Lower half	4.75	4.33	4.54
S96T005778	163:18	Upper half	<4.81	<4.54	<4.675
S96T005783		Lower half	<4.74	<4.72	<4.73
S96T005557	163:20	Upper half	4.39	4.06	4.225
S96T005560		Lower half	<4.42	4.38	<4.4
S96T004797	164:1	Lower half	5.34	5.79	5.565
S96T004798	164:13	Lower half	7.06	7.2	7.13
S96T005042	164:14	Upper half	19	5.67	12.335[QC:e]
S96T005040		Lower half	5.12	6.01	5.565
S96T005061	164:15	Upper half	4.98	6.02	5.5
S96T005043		Lower half	5.6	5.6	5.6
S96T005062	164:16	Upper half	<15.1	<14.9	<15
S96T005044		Lower half	<14.7	<15	<14.85
S96T005063	164:17	Upper half	<13.9	<14.3	<14.1
S96T005041		Lower half	<15.2	<15.1	<15.15
S96T005064	164:19	Upper half	<15.1	<15.3	<15.2
S96T005045		Lower half	<14.5	<14.4	<14.45
S96T005282	164:20	Upper half	6.27	5.34	5.805
S96T005279		Lower half	6.1	5.29	5.695
S96T005976	Core 164	Composite	5.32	5.02	5.17[QC:a]

Table B2-19. Tank 241-AN-104 Analytical Results: Copper (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion			µg/g	µg/g	µg/g
S96T005284	163:1	Lower half	<187	<187	<187
S96T005285	163:2	Lower half	<179	<191	<185
S96T005780	163:12	Lower half	<188	<190	<189
S96T005747	163:14	Upper half	<224	<225	<224.5
S96T005748		Lower half	<187	<193	<190
S96T005293	163:16	Upper half	<177	<190	<183.5
S96T005286		Lower half	<199	<183	<191
S96T005777	163:18	Upper half	<205	<198	<201.5
S96T005781		Lower half	<213	339	<276[QC:e]
S96T005556	163:20	Upper half	<185	<194	<189.5
S96T005559		Lower half	<195	<195	<195
S96T004795	164:1	Lower half	<204	<201	<202.5
S96T004796	164:13	Lower half	<206	<207	<206.5
S96T005035	164:14	Upper half	<204	<206	<205
S96T005030		Lower half	<205	<204	<204.5
S96T005036	164:15	Upper half	<201	<197	<199
S96T005032		Lower half	<197	<200	<198.5
S96T005037	164:16	Upper half	<192	<183	<187.5
S96T005033		Lower half	<191	<187	<189
S96T005038	164:17	Upper half	<193	<190	<191.5
S96T005031		Lower half	<218	<217	<217.5
S96T005039	164:19	Upper half	<194	<200	<197
S96T005034		Lower half	<214	<217	<215.5
S96T005281	164:20	Upper half	<172	<185	<178.5
S96T005278		Lower half	<189	<193	<191

Table B2-19. Tank 241-AN-104 Analytical Results: Copper (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			μg/mL	μg/mL	μg/mL
S96T005256	163:2	Liquid	<6.01	<6.01	<6.01
S96T005260	163:4	Liquid	<6.01	<6.01	<6.01
S96T005527	163:5	Liquid	<6.01	<6.01	<6.01
S96T005554	163:6	Liquid	<6.01	<6.01	<6.01
S96T005255	163:7	Liquid	<6.01	<6.01	<6.01
S96T005257	163:8	Liquid	<6.01	<6.01	<6.01
S96T005258	163:9	Liquid	<6.01	<6.01	<6.01
S96T005528	163:10	Liquid	<6.01	<6.01	<6.01
S96T005739	163:11	Liquid	<6.01	<6.01	<6.01
S96T005766	163:12	Liquid	<6.01	<6.01	<6.01
S96T005741	163:14	Liquid	<6.01	<6.01	<6.01
S96T004774	164:1	Liquid	<12	<12	<12
S96T004778	164:2	Liquid	<12	<12	<12
S96T004779	164:3	Liquid	<12	<12	<12
S96T004780	164:4	Liquid	<6.01	<6.01	<6.01
S96T004976	164:5	Liquid	<6.01	<6.01	<6.01
S96T004781	164:7	Liquid	<6.01	<6.01	<6.01
S96T004977	164:8	Liquid	<6.01	9.26	<7.635[QC:e]
S96T004978	164:9	Liquid	9.13	<6.01	<7.57[QC:e]
S96T004979	164:10	Liquid	<6.01	<6.01	<6.01
S96T004782	164:11	Liquid	<6.01	<6.01	<6.01
S96T004783	164:12	Liquid	<6.01	<6.01	<6.01
S96T004784	164:13	Liquid	<6.01	<6.01	<6.01
S96T005979	Core 164	Composite	<12	<12	<12

Table B2-20. Tank 241-AN-104 Analytical Results: Iron (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005287	163:1	Lower half	489	570	529.5
S96T005288	163:2	Lower half	198	181	189.5
S96T005782	163:12	Lower half	75.8	72.2	74
S96T005749	163:14	Upper half	91.1	100	95.55
S96T005750		Lower half	87.1	62	74.55[QC:c]
S96T005294	163:16	Upper half	102	84.4	93.2
S96T005289		Lower half	87	67.6	77.3[QC:c]
S96T005778	163:18	Upper half	107	154	130.5[QC:c]
S96T005783		Lower half	77.8	77.7	77.75
S96T005557	163:20	Upper half	104	107	105.5
S96T005560		Lower half	171	92.3	131.65[QC:c]
S96T004797	164:1	Lower half	58.1	51.1	54.6
S96T004798	164:13	Lower half	188	227	207.5
S96T005042	164:14	Upper half	97.6	97.1	97.35
S96T005040		Lower half	56.5	53.6	55.05
S96T005061	164:15	Upper half	69.2	82.2	75.7
S96T005043		Lower half	106	108	107
S96T005062	164:16	Upper half	<75.3	<74.7	<75
S96T005044		Lower half	<73.7	<75	<74.35
S96T005063	164:17	Upper half	<69.7	<71.4	<70.55
S96T005041		Lower half	<76.2	<75.6	<75.9
S96T005064	164:19	Upper half	80.6	133	106.8[QC:c]
S96T005045		Lower half	<72.5	<72	<72.25
S96T005282	164:20	Upper half	126	104	115
S96T005279		Lower half	125	77.1	101.05[QC:c]
S96T005976	Core 164	Composite	104	94.9	99.45[QC:a]

Table B2-20. Tank 241-AN-104 Analytical Results: Iron (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion			µg/g	µg/g	µg/g
S96T005284	163:1	Lower half	<937	<936	<936.5
S96T005285	163:2	Lower half	<894	<956	<925
S96T005780	163:12	Lower half	<940	<950	<945
S96T005747	163:14	Upper half	<1,120	<1,130	<1,125
S96T005748		Lower half	<934	<963	<948.5
S96T005293	163:16	Upper half	<887	<949	<918
S96T005286		Lower half	<993	<917	<955
S96T005777	163:18	Upper half	<1,030	<992	<1,011
S96T005781		Lower half	1,890	3,620	2,755[QC:e]
S96T005556	163:20	Upper half	<924	<968	<946
S96T005559		Lower half	<977	<973	<975
S96T004795	164:1	Lower half	<1,020	<1,000	<1,010
S96T004796	164:13	Lower half	<1,030	<1,040	<1,035
S96T005035	164:14	Upper half	<1,020	<1,030	<1,025
S96T005030		Lower half	<1,020	<1,020	<1,020
S96T005036	164:15	Upper half	<1,000	<983	<991.5
S96T005032		Lower half	<987	<1,000	<993.5
S96T005037	164:16	Upper half	<961	<915	<938
S96T005033		Lower half	<957	<933	<945
S96T005038	164:17	Upper half	<966	<949	<957.5
S96T005031		Lower half	<1,090	<1,080	<1,085
S96T005039	164:19	Upper half	<972	<1,000	<986
S96T005034		Lower half	<1,070	<1,090	<1,080
S96T005281	164:20	Upper half	<860	<925	<892.5
S96T005278		Lower half	<943	<966	<954.5

Table B2-20. Tank 241-AN-104 Analytical Results: Iron (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
S96T005256	163:2	Liquid	<30.1	<30.1	<30.1
S96T005260	163:4	Liquid	<30.1	<30.1	<30.1
S96T005527	163:5	Liquid	<30.1	<30.1	<30.1
S96T005554	163:6	Liquid	<30.1	<30.1	<30.1
S96T005255	163:7	Liquid	33.3	<30.1	<31.7
S96T005257	163:8	Liquid	<30.1	<30.1	<30.1
S96T005258	163:9	Liquid	<30.1	<30.1	<30.1
S96T005528	163:10	Liquid	<30.1	<30.1	<30.1
S96T005739	163:11	Liquid	<30.1	<30.1	<30.1
S96T005766	163:12	Liquid	<30.1	<30.1	<30.1
S96T005741	163:14	Liquid	<30.1	<30.1	<30.1
S96T004774	164:1	Liquid	<60.1	<60.1	<60.1
S96T004778	164:2	Liquid	<60.1	<60.1	<60.1
S96T004779	164:3	Liquid	<60.1	<60.1	<60.1
S96T004780	164:4	Liquid	<30.1	<30.1	<30.1
S96T004976	164:5	Liquid	<30.1	<30.1	<30.1
S96T004781	164:7	Liquid	<30.1	<30.1	<30.1
S96T004977	164:8	Liquid	<30.1	<30.1	<30.1
S96T004978	164:9	Liquid	<30.1	<30.1	<30.1
S96T004979	164:10	Liquid	<30.1	<30.1	<30.1
S96T004782	164:11	Liquid	<30.1	<30.1	<30.1
S96T004783	164:12	Liquid	<30.1	<30.1	<30.1
S96T004784	164:13	Liquid	<30.1	<30.1	<30.1
S96T005979	Core 164	Composite	<60.1	<60.1	<60.1

Table B2-21. Tank 241-AN-104 Analytical Results: Lanthanum (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005287	163:1	Lower half	<18.9	<19.6	<19.25
S96T005288	163:2	Lower half	<22.2	<18.7	<20.45
S96T005782	163:12	Lower half	<22.8	<23	<22.9
S96T005749	163:14	Upper half	<22.4	<21.8	<22.1
S96T005750		Lower half	<23	<22.6	<22.8
S96T005294	163:16	Upper half	<20.6	<18.5	<19.55
S96T005289		Lower half	<23.2	<21.3	<22.25
S96T005778	163:18	Upper half	<24.1	<22.7	<23.4
S96T005783		Lower half	<23.7	<23.6	<23.65
S96T005557	163:20	Upper half	<19	<20.1	<19.55
S96T005560		Lower half	<22.1	<18.7	<20.4
S96T004797	164:1	Lower half	<23.4	<23.5	<23.45
S96T004798	164:13	Lower half	<24.2	<23.8	<24
S96T005042	164:14	Upper half	<23.7	<24	<23.85
S96T005040		Lower half	<23.9	<23.5	<23.7
S96T005061	164:15	Upper half	<24.2	<24	<24.1
S96T005043		Lower half	<23.2	<23.9	<23.55
S96T005062	164:16	Upper half	<75.3	<74.7	<75
S96T005044		Lower half	<73.7	<75	<74.35
S96T005063	164:17	Upper half	<69.7	<71.4	<70.55
S96T005041		Lower half	<76.2	<75.6	<75.9
S96T005064	164:19	Upper half	<75.6	<76.7	<76.15
S96T005045		Lower half	<72.5	<72	<72.25
S96T005282	164:20	Upper half	<19.7	<18	<18.85
S96T005279		Lower half	<22.7	<18.9	<20.8
S96T005976	Core 164	Composite	<19.9	<19.9	<19.9[QC:a]

Table B2-21. Tank 241-AN-104 Analytical Results: Lanthanum (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion			µg/g	µg/g	µg/g
S96T005284	163:1	Lower half	<937	<936	<936.5
S96T005285	163:2	Lower half	<894	<956	<925
S96T005780	163:12	Lower half	<940	<950	<945
S96T005747	163:14	Upper half	<1,120	<1,130	<1,125
S96T005748		Lower half	<934	<963	<948.5
S96T005293	163:16	Upper half	<887	<949	<918
S96T005286		Lower half	<993	<917	<955
S96T005777	163:18	Upper half	<1,030	<992	<1,011
S96T005781		Lower half	<1,060	<1,070	<1,065
S96T005556	163:20	Upper half	<924	<968	<946
S96T005559		Lower half	<977	<973	<975
S96T004795	164:1	Lower half	<1,020	<1,000	<1,010
S96T004796	164:13	Lower half	<1,030	<1,040	<1,035
S96T005035	164:14	Upper half	<1,020	<1,030	<1,025
S96T005030		Lower half	<1,020	<1,020	<1,020
S96T005036	164:15	Upper half	<1,000	<983	<991.5
S96T005032		Lower half	<987	<1,000	<993.5
S96T005037	164:16	Upper half	<961	<915	<938
S96T005033		Lower half	<957	<933	<945
S96T005038	164:17	Upper half	<966	<949	<957.5
S96T005031		Lower half	<1,090	<1,080	<1,085
S96T005039	164:19	Upper half	<972	<1,000	<986
S96T005034		Lower half	<1,070	<1,090	<1,080
S96T005281	164:20	Upper half	<860	<925	<892.5
S96T005278		Lower half	<943	<966	<954.5

Table B2-21. Tank 241-AN-104 Analytical Results: Lanthanum (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			μg/mL	μg/mL	μg/mL
S96T005256	163:2	Liquid	<30.1	<30.1	<30.1
S96T005260	163:4	Liquid	<30.1	<30.1	<30.1
S96T005527	163:5	Liquid	<30.1	<30.1	<30.1
S96T005554	163:6	Liquid	<30.1	<30.1	<30.1
S96T005255	163:7	Liquid	<30.1	<30.1	<30.1
S96T005257	163:8	Liquid	<30.1	<30.1	<30.1
S96T005258	163:9	Liquid	<30.1	<30.1	<30.1
S96T005528	163:10	Liquid	<30.1	<30.1	<30.1
S96T005739	163:11	Liquid	<30.1	<30.1	<30.1
S96T005766	163:12	Liquid	<30.1	<30.1	<30.1
S96T005741	163:14	Liquid	<30.1	<30.1	<30.1
S96T004774	164:1	Liquid	<60.1	<60.1	<60.1
S96T004778	164:2	Liquid	<60.1	<60.1	<60.1
S96T004779	164:3	Liquid	<60.1	<60.1	<60.1
S96T004780	164:4	Liquid	<30.1	<30.1	<30.1
S96T004976	164:5	Liquid	<30.1	<30.1	<30.1
S96T004781	164:7	Liquid	<30.1	<30.1	<30.1
S96T004977	164:8	Liquid	<30.1	<30.1	<30.1
S96T004978	164:9	Liquid	<30.1	<30.1	<30.1
S96T004979	164:10	Liquid	<30.1	<30.1	<30.1
S96T004782	164:11	Liquid	<30.1	<30.1	<30.1
S96T004783	164:12	Liquid	<30.1	<30.1	<30.1
S96T004784	164:13	Liquid	<30.1	<30.1	<30.1
S96T005979	Core 164	Composite	<60.1	<60.1	<60.1

Table B2-22. Tank 241-AN-104 Analytical Results: Lead (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005287	163:1	Lower half	<37.9	<39.3	<38.6
S96T005288	163:2	Lower half	<44.3	<37.5	<40.9
S96T005782	163:12	Lower half	<45.7	<46.1	<45.9
S96T005749	163:14	Upper half	<44.8	<43.6	<44.2
S96T005750		Lower half	<45.9	<45.2	<45.55
S96T005294	163:16	Upper half	<41.3	<37	<39.15
S96T005289		Lower half	<46.4	<42.6	<44.5
S96T005778	163:18	Upper half	<48.1	<45.4	<46.75
S96T005783		Lower half	<47.4	<47.2	<47.3
S96T005557	163:20	Upper half	<38	166	<102[QC:e]
S96T005560		Lower half	<44.2	<37.3	<40.75
S96T004797	164:1	Lower half	<46.9	<47.1	<47
S96T004798	164:13	Lower half	<48.4	<47.7	<48.05
S96T005042	164:14	Upper half	434	706	570[QC:e]
S96T005040		Lower half	<47.7	<47	<47.35
S96T005061	164:15	Upper half	<48.3	<48	<48.15
S96T005043		Lower half	<46.4	<47.7	<47.05
S96T005062	164:16	Upper half	<151	<149	<150
S96T005044		Lower half	<147	<150	<148.5
S96T005063	164:17	Upper half	<139	<143	<141
S96T005041		Lower half	<152	<151	<151.5
S96T005064	164:19	Upper half	<151	<153	<152
S96T005045		Lower half	<145	<144	<144.5
S96T005282	164:20	Upper half	58.9	38.9	48.9[QC:e]
S96T005279		Lower half	<45.4	45.3	<45.35
S96T005976	Core 164	Composite	42.1	41.9	42[QC:a]

Table B2-22. Tank 241-AN-104 Analytical Results: Lead (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion			µg/g	µg/g	µg/g
S96T005284	163:1	Lower half	<1,870	<1,870	<1,870
S96T005285	163:2	Lower half	<1,790	<1,910	<1,850
S96T005780	163:12	Lower half	<1,880	<1,900	<1,890
S96T005747	163:14	Upper half	<2,240	<2,250	<2,245
S96T005748		Lower half	<1,870	<1,930	<1,900
S96T005293	163:16	Upper half	<1,770	<1,900	<1,835
S96T005286		Lower half	<1,990	<1,830	<1,910
S96T005777	163:18	Upper half	<2,050	<1,980	<2,015
S96T005781		Lower half	<2,130	<2,140	<2,135
S96T005556	163:20	Upper half	<1,850	<1,940	<1,895
S96T005559		Lower half	<1,950	<1,950	<1,950
S96T004795	164:1	Lower half	<2,040	<2,010	<2,025
S96T004796	164:13	Lower half	<2,060	<2,070	<2,065
S96T005035	164:14	Upper half	<2,040	<2,060	<2,050
S96T005030		Lower half	<2,050	<2,040	<2,045
S96T005036	164:15	Upper half	<2,010	<1,970	<1,990
S96T005032		Lower half	<1,970	<2,000	<1,985
S96T005037	164:16	Upper half	<1,920	<1,830	<1,875
S96T005033		Lower half	<1,910	<1,870	<1,890
S96T005038	164:17	Upper half	<1,930	<1,900	<1,915
S96T005031		Lower half	<2,180	<2,170	<2,175
S96T005039	164:19	Upper half	<1,940	<2,000	<1,970
S96T005034		Lower half	<2,140	<2,170	<2,155
S96T005281	164:20	Upper half	<1,720	<1,850	<1,785
S96T005278		Lower half	<1,890	<1,930	<1,910

Table B2-22. Tank 241-AN-104 Analytical Results: Lead (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
S96T005256	163:2	Liquid	<60.1	64.3	<62.2
S96T005260	163:4	Liquid	61.5	69.5	65.5
S96T005527	163:5	Liquid	<60.1	<60.1	<60.1
S96T005554	163:6	Liquid	60.2	60.5	60.35
S96T005255	163:7	Liquid	67	65.5	66.25
S96T005257	163:8	Liquid	<60.1	66.7	<63.4
S96T005258	163:9	Liquid	60.8	<60.1	<60.45
S96T005528	163:10	Liquid	60.5	<60.1	<60.3
S96T005739	163:11	Liquid	64.7	67.1	65.9
S96T005766	163:12	Liquid	77.7	68.6	73.15
S96T005741	163:14	Liquid	60.1	66.9	63.5
S96T004774	164:1	Liquid	<120	<120	<120
S96T004778	164:2	Liquid	<120	<120	<120
S96T004779	164:3	Liquid	<120	<120	<120
S96T004780	164:4	Liquid	<60.1	<60.1	<60.1
S96T004976	164:5	Liquid	<60.1	<60.1	<60.1
S96T004781	164:7	Liquid	<60.1	<60.1	<60.1
S96T004977	164:8	Liquid	70.7	<60.1	<65.4
S96T004978	164:9	Liquid	<60.1	76.7	<68.4[QC:c]
S96T004979	164:10	Liquid	<60.1	<60.1	<60.1
S96T004782	164:11	Liquid	<60.1	<60.1	<60.1
S96T004783	164:12	Liquid	<60.1	<60.1	<60.1
S96T004784	164:13	Liquid	<60.1	<60.1	<60.1
S96T005979	Core 164	Composite	<120	<120	<120

Table B2-23. Tank 241-AN-104 Analytical Results: Lithium (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005287	163:1	Lower half	<3.79	<3.93	<3.86
S96T005288	163:2	Lower half	47	45.1	46.05
S96T005782	163:12	Lower half	25.4	26.2	25.8
S96T005749	163:14	Upper half	11.9	12.6	12.25
S96T005750		Lower half	5.28	4.99	5.135
S96T005294	163:16	Upper half	5.36	4.99	5.175
S96T005289		Lower half	<4.64	<4.26	<4.45
S96T005778	163:18	Upper half	15.1	21.5	18.3[QC:c]
S96T005783		Lower half	<4.74	4.82	<4.78
S96T005557	163:20	Upper half	7.83	8.18	8.005
S96T005560		Lower half	8.39	6.49	7.44[QC:c]
S96T004797	164:1	Lower half	<4.69	<4.71	<4.7
S96T004798	164:13	Lower half	52.4	69	60.7[QC:c]
S96T005042	164:14	Upper half	22	21.9	21.95
S96T005040		Lower half	12	12.2	12.1
S96T005061	164:15	Upper half	12.5	12.7	12.6
S96T005043		Lower half	9.64	9.3	9.47
S96T005062	164:16	Upper half	<15.1	<14.9	<15
S96T005044		Lower half	<14.7	<15	<14.85
S96T005063	164:17	Upper half	<13.9	<14.3	<14.1
S96T005041		Lower half	<15.2	<15.1	<15.15
S96T005064	164:19	Upper half	48.9	52.2	50.55
S96T005045		Lower half	<14.5	<14.4	<14.45
S96T005282	164:20	Upper half	7.46	8.82	8.14
S96T005279		Lower half	9.85	8.56	9.205
S96T005976	Core 164	Composite	16.4	13.6	15[QC:a]

Table B2-23. Tank 241-AN-104 Analytical Results: Lithium (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion			**µg/g**	**µg/g**	**µg/g**
S96T005284	163:1	Lower half	<187	<187	<187
S96T005285	163:2	Lower half	<179	<191	<185
S96T005780	163:12	Lower half	<188	<190	<189
S96T005747	163:14	Upper half	<224	<225	<224.5
S96T005748		Lower half	<187	<193	<190
S96T005293	163:16	Upper half	<177	<190	<183.5
S96T005286		Lower half	<199	<183	<191
S96T005777	163:18	Upper half	<205	<198	<201.5
S96T005781		Lower half	<213	<214	<213.5
S96T005556	163:20	Upper half	<185	<194	<189.5
S96T005559		Lower half	<195	<195	<195
S96T004795	164:1	Lower half	<204	<201	<202.5
S96T004796	164:13	Lower half	<206	<207	<206.5
S96T005035	164:14	Upper half	<204	<206	<205
S96T005030		Lower half	<205	<204	<204.5
S96T005036	164:15	Upper half	<201	<197	<199
S96T005032		Lower half	<197	<200	<198.5
S96T005037	164:16	Upper half	<192	<183	<187.5
S96T005033		Lower half	<191	<187	<189
S96T005038	164:17	Upper half	<193	<190	<191.5
S96T005031		Lower half	<218	<217	<217.5
S96T005039	164:19	Upper half	<194	<200	<197
S96T005034		Lower half	<214	<217	<215.5
S96T005281	164:20	Upper half	<172	<185	<178.5
S96T005278		Lower half	<189	<193	<191

Table B2-23. Tank 241-AN-104 Analytical Results: Lithium (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
S96T005256	163:2	Liquid	12.5	14.7	13.6
S96T005260	163:4	Liquid	7.19	6.01	6.6
S96T005527	163:5	Liquid	<6.01	<6.01	<6.01
S96T005554	163:6	Liquid	<6.01	<6.01	<6.01
S96T005255	163:7	Liquid	21.2	22.5	21.85
S96T005257	163:8	Liquid	<6.01	6.45	<6.23
S96T005258	163:9	Liquid	8.97	8.9	8.935
S96T005528	163:10	Liquid	<6.01	<6.01	<6.01
S96T005739	163:11	Liquid	<6.01	<6.01	<6.01
S96T005766	163:12	Liquid	<6.01	<6.01	<6.01
S96T005741	163:14	Liquid	<6.01	<6.01	<6.01
S96T004774	164:1	Liquid	<12	<12	<12
S96T004778	164:2	Liquid	<12	<12	<12
S96T004779	164:3	Liquid	<12	<12	<12
S96T004780	164:4	Liquid	6.33	<6.01	<6.17
S96T004976	164:5	Liquid	46	10.5	28.25[QC:e]
S96T004781	164:7	Liquid	11	11.9	11.45
S96T004977	164:8	Liquid	18.6	28.7	23.65[QC:e]
S96T004978	164:9	Liquid	9.56	7.3	8.43[QC:e]
S96T004979	164:10	Liquid	15	13	14
S96T004782	164:11	Liquid	46.9	24.5	35.7[QC:e]
S96T004783	164:12	Liquid	<6.01	<6.01	<6.01
S96T004784	164:13	Liquid	7.43	7.8	7.615
S96T005979	Core 164	Composite	<12	<12	<12

Table B2-24. Tank 241-AN-104 Analytical Results: Magnesium (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005287	163:1	Lower half	<37.9	<39.3	<38.6
S96T005288	163:2	Lower half	<44.3	<37.5	<40.9
S96T005782	163:12	Lower half	<45.7	<46.1	<45.9
S96T005749	163:14	Upper half	<44.8	<43.6	<44.2
S96T005750		Lower half	<45.9	<45.2	<45.55
S96T005294	163:16	Upper half	<41.3	<37	<39.15
S96T005289		Lower half	<46.4	<42.6	<44.5
S96T005778	163:18	Upper half	<48.1	<45.4	<46.75
S96T005783		Lower half	<47.4	<47.2	<47.3
S96T005557	163:20	Upper half	<38	<40.1	<39.05
S96T005560		Lower half	<44.2	<37.3	<40.75
S96T004797	164:1	Lower half	<46.9	<47.1	<47
S96T004798	164:13	Lower half	<48.4	<47.7	<48.05
S96T005042	164:14	Upper half	<47.4	<48	<47.7
S96T005040		Lower half	<47.7	<47	<47.35
S96T005061	164:15	Upper half	<48.3	<48	<48.15
S96T005043		Lower half	<46.4	<47.7	<47.05
S96T005062	164:16	Upper half	<151	<149	<150
S96T005044		Lower half	<147	<150	<148.5
S96T005063	164:17	Upper half	<139	<143	<141
S96T005041		Lower half	<152	<151	<151.5
S96T005064	164:19	Upper half	<151	<153	<152
S96T005045		Lower half	<145	<144	<144.5
S96T005282	164:20	Upper half	<39.3	<36.1	<37.7
S96T005279		Lower half	<45.4	<37.8	<41.6
S96T005976	Core 164	Composite	<39.8	<39.8	<39.8[QC:a]

Table B2-24. Tank 241-AN-104 Analytical Results: Magnesium (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion			µg/g	µg/g	µg/g
S96T005284	163:1	Lower half	<1,870	<1,870	<1,870
S96T005285	163:2	Lower half	<1,790	<1,910	<1,850
S96T005780	163:12	Lower half	<1,880	<1,900	<1,890
S96T005747	163:14	Upper half	<2,240	<2,250	<2,245
S96T005748		Lower half	<1,870	<1,930	<1,900
S96T005293	163:16	Upper half	<1,770	<1,900	<1,835
S96T005286		Lower half	<1,990	<1,830	<1,910
S96T005777	163:18	Upper half	<2,050	<1,980	<2,015
S96T005781		Lower half	<2,130	<2,140	<2,135
S96T005556	163:20	Upper half	<1,850	<1,940	<1,895
S96T005559		Lower half	<1,950	<1,950	<1,950
S96T004795	164:1	Lower half	<2,040	<2,010	<2,025
S96T004796	164:13	Lower half	<2,060	<2,070	<2,065
S96T005035	164:14	Upper half	<2,040	<2,060	<2,050
S96T005030		Lower half	<2,050	<2,040	<2,045
S96T005036	164:15	Upper half	<2,010	<1,970	<1,990
S96T005032		Lower half	<1,970	<2,000	<1,985
S96T005037	164:16	Upper half	<1,920	<1,830	<1,875
S96T005033		Lower half	<1,910	<1,870	<1,890
S96T005038	164:17	Upper half	<1,930	<1,900	<1,915
S96T005031		Lower half	<2,180	<2,170	<2,175
S96T005039	164:19	Upper half	<1,940	<2,000	<1,970
S96T005034		Lower half	<2,140	<2,170	<2,155
S96T005281	164:20	Upper half	<1,720	<1,850	<1,785
S96T005278		Lower half	<1,890	<1,930	<1,910

Table B2-24. Tank 241-AN-104 Analytical Results: Magnesium (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
S96T005256	163:2	Liquid	<60.1	<60.1	<60.1
S96T005260	163:4	Liquid	<60.1	<60.1	<60.1
S96T005527	163:5	Liquid	<60.1	<60.1	<60.1
S96T005554	163:6	Liquid	<60.1	<60.1	<60.1
S96T005255	163:7	Liquid	<60.1	<60.1	<60.1
S96T005257	163:8	Liquid	<60.1	<60.1	<60.1
S96T005258	163:9	Liquid	<60.1	<60.1	<60.1
S96T005528	163:10	Liquid	<60.1	<60.1	<60.1
S96T005739	163:11	Liquid	<60.1	<60.1	<60.1
S96T005766	163:12	Liquid	<60.1	<60.1	<60.1
S96T005741	163:14	Liquid	<60.1	<60.1	<60.1
S96T004774	164:1	Liquid	<120	<120	<120
S96T004778	164:2	Liquid	<120	<120	<120
S96T004779	164:3	Liquid	<120	<120	<120
S96T004780	164:4	Liquid	<60.1	<60.1	<60.1
S96T004976	164:5	Liquid	<60.1	<60.1	<60.1
S96T004781	164:7	Liquid	<60.1	<60.1	<60.1
S96T004977	164:8	Liquid	<60.1	<60.1	<60.1
S96T004978	164:9	Liquid	<60.1	<60.1	<60.1
S96T004979	164:10	Liquid	<60.1	<60.1	<60.1
S96T004782	164:11	Liquid	<60.1	<60.1	<60.1
S96T004783	164:12	Liquid	<60.1	<60.1	<60.1
S96T004784	164:13	Liquid	<60.1	<60.1	<60.1
S96T005979	Core 164	Composite	<120	<120	<120

Table B2-25. Tank 241-AN-104 Analytical Results: Manganese (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005287	163:1	Lower half	18	18.2	18.1
S96T005288	163:2	Lower half	9.7	9.38	9.54
S96T005782	163:12	Lower half	13	12.6	12.8
S96T005749	163:14	Upper half	11.5	11.8	11.65
S96T005750		Lower half	13.8	13.4	13.6
S96T005294	163:16	Upper half	16.8	13.3	15.05[QC:e]
S96T005289		Lower half	16.5	13.2	14.85[QC:e]
S96T005778	163:18	Upper half	13.4	14.1	13.75
S96T005783		Lower half	12.9	12.9	12.9
S96T005557	163:20	Upper half	15.3	15.1	15.2
S96T005560		Lower half	26.1	20.7	23.4[QC:e]
S96T004797	164:1	Lower half	8.22	8.3	8.26
S96T004798	164:13	Lower half	39	41.1	40.05
S96T005042	164:14	Upper half	19	18.8	18.9
S96T005040		Lower half	11.1	10.9	11
S96T005061	164:15	Upper half	15	15.3	15.15
S96T005043		Lower half	27.1	26.2	26.65
S96T005062	164:16	Upper half	<15.1	<14.9	<15
S96T005044		Lower half	15.8	15.6	15.7
S96T005063	164:17	Upper half	14.5	15.3	14.9
S96T005041		Lower half	21.2	21.6	21.4
S96T005064	164:19	Upper half	27.3	28.1	27.7
S96T005045		Lower half	21	23.9	22.45
S96T005282	164:20	Upper half	17.8	14.7	16.25
S96T005279		Lower half	17.5	11	14.25[QC:e]
S96T005976	Core 164	Composite	22.1	19.6	20.85[QC:a]

Table B2-25. Tank 241-AN-104 Analytical Results: Manganese (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion			µg/g	µg/g	µg/g
S96T005284	163:1	Lower half	<187	<187	<187
S96T005285	163:2	Lower half	<179	<191	<185
S96T005780	163:12	Lower half	<188	<190	<189
S96T005747	163:14	Upper half	<224	<225	<224.5
S96T005748		Lower half	<187	<193	<190
S96T005293	163:16	Upper half	<177	<190	<183.5
S96T005286		Lower half	<199	<183	<191
S96T005777	163:18	Upper half	<205	325	<265[QC:c]
S96T005781		Lower half	<213	<214	<213.5
S96T005556	163:20	Upper half	<185	<194	<189.5
S96T005559		Lower half	<195	<195	<195
S96T004795	164:1	Lower half	<204	<201	<202.5
S96T004796	164:13	Lower half	<206	<207	<206.5
S96T005035	164:14	Upper half	<204	<206	<205
S96T005030		Lower half	<205	<204	<204.5
S96T005036	164:15	Upper half	<201	<197	<199
S96T005032		Lower half	<197	<200	<198.5
S96T005037	164:16	Upper half	<192	<183	<187.5
S96T005033		Lower half	<191	<187	<189
S96T005038	164:17	Upper half	<193	<190	<191.5
S96T005031		Lower half	<218	<217	<217.5
S96T005039	164:19	Upper half	<194	<200	<197
S96T005034		Lower half	<214	<217	<215.5
S96T005281	164:20	Upper half	<172	<185	<178.5
S96T005278		Lower half	<189	<193	<191

Table B2-25. Tank 241-AN-104 Analytical Results: Manganese (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			μg/mL	μg/mL	μg/mL
S96T005256	163:2	Liquid	<6.01	<6.01	<6.01
S96T005260	163:4	Liquid	<6.01	<6.01	<6.01
S96T005527	163:5	Liquid	<6.01	<6.01	<6.01
S96T005554	163:6	Liquid	<6.01	<6.01	<6.01
S96T005255	163:7	Liquid	<6.01	<6.01	<6.01
S96T005257	163:8	Liquid	<6.01	<6.01	<6.01
S96T005258	163:9	Liquid	<6.01	<6.01	<6.01
S96T005528	163:10	Liquid	<6.01	<6.01	<6.01
S96T005739	163:11	Liquid	<6.01	<6.01	<6.01
S96T005766	163:12	Liquid	<6.01	<6.01	<6.01
S96T005741	163:14	Liquid	<6.01	<6.01	<6.01
S96T004774	164:1	Liquid	<12	<12	<12
S96T004778	164:2	Liquid	<12	<12	<12
S96T004779	164:3	Liquid	<12	<12	<12
S96T004780	164:4	Liquid	<6.01	<6.01	<6.01
S96T004976	164:5	Liquid	<6.01	<6.01	<6.01
S96T004781	164:7	Liquid	<6.01	<6.01	<6.01
S96T004977	164:8	Liquid	<6.01	<6.01	<6.01
S96T004978	164:9	Liquid	<6.01	<6.01	<6.01
S96T004979	164:10	Liquid	<6.01	<6.01	<6.01
S96T004782	164:11	Liquid	<6.01	<6.01	<6.01
S96T004783	164:12	Liquid	<6.01	<6.01	<6.01
S96T004784	164:13	Liquid	<6.01	<6.01	<6.01
S96T005979	Core 164	Composite	<12	<12	<12

Table B2-26. Tank 241-AN-104 Analytical Results: Molybdenum (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005287	163:1	Lower half	44.1	43.2	43.65
S96T005288	163:2	Lower half	37.4	36.8	37.1
S96T005782	163:12	Lower half	45.2	42.6	43.9
S96T005749	163:14	Upper half	42	44.1	43.05
S96T005750		Lower half	45.2	45.4	45.3
S96T005294	163:16	Upper half	41.6	41.7	41.65
S96T005289		Lower half	42.2	44.7	43.45
S96T005778	163:18	Upper half	36.8	38.4	37.6
S96T005783		Lower half	38	37.5	37.75
S96T005557	163:20	Upper half	37.3	38.5	37.9
S96T005560		Lower half	40.6	33.1	36.85[QC:c]
S96T004797	164:1	Lower half	42.4	43.7	43.05
S96T004798	164:13	Lower half	44.7	48.5	46.6
S96T005042	164:14	Upper half	45	43.9	44.45
S96T005040		Lower half	46.9	49.4	48.15
S96T005061	164:15	Upper half	42.9	45.1	44
S96T005043		Lower half	44.1	44.2	44.15
S96T005062	164:16	Upper half	<75.3	<74.7	<75
S96T005044		Lower half	<73.7	<75	<74.35
S96T005063	164:17	Upper half	<69.7	<71.4	<70.55
S96T005041		Lower half	<76.2	<75.6	<75.9
S96T005064	164:19	Upper half	<75.6	<76.7	<76.15
S96T005045		Lower half	<72.5	<72	<72.25
S96T005282	164:20	Upper half	44.7	43.8	44.25
S96T005279		Lower half	40.5	43.3	41.9
S96T005976	Core 164	Composite	43.3	43.5	43.4

Table B2-26. Tank 241-AN-104 Analytical Results: Molybdenum (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion			µg/g	µg/g	µg/g
S96T005284	163:1	Lower half	<937	<936	<936.5
S96T005285	163:2	Lower half	<894	<956	<925
S96T005780	163:12	Lower half	<940	<950	<945
S96T005747	163:14	Upper half	<1,120	<1,130	<1,125
S96T005748		Lower half	<934	<963	<948.5
S96T005293	163:16	Upper half	<887	<949	<918
S96T005286		Lower half	<993	<917	<955
S96T005777	163:18	Upper half	<1,030	<992	<1,011
S96T005781		Lower half	<1,060	<1,070	<1,065
S96T005556	163:20	Upper half	<924	<968	<946
S96T005559		Lower half	<977	<973	<975
S96T004795	164:1	Lower half	<1,020	<1,000	<1,010
S96T004796	164:13	Lower half	<1,030	<1,040	<1,035
S96T005035	164:14	Upper half	<1,020	<1,030	<1,025
S96T005030		Lower half	<1,020	<1,020	<1,020
S96T005036	164:15	Upper half	<1,000	<983	<991.5
S96T005032		Lower half	<987	<1,000	<993.5
S96T005037	164:16	Upper half	<961	<915	<938
S96T005033		Lower half	<957	<933	<945
S96T005038	164:17	Upper half	<966	<949	<957.5
S96T005031		Lower half	<1,090	<1,080	<1,085
S96T005039	164:19	Upper half	<972	<1,000	<986
S96T005034		Lower half	<1,070	<1,090	<1,080
S96T005281	164:20	Upper half	<860	<925	<892.5
S96T005278		Lower half	<943	<966	<954.5

Table B2-26. Tank 241-AN-104 Analytical Results: Molybdenum (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
S96T005256	163:2	Liquid	77	85.4	81.2
S96T005260	163:4	Liquid	83.2	77.5	80.35
S96T005527	163:5	Liquid	77.5	76.6	77.05
S96T005554	163:6	Liquid	80.5	79.7	80.1
S96T005255	163:7	Liquid	84.3	89.6	86.95
S96T005257	163:8	Liquid	73	78.6	75.8
S96T005258	163:9	Liquid	80.4	77.9	79.15
S96T005528	163:10	Liquid	74.4	75.3	74.85
S96T005739	163:11	Liquid	77.3	79.6	78.45
S96T005766	163:12	Liquid	85.4	84.5	84.95
S96T005741	163:14	Liquid	75.4	79.4	77.4
S96T004774	164:1	Liquid	80	82.8	81.4
S96T004778	164:2	Liquid	69.2	81.6	75.4
S96T004779	164:3	Liquid	80.3	76.4	78.35
S96T004780	164:4	Liquid	80.2	82.9	81.55
S96T004976	164:5	Liquid	87.4	82.7	85.05
S96T004781	164:7	Liquid	76.9	81.4	79.15
S96T004977	164:8	Liquid	91.9	78.1	85
S96T004978	164:9	Liquid	84.3	72.5	78.4
S96T004979	164:10	Liquid	79.9	77.4	78.65
S96T004782	164:11	Liquid	78	81.1	79.55
S96T004783	164:12	Liquid	83.4	89.1	86.25
S96T004784	164:13	Liquid	79.2	83.2	81.2
S96T005979	Core 164	Composite	88.9	85	86.95

Table B2-27. Tank 241-AN-104 Analytical Results: Neodymium (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005287	163:1	Lower half	<37.9	<39.3	<38.6
S96T005288	163:2	Lower half	<44.3	<37.5	<40.9
S96T005782	163:12	Lower half	<45.7	<46.1	<45.9
S96T005749	163:14	Upper half	<44.8	<43.6	<44.2
S96T005750		Lower half	<45.9	<45.2	<45.55
S96T005294	163:16	Upper half	<41.3	<37	<39.15
S96T005289		Lower half	<46.4	<42.6	<44.5
S96T005778	163:18	Upper half	<48.1	<45.4	<46.75
S96T005783		Lower half	<47.4	<47.2	<47.3
S96T005557	163:20	Upper half	<38	<40.1	<39.05
S96T005560		Lower half	<44.2	<37.3	<40.75
S96T004797	164:1	Lower half	<46.9	<47.1	<47
S96T004798	164:13	Lower half	<48.4	<47.7	<48.05
S96T005042	164:14	Upper half	<47.4	<48	<47.7
S96T005040		Lower half	<47.7	<47	<47.35
S96T005061	164:15	Upper half	<48.3	<48	<48.15
S96T005043		Lower half	<46.4	<47.7	<47.05
S96T005062	164:16	Upper half	<151	<149	<150
S96T005044		Lower half	<147	<150	<148.5
S96T005063	164:17	Upper half	<139	<143	<141
S96T005041		Lower half	<152	<151	<151.5
S96T005064	164:19	Upper half	<151	<153	<152
S96T005045		Lower half	<145	<144	<144.5
S96T005282	164:20	Upper half	<39.3	<36.1	<37.7
S96T005279		Lower half	<45.4	<37.8	<41.6
S96T005976	Core 164	Composite	<39.8	<39.8	<39.8[QC:a]

Table B2-27. Tank 241-AN-104 Analytical Results: Neodymium (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion			µg/g	µg/g	µg/g
S96T005284	163:1	Lower half	<1,870	<1,870	<1,870
S96T005285	163:2	Lower half	<1,790	<1,910	<1,850
S96T005780	163:12	Lower half	<1,880	<1,900	<1,890
S96T005747	163:14	Upper half	<2,240	<2,250	<2,245
S96T005748		Lower half	<1,870	<1,930	<1,900
S96T005293	163:16	Upper half	<1,770	<1,900	<1,835
S96T005286		Lower half	<1,990	<1,830	<1,910
S96T005777	163:18	Upper half	<2,050	<1,980	<2,015
S96T005781		Lower half	<2,130	<2,140	<2,135
S96T005556	163:20	Upper half	<1,850	<1,940	<1,895
S96T005559		Lower half	<1,950	<1,950	<1,950
S96T004795	164:1	Lower half	<2,040	<2,010	<2,025
S96T004796	164:13	Lower half	<2,060	<2,070	<2,065
S96T005035	164:14	Upper half	<2,040	<2,060	<2,050
S96T005030		Lower half	<2,050	<2,040	<2,045
S96T005036	164:15	Upper half	<2,010	<1,970	<1,990
S96T005032		Lower half	<1,970	<2,000	<1,985
S96T005037	164:16	Upper half	<1,920	<1,830	<1,875
S96T005033		Lower half	<1,910	<1,870	<1,890
S96T005038	164:17	Upper half	<1,930	<1,900	<1,915
S96T005031		Lower half	<2,180	<2,170	<2,175
S96T005039	164:19	Upper half	<1,940	<2,000	<1,970
S96T005034		Lower half	<2,140	<2,170	<2,155
S96T005281	164:20	Upper half	<1,720	<1,850	<1,785
S96T005278		Lower half	<1,890	<1,930	<1,910

Table B2-27. Tank 241-AN-104 Analytical Results: Neodymium (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
S96T005256	163:2	Liquid	<60.1	<60.1	<60.1
S96T005260	163:4	Liquid	<60.1	<60.1	<60.1
S96T005527	163:5	Liquid	<60.1	<60.1	<60.1
S96T005554	163:6	Liquid	<60.1	<60.1	<60.1
S96T005255	163:7	Liquid	<60.1	<60.1	<60.1
S96T005257	163:8	Liquid	<60.1	<60.1	<60.1
S96T005258	163:9	Liquid	<60.1	<60.1	<60.1
S96T005528	163:10	Liquid	<60.1	<60.1	<60.1
S96T005739	163:11	Liquid	<60.1	<60.1	<60.1
S96T005766	163:12	Liquid	<60.1	<60.1	<60.1
S96T005741	163:14	Liquid	<60.1	<60.1	<60.1
S96T004774	164:1	Liquid	<120	<120	<120
S96T004778	164:2	Liquid	<120	<120	<120
S96T004779	164:3	Liquid	<120	<120	<120
S96T004780	164:4	Liquid	<60.1	<60.1	<60.1
S96T004976	164:5	Liquid	<60.1	<60.1	<60.1
S96T004781	164:7	Liquid	<60.1	<60.1	<60.1
S96T004977	164:8	Liquid	<60.1	<60.1	<60.1
S96T004978	164:9	Liquid	<60.1	<60.1	<60.1
S96T004979	164:10	Liquid	<60.1	<60.1	<60.1
S96T004782	164:11	Liquid	<60.1	<60.1	<60.1
S96T004783	164:12	Liquid	<60.1	<60.1	<60.1
S96T004784	164:13	Liquid	<60.1	<60.1	<60.1
S96T005979	Core 164	Composite	<120	<120	<120

Table B2-28. Tank 241-AN-104 Analytical Results: Nickel (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005287	163:1	Lower half	42.8	40.8	41.8
S96T005288	163:2	Lower half	23.7	24	23.85
S96T005782	163:12	Lower half	43.5	44.6	44.05
S96T005749	163:14	Upper half	41	38.1	39.55
S96T005750		Lower half	46.5	44.6	45.55
S96T005294	163:16	Upper half	89.3	67.3	78.3[QC:c]
S96T005289		Lower half	74.8	63.2	69
S96T005778	163:18	Upper half	39.7	43.8	41.75
S96T005783		Lower half	36.8	38.7	37.75
S96T005557	163:20	Upper half	62.2	58.3	60.25
S96T005560		Lower half	59.8	45.2	52.5[QC:c]
S96T004797	164:1	Lower half	30.7	27.3	29
S96T004798	164:13	Lower half	148	159	153.5
S96T005042	164:14	Upper half	72.9	70.7	71.8
S96T005040		Lower half	39.2	40.6	39.9
S96T005061	164:15	Upper half	52.3	55.5	53.9
S96T005043		Lower half	89.8	89.9	89.85
S96T005062	164:16	Upper half	48	54.6	51.3
S96T005044		Lower half	51	44.3	47.65
S96T005063	164:17	Upper half	52	63.3	57.65
S96T005041		Lower half	84.3	88.3	86.3
S96T005064	164:19	Upper half	82.2	79.5	80.85
S96T005045		Lower half	66.3	75.8	71.05
S96T005282	164:20	Upper half	93.7	73	83.35[QC:c]
S96T005279		Lower half	73.3	44.3	58.8[QC:c]
S96T005976	Core 164	Composite	79.5	70.5	75[QC:a]

Table B2-28. Tank 241-AN-104 Analytical Results: Nickel (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion			µg/g	µg/g	µg/g
S96T005284	163:1	Lower half	1,090	4,080	2,585[QC:e]
S96T005285	163:2	Lower half	2,750	2,930	2,840
S96T005780	163:12	Lower half	1,720	3,810	2,765[QC:e]
S96T005747	163:14	Upper half	3,630	5,410	4,520[QC:e]
S96T005748		Lower half	4,620	3,120	3,870[QC:e]
S96T005293	163:16	Upper half	2,380	5,020	3,700[QC:e]
S96T005286		Lower half	2,250	2,670	2,460
S96T005777	163:18	Upper half	23,600	1.200E+05	71,800[QC:e]
S96T005781		Lower half	8,600	2,880	5,740[QC:e]
S96T005556	163:20	Upper half	2,020	4,270	3,145[QC:e]
S96T005559		Lower half	1,470	3,220	2,345[QC:e]
S96T004795	164:1	Lower half	5,820	4,300	5,060[QC:e]
S96T004796	164:13	Lower half	6,180	4,480	5,330[QC:e]
S96T005035	164:14	Upper half	1,600	5,870	3,735[QC:e]
S96T005030		Lower half	6,060	2,920	4,490[QC:e]
S96T005036	164:15	Upper half	4,920	3,230	4,075[QC:e]
S96T005032		Lower half	5,450	1,470	3,460[QC:e]
S96T005037	164:16	Upper half	779	486	632.5[QC:e]
S96T005033		Lower half	2,500	1,840	2,170[QC:e]
S96T005038	164:17	Upper half	1,100	506	803[QC:e]
S96T005031		Lower half	553	2,670	1,611.5[QC:e]
S96T005039	164:19	Upper half	467	1,980	1,223.5[QC:e]
S96T005034		Lower half	<427	558	<492.5[QC:e]
S96T005281	164:20	Upper half	2,100	1,280	1,690[QC:e]
S96T005278		Lower half	1,920	2,820	2,370[QC:e]

Table B2-28. Tank 241-AN-104 Analytical Results: Nickel (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
S96T005256	163:2	Liquid	<12	<12	<12
S96T005260	163:4	Liquid	<12	<12	<12
S96T005527	163:5	Liquid	<12	<12	<12
S96T005554	163:6	Liquid	<12	<12	<12
S96T005255	163:7	Liquid	<12	<12	<12
S96T005257	163:8	Liquid	<12	<12	<12
S96T005258	163:9	Liquid	<12	<12	<12
S96T005528	163:10	Liquid	<12	<12	<12
S96T005739	163:11	Liquid	<12	<12	<12
S96T005766	163:12	Liquid	<12	<12	<12
S96T005741	163:14	Liquid	<12	<12	<12
S96T004774	164:1	Liquid	<24	<24	<24
S96T004778	164:2	Liquid	<24	<24	<24
S96T004779	164:3	Liquid	<24	<24	<24
S96T004780	164:4	Liquid	<12	<12	<12
S96T004976	164:5	Liquid	<12	<12	<12
S96T004781	164:7	Liquid	<12	<12	<12
S96T004977	164:8	Liquid	<12	<12	<12
S96T004978	164:9	Liquid	<12	<12	<12
S96T004979	164:10	Liquid	<12	<12	<12
S96T004782	164:11	Liquid	<12	<12	<12
S96T004783	164:12	Liquid	<12	<12	<12
S96T004784	164:13	Liquid	<12	<12	<12
S96T005979	Core 164	Composite	<24	<24	<24

Table B2-29. Tank 241-AN-104 Analytical Results: Phosphorus (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005287	163:1	Lower half	1,120	866	993[QC:c,e]
S96T005288	163:2	Lower half	1,400	1,390	1,395
S96T005782	163:12	Lower half	1,600	2,250	1,925[QC:e]
S96T005749	163:14	Upper half	809	711	760
S96T005750		Lower half	957	626	791.5[QC:e]
S96T005294	163:16	Upper half	1,180	935	1,057.5[QC:e]
S96T005289		Lower half	1,150	858	1,004[QC:e]
S96T005778	163:18	Upper half	1,270	1,260	1,265
S96T005783		Lower half	1,220	1,330	1,275
S96T005557	163:20	Upper half	1,400	1,610	1,505
S96T005560		Lower half	6,210	5,380	5,795[QC:e]
S96T004797	164:1	Lower half	2,070	1,770	1,920[QC:e]
S96T004798	164:13	Lower half	1,990	1,970	1,980[QC:e]
S96T005042	164:14	Upper half	991	1,170	1,080.5
S96T005040		Lower half	797	688	742.5
S96T005061	164:15	Upper half	961	1,190	1,075.5[QC:e]
S96T005043		Lower half	798	813	805.5
S96T005062	164:16	Upper half	692	710	701
S96T005044		Lower half	1,090	1,110	1,100
S96T005063	164:17	Upper half	1,470	861	1,165.5[QC:e]
S96T005041		Lower half	1,430	1,050	1,240[QC:e]
S96T005064	164:19	Upper half	1,860	1,440	1,650[QC:e]
S96T005045		Lower half	863	815	839
S96T005282	164:20	Upper half	1,050	951	1,000.5
S96T005279		Lower half	1,590	966	1,278[QC:d,e]
S96T005976	Core 164	Composite	1,000	790	895[QC:e]

Table B2-29. Tank 241-AN-104 Analytical Results: Phosphorus (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion			µg/g	µg/g	µg/g
S96T005284	163:1	Lower half	<3,750	<3,740	<3,745
S96T005285	163:2	Lower half	<3,580	<3,820	<3,700
S96T005780	163:12	Lower half	<3,760	<3,800	<3,780
S96T005747	163:14	Upper half	<4,480	<4,510	<4,495
S96T005748		Lower half	<3,730	<3,850	<3,790
S96T005293	163:16	Upper half	<3,550	<3,800	<3,675
S96T005286		Lower half	<3,970	<3,670	<3,820
S96T005777	163:18	Upper half	<4,100	<3,970	<4,035
S96T005781		Lower half	<4,260	<4,280	<4,270
S96T005556	163:20	Upper half	<3,700	<3,870	<3,785
S96T005559		Lower half	5,360	<3,890	<4,625[QC:e]
S96T004795	164:1	Lower half	<4,090	<4,020	<4,055
S96T004796	164:13	Lower half	<4,120	<4,150	<4,135
S96T005035	164:14	Upper half	<4,080	<4,120	<4,100
S96T005030		Lower half	<4,100	<4,070	<4,085
S96T005036	164:15	Upper half	<4,020	<3,930	<3,975
S96T005032		Lower half	<3,950	<4,010	<3,980
S96T005037	164:16	Upper half	<3,840	<3,660	<3,750
S96T005033		Lower half	<3,830	<3,730	<3,780
S96T005038	164:17	Upper half	<3,860	<3,790	<3,825
S96T005031		Lower half	<4,370	<4,340	<4,355
S96T005039	164:19	Upper half	<3,890	<4,000	<3,945
S96T005034		Lower half	<4,270	<4,350	<4,310
S96T005281	164:20	Upper half	<3,440	5,400	<4,420[QC:e]
S96T005278		Lower half	<3,770	<3,870	<3,820

Table B2-29. Tank 241-AN-104 Analytical Results: Phosphorus (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			μg/mL	μg/mL	μg/mL
S96T005256	163:2	Liquid	862	954	908
S96T005260	163:4	Liquid	1,000	938	969
S96T005527	163:5	Liquid	960	943	951.5
S96T005554	163:6	Liquid	992	964	978
S96T005255	163:7	Liquid	1,030	1,070	1,050
S96T005257	163:8	Liquid	835	850	842.5
S96T005258	163:9	Liquid	876	860	868
S96T005528	163:10	Liquid	785	804	794.5
S96T005739	163:11	Liquid	729	736	732.5
S96T005766	163:12	Liquid	554	529	541.5
S96T005741	163:14	Liquid	559	561	560
S96T004774	164:1	Liquid	908	895	901.5
S96T004778	164:2	Liquid	847	973	910
S96T004779	164:3	Liquid	954	909	931.5
S96T004780	164:4	Liquid	908	877	892.5
S96T004976	164:5	Liquid	1,150	886	1,018[QC:c,c]
S96T004781	164:7	Liquid	860	878	869
S96T004977	164:8	Liquid	1,130	937	1,033.5
S96T004978	164:9	Liquid	1,020	860	940
S96T004979	164:10	Liquid	959	888	923.5
S96T004782	164:11	Liquid	900	899	899.5
S96T004783	164:12	Liquid	883	1,050	966.5
S96T004784	164:13	Liquid	804	837	820.5
S96T005979	Core 164	Composite	1,060	995	1,027.5

Table B2-30. Tank 241-AN-104 Analytical Results: Potassium (ICP). (2 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005287	163:1	Lower half	3,590	3,510	3,550
S96T005288	163:2	Lower half	3,050	3,200	3,125[QC:d]
S96T005782	163:12	Lower half	3,660	3,460	3,560
S96T005749	163:14	Upper half	3,450	3,590	3,520
S96T005750		Lower half	3,650	3,770	3,710
S96T005294	163:16	Upper half	3,330	3,410	3,370
S96T005289		Lower half	3,450	3,720	3,585[QC:d]
S96T005778	163:18	Upper half	3,150	3,150	3,150
S96T005783		Lower half	3,200	3,060	3,130
S96T005557	163:20	Upper half	3,070	3,220	3,145
S96T005560		Lower half	3,350	2,680	3,015[QC:c,e]
S96T004797	164:1	Lower half	3,690	3,720	3,705
S96T004798	164:13	Lower half	3,820	4,020	3,920[QC:d]
S96T005042	164:14	Upper half	3,820	3,880	3,850
S96T005040		Lower half	3,940	4,070	4,005
S96T005061	164:15	Upper half	3,750	3,860	3,805
S96T005043		Lower half	3,740	3,700	3,720
S96T005062	164:16	Upper half	3,830	3,820	3,825
S96T005044		Lower half	3,530	3,690	3,610
S96T005063	164:17	Upper half	3,810	4,060	3,935
S96T005041		Lower half	3,490	3,800	3,645
S96T005064	164:19	Upper half	3,460	3,570	3,515
S96T005045		Lower half	3,980	3,810	3,895
S96T005282	164:20	Upper half	3,590	3,780	3,685
S96T005279		Lower half	3,330	3,840	3,585
S96T005976	Core 164	Composite	3,630	3,810	3,720[QC:a]

Table B2-30. Tank 241-AN-104 Analytical Results: Potassium (ICP). (2 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			μg/mL	μg/mL	μg/mL
S96T005256	163:2	Liquid	6,680	7,190	6,935
S96T005260	163:4	Liquid	7,200	6,690	6,945[QC:c]
S96T005527	163:5	Liquid	6,520	6,630	6,575
S96T005554	163:6	Liquid	6,850	6,670	6,760
S96T005255	163:7	Liquid	7,240	7,710	7,475[QC:d]
S96T005257	163:8	Liquid	6,640	6,820	6,730
S96T005258	163:9	Liquid	7,140	6,590	6,865
S96T005528	163:10	Liquid	6,430	6,470	6,450
S96T005739	163:11	Liquid	6,630	6,670	6,650
S96T005766	163:12	Liquid	7,360	7,080	7,220
S96T005741	163:14	Liquid	6,760	6,660	6,710
S96T004774	164:1	Liquid	6,820	6,960	6,890
S96T004778	164:2	Liquid	5,910	6,950	6,430
S96T004779	164:3	Liquid	6,860	6,620	6,740
S96T004780	164:4	Liquid	6,340	6,600	6,470[QC:d]
S96T004976	164:5	Liquid	6,640	6,330	6,485[QC:c]
S96T004781	164:7	Liquid	6,170	6,410	6,290[QC:d]
S96T004977	164:8	Liquid	7,440	6,290	6,865[QC:c]
S96T004978	164:9	Liquid	7,080	5,980	6,530
S96T004979	164:10	Liquid	6,510	6,330	6,420
S96T004782	164:11	Liquid	6,110	6,470	6,290[QC:d]
S96T004783	164:12	Liquid	6,540	7,160	6,850[QC:c]
S96T004784	164:13	Liquid	6,080	6,500	6,290[QC:d]
S96T005979	Core 164	Composite	7,020	6,770	6,895

Table B2-31. Tank 241-AN-104 Analytical Results: Samarium (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005287	163:1	Lower half	<37.9	<39.3	<38.6
S96T005288	163:2	Lower half	<44.3	<37.5	<40.9
S96T005782	163:12	Lower half	<45.7	<46.1	<45.9
S96T005749	163:14	Upper half	<44.8	<43.6	<44.2
S96T005750		Lower half	<45.9	<45.2	<45.55
S96T005294	163:16	Upper half	<41.3	<37	<39.15
S96T005289		Lower half	<46.4	<42.6	<44.5
S96T005778	163:18	Upper half	<48.1	<45.4	<46.75
S96T005783		Lower half	<47.4	<47.2	<47.3
S96T005557	163:20	Upper half	<38	<40.1	<39.05
S96T005560		Lower half	<44.2	<37.3	<40.75
S96T004797	164:1	Lower half	<46.9	<47.1	<47
S96T004798	164:13	Lower half	<48.4	<47.7	<48.05
S96T005042	164:14	Upper half	<47.4	<48	<47.7
S96T005040		Lower half	<47.7	<47	<47.35
S96T005061	164:15	Upper half	<48.3	<48	<48.15
S96T005043		Lower half	<46.4	<47.7	<47.05
S96T005062	164:16	Upper half	<151	<149	<150
S96T005044		Lower half	<147	<150	<148.5
S96T005063	164:17	Upper half	<139	<143	<141
S96T005041		Lower half	<152	<151	<151.5
S96T005064	164:19	Upper half	<151	<153	<152
S96T005045		Lower half	<145	<144	<144.5
S96T005282	164:20	Upper half	<39.3	<36.1	<37.7
S96T005279		Lower half	<45.4	<37.8	<41.6
S96T005976	Core 164	Composite	<39.8	<39.8	<39.8[QC:a]

Table B2-31. Tank 241-AN-104 Analytical Results: Samarium (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion			µg/g	µg/g	µg/g
S96T005284	163:1	Lower half	<1,870	<1,870	<1,870
S96T005285	163:2	Lower half	<1,790	<1,910	<1,850
S96T005780	163:12	Lower half	<1,880	<1,900	<1,890
S96T005747	163:14	Upper half	<2,240	<2,250	<2,245
S96T005748		Lower half	<1,870	<1,930	<1,900
S96T005293	163:16	Upper half	<1,770	<1,900	<1,835
S96T005286		Lower half	<1,990	<1,830	<1,910
S96T005777	163:18	Upper half	<2,050	<1,980	<2,015
S96T005781		Lower half	<2,130	<2,140	<2,135
S96T005556	163:20	Upper half	<1,850	<1,940	<1,895
S96T005559		Lower half	<1,950	<1,950	<1,950
S96T004795	164:1	Lower half	<2,040	<2,010	<2,025
S96T004796	164:13	Lower half	<2,060	<2,070	<2,065
S96T005035	164:14	Upper half	<2,040	<2,060	<2,050
S96T005030		Lower half	<2,050	<2,040	<2,045
S96T005036	164:15	Upper half	<2,010	<1,970	<1,990
S96T005032		Lower half	<1,970	<2,000	<1,985
S96T005037	164:16	Upper half	<1,920	<1,830	<1,875
S96T005033		Lower half	<1,910	<1,870	<1,890
S96T005038	164:17	Upper half	<1,930	<1,900	<1,915
S96T005031		Lower half	<2,180	<2,170	<2,175
S96T005039	164:19	Upper half	<1,940	<2,000	<1,970
S96T005034		Lower half	<2,140	<2,170	<2,155
S96T005281	164:20	Upper half	<1,720	<1,850	<1,785
S96T005278		Lower half	<1,890	<1,930	<1,910

Table B2-31. Tank 241-AN-104 Analytical Results: Samarium (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
S96T005256	163:2	Liquid	<60.1	<60.1	<60.1
S96T005260	163:4	Liquid	<60.1	<60.1	<60.1
S96T005527	163:5	Liquid	<60.1	<60.1	<60.1
S96T005554	163:6	Liquid	<60.1	<60.1	<60.1
S96T005255	163:7	Liquid	<60.1	<60.1	<60.1
S96T005257	163:8	Liquid	<60.1	<60.1	<60.1
S96T005258	163:9	Liquid	<60.1	<60.1	<60.1
S96T005528	163:10	Liquid	<60.1	<60.1	<60.1
S96T005739	163:11	Liquid	<60.1	<60.1	<60.1
S96T005766	163:12	Liquid	<60.1	<60.1	<60.1
S96T005741	163:14	Liquid	<60.1	<60.1	<60.1
S96T004774	164:1	Liquid	<120	<120	<120
S96T004778	164:2	Liquid	<120	<120	<120
S96T004779	164:3	Liquid	<120	<120	<120
S96T004780	164:4	Liquid	<60.1	<60.1	<60.1
S96T004976	164:5	Liquid	<60.1	<60.1	<60.1
S96T004781	164:7	Liquid	<60.1	<60.1	<60.1
S96T004977	164:8	Liquid	<60.1	<60.1	<60.1
S96T004978	164:9	Liquid	<60.1	<60.1	<60.1
S96T004979	164:10	Liquid	<60.1	<60.1	<60.1
S96T004782	164:11	Liquid	<60.1	<60.1	<60.1
S96T004783	164:12	Liquid	<60.1	<60.1	<60.1
S96T004784	164:13	Liquid	<60.1	<60.1	<60.1
S96T005979	Core 164	Composite	<120	<120	<120

Table B2-32. Tank 241-AN-104 Analytical Results: Selenium (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005287	163:1	Lower half	<37.9	<39.3	<38.6
S96T005288	163:2	Lower half	<44.3	<37.5	<40.9
S96T005782	163:12	Lower half	<45.7	<46.1	<45.9
S96T005749	163:14	Upper half	<44.8	<43.6	<44.2
S96T005750		Lower half	<45.9	<45.2	<45.55
S96T005294	163:16	Upper half	<41.3	<37	<39.15
S96T005289		Lower half	<46.4	<42.6	<44.5
S96T005778	163:18	Upper half	<48.1	<45.4	<46.75
S96T005783		Lower half	<47.4	<47.2	<47.3
S96T005557	163:20	Upper half	<38	<40.1	<39.05
S96T005560		Lower half	<44.2	<37.3	<40.75
S96T004797	164:1	Lower half	<46.9	<47.1	<47
S96T004798	164:13	Lower half	<48.4	<47.7	<48.05
S96T005042	164:14	Upper half	<47.4	<48	<47.7
S96T005040		Lower half	<47.7	<47	<47.35
S96T005061	164:15	Upper half	<48.3	<48	<48.15
S96T005043		Lower half	<46.4	<47.7	<47.05
S96T005062	164:16	Upper half	194	<149	<171.5[QC:c]
S96T005044		Lower half	<147	185	<166[QC:c]
S96T005063	164:17	Upper half	157	182	169.5
S96T005041		Lower half	213	279	246[QC:c]
S96T005064	164:19	Upper half	244	221	232.5
S96T005045		Lower half	237	216	226.5
S96T005282	164:20	Upper half	<39.3	<36.1	<37.7
S96T005279		Lower half	<45.4	<37.8	<41.6
S96T005976	Core 164	Composite	<39.8	<39.8	<39.8[QC:a]

Table B2-32. Tank 241-AN-104 Analytical Results: Selenium (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion			µg/g	µg/g	µg/g
S96T005284	163:1	Lower half	<1,870	<1,870	<1,870
S96T005285	163:2	Lower half	<1,790	<1,910	<1,850
S96T005780	163:12	Lower half	<1,880	<1,900	<1,890
S96T005747	163:14	Upper half	<2,240	<2,250	<2,245
S96T005748		Lower half	<1,870	<1,930	<1,900
S96T005293	163:16	Upper half	<1,770	<1,900	<1,835
S96T005286		Lower half	<1,990	<1,830	<1,910
S96T005777	163:18	Upper half	<2,050	<1,980	<2,015
S96T005781		Lower half	<2,130	<2,140	<2,135
S96T005556	163:20	Upper half	<1,850	<1,940	<1,895
S96T005559		Lower half	<1,950	<1,950	<1,950
S96T004795	164:1	Lower half	<2,040	<2,010	<2,025
S96T004796	164:13	Lower half	<2,060	<2,070	<2,065
S96T005035	164:14	Upper half	<2,040	<2,060	<2,050
S96T005030		Lower half	<2,050	<2,040	<2,045
S96T005036	164:15	Upper half	<2,010	<1,970	<1,990
S96T005032		Lower half	<1,970	<2,000	<1,985
S96T005037	164:16	Upper half	<1,920	<1,830	<1,875
S96T005033		Lower half	<1,910	<1,870	<1,890
S96T005038	164:17	Upper half	<1,930	<1,900	<1,915
S96T005031		Lower half	<2,180	<2,170	<2,175
S96T005039	164:19	Upper half	<1,940	<2,000	<1,970
S96T005034		Lower half	<2,140	<2,170	<2,155
S96T005281	164:20	Upper half	<1,720	<1,850	<1,785
S96T005278		Lower half	<1,890	<1,930	<1,910

Table B2-32. Tank 241-AN-104 Analytical Results: Selenium (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			μg/mL	μg/mL	μg/mL
S96T005256	163:2	Liquid	<60.1	<60.1	<60.1
S96T005260	163:4	Liquid	<60.1	<60.1	<60.1
S96T005527	163:5	Liquid	<60.1	<60.1	<60.1
S96T005554	163:6	Liquid	<60.1	<60.1	<60.1
S96T005255	163:7	Liquid	<60.1	<60.1	<60.1
S96T005257	163:8	Liquid	<60.1	<60.1	<60.1
S96T005258	163:9	Liquid	<60.1	<60.1	<60.1
S96T005528	163:10	Liquid	<60.1	<60.1	<60.1
S96T005739	163:11	Liquid	<60.1	<60.1	<60.1
S96T005766	163:12	Liquid	<60.1	<60.1	<60.1
S96T005741	163:14	Liquid	<60.1	<60.1	<60.1
S96T004774	164:1	Liquid	<120	<120	<120
S96T004778	164:2	Liquid	<120	<120	<120
S96T004779	164:3	Liquid	<120	<120	<120
S96T004780	164:4	Liquid	<60.1	<60.1	<60.1
S96T004976	164:5	Liquid	<60.1	<60.1	<60.1
S96T004781	164:7	Liquid	<60.1	<60.1	<60.1
S96T004977	164:8	Liquid	<60.1	<60.1	<60.1
S96T004978	164:9	Liquid	<60.1	<60.1	<60.1
S96T004979	164:10	Liquid	<60.1	<60.1	<60.1
S96T004782	164:11	Liquid	<60.1	<60.1	<60.1
S96T004783	164:12	Liquid	<60.1	<60.1	<60.1
S96T004784	164:13	Liquid	<60.1	<60.1	<60.1
S96T005979	Core 164	Composite	<120	<120	<120

Table B2-33. Tank 241-AN-104 Analytical Results: Silicon (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005287	163:1	Lower half	803	881	842[QC:b]
S96T005288	163:2	Lower half	952	872	912[QC:b,c]
S96T005782	163:12	Lower half	507	507	507[QC:b]
S96T005749	163:14	Upper half	193	191	192[QC:b]
S96T005750		Lower half	579	530	554.5[QC:b]
S96T005294	163:16	Upper half	780	644	712[QC:b]
S96T005289		Lower half	1,030	721	875.5[QC:b,c]
S96T005778	163:18	Upper half	377	292	334.5[QC:b,c]
S96T005783		Lower half	675	652	663.5[QC:b]
S96T005557	163:20	Upper half	742	625	683.5[QC:b]
S96T005560		Lower half	882	770	826[QC:b,c]
S96T004797	164:1	Lower half	887	897	892[QC:b]
S96T004798	164:13	Lower half	1,040	949	994.5[QC:b,c]
S96T005042	164:14	Upper half	401	547	474[QC:b,c]
S96T005040		Lower half	776	1,060	918[QC:b,c]
S96T005061	164:15	Upper half	567	540	553.5[QC:b]
S96T005043		Lower half	717	652	684.5[QC:b]
S96T005062	164:16	Upper half	477	524	500.5[QC:b]
S96T005044		Lower half	682	615	648.5[QC:b]
S96T005063	164:17	Upper half	317	309	313[QC:b]
S96T005041		Lower half	567	615	591[QC:b]
S96T005064	164:19	Upper half	630	519	574.5[QC:b]
S96T005045		Lower half	614	663	638.5[QC:b]
S96T005282	164:20	Upper half	355	592	473.5[QC:b,c]
S96T005279		Lower half	671	685	678[QC:b]
S96T005976	Core 164	Composite	688	835	761.5[QC:b]

Table B2-33. Tank 241-AN-104 Analytical Results: Silicon (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion			µg/g	µg/g	µg/g
S96T005284	163:1	Lower half	<937	1,010	<973.5
S96T005285	163:2	Lower half	1,180	<956	<1,068[QC:e]
S96T005780	163:12	Lower half	<940	1,130	<1,035
S96T005747	163:14	Upper half	<1,120	<1,130	<1,125
S96T005748		Lower half	938	1,140	1,039
S96T005293	163:16	Upper half	<887	<949	<918
S96T005286		Lower half	<993	<917	<955
S96T005777	163:18	Upper half	<1,030	<992	<1,011
S96T005781		Lower half	1,260	1,660	1,460[QC:e]
S96T005556	163:20	Upper half	<924	<968	<946
S96T005559		Lower half	<977	<973	<975
S96T004795	164:1	Lower half	<1,020	<1,000	<1,010
S96T004796	164:13	Lower half	1,090	<1,040	<1,065
S96T005035	164:14	Upper half	1,300	1,240	1,270
S96T005030		Lower half	1,750	<1,020	<1,385[QC:e]
S96T005036	164:15	Upper half	<1,000	<983	<991.5
S96T005032		Lower half	<987	<1,000	<993.5
S96T005037	164:16	Upper half	<961	<915	<938
S96T005033		Lower half	987	<933	<960
S96T005038	164:17	Upper half	<966	<949	<957.5
S96T005031		Lower half	<1,090	1,110	<1,100
S96T005039	164:19	Upper half	<972	<1,000	<986
S96T005034		Lower half	<1,070	<1,090	<1,080
S96T005281	164:20	Upper half	2,060	<925	<1,492.5[QC:e]
S96T005278		Lower half	<943	<966	<954.5

Table B2-33. Tank 241-AN-104 Analytical Results: Silicon (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			μg/mL	μg/mL	μg/mL
S96T005256	163:2	Liquid	202	220	211
S96T005260	163:4	Liquid	234	222	228
S96T005527	163:5	Liquid	173	173	173
S96T005554	163:6	Liquid	200	200	200
S96T005255	163:7	Liquid	230	242	236
S96T005257	163:8	Liquid	236	248	242
S96T005258	163:9	Liquid	220	217	218.5
S96T005528	163:10	Liquid	204	208	206
S96T005739	163:11	Liquid	245	243	244
S96T005766	163:12	Liquid	158	155	156.5
S96T005741	163:14	Liquid	220	223	221.5
S96T004774	164:1	Liquid	478	507	492.5
S96T004778	164:2	Liquid	170	205	187.5
S96T004779	164:3	Liquid	203	192	197.5
S96T004780	164:4	Liquid	224	216	220
S96T004976	164:5	Liquid	390	249	319.5[QC:e]
S96T004781	164:7	Liquid	216	221	218.5
S96T004977	164:8	Liquid	358	317	337.5
S96T004978	164:9	Liquid	363	263	313[QC:e]
S96T004979	164:10	Liquid	245	219	232
S96T004782	164:11	Liquid	279	269	274
S96T004783	164:12	Liquid	260	288	274
S96T004784	164:13	Liquid	213	206	209.5
S96T005979	Core 164	Composite	411	347	379

Table B2-34. Tank 241-AN-104 Analytical Results: Silver (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005287	163:1	Lower half	14.1	13.8	13.95[QC:a,c]
S96T005288	163:2	Lower half	16.9	16.2	16.55[QC:a,c]
S96T005782	163:12	Lower half	12.3	12.3	12.3
S96T005749	163:14	Upper half	13.8	13.7	13.75
S96T005750		Lower half	13	13.1	13.05
S96T005294	163:16	Upper half	38.6	27.3	32.95[QC:a,e]
S96T005289		Lower half	15	14.4	14.7[QC:a,c]
S96T005778	163:18	Upper half	14.4	14.9	14.65
S96T005783		Lower half	15	14.7	14.85
S96T005557	163:20	Upper half	15.7	15.4	15.55[QC:a]
S96T005560		Lower half	17.7	14.8	16.25[QC:a,c]
S96T004797	164:1	Lower half	13.7	14.2	13.95
S96T004798	164:13	Lower half	14.5	14.3	14.4
S96T005042	164:14	Upper half	13.7	14.4	14.05
S96T005040		Lower half	14.6	14.1	14.35
S96T005061	164:15	Upper half	14.5	14.8	14.65
S96T005043		Lower half	14.3	14.5	14.4
S96T005062	164:16	Upper half	<15.1	<14.9	<15
S96T005044		Lower half	<14.7	<15	<14.85
S96T005063	164:17	Upper half	<13.9	<14.3	<14.1
S96T005041		Lower half	<15.2	<15.1	<15.15
S96T005064	164:19	Upper half	<15.1	<15.3	<15.2
S96T005045		Lower half	<14.5	<14.4	<14.45
S96T005282	164:20	Upper half	26.4	21.2	23.8[QC:e]
S96T005279		Lower half	15.9	14	14.95
S96T005976	Core 164	Composite	14.2	13.5	13.85[QC:a]

Table B2-34. Tank 241-AN-104 Analytical Results: Silver (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion			μg/g	μg/g	μg/g
S96T005284	163:1	Lower half	<187	<187	<187[QC:c]
S96T005285	163:2	Lower half	<179	<191	<185[QC:c]
S96T005780	163:12	Lower half	<188	<190	<189
S96T005747	163:14	Upper half	<224	<225	<224.5
S96T005748		Lower half	<187	<193	<190
S96T005293	163:16	Upper half	<177	<190	<183.5
S96T005286		Lower half	<199	<183	<191[QC:c]
S96T005777	163:18	Upper half	<205	<198	<201.5
S96T005781		Lower half	<213	<214	<213.5[QC:c]
S96T005556	163:20	Upper half	<185	<194	<189.5
S96T005559		Lower half	<195	<195	<195[QC:c]
S96T004795	164:1	Lower half	<204	<201	<202.5
S96T004796	164:13	Lower half	<206	<207	<206.5
S96T005035	164:14	Upper half	<204	<206	<205
S96T005030		Lower half	<205	<204	<204.5
S96T005036	164:15	Upper half	<201	<197	<199
S96T005032		Lower half	<197	<200	<198.5
S96T005037	164:16	Upper half	<192	<183	<187.5
S96T005033		Lower half	<191	<187	<189
S96T005038	164:17	Upper half	<193	<190	<191.5
S96T005031		Lower half	<218	<217	<217.5
S96T005039	164:19	Upper half	<194	<200	<197
S96T005034		Lower half	<214	<217	<215.5
S96T005281	164:20	Upper half	<172	<185	<178.5
S96T005278		Lower half	<189	<193	<191[QC:c]

Table B2-34. Tank 241-AN-104 Analytical Results: Silver (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
S96T005256	163:2	Liquid	19.1	19.9	19.5
S96T005260	163:4	Liquid	19.2	17.8	18.5
S96T005527	163:5	Liquid	18	18.1	18.05
S96T005554	163:6	Liquid	18.6	17.1	17.85
S96T005255	163:7	Liquid	19.3	20.2	19.75
S96T005257	163:8	Liquid	17.7	18.4	18.05
S96T005258	163:9	Liquid	19.6	17.9	18.75
S96T005528	163:10	Liquid	17	17.4	17.2
S96T005739	163:11	Liquid	17.2	16.9	17.05
S96T005766	163:12	Liquid	18.3	19	18.65
S96T005741	163:14	Liquid	18.1	18.6	18.35
S96T004774	164:1	Liquid	<12	<12	<12[QC:c]
S96T004778	164:2	Liquid	<12	<12	<12
S96T004779	164:3	Liquid	<12	<12	<12
S96T004780	164:4	Liquid	18.5	18.8	18.65
S96T004976	164:5	Liquid	19.8	18.7	19.25
S96T004781	164:7	Liquid	18	18.9	18.45
S96T004977	164:8	Liquid	20.8	17.3	19.05
S96T004978	164:9	Liquid	20	17.3	18.65
S96T004979	164:10	Liquid	18.6	18.2	18.4
S96T004782	164:11	Liquid	18	19.5	18.75
S96T004783	164:12	Liquid	19.2	20.4	19.8
S96T004784	164:13	Liquid	17.9	18.8	18.35
S96T005979	Core 164	Composite	<12	<12	<12

Table B2-35. Tank 241-AN-104 Analytical Results: Sodium (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005287	163:1	Lower half	1.910E+05	1.920E+05	1.915E+05[QC:d]
S96T005288	163:2	Lower half	1.960E+05	1.970E+05	1.965E+05[QC:d]
S96T005782	163:12	Lower half	1.730E+05	1.680E+05	1.705E+05
S96T005749	163:14	Upper half	1.900E+05	1.840E+05	1.870E+05
S96T005750		Lower half	1.830E+05	1.800E+05	1.815E+05
S96T005294	163:16	Upper half	1.930E+05	1.850E+05	1.890E+05
S96T005289		Lower half	1.910E+05	1.830E+05	1.870E+05[QC:d]
S96T005778	163:18	Upper half	1.920E+05	1.940E+05	1.930E+05
S96T005783		Lower half	1.960E+05	1.970E+05	1.965E+05
S96T005557	163:20	Upper half	2.020E+05	2.020E+05	2.020E+05
S96T005560		Lower half	2.310E+05	1.830E+05	2.070E+05[QC:c,e]
S96T004797	164:1	Lower half	1.920E+05	1.950E+05	1.935E+05[QC:c]
S96T004798	164:13	Lower half	1.870E+05	1.880E+05	1.875E+05
S96T005042	164:14	Upper half	1.910E+05	1.890E+05	1.900E+05
S96T005040		Lower half	1.880E+05	1.900E+05	1.890E+05
S96T005061	164:15	Upper half	1.940E+05	1.980E+05	1.960E+05
S96T005043		Lower half	1.970E+05	1.940E+05	1.955E+05
S96T005062	164:16	Upper half	1.950E+05	2.050E+05	2.000E+05
S96T005044		Lower half	1.990E+05	1.950E+05	1.970E+05
S96T005063	164:17	Upper half	1.900E+05	1.960E+05	1.930E+05
S96T005041		Lower half	1.990E+05	1.940E+05	1.965E+05[QC:d]
S96T005064	164:19	Upper half	1.960E+05	2.080E+05	2.020E+05
S96T005045		Lower half	1.870E+05	1.960E+05	1.915E+05
S96T005282	164:20	Upper half	1.900E+05	1.850E+05	1.875E+05
S96T005279		Lower half	2.130E+05	1.920E+05	2.025E+05[QC:d]
S96T005976	Core 164	Composite	1.950E+05	1.880E+05	1.915E+05

Table B2-35. Tank 241-AN-104 Analytical Results: Sodium (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion			µg/g	µg/g	µg/g
S96T005284	163:1	Lower half	2.310E+05	2.390E+05	2.350E+05[QC:c]
S96T005285	163:2	Lower half	2.200E+05	2.300E+05	2.250E+05[QC:d]
S96T005780	163:12	Lower half	2.180E+05	2.180E+05	2.180E+05
S96T005747	163:14	Upper half	2.240E+05	2.330E+05	2.285E+05
S96T005748		Lower half	2.200E+05	2.150E+05	2.175E+05
S96T005293	163:16	Upper half	2.320E+05	2.380E+05	2.350E+05
S96T005286		Lower half	2.380E+05	2.210E+05	2.295E+05
S96T005777	163:18	Upper half	3.140E+05	2.760E+05	2.950E+05
S96T005781		Lower half	3.180E+05	3.120E+05	3.150E+05[QC:c]
S96T005556	163:20	Upper half	2.560E+05	2.430E+05	2.495E+05
S96T005559		Lower half	2.410E+05	2.480E+05	2.445E+05
S96T004795	164:1	Lower half	2.480E+05	2.400E+05	2.440E+05
S96T004796	164:13	Lower half	2.320E+05	2.270E+05	2.295E+05[QC:c]
S96T005035	164:14	Upper half	2.380E+05	2.380E+05	2.380E+05
S96T005030		Lower half	2.340E+05	2.330E+05	2.335E+05
S96T005036	164:15	Upper half	2.390E+05	2.320E+05	2.355E+05
S96T005032		Lower half	2.400E+05	2.240E+05	2.320E+05[QC:d]
S96T005037	164:16	Upper half	2.140E+05	2.180E+05	2.160E+05
S96T005033		Lower half	2.290E+05	2.370E+05	2.330E+05
S96T005038	164:17	Upper half	2.080E+05	2.100E+05	2.090E+05
S96T005031		Lower half	2.180E+05	2.300E+05	2.240E+05
S96T005039	164:19	Upper half	2.090E+05	2.200E+05	2.145E+05
S96T005034		Lower half	2.050E+05	2.180E+05	2.115E+05
S96T005281	164:20	Upper half	2.450E+05	2.420E+05	2.435E+05
S96T005278		Lower half	2.490E+05	2.530E+05	2.510E+05[QC:c]

Table B2-35. Tank 241-AN-104 Analytical Results: Sodium (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			μg/mL	μg/mL	μg/mL
S96T005256	163:2	Liquid	2.480E+05	2.680E+05	2.580E+05
S96T005260	163:4	Liquid	2.710E+05	2.520E+05	2.615E+05[QC:c]
S96T005527	163:5	Liquid	2.510E+05	2.480E+05	2.495E+05[QC:c]
S96T005554	163:6	Liquid	2.560E+05	2.530E+05	2.545E+05
S96T005255	163:7	Liquid	2.730E+05	2.890E+05	2.810E+05[QC:d]
S96T005257	163:8	Liquid	2.470E+05	2.520E+05	2.495E+05
S96T005258	163:9	Liquid	2.710E+05	2.550E+05	2.630E+05
S96T005528	163:10	Liquid	2.430E+05	2.450E+05	2.440E+05
S96T005739	163:11	Liquid	2.460E+05	2.450E+05	2.455E+05
S96T005766	163:12	Liquid	2.630E+05	2.600E+05	2.615E+05
S96T005741	163:14	Liquid	2.470E+05	2.460E+05	2.465E+05
S96T004774	164:1	Liquid	2.540E+05	2.610E+05	2.575E+05[QC:d]
S96T004778	164:2	Liquid	2.290E+05	2.710E+05	2.500E+05
S96T004779	164:3	Liquid	2.580E+05	2.560E+05	2.570E+05
S96T004780	164:4	Liquid	2.490E+05	2.580E+05	2.535E+05[QC:d]
S96T004976	164:5	Liquid	2.650E+05	2.520E+05	2.585E+05[QC:c]
S96T004781	164:7	Liquid	2.440E+05	2.510E+05	2.475E+05[QC:d]
S96T004977	164:8	Liquid	2.880E+05	2.440E+05	2.660E+05[QC:c]
S96T004978	164:9	Liquid	2.810E+05	2.360E+05	2.585E+05
S96T004979	164:10	Liquid	2.570E+05	2.470E+05	2.520E+05
S96T004782	164:11	Liquid	2.430E+05	2.570E+05	2.500E+05[QC:d]
S96T004783	164:12	Liquid	2.580E+05	2.820E+05	2.700E+05[QC:c]
S96T004784	164:13	Liquid	2.410E+05	2.540E+05	2.475E+05[QC:d]
S96T005979	Core 164	Composite	2.670E+05	2.550E+05	2.610E+05[QC:c]

Table B2-36. Tank 241-AN-104 Analytical Results: Strontium (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005287	163:1	Lower half	<3.79	<3.93	<3.86
S96T005288	163:2	Lower half	<4.43	<3.75	<4.09
S96T005782	163:12	Lower half	<4.57	<4.61	<4.59
S96T005749	163:14	Upper half	<4.48	<4.36	<4.42
S96T005750		Lower half	<4.59	<4.52	<4.555
S96T005294	163:16	Upper half	<4.13	<3.7	<3.915
S96T005289		Lower half	<4.64	<4.26	<4.45
S96T005778	163:18	Upper half	<4.81	<4.54	<4.675
S96T005783		Lower half	<4.74	<4.72	<4.73
S96T005557	163:20	Upper half	<3.8	<4.01	<3.905
S96T005560		Lower half	<4.42	<3.73	<4.075
S96T004797	164:1	Lower half	<4.69	<4.71	<4.7
S96T004798	164:13	Lower half	<4.84	<4.77	<4.805
S96T005042	164:14	Upper half	<4.74	<4.8	<4.77
S96T005040		Lower half	<4.77	<4.7	<4.735
S96T005061	164:15	Upper half	<4.83	<4.8	<4.815
S96T005043		Lower half	<4.64	<4.77	<4.705
S96T005062	164:16	Upper half	<15.1	<14.9	<15
S96T005044		Lower half	<14.7	<15	<14.85
S96T005063	164:17	Upper half	<13.9	<14.3	<14.1
S96T005041		Lower half	<15.2	<15.1	<15.15
S96T005064	164:19	Upper half	<15.1	<15.3	<15.2
S96T005045		Lower half	<14.5	<14.4	<14.45
S96T005282	164:20	Upper half	<3.93	<3.61	<3.77
S96T005279		Lower half	<4.54	<3.78	<4.16
S96T005976	Core 164	Composite	<3.98	<3.98	<3.98[QC:a]

Table B2-36. Tank 241-AN-104 Analytical Results: Strontium (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion			µg/g	µg/g	µg/g
S96T005284	163:1	Lower half	<187	<187	<187
S96T005285	163:2	Lower half	<179	<191	<185
S96T005780	163:12	Lower half	<188	<190	<189
S96T005747	163:14	Upper half	<224	<225	<224.5
S96T005748		Lower half	<187	<193	<190
S96T005293	163:16	Upper half	<177	<190	<183.5
S96T005286		Lower half	<199	<183	<191
S96T005777	163:18	Upper half	<205	<198	<201.5
S96T005781		Lower half	<213	<214	<213.5
S96T005556	163:20	Upper half	<185	<194	<189.5
S96T005559		Lower half	<195	<195	<195
S96T004795	164:1	Lower half	<204	<201	<202.5
S96T004796	164:13	Lower half	<206	<207	<206.5
S96T005035	164:14	Upper half	<204	<206	<205
S96T005030		Lower half	<205	<204	<204.5
S96T005036	164:15	Upper half	<201	<197	<199
S96T005032		Lower half	<197	<200	<198.5
S96T005037	164:16	Upper half	<192	<183	<187.5
S96T005033		Lower half	<191	<187	<189
S96T005038	164:17	Upper half	<193	<190	<191.5
S96T005031		Lower half	<218	<217	<217.5
S96T005039	164:19	Upper half	<194	<200	<197
S96T005034		Lower half	<214	<217	<215.5
S96T005281	164:20	Upper half	<172	<185	<178.5
S96T005278		Lower half	<189	<193	<191

Table B2-36. Tank 241-AN-104 Analytical Results: Strontium (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
S96T005256	163:2	Liquid	<6.01	<6.01	<6.01
S96T005260	163:4	Liquid	<6.01	<6.01	<6.01
S96T005527	163:5	Liquid	<6.01	<6.01	<6.01
S96T005554	163:6	Liquid	<6.01	<6.01	<6.01
S96T005255	163:7	Liquid	<6.01	<6.01	<6.01
S96T005257	163:8	Liquid	<6.01	<6.01	<6.01
S96T005258	163:9	Liquid	<6.01	<6.01	<6.01
S96T005528	163:10	Liquid	<6.01	<6.01	<6.01
S96T005739	163:11	Liquid	<6.01	<6.01	<6.01
S96T005766	163:12	Liquid	<6.01	<6.01	<6.01
S96T005741	163:14	Liquid	<6.01	<6.01	<6.01
S96T004774	164:1	Liquid	<12	<12	<12
S96T004778	164:2	Liquid	<12	<12	<12
S96T004779	164:3	Liquid	<12	<12	<12
S96T004780	164:4	Liquid	<6.01	<6.01	<6.01
S96T004976	164:5	Liquid	<6.01	<6.01	<6.01
S96T004781	164:7	Liquid	<6.01	<6.01	<6.01
S96T004977	164:8	Liquid	<6.01	<6.01	<6.01
S96T004978	164:9	Liquid	<6.01	<6.01	<6.01
S96T004979	164:10	Liquid	<6.01	<6.01	<6.01
S96T004782	164:11	Liquid	<6.01	<6.01	<6.01
S96T004783	164:12	Liquid	<6.01	<6.01	<6.01
S96T004784	164:13	Liquid	<6.01	<6.01	<6.01
S96T005979	Core 164	Composite	<12	<12	<12

Table B2-37. Tank 241-AN-104 Analytical Results: Sulfur (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005287	163:1	Lower half	3,510	3,420	3,465
S96T005288	163:2	Lower half	1,870	1,940	1,905[QC:d]
S96T005782	163:12	Lower half	2,550	2,470	2,510
S96T005749	163:14	Upper half	2,990	3,030	3,010
S96T005750		Lower half	3,340	3,310	3,325
S96T005294	163:16	Upper half	4,910	4,090	4,500
S96T005289		Lower half	4,550	3,840	4,195
S96T005778	163:18	Upper half	5,430	5,490	5,460
S96T005783		Lower half	5,590	5,570	5,580
S96T005557	163:20	Upper half	5,160	5,030	5,095
S96T005560		Lower half	4,330	3,520	3,925[QC:c,e]
S96T004797	164:1	Lower half	2,500	2,530	2,515
S96T004798	164:13	Lower half	2,780	2,860	2,820
S96T005042	164:14	Upper half	3,260	3,270	3,265
S96T005040		Lower half	3,210	3,160	3,185
S96T005061	164:15	Upper half	3,390	3,460	3,425
S96T005043		Lower half	3,970	3,780	3,875
S96T005062	164:16	Upper half	3,270	3,670	3,470
S96T005044		Lower half	3,620	3,600	3,610
S96T005063	164:17	Upper half	3,390	3,520	3,455
S96T005041		Lower half	4,050	4,080	4,065
S96T005064	164:19	Upper half	4,100	4,360	4,230
S96T005045		Lower half	3,520	4,020	3,770
S96T005282	164:20	Upper half	4,150	3,730	3,940
S96T005279		Lower half	5,550	3,950	4,750[QC:d,e]
S96T005976	Core 164	Composite	4,220	3,740	3,980

Table B2-37. Tank 241-AN-104 Analytical Results: Sulfur (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion			µg/g	µg/g	µg/g
S96T005284	163:1	Lower half	4,500	4,000	4,250
S96T005285	163:2	Lower half	<1,790	<1,910	<1,850
S96T005780	163:12	Lower half	2,760	2,820	2,790
S96T005747	163:14	Upper half	3,400	3,100	3,250
S96T005748		Lower half	3,920	3,370	3,645
S96T005293	163:16	Upper half	5,010	5,010	5,010
S96T005286		Lower half	4,180	4,390	4,285
S96T005777	163:18	Upper half	7,840	6,450	7,145
S96T005781		Lower half	6,880	7,310	7,095
S96T005556	163:20	Upper half	5,560	5,470	5,515
S96T005559		Lower half	3,970	5,520	4,745[QC:c]
S96T004795	164:1	Lower half	3,480	3,140	3,310
S96T004796	164:13	Lower half	2,720	3,120	2,920
S96T005035	164:14	Upper half	2,690	2,750	2,720
S96T005030		Lower half	3,300	3,410	3,355
S96T005036	164:15	Upper half	3,580	3,460	3,520
S96T005032		Lower half	3,910	4,030	3,970
S96T005037	164:16	Upper half	3,400	3,360	3,380
S96T005033		Lower half	3,580	3,550	3,565
S96T005038	164:17	Upper half	2,790	3,360	3,075
S96T005031		Lower half	4,070	4,100	4,085
S96T005039	164:19	Upper half	4,070	3,800	3,935
S96T005034		Lower half	3,430	3,630	3,530
S96T005281	164:20	Upper half	5,110	3,760	4,435[QC:c]
S96T005278		Lower half	5,700	5,600	5,650

Table B2-37. Tank 241-AN-104 Analytical Results: Sulfur (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
S96T005256	163:2	Liquid	1,210	1,310	1,260
S96T005260	163:4	Liquid	1,200	1,120	1,160
S96T005527	163:5	Liquid	1,120	1,080	1,100
S96T005554	163:6	Liquid	1,140	1,140	1,140
S96T005255	163:7	Liquid	1,220	1,280	1,250
S96T005257	163:8	Liquid	1,110	1,130	1,120
S96T005258	163:9	Liquid	1,180	1,130	1,155
S96T005528	163:10	Liquid	1,050	1,090	1,070
S96T005739	163:11	Liquid	1,120	1,120	1,120
S96T005766	163:12	Liquid	1,390	1,380	1,385
S96T005741	163:14	Liquid	1,470	1,440	1,455
S96T004774	164:1	Liquid	1,200	1,220	1,210
S96T004778	164:2	Liquid	1,010	1,160	1,085
S96T004779	164:3	Liquid	1,160	1,130	1,145
S96T004780	164:4	Liquid	1,100	1,110	1,105
S96T004976	164:5	Liquid	1,210	1,140	1,175
S96T004781	164:7	Liquid	1,100	1,170	1,135
S96T004977	164:8	Liquid	1,310	1,100	1,205
S96T004978	164:9	Liquid	1,210	1,040	1,125
S96T004979	164:10	Liquid	1,140	1,100	1,120
S96T004782	164:11	Liquid	1,110	1,160	1,135
S96T004783	164:12	Liquid	1,140	1,290	1,215
S96T004784	164:13	Liquid	1,150	1,220	1,185[QC:d]
S96T005979	Core 164	Composite	1,220	1,180	1,200

Table B2-38. Tank 241-AN-104 Analytical Results: Thallium (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005287	163:1	Lower half	<75.7	<78.6	<77.15
S96T005288	163:2	Lower half	<88.7	<74.9	<81.8
S96T005782	163:12	Lower half	<91.4	<92.2	<91.8
S96T005749	163:14	Upper half	<89.5	<87.2	<88.35
S96T005750		Lower half	<91.8	<90.4	<91.1
S96T005294	163:16	Upper half	<82.5	<74	<78.25
S96T005289		Lower half	<92.9	<85.2	<89.05
S96T005778	163:18	Upper half	<96.2	<90.9	<93.55
S96T005783		Lower half	<94.8	<94.5	<94.65
S96T005557	163:20	Upper half	<75.9	<80.2	<78.05
S96T005560		Lower half	<88.5	<74.6	<81.55
S96T004797	164:1	Lower half	<93.8	<94.2	<94
S96T004798	164:13	Lower half	<96.8	<95.3	<96.05
S96T005042	164:14	Upper half	<94.9	<95.9	<95.4
S96T005040		Lower half	<95.5	<94	<94.75
S96T005061	164:15	Upper half	<96.6	<96	<96.3
S96T005043		Lower half	<92.8	<95.5	<94.15
S96T005062	164:16	Upper half	<301	<299	<300
S96T005044		Lower half	<295	<300	<297.5
S96T005063	164:17	Upper half	<279	<286	<282.5
S96T005041		Lower half	<305	<302	<303.5
S96T005064	164:19	Upper half	<303	<307	<305
S96T005045		Lower half	<290	<288	<289
S96T005282	164:20	Upper half	<78.6	<72.1	<75.35
S96T005279		Lower half	<90.7	<75.5	<83.1
S96T005976	Core 164	Composite	<79.5	<79.6	<79.55[QC:a]

Table B2-38. Tank 241-AN-104 Analytical Results: Thallium (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion			µg/g	µg/g	µg/g
S96T005284	163:1	Lower half	<3,750	<3,740	<3,745
S96T005285	163:2	Lower half	<3,580	<3,820	<3,700
S96T005780	163:12	Lower half	<3,760	<3,800	<3,780
S96T005747	163:14	Upper half	<4,480	<4,510	<4,495
S96T005748		Lower half	<3,730	<3,850	<3,790
S96T005293	163:16	Upper half	<3,550	<3,800	<3,675
S96T005286		Lower half	<3,970	<3,670	<3,820
S96T005777	163:18	Upper half	<4,100	<3,970	<4,035
S96T005781		Lower half	<4,260	<4,280	<4,270
S96T005556	163:20	Upper half	<3,700	<3,870	<3,785
S96T005559		Lower half	<3,910	<3,890	<3,900
S96T004795	164:1	Lower half	<4,090	<4,020	<4,055
S96T004796	164:13	Lower half	<4,120	<4,150	<4,135
S96T005035	164:14	Upper half	<4,080	<4,120	<4,100
S96T005030		Lower half	<4,100	<4,070	<4,085
S96T005036	164:15	Upper half	<4,020	<3,930	<3,975
S96T005032		Lower half	<3,950	<4,010	<3,980
S96T005037	164:16	Upper half	<3,840	<3,660	<3,750
S96T005033		Lower half	<3,830	<3,730	<3,780
S96T005038	164:17	Upper half	<3,860	<3,790	<3,825
S96T005031		Lower half	<4,370	<4,340	<4,355
S96T005039	164:19	Upper half	<3,890	<4,000	<3,945
S96T005034		Lower half	<4,270	<4,350	<4,310
S96T005281	164:20	Upper half	<3,440	<3,700	<3,570
S96T005278		Lower half	<3,770	<3,870	<3,820

Table B2-38. Tank 241-AN-104 Analytical Results: Thallium (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
S96T005256	163:2	Liquid	<120	<120	<120
S96T005260	163:4	Liquid	<120	<120	<120
S96T005527	163:5	Liquid	<120	<120	<120
S96T005554	163:6	Liquid	<120	<120	<120
S96T005255	163:7	Liquid	<120	<120	<120
S96T005257	163:8	Liquid	<120	<120	<120
S96T005258	163:9	Liquid	<120	<120	<120
S96T005528	163:10	Liquid	<120	<120	<120
S96T005739	163:11	Liquid	<120	<120	<120
S96T005766	163:12	Liquid	<120	<120	<120
S96T005741	163:14	Liquid	<120	<120	<120
S96T004774	164:1	Liquid	<240	<240	<240
S96T004778	164:2	Liquid	<240	<240	<240
S96T004779	164:3	Liquid	<240	<240	<240
S96T004780	164:4	Liquid	<120	<120	<120
S96T004976	164:5	Liquid	<120	<120	<120
S96T004781	164:7	Liquid	<120	<120	<120
S96T004977	164:8	Liquid	<120	<120	<120
S96T004978	164:9	Liquid	<120	<120	<120
S96T004979	164:10	Liquid	<120	<120	<120
S96T004782	164:11	Liquid	<120	<120	<120
S96T004783	164:12	Liquid	<120	<120	<120
S96T004784	164:13	Liquid	<120	<120	<120
S96T005979	Core 164	Composite	<240	<240	<240

Table B2-39. Tank 241-AN-104 Analytical Results: Titanium (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005287	163:1	Lower half	<3.79	<3.93	<3.86
S96T005288	163:2	Lower half	<4.43	<3.75	<4.09
S96T005782	163:12	Lower half	<4.57	<4.61	<4.59[QC:a]
S96T005749	163:14	Upper half	<4.48	<4.36	<4.42[QC:a]
S96T005750		Lower half	<4.59	<4.52	<4.555[QC:a]
S96T005294	163:16	Upper half	<4.13	<3.7	<3.915
S96T005289		Lower half	<4.64	<4.26	<4.45
S96T005778	163:18	Upper half	<4.81	<4.54	<4.675[QC:a]
S96T005783		Lower half	<4.74	<4.72	<4.73[QC:a]
S96T005557	163:20	Upper half	<3.8	<4.01	<3.905
S96T005560		Lower half	<4.42	<3.73	<4.075
S96T004797	164:1	Lower half	<4.69	<4.71	<4.7
S96T004798	164:13	Lower half	<4.84	<4.77	<4.805
S96T005042	164:14	Upper half	<4.74	<4.8	<4.77
S96T005040		Lower half	<4.77	<4.7	<4.735
S96T005061	164:15	Upper half	<4.83	<4.8	<4.815
S96T005043		Lower half	<4.64	<4.77	<4.705
S96T005062	164:16	Upper half	<15.1	<14.9	<15
S96T005044		Lower half	<14.7	<15	<14.85
S96T005063	164:17	Upper half	<13.9	<14.3	<14.1
S96T005041		Lower half	<15.2	<15.1	<15.15
S96T005064	164:19	Upper half	<15.1	<15.3	<15.2
S96T005045		Lower half	<14.5	<14.4	<14.45
S96T005282	164:20	Upper half	<3.93	<3.61	<3.77
S96T005279		Lower half	<4.54	<3.78	<4.16
S96T005976	Core 164	Composite	<3.98	<3.98	<3.98[QC:a]

Table B2-39. Tank 241-AN-104 Analytical Results: Titanium (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion			µg/g	µg/g	µg/g
S96T005284	163:1	Lower half	<187	<187	<187
S96T005285	163:2	Lower half	<179	<191	<185
S96T005780	163:12	Lower half	<188	<190	<189
S96T005747	163:14	Upper half	<224	<225	<224.5
S96T005748		Lower half	<187	<193	<190
S96T005293	163:16	Upper half	<177	<190	<183.5
S96T005286		Lower half	<199	<183	<191
S96T005777	163:18	Upper half	<205	<198	<201.5
S96T005781		Lower half	<213	<214	<213.5
S96T005556	163:20	Upper half	<185	<194	<189.5
S96T005559		Lower half	<195	<195	<195
S96T004795	164:1	Lower half	<204	<201	<202.5
S96T004796	164:13	Lower half	<206	<207	<206.5
S96T005035	164:14	Upper half	<204	<206	<205
S96T005030		Lower half	<205	<204	<204.5
S96T005036	164:15	Upper half	<201	<197	<199
S96T005032		Lower half	<197	<200	<198.5
S96T005037	164:16	Upper half	<192	<183	<187.5
S96T005033		Lower half	<191	<187	<189
S96T005038	164:17	Upper half	<193	<190	<191.5
S96T005031		Lower half	<218	<217	<217.5
S96T005039	164:19	Upper half	<194	<200	<197
S96T005034		Lower half	<214	<217	<215.5
S96T005281	164:20	Upper half	<172	<185	<178.5
S96T005278		Lower half	<189	<193	<191

Table B2-39. Tank 241-AN-104 Analytical Results: Titanium (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
S96T005256	163:2	Liquid	<6.01	<6.01	<6.01
S96T005260	163:4	Liquid	<6.01	<6.01	<6.01
S96T005527	163:5	Liquid	<6.01	<6.01	<6.01
S96T005554	163:6	Liquid	<6.01	<6.01	<6.01
S96T005255	163:7	Liquid	<6.01	<6.01	<6.01
S96T005257	163:8	Liquid	<6.01	<6.01	<6.01
S96T005258	163:9	Liquid	<6.01	<6.01	<6.01
S96T005528	163:10	Liquid	<6.01	<6.01	<6.01
S96T005739	163:11	Liquid	<6.01	<6.01	<6.01
S96T005766	163:12	Liquid	<6.01	<6.01	<6.01
S96T005741	163:14	Liquid	<6.01	<6.01	<6.01
S96T004774	164:1	Liquid	<12	<12	<12
S96T004778	164:2	Liquid	<12	<12	<12
S96T004779	164:3	Liquid	<12	<12	<12
S96T004780	164:4	Liquid	<6.01	<6.01	<6.01
S96T004976	164:5	Liquid	<6.01	<6.01	<6.01
S96T004781	164:7	Liquid	<6.01	<6.01	<6.01
S96T004977	164:8	Liquid	<6.01	<6.01	<6.01
S96T004978	164:9	Liquid	<6.01	<6.01	<6.01
S96T004979	164:10	Liquid	<6.01	<6.01	<6.01
S96T004782	164:11	Liquid	<6.01	<6.01	<6.01
S96T004783	164:12	Liquid	<6.01	<6.01	<6.01
S96T004784	164:13	Liquid	<6.01	<6.01	<6.01
S96T005979	Core 164	Composite	<12	<12	<12

Table B2-40. Tank 241-AN-104 Analytical Results: Total Uranium (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005287	163:1	Lower half	<189	<196	<192.5
S96T005288	163:2	Lower half	<222	<187	<204.5
S96T005782	163:12	Lower half	<228	<230	<229
S96T005749	163:14	Upper half	<224	<218	<221
S96T005750		Lower half	<230	<226	<228
S96T005294	163:16	Upper half	230	196	213
S96T005289		Lower half	<232	<213	<222.5
S96T005778	163:18	Upper half	264	282	273
S96T005783		Lower half	268	269	268.5
S96T005557	163:20	Upper half	237	235	236
S96T005560		Lower half	353	283	318[QC:e]
S96T004797	164:1	Lower half	<234	<235	<234.5
S96T004798	164:13	Lower half	<242	<238	<240
S96T005042	164:14	Upper half	<237	<240	<238.5
S96T005040		Lower half	<239	<235	<237
S96T005061	164:15	Upper half	<242	<240	<241
S96T005043		Lower half	<232	<239	<235.5
S96T005062	164:16	Upper half	<753	<747	<750
S96T005044		Lower half	<737	<750	<743.5
S96T005063	164:17	Upper half	<697	<714	<705.5
S96T005041		Lower half	<762	<756	<759
S96T005064	164:19	Upper half	<756	<767	<761.5
S96T005045		Lower half	<725	<720	<722.5
S96T005282	164:20	Upper half	<197	<180	<188.5
S96T005279		Lower half	<227	<189	<208
S96T005976	Core 164	Composite	<199	<199	<199[QC:a]

Table B2-40. Tank 241-AN-104 Analytical Results: Total Uranium (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion			μg/g	μg/g	μg/g
S96T005284	163:1	Lower half	<9,370	<9,360	<9,365
S96T005285	163:2	Lower half	<8,940	<9,560	<9,250
S96T005780	163:12	Lower half	<9,400	<9,500	<9,450
S96T005747	163:14	Upper half	<11,200	<11,300	<11,250
S96T005748		Lower half	<9,340	<9,630	<9,485
S96T005293	163:16	Upper half	<8,870	<9,490	<9,180
S96T005286		Lower half	<9,930	<9,170	<9,550
S96T005777	163:18	Upper half	<10,300	<9,920	<10,110
S96T005781		Lower half	<10,600	<10,700	<10,650
S96T005556	163:20	Upper half	<9,240	<9,680	<9,460
S96T005559		Lower half	<9,770	<9,730	<9,750
S96T004795	164:1	Lower half	<10,200	<10,000	<10,100
S96T004796	164:13	Lower half	<10,300	<10,400	<10,350
S96T005035	164:14	Upper half	<10,200	<10,300	<10,250
S96T005030		Lower half	<10,200	<10,200	<10,200
S96T005036	164:15	Upper half	<10,000	<9,830	<9,915
S96T005032		Lower half	<9,870	<10,000	<9,935
S96T005037	164:16	Upper half	<9,610	<9,150	<9,380
S96T005033		Lower half	<9,570	<9,330	<9,450
S96T005038	164:17	Upper half	<9,660	<9,490	<9,575
S96T005031		Lower half	<10,900	<10,800	<10,850
S96T005039	164:19	Upper half	<9,720	<10,000	<9,860
S96T005034		Lower half	<10,700	<10,900	<10,800
S96T005281	164:20	Upper half	<8,600	<9,250	<8,925
S96T005278		Lower half	<9,430	<9,660	<9,545

Table B2-40. Tank 241-AN-104 Analytical Results: Total Uranium (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
S96T005256	163:2	Liquid	<300	<300	<300
S96T005260	163:4	Liquid	<300	<300	<300
S96T005527	163:5	Liquid	<300	<300	<300
S96T005554	163:6	Liquid	<300	<300	<300
S96T005255	163:7	Liquid	<300	<300	<300
S96T005257	163:8	Liquid	<300	<300	<300
S96T005258	163:9	Liquid	<300	<300	<300
S96T005528	163:10	Liquid	<300	<300	<300
S96T005739	163:11	Liquid	<300	<300	<300
S96T005766	163:12	Liquid	<300	<300	<300
S96T005741	163:14	Liquid	<300	<300	<300
S96T004774	164:1	Liquid	<600	<600	<600
S96T004778	164:2	Liquid	<600	<600	<600
S96T004779	164:3	Liquid	<600	<600	<600
S96T004780	164:4	Liquid	<300	<300	<300
S96T004976	164:5	Liquid	<300	<300	<300
S96T004781	164:7	Liquid	<300	<300	<300
S96T004977	164:8	Liquid	<300	<300	<300
S96T004978	164:9	Liquid	<300	<300	<300
S96T004979	164:10	Liquid	<300	<300	<300
S96T004782	164:11	Liquid	<300	<300	<300
S96T004783	164:12	Liquid	<300	<300	<300
S96T004784	164:13	Liquid	<300	<300	<300
S96T005979	Core 164	Composite	<600	<600	<600

Table B2-41. Tank 241-AN-104 Analytical Results: Vanadium (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005287	163:1	Lower half	<18.9	<19.6	<19.25
S96T005288	163:2	Lower half	<22.2	<18.7	<20.45
S96T005782	163:12	Lower half	<22.8	<23	<22.9
S96T005749	163:14	Upper half	<22.4	<21.8	<22.1
S96T005750		Lower half	<23	<22.6	<22.8
S96T005294	163:16	Upper half	<20.6	<18.5	<19.55
S96T005289		Lower half	<23.2	<21.3	<22.25
S96T005778	163:18	Upper half	<24.1	<22.7	<23.4
S96T005783		Lower half	<23.7	<23.6	<23.65
S96T005557	163:20	Upper half	<19	<20.1	<19.55
S96T005560		Lower half	<22.1	<18.7	<20.4
S96T004797	164:1	Lower half	<23.4	<23.5	<23.45
S96T004798	164:13	Lower half	<24.2	<23.8	<24
S96T005042	164:14	Upper half	<23.7	<24	<23.85
S96T005040		Lower half	<23.9	<23.5	<23.7
S96T005061	164:15	Upper half	<24.2	<24	<24.1
S96T005043		Lower half	<23.2	<23.9	<23.55
S96T005062	164:16	Upper half	<75.3	<74.7	<75
S96T005044		Lower half	<73.7	<75	<74.35
S96T005063	164:17	Upper half	<69.7	<71.4	<70.55
S96T005041		Lower half	<76.2	<75.6	<75.9
S96T005064	164:19	Upper half	<75.6	<76.7	<76.15
S96T005045		Lower half	<72.5	<72	<72.25
S96T005282	164:20	Upper half	<19.7	<18	<18.85
S96T005279		Lower half	<22.7	<18.9	<20.8
S96T005976	Core 164	Composite	<19.9	<19.9	<19.9[QC:a]

Table B2-41. Tank 241-AN-104 Analytical Results: Vanadium (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion			µg/g	µg/g	µg/g
S96T005284	163:1	Lower half	<937	<936	<936.5
S96T005285	163:2	Lower half	<894	<956	<925
S96T005780	163:12	Lower half	<940	<950	<945
S96T005747	163:14	Upper half	<1,120	<1,130	<1,125
S96T005748		Lower half	<934	<963	<948.5
S96T005293	163:16	Upper half	<887	<949	<918
S96T005286		Lower half	<993	<917	<955
S96T005777	163:18	Upper half	<1,030	<992	<1,011
S96T005781		Lower half	<1,060	<1,070	<1,065
S96T005556	163:20	Upper half	<924	<968	<946
S96T005559		Lower half	<977	<973	<975
S96T004795	164:1	Lower half	<1,020	<1,000	<1,010
S96T004796	164:13	Lower half	<1,030	<1,040	<1,035
S96T005035	164:14	Upper half	<1,020	<1,030	<1,025
S96T005030		Lower half	<1,020	<1,020	<1,020
S96T005036	164:15	Upper half	<1,000	<983	<991.5
S96T005032		Lower half	<987	<1,000	<993.5
S96T005037	164:16	Upper half	<961	<915	<938
S96T005033		Lower half	<957	<933	<945
S96T005038	164:17	Upper half	<966	<949	<957.5
S96T005031		Lower half	<1,090	<1,080	<1,085
S96T005039	164:19	Upper half	<972	<1,000	<986
S96T005034		Lower half	<1,070	<1,090	<1,080
S96T005281	164:20	Upper half	<860	<925	<892.5
S96T005278		Lower half	<943	<966	<954.5

Table B2-41. Tank 241-AN-104 Analytical Results: Vanadium (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			μg/mL	μg/mL	μg/mL
S96T005256	163:2	Liquid	<30.1	<30.1	<30.1
S96T005260	163:4	Liquid	<30.1	<30.1	<30.1
S96T005527	163:5	Liquid	<30.1	<30.1	<30.1
S96T005554	163:6	Liquid	<30.1	<30.1	<30.1
S96T005255	163:7	Liquid	<30.1	<30.1	<30.1
S96T005257	163:8	Liquid	<30.1	<30.1	<30.1
S96T005258	163:9	Liquid	<30.1	<30.1	<30.1
S96T005528	163:10	Liquid	<30.1	<30.1	<30.1
S96T005739	163:11	Liquid	<30.1	<30.1	<30.1
S96T005766	163:12	Liquid	<30.1	<30.1	<30.1
S96T005741	163:14	Liquid	<30.1	<30.1	<30.1
S96T004774	164:1	Liquid	<60.1	<60.1	<60.1
S96T004778	164:2	Liquid	<60.1	<60.1	<60.1
S96T004779	164:3	Liquid	<60.1	<60.1	<60.1
S96T004780	164:4	Liquid	<30.1	<30.1	<30.1
S96T004976	164:5	Liquid	<30.1	<30.1	<30.1
S96T004781	164:7	Liquid	<30.1	<30.1	<30.1
S96T004977	164:8	Liquid	<30.1	<30.1	<30.1
S96T004978	164:9	Liquid	<30.1	<30.1	<30.1
S96T004979	164:10	Liquid	<30.1	<30.1	<30.1
S96T004782	164:11	Liquid	<30.1	<30.1	<30.1
S96T004783	164:12	Liquid	<30.1	<30.1	<30.1
S96T004784	164:13	Liquid	<30.1	<30.1	<30.1
S96T005979	Core 164	Composite	<60.1	<60.1	<60.1

Table B2-42. Tank 241-AN-104 Analytical Results: Zinc (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005287	163:1	Lower half	26.2	25.2	25.7
S96T005288	163:2	Lower half	26.8	15.7	21.25[QC:c]
S96T005782	163:12	Lower half	10.2	9.99	10.095
S96T005749	163:14	Upper half	9.61	9.6	9.605
S96T005750		Lower half	7.68	8.11	7.895
S96T005294	163:16	Upper half	17.8	16.5	17.15
S96T005289		Lower half	16.9	14.5	15.7
S96T005778	163:18	Upper half	8.5	9.96	9.23
S96T005783		Lower half	8.51	8.53	8.52
S96T005557	163:20	Upper half	24.1	25.8	24.95
S96T005560		Lower half	27.2	22.8	25
S96T004797	164:1	Lower half	29.5	29.5	29.5
S96T004798	164:13	Lower half	66	39	52.5[QC:c]
S96T005042	164:14	Upper half	37	32.1	34.55
S96T005040		Lower half	29.4	21.1	25.25[QC:c]
S96T005061	164:15	Upper half	17.9	33.1	25.5[QC:c]
S96T005043		Lower half	22.1	30.7	26.4[QC:c]
S96T005062	164:16	Upper half	<15.1	<14.9	<15
S96T005044		Lower half	36.4	<15	<25.7[QC:c]
S96T005063	164:17	Upper half	14.4	14.4	14.4
S96T005041		Lower half	31.6	17.7	24.65[QC:c]
S96T005064	164:19	Upper half	23.5	24	23.75
S96T005045		Lower half	21	20	20.5
S96T005282	164:20	Upper half	18.8	15.8	17.3
S96T005279		Lower half	12.9	11.5	12.2
S96T005976	Core 164	Composite	19.2	14.4	16.8[QC:a,c]

Table B2-42. Tank 241-AN-104 Analytical Results: Zinc (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion			μg/g	μg/g	μg/g
S96T005284	163:1	Lower half	466	<187	<326.5[QC:e]
S96T005285	163:2	Lower half	<179	<191	<185
S96T005780	163:12	Lower half	<188	<190	<189
S96T005747	163:14	Upper half	<224	<225	<224.5
S96T005748		Lower half	<187	<193	<190
S96T005293	163:16	Upper half	253	<190	<221.5[QC:e]
S96T005286		Lower half	<199	<183	<191
S96T005777	163:18	Upper half	<205	445	<325[QC:e]
S96T005781		Lower half	<213	262	<237.5[QC:e]
S96T005556	163:20	Upper half	<185	<194	<189.5
S96T005559		Lower half	<195	<195	<195
S96T004795	164:1	Lower half	<204	<201	<202.5
S96T004796	164:13	Lower half	<206	<207	<206.5
S96T005035	164:14	Upper half	<204	<206	<205
S96T005030		Lower half	<205	<204	<204.5
S96T005036	164:15	Upper half	430	493	461.5
S96T005032		Lower half	316	429	372.5[QC:e]
S96T005037	164:16	Upper half	238	635	436.5[QC:e]
S96T005033		Lower half	344	<187	<265.5[QC:e]
S96T005038	164:17	Upper half	<193	<190	<191.5
S96T005031		Lower half	<218	<217	<217.5
S96T005039	164:19	Upper half	<194	<200	<197
S96T005034		Lower half	<214	<217	<215.5
S96T005281	164:20	Upper half	<172	<185	<178.5
S96T005278		Lower half	196	<193	<194.5

Table B2-42. Tank 241-AN-104 Analytical Results: Zinc (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			μg/mL	μg/mL	μg/mL
S96T005256	163:2	Liquid	9	9.9	9.45
S96T005260	163:4	Liquid	7.74	7.25	7.495
S96T005527	163:5	Liquid	<6.01	<6.01	<6.01
S96T005554	163:6	Liquid	<6.01	<6.01	<6.01
S96T005255	163:7	Liquid	<6.01	<6.01	<6.01
S96T005257	163:8	Liquid	7.75	8.75	8.25
S96T005258	163:9	Liquid	7.66	7.38	7.52
S96T005528	163:10	Liquid	<6.01	<6.01	<6.01
S96T005739	163:11	Liquid	<6.01	<6.01	<6.01
S96T005766	163:12	Liquid	<6.01	<6.01	<6.01
S96T005741	163:14	Liquid	<6.01	<6.01	<6.01
S96T004774	164:1	Liquid	12.2	14.7	13.45
S96T004778	164:2	Liquid	<12	<12	<12
S96T004779	164:3	Liquid	17.5	15.7	16.6
S96T004780	164:4	Liquid	24.2	26.4	25.3
S96T004976	164:5	Liquid	24.9	22.4	23.65
S96T004781	164:7	Liquid	24.8	25	24.9
S96T004977	164:8	Liquid	24.1	24	24.05
S96T004978	164:9	Liquid	25.7	20	22.85[QC:e]
S96T004979	164:10	Liquid	20.8	21.8	21.3
S96T004782	164:11	Liquid	24	24.8	24.4
S96T004783	164:12	Liquid	22.5	25.4	23.95
S96T004784	164:13	Liquid	27.8	22.6	25.2[QC:e]
S96T005979	Core 164	Composite	<12	<12	<12

Table B2-43. Tank 241-AN-104 Analytical Results: Zirconium (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005287	163:1	Lower half	13.9	13.1	13.5
S96T005288	163:2	Lower half	9.09	9.13	9.11
S96T005782	163:12	Lower half	20.1	17.8	18.95
S96T005749	163:14	Upper half	11.8	11.9	11.85
S96T005750		Lower half	12.9	13.6	13.25
S96T005294	163:16	Upper half	19.5	16.8	18.15
S96T005289		Lower half	19.2	16.4	17.8
S96T005778	163:18	Upper half	20.4	20.7	20.55
S96T005783		Lower half	19.9	19.8	19.85
S96T005557	163:20	Upper half	19.3	19.2	19.25
S96T005560		Lower half	24.2	19.6	21.9[QC:e]
S96T004797	164:1	Lower half	9.94	9.52	9.73
S96T004798	164:13	Lower half	21.7	22.4	22.05
S96T005042	164:14	Upper half	15.5	15.7	15.6
S96T005040		Lower half	12.5	12.5	12.5
S96T005061	164:15	Upper half	13.7	13.9	13.8
S96T005043		Lower half	17.6	16.7	17.15
S96T005062	164:16	Upper half	21.6	<14.9	<18.25[QC:e]
S96T005044		Lower half	17.5	<15	<16.25
S96T005063	164:17	Upper half	<13.9	25	<19.45[QC:e]
S96T005041		Lower half	17.6	21.2	19.4
S96T005064	164:19	Upper half	19.7	23.3	21.5
S96T005045		Lower half	16.5	22.4	19.45[QC:e]
S96T005282	164:20	Upper half	17.3	15.6	16.45
S96T005279		Lower half	18.8	13.7	16.25[QC:e]
S96T005976	Core 164	Composite	17.6	16.1	16.85

Table B2-43. Tank 241-AN-104 Analytical Results: Zirconium (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion			µg/g	µg/g	µg/g
S96T005284	163:1	Lower half	<187	<187	<187
S96T005285	163:2	Lower half	<179	<191	<185
S96T005780	163:12	Lower half	<188	<190	<189
S96T005747	163:14	Upper half	<224	<225	<224.5
S96T005748		Lower half	<187	<193	<190
S96T005293	163:16	Upper half	<177	<190	<183.5
S96T005286		Lower half	<199	<183	<191
S96T005777	163:18	Upper half	<205	<198	<201.5
S96T005781		Lower half	<213	<214	<213.5
S96T005556	163:20	Upper half	<185	<194	<189.5
S96T005559		Lower half	<195	<195	<195
S96T004795	164:1	Lower half	<204	<201	<202.5
S96T004796	164:13	Lower half	<206	<207	<206.5
S96T005035	164:14	Upper half	<204	<206	<205
S96T005030		Lower half	<205	<204	<204.5
S96T005036	164:15	Upper half	<201	<197	<199
S96T005032		Lower half	<197	<200	<198.5
S96T005037	164:16	Upper half	<192	<183	<187.5
S96T005033		Lower half	<191	<187	<189
S96T005038	164:17	Upper half	<193	<190	<191.5
S96T005031		Lower half	<218	<217	<217.5
S96T005039	164:19	Upper half	<194	<200	<197
S96T005034		Lower half	<214	<217	<215.5
S96T005281	164:20	Upper half	<172	<185	<178.5
S96T005278		Lower half	<189	<193	<191

Table B2-43. Tank 241-AN-104 Analytical Results: Zirconium (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
S96T005256	163:2	Liquid	7.98	8.31	8.145
S96T005260	163:4	Liquid	6.78	6.17	6.475
S96T005527	163:5	Liquid	6.93	6.43	6.68
S96T005554	163:6	Liquid	7.53	8.4	7.965
S96T005255	163:7	Liquid	8.01	8.13	8.07
S96T005257	163:8	Liquid	<6.01	<6.01	<6.01
S96T005258	163:9	Liquid	<6.01	<6.01	<6.01
S96T005528	163:10	Liquid	<6.01	<6.01	<6.01
S96T005739	163:11	Liquid	<6.01	<6.01	<6.01
S96T005766	163:12	Liquid	<6.01	<6.01	<6.01
S96T005741	163:14	Liquid	8.73	8.28	8.505
S96T004774	164:1	Liquid	<12	<12	<12
S96T004778	164:2	Liquid	<12	<12	<12
S96T004779	164:3	Liquid	<12	<12	<12
S96T004780	164:4	Liquid	7.51	6.73	7.12
S96T004976	164:5	Liquid	8.72	7.77	8.245
S96T004781	164:7	Liquid	6.49	6.95	6.72
S96T004977	164:8	Liquid	11.7	11.1	11.4
S96T004978	164:9	Liquid	<6.01	<6.01	<6.01
S96T004979	164:10	Liquid	<6.01	<6.01	<6.01
S96T004782	164:11	Liquid	7.34	6.04	6.69
S96T004783	164:12	Liquid	8.17	8.59	8.38
S96T004784	164:13	Liquid	7.78	7.82	7.8
S96T005979	Core 164	Composite	<12	<12	<12

Table B2-44. Tank 241-AN-104 Analytical Results: Bromide (IC). (2 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: water digest			µg/g	µg/g	µg/g
S96T005290	163:1	Lower half	<498.5	<476	<487.25
S96T005291	163:2	Lower half	<934.2	<904	<919.1
S96T005784	163:12	Lower half	1,038	1,020	1,029
S96T005751	163:14	Upper half	<1,024	<1,030	<1,027
S96T005752		Lower half	<1,107	<1,100	<1,103.5
S96T005295	163:16	Upper half	<594	<579	<586.5
S96T005292		Lower half	<881.3	<941	<911.15
S96T005779	163:18	Upper half	667.9	635	651.45
S96T005785		Lower half	<563.1	<521	<542.05
S96T005558	163:20	Upper half	<512.6	<494	<503.3
S96T005561		Lower half	<477.4	<491	<484.2
S96T004799	164:1	Lower half	<1,007	<1,020	<1,013.5
S96T004800	164:13	Lower half	<1,038	<1,020	<1,029
S96T005067	164:14	Upper half	1,158	1,160	1,159
S96T005065		Lower half	389.6	513	451.3[QC:c]
S96T005071	164:15	Upper half	1,091	<1,040	<1,065.5
S96T005068		Lower half	<1,031	<1,000	<1,015.5
S96T005072	164:16	Upper half	<519.5	<507	<513.25
S96T005069		Lower half	<1,060	<1,060	<1,060
S96T005073	164:17	Upper half	<577.3	<579	<578.15
S96T005066		Lower half	<948.7	<954	<951.35
S96T005074	164:19	Upper half	1,165	1,160	1,162.5
S96T005070		Lower half	956.5	<939	<947.75
S96T005283	164:20	Upper half	<515.9	<520	<517.95
S96T005280		Lower half	<506.2	<510	<508.1
S96T005977	Core 164	Composite	1,145	<976	<1,060.5

Table B2-44. Tank 241-AN-104 Analytical Results: Bromide (IC). (2 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			μg/mL	μg/mL	μg/mL
S96T005256	163:2	Liquid	<1,275	<1,280	<1,277.5
S96T005260	163:4	Liquid	916.9	950	933.45
S96T005527	163:5	Liquid	815.8	893	854.4
S96T005554	163:6	Liquid	736.3	748	742.15
S96T005255	163:7	Liquid	654.9	650	652.45
S96T005257	163:8	Liquid	731.3	749	740.15
S96T005258	163:9	Liquid	1,104	1,050	1,077
S96T005528	163:10	Liquid	1,107	1,080	1,093.5
S96T005739	163:11	Liquid	<643.9	<644	<643.95
S96T005766	163:12	Liquid	1,128	1,150	1,139
S96T005741	163:14	Liquid	757.2	759	758.1
S96T004774	164:1	Liquid	<643.9	<644	<643.95
S96T004778	164:2	Liquid	1,167	1,120	1,143.5
S96T004779	164:3	Liquid	1,756	1,740	1,748
S96T004780	164:4	Liquid	1,738	1,740	1,739
S96T004976	164:5	Liquid	<1,275	<1,280	<1,277.5
S96T004781	164:7	Liquid	<1,275	<1,280	<1,277.5
S96T004977	164:8	Liquid	<1,275	<1,280	<1,277.5
S96T004978	164:9	Liquid	848.7	844	846.35
S96T004979	164:10	Liquid	825.2	810	817.6
S96T004782	164:11	Liquid	1,707	1,750	1,728.5
S96T004783	164:12	Liquid	<1,275	<1,280	<1,277.5
S96T004784	164:13	Liquid	902.5	887	894.75
S96T005979	Core 164	Composite	1,520	1,580	1,550

Table B2-45. Tank 241-AN-104 Analytical Results: Chloride (IC). (2 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: water digest			µg/g	µg/g	µg/g
S96T005290	163:1	Lower half	4,626	4,450	4,538[QC:d]
S96T005291	163:2	Lower half	4,471	3,690	4,080.5
S96T005784	163:12	Lower half	4,688	4,830	4,759
S96T005751	163:14	Upper half	4,688	4,810	4,749
S96T005752		Lower half	4,849	5,110	4,979.5
S96T005295	163:16	Upper half	4,329	4,170	4,249.5
S96T005292		Lower half	4,754	4,760	4,757
S96T005779	163:18	Upper half	3,864	4,240	4,052
S96T005785		Lower half	3,829	4,170	3,999.5
S96T005558	163:20	Upper half	3,848	4,000	3,924
S96T005561		Lower half	3,711	3,610	3,660.5
S96T004799	164:1	Lower half	4,824	4,910	4,867
S96T004800	164:13	Lower half	3,148	3,180	3,164
S96T005067	164:14	Upper half	5,027	5,030	5,028.5
S96T005065		Lower half	4,980	4,990	4,985
S96T005071	164:15	Upper half	4,842	4,750	4,796
S96T005068		Lower half	4,551	4,410	4,480.5
S96T005072	164:16	Upper half	4,760	4,630	4,695
S96T005069		Lower half	4,959	4,740	4,849.5
S96T005073	164:17	Upper half	4,440	4,720	4,580
S96T005066		Lower half	4,585	4,430	4,507.5
S96T005074	164:19	Upper half	4,483	4,480	4,481.5
S96T005070		Lower half	4,627	4,580	4,603.5
S96T005283	164:20	Upper half	4,453	4,490	4,471.5
S96T005280		Lower half	4,345	4,360	4,352.5
S96T005977	Core 164	Composite	4,016	4,150	4,083

Table B2-45. Tank 241-AN-104 Analytical Results: Chloride (IC). (2 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			μg/mL	μg/mL	μg/mL
S96T005256	163: 2	Liquid	15,330	15,100	15,215
S96T005260	163:4	Liquid	8,157	8,080	8,118.5
S96T005527	163:5	Liquid	7,596	7,520	7,558
S96T005554	163:6	Liquid	8,000	7,970	7,985
S96T005255	163:7	Liquid	3,655	3,630	3,642.5
S96T005257	163:8	Liquid	7,988	7,970	7,979
S96T005258	163:9	Liquid	7,611	7,740	7,675.5
S96T005528	163:10	Liquid	7,809	7,840	7,824.5
S96T005739	163:11	Liquid	7,647	7,510	7,578.5
S96T005766	163:12	Liquid	7,595	7,550	7,572.5
S96T005741	163:14	Liquid	8,152	8,120	8,136
S96T004774	164:1	Liquid	8,285	8,080	8,182.5
S96T004778	164:2	Liquid	8,376	8,360	8,368
S96T004779	164:3	Liquid	8,019	8,110	8,064.5
S96T004780	164:4	Liquid	7,843	8,140	7,991.5
S96T004976	164:5	Liquid	6,826	6,810	6,818
S96T004781	164:7	Liquid	7,215	7,340	7,277.5
S96T004977	164:8	Liquid	8,932	8,650	8,791
S96T004978	164:9	Liquid	8,091	9,170	8,630.5
S96T004979	164:10	Liquid	8,108	8,120	8,114
S96T004782	164:11	Liquid	7,868	7,910	7,889
S96T004783	164:12	Liquid	8,429	8,600	8,514.5
S96T004784	164:13	Liquid	8,239	7,890	8,064.5
S96T005979	Core 164	Composite	9,617	9,300	9,458.5

Table B2-46. Tank 241-AN-104 Analytical Results: Fluoride (IC). (2 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: water digest			µg/g	µg/g	µg/g
S96T005290	163:1	Lower half	304.8	290	297.4
S96T005291	163:2	Lower half	411.2	552	481.6[QC:e]
S96T005784	163:12	Lower half	583.1	593	588.05[QC:c]
S96T005751	163:14	Upper half	618.9	616	617.45
S96T005752		Lower half	677	638	657.5
S96T005295	163:16	Upper half	806.1	657	731.55[QC:e]
S96T005292		Lower half	1,021	1,130	1,075.5
S96T005779	163:18	Upper half	651.8	669	660.4
S96T005785		Lower half	675	626	650.5
S96T005558	163:20	Upper half	893.2	985	939.1[QC:d]
S96T005561		Lower half	3,301	3,140	3,220.5
S96T004799	164:1	Lower half	850.7	825	837.85
S96T004800	164:13	Lower half	643.5	622	632.75
S96T005067	164:14	Upper half	636.8	635	635.9
S96T005065		Lower half	562.6	645	603.8[QC:e]
S96T005071	164:15	Upper half	427.7	482	454.85
S96T005068		Lower half	769.6	709	739.3
S96T005072	164:16	Upper half	405.5	422	413.75
S96T005069		Lower half	468.4	461	464.7
S96T005073	164:17	Upper half	449.5	426	437.75[QC:d]
S96T005066		Lower half	692.3	674	683.15
S96T005074	164:19	Upper half	680.7	701	690.85
S96T005070		Lower half	651.1	644	647.55[QC:d]
S96T005283	164:20	Upper half	836.7	854	845.35[QC:d]
S96T005280		Lower half	2,109	2,050	2,079.5
S96T005977	Core 164	Composite	532.4	784	658.2[QC:e]

Table B2-46. Tank 241-AN-104 Analytical Results: Fluoride (IC). (2 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
S96T005256	163:2	Liquid	<122.4	<122	<122.2
S96T005260	163:4	Liquid	<49.69	<49.7	<49.695
S96T005527	163:5	Liquid	<61.81	<61.8	<61.805
S96T005554	163:6	Liquid	<61.81	<61.8	<61.805
S96T005255	163:7	Liquid	<49.69	<49.7	<49.695
S96T005257	163:8	Liquid	<61.81	<61.8	<61.805
S96T005258	163:9	Liquid	<49.69	<49.7	<49.695
S96T005528	163:10	Liquid	<61.81	<61.8	<61.805
S96T005739	163:11	Liquid	<61.81	<61.8	<61.805
S96T005766	163:12	Liquid	<61.81	<61.8	<61.805
S96T005741	163:14	Liquid	<61.81	<61.8	<61.805
S96T004774	164:1	Liquid	<61.81	<61.8	<61.805
S96T004778	164:2	Liquid	<61.81	<61.8	<61.805
S96T004779	164:3	Liquid	<122.4	<122	<122.2
S96T004780	164:4	Liquid	<122.4	<122	<122.2
S96T004976	164:5	Liquid	273.4	<122	<197.7[QC:e]
S96T004781	164:7	Liquid	<122.4	<122	<122.2
S96T004977	164:8	Liquid	357.5	333	345.25
S96T004978	164:9	Liquid	<49.69	<49.7	<49.695
S96T004979	164:10	Liquid	<49.69	<49.7	<49.695
S96T004782	164:11	Liquid	<122.4	<122	<122.2
S96T004783	164:12	Liquid	<122.4	<122	<122.2
S96T004784	164:13	Liquid	<61.81	<61.8	<61.805
S96T005979	Core 164	Composite	<122.4	<122	<122.2

Table B2-47. Tank 241-AN-104 Analytical Results: Formate (IC). (2 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: water digest			µg/g	µg/g	µg/g
S96T005290	163:1	Lower half	707.6	711	709.3
S96T005291	163:2	Lower half	645.1	531	588.05
S96T005784	163:12	Lower half	650.9	635	642.95
S96T005751	163:14	Upper half	633.2	620	626.6
S96T005752		Lower half	624.9	630	627.45
S96T005295	163:16	Upper half	915.4	910	912.7
S96T005292		Lower half	1,417	1,580	1,498.5
S96T005779	163:18	Upper half	879.8	841	860.4
S96T005785		Lower half	850.7	799	824.85
S96T005558	163:20	Upper half	690.9	738	714.45
S96T005561		Lower half	636.3	603	619.65
S97T000648	164:1	Lower half	569.2	601	585.1
S97T000649	164:13	Lower half	945.6	832	888.8
S96T005067	164:14	Upper half	853.2	850	851.6
S96T005065		Lower half	742	747	744.5
S96T005071	164:15	Upper half	724.2	695	709.6
S96T005068		Lower half	741.2	694	717.6
S96T005072	164:16	Upper half	612.3	652	632.15
S96T005069		Lower half	695.4	701	698.2
S96T005073	164:17	Upper half	656.9	625	640.95
S96T005066		Lower half	742.5	737	739.75
S96T005074	164:19	Upper half	749.5	716	732.75
S96T005070		Lower half	782.5	762	772.25
S96T005283	164:20	Upper half	777.1	833	805.05
S96T005280		Lower half	790.4	875	832.7
S96T005977	Core 164	Composite	762.6	702	732.3

Table B2-47. Tank 241-AN-104 Analytical Results: Formate (IC). (2 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
S96T005256	163:2	Liquid	1,249	1,360	1,304.5
S96T005260	163:4	Liquid	1,112	1,050	1,081
S96T005527	163:5	Liquid	459.5	480	469.75
S96T005554	163:6	Liquid	491	489	490
S96T005255	163:7	Liquid	1,070	1,070	1,070
S96T005257	163:8	Liquid	<426.3	<426	<426.15
S96T005258	163:9	Liquid	1,019	1,050	1,034.5
S96T005528	163:10	Liquid	418.6	435	426.8
S96T005739	163:11	Liquid	1,024	1,070	1,047
S96T005766	163:12	Liquid	1,168	1,130	1,149
S96T005741	163:14	Liquid	1,089	1,120	1,104.5
S96T004774	164:1	Liquid	1,138	1,140	1,139
S96T004778	164:2	Liquid	750.3	873	811.65
S96T004779	164:3	Liquid	1,033	1,050	1,041.5
S96T004780	164:4	Liquid	1,009	1,020	1,014.5
S96T004976	164:5	Liquid	1,003	972	987.5
S96T004781	164:7	Liquid	1,098	1,020	1,059
S96T004977	164:8	Liquid	1,373	1,070	1,221.5[QC:e]
S96T004978	164:9	Liquid	1,103	1,040	1,071.5
S96T004979	164:10	Liquid	1,067	1,040	1,053.5
S96T004782	164:11	Liquid	1,073	1,060	1,066.5
S96T004783	164:12	Liquid	1,061	1,060	1,060.5
S96T004784	164:13	Liquid	994.6	971	982.8
S96T005979	Core 164	Composite	3,447	3,430	3,438.5

Table B2-48. Tank 241-AN-104 Analytical Results: Nitrate (IC). (2 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: water digest			µg/g	µg/g	µg/g
S96T005290	163:1	Lower half	1.424E+05	1.360E+05	1.392E+05
S96T005291	163:2	Lower half	2.218E+05	2.760E+05	2.489E+05[QC:e]
S96T005784	163:12	Lower half	1.114E+05	1.120E+05	1.117E+05
S96T005751	163:14	Upper half	96,210	97,500	96,855
S96T005752		Lower half	97,720	95,800	96,760
S96T005295	163:16	Upper half	1.003E+05	96,900	98,600
S96T005292		Lower half	1.041E+05	1.020E+05	1.031E+05
S96T005779	163:18	Upper half	1.156E+05	1.520E+05	1.338E+05[QC:e]
S96T005785		Lower half	1.042E+05	1.020E+05	1.031E+05
S96T005558	163:20	Upper half	1.395E+05	1.220E+05	1.308E+05
S96T005561		Lower half	1.611E+05	1.730E+05	1.671E+05[QC:e]
S96T004799	164:1	Lower half	1.461E+05	1.470E+05	1.466E+05
S96T004800	164:13	Lower half	1.608E+05	1.590E+05	1.599E+05
S96T005067	164:14	Upper half	1.036E+05	1.050E+05	1.043E+05
S96T005065		Lower half	98,000	1.010E+05	99,500
S96T005071	164:15	Upper half	1.056E+05	1.030E+05	1.043E+05
S96T005068		Lower half	1.030E+05	98,800	1.009E+05
S96T005072	164:16	Upper half	1.004E+05	1.010E+05	1.007E+05
S96T005069		Lower half	1.027E+05	1.050E+05	1.039E+05
S96T005073	164:17	Upper half	1.098E+05	1.020E+05	1.059E+05
S96T005066		Lower half	1.029E+05	1.020E+05	1.025E+05
S96T005074	164:19	Upper half	1.111E+05	1.120E+05	1.116E+05
S96T005070		Lower half	1.035E+05	1.050E+05	1.043E+05
S96T005283	164:20	Upper half	1.046E+05	1.040E+05	1.043E+05
S96T005280		Lower half	95,590	96,700	96,145
S96T005977	Core 164	Composite	1.018E+05	1.0E+05	1.009E+05

Table B2-48. Tank 241-AN-104 Analytical Results: Nitrate (IC). (2 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			μg/mL	μg/mL	μg/mL
S96T005256	163:2	Liquid	3.199E+05	3.190E+05	3.195E+05[QC:c]
S96T005260	163:4	Liquid	1.731E+05	1.760E+05	1.746E+05
S96T005527	163:5	Liquid	1.575E+05	1.590E+05	1.583E+05
S96T005554	163:6	Liquid	1.597E+05	1.630E+05	1.614E+05
S96T005255	163:7	Liquid	78,460	80,000	79,230
S96T005257	163:8	Liquid	1.660E+05	1.660E+05	1.660E+05
S96T005258	163:9	Liquid	1.731E+05	1.750E+05	1.741E+05
S96T005528	163:10	Liquid	1.783E+05	1.790E+05	1.787E+05
S96T005739	163:11	Liquid	1.522E+05	1.530E+05	1.526E+05
S96T005766	163:12	Liquid	1.419E+05	1.420E+05	1.420E+05
S96T005741	163:14	Liquid	1.661E+05	1.640E+05	1.651E+05
S96T004774	164:1	Liquid	1.605E+05	1.600E+05	1.603E+05
S96T004778	164:2	Liquid	1.889E+05	1.860E+05	1.875E+05
S96T004779	164:3	Liquid	1.679E+05	1.660E+05	1.670E+05
S96T004780	164:4	Liquid	1.717E+05	1.680E+05	1.699E+05
S96T004976	164:5	Liquid	1.466E+05	1.490E+05	1.478E+05
S96T004781	164:7	Liquid	1.695E+05	1.670E+05	1.683E+05
S96T004977	164:8	Liquid	1.754E+05	1.760E+05	1.757E+05
S96T004978	164:9	Liquid	1.790E+05	1.780E+05	1.785E+05
S96T004979	164:10	Liquid	1.725E+05	1.730E+05	1.728E+05
S96T004782	164:11	Liquid	1.656E+05	1.670E+05	1.663E+05
S96T004783	164:12	Liquid	1.797E+05	1.770E+05	1.784E+05
S96T004784	164:13	Liquid	1.816E+05	1.720E+05	1.768E+05
S96T005979	Core 164	Composite	2.072E+05	2.060E+05	2.066E+05

Table B2-49. Tank 241-AN-104 Analytical Results: Nitrite (IC). (2 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: water digest			µg/g	µg/g	µg/g
S96T005290	163:1	Lower half	69,320	66,300	67,810[QC:d]
S96T005291	163:2	Lower half	69,010	66,900	67,955
S96T005784	163:12	Lower half	63,810	64,400	64,105
S96T005751	163:14	Upper half	64,460	65,300	64,880
S96T005752		Lower half	65,830	66,300	66,065
S96T005295	163:16	Upper half	56,690	54,800	55,745
S96T005292		Lower half	62,630	65,100	63,865
S96T005779	163:18	Upper half	61,740	59,400	60,570
S96T005785		Lower half	60,240	63,900	62,070
S96T005558	163:20	Upper half	60,230	62,200	61,215
S96T005561		Lower half	56,880	56,100	56,490
S96T004799	164:1	Lower half	63,340	63,700	63,520
S96T004800	164:13	Lower half	57,810	57,200	57,505
S96T005067	164:14	Upper half	65,150	64,800	64,975
S96T005065		Lower half	67,630	68,100	67,865
S96T005071	164:15	Upper half	65,920	64,200	65,060
S96T005068		Lower half	60,700	59,000	59,850
S96T005072	164:16	Upper half	64,690	62,400	63,545
S96T005069		Lower half	74,380	72,200	73,290
S96T005073	164:17	Upper half	60,520	63,400	61,960
S96T005066		Lower half	59,300	59,000	59,150
S96T005074	164:19	Upper half	58,760	60,100	59,430
S96T005070		Lower half	62,010	61,800	61,905
S96T005283	164:20	Upper half	68,590	69,300	68,945
S96T005280		Lower half	64,170	64,100	64,135
S96T005977	Core 164	Composite	57,870	58,200	58,035

Table B2-49. Tank 241-AN-104 Analytical Results: Nitrite (IC). (2 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
S96T005256	163:2	Liquid	2.271E+05	2.230E+05	2.251E+05[QC:]
S96T005260	163:4	Liquid	1.136E+05	1.120E+05	1.128E+05
S96T005527	163:5	Liquid	1.327E+05	1.330E+05	1.329E+05
S96T005554	163:6	Liquid	1.191E+05	1.260E+05	1.226E+05
S96T005255	163:7	Liquid	49,300	49,100	49,200
S96T005257	163:8	Liquid	1.174E+05	1.170E+05	1.172E+05
S96T005258	163:9	Liquid	1.077E+05	1.060E+05	1.069E+05
S96T005528	163:10	Liquid	1.292E+05	1.300E+05	1.296E+05
S96T005739	163:11	Liquid	91,010	93,600	92,305
S96T005766	163:12	Liquid	1.183E+05	1.080E+05	1.132E+05
S96T005741	163:14	Liquid	3.126E+05	3.170E+05	3.148E+05
S96T004774	164:1	Liquid	1.140E+05	1.140E+05	1.140E+05
S96T004778	164:2	Liquid	1.175E+05	1.180E+05	1.178E+05
S96T004779	164:3	Liquid	1.091E+05	1.090E+05	1.091E+05
S96T004780	164:4	Liquid	1.077E+05	1.080E+05	1.079E+05
S96T004976	164:5	Liquid	94,260	94,000	94,130
S96T004781	164:7	Liquid	1.094E+05	1.100E+05	1.097E+05
S96T004977	164:8	Liquid	1.239E+05	1.220E+05	1.230E+05
S96T004978	164:9	Liquid	1.137E+05	1.160E+05	1.149E+05
S96T004979	164:10	Liquid	1.111E+05	1.120E+05	1.116E+05
S96T004782	164:11	Liquid	1.046E+05	1.050E+05	1.048E+05
S96T004783	164:12	Liquid	1.279E+05	1.300E+05	1.290E+05
S96T004784	164:13	Liquid	1.188E+05	1.140E+05	1.164E+05
S96T005979	Core 164	Composite	1.325E+05	1.290E+05	1.308E+05

Table B2-50. Tank 241-AN-104 Analytical Results: Phosphate (IC). (2 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: water digest			µg/g	µg/g	µg/g
S96T005290	163:1	Lower half	3,088	2,920	3,004
S96T005291	163:2	Lower half	3,221	3,770	3,495.5
S96T005784	163:12	Lower half	4,823	4,300	4,561.5
S96T005751	163:14	Upper half	2,284	2,130	2,207
S96T005752		Lower half	2,603	2,620	2,611.5
S96T005295	163:16	Upper half	2,692	2,410	2,551
S96T005292		Lower half	3,500	4,170	3,835
S96T005779	163:18	Upper half	3,379	3,220	3,299.5
S96T005785		Lower half	3,496	3,430	3,463
S96T005558	163:20	Upper half	3,704	4,070	3,887
S96T005561		Lower half	15,920	15,300	15,610
S96T004799	164:1	Lower half	5,752	5,830	5,791
S96T004800	164:13	Lower half	1,529	<980	<1,254.5[QC:c]
S96T005067	164:14	Upper half	2,968	2,930	2,949
S96T005065		Lower half	2,240	3,010	2,625[QC:c]
S96T005071	164:15	Upper half	2,234	2,350	2,292
S96T005068		Lower half	2,103	2,270	2,186.5
S96T005072	164:16	Upper half	2,689	1,880	2,284.5[QC:c]
S96T005069		Lower half	1,535	1,370	1,452.5
S96T005073	164:17	Upper half	3,195	2,800	2,997.5
S96T005066		Lower half	4,484	4,840	4,662
S96T005074	164:19	Upper half	4,189	4,410	4,299.5
S96T005070		Lower half	3,961	4,300	4,130.5
S96T005283	164:20	Upper half	3,622	3,450	3,536
S96T005280		Lower half	3,384	3,200	3,292
S96T005977	Core 164	Composite	3,555	3,130	3,342.5

Table B2-50. Tank 241-AN-104 Analytical Results: Phosphate (IC). (2 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
S96T005256	163:2	Liquid	3,859	3,790	3,824.5
S96T005260	163:4	Liquid	2,458	2,350	2,404
S96T005527	163:5	Liquid	2,169	2,080	2,124.5
S96T005554	163:6	Liquid	2,672	2,280	2,476
S96T005255	163:7	Liquid	2,615	2,570	2,592.5
S96T005257	163:8	Liquid	1,747	1,870	1,808.5
S96T005258	163:9	Liquid	2,068	2,040	2,054
S96T005528	163:10	Liquid	1,839	1,870	1,854.5
S96T005739	163:11	Liquid	1,252	1,580	1,416[QC:c]
S96T005766	163:12	Liquid	1,039	893	966
S96T005741	163:14	Liquid	1,027	997	1,012
S96T004774	164:1	Liquid	2,161	2,310	2,235.5
S96T004778	164:2	Liquid	2,665	2,750	2,707.5
S96T004779	164:3	Liquid	2,832	3,110	2,971
S96T004780	164:4	Liquid	2,769	3,100	2,934.5
S96T004976	164:5	Liquid	1,679	<1,220	<1,449.5[QC:c]
S96T004781	164:7	Liquid	3,775	1,810	2,792.5[QC:c]
S96T004977	164:8	Liquid	2,194	2,150	2,172
S96T004978	164:9	Liquid	2,479	2,230	2,354.5
S96T004979	164:10	Liquid	2,171	2,180	2,175.5
S96T004782	164:11	Liquid	3,081	2,610	2,845.5
S96T004783	164:12	Liquid	2,648	2,710	2,679
S96T004784	164:13	Liquid	2,205	2,100	2,152.5
S96T005979	Core 164	Composite	3,980	3,610	3,795

Table B2-51. Tank 241-AN-104 Analytical Results: Sulfate (IC). (2 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: water digest			µg/g	µg/g	µg/g
S96T005290	163:1	Lower half	11,380	11,100	11,240
S96T005291	163:2	Lower half	3,653	3,900	3,776.5
S96T005784	163:12	Lower half	7,544	7,270	7,407
S96T005751	163:14	Upper half	9,571	9,420	9,495.5
S96T005752		Lower half	10,410	10,200	10,305
S96T005295	163:16	Upper half	12,600	12,400	12,500
S96T005292		Lower half	12,940	12,900	12,920
S96T005779	163:18	Upper half	16,480	16,600	16,540
S96T005785		Lower half	16,490	16,300	16,395
S96T005558	163:20	Upper half	14,400	14,900	14,650
S96T005561		Lower half	10,370	10,500	10,435
S96T004799	164:1	Lower half	8,357	8,610	8,483.5
S96T004800	164:13	Lower half	4,386	4,370	4,378
S96T005067	164:14	Upper half	11,020	11,000	11,010
S96T005065		Lower half	8,954	8,730	8,842
S96T005071	164:15	Upper half	10,250	9,880	10,065
S96T005068		Lower half	11,650	10,800	11,225
S96T005072	164:16	Upper half	9,477	12,000	10,738.5[QC:c]
S96T005069		Lower half	10,130	9,960	10,045
S96T005073	164:17	Upper half	10,230	9,980	10,105
S96T005066		Lower half	12,480	12,600	12,540
S96T005074	164:19	Upper half	11,960	13,100	12,530
S96T005070		Lower half	12,640	12,800	12,720
S96T005283	164:20	Upper half	13,190	13,500	13,345
S96T005280		Lower half	16,590	17,100	16,845
S96T005977	Core 164	Composite	11,710	11,500	11,605

Table B2-51. Tank 241-AN-104 Analytical Results: Sulfate (IC). (2 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
S96T005256	163:2	Liquid	2,796	2,490	2,643
S96T005260	163:4	Liquid	1,925	1,800	1,862.5
S96T005527	163:5	Liquid	1,036	1,090	1,063
S96T005554	163:6	Liquid	<710.8	754	<732.4
S96T005255	163:7	Liquid	1,023	1,470	1,246.5[QC:e]
S96T005257	163:8	Liquid	1,045	1,090	1,067.5
S96T005258	163:9	Liquid	1,484	2,080	1,782[QC:e]
S96T005528	163:10	Liquid	1,452	1,710	1,581
S96T005739	163:11	Liquid	<710.8	<711	<710.9
S96T005766	163:12	Liquid	911.3	<711	<811.15[QC:e]
S96T005741	163:14	Liquid	1,670	1,330	1,500[QC:e]
S96T004774	164:1	Liquid	1,980	1,870	1,925
S96T004778	164:2	Liquid	2,100	1,810	1,955
S96T004779	164:3	Liquid	1,997	2,020	2,008.5
S96T004780	164:4	Liquid	1,933	1,980	1,956.5
S96T004976	164:5	Liquid	<1,408	<1,410	<1,409
S96T004781	164:7	Liquid	2,725	1,500	2,112.5[QC:e]
S96T004977	164:8	Liquid	<1,408	<1,410	<1,409
S96T004978	164:9	Liquid	1,642	1,930	1,786
S96T004979	164:10	Liquid	1,463	1,780	1,621.5
S96T004782	164:11	Liquid	1,963	2,110	2,036.5
S96T004783	164:12	Liquid	1,818	2,310	2,064[QC:e]
S96T004784	164:13	Liquid	1,880	2,090	1,985
S96T005979	Core 164	Composite	2,118	2,500	2,309

Table B2-52. Tank 241-AN-104 Analytical Results: Acetate (IC). (2 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: water digest			µg/g	µg/g	µg/g
S96T005290	163:1	Lower half	425.6	507	466.3
S96T005291	163:2	Lower half	476.5	346	411.25[QC:e]
S96T005784	163:12	Lower half	495.9	443	469.45
S96T005751	163:14	Upper half	429.5	438	433.75[QC:d]
S96T005752		Lower half	442.5	469	455.75[QC:d]
S96T005295	163:16	Upper half	< 149.9	< 146	< 147.95
S96T005292		Lower half	1,019	1,090	1,054.5
S96T005779	163:18	Upper half	608.3	554	581.15
S96T005785		Lower half	554.7	489	521.85
S96T005558	163:20	Upper half	483.5	493	488.25
S96T005561		Lower half	439.5	459	449.25
S97T000648	164:1	Lower half	332	354	343
S97T000649	164:13	Lower half	604.9	591	597.95[QC:d]
S96T005067	164:14	Upper half	623.2	637	630.1
S96T005065		Lower half	524.7	490	507.35
S96T005071	164:15	Upper half	517.5	516	516.75
S96T005068		Lower half	508.9	470	489.45
S96T005072	164:16	Upper half	553.3	554	553.65
S96T005069		Lower half	751.7	635	693.35
S96T005073	164:17	Upper half	543.7	568	555.85
S96T005066		Lower half	529.8	511	520.4
S96T005074	164:19	Upper half	502.2	495	498.6
S96T005070		Lower half	618.8	562	590.4
S96T005283	164:20	Upper half	613	661	637
S96T005280		Lower half	661	688	674.5
S96T005977	Core 164	Composite	612.7	660	636.35[QC:e]

Table B2-52. Tank 241-AN-104 Analytical Results: Acetate (IC). (2 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
S96T005256	163:2	Liquid	1,917	1,150	1,533.5[QC:e]
S96T005260	163:4	Liquid	620.7	616	618.35
S96T005527	163:5	Liquid	180.9	144	162.45[QC:e]
S96T005554	163:6	Liquid	189.5	339	264.25[QC:e]
S96T005255	163:7	Liquid	550.9	645	597.95
S96T005257	163:8	Liquid	<406	1,290	<848[QC:e]
S96T005258	163:9	Liquid	564.3	565	564.65
S96T005528	163:10	Liquid	289.6	293	291.3
S96T005739	163:11	Liquid	820.4	777	798.7
S96T005766	163:12	Liquid	788.4	788	788.2
S96T005741	163:14	Liquid	826	864	845
S96T004774	164:1	Liquid	515.7	532	523.85
S96T004778	164:2	Liquid	557.6	665	611.3
S96T004779	164:3	Liquid	523.3	536	529.65
S96T004780	164:4	Liquid	552.9	567	559.95
S96T004976	164:5	Liquid	452.5	453	452.75
S96T004781	164:7	Liquid	626.2	566	596.1
S96T004977	164:8	Liquid	685.3	506	595.65[QC:e]
S96T004978	164:9	Liquid	609.3	621	615.15
S96T004979	164:10	Liquid	504	512	508
S96T004782	164:11	Liquid	563.1	546	554.55
S96T004783	164:12	Liquid	643.4	623	633.2
S96T004784	164:13	Liquid	598.6	578	588.3
S96T005979	Core 164	Composite	1,773	1,990	1,881.5

Table B2-53. Tank 241-AN-104 Analytical Results: Oxalate (IC). (2 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: water digest			µg/g	µg/g	µg/g
S96T005290	163:1	Lower half	9,520	9,290	9,405
S96T005291	163:2	Lower half	5,755	5,550	5,652.5
S96T005784	163:12	Lower half	7,379	7,730	7,554.5
S96T005751	163:14	Upper half	9,914	10,100	10,007
S96T005752		Lower half	10,180	9,240	9,710
S96T005295	163:16	Upper half	9,188	9,380	9,284
S96T005292		Lower half	10,400	9,770	10,085
S96T005779	163:18	Upper half	6,127	6,140	6,133.5
S96T005785		Lower half	5,936	5,560	5,748
S96T005558	163:20	Upper half	6,205	6,800	6,502.5
S96T005561		Lower half	8,438	7,780	8,109
S96T004799	164:1	Lower half	7,609	7,810	7,709.5
S96T004800	164:13	Lower half	2,105	2,110	2,107.5
S96T005067	164:14	Upper half	10,810	10,700	10,755
S96T005065		Lower half	9,210	9,390	9,300
S96T005071	164:15	Upper half	8,224	8,100	8,162
S96T005068		Lower half	8,731	8,230	8,480.5
S96T005072	164:16	Upper half	8,017	10,200	9,108.5[QC:e]
S96T005069		Lower half	7,865	7,310	7,587.5
S96T005073	164:17	Upper half	9,419	8,590	9,004.5
S96T005066		Lower half	12,160	11,900	12,030
S96T005074	164:19	Upper half	11,310	10,900	11,105
S96T005070		Lower half	9,839	10,500	10,169.5
S96T005283	164:20	Upper half	9,832	9,650	9,741
S96T005280		Lower half	8,172	8,220	8,196
S96T005977	Core 164	Composite	9,783	9,550	9,666.5

Table B2-53. Tank 241-AN-104 Analytical Results: Oxalate (IC). (2 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			μg/mL	μg/mL	μg/mL
S96T005256	163:2	Liquid	<1,071	<1,070	<1,070.5
S96T005260	163:4	Liquid	526.6	769	647.8[QC:e]
S96T005527	163:5	Liquid	<540.9	<541	<540.95
S96T005554	163:6	Liquid	<540.9	<541	<540.95
S96T005255	163:7	Liquid	<434.8	<435	<434.9
S96T005257	163:8	Liquid	<540.9	579	<559.95
S96T005258	163:9	Liquid	905.9	528	716.95[QC:e]
S96T005528	163:10	Liquid	<540.9	<541	<540.95
S96T005739	163:11	Liquid	<540.9	<541	<540.95
S96T005766	163:12	Liquid	<540.9	<541	<540.95
S96T005741	163:14	Liquid	<540.9	<541	<540.95
S96T004774	164:1	Liquid	603.4	616	609.7
S96T004778	164:2	Liquid	1,024	<541	<782.5[QC:e]
S96T004779	164:3	Liquid	<1,071	<1,070	<1,070.5
S96T004780	164:4	Liquid	<1,071	<1,070	<1,070.5
S96T004976	164:5	Liquid	<540.9	<541	<540.95
S96T004781	164:7	Liquid	1,434	<1,070	<1,252[QC:e]
S96T004977	164:8	Liquid	<540.9	<541	<540.95
S96T004978	164:9	Liquid	506	472	489
S96T004979	164:10	Liquid	495.4	616	555.7[QC:e]
S96T004782	164:11	Liquid	<1,071	<1,070	<1,070.5
S96T004783	164:12	Liquid	<1,071	<1,070	<1,070.5
S96T004784	164:13	Liquid	<540.9	<541	<540.95
S96T005979	Core 164	Composite	<1,071	<1,070	<1,070.5

Table B2-54. Tank 241-AN-104 Analytical Results: Hexavalent Chromium (Cr+6).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			μg/mL	μg/mL	μg/mL
S96T005980	Core 164	Composite	214	211	212.5
Solids: water digest			μg/g	μg/g	μg/g
S96T005977	Core 164	Composite	203	197	200

Table B2-55. Tank 241-AN-104 Analytical Results: Total Inorganic Carbon/Total Organic Carbon.

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Total Inorganic Carbon					
Solids			μg/g	μg/g	μg/g
S96T005972	Core 164	Composite	15,000	14,300	14,650[QC:c]
Liquids			μg/mL	μg/mL	μg/mL
S96T005978	Core 164	Composite	2,280	2,050	2,165
Total Organic Carbon					
Solids			μg/g	μg/g	μg/g
S96T005972	Core 164	Composite	4,650	4,600	4,625
Liquids			μg/mL	μg/mL	μg/mL
S96T005978	Core 164	Composite	4,040	2,770	3,405[QC:e]

Table B2-56. Tank 241-AN-104 Analytical Results: Hydroxide (OH Direct).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: water digest			μg/g	μg/g	μg/g
S96T005977	Core 164	Composite	36,100	38,200	37,150
Liquids			μg/mL	μg/mL	μg/mL
S96T005981	Core 164	Composite	71,400	70,400	70,900

Table B2-57. Tank 241-AN-104 Analytical Results: Percent Water[1] (Thermogravimetric Analysis). (2 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids			%	%	%
S96T005269	163:1	Lower half	42.53	41.69	42.11
S96T005270	163:2	Lower half	50.56	51.34	50.95
S96T005771	163:12	Lower half	46.83	47.15	46.99
S96T005743	163:14	Upper half	44.54	46.36	45.45
S96T005744		Lower half	44.4	43.19	43.80
S96T005271	163:16	Upper half	50.23	45.36	47.80
S96T005272		Lower half	46.27	43.9	45.09
S96T005772	163:18	Upper half	40.95	41.57	41.26
S96T005773		Lower half	39.90	40.85	40.38
S96T005548	163:20	Upper half	40.80	40.98	40.89
S96T005549		Lower half	41.27	40.91	41.09
S96T004772	164:1	Lower half	41.31	43.6	42.46
S96T004773	164:13	Lower half	47.20	45.64	46.42
S96T004984	164:14	Upper half	46.04	45.63	45.84
S96T004985		Lower half	46.72	46.60	46.66
S96T004986	164:15	Upper half	47.48	46.86	47.17
S96T004987		Lower half	45.45	45.42	45.44
S96T004988	164:16	Upper half	45.09	47.25	46.17
S96T004989		Lower half	47.18	49.33	48.26
S96T004990	164:17	Upper half	49.51	49.85	49.68
S96T004991		Lower half	47.76	48.57	48.17
S96T004992	164:19	Upper half	46.16	45.93	46.05
S96T004993		Lower half	46.08	44.00	45.04
S96T005249	164:20	Upper half	50.75	48.55	49.65
S96T005250		Lower half	50.51	50.05	50.28
S96T005972	Core 164	Composite	45.25	36.54	40.89

Table B2-57. Tank 241-AN-104 Analytical Results: Percent Water[1] (Thermogravimetric Analysis). (2 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			%	%	%
S96T005256	163:2	Liquid	52.1	51.87	51.99
S96T005260	163:4	Liquid	52.13	51.77	51.95
S96T005527	163:5	Liquid	52.09	52.01	52.05
S96T005554	163:6	Liquid	52.41	52.27	52.34
S96T005255	163:7	Liquid	51.47	51.75	51.61
S96T005257	163:8	Liquid	52.13	51.93	52.03
S96T005258	163:9	Liquid	51.92	52.35	52.14
S96T005528	163:10	Liquid	51.77	52.41	52.09
S96T005739	163:11	Liquid	50.94	50.26	50.60
S96T005766	163:12	Liquid	52.44	52.71	52.58
S96T005741	163:14	Liquid	51.77	51.18	51.48
S96T004774	164:1	Liquid	47.35	51.28	49.32
S96T004778	164:2	Liquid	52.25	49.11	50.68
S96T004779	164:3	Liquid	51.03	51.09	51.06
S96T004780	164:4	Liquid	51.65	51.61	51.63
S96T004976	164:5	Liquid	51.77	49.57	50.67
S96T004781	164:7	Liquid	51.82	52.23	52.03
S96T004977	164:8	Liquid	49.32	51.88	50.60
S96T004978	164:9	Liquid	52.03	51.03	51.53
S96T004979	164:10	Liquid	51.56	51.84	51.70
S96T004782	164:11	Liquid	51.73	51.69	51.71
96T004783	164:12	Liquid	51.37	50.87	51.12
S96T004784	164:13	Liquid	51.44	51.76	51.60
S96T005978	Core 164	Composite	50.86	51.37	51.12

Note:

Some waste samples were contaminated by hydrostatic head fluid, and the moisture content was corrected.

Table B2-58. Tank 241-AN-104 Analytical Results: Exotherm - transition 1 (Differential Scanning Calorimetry). (2 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			J/g	J/g	J/g
S96T005256	163:2	Liquid	0.0	0.0	0.0
S96T005260	163:4	Liquid	14.7	0.0	7.35[QC:e]
S96T005527	163:5	Liquid	27.7	38.4	33.05[QC:e]
S96T005254	163:6	Liquid	0.0	0.0	0.0
S96T005255	163:7	Liquid	0.0	0.0	0.0
S96T005257	163:8	Liquid	0.0	0.0	0.0
S96T005258	163:9	Liquid	0.0	14.6	7.35[QC:e]
S96T005528	163:10	Liquid	39.3	0.0	19.65[QC:e]
S96T005739	163:11	Liquid	0.0	27.1	13.55[QC:e]
S96T005766	163:12	Liquid	0.0	0.0	0.0
S96T005741	163:14	Liquid	0.0	15.9	7.95[QC:e]
S96T004774	164:1	Liquid	0.0	0.0	0.0
S96T004778	164:2	Liquid	0.0	0.0	0.0
S96T004779	164:3	Liquid	0.0	0.0	0.0
S96T004780	164:4	Liquid	0.0	15.7	7.85[QC:e]
S96T004976	164:5	Liquid	0.0	0.0	0.0
S96T004781	164:7	Liquid	0.0	0.0	0.0
S96T004977	164:8	Liquid	0.0	0.0	0.0
S96T004978	164:9	Liquid	0.0	0.0	0.0
S96T004979	164:10	Liquid	0.0	0.0	0.0
S96T004782	164:11	Liquid	0.0	0.0	0.0
S96T004783	164:12	Liquid	0.0	0.0	0.0
S96T004784	164:13	Liquid	0.0	0.0	0.0
S96T005978	Core 164	Composite	18.5	19.4	18.95

Table B2-58. Tank 241-AN-104 Analytical Results: Exotherm - transition 1 (Differential Scanning Calorimetry). (2 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids			J/g	J/g	J/g
S96T005269	163:1	Lower half	0.0	0.0	0.0
S96T005270	163:2	Lower half	0.0	0.0	0.0
S96T005771	163:12	Lower half	31.6	25.9	28.75
S96T005743	163:14	Upper half	0.0	0.0	0.0
S96T005744		Lower half	0.0	0.0	0.0
S96T005271	163:16	Upper half	106.6	32.8	69.7[QC:c]
S96T005272		Lower half	31.4	24.2	27.8
S96T005772	163:18	Upper half	23.6	19.5	21.55
S96T005773		Lower half	22.1	23.6	22.85
S96T005548	163:20	Upper half	0.0	0.0	0.0
S96T005549		Lower half	0.0	0.0	0.0
S96T004772	164:1	Lower half	0.0	0.0	0.0
S96T004773	164:13	Lower half	0.0	0.0	0.0
S96T004984	164:14	Upper half	0.0	0.0	0.0
S96T004985		Lower half	0.0	0.0	0.0
S96T004986	164:15	Upper half	35.7	19.7	27.7[QC:c]
S96T004987		Lower half	25.9	33.6	29.75
S96T004988	164:16	Upper half	32.6	24.9	28.75
S96T004989		Lower half	16.5	0.0	8.25[QC:c]
S96T004990	164:17	Upper half	7	0.0	3.50[QC:c]
S96T004991		Lower half	2.2	4.7	3.45[QC:c]
S96T004992	164:19	Upper half	0.0	0.0	0.0
S96T004993		Lower half	0.0	0.0	0.0
S96T005249	164:20	Upper half	0.0	0.0	0.0
S96T005250		Lower half	0.0	0.0	0.0
S96T005972	Core 164	Composite	101	105	103

Table B2-59. Tank 241-AN-104 Analytical Results: Bulk Density and Specific Gravity. (2 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids (bulk density)			g/mL	g/mL	g/mL
S96T005768	163:12	Lower half	1.76	N/A	1.76
S96T005728	163:14	Upper half	1.65	N/A	1.65
S96T005729		Lower half	1.61	N/A	1.61
S96T005226	163:16	Upper half	1.56	N/A	1.56
S96T005227		Lower half	1.57	N/A	1.57
S96T005769	163:18	Upper half	1.59	N/A	1.59
S96T005770		Lower half	1.71	N/A	1.71
S96T005552	163:20	Upper half	1.63	N/A	1.63
S96T005553		Lower half	1.64	N/A	1.64
S96T004771	164:13	Lower half	1.53	N/A	1.53
S96T004965	164:14	Upper half	1.56	N/A	1.56
S96T004966		Lower half	1.52	N/A	1.52
S96T004968	164:15	Upper half	1.55	N/A	1.55
S96T004967		Lower half	1.57	N/A	1.57
S96T004970	164:16	Upper half	1.56	N/A	1.56
S96T004969		Lower half	1.58	N/A	1.58
S96T004971	164:17	Upper half	1.53	N/A	1.53
S96T004972		Lower half	1.55	N/A	1.55
S96T004973	164:19	Upper half	1.56	N/A	1.56
S96T004974		Lower half	1.58	N/A	1.58
S96T005222	164:20	Upper half	1.60	N/A	1.60
S96T005223		Lower half	1.60	N/A	1.60
S96T005970	Core 164	Composite	1.57	N/A	1.57

Table B2-59. Tank 241-AN-104 Analytical Results: Bulk Density and Specific Gravity. (2 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids (specific gravity)			unitless	unitless	unitless
S96T005256	163:2	Liquid	1.384	1.389	1.387
S96T005260	163:4	Liquid	1.369	1.384	1.377
S96T005527	163:5	Liquid	1.358	1.373	1.366
S96T005554	163:6	Liquid	1.344	1.343	1.344
S96T005255	163:7	Liquid	1.416	1.406	1.411
S96T005257	163:8	Liquid	1.402	1.412	1.407
S96T005258	163:9	Liquid	1.354	1.35	1.352
S96T005528	163:10	Liquid	1.362	1.426	1.394
S96T005739	163:11	Liquid	1.34	1.339	1.340
S96T005766	163:12	Liquid	1.449	1.463	1.456
S96T005741	163:14	Liquid	1.489	1.49	1.490
S96T004774	164:1	Liquid	1.442	1.414	1.428
S96T004778	164:2	Liquid	1.384	1.399	1.392
S96T004779	164:3	Liquid	1.407	1.396	1.402
S96T004780	164:4	Liquid	1.415	1.416	1.412
S96T004976	164:5	Liquid	1.418	1.403	1.411
S96T004781	164:7	Liquid	1.412	1.412	1.412
S96T004977	164:8	Liquid	1.408	1.408	1.408
S96T004978	164:9	Liquid	1.414	1.409	1.412
S96T004979	164:10	Liquid	1.383	1.377	1.38
S96T004782	164:11	Liquid	1.406	1.421	1.414
S96T004783	164:12	Liquid	1.419	1.422	1.421
S96T004784	164:13	Liquid	1.38	1.399	1.390
S96T005981	Core 164	Composite	1.411	1.401	1.406

Table B2-60. Tank 241-AN-104 Analytical Results: Total Alpha (Alpha Radiation). (2 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µCi/mL	µCi/mL	µCi/mL
S96T005256	163:2	Liquid	<0.0994	<0.0822	<0.0908
S96T005260	163:4	Liquid	<0.0483	<0.0994	<0.07385[QC:e]
S96T005527	163:5	Liquid	<0.00212	<0.00226	<0.00219
S96T005554	163:6	Liquid	<0.00243	<0.00212	<0.002275
S96T005255	163:7	Liquid	<0.0822	<0.0649	<0.07355[QC:e]
S96T005257	163:8	Liquid	<0.0483	<0.0483	<0.0483
S96T005258	163:9	Liquid	<0.0483	<0.0483	<0.0483
S96T005528	163:10	Liquid	0.0025	<0.00243	<0.002465
S96T005739	163:11	Liquid	<0.00212	<0.00243	<0.002275
S96T005766	163:12	Liquid	0.00362	0.00201	0.002815[QC:e]
S96T005741	163:14	Liquid	<0.00243	<0.00181	<0.00212[QC:e]
S96T004774	164:1	Liquid	<0.0142	<0.0142	<0.0142
S96T004778	164:2	Liquid	<0.0272	<0.0142	<0.0207[QC:e]
S96T004779	164:3	Liquid	<0.0142	<0.0142	<0.0142
S96T004780	164:4	Liquid	<0.0142	<0.0142	<0.0142
S96T004976	164:5	Liquid	<0.0539	<0.0348	<0.04435[QC:e]
S96T004781	164:7	Liquid	<0.0645	<0.0565	<0.0605
S96T004977	164:8	Liquid	<0.0189	<0.0316	<0.02525[QC:e]
S96T004978	164:9	Liquid	<0.0189	<0.0189	<0.0189
S96T004979	164:10	Liquid	<0.0253	<0.0943	<0.0598[QC:e]
S96T004782	164:11	Liquid	<0.0147	<0.0179	<0.0163
S96T004783	164:12	Liquid	<0.0147	<0.021	<0.01785[QC:e]
S96T004784	164:13	Liquid	<0.0273	<0.0242	<0.02575
S96T005978	Core 164	Composite	0.0276	0.0219	0.02475[QC:e,f]
S96T005979		Composite	<0.0257	0.0259	<0.0258

Table B2-60. Tank 241-AN-104 Analytical Results: Total Alpha (Alpha Radiation). (2 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion			μCi/g	μCi/g	μCi/g
S96T005284	163:1	Lower half	0.0808	0.0251	0.05295[QC:c,e]
S96T005285	163:2	Lower half	0.0493	0.0365	0.0429[QC:c,e]
S96T005780	163:12	Lower half	<0.178	<0.232	<0.205[QC:a,e]
S96T005748	163:14	Lower half	<0.35	<0.288	<0.319[QC:a]
S96T005286	163:16	Lower half	0.0226	0.0299	0.02625[QC:c,e]
S96T005781	163:18	Lower half	<0.0282	0.0215	<0.02485[QC:e]
S96T005559	163:20	Lower half	0.0498	0.0249	0.03735[QC:c,e]
S96T004795	164:1	Lower half	<0.0427	<0.042	<0.04235
S96T004796	164:13	Lower half	0.0499	<0.0455	<0.0477
S96T005030	164:14	Lower half	<0.0315	<0.0351	<0.0333
S96T005032	164:15	Lower half	0.0432	0.0457	0.04445
S96T005033	164:16	Lower half	<0.0419	0.0257	<0.0338[QC:e]
S96T005031	164:17	Lower half	0.0219	0.0542	0.03805[QC:e]
S96T005034	164:19	Lower half	0.041	0.0671	0.05405[QC:e]
S96T005278	164:20	Lower half	0.0558	0.0558	0.0558[QC:f]
S96T005975	Core 164	Composite	<0.0393	<0.0196	<0.02945[QC:c,e]

Table B2-61. Tank 241-AN-104 Analytical Results: Total Beta (Alpha).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion			µCi/g	µCi/g	µCi/g
S96T005975	Core 164	Composite	415	385	400
Liquids			µCi/mL	µCi/mL	µCi/mL
S96T005979	Core 164	Composite	482	509	495.5

Table B2-62. Tank 241-AN-104 Analytical Results: Strontium-89/90.

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion			µCi/g	µCi/g	µCi/g
S96T005975	Core 164	Composite	33.8	34.7	34.25
Liquids			µCi/mL	µCi/mL	µCi/mL
S96T005980	Core 164	Composite	0.334	0.342	0.338[QC:f]

Table B2-63. Tank 241-AN-104 Analytical Results: Americium-241 (Gamma Energy Analysis).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion			µCi/g	µCi/g	µCi/g
S96T005975	Core 164	Composite	<1.413	<1.35	<1.3815
Liquids			µCi/mL	µCi/mL	µCi/mL
S96T005979	Core 164	Composite	<1.364	<1.35	<1.357

Table B2-64. Tank 241-AN-104 Analytical Results: Cesium-137 (Gamma Energy Analysis).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion			µCi/g	µCi/g	µCi/g
S96T005975	Core 164	Composite	357.4	341	349.2
Liquids			µCi/mL	µCi/mL	µCi/mL
S96T005979	Core 164	Composite	572	568	570

Table B2-65. Tank 241-AN-104 Analytical Results: Cobalt-60 (Gamma Energy Analysis).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion			µCi/g	µCi/g	µCi/g
S96T005975	Core 164	Composite	<0.02636	<0.026	<0.02618
Liquids			µCi/mL	µCi/mL	µCi/mL
S96T005979	Core 164	Composite	<0.01674	<0.0159	<0.01632

Table B2-66. Tank 241-AN-104 Analytical Results: Europium-154 (Gamma Energy Analysis).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion			µCi/g	µCi/g	µCi/g
S96T005975	Core 164	Composite	<0.09029	<0.1	<0.095145
Liquids			µCi/mL	µCi/mL	µCi/mL
S96T005979	Core 164	Composite	<0.1282	<0.123	<0.1256

Table B2-67. Tank 241-AN-104 Analytical Results: Europium-155 (Gamma Energy Analysis).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion			µCi/g	µCi/g	µCi/g
S96T005975	Core 164	Composite	<0.6724	<0.655	<0.6637
Liquids			µCi/mL	µCi/mL	µCi/mL
S96T005979	Core 164	Composite	<0.6573	<0.654	<0.65565

Table B2-68. Tank 241-AN-104 Analytical Results: Total Uranium.

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion			µg/g	µg/g	µg/g
S96T005975	Core 164	Composite	174	187	180.5
Liquids			µg/mL	µg/mL	µg/mL
S96T005981	Core 164	Composite	3.3	4.06	3.68[QC:e,f]

Table B2-69. Tank 241-AN-104 Analytical Results: Plutonium-239/40.

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids			µCi/g	µCi/g	µCi/g
S96T005975	Core 164	Composite	0.00359	0.00371	0.00365
Liquids			µCi/mL	µCi/mL	µCi/mL
S96T005980	Core 164	Composite	<1.740E-04	<1.760E-04	<1.750E-04

Table B2-70. Tank 241-AN-104 Analytical Results: Iodine-129.

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			**µCi/mL**	**µCi/mL**	**µCi/mL**
S97T000022	Core 164	Composite	1.930E-04	2.220E-04	2.075E-04
Solids: water digest			**µCi/g**	**µCi/g**	**µCi/g**
S96T005977	Core 164	Composite	<0.00277	<0.00276	<0.002765

Table B2-71. Tank 241-AN-104 Analytical Results: Tritium (Liquid Scintillation).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: water digest			**µCi/g**	**µCi/g**	**µCi/g**
S96T005977	Core 164	Composite	0.00971	0.0105	0.010105[QC:f]
Liquids			**µCi/mL**	**µCi/mL**	**µCi/mL**
S97T000389	Core 164	Composite	0.00159	0.00143	0.00151

Table B2-72. Tank 241-AN-104 Analytical Results: Neptunium-237.

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion			**µCi/g**	**µCi/g**	**µCi/g**
S96T005975	Core 164	Composite	<0.012	<0.0112	<0.0116[QC:a]
Liquids			**µCi/mL**	**µCi/mL**	**µCi/mL**
S96T005980	Core 164	Composite	<2.260E-05	<3.680E-05	<2.970E-05[QC:a]

Table B2-73. Tank 241-AN-104 Analytical Results: Technetium-99.

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion			**µCi/g**	**µCi/g**	**µCi/g**
S96T005975	Core 164	Composite	0.141	0.128	0.1345
Liquids			**µCi/mL**	**µCi/mL**	**µCi/mL**
S97T000022	Core 164	Composite	2.220E-04	2.170E-04	2.195E-04

Table B2-74. Tank 241-AN-104 Analytical Results: Americium-241 (Alpha Energy Analysis).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion			μCi/g	μCi/g	μCi/g
S96T005975	Core 164	Composite	0.0188	0.0196	0.0192
Liquids			μCi/mL	μCi/mL	μCi/mL
S96T005980	Core 164	Composite	<3.510E-04	<3.430E-04	<3.470E-04

Table B2-75. Tank 241-AN-104 Analytical Results: Cm-243/244 (Alpha Energy Analysis).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion			μCi/g	μCi/g	μCi/g
S96T005975	Core 164	Composite	<0.00399	<0.00377	<0.00388
Liquids			μCi/mL	μCi/mL	μCi/mL
S96T005980	Core 164	Composite	<3.510E-04	<3.430E-04	<3.470E-04

B3.0 ASSESSMENT OF CHARACTERIZATION RESULTS

This section discusses the overall quality and consistency of the current sampling results for tank 241-AN-104, and it provides the calculation results of an analytical-based inventory. This section also evaluates sampling and analysis factors that may impact data interpretation. These factors are used to assess overall data quality and consistency and to identify limitations in data use.

B3.1 FIELD OBSERVATIONS

The safety screening DQO (Dukelow et al. 1995) requires all vertical waste profiles be obtained from two widely spaced risers. The flammable gas DQO (McDuffie and Johnson 1995) requires at least one complete core be obtained. All expected segments were collected from core 163; segments 6 and 21 were not recovered from core 164. The waste recovered in segments with less than full recovery was assumed to represent the whole segment. Hydrostatic head fluid was used in the sampling. The analytical results of the trace elements Br and Li indicate few segments were contaminated by HHF.

B3.1.1 Evaluation of Hydrostatic Head Fluid Contamination

In tank 241-AN-104, the trace elements Li and Br in HHF were detected in solid and liquid samples, thus providing evidence of HHF extrusion in the waste samples. Tables B2-23 and B2-44 show the analytical results of Li and Br. Based on the data, a corrected water content in the contaminated samples was calculated. For the core sampling event, correction of water intrusion (such as HHF) based on Li and Br tracers was addressed and formulated by Winkleman (1996b). Detailed contaminated water content evaluations are given below.

According to the sample chain-of-custody data, the HHF used in sampling contains 0.3*M* of a Li and Br solution. The analytical results of Li and Br in the sample of the HHF field blank are 1,960 μg/mL for Li and 22,000 μg/mL for Br. To convert the concentration from μg/g to molarity, use approximately 0.282*M* and 0.275*M* for Li and Br, respectively. These are close to the Li and Br concentration 0.3*M* in the HHF solution prepared for field use. The data are used as a baseline for the evaluation of water contamination in the sample.

According to Bechtold (1995), lithium ions were easily formed into soluble compounds with other constituents and precipitate. Therefore, the concentrations was not a good indicator to use in calculating the amount of HHF in waste samples. Correction of the water content was based only on bromide data. Table B3-1 lists the analytical results of Br above the detection limit. The highest value of Br is 1,748 μg/mL for the liquid sample from segment 3, core 164, and 1,163 μg/g for the solid sample from segment 19, upper half of core 164. Based on these results, the percent of HHF in water and corrected water content in the waste samples are calculated according to Winkelman (1996b) and listed in Table B3-1. The

Table B3-1. Weight Percent Water Correction Based on Bromide Results for Tank 241-AN-104.

Samples	Br (by IC)			Water		
	Sample Results	Duplicate Results	Mean Value	% of HHF in Water	Uncorrected wt% Water[1]	Corrected wt% Water
Solids:	µg/g					
163:12 Lower half	1,038	1,020	1,029	9.87	46.99 (0.16)	44.6
163:18 Upper half	667.9	635	651.5	7.12	41.26 (0.31)	39.51
164:14 Upper half	1,158	1,160	1,159	11.66	45.84 (0.79)	41.85
164:14 Lower half	389.6	513	451.3	4.36	46.66 (0.06)	45.57
164:19 Upper half	1,165	1,160	1,162.5	11.40	46.05 (0.06)	43.06
164:Composite	1,145	n/a	1,145	13.0	39.81 (1.09)	36.58
Liquids	µg/mL					
163:4	916.9	950	933.45	5.89	51.95 (0.18)	50.57
163:5	815.8	893	854.4	5.42	52.05 (0.04)	50.69
163:6	736.3	748	742.15	4.76	52.34 (0.07)	51.15
163:7	654.9	650	652.45	4.04	51.61 (0.14)	50.61
163:8	731.3	749	740.15	4.56	52.03 (0.10)	50.89
163:9	1,104	1,050	1,077	6.89	52.14 (0.21)	50.40
163:10	1,107	1,080	1,093.5	6.79	52.09 (0.32)	50.38
163:12	1,128	1,150	1,139	6.71	52.58 (0.14)	50.89
163:14	757.2	759	758.1	4.43	51.48 (0.30)	50.72
164:2	1,167	1,120	1,143.5	7.31	50.68 (1.57)	48.83
164:3	1,756	1,740	1,748	11.02	51.02 (0.02)	48.16
164:4	1,738	1,740	1,739	10.74	51.63 (0.02)	48.86
164:9	848.7	844	846.35	5.25	51.53 (0.50)	50.22
164:10	825.2	810	817.6	5.17	51.70 (0.14)	50.41
164:11	1,707	1,750	1,728.5	10.66	51.71 (0.02)	48.96
164:13	902.5	887	894.75	5.63	51.60 (0.16)	50.19
164:Composite	1,520	1,580	1,550	9.70	51.25 (0.12)	48.76

Note:

[1]Uncorrected wt% water is from Table B2-57. The values in parentheses are the standard deviation of wt% water.

results show the highest contaminations are 11.66 percent for solid samples from segment 14, upper half of core 164, and 11.02 percent for liquid samples from segment 3, core 163. The solid core composite sample has 13 percent HHF in water, and the calculation based on Br data was 1,145 ug/g. The duplicate data is below a detection limit of 976 ug/g. The corrected water content is reduced ranging from 3.9 wt% (solid sample from segment 14, upper half of core 164) to 0.76 wt% water (liquid sample from segment 14, core 163 comparing the uncorrected value).

By incorporating the water content corrections, tank mean TGA values were recalculated as 50.4 percent for liquids and 45.31 percent for solids. The DSC and TOC values in dry weight basis were corrected accordingly. No corrected value exceeds the threshold values of the safety screening DQO requirements.

B3.2 QUALITY CONTROL ASSESSMENT

The usual QC assessment includes an evaluation of the appropriate standard recoveries, spike recoveries, duplicate analyses, and blanks that are performed in conjunction with the chemical analyses. All pertinent QC tests were conducted on 1996 core samples, enabling a full assessment regarding data accuracy and precision. Winkelman (1996a) established specific criteria for all analytes. Sample and duplicate pairs with one or more QC results outside the specified criteria are identified by footnotes in the data summary tables.

The standard and spike recovery results provide an estimate of analysis accuracy. If a standard or spike recovery is above or below the given criterion, the analytical results may be biased high or low, respectively. The precision is estimated by the RPD, which is defined as the absolute value of the difference between the primary and duplicate samples, divided by their mean, times 100.

A high RPD was reported for two of 40 subsamples submitted for total alpha activity. This may have been caused by subsequent self-shielding. Reruns were deemed unnecessary because sample results were far below the action limit. Some high RPDs for IC analytes may be attributable to sample homogeneity problems. The high RPD and poor spike recovery for fluoride is because the fluoride peak is near the baseline, and it experiences interference from the slightly larger chloride peak.

Many ICP analytes also had one or more QC parameters outside specified limits. Poor spike recoveries for sodium may be caused by the high concentration of sodium in the samples. (Samples cannot be spiked to levels much greater than at present.) High concentrations of sodium required high dilutions for all ICP samples. These high dilutions can cause poor or meaningless spike recoveries and RPDs for ICP elements with very high concentrations or for those close to the detection limit. Finally, no sample exceeded the criterion for preparation blanks; therefore, contamination was not a problem.

In summary, the vast majority of QC results were within the boundaries specified in sampling and analysis plans. The discrepancies mentioned here and footnoted in the data summary tables should not impact data validity or use.

B3.3 DATA CONSISTENCY CHECKS

Comparing different analytical methods helps in accessing data consistency and quality. Several comparisons were possible with the data set provided by the two core samples, including a comparison of phosphorous and sulfur as analyzed by ICP with phosphate and sulfate as analyzed by IC. Weight percent water data was checked using Li and Br data as described in Section B3.1.1. In addition, mass and charge balances were calculated to help assess the overall data consistency.

B3.3.1 Comparison of Results from Different Analytical Methods

The following data consistency checks compare the results from two analytical methods. A close comparison between the two methods strengthens the credibility of both results, but a poor comparison brings the reliability of the data into question.

The analytical phosphorous mean result as determined by ICP was 808 μg/g, which converts to 2,478 μg/g of phosphate. This compared well with the IC phosphate mean result of 2,118 μg/g (see Table B3-2). The RPD between these two phosphate results was 16 percent. The ICP sulfur value of 1,955 μg/g, which represents total sulfur, is equivalent to 5,864 μg/g of sulfate. The IC result for sulfate was 4,866 μg/g (see Table B3-2) with an RPD between the two values of 19 percent. This comparison shows that the results from ICP and IC methods agree reasonably well. Usually the calculated sulfur/phosphate values from ICP are equal or larger than the measured sulfur/phosphate from IC because the IC only measured the soluble sulfur/phosphate.

Table B3-2. Comparison of Phosphate/Phosphorous and Sulfate/Sulfur Results.

Analytes	Supernate		Salt Slurry	Weighted Mean[1]
	$\mu g/mL$	$\mu g/g$	$\mu g/g$	$\mu g/g$
Phosphate vs Phosphorous				
P (by ICP)	629	449	1,370	1,219
PO_4 (by IC)	1,621	1,158	3,620	2,118
PO_4 (calculated from P)		1,377	4,198	2,478
PO_4 ratio (calculated/IC)		1.19	1.16	1.17
Sulfate vs Sulfur				
S (by ICP)	843	602	4,070	1,955
SO_4 (by IC)	1,143	816	11,200	4,866
SO_4 (calculated from S)		1,806	12,210	5,864
SO_4 ratio (calculated/IC)		2.21	1.09	1.21

Note:

[1]Weighted mean was calculated using the following formula: 0.61*[supernatant]+0.39*[salt slurry].

B3.3.2 Mass and Charge Balance

The principal objective in performing mass and charge balances is to determine whether the measurements are consistent. In calculating the balances, only the analytes listed in Section B2.0, detected at a concentration of 1,000 $\mu g/g$ or greater, were considered. Table B3-3 lists the analytical data and calculations for charge and mass balances. All analytical results used in calculating the supernatant mass and charge balances were first converted from $\mu g/mL$ to $\mu g/g$ (using the supernatant specific gravity mean of 1.4 g/mL). The weighted total concentration was generated by multiplying the concentration of analyte in supernate and slurry by 61 percent and 39 percent, respectively, based on the volumes of supernate and slurry. The anions listed in Table B3-3 were assumed present as sodium salts and were expected to balance the positive charge exhibited by the cations. Sulfur was assumed present as sulfate. Phosphate, as determined by IC, is assumed to be completely water soluble and appears only in the anion mass and charge calculations. The concentrations of cationic species, anionic species, and water were used to calculate the mass and charge balance.

Table B3-3. Mass and Charge Balance for Tank 241-AN-104.

Analyte	Supernate Conc. (μg/mL)	Slurry Conc. (μg/g)	Weighted Total Conc. (μg/g)	Assumed Species	Conc. of Assumed Species (μg/g)	Charge (μeq/g)
Cation						
Sodium	256,000	236,000	203,583	Na^+	203,583	8,851
Sub-Total					203,583	8,851
Anion						
Aluminum	38,600	21,100	25,048	AlO_2	54,734	-2,027
Chloride	8,090	4,420	5,249	Cl^-	5,249	-148
Hydroxide	70,900	37,200	45,400	OH^-	45,400	-2,671
Nitrate	170,000	112,000	117,751	NO_3^-	117,751	-1,899
Nitrite	125,000	62,800	78,956	NO_2^-	78,956	-1,716
Phosphate	2,270	3,620	2,401	PO_4^{3-}	2,401	-76
Sulfate	1,600	11,200	5,065	SO_4^{2-}	5,065	-106
Sub-Total					309,556	-8,643
Water						
Water	511,000	456,000	489,550	H_2O	489,550	0
Sub-Total					489,550	0
Total					1,002,689	208

Note:
Conc. = concentration

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

Mass balance = % Water + 0.0001 x {total analyte concentration}

= % Water + 0.0001 x $Na^+ + AlO_2^- + Cl^- + OH^- + NO_2^- + NO_3^- + PO_4^{-3}$}

The total analyte concentration calculated from the above equation is 513,139 μg/g. The mean weight percent water is 49 percent, or 489,550 μg/g. The mass balance resulting from adding the percent water to the total analyte concentration is 100.2 percent (see Table B3-4).

The following equations demonstrate the derivation of total cations and total anions; the charge balance is the ratio of these two values.

Total cations (μeq/g) = $[Na^+]/23.0$ = 8,851 μeq/g

Total anions (μeq/g) = $[AlO_2^-/59] + [Cl^-]/35.5 + [OH^-]/17.0 + [NO_2^-]/46.0 + [NO_3^-]/62.0 + [PO_4^{-3}]/95.0 * 3 + [SO_4^{-2}]/96.0 * 2$ = -8,643 μeq/g

The charge balance obtained by dividing the sum of the positive charge by the sum of the negative charge was 1.02.

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

B3.4 MEAN CONCENTRATIONS AND CONFIDENCE INTERVALS

The following statistical evaluation was performed using the analytical data generated from tank 241-AN-104 core samples. The core samples (163 and 164) were obtained September 1996 from two risers and included the full length of the waste in the tank (21 segments). The crust was considered to be the solids from segment 1 and a portion of segment 2. Supernatant samples made up the remainder of segment 2 through segment 12 and a portion of segment 13. Salt slurry samples made up the remainder of segment 13 through segment 21. The three sets of data (crust, supernate, and slurry) were analyzed separately.

For each data set, a mean concentration and the associated variability were calculated for each analyte. A two-sided 95 percent CI for the mean concentration was also calculated for each analyte. The CI takes into account the sampling and analytical uncertainties. The upper and lower limits (UL and LL) of a two-sided 95 percent CI for the mean are

$$\hat{\mu} \pm t_{(df,0.025)} \times \hat{\sigma}_{\hat{\mu}}.$$

In these equations, $\hat{\mu}$ is the estimate of the mean concentration, $\hat{\sigma}_{\hat{\mu}}$ is the estimate of the standard deviation of the mean concentration, and $t_{(df,0.025)}$ is the quantile from Student's t distribution with *df* degrees of freedom for a two-sided 95 percent CI. The mean, $\hat{\mu}$, and the standard deviation of the mean, $\hat{\sigma}_{\hat{\mu}}$, were estimated using restricted maximum likelihood estimation (REML) methods.

B3.4.1 Mean Concentrations

B3.4.1.1 Supernate Data. The statistics in this section were based on analytical data from the 1996 sampling event of tank 241-AN-104. The 1996 data were statistically evaluated using two different models. The first model used a nested analysis of variance (ANOVA): the data were identified by segment within riser. The second model used a one-way ANOVA: the data were identified by one variable (the sample). Analysis of variance techniques were used to estimate the mean and its associated variability for all analytes that had at least 50 percent of the reported data as quantitative values.

For those analytes, which had a mixture of quantitative values and "less than" values, the ANOVA was computed using two methodologies.

> The upper value of the "less than" (for example, 3.5 for <3.5) was used to represent all "less than" analytical values in the first computation. This produces a bias of unknown magnitude in both the mean analyte concentration and the variance associated with the mean; the mean analyte concentration is biased high. The extension ".lt" was added to the analyte name in the tables to distinguish which analyte was statistically analyzed using "less than" values.
>
> The "less than" values were deleted in the second computation. Deleting data produces unbalanced data sets and complicates the statistical analysis. Deleting data decreases the number of degrees of freedom and produces a bias of unknown magnitude in both the mean analyte concentration and the variance associated with the mean. The extension ".nlt" was added to the analyte name in the tables to distinguish which analyte was statistically analyzed with the "less than" values deleted.

No ANOVA estimates were computed for analytes that had less than 50 percent of the reported data as quantitative values.

Tables B3-4 (nested ANOVA) and B3-5 (one-way ANOVA) provide the mean concentration estimates for the supernate layer and the two-sided 95 percent CI for the mean concentration for analytes with at least 50 percent of the reported data as quantitative values. For some analytes, the LL of the 95 percent CI was a negative value caused by the magnitude of the variability. Because the actual concentration of a tank sample cannot be less than zero, the LL is reported as zero. The analytes in Table B3-4 where $\hat{\sigma}_{riser}$ is significantly different from zero are marked with a "*". The riser variable is an indicator of horizontal homogeneity.

For analytes where $\hat{\sigma}_{riser}$ is not significantly different from zero, the mean concentrations and the variances of the mean concentrations calculated using the two statistical models (one-way ANOVA and nested ANOVA) are not significantly different. In these cases, the result from the one-way ANOVA model is more appropriate.

Table B3-6 lists the analytes (supernate layer) which had less than 50 percent of the reported data as quantitative values, and it cites the largest value observed from analytical results.

Table B3-4. Summary Statistics - Supernate (nested ANOVA). (2 sheets)

Analyte	Units	$\hat{\mu}$	$\hat{\sigma}_{\hat{\mu}}$	df	LL	UL
% Water.tga	wt%	5.11E+01	3.85E-01	1	4.63E+01	5.60E+01
Acetate.ic.lt	μg/mL	6.12E+02	5.47E+01	1	0.00E+00	1.31E+03
Acetate.ic.nlt	μg/mL	6.02E+02	5.61E+01	1	0.00E+00	1.31E+03
Ag.icp.d.lt	μg/mL	1.77E+01	6.12E-01	1	9.94E+00	2.55E+01
Ag.icp.d.nlt	μg/mL	1.86E+01	2.40E-01	1	1.55E+01	2.16E+01
Al.icp.d	μg/mL	3.86E+04	3.34E+02	1	3.43E+04	4.28E+04
B.icp.d.lt	μg/mL	6.48E+01	5.16E-01	1	5.83E+01	7.14E+01
B.icp.d.nlt	μg/mL	6.49E+01	6.18E-01	1	5.71E+01	7.28E+01
Br^-.ic.lt	μg/mL	1.08E+03	1.76E+02	1	0.00E+00	3.32E+03
Br^-.ic.nlt	μg/mL	1.11E+03	2.25E+02	1	0.00E+00	3.97E+03
Cl^-.ic	μg/mL	8.09E+03	4.02E+02	1	0.00E+00	1.32E+04
Cr.icp.d	μg/mL	3.36E+02	3.01E+00	1	2.98E+02	3.74E+02
DSC.dry[1]	J/g dry	9.34E+00	8.04E+00	1	0.00E+00	1.11E+02
DSC.exo[1]	J/g wet	4.34E+00	3.71E+00	1	0.00E+00	5.15E+01
Formate.ic.lt	μg/mL	9.59E+02	8.46E+01	1	0.00E+00	2.03E+03
Formate.ic.nlt	μg/mL	9.83E+02	6.21E+01	1	1.94E+02	1.77E+03
K.icp.d[1]	μg/mL	6.70E+03	1.50E+02	1	4.78E+03	8.61E+03
Li.icp.d.lt	μg/mL	1.17E+01	3.15E+00	1	0.00E+00	5.16E+01
Li.icp.d.nlt	μg/mL	1.53E+01	2.68E+00	1	0.00E+00	4.94E+01
Mo.icp.d	μg/mL	8.03E+01	7.17E-01	1	7.12E+01	8.94E+01
NO_2^-.ic	μg/mL	1.25E+05	1.27E+04	1	0.00E+00	2.87E+05
NO_3^-.ic	μg/mL	1.70E+05	8.47E+03	1	0.00E+00	2.78E+05
Na.icp.d	μg/mL	2.56E+05	1.92E+03	1	2.31E+05	2.80E+05
P.icp.d	μg/mL	8.81E+02	4.48E+01	1	3.13E+02	1.45E+03
PO_4^{3-}.ic.lt	μg/mL	2.27E+03	2.17E+02	1	0.00E+00	5.02E+03
S.icp.d	μg/mL	1.18E+03	2.40E+01	1	8.72E+02	1.48E+03
SO_4^{2-}.ic.lt	μg/mL	1.60E+03	2.40E+02	1	0.00E+00	4.66E+03
SO_4^{2-}.ic.nlt	μg/mL	1.70E+03	2.36E+02	1	0.00E+00	4.70E+03
Si.icp.d[1]	μg/mL	2.43E+02	3.03E+01	1	0.00E+00	6.28E+02
Specific gravity	---	1.40E+00	7.04E-03	1	1.31E+00	1.49E+00
Zn.icp.d.lt[1]	μg/mL	1.41E+01	7.34E+00	1	0.00E+00	1.07E+02

Table B3-4. Summary Statistics - Supernate (nested ANOVA). (2 sheets)

Analyte	Units	$\hat{\mu}$	$\hat{\sigma}_{\hat{\mu}}$	df	LL	UL
Zn.icp.d.nlt[1]	μg/mL	1.53E+01	7.08E+00	1	0.00E+00	1.05E+02
Zr.icp.d.lt[1]	μg/mL	7.81E+00	8.99E-01	1	0.00E+00	1.92E+01
Zr.icp.d.nlt	μg/mL	7.86E+00	3.58E-01	1	3.31E+00	1.24E+01

Note:

[1] $\hat{\sigma}_{riser}$ is significantly different from zero (evidence of horizontal heterogeneity).

Table B3-5. Summary Statistics - Supernate (one-way ANOVA). (2 sheets)

Analyte	Units	$\hat{\mu}$	$\hat{\sigma}_{\hat{\mu}}$	df	LL	UL
% Water.tga	wt%	5.11E+01	3.85E-01	22	5.03E+01	5.19E+01
Acetate.ic.lt	μg/mL	6.12E+02	5.47E+01	22	4.99E+02	7.26E+02
Acetate.ic.nlt	μg/mL	6.02E+02	5.61E+01	21	4.85E+02	7.18E+02
Ag.icp.d.lt	μg/mL	1.77E+01	4.91E-01	22	1.67E+01	1.87E+01
Ag.icp.d.nlt	μg/mL	1.86E+01	1.62E-01	19	1.82E+01	1.89E+01
Al.icp.d	μg/mL	3.86E+04	3.33E+02	22	3.79E+04	3.93E+04
B.icp.d.lt	μg/mL	6.48E+01	5.16E-01	22	6.38E+01	6.59E+01
B.icp.d.nlt	μg/mL	6.49E+01	5.16E-01	22	6.39E+01	6.60E+01
Br^-.ic.lt	μg/mL	1.08E+03	7.51E+01	21	9.21E+02	1.23E+03
Br^-.ic.nlt	μg/mL	1.07E+03	9.82E+01	14	8.57E+02	1.28E+03
Cl^-.ic	μg/mL	8.09E+03	4.02E+02	21	7.25E+03	8.92E+03
Cr.icp.d	μg/mL	3.36E+02	3.01E+00	22	3.30E+02	3.42E+02
Formate.ic.lt	μg/mL	9.61E+02	5.32E+01	22	8.51E+02	1.07E+03
Formate.ic.nlt	μg/mL	9.86E+02	4.95E+01	21	8.83E+02	1.09E+03
Li.icp.d.lt	μg/mL	1.18E+01	1.69E+00	22	8.25E+00	1.53E+01
Li.icp.d.nlt	μg/mL	1.55E+01	2.77E+00	11	9.44E+00	2.16E+01
Mo.icp.d	μg/mL	8.03E+01	7.17E-01	22	7.88E+01	8.18E+01
NO_2^-.ic	μg/mL	1.25E+05	1.10E+04	21	1.02E+05	1.48E+05
NO_3^-.ic	μg/mL	1.70E+05	8.47E+03	21	1.53E+05	1.88E+05
Na.icp.d	μg/mL	2.56E+05	1.92E+03	22	2.52E+05	2.60E+05
P.icp.d	μg/mL	8.83E+02	2.68E+01	22	8.27E+02	9.38E+02
PO_4^{3-}.ic.lt	μg/mL	2.27E+03	1.44E+02	21	1.97E+03	2.57E+03

Table B3-5. Summary Statistics - Supernate (one-way ANOVA). (2 sheets)

Analyte	Units	$\hat{\mu}$	$\hat{\sigma}_{\hat{\mu}}$	df	LL	UL
S.icp.d	µg/mL	1.18E+03	1.92E+01	22	1.14E+03	1.22E+03
SO_4^{2-}.ic.lt	µg/mL	1.60E+03	1.08E+02	21	1.38E+03	1.83E+03
SO_4^{2-}.ic.nlt	µg/mL	1.69E+03	1.06E+02	18	1.47E+03	1.92E+03
Specific gravity	---	1.40E+00	7.04E-03	22	1.39E+00	1.41E+00
Zr.icp.d.nlt	µg/mL	7.86E+00	3.58E-01	12	7.08E+00	8.64E+00

Table B3-6. Analytes (Supernate) with >50 Percent "Less Than" Values. (2 sheets)

Analyte	Unit	Maximum Result
As.icp.d	µg/mL	<120
Ba.icp.d	µg/mL	<60.1
Be.icp.d	µg/mL	<6
Bi.icp.d	µg/mL	<120
Ca.icp.d	µg/mL	<120
Cd.icp.d	µg/mL	<6
Ce.icp.d	µg/mL	<120
Co.icp.d	µg/mL	66.5
Cu.icp.d	µg/mL	<12
Fe.icp.d	µg/mL	<60.1
La.icp.d	µg/mL	<60.1
Mg.icp.d	µg/mL	<120
Mn.icp.d	µg/mL	<12
Nd.icp.d	µg/mL	<120
Ni.icp.d	µg/mL	<24
Sb.icp.d	µg/mL	<72.1
Se.icp.d	µg/mL	<120
Sm.icp.d	µg/mL	<120
Sr.icp.d	µg/mL	<12
Ti.icp.d	µg/mL	<12
Tl.icp.d	µg/mL	<240

Table B3-6. Analytes (Supernate) with >50 Percent "Less Than" Values. (2 sheets)

Analyte	Unit	Maximum Result
Total Alpha	μCi/mL	<0.0994
U.icp.d	μg/mL	<600
V.icp.d	μCi/mL	<60.1

A supernate composite sample was formed from supernate subsamples from core 164 segments 1 to 13 (15 mL from segments 1, 2, 3, 4, 5, 7, 8, 9, 10, 11, 12, and 13). The arithmetic mean, the associated variability, and a two-sided 95 percent CI for the mean concentration were calculated for each analyte with at least 50 percent of the reported data as quantitative values. The CI takes into account only the analytical uncertainty. Tables B3-7 and B3-8 list the summary statistics.

Table B3-7. Summary Statistics - Supernate Composite (core 164, segments 1 to 13). (2 sheets)

Analyte	Units	$\hat{\mu}$	$\hat{\sigma}_{\hat{\mu}}$	df	LL	UL
% Water.tga	wt%	5.11E+01	2.55E-01	1	4.79E+01	5.44E+01
Acetate.ic	μg/mL	1.88E+03	1.10E+02	1	4.82E+02	3.28E+03
Al.icp.d	μg/mL	4.17E+04	8.00E+02	1	3.15E+04	5.19E+04
Br^-.ic	μg/mL	1.55E+03	3.00E+01	1	1.17E+03	1.93E+03
Cl^-.ic	μg/mL	9.46E+03	1.60E+02	1	7.43E+03	1.15E+04
Co.icp.d	μg/mL	7.13E+01	3.95E+00	1	2.11E+01	1.21E+02
Cr(VI)	μg/mL	2.13E+02	1.50E+00	1	1.93E+02	2.32E+02
Cr.icp.d	μg/mL	3.61E+02	4.00E+00	1	3.10E+02	4.12E+02
^{137}Cs.gea	μCi/mL	5.70E+02	2.00E+00	1	5.45E+02	5.95E+02
DSC.dry	Joules/g dry	3.88E+01	9.00E-01	1	2.74E+01	5.02E+01
DSC.exo	Joules/g wet	1.90E+01	4.50E-01	1	1.32E+01	2.47E+01
Formate.ic	μg/mL	3.44E+03	1.00E+01	1	3.31E+03	3.57E+03
^{3}H	μCi/mL	1.51E-03	8.00E-05	1	4.94E-04	2.53E-03
^{129}I	μCi/mL	2.08E-04	1.45E-05	1	2.33E-05	3.92E-04
K.icp.d	μg/mL	6.90E+03	1.25E+02	1	5.31E+03	8.48E+03
Mo.icp.d	μg/mL	8.70E+01	1.95E+00	1	6.22E+01	1.12E+02
NO_2^-.ic	μg/mL	1.31E+05	1.50E+03	1	1.11E+05	1.50E+05
NO_3^-.ic	μg/mL	2.07E+05	5.00E+02	1	2.00E+05	2.13E+05
Na.icp.d	μCi/mL	2.61E+05	6.00E+03	1	1.85E+05	3.37E+05

Table B3-7. Summary Statistics - Supernate Composite (core 164, segments 1 to 13). (2 sheets)

Analyte	Units	$\hat{\mu}$	$\hat{\sigma}_{\hat{\mu}}$	df	LL	UL
OH^-	μg/mL	7.09E+04	5.00E+02	1	6.45E+04	7.73E+04
P.icp.d	μg/mL	1.03E+03	3.25E+01	1	6.15E+02	1.44E+03
PO_4^{3-}.ic	μg/mL	3.80E+03	1.85E+02	1	1.44E+03	6.15E+03
S.icp.d	μg/mL	1.20E+03	2.00E+01	1	9.46E+02	1.45E+03
SO_4^{2-}.ic	μg/mL	2.31E+03	1.90E+02	1	0.00E+00	4.72E+03
Si.icp.d	μg/mL	3.79E+02	3.20E+01	1	0.00E+00	7.86E+02
Specific gravity	---	1.41E+00	5.00E-03	1	1.34E+00	1.47E+00
$^{89/90}Sr$	μCi/mL	3.38E-01	4.00E-03	1	2.87E-01	3.89E-01
TIC	μg/mL	2.17E+03	1.15E+02	1	7.04E+02	3.63E+03
TOC	μg/mL	3.11E+03	5.76E+02	2	6.30E+02	5.59E+03
^{99}Tc	μCi/mL	2.20E-04	2.50E-06	1	1.88E-04	2.51E-04
Total Alpha.lt	μCi/mL	2.53E-02	1.20E-03	1	2.14E-02	2.91E-02
Total Alpha.nlt	μCi/mL	2.51E-02	1.69E-03	1	1.79E-02	3.24E-02
Total Beta	μCi/mL	4.96E+02	1.35E+01	1	3.24E+02	6.67E+02
U.phos	μg/mL	3.68E+00	3.80E-01	1	0.00E+00	8.51E+00

Table B3-8. Supernate Composite (core 164, segments 1 to 13) Analytes with >50 Percent "Less Than" Values. (2 sheets)

Analyte	Unit	Maximum Result
Ag.icp.d	μg/mL	<1.20E+01
^{241}Am.aea	μCi/mL	<3.51E-04
^{241}Am.gea	μCi/mL	<1.36E+00
As.icp.d	μg/mL	<1.20E+02
B.icp.d	μg/mL	<6.01E+01
Ba.icp.d	μg/mL	<6.01E+01
Be.icp.d	μg/mL	<6.00E+00
Bi.icp.d	μg/mL	<1.20E+02
Ca.icp.d	μg/mL	<1.20E+02
Cd.icp.d	μg/mL	<6.00E+00
Ce.icp.d	μg/mL	<1.20E+02
$^{243/244}Cm$	μCi/mL	<3.51E-04

Table B3-8. Supernate Composite (core 164, segments 1 to 13) Analytes with >50 Percent "Less Than" Values. (2 sheets)

Analyte	Unit	Maximum Result
^{60}Co.gea	μCi/mL	<1.67E-02
Cu.icp.d	μg/mL	<1.20E+01
^{154}Eu.gea	μCi/mL	<1.28E-01
^{155}Eu.gea	μCi/mL	<6.57E-01
F^-.ic	μg/mL	<1.22E+02
Fe.icp.d	μg/mL	<6.01E+01
La.icp.d	μg/mL	<6.01E+01
Li.icp.d	μg/mL	<1.20E+01
Mg.icp.d	μg/mL	<1.20E+02
Mn.icp.d	μg/mL	<1.20E+01
Nd.icp.d	μg/mL	<1.20E+02
Ni.icp.d	μg/mL	<2.40E+01
^{237}Np	μCi/mL	<3.68E-05
Oxalate.ic	μg/mL	<1.07E+03
Pb.icp.d	μg/mL	<1.20E+02
$^{239/240}Pu$	μCi/mL	<1.76E-04
Sb.icp.d	μg/mL	<7.21E+01
Se.icp.d	μg/mL	<1.20E+02
Sm.icp.d	μg/mL	<1.20E+02
Sr.icp.d	μg/mL	<1.20E+01
Ti.icp.d	μg/mL	<1.20E+01
Tl.icp.d	μg/mL	<2.40E+02
U.icp.d	μg/mL	<6.00E+02
V.icp.d	μg/mL	<6.01E+01
Zn.icp.d	μg/mL	<1.20E+01
Zr.icp.d	μg/mL	<1.20E+01

B.3.4.1.2 Salt Slurry

Tables B3-9 (nested ANOVA with the riser term) and B3-10 (nested ANOVA without the riser term) list the mean concentration estimates for the slurry layer and the two-sided 95 percent CI for the mean concentration for analytes with at least 50 percent of the reported data as quantitative values. For some analytes, the LL of the 95 percent CI was a negative value caused by the magnitude of the variability. Because the actual concentration of a tank sample cannot be less than zero, the LL is reported as zero. The analytes in Table B3-9, where $\hat{\sigma}_{riser}$ is significantly different from zero, are marked with a "*". The riser variable is an indicator of horizontal homogeneity.

For analytes where $\hat{\sigma}_{riser}$ is not significantly different from zero, the mean concentrations and the variances of the mean concentrations calculated using the two statistical models (nested ANOVA with the riser term and nested ANOVA without the riser term) are not significantly different. In these cases, the results from the nested ANOVA model without the riser term is more appropriate. Table B3-11 lists the analytes (slurry layer) which had less than 50 percent of the reported data as quantitative values. Table B3-11 cites the largest value observed from the analytical results.

Table B3-9. Summary Statistics (per g basis) - Slurry (nested ANOVA with riser term). (2 sheets)

Analyte	Units	$\hat{\mu}$	$\hat{\sigma}_{\hat{\mu}}$	df	LL	UL
% Water.tga[1]	wt%	4.56E+01	1.66E+00	1	2.45E+01	6.67E+01
Acetate.ic.lt	μg/g	5.49E+02	3.37E+01	1	1.20E+02	9.77E+02
Acetate.ic.nlt	μg/g	5.83E+02	4.49E+01	1	1.22E+01	1.15E+03
Ag.icp.a.lt	μg/g	1.58E+01	9.35E-01	1	3.91E+00	2.77E+01
Ag.icp.a.nlt	μg/g	1.62E+01	1.28E+00	1	0.00E+00	3.25E+01
Al.icp.a[1]	μg/g	2.06E+04	1.38E+03	1	3.04E+03	3.82E+04
Al.icp.f	μg/g	2.11E+04	3.99E+02	1	1.60E+04	2.62E+04
B.icp.a	μg/g	1.34E+02	7.70E+00	1	3.59E+01	2.31E+02
Bulk Density[1]	g/mL	1.60E+00	4.15E-02	1	1.07E+00	2.13E+00
Ca.icp.a.lt	μg/g	2.25E+02	2.13E+01	1	0.00E+00	4.96E+02
Ca.icp.a.nlt	μg/g	2.25E+02	2.13E+01	1	0.00E+00	4.96E+02
Cd.icp.a.lt	μg/g	1.07E+01	1.58E+00	1	0.00E+00	3.09E+01
Cd.icp.a.nlt	μg/g	1.08E+01	1.65E+00	1	0.00E+00	3.17E+01
Cl^-.ic	μg/g	4.42E+03	1.48E+02	1	2.55E+03	6.30E+03
Cr.icp.a	μg/g	1.65E+03	2.99E+02	1	0.00E+00	5.45E+03
Cr.icp.f	μg/g	1.71E+03	1.88E+02	1	0.00E+00	4.10E+03
Cu.icp.a.lt[1]	μg/g	7.46E+00	2.89E+00	1	0.00E+00	4.42E+01
Cu.icp.a.nlt	μg/g	5.72E+00	1.21E+00	1	0.00E+00	2.11E+01
DSC.dry	Joules/g dry	2.38E+01	1.10E+01	1	0.00E+00	1.64E+02
DSC.exo	Joules/g wet	1.29E+01	6.07E+00	1	0.00E+00	9.01E+01
F^-.ic	μg/g	8.36E+02	1.45E+02	1	0.00E+00	2.68E+03
Fe.icp.a.lt	μg/g	9.75E+01	9.31E+00	1	0.00E+00	2.16E+02
Fe.icp.a.nlt	μg/g	1.04E+02	1.06E+01	1	0.00E+00	2.38E+02
Formate.ic	μg/g	7.77E+02	4.71E+01	1	1.79E+02	1.37E+03
K.icp.a[1]	μg/g	3.57E+03	2.05E+02	1	9.69E+02	6.17E+03
Li.icp.a.lt	μg/g	1.68E+01	5.21E+00	1	0.00E+00	8.30E+01
Li.icp.a.nlt	μg/g	2.05E+01	8.65E+00	1	0.00E+00	1.30E+02
Mn.icp.a.lt	μg/g	1.80E+01	3.08E+00	1	0.00E+00	5.71E+01
Mn.icp.a.nlt	μg/g	1.80E+01	3.14E+00	1	0.00E+00	5.79E+01
Mo.icp.a.lt[1]	μg/g	4.96E+01	8.17E+00	1	0.00E+00	1.53E+02

Table B3-9. Summary Statistics (per g basis) - Slurry (nested ANOVA with riser term). (2 sheets)

Analyte	Units	$\hat{\mu}$	$\hat{\sigma}_{\hat{\mu}}$	df	LL	UL
Mo.icp.a.nlt	µg/g	4.30E+01	1.95E+00	1	1.82E+01	6.77E+01
NO_2^-.ic	µg/g	6.28E+04	9.93E+02	1	5.02E+04	7.54E+04
NO_3^-.ic	µg/g	1.12E+05	5.60E+03	1	4.13E+04	1.84E+05
Na.icp.a	µg/g	1.92E+05	2.44E+03	1	1.61E+05	2.23E+05
Na.icp.f	µg/g	2.36E+05	8.30E+03	1	1.31E+05	3.41E+05
Ni.icp.a	µg/g	6.49E+01	1.27E+01	1	0.00E+00	2.26E+02
Ni.icp.f.lt	µg/g	6.37E+03	4.30E+03	1	0.00E+00	6.10E+04
Ni.icp.f.nlt	µg/g	6.41E+03	4.27E+03	1	0.00E+00	6.07E+04
Oxalate.ic	µg/g	8.33E+03	6.66E+02	1	0.00E+00	1.68E+04
P.icp.a	µg/g	1.39E+03	2.85E+02	1	0.00E+00	5.01E+03
PO_4^{3-}.ic.lt	µg/g	3.70E+03	8.77E+02	1	0.00E+00	1.48E+04
PO_4^{3-}.ic.nlt	µg/g	3.72E+03	8.65E+02	1	0.00E+00	1.47E+04
S.icp.a	µg/g	3.80E+03	2.35E+02	1	8.21E+02	6.79E+03
S.icp.f	µg/g	4.12E+03	4.99E+02	1	0.00E+00	1.05E+04
SO_4^{2-}.ic	µg/g	1.12E+04	8.95E+02	1	0.00E+00	2.26E+04
Si.icp.a	µg/g	6.09E+02	4.25E+01	1	6.93E+01	1.15E+03
Total Alpha.lt	µCi/g	8.06E-02	3.92E-02	1	0.00E+00	5.79E-01
Total Alpha.nlt	µCi/g	3.84E-02	8.13E-03	1	0.00E+00	1.42E-01
Zn.icp.a.lt	µg/g	2.02E+01	6.10E+00	1	0.00E+00	9.78E+01
Zn.icp.a.nlt[1]	µg/g	2.13E+01	7.20E+00	1	0.00E+00	1.13E+02
Zr.icp.a.lt	µg/g	1.79E+01	8.32E-01	1	7.31E+00	2.84E+01
Zr.icp.a.nlt	µCi/g	1.82E+01	8.93E-01	1	6.89E+00	2.96E+01

Note:

[1]$\hat{\sigma}_{riser}$ is significantly different from zero (evidence of horizontal heterogeneity).

Table B3-10. Summary Statistics (per g basis) - Slurry (nested ANOVA without riser). (2 sheets)

Analyte	Units	$\hat{\mu}$	$\hat{\sigma}_{\hat{\mu}}$	df	LL	UL
Acetate.ic.lt	µg/g	5.49E+02	3.37E+01	11	4.74E+02	6.23E+02
Acetate.ic.nlt	µg/g	5.83E+02	4.49E+01	11	4.84E+02	6.82E+02
Ag.icp.a.lt	µg/g	1.58E+01	9.35E-01	11	1.37E+01	1.78E+01
Ag.icp.a.nlt	µg/g	1.62E+01	1.28E+00	8	1.32E+01	1.91E+01
Al.icp.f	µg/g	2.11E+04	3.99E+02	11	2.02E+04	2.20E+04
B.icp.a	µg/g	1.34E+02	7.70E+00	11	1.17E+02	1.51E+02
Ca.icp.a.lt	µg/g	2.25E+02	2.13E+01	11	1.78E+02	2.72E+02
Ca.icp.a.nlt	µg/g	2.26E+02	2.11E+01	11	1.79E+02	2.72E+02
Cd.icp.a.lt	µg/g	1.09E+01	1.26E+00	11	8.09E+00	1.36E+01
Cd.icp.a.nlt	µg/g	1.09E+01	1.24E+00	11	8.18E+00	1.36E+01
Cl^-.ic	µg/g	4.42E+03	1.48E+02	11	4.10E+03	4.75E+03
Cr.icp.a	µg/g	1.69E+03	1.81E+02	11	1.29E+03	2.09E+03
Cr.icp.f	µg/g	1.71E+03	1.88E+02	11	1.30E+03	2.13E+03
Cu.icp.a.nlt	µg/g	5.99E+00	7.57E-01	6	4.14E+00	7.84E+00
DSC.dry	J/g dry	2.31E+01	8.96E+00	11	3.40E+00	4.28E+01
DSC.exo	J/g wet	1.25E+01	4.80E+00	11	1.93E+00	2.30E+01
F^-.ic	µg/g	8.36E+02	1.45E+02	11	5.16E+02	1.16E+03
Fe.icp.a.lt	µg/g	9.75E+01	9.31E+00	11	7.70E+01	1.18E+02
Fe.icp.a.nlt	µg/g	1.04E+02	1.06E+01	9	8.00E+01	1.28E+02
Formate.ic	µg/g	7.77E+02	4.71E+01	11	6.73E+02	8.80E+02
Li.icp.a.lt	µg/g	1.73E+01	3.97E+00	11	8.53E+00	2.60E+01
Li.icp.a.nlt	µg/g	2.05E+01	6.05E+00	9	6.86E+00	3.42E+01
Mn.icp.a.lt	µg/g	1.83E+01	2.00E+00	11	1.39E+01	2.27E+01
Mn.icp.a.nlt	µg/g	1.84E+01	1.99E+00	11	1.40E+01	2.28E+01
Mo.icp.a.nlt	µg/g	4.28E+01	1.11E+00	8	4.03E+01	4.54E+01
NO_2^-.ic	µg/g	6.28E+04	9.93E+02	11	6.06E+04	6.50E+04
NO_3^-.ic	µg/g	1.12E+05	5.60E+03	11	1.00E+05	1.25E+05
Na.icp.a	µg/g	1.92E+05	2.27E+03	11	1.87E+05	1.97E+05
Na.icp.f	µg/g	2.36E+05	7.11E+03	11	2.20E+05	2.51E+05
Ni.icp.a	µg/g	6.65E+01	8.03E+00	11	4.88E+01	8.41E+01

Table B3-10. Summary Statistics (per g basis) - Slurry (nested ANOVA without riser). (2 sheets)

Analyte	Units	$\hat{\mu}$	$\hat{\sigma}_{\hat{\mu}}$	df	LL	UL
Ni.icp.f.lt	μg/g	6.01E+03	3.27E+03	11	0.00E+00	1.32E+04
Ni.icp.f.nlt	μg/g	6.09E+03	3.30E+03	11	0.00E+00	1.33E+04
Oxalate.ic	μg/g	8.33E+03	6.66E+02	11	6.86E+03	9.79E+03
P.icp.a	μg/g	1.37E+03	2.41E+02	11	8.44E+02	1.90E+03
PO_4^{3-}.ic.lt	μg/g	3.62E+03	6.46E+02	11	2.20E+03	5.05E+03
PO_4^{3-}.ic.nlt	μg/g	3.64E+03	6.43E+02	11	2.22E+03	5.06E+03
S.icp.a	μg/g	3.80E+03	2.35E+02	11	3.29E+03	4.32E+03
S.icp.f	μg/g	4.07E+03	3.58E+02	11	3.28E+03	4.86E+03
SO_4^{2-}.ic	μg/g	1.12E+04	8.95E+02	11	9.24E+03	1.32E+04
Si.icp.a	μg/g	6.09E+02	4.25E+01	11	5.16E+02	7.03E+02
Total Alpha.lt	μCi/g	7.66E-02	2.61E-02	11	1.92E-02	1.34E-01
Total Alpha.nlt	μCi/g	4.04E-02	4.07E-03	8	3.10E-02	4.98E-02
Zn.icp.a.lt	μg/g	2.11E+01	3.34E+00	11	1.37E+01	2.84E+01
Zr.icp.a.lt	μg/g	1.79E+01	8.32E-01	11	1.60E+01	1.97E+01
Zr.icp.a.nlt	μg/g	1.83E+01	9.13E-01	11	1.63E+01	2.03E+01

Table B3-11. Analytes (Slurry - per g basis) with >50 Percent "Less Than" Values. (2 sheets)

Analyte	Unit	Maximum Result
Ag.icp.f	μg/g	<225
As.icp.a	μg/g	<153
As.icp.f	μg/g	<2250
B.icp.f	μg/g	<1130
Ba.icp.a	μg/g	<76.7
Ba.icp.f	μg/g	<1130
Be.icp.a	μg/g	<7.67
Be.icp.f	μg/g	<113
Bi.icp.a	μg/g	<153
Bi.icp.f	μg/g	<2250
Ca.icp.f	μg/g	<2250
Cd.icp.f	μg/g	<113
Ce.icp.a	μg/g	<153
Ce.icp.f	μg/g	<2250
Co.icp.a	μg/g	52.2
Co.icp.f	μg/g	<451
Cu.icp.f	μg/g	339
Fe.icp.f	μg/g	3620
La.icp.a	μg/g	<76.7
La.icp.f	μg/g	<1130
Li.icp.f	μg/g	<225
Mg.icp.a	μg/g	<153
Mg.icp.f	μg/g	<2250
Mn.icp.f	μg/g	325
Mo.icp.f	μg/g	<1130
Nd.icp.a	μg/g	<153
Nd.icp.f	μg/g	<2250
P.icp.f	μg/g	5400
Pb.icp.a	μg/g	706
Pb.icp.f	μg/g	<2250

Table B3-11. Analytes (Slurry - per g basis) with >50 Percent "Less Than" Values. (2 sheets)

Analyte	Unit	Maximum Result
Sb.icp.a	μg/g	<92.1
Sb.icp.f	μg/g	1590
Se.icp.a	μg/g	279
Se.icp.f	μg/g	<2250
Si.icp.f	μg/g	2060
Sm.icp.a	μg/g	<153
Sm.icp.f	μg/g	<2250
Sr.icp.a	μg/g	<15.3
Sr.icp.f	μg/g	<225
Ti.icp.a	μg/g	<15.3
Ti.icp.f	μg/g	<225
Tl.icp.a	μg/g	<307
Tl.icp.f	μg/g	<4510
U.icp.a	μg/g	<767
U.icp.f	μg/g	<11300
V.icp.a	μg/g	<76.7
V.icp.f	μg/g	<1130
Zn.icp.f	μg/g	635
Zr.icp.f	μg/g	<225

A slurry composite sample was formed from slurry subsamples from core 164, segments 13 to 20 (20 grams from segments 13 lower half (LH), 14 upper half (UH), 14 LH, 15 UH, 15 LH, 16 UH, 16 LH, 17 UH, 17 LH, 19 UH, 19 LH, 20 UH, and 20 LH). The arithmetic mean, the associated variability, and a two-sided 95 percent CI for the mean concentration were calculated for each analyte with at least 50 percent of the reported data as quantitative values. The CI takes into account only the analytical uncertainty. Tables B3-12 and B3-13 list the summary statistics.

Table B3-12. Summary Statistics - Slurry Composite (core 164, segments 13 to 20). (2 sheets)

Analyte	Units	$\hat{\mu}$	$\hat{\sigma}_{\hat{\mu}}$	df	LL	UL
% Water.tga	wt%	4.09E+01	4.36E+00	1	0.00E+00	9.62E+01
Acetate.ic	μg/g	6.37E+02	2.35E+01	1	3.38E+02	9.35E+02
Ag.icp.a	μg/g	1.39E+01	3.50E-01	1	9.40E+00	1.83E+01
Al.icp.a	μg/g	2.08E+04	1.50E+02	1	1.88E+04	2.27E+04
^{241}Am.aea	μCi/g	1.92E-02	4.00E-04	1	1.41E-02	2.43E-02
B.icp.a	μg/g	1.46E+02	1.25E+01	1	0.00E+00	3.04E+02
Br^-.ic.lt	μg/g	1.06E+03	8.20E+01	1	1.61E+01	2.10E+03
Bulk Density	g/mL	1.57E+00	NA	1	NA	NA
Ca.icp.a	μg/g	2.44E+02	2.55E+01	1	0.00E+00	5.68E+02
Cd.icp.a	μg/g	1.29E+01	3.00E-01	1	9.09E+00	1.67E+01
Cl^-.ic	μg/g	4.09E+03	6.50E+01	1	3.26E+03	4.91E+03
Cr(VI)	μg/g	2.00E+02	3.00E+00	1	1.62E+02	2.38E+02
Cr.icp.a	μg/g	2.00E+03	1.05E+02	1	6.61E+02	3.33E+03
^{137}Cs.gea	μCi/g	3.49E+02	8.00E+00	1	2.47E+02	4.51E+02
Cu.icp.a	μg/g	5.17E+00	1.50E-01	1	3.26E+00	7.08E+00
DSC.dry	J/g dry	1.75E+02	3.50E+00	1	1.30E+02	2.19E+02
DSC.exo	J/g wet	1.03E+02	2.00E+00	1	7.76E+01	1.28E+02
F^-.ic	μg/g	6.58E+02	1.26E+02	1	0.00E+00	2.26E+03
Fe.icp.a	μg/g	9.95E+01	4.55E+00	1	4.16E+01	1.57E+02
Formate.ic	μg/g	7.33E+02	3.05E+01	1	3.45E+02	1.12E+03
^{3}H	μCi/g	1.01E-02	3.95E-04	1	5.09E-03	1.51E-02
K.icp.a	μg/g	3.72E+03	9.00E+01	1	2.58E+03	4.86E+03
Li.icp.a	μg/g	1.50E+01	1.40E+00	1	0.00E+00	3.28E+01
Mn.icp.a	μg/g	2.09E+01	1.25E+00	1	4.97E+00	3.67E+01
Mo.icp.a	μg/g	4.34E+01	1.00E-01	1	4.21E+01	4.47E+01
NO_2^-.ic	μg/g	5.81E+04	1.50E+02	1	5.61E+04	6.00E+04
NO_3^-.ic	μg/g	1.01E+05	1.00E+03	1	8.83E+04	1.14E+05
Na.icp.a	μg/g	1.92E+05	3.50E+03	1	1.47E+05	2.36E+05
Ni.icp.a	μg/g	7.50E+01	4.50E+00	1	1.78E+01	1.32E+02
OH^-	μg/g	3.72E+04	1.05E+03	1	2.38E+04	5.05E+04

Table B3-12. Summary Statistics - Slurry Composite (core 164, segments 13 to 20). (2 sheets)

Analyte	Units	$\hat{\mu}$	$\hat{\sigma}_{\hat{\mu}}$	df	LL	UL
Oxalate.ic	μg/g	9.67E+03	1.15E+02	1	8.20E+03	1.11E+04
P.icp.a	μg/g	8.95E+02	1.05E+02	1	0.00E+00	2.23E+03
PO_4^{3-}.ic	μg/g	3.35E+03	2.15E+02	1	6.13E+02	6.08E+03
Pb.icp.a	μg/g	4.20E+01	1.00E-01	1	4.07E+01	4.33E+01
$^{239/240}Pu$	μCi/g	3.65E-03	6.00E-05	1	2.89E-03	4.41E-03
S.icp.a	μg/g	3.98E+03	2.40E+02	1	9.31E+02	7.03E+03
SO_4^{2-}.ic	μg/g	1.16E+04	1.00E+02	1	1.03E+04	1.29E+04
Si.icp.a	μg/g	7.62E+02	7.35E+01	1	0.00E+00	1.70E+03
$^{89/90}Sr$	μCi/g	3.43E+01	4.50E-01	1	2.85E+01	4.00E+01
TIC	μg/g	1.47E+04	3.50E+02	1	1.02E+04	1.91E+04
TOC	μg/g	4.63E+03	2.50E+01	1	4.31E+03	4.94E+03
^{99}Tc	μCi/g	1.35E-01	6.50E-03	1	5.19E-02	2.17E-01
Total Beta	μCi/g	4.00E+02	1.50E+01	1	2.09E+02	5.91E+02
U.phos	μg/g	1.81E+02	6.50E+00	1	9.79E+01	2.63E+02
Zn.icp.a	μg/g	1.68E+01	2.40E+00	1	0.00E+00	4.73E+01
Zr.icp.a	μg/g	1.69E+01	7.50E-01	1	7.32E+00	2.64E+01

Table B3-13. Slurry Composite (core 164, segments 13 to 20) Analytes with >50 percent "Less Than" Values.

Analyte	Unit	Maximum Result
^{241}Am.gea	μCi/g	<1.41E+00
As.icp.a	μg/g	<3.98E+01
Ba.icp.a	μg/g	<1.99E+01
Be.icp.a	μg/g	<1.99E+00
Bi.icp.a	μg/g	<3.98E+01
Ce.icp.a	μg/g	<3.98E+01
$^{243/244}$Cm	μCi/g	<3.99E-03
Co.icp.a	μg/g	<7.96E+00
^{60}Co.gea	μCi/g	<2.64E-02
^{154}Eu.gea	μCi/g	<1.00E-01
^{155}Eu.gea	μCi/g	<6.72E-01
^{129}I	μCi/g	<2.77E-03
La.icp.a	μCi/g	<1.99E+01
Mg.icp.a	μg/g	<3.98E+01
Nd.icp.a	μg/g	<3.98E+01
^{237}Np	μCi/g	<1.20E-02
Sb.icp.a	μg/g	<2.39E+01
Se.icp.a	μCi/g	<3.98E+01
Sm.icp.a	μg/g	<3.98E+01
Sr.icp.a	μg/g	<3.98E+00
Ti.icp.a	μg/g	<3.98E+00
Tl.icp.a	μg/g	<7.96E+01
Total Alpha	μCi/g	<3.93E-02
U.icp.a	μg/g	<1.99E+02
V.icp.a	μg/g	<1.99E+01

B3.4.1.3 Crust. Tables B3-14 (nested ANOVA with the riser term) and Table B3-15 (nested ANOVA without the riser term) list the mean concentration estimates for the crust and the two-sided 95 percent CI for the mean concentration for analytes with at least 50 percent of the reported data as quantitative values. For some analytes, the LL of the 95 percent CI was a negative value caused by the magnitude of the variability. Because the actual concentration of a tank sample cannot be less than zero, the LL is reported as zero. Table B3-16 lists the analytes (crust) which had less than 50 percent of the reported data as quantitative values, and it cites the largest value observed from the analytical results.

Table B3-14. Summary Statistics (per g basis) - Crust (nested ANOVA with riser term). (2 sheets)

Analyte	Units	$\hat{\mu}$	$\hat{\sigma}_{\hat{\mu}}$	df	LL	UL
% Water.tga	wt%	4.52E+01	2.89E+00	1	8.44E+00	8.19E+01
Acetate.ic[1]	μg/g	3.96E+02	4.76E+01	1	0.00E+00	1.00E+03
Ag.icp.a	μg/g	1.48E+01	8.67E-01	1	3.80E+00	2.58E+01
Al.icp.a	μg/g	1.95E+04	1.10E+03	1	5.55E+03	3.34E+04
Al.icp.f	μg/g	1.95E+04	2.29E+03	1	0.00E+00	4.85E+04
B.icp.a	μg/g	1.57E+02	2.19E+01	1	0.00E+00	4.35E+02
Ca.icp.a	μg/g	1.60E+02	2.14E+01	1	0.00E+00	4.32E+02
Cd.icp.a	μg/g	5.25E+00	1.04E+00	1	0.00E+00	1.84E+01
Cl^-.ic	μg/g	4.54E+03	2.73E+02	1	1.07E+03	8.01E+03
Cr.icp.a	μg/g	8.93E+02	1.42E+02	1	0.00E+00	2.70E+03
Cr.icp.f	μg/g	1.34E+03	4.05E+02	1	0.00E+00	6.49E+03
Cu.icp.a.lt	μg/g	4.89E+00	6.57E-01	1	0.00E+00	1.32E+01
Cu.icp.a.nlt	μg/g	4.99E+00	5.77E-01	1	0.00E+00	1.23E+01
F^-.ic	μg/g	6.04E+02	2.24E+02	1	0.00E+00	3.45E+03
Fe.icp.a	μg/g	2.54E+02	1.45E+02	1	0.00E+00	2.10E+03
Formate.ic	μg/g	6.28E+02	4.10E+01	1	0.00E+00	1.15E+03
K.icp.a	μg/g	3.46E+03	1.73E+02	1	1.26E+03	5.66E+03
Mn.icp.a	μg/g	1.20E+01	3.09E+00	1	0.00E+00	5.12E+01
Mo.icp.a	μg/g	4.13E+01	2.09E+00	1	1.47E+01	6.78E+01
NO_2^-.ic[1]	μg/g	6.57E+04	2.19E+03	1	3.79E+04	9.35E+04
NO_3^-.ic	μg/g	1.78E+05	3.55E+04	1	0.00E+00	6.29E+05
Na.icp.a	μg/g	1.94E+05	1.45E+03	1	1.75E+05	2.12E+05
Na.icp.f	μg/g	2.36E+05	6.94E+03	1	1.48E+05	3.24E+05

Table B3-14. Summary Statistics (per g basis) - Crust (nested ANOVA with riser term). (2 sheets)

Analyte	Units	$\hat{\mu}$	$\hat{\sigma}_{\hat{\mu}}$	df	LL	UL
Ni.icp.a	µg/g	3.16E+01	5.34E+00	1	0.00E+00	9.94E+01
Ni.icp.f	µg/g	3.81E+03	1.17E+03	1	0.00E+00	1.87E+04
Oxalate.ic	µg/g	7.59E+03	1.08E+03	1	0.00E+00	2.14E+04
P.icp.a	µg/g	1.53E+03	3.62E+02	1	0.00E+00	6.13E+03
PO_4^{3-}.ic	µg/g	4.51E+03	1.27E+03	1	0.00E+00	2.06E+04
S.icp.a	µg/g	2.63E+03	4.54E+02	1	0.00E+00	8.40E+03
S.icp.f.lt	µg/g	3.14E+03	6.98E+02	1	0.00E+00	1.20E+04
S.icp.f.nlt	µg/g	3.78E+03	4.70E+02	1	0.00E+00	9.75E+03
SO_4^{2-}.ic	µg/g	7.84E+03	2.18E+03	1	0.00E+00	3.56E+04
Si.icp.a	µg/g	8.82E+02	2.08E+01	1	6.17E+02	1.15E+03
Total Alpha.lt	µCi/g	4.61E-02	7.69E-03	1	0.00E+00	1.44E-01
Total Alpha.nlt	µCi/g	4.79E-02	1.20E-02	1	0.00E+00	2.01E-01
Zn.icp.a	µg/g	2.61E+01	2.98E+00	1	0.00E+00	6.40E+01
Zr.icp.a	µg/g	1.08E+01	1.37E+00	1	0.00E+00	2.82E+01

Note:

[1]$\hat{\sigma}_{riser}$ is significantly different from zero (evidence of horizontal heterogeneity).

Table B3-15. Summary Statistics (per g basis) - Crust (nested ANOVA without riser term). (2 sheets)

Analyte	Units	$\hat{\mu}$	$\hat{\sigma}_{\hat{\mu}}$	df	LL	UL
% Water.tga	wt%	4.52E+01	2.89E+00	2	3.27E+01	5.76E+01
Ag.icp.a	µg/g	1.48E+01	8.67E-01	2	1.11E+01	1.85E+01
Al.icp.a	µg/g	1.95E+04	1.10E+03	2	1.48E+04	2.42E+04
Al.icp.f	µg/g	1.95E+04	2.29E+03	2	9.61E+03	2.93E+04
B.icp.a	µg/g	1.62E+02	1.67E+01	2	9.03E+01	2.34E+02
Ca.icp.a	µg/g	1.60E+02	2.14E+01	2	6.85E+01	2.52E+02
Cd.icp.a	µg/g	5.25E+00	1.04E+00	2	7.88E-01	9.72E+00
Cl^-.ic	µg/g	4.50E+03	2.28E+02	2	3.52E+03	5.47E+03
Cr.icp.a	µg/g	8.93E+02	1.42E+02	2	2.80E+02	1.50E+03
Cr.icp.f	µg/g	1.27E+03	3.43E+02	2	0.00E+00	2.75E+03
Cu.icp.a.lt	µg/g	4.69E+00	4.48E-01	2	2.76E+00	6.62E+00
Cu.icp.a.nlt	µg/g	4.99E+00	5.77E-01	1	0.00E+00	1.23E+01
F^-.ic	µg/g	5.39E+02	1.59E+02	2	0.00E+00	1.22E+03
Fe.icp.a	µg/g	2.58E+02	1.41E+02	2	0.00E+00	8.66E+02
Formate.ic	µg/g	6.28E+02	4.10E+01	2	4.51E+02	8.04E+02
K.icp.a	µg/g	3.46E+03	1.73E+02	2	2.71E+03	4.21E+03
Li.icp.a.lt	µg/g	1.82E+01	1.39E+01	2	0.00E+00	7.81E+01
Li.icp.a.nlt	µg/g	4.61E+01	9.50E-01	1	3.40E+01	5.81E+01
Mn.icp.a	µg/g	1.20E+01	3.09E+00	2	0.00E+00	2.53E+01
Mo.icp.a	µg/g	4.13E+01	2.09E+00	2	3.23E+01	5.03E+01
NO_3^-.ic	µg/g	1.78E+05	3.55E+04	2	2.55E+04	3.31E+05
Na.icp.a	µg/g	1.94E+05	1.45E+03	2	1.88E+05	2.00E+05
Na.icp.f	µg/g	2.35E+05	5.49E+03	2	2.11E+05	2.58E+05
Ni.icp.a	µg/g	3.16E+01	5.34E+00	2	8.59E+00	5.45E+01
Ni.icp.f	µg/g	3.50E+03	7.86E+02	2	1.13E+02	6.88E+03
Oxalate.ic	µg/g	7.59E+03	1.08E+03	2	2.93E+03	1.23E+04
P.icp.a	µg/g	1.44E+03	2.68E+02	2	2.81E+02	2.59E+03
PO_4^{3-}.ic	µg/g	4.10E+03	8.58E+02	2	4.03E+02	7.79E+03
S.icp.a	µg/g	2.63E+03	4.54E+02	2	6.75E+02	4.58E+03
S.icp.f.lt	µg/g	3.14E+03	6.98E+02	2	1.32E+02	6.14E+03

Table B3-15. Summary Statistics (per g basis) - Crust (nested ANOVA without riser term). (2 sheets)

Analyte	Units	$\hat{\mu}$	$\hat{\sigma}_{\hat{\mu}}$	df	LL	UL
S.icp.f.nlt	μg/g	3.78E+03	4.70E+02	1	0.00E+00	9.75E+03
SO_4^{2-}.ic	μg/g	7.84E+03	2.18E+03	2	0.00E+00	1.72E+04
Si.icp.a	μg/g	8.82E+02	2.08E+01	2	7.92E+02	9.72E+02
Total Alpha.lt	μCi/g	4.61E-02	7.69E-03	2	1.30E-02	7.92E-02
Total Alpha.nlt	μCi/g	4.79E-02	1.20E-02	1	0.00E+00	2.01E-01
Zn.icp.a	μg/g	2.55E+01	2.38E+00	2	1.52E+01	3.57E+01
Zr.icp.a	μg/g	1.08E+01	1.37E+00	2	4.88E+00	1.67E+01

Table B3-16. Analytes (Crust - per g basis) with >50 Percent "Less Than" Values. (2 sheets)

Analyte	Unit	Maximum Result
Ag.icp.f	μg/g	<204
As.icp.a	μg/g	<47.1
As.icp.f	μg/g	<2040
B.icp.f	μg/g	<1020
Ba.icp.a	μg/g	<23.5
Ba.icp.f	μg/g	<1020
Be.icp.a	μg/g	<2.35
Be.icp.f	μg/g	<102
Bi.icp.a	μg/g	<47.1
Bi.icp.f	μg/g	<2040
Ca.icp.f	μg/g	<2040
Cd.icp.f	μg/g	<102
Ce.icp.a	μg/g	<47.1
Ce.icp.f	μg/g	<2040
Co.icp.a	μg/g	<9.42
Co.icp.f	μg/g	<409
Cu.icp.f	μg/g	<204
Fe.icp.f	μg/g	<1020
La.icp.a	μg/g	<23.5

Table B3-16. Analytes (Crust - per g basis) with >50 Percent "Less Than" Values. (2 sheets)

Analyte	Unit	Maximum Result
La.icp.f	μg/g	<1020
Li.icp.f	μg/g	<204
Mg.icp.a	μg/g	<47.1
Mg.icp.f	μg/g	<2040
Mn.icp.f	μg/g	<204
Mo.icp.f	μg/g	<1020
Nd.icp.a	μg/g	<47.1
Nd.icp.f	μg/g	<2040
P.icp.f	μg/g	<4090
Pb.icp.a	μg/g	<47.1
Pb.icp.f	μg/g	<2040
Sb.icp.a	μg/g	<28.3
Sb.icp.f	μg/g	<1230
Se.icp.a	μg/g	<47.1
Se.icp.f	μg/g	<2040
Si.icp.f	μg/g	<1180
Sm.icp.a	μg/g	<47.1
Sm.icp.f	μg/g	<2040
Sr.icp.a	μg/g	<4.71
Sr.icp.f	μg/g	<204
Ti.icp.a	μg/g	<4.71
Ti.icp.f	μg/g	<204
Tl.icp.a	μg/g	<94.2
Tl.icp.f	μg/g	<4090
U.icp.a	μg/g	<235
U.icp.f	μg/g	<10200
V.icp.a	μg/g	<23.5
V.icp.f	μg/g	<1020
Zn.icp.f	μg/g	<466
Zr.icp.f	μg/g	<204

B3.4.2 Analysis of Variance Model

A statistical model is needed to account for the spatial and measurement variability in $\hat{\sigma}_{\hat{\mu}}$. This cannot be done using an ordinary standard deviation of the data (Snedecor and Cochran 1980).

B3.4.2.1 Supernate. The data were statistically evaluated using two models. The first model used a nested analysis of variance. The nested analysis of variance statistical model used to describe the structure of the data is

$$Y_{ijk} = \mu + R_i + S_{ij} + A_{ijk},$$

$$i=1,2,\ldots,a;\ j=1,2,\ldots,b_i;\ k=1,2,\ldots,n_{ij};$$

where

Y_{ijk}	=	concentration from the k^{th} analytical result from the j^{th} segment from the i^{th} riser
μ	=	the grand mean
R_i	=	the effect of the i^{th} riser
S_{ij}	=	the effect of the j^{th} segment from the i^{th} riser
A_{ijk}	=	the effect of the k^{th} analytical result from the j^{th} segment from the i^{th} riser
a	=	the number of risers
b_i	=	the number of segments from the i^{th} riser
n_{ij}	=	the number of analytical results from the j^{th} segment from the i^{th} riser.

The variables R_i and S_{ij} are assumed to be a random effects. These variables and A_{ijk} are assumed to be uncorrelated and normally distributed with means zero and variances $\sigma^2(R)$, $\sigma^2(S)$, and $\sigma^2(A)$, respectively. Estimates of $\sigma^2(R)$, $\sigma^2(S)$, and $\sigma^2(A)$ were obtained using REML methods. This method applied to variance component estimation is described in Harville (1977). The results using the REML methods were obtained using the statistical analysis package S-PLUS[1] (Statistical Sciences 1993). The *df* associated with the standard deviation of the mean (a function of $\sigma^2(R)$, $\sigma^2(S)$, and $\sigma^2(A)$) is the number of risers minus one.

[1]S-PLUS is a registered trademark of Statistical Science, Seattle, Washington.

The second model used one-way analysis of variance. The one-way analysis of variance statistical model used to describe the structure of the data is

$$Y_{ij} = \mu + S_i + A_{ij},$$

$$i=1,2,\ldots,a,\ j=1,2,\ldots,n_i,$$

where

Y_{ij}	=	concentration from the j[th] analytical result from the i[th] sample
μ	=	the grand mean
S_i	=	the effect of the i[th] sample
A_{ij}	=	the effect of the j[th] analytical result from the i[th] sample
a	=	the number of samples
n_i	=	the number of analytical results from the i[th] sample.

The variable S_i is assumed to be a random effect. This variable and A_{ij} are assumed to be uncorrelated and normally distributed with means zero and variances $\sigma^2(S)$ and $\sigma^2(A)$, respectively. Estimates of $\sigma^2(S)$ and $\sigma^2(A)$ were obtained using REML methods. The results were obtained using the statistical analysis package S-PLUS® (Statistical Sciences 1993). The *df* associated with the standard deviation of the mean (a function of $\sigma^2(S)$ and $\sigma^2(A)$) is the number of samples minus one.

B3.4.2.2 Salt Slurry and Crust. The data were statistically evaluated using two models. The first model used a nested analysis of variance with a riser term. The nested analysis of variance statistical model used to describe the structure of the data is

$$Y_{ijkl} = \mu + R_i + S_{ij} + L_{ijk} + A_{ijkl},$$

$$i=1,2,\ldots,a;\ j=1,2,\ldots,b_i;\ k=1,2,\ldots,c_{ij};\ l=1,2,\ldots,n_{ijk};$$

where

Y_{ijkl}	=	concentration from the l[th] analytical result from the k[th] location from the j[th] segment from the i[th] riser
μ	=	the grand mean
R_i	=	the effect of the i[th] riser
S_{ij}	=	the effect of the j[th] segment from the i[th] riser
L_{ijk}	=	the effect of the k[th] location from the j[th] segment from the i[th] riser

A_{ijkl}	=	the effect of the l^{th} analytical result from the k^{th} location from the j^{th} segment from the i^{th} riser
a	=	the number of risers
b_i	=	the number of segments from the i^{th} riser
c_{ij}	=	the number of locations from the j^{th} segment from the i^{th} riser
n_{ijk}	=	the number of analytical results from the k^{th} location from the j^{th} segment from the i^{th} riser.

The variables R_i, S_{ij}, and L_{ijk} are assumed to be a random effects. These variables and A_{ijkl} are assumed to be uncorrelated and normally distributed with means zero and variances $\sigma^2(R)$, $\sigma^2(S)$, $\sigma^2(L)$, and $\sigma^2(A)$, respectively. Estimates of $\sigma^2(R)$, $\sigma^2(S)$, $\sigma^2(L)$, and $\sigma^2(A)$ were obtained using REML methods. This method applied to variance component estimation is described in Harville (1977). The results using the REML methods were obtained using the statistical analysis package S-PLUS® (Statistical Sciences 1993). The *df* associated with the standard deviation of the mean (a function of $\sigma^2(R)$, $\sigma^2(S)$, $\sigma^2(L)$, and $\sigma^2(A)$) is the number of risers minus one.

The second model used nested analysis of variance without the riser term. This nested ANOVA model is

$$Y_{ijk} = \mu + S_i + L_{ij} + A_{ijk},$$

$$i=1,2,\ldots,a;\ j=1,2,\ldots,b_i;\ k=1,2,\ldots,n_{ij};$$

where

Y_{ijk}	=	concentration from the k^{th} analytical result from the j^{th} location from the i^{th} segment
μ	=	the grand mean
S_i	=	the effect of the i^{th} segment
L_{ij}	=	the effect of the j^{th} location from the i^{th} segment
A_{ijk}	=	the effect of the k^{th} analytical result from the j^{th} location from the i^{th} segment
a	=	the number of segments
b_i	=	the number of locations from the i^{th} segment

n_{ij} = the number of analytical results from the j^{th} location from the i^{th} segment.

The variables S_i and L_{ij} are assumed to be a random effects. These variables and A_{ijk} are assumed to be uncorrelated and normally distributed with means zero and variances $\sigma^2(S)$, $\sigma^2(L)$, and $\sigma^2(A)$, respectively. Estimates of $\sigma^2(S)$, $\sigma^2(L)$, and $\sigma^2(A)$ were obtained using REML methods. This method applied to variance component estimation is described in Harville (1977). The results using the REML methods were obtained using the statistical analysis package S-PLUS® (Statistical Sciences 1993). The *df* associated with the standard deviation of the mean (a function of $\sigma^2(S)$, $\sigma^2(L)$, and $\sigma^2(A)$) is the number of segments minus one.

B4.0 APPENDIX B REFERENCES

Bechtold, D. B., 1995, *Use of LiBr as Tracer for HHF and Correction of Results*," (internal memorandum 75980-PCS95-045 to J. Jo, May 13), 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.

Harville, D. A., 1977, "Maximum Likelihood Approaches to Variance Component Estimation and to Related Problems," *Journal of the American Statistical Association*, pp. 320-340.

Jansky, M. T., 1984a, *Laboratory for Tank Farm Samples from Tanks 103 and 104 AN,* (internal letter 65453-84-164 to P.J. Certa, July 2), Rockwell Hanford Operation, Richland, Washington.

Jansky, M. T., 1984b, *Laboratory Support for Upcoming 242-A Evaporator Campaign*, (internal memorandum 65453-84-134 to E. G. Gratny, May 10), Rockwell Hanford Operation, Richland, Washington.

Kristofzski, J. G., 1996, *Directions for "Opportunistic Analyses,"* (memorandum 75310-96 to J. H. Baldwin et al., September 11), Westinghouse Hanford Company, Richland, Washington.

Mauss, B. M., 1984a, *Chemical Compositions of 102-AY, 101-AW, 105-AN and 104-AW*, (internal memorandum 65453-84-348 to E. G. Gratny, November 9), Rockwell Hanford Operation, Richland, Washington.

Mauss, B. M., and M. T. Jansky, 1985, *102-AW Laboratory Boildowns in Support of Evaporator Run 84-5,* (internal memorandum 65453-85-013 to E. G. Gratny and N. L. Pontious, January 18), Rockwell Hanford Operation, Richland, Washington.

McDuffie, N. G., and G. D Johnson, 1995, *Flammable Gas Tank Safety Program: Data Requirements for Core Sample Analysis Developed Through the Data Quality Objectives (DQO) Process*, WHC-SD-WM DQO-004, Rev. 2, Westinghouse Hanford Company, Richland, Washington.

Shekarriz, A., D. R. Rector, N. S. Cannon, L. A. Mahoney, B. E. Hey, M. A. Chieda, C. G. Linshooten, J. M. Bates, F. J. Reitz, R. E. Bauer, and E. R. Siciliano, 1997, *Composition and Quantities of Retained Gas Measured in Hanford Waste Tanks 241-AW-101, A-101, AN-105, AN-104, and AN-103*, PNNL-11450, Rev. 1, Pacific Northwest National Laboratory, Richland, Washington.

Stewart, C. W., J. M. Alzheimer, M. E. Brewster, G. Chen, R. E. Mendoza, H. C. Reid, C. L. Shepard, and G. Terrones, 1996, *In Situ Rheology and Gas Volume in Hanford Double-shell Waste Tanks*, PNNL-11296, Pacific Northwest National Laboratory, Richland, Washington.

Snedecor, G. W., and W. G. Cochran, 1980, *Statistical Methods*, 7th Edition, Iowa State University Press, Ames, Iowa.

Statistical Sciences, Inc., 1993, *S-PLUS Reference Manual, Version 3.2*, StatSci, (a division of MathSoft, Inc.), Statistical Sciences, Inc., Seattle, Washington.

Steen, F. H., 1997, *Final Report for Tank 241-AN-104, Cores 163 and 164*, HNF-SD-WM-DP-226, Rev. 1A, Rust Federal Services of Hanford, Inc. for Fluor Daniel Hanford Inc, Richland, Washington.

Winkelman, W. D., 1996a, *Tank 241-AN-104 Push Mode Core Sampling and Analysis Plan*, WHC-SD-WM-TSAP-086, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

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

APPENDIX C

STATISTICAL ANALYSIS FOR ISSUE RESOLUTION

This page intentionally left blank.

APPENDIX C

STATISTICAL ANALYSIS FOR ISSUE RESOLUTION

Appendix C reports the analysis results of the safety screening DQO (Dukelow et al. 1995) as it relates to tank 241-AN-104. Specifically, confidence intervals were needed to support the DSC and plutonium (criticality) threshold limits.

C1.0 STATISTICS FOR SAFETY SCREENING DATA QUALITY OBJECTIVES

The safety screening DQO (Dukelow et al. 1995) defines acceptable decision confidence limits in terms of one-sided 95 percent confidence intervals. The confidence limits are calculated from the 1996 sampling event for tank 241-AN-104.

Confidence intervals were computed for each sample number from tank 241-AN-104 analytical data (Steen 1997). The UL of a one-sided 95 percent CIfor the mean is

$$\hat{\mu} + t_{(df,0.05)} * \hat{\sigma}_{\hat{\mu}}.$$

In this equation, $\hat{\mu}$ is the arithmetic mean of the data, $\hat{\sigma}_{\hat{\mu}}$ is the estimate of the standard deviation of the mean, and $t_{(df,0.05)}$ is the quantile from Student's t distribution with *df* degrees of freedom for a one-sided 95 percent CI. For tank 241-AN-104 data (per sample number), *df* equals the number of observations minus one.

C1.1 DIFFERENTIAL SCANNING CALORIMETRY IN DRY

The UL of the 95 percent CI was calculated for each subsample that had DSC measurements. The UL for each sample number is listed in Table C1-1. Each CI can be used to make the following statement. If the UL is less than 480 J/g dry, reject the null hypothesis that DSC is greater than or equal to 480 J/g dry at the 0.05 level of significance. All but one DSC dry upper limit was less than 480 J/g dry. Thus, the hypothesis that the DSC results are greater than 480 J/g dry is rejected for all subsamples except core 163, segment 16, upper half.

C1.2 TOTAL ALPHA

The UL of the 95 percent CI was calculated for each subsample that had at least 50 percent of the reported total alpha data as quantitative values. The sample numbers and the UL of the 95 percent CI are listed in Table C1-1. Each CI can be used to make the following statement. If the UL is less than 61.5 μCi/mL or 38.4 μCi/g, reject the null hypothesis that total alpha is greater than or equal to 61.5 μCi/mL (or 38.4 μCi/g) at the 0.05 level of significance. For all subsamples with at least 50 percent of the reported total alpha data as quantitative values, the UL were less than 61.5 μCi/mL or 38.4 μCi/g. In subsamples where both analytical results were "less than" values, the maximum "less than" value is orders of magnitude smaller than either 61.5 μCi/mL or 38.4 μCi/g. Thus, the hypothesis that Total alpha results are greater than 61.5 μCi/mL or 38.4 μCi/g is rejected for all subsamples.

Table C1-1. Tank 241-AN-104 Differential Scanning Calorimetry Results (J/g dry). (2 sheets)

Sample Number	Core	Segment	Location	$\hat{\mu}$	$\hat{\sigma}_{\hat{\mu}}$	UL[1]
S96T005256	163	2	DL	0.00E+00	0.00E+00	0.00E+00
S96T005260	163	4	DL	1.53E+01	1.53E+01	1.12E+02
S96T005527	163	5	DL	6.90E+01	1.12E+01	1.39E+02
S96T005554	163	6	DL	0.00E+00	0.00E+00	0.00E+00
S96T005255	163	7	DL	0.00E+00	0.00E+00	0.00E+00
S96T005257	163	8	DL	8.75E+00	8.75E+00	6.40E+01
S96T005258	163	9	DL	1.53E+01	1.53E+01	1.12E+02
S96T005528	163	10	DL	4.10E+01	4.10E+01	3.00E+02
S96T005739	163	11	DL	2.75E+01	2.75E+01	2.01E+02
S96T005766	163	12	DL	0.00E+00	0.00E+00	0.00E+00
S96T005741	163	14	DL	1.51E+01	1.51E+01	1.10E+02
S96T004774	164	1	DL	0.00E+00	0.00E+00	0.00E+00
S96T004778	164	2	DL	0.00E+00	0.00E+00	0.00E+00
S96T004779	164	3	DL	0.00E+00	0.00E+00	0.00E+00
S96T004780	164	4	DL	1.63E+01	1.63E+01	1.19E+02
S96T004976	164	5	DL	0.00E+00	0.00E+00	0.00E+00
S96T004781	164	7	DL	0.00E+00	0.00E+00	0.00E+00
S96T004977	164	8	DL	0.00E+00	0.00E+00	0.00E+00
S96T004978	164	9	DL	0.00E+00	0.00E+00	0.00E+00
S96T004979	164	10	DL	0.00E+00	0.00E+00	0.00E+00
S96T004782	164	11	DL	0.00E+00	0.00E+00	0.00E+00
S96T004783	164	12	DL	0.00E+00	0.00E+00	0.00E+00
S96T004784	164	13	DL	0.00E+00	0.00E+00	0.00E+00
S96T005978	164	COMP	---	3.88E+01	9.00E-01	4.45E+01

Table C1-1. Tank 241-AN-104 Differential Scanning Calorimetry Results (J/g dry). (2 sheets)

Sample Number	Core	Segment	Location	$\hat{\mu}$	$\hat{\sigma}_{\hat{\mu}}$	UL[1]
S96T005269	163	1	LH	0.00E+00	0.00E+00	0.00E+00
S96T005270	163	2	LH	0.00E+00	0.00E+00	0.00E+00
S96T005771	163	12	LH	5.43E+01	5.35E+00	8.80E+01
S96T005744	163	14	LH	0.00E+00	0.00E+00	0.00E+00
S96T005743	163	14	UH	0.00E+00	0.00E+00	0.00E+00
S96T005272	163	16	LH	5.06E+01	6.56E+00	9.20E+01
S96T005271[1]	163	16	UH	1.33E+02	7.06E+01	5.79E+02
S96T005773	163	18	LH	3.84E+01	1.25E+00	4.62E+01
S96T005772	163	18	UH	3.67E+01	3.50E+00	5.88E+01
S96T005549	163	20	LH	0.00E+00	0.00E+00	0.00E+00
S96T005548	163	20	UH	0.00E+00	0.00E+00	0.00E+00
S96T004772	164	1	LH	0.00E+00	0.00E+00	0.00E+00
S96T004773	164	13	LH	0.00E+00	0.00E+00	0.00E+00
S96T004985	164	14	LH	0.00E+00	0.00E+00	0.00E+00
S96T004984	164	14	UH	0.00E+00	0.00E+00	0.00E+00
S96T004987	164	15	LH	5.46E+01	7.05E+00	9.91E+01
S96T004986	164	15	UH	5.25E+01	1.52E+01	1.48E+02
S96T004989	164	16	LH	1.60E+01	1.60E+01	1.17E+02
S96T004988	164	16	UH	5.35E+01	7.15E+00	9.86E+01
S96T004991	164	17	LH	6.66E+00	2.41E+00	2.19E+01
S96T004990	164	17	UH	7.00E+00	7.00E+00	5.12E+01
S96T004993	164	19	LH	0.00E+00	0.00E+00	0.00E+00
S96T004992	164	19	UH	0.00E+00	0.00E+00	0.00E+00
S96T005250	164	20	LH	0.00E+00	0.00E+00	0.00E+00
S96T005249	164	20	UH	0.00E+00	0.00E+00	0.00E+00
S96T005972	164	COMP	---	1.75E+02	3.50E+00	1.97E+02

Notes:

DL = drainable liquid
UH = upper half
LH = lower half
COMP = composite

[1]UL is greater than the action limit of 480 J/g dry.

Table C1-2. Tank 241-AN-104 Total Alpha Results. (2 sheets)

Sample Number	Core	Segment	Location	$\hat{\mu}$ or Maximum <	$\hat{\sigma}_{\hat{\mu}}$	UL
Liquid Samples						
S96T005256	163	2	DL	< 9.94E-02	n/a	n/a
S96T005260	163	4	DL	< 9.94E-02	n/a	n/a
S96T005527	163	5	DL	< 2.26E-03	n/a	n/a
S96T005554	163	6	DL	< 2.43E-03	n/a	n/a
S96T005255	163	7	DL	< 8.22E-02	n/a	n/a
S96T005257	163	8	DL	< 4.83E-02	n/a	n/a
96T005258	163	9	DL	< 4.83E-02	n/a	n/a
S96T0055281[1]	163	10	DL	2.47E-03	3.50E-05	2.69E-03
S96T005739	163	11	DL	< 2.43E-03	n/a	n/a
S96T005766	163	12	DL	2.82E-03	8.05E-04	7.90E-03
S96T005741	163	14	DL	< 2.43E-03	n/a	n/a
S96T004774	164	1	DL	< 1.42E-02	n/a	n/a
S96T004778	164	2	DL	< 2.72E-02	n/a	n/a
S96T004779	164	3	DL	< 1.42E-02	n/a	n/a
S96T004780	164	4	DL	< 1.42E-02	n/a	n/a
S96T004976	164	5	DL	< 5.39E-02	n/a	n/a
S96T004781	164	7	DL	< 6.45E-02	n/a	n/a
S96T004977	164	8	DL	< 3.16E-02	n/a	n/a
S96T004978	164	9	DL	< 1.89E-02	n/a	n/a
S96T004979	164	10	DL	< 9.43E-02	n/a	n/a
S96T004782	164	11	DL	< 1.79E-02	n/a	n/a
S96T004783	164	12	DL	< 2.10E-02	n/a	n/a
S96T004784	164	13	DL	< 2.73E-02	n/a	n/a
S96T005978,9 all 4 results	164	COMP	---	2.53E-02	2.41E-03	3.09E-02
S96T005978,9 3 results (< deleted)	164	COMP	---	2.51E-02	2.93E-03	3.37E-02

Table C1-2. Tank 241-AN-104 Total Alpha Results. (2 sheets)

Sample Number	Core	Segment	Location	$\hat{\mu}$ or Maximum <	$\hat{\sigma}_{\hat{\mu}}$	UL
Slurry samples (μCi/g)						
S96T005284	163	1	LH	5.30E-02	2.79E-02	2.29E-01
S96T005285	163	2	LH	4.29E-02	6.40E-03	8.33E-02
S96T005780	163	12	LH	< 2.32E-01	n/a	n/a
S96T005748	163	14	LH	< 3.50E-01	n/a	n/a
S96T005286	163	16	LH	2.63E-02	3.65E-03	4.93E-02
S96T005781[1]	163	18	LH	2.49E-02	3.35E-03	4.60E-02
S96T005559	163	20	LH	3.74E-02	1.25E-02	1.16E-01
S96T004795	164	1	LH	< 4.27E-02	n/a	n/a
S96T004796[1]	164	13	LH	4.77E-02	2.20E-03	6.16E-02
S96T005030	164	14	LH	< 3.51E-02	n/a	n/a
S96T005032	164	15	LH	4.45E-02	1.25E-03	5.23E-02
S96T005033[1]	164	16	LH	3.38E-02	8.10E-03	8.49E-02
S96T005031	164	17	LH	3.81E-02	1.62E-02	1.40E-01
S96T005034	164	19	LH	5.41E-02	1.31E-02	1.36E-01
S96T005278	164	20	LH	5.58E-02	0.00E+00	5.58E-02
S96T005975	164	COMP	---	< 3.93E-02	n/a	n/a

Notes:

[1]One of two results was a less than value; it was treated as a real number.

C2.0 APPENDIX C REFERENCES

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.

Steen, F. H., 1997, *Final Report for Tank 241-AN-104, Cores 163 and 164*, HNF-SD-WM-DP-226, Rev. 1A, Rush Federal Services of Hanford, Inc. for Fluor Daniel Hanford, Inc., Richland, Washington.

APPENDIX D

EVALUATION TO ESTABLISH BEST-BASIS INVENTORY FOR TANK 241-AN-104

This page intentionally left blank.

APPENDIX D

EVALUATION TO ESTABLISH BEST-BASIS INVENTORY FOR TANK 241-AN-104

An effort is underway to provide waste inventory estimates that will serve as standard characterization source terms for waste management activities (Hodgson and LeClair 1996). As part of this effort, an evaluation of available information for tank 241-AN-104 was performed, and a best-basis inventory was established. This work follows the methodology that was established by the standard inventory task.

D1.O CHEMICAL INFORMATION SOURCES

Available composition information for the waste in tank 241-AN-104 is as follows:

- Appendix B provides characterization results from the June 1996 core sampling event.
- A feed projection document that supported grout treatment facility studies provides estimates of the waste in tank 241-AN-104 based on 242-A Evaporator slurry product data (Hendrickson 1994).
- The HDW model document (Agnew et al. 1997) provides tank content estimates derived from the Los Alamos National Laboratory model in terms of component concentrations and inventories.

D2.0 COMPARISON OF COMPONENT INVENTORY VALUES

There have been no transfers into or out of tank 241-AN-104 since the third quarter of 1985. The HDW model provides composition estimates for the waste in tank 241-AN-104 as of January 1, 1994. Sample-based inventories, derived from the September 1996 core samples and inventories generated by the HDW model (Agnew et al. 1997), are compared in Tables D2-1 and D2-2. A tank volume of 3,994 kL (1,055 kgal) was used to generate the sample-based and HDW inventories (Hanlon 1997). The chemical species are reported without charge designation per the best-basis inventory convention.

Table D2-1. Sampling And Hanford Defined Waste Model Inventory Estimates for Nonradioactive Components in Double-Shell Tank 241-AN-104.

Analyte	September 1996 Segment Data from Both Cores (kg)	September 1996 Composite of Core 164 (kg)	HDW Model Inventory (kg)	Inventory Based on Evaporator Post-Run Data (kg)
Al	143,000	151,000	136,0000	150,000
Bi	<667	108	793	NR
Ca	885	928	5,110	NR
Cl	29,900	32,600	26,900	30,000
CO_3	NR	220,000	121,0000	113,000
Cr	5,190	6,740	10,500	2,700
F	2,160	2,050	7,590	NR
Fe	<395	410	2,020	44.6
Hg	NR	NR	7.34	NR
K	NR	25,700	15,600	24,500
La	<334	191	7.04	NR
Mn	74.6	83.2	1,470	NR
Na	1.19E+06	1.11E+06	1.02E+06	1.10E+06
Ni	<226	256	1,340	NR
NO_2	448,000	455,000	316,000	353,000
NO_3	680,000	747,000	156,000	768,000
OH	NR	261,000	502,000	277,000
Pb	<382	387	785	NR
PO_4	17,100	17,700	43,700	11,200
Si	1,590	2,920	6,850	NR
SO_4	37,100	39,400	80,800	26,200
Sr	<66.7	38.1	NR	NR
TOC	NR	20,100	61,845	18,400
U	<3,430	498	8,650	NR
Zr	64.1	73.0	273	NR
% water	48	48	42.8	NR
Density (g/mL)	1.45	1.46	1.47	1.50

Note:
NR = not reported

Table D2-2. Sampling and Hanford Defined Waste Model Inventory Estimates for Radioactive Components in Double-Shell Tank 241-AN-104 (Decayed to January 1, 1994).

Analyte	September 1996 Segment Data from Both Cores (Ci)	September 1996 on Composite of Core 164 (Ci)	HDW Model Inventory (Ci)	Inventory Based on Evaporator Post-Run Data (Ci)
^{3}H	NR	42.8	744	NR
^{60}Co	NR	<147	135	NR
^{79}Se	NR	NR	11.3	NR
^{90}Sr	NR	92,700	354,000	39,300
^{90}Y	NR	92,700	NR	NR
^{99}Tc	NR	340	782	NR
^{129}I	NR	7.45	1.51	NR
^{137}Cs	NR	2.31E+06	783,000	3.02E+06
^{137}mBa	NR	2.19E+06	NR	2.87E+06
^{154}Eu	NR	<671	2,130	NR
^{155}Eu	NR	<4,700	899	NR
^{237}Np	NR	<30.3	2.77	NR
^{238}Pu	NR	NR	7.97	NR
^{239}Pu	NR	NR	NR	NR
$^{239/240}$Pu	NR	<9.59	205	41.6
^{241}Am	NR	<49.4	223	NR
^{244}Cm	NR	<11.9	0.520	NR

The sample-based densities are 1.40 g/mL for the liquid and 1.58 g/mL for the slurry. The slurry density is based on measurements of centrifuged solids; it may not be the same as the slurry density of the slurry. Gases generated in the tank are trapped in the slurry layer and form gas pockets; therefore, a lower density is expected in tank waste than in laboratory waste. In tank 241-AN-104, the retained gas is 5.7 vol% of the slurry volume (Shekarriz et al. 1996). The mean slurry density was corrected by multiplying by 0.943 (1 - vol% retained gas). The corrected slurry density is 1.51 g/mL. The HDW model bulk density is 1.47 g/mL.

The sample-based concentrations were taken from the inventory tables in Section B3.4.1. The means which included the less than values (those having a "lt" extension in Appendix B) were used to calculate the sample-based inventories.

The slurry volume, determined from temperature profiles, rheometer and core sample data is 1,700 kL (449 kgal) (Stauffer 1997). Based on the extrusion reports, a 5.1 cm (2 in.) crust layer exists in tank 241-AN-104. This constitutes a volume of 21 kL (5.5 kgal) as saltcake. The supernatant and slurry volume, equal to the total volume minus the slurry and crust volumes, is 2,273 kL (600.5 kgal). The supernatant volume in Hanlon (1997) are out of date estimates and should be updated to the newer basis presented here barring changes to the total measured volume.

The HDW model estimates for tank 241-AN-104 were derived by combining supernatant streams that were believed to have been concentrated in the 242-A Evaporator, then sent to tank 241-AN-104. (This part of the HDW model is called the SMM.) The supernatant compositions were derived largely from estimates of bulk compositions of the process waste streams that left processing facilities. To obtain the supernatant fractions, the bulk compositions were multiplied by solubility factors determined from the highest concentrations found among supernatant sample analyses. Normally, these solubility assumptions result in higher inventories in the HDW model estimates for double-shell tank supernatants and slurries when compared to their respective laboratory sample results.

In the case of tank 241-AN-104, the higher inventory estimates made by the HDW model are noted in Table D2-1 for most minor (< 100,000 kg) waste constituents. In a departure from other double-shell tank comparisons, the HDW model estimates for major components such as Al, Na, NO_2, and NO_3 are in reasonable agreement with the sample-based inventories. This may be caused by the higher percent of salt-slurry waste types used to derive the tank inventories in the HDW model. The salt-slurry waste types, as defined in the HDW model, are based more on sample data. In this case, the overstated solubility assumptions would not impact the composition as much as other double-shell tanks.

The periods in which tank 241-AN-104 received double-shell slurry feed from the 242-A Evaporator and other waste tanks are known (see Appendix A). Slurry product concentration data from 242-A Evaporator post-run documents can be obtained for each batch of feed processed. This data combined with the fill history of tank 241-AN-104 can be used to estimate the composition of tank 241-AN-104. This can serve as a check against the sample-based and HDW model inventories.

In 1994, Hendrickson performed such an analysis of the double-shell slurry feed in tank 241-AN-104 (Hendrickson 1994). Column 5 of Table D2-1 shows the results for tank 241-AN-104, the average of the segment data from 1996 for core samples 163 and 164, the core composite for core 163, and the HDW model inventory estimates. This table demonstrates close agreement between 242-A Evaporator slurry data and the September 1996 core samples for many major components including Al, K, Na, OH, NO_2, and NO_3, PO_4, and TOC. This agreement suggests that the sample-based inventories are a better basis than the HDW model.

D3.0 COMPONENT INVENTORY EVALUATION

Table D3-1 shows concentrations for the supernatant, slurry, and crust portions based on the means of the segment data for both cores and the core 163 composite. Core 163 was taken from riser 10A, and core 164 was taken from riser 12A. Mean concentrations from segment data are based on segments from both cores. Mean concentrations from composite data are based on a composite of core 164 only.

Acid and fusion digests and were performed on individual segments to obtain cation concentrations, but only acid digests were performed on the core composite. Fusion digests with KOH or NaOH are usually a more complete method of dissolving solids than acid dissolution.

The segment-based data are a better source of information than the core composite data even though the core composite and segment-based concentrations agree. However, the composite core data contain information on several components not found in the segment-based data including CO_3, OH, and TOC. The composite data are also the only source of individual radionuclide concentrations from this sampling event.

The best-basis inventory is a combination of segment and core composite analysis values. Core composite concentrations are used for components not included in the segment analyses. Note that liquid concentrations from the core composite are approximately 5 percent to 30 percent higher than the segment-based data.

Table D3-1 shows concentrations for the 5.1 cm (2 in.) crust. The crustis similar to the slurry below it. Although the density of the crust was not reported, it is assumed that it is equal to the supernatant density because it floats.

Table D3-1. Comparison of September 1996 Core Sample Concentrations. (2 sheets)

Analyte	Segment Mean from Both Core Samples (μg/mL)	Liquid Mean from Core 164 Composite (μg/mL)	Slurry Mean from Both Core Samples (μg/g)	Slurry Mean from the Composite of Core 164 (μg/g)	Crust Mean from Both Core Samples (μg/g)
Al	38,600	41,700	21,100	20,800	19,500
Bi	<120	NR	<153	<39.8	<47.1
Ca	<120	<120	225	244	160
Cl	8,090	9,500	4,420	4,090	4,500
CO_3	NR	10,900	NR	73,500	NR
Cr	336	574	1,710	2,200	1,270

Table D3-1. Comparison of September 1996 Core Sample Concentrations. (2 sheets)

Analyte	Segment Mean from Both Core Samples (μg/mL)	Liquid Mean from Core 164 Composite (μg/mL)	Slurry Mean from Both Core Samples (μg/g)	Slurry Mean from the Composite of Core 164 (μg/g)	Crust Mean from Both Core Samples (μg/g)
F	NR	<122	836	658	539
Fe	<60.1	<60.1	97.5	99.5	258
Hg	NR	NR	NR	NR	NR
K	NR	6,900	3,720	3,720	3,460
La	<60.1	<60.1	<76.7	<19.9	<23.5
Mn	<12.0	<12.0	18.3	20.9	12.0
Na	256,000	261,000	236,000	192,000	235,000
Ni	<24.0	<24.0	66.5	75.0	31.5
NO_2	125,000	131,000	62,800	58,100	66,400
NO_3	170,000	207,000	112,000	101,000	178,000
OH	NR	70,900	NR	37,200	NR
Pb	NR	<120	NR	42.0	<47.1
PO_4	2,710	3,800	4,200	3,350	4,420
Si	NR	379	609	761.5	882
SO_4	3,540	3,600	11,200	11,600	9,410
Sr	<12.0	<12.0	<15.3	<3.98	<4.71
TOC	NR	3,110	NR	4,630	NR
U	<600	3.68	<767	<181	<235
Zr	7.86	<12.0	17.9	16.9	10.8
Volume (L)	2.275E+06	2.275E+06	1.700E+06	1.7000E+06	20,820
Density (g/mL)	1.40	1.41	1.51	1.48	1.40[a]

D4.0 DEFINE THE BEST-BASIS AND ESTABLISH COMPONENT INVENTORIES

Inventories based on the September 1996 sampling event should serve as the basis for the best estimate inventory to tank 241-AN-104 for the following reasons:

1. The September 1996 sampling event provides the most recent data for the waste.

2. Estimates based on 242-A Evaporator product sample data agree with the September 1996 analytical data.

3. Although the HDW model estimates are in reasonable agreement with sampling data, they do not agree well with the evaporator product data.

Once the best-basis inventories were determined, the hydroxide inventory was calculated by performing a charge balance with the valence of other analytes. In some cases, this approach requires the other analyte (for example, sodium or nitrate) inventories be adjusted to achieve the charge balance. During such adjustments, significant figures are retained. This charge balance approach is consistent with that used by Agnew et al. (1997).

Best-basis tank inventory values are derived for 46 key radionuclides (Kupfer et al. 1997) decayed to a common report date, January 1, 1994. Often, waste sample analyses have only reported ^{90}Sr, ^{137}Cs, $^{239/240}$Pu, and total uranium, or total beta and total alpha, while other key radionuclides such as ^{60}Co, ^{99}Tc, ^{129}I, ^{154}Eu, ^{155}Eu, and ^{241}Am etc. have been infrequently reported. For this reason, it was necessary to derive most 46 key radionuclides by computer models. These models estimate radionuclide activity in batches of reactor fuel, account for the split of radionuclides to various separations plant waste streams, and track their movement with tank waste transactions. The computer models are described in Kupfer et al. (1997) and Watrous and Wootan (1997).

Model-generated values for radionuclides in the 177 tanks are reported in Agnew et al. (1997). The best-basis value for any one analyte may be a model result or a sample of engineering assessment-based result, if available. No attempt was made to ratio or normalize model results for the 46 radionuclides when values for measured radionuclides disagree with the model. For a discussion of typical error between model derived values and sample derived values, refer to Kupfer et al. (1997).

Tables D4-1 through D4-6 show best-basis inventory estimates of the crust, supernatant, and sludge layers for tank 241-AN-104. Table D4-7 and D4-8 list best basis inventory estimates for the whole tank. Radionuclide values are decayed to January 1, 1994.

Table D4-1. Best-Basis Inventory Estimates for Nonradioactive Components in Tank 241-AN-104 Supernatant as of May 31, 1997.[1]

Analyte	Supernatant Inventory (kg)	Basis (S, M, E, or C)[2]	Comment
Al	87,800	S	
Bi	<273	S	
Ca	<273	S	
Cl	18,400	S	
TIC as CO_3	24,700	S	Not reported in segment-based data
Cr	765	S	
F	<278	S	Not reported in segment-based data
Fe	<137	S	
K	15,200	S	
La	<137	S	
Mn	<27.3	S	
Na	582,000	S	
Ni	<54.6	S	
NO_2	284,000	S	
NO_3	387,000	S	
OH	362,000	C	Composite-based inventory = 161,000
Pb	273	S	Composite <154
P as PO_4	6,160	S	
Si	862	S	Not reported in segment-based data
SO_4	8,022	S	
Sr	<27.3	S	
TOC	7,760	S	Not reported in segment-based data
U_{TOTAL}	<1,370	S	
Zr	17.8	S	
% water	51.1	S	
Density g/mL	1.40	S	

Notes:

[1]The tank is active. Waste transfers will change tank contents.

[2]S = sample-based, M = HDW model-based, E = engineering assessment-based,
C = calculated by charge balance; includes oxides as hydroxides, not including CO_3, NO_2, NO_3, PO_4, SO_4, and SiO_3

Table D4-2. Best-Basis Inventory Estimates for Radioactive Components in Tank 241-AN-104 Supernatant as of May 31, 1997 (Decayed to January 1, 1994).[1]

Analyte	Supernatant Inventory (Ci)	Basis (S, M, or E)[2]	Comment
^{60}Co	<53.7	S	
^{90}Sr	819	S	
^{90}Y	819	S	
^{99}Tc	0.500	S	
^{129}I	0.470	S	
^{137}Cs	1.38E+06	S	
^{137m}Ba	1.31E+06	S	
^{154}Eu	<360	S	
^{155}Eu	<2,200	S	
^{237}Np	<0.0837	S	
$^{239/240}Pu$	0.400	S	
^{241}Am	<0.801	S	
^{243}Cm	<0.0320	S/E	
$^{243/244}Cm$	<0.767	S/E	

Notes:

[1]The tank is active. Waste transfers will change tank contents.

[1]S = sample-based, M = HDW model-based, E = engineering assessment-based,
C = calculated by charge balance; includes oxides as hydroxides, not including CO_3, NO_2, NO_3, PO_4, SO_4, and SiO_3

Table D4-3. Best-Basis Inventory Estimates for Nonradioactive Components in Tank 241-AN-104 Salt Slurry as of May 31, 1997.[1] (2 sheets)

Analyte	Salt Slurry Inventory (kg)	Basis (S, M, or E)[2]	Comment
Al	54,100	S	
Bi	<393	S	
Ca	577	S	
Cl	11,300	S	
TIC as CO_3	189,000	S	Not reported in segment-based data.
Cr	4,390	S	
F	2,150	S	
Fe	250	S	
K	9,550	S	
La	<197	S	
Mn	47.0	S	
Na	606,000	S	
Ni	171	S	
NO_2	161,000	S	
NO_3	287,000	S	
OH	285,000	C	Composite-based inventory = 95,300.
Pb	108	S	
PO_4	10,800	S	
Si	1,560	S	
SO_4	28,700	S	
Sr	<39.3	S	
TOC	11,900	S	Not reported in segment-based data.
U_{TOTAL}	<1,970	S	Not reported in segment-based data.

Table D4-3. Best-Basis Inventory Estimates for Nonradioactive Components in Tank 241-AN-104 Salt Slurry as of May 31, 1997.[1] (2 sheets)

Analyte	Salt Slurry Inventory (kg)	Basis (S, M, or E)[2]	Comment
Zr	45.9	S	
% water	45.6	S	
Density (g/mL)	1.51	S	

Notes:

[1]The tank is active. Waste transfers will change tank contents.

[2]S = sample-based, M = HDW model-based, E = engineering assessment-based, C = calculated by charge balance; includes oxides as hydroxides, not including CO_3, NO_2, NO_3, PO_4, SO_4, and SiO_3

Table D4-4. Best-Basis Inventory Estimates for Radioactive Components in Tank 241-AN-104 Salt Slurry as of May 31, 1997 (Decayed to January 1, 1994).[1] (2 sheets)

Analyte	Salt Slurry Inventory (Ci)	Basis (S, M, or E)[2]	Comment
^{3}H	42.8	S	
^{60}Co	<93.9	S	
^{90}Sr	91,900	S	
^{90}Y	91,900	S	
^{99}Tc	340	S	
^{129}I	<6.97	S	
^{137}Cs	934,000	S	
^{137m}Ba	887,000	S	
^{154}Eu	<312	S	
^{155}Eu	<2,490	S	
^{237}Np	<30.2	S	
$^{239/240}Pu$	9.19	S	

Table D4-4. Best-Basis Inventory Estimates for Radioactive Components in Tank 241-AN-104 Salt Slurry as of May 31, 1997 (Decayed to January 1, 1994).[1] (2 sheets)

Analyte	Salt Slurry Inventory (Ci)	Basis (S, M, or E)[2]	Comment
^{241}Am	48.6	S/E	
^{243}Cm	<0.472	S	
$^{243/244}Cm$	<11.4	S/E	

Notes:

[1]The tank is active. Waste transfers will change tank contents.

[2]S = sample-based, M = HDW model-based, E = engineering assessment-based, C = calculated by charge balance; includes oxides as hydroxides, not including CO_3, NO_2, NO_3, PO_4, SO_4, and SiO_3

Table D4-5. Best-Basis Inventory Estimates for Nonradioactive Components in Tank 241-AN-104 Crust as of May 31, 1997.[1] (2 sheets)

Analyte	Salt Slurry Inventory (kg)	Basis (S, M, or E)[2]	Comment
Al	611	S	
Bi	<1.48	S	
Ca	5.04	S	
Cl	141	S	
TIC as CO_3	2,310	S	Assumed to be equal to slurry-based concentration.
Cr	40.0	S	
F	16.9	S	
Fe	8.10	S	
K	109	S	
La	<0.738	S	
Mn	0.376	S	
Na	7,370	S	
Ni	0.991	S	
NO_2	2,090	S	

Table D4-5. Best-Basis Inventory Estimates for Nonradioactive Components in Tank 241-AN-104 Crust as of May 31, 1997.[1] (2 sheets)

Analyte	Salt Slurry Inventory (kg)	Basis (S, M, or E)[2]	Comment
NO_3	5,600	S	
OH	2,730	C	Composite slurry-based inventory = 1,170
Pb	<1.48	S	
PO_4	139	S	
Si	27.7	S	
SO_4	296	S	
Sr	<0.148	S	
TOC	145	S	Assumed to be equal to slurry-based concentration.
U_{TOTAL}	<7.38	S	
Zr	0.339	S	
% water	NR	S	
Density (g/mL)	1.40	S	Assumed to be equal to supernatant density.

Notes:

[1]The tank is active. Waste transfers will change tank contents.

[2]S = sample-based, M = HDW model-based, E = engineering assessment-based, C = calculated by charge balance; includes oxides as hydroxides, not including CO_3, NO_2, NO_3, PO_4, SO_4, and SiO_3

Table D4-6. Best-Basis Inventory Estimates for Radioactive Components in Tank 241-AN-104 Crust as of May 31, 1997[1] (Decayed to January 1, 1994).

Analyte	Crust Inventory (Ci)	Basis (S, M, or E)[2]	Comment
^{3}H	0.524	S	
^{60}Co	<1.15	S	
^{90}Sr	1,120	S	
^{90}Y	1,120	S	
^{99}Tc	4.16	S	
^{129}I	<0.0854	S	
^{137}Cs	11,400	S	
^{137m}Ba	10,800	S	
^{154}Eu	<3.82	S	
^{155}Eu	<30.5	S	
^{237}Np	<0.370	S	
$^{239/240}Pu$	0.112	S	
^{241}Am	0.595	S/E	
^{243}Cm	<0.00544	S	
$^{243/244}Cm$	<0.131	S/E	

Notes:

[1]The tank is active. Waste transfers will change tank contents.

[2]S = sample-based, M = HDW model-based, E = engineering assessment-based, C = calculated by charge balance; includes oxides as hydroxides, not including CO_3, NO_2, NO_3, PO_4, SO_4, and SiO_3

Table D4-7. Best-Basis Total Inventory Estimates for Nonradioactive Components in Tank 241-AN-104 as of May 31, 1997.[1] (2 sheets)

Analyte	Total Inventory (kg)	Basis (S, M, or E)[2]	Comment
Al	143,000	S	
Bi	<667	S	
Ca	<855	S	
Cl	29,900	S	
TIC as CO_3	210,000	S	
Cr	5,190	S	
F	2,160	S	
Fe	<395	S	
K	24,900	S	
La	<334	S	
Mn	<74.6	S	
Na	1.19E+06	S	
Ni	<226	S	
NO_2	448,000	S	
NO_3	680,000	S	
OH	650,000	C	Sample-based = 255,000
Pb	<382	S	
PO_4	17,100	S	
Si	1,590	S	
SO_4	37,100	S	
Sr	<66.7	S	
TOC	18,700	S	
U_{TOTAL}	<3,340	S	

Table D4-7. Best-Basis Total Inventory Estimates for Nonradioactive Components in Tank 241-AN-104 as of May 31, 1997.[1] (2 sheets)

Analyte	Total Inventory (kg)	Basis (S, M, or E)[2]	Comment
Zr	64.2	S	
% water	48.4	S	
Density (g/mL)	1.45	S	

Notes:

[1]The tank is active. Waste transfers will change tank contents.

[2]S = sample-based, M = HDW model-based, E = engineering assessment-based, C = calculated by charge balance; includes oxides as hydroxides, not including CO_3, NO_2, NO_3, PO_4, SO_4, and SiO_3

Table D4-8. Best-Basis Inventory Estimates for Radioactive Components in Tank 241-AN-104 as of May 31, 1997[1] (Decayed to January 1, 1994). (2 sheets)

Analyte	Total Inventory (Ci)	Basis (S, M, or E)[2]	Comment
^{3}H	43.3	S	Slurry/crust only
^{14}C	104	M	
^{59}Ni	5.61	M	
^{60}Co	< 149	S	
^{63}Ni	552	M	
^{79}Se	11.3	M	
^{90}Sr	93,800	S	
^{90}Y	93,800	S	Referenced to ^{90}Sr.
^{93}Zr	55.3	M	
^{93m}Nb	40.2	M	
^{99}Tc	345	S	
^{106}Ru	0.0323	M	
^{113m}Cd	290	M	
^{125}Sb	745	M	
^{126}Sn	17.2	M	
^{129}I	<7.53	S	
^{134}Cs	123	M	
^{137}Cs	2.32E+06	S	
^{137m}Ba	2.20E+06	S	Referenced to ^{137}Cs
^{151}Sm	40,000	M	
^{152}Eu	14.5	M	
^{154}Eu	<676	S	
^{155}Eu	<4,730	S	
^{226}Ra	4.63E-04	M	
^{227}Ac	0.00286	M	
^{228}Ra	1.03	M	

Table D4-8. Best-Basis Inventory Estimates for Radioactive Components in Tank 241-AN-104 as of May 31, 1997[1] (Decayed to January 1, 1994). (2 sheets)

Analyte	Total Inventory (Ci)	Basis (S, M, or E)[2]	Comment
^{229}Th	0.0239	M	
^{231}Pa	0.0128	M	
^{232}Th	0.109	M	
^{232}U	3.17	M	
^{233}U	12.1	M	
^{234}U	3.59	M	
^{235}U	0.140	M	
^{236}U	0.193	M	
^{237}Np	<30.7	S	
^{238}Pu	7.97	M	
^{238}U	3.86	M	
$^{239/240}Pu$	9.70	S	
^{241}Am	<50.0	S	Slurry = 9.04 Ci.
^{241}Pu	664	M	
^{242}Cm	0.524	M	
^{242}Pu	0.00306	M	
^{243}Am	0.00124	M	
^{243}Cm	<0.48	S	
^{244}Cm	<Y2.0	S	

Notes:

[1]The tank was active. Waste transfers will change tank contents.

[2]S = sample-based, M = HDW model-based, E = engineering assessment-based, C = calculated by charge balance; includes oxides as hydroxides, not including CO_3, NO_2, NO_3, PO_4, SO_4, and SiO_3

D5.0 APPENDIX D REFERENCES

Agnew, S. F., 1997, *Hanford Tank Chemical and Radionuclide Inventories: HDW Model Rev. 4*, Los Alamos National Laboratory, Los Alamos, New Mexico.

Hanlon, B. M., 1997, *Waste Tank Summary Report for Month Ending May 31, 1997*, HNF-EP-0182-110, Lockheed Martin Hanford Corp. for Fluor Daniel Hanford Inc., Richland, Washington.

Hendrickson, D. W., 1994, *Grout Treatment Facility Waste Feed Projections*, WHC-SD-WM-TI-528, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

Hodgson, K. M., and M. D. LeClair, 1996, *Work Plan for Defining a Standard Inventory Estimate for Wastes Stored in Hanford Site Underground Tanks*, WHC-SD-WM-WP-311, Rev. 1, Lockheed Martin Hanford Corp. for Fluor Daniel Hanford, Inc., Richland, Washington.

Kupfer, M. J., A. L. Boldt, B. A. Higley, K. M. Hodgson, L. W. Shelton, R. A. Watrous, S. L. Lambert, D. E. Place, R. M. Orme, G. L. Borsheim, N. G. Colton, M. D. LeClair, R. T. Winward, and W. W. Schulz, 1997, *Standard Inventories of Chemicals and Radionuclides in Hanford Site Tank Wastes*, HNF-SD-WM-TI-740, Rev. 0, Lockheed Martin Hanford Corp. for Fluor Daniel Hanford, Richland, Washington.

Shekarriz, A., J. M. Bates, R. E. Bauer, N. S. Cannon, M. A. Chieda, B. E. Hey, C. G. Linschooten, L. A. Mahoney, D. R. Rector, and E. R. Siciliano, 1997, *Composition and Quantities of Retained Gas Measured in Hanford Waste Tanks 241-AW-101,A-101, AN-105, AN-104, and AN-103*, PNNL-11450, Rev. 1, Pacific Northwest National Laboratory, Richland, Washington.

Stauffer, L. A., 1997, *Solids Level Changes for Tanks 241-AN-103, 241-AN-104, 241-AN-105, 241-AW-101, and 241-SY-103*, (internal memorandum 74330-97-105 to B. M. Hanlon, April 3), Lockheed Martin Hanford Corp. for Fluor Daniel Hanford, Inc., Richland, Washington.

Watrous, R. A., and D. W. Wootan, 1997, *Activity of Fuel Batches Processed Through Hanford Separations Plants, 1944 Through 1989*, Lockheed Martin Hanford Corp. for Fluor Daniel Hanford Inc., Richland, Washington.

This page intentionally left blank.

APPENDIX E

BIBLIOGRAPHY FOR TANK 241-AN-104

This page intentionally left blank.

APPENDIX E

BIBLIOGRAPHY FOR TANK 241-AN-104

Appendix E is a bibliography that supports the characterization of tank 241-AN-104. The bibliography represents an in-depth literature search of all known information sources that provide sampling, analysis, surveillance, and modeling information, as well as processing occurrences associated with tank 241-AN-104 and its respective waste types.

The references in this bibliography are separated into three broad categories containing references broken down into subgroups. These categories and their subgroups are listed below.

I. NON-ANALYTICAL DATA

- Ia. Models/Waste Type Inventories/Campaign Information
- Ib. Fill History/Waste Transfer Records
- Ic. Surveillance/Tank Configuration
- Id. Sample Planning/Tank Prioritization
- Ie. Data Quality Objectives/Customers of Characterization Data

II. ANALYTICAL DATA - SAMPLING OF TANK WASTE AND WASTE TYPES

- IIa. Sampling of tank 241-AN-104
- IIb. Sampling of 242-A Evaporator Streams

III. COMBINED ANALYTICAL/NON-ANALYTICAL DATA

- IIIa. Inventories using both Campaign and Analytical Information (Best Estimate)
- IIIb. Compendium of Existing Physical and Chemical Documented Data Sources

This bibliography is broken down into the appropriate sections with an annotation at the end of each reference. Where possible, a reference is provided for information sources. A majority of the information listed below is available in the Tank Characterization safety and Resource Center.

I. NON-ANALYTICAL DATA

Ia. Models/Waste Type Inventories/Campaign Information

Agnew, S. F., J. Boyer, R. A. Corbin, T. B. Duran, J. R. Fitzpatrick, K. A. Jurgensen, T. P. Ortiz, and B. L. Young, 1997, *Hanford Tank Chemical and Radionuclide Inventories: HDW Model Rev. 4*, LA-UR-96-3680, Rev. 0, Los Alamos National Laboratory, Los Alamos, New Mexico.

- Contains tank layer and supernatant models, the historical tank content estimate for Hanford Site underground waste storage tanks, and a list of Hanford Site waste types.

Ib. Fill History/Waste Transfer Records

Agnew, S. F., R. A. Corbin, T. B. Duran, K. A. Jurgensen, T. P. Ortiz, and B. L. Young, 1994, *Waste Status and Transaction Record Summary, WSTRS, Rev. 4*, LA-UR-97-311, Rev. 0, Los Alamos National Laboratory, Los Alamos, New Mexico.

- Contains spreadsheets showing all available data on tank additions and transfers.

Koreski, G. M., and J. N. Strode, 1996, *Operational Waste Volume Projections*, WHC-SD-WM-ER-029, Rev. 22, Westinghouse Hanford Company, Richland, Washington.

- Contains an account of waste transfers for double-shell tanks, including waste type and volume, source, and destination.

Ic. Surveillance/Tank Configuration

Lipnizki, J., 1997, *Waste Tank Risers Available for Sampling*, WHC-SD-WM-TI-710, Rev. 4, Westinghouse Hanford Company, Richland, Washington.

- Describes riser information.

Salazar, B. E. 1994, *Double-Shell Underground Waste Storage Tank Riser Survey*, WHC-SD-RE-TI-093, Rev. 4, Westinghouse Hanford Company, Richland, Washington.

- Describes the double-shell underground waste tank riser survey.

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

- Contains information about the thermocouple trees installed in the Hanford Site underground waste tanks, for example, installation date, material condition, riser number, height of individual thermocouples above the tank bottom, high temperature reading, frequency of surveillance, and type of thermocouple.

Id. Sample Planning/Tank Prioritization

Baldwin, J. H., 1997, *Push Mode Core Sampling and Analysis Plan for Tank 241-AN-104 in Support of the Privatization Request Tank for Proposal,* WHC-SD-WM-TSAP-111, Rev. 0A, Westinghouse Hanford Company, Richland, Washington.

- Contains detailed sampling and analysis procedure information for tank 241-AN-104 based on TWRS Privatization's Request for Proposal.

Bell, K. E., 1993, *Tank Waste Remediation System Tank Waste Characterization Plan,* WHC-SD-WM-PLN-047, Rev. 1, Westinghouse Hanford Company, Richland, Washington.

- Coordinates the activities of the tank farms and the laboratories by establishing standard sample procurement and analysis procedures, standard quality control procedures and criteria, and prioritizing tank samples.

Brown, T. M., J. W. Hunt, and L. J. Fergestrom, 1997, *Tank Waste Characterization Basis,* HNF-SD-WM-TA-164, Rev. 3, Lockheed Martin Hanford Corp. for Fluor Daniel Hanford, Inc., Richland, Washington.

- Summarizes the technical basis for characterizing tank waste and assigns a priority number to each tank.

Winkelman, W. D., 1996, *Tank 241-AN-104 Push Mode Core Sampling and Analysis Plan,* WHC-SD-WM-TSAP-086, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

- Contains detailed sampling and analysis procedure information for tank 241-AN-104 based on applicable DQOs.

Grimes, G. W., 1977, *Hanford Long-Term Defense High-Level Waste Management Program Waste Sampling and Characterization Plan*, RHO-CD-137, Rockwell Hanford Operations, Richland, Washington.

- Early characterization planning document.

Phillips, J. R., A. Shekarriz, and J. M. Bates, 1996, *Sampling Plan for Tank 241-AN-104 Retained Gas Samples Deployment*, PNNLMIT:030796, Pacific Northwest National Laboratory, Richland, Washington.

- Letter report and May 30, 1996 addendum provide RGS requirements for the 241-AN-104 TSAP.

Winkelman, W. D., 1996, *Tank 241-AN-104 Tank Characterization Plan*, WHC-SD-WM-SD-TP-384, Rev. 3, Westinghouse Hanford Company, Richland, Washington.

- Discusses all relevant DQOs and how they will be met for tank 241-AN-104.

Winkelman, W. D., J. W. Hunt, and L. J. Fergstrom, 1996, *FY 1997 Tank Waste Analysis Plan*, WHC-SD-WM-PLN-120, Rev. 1, Lockheed Martin Hanford Corp. for Fluor Daniel Hanford, Inc., Richland, Washington.

- Contains Tri-Party Agreement (see Ecology et al. 1996 listing in Section 5.0) requirement-driven TWRS Characterization Program information and a list of tanks addressed in fiscal year 1997.

Winters, W. I., 1996, *Privatization Samples for Envelopes "A," "B," and "C,"* WHC-SD-WM-TP-495, Rev. 2, Westinghouse Hanford Company, Richland, Washington.

- Contains test plan to describe the method for sampling and analysis for privatization.

Ie. Data Quality Objectives (DQO) and Customers of Characterization Data

Carothers, K. G., 1994, *Data Quality Objectives for the Waste Compatibility Program,* WHC-SD-WM-DQO-001, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

- Provides requirements for safe and efficient combination of waste from different tanks and tank systems.

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.

- Determines whether tanks are under safe operating conditions.

Jones, T. E., and K. D. Wiemers, 1996, *Data Requirements for TWRS Privatization Characterization of Potential Low Activity Waste Feed*, WHC-SD-WM-DQO-023, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

- Documents the need for the privatization function within TWRS.

McDuffie, N. G., and G. D. Johnson, 1995, *Flammable Gas Tank Safety Program: Data Requirements for Core Sample Analysis Developed Through the Data Quality Objectives (DQO) Process*, WHC-SD-WM-DQO-004, Rev. 2, Westinghouse Hanford Company, Richland Washington.

- Provides data needs for evaluating flammability issues in the tank.

Minteer, D. J., 1996, *Waste Tank 214-AN-105 Gas Release Response Recommendations*, WHC-SD-WM-ER-524, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

- Describes gas release response recommendations.

Slankas, T. J., M. J. Kupfer, and W. W. Schultz, 1995, *Data Needs and Attendant Data Quality Objectives for Tank Waste Pretreatment and Disposal*, WHC-SD-WM-DQO-022, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

- Documents the needs for the pretreatment function within TWRS.

II. ANALYTICAL DATA - SAMPLING OF TANK WASTE AND WASTE TYPES

IIa. Sampling of tank 241-AN-104

Harmon, H. D., 1991, *Watch List for Tanks Which May Have Hydrogen Buildup*, (letter 9001478B.R1 to R. E. Gerton, February 8), Westinghouse Hanford Company, Richland, Washington.

- Reports the results of the slurry growth study of actual waste.

Jansky, M. T., and K. T. Patterson, 1984, *Laboratory Batch Boil Down on Actual Double-Shell Slurry Feed: AN-104 & AN-105 Blend,* (letter 65453-84-090 to L. M. Sasaki, April 2), Rockwell Hanford Operation, Richland, Washington.

- Reports the results of the slurry growth study of actual waste.

Jansky, M. T., 1984, *Boil Down & Slurry Growth Experiment with Tank AN-104 & AN-105 Double-Shell Slurry Feed (DSSF),* (letter 65611-84-008 to L. M. Sasaki, January 19), Rockwell Hanford Operation, Richland, Washington.

- Provide information in support of double-shell flowsheet and for determining scale-up effects on slurry growth.

King, A. G., 1996, *TWRS Privatization Private Contractor Samples for Low-Activity Waste Envelope B Tank 241-AN-104 Preliminary Analytical Report*, (letter 9655753 to C. G. Mattsson, November 20), Rust Federal Services of Hanford, Inc. for Fluor Daniel Hanford, Inc., Richland, Washington.

- Provides analyses of TWRS privatization contract samples, low-activity waste feed envelope B Tank.

Mauss, B. M., 1984, *Chemical Compositions of 102-AY, 101-AW, 105-AN, and 104-AN*, (internal memorandum 65453-84-348 to E. G. Gratny, November 9), Rockwell Hanford Operation, Richland, Washington.

- Provides the chemical compositions of 105-AN tank.

Payne, M. A., 1992, *Addition of Water to Watch List Tanks*, (letter 9251519 to R. E. Gerton, March 12), Westinghouse Hanford Company, Richland, Washington.

- Reports the results of the slurry growth study of actual waste.

Sasaki L. M., 1984, *Results of Organic Analysis of Double Shell Slurry*, (letter 65611-84-053 to D. J. Flesher, April 5), Rockwell Hanford Operation, Richland, Washington.

- Reports the results of the slurry growth study of actual waste. Also supports complexant removal studies.

Stewart, C. W., J. M. Alzheimer, C. L. Shepard, G. Terrones, G. Chen, and N. E. Wilkins, 1996, *In Situ Determination of Rheological Properties and Void Fraction: Hanford Waste Tank 241-AN-104,* PNNLMIT:021696, Pacific Northwest National Laboratory, Richland, Washington.

- Provides results from operating the ball rheometer and void fraction instrument in Hanford Site waste tank 241-AN-104.

Steen, F. H., 1997, *Final Report for Tank 241-AN-104, Cores 163 and 164*, HNF-SD-WM-DP-226, Rev. 1A, Rust Federal Services of Hanford, Inc. for Fluor Daniel Hanford, Inc., Richland, Washington.

- Contains sample analyses from 1996 tank 241-AN-104 core sampling event.

Shekarriz, A., R. E. Bauer, D. R. Rector, N. S. Cannon, L. A. Mahoney, B. E. Hey, M. A. Chieda, C. G. Linshooten, J. M. Bates, F. J. Reitz, and E. R. Siciliano., 1997, *Retained Gas Sampler Measurement Results for Hanford Waste Tanks 241-AW-101, 241-A-101, 241-AN-104, 241-AN-104 241-AN-103*, PNNL-11450, Rev. 1, Pacific Northwest National Laboratory, Richland, Washington.

- Contains the measurements resulting from retained gas sampling tanks.

Wilkins, N. E., 1995, *Results of Gas Monitoring of Double-Shell Flammable Gas Watch List Tanks*, WHC-SD-WM-TI-682, Rev. OA, Westinghouse Hanford Company, Richland, Washington.

- Describes gas monitoring of double-shell tanks.

Wilkins, N. E., R. E. Bauer, and D. M. Ogden, 1996, *Results of Vapor Space Monitoring of Flammable Gas Watch List Tanks*, HNF-SD-WM-TI-797, Rev. 1, Lockheed Martin Hanford Corp. for Fluor Daniel Hanford, Inc., Richland, Washington.

- Contains results of the standard hydrogen monitoring system, vapor grab sampling, and gas character system monitoring of tank 241-AN-104 and other watch list tanks.

IIb. Sampling of 242-A Evaporator Streams

Cash, R. J., 1996, *Flammable Gas Safety Program Report on May 30, 1996 Gas Release Event in Tank AN-105, 1996,* (letter 9652960 to J. K. McClusky, July 3), Westinghouse Hanford Company, Richland, Washington.

- Reports assessment and actions in response to gas release event of May 30, 1996.

Jansky, M. T., 1984, *Laboratory Support for Upcoming 242-Evaporator Campaign, Run 84-5*, (letter 65453-84-134 to E. F. Gratny, May 10), Rockwell Hanford Operation, Richland, Washington.

- Reports analytical data to support Evaporator Campaign, Run 84-5.

Johnson, G. D., and M. A. Payne, 1994, *Tank AN-105 Gas Release Event of May 1994*, (letter 9455249 to distribution, July 29), Westinghouse Hanford Company, Richland, Washington.

- Reviews data and evaluates the safety implications of gas release event of May 17, 1994.

Pontious, N. L., 1986, *242-A Evaporator/Crystal; FY-1985 Campaign 85-3 Post-Run Document*, WHC-SD-WM-PE-023, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

- Describes Evaporator Campaign Run 85-3.

Von Bergen, B. H., 1987, *242-A Evaporator Run Schedule for Room 88-1*, (internal memorandum 13331-87-975 to G. L. Dunford, December 18), Westinghouse Hanford Company, Richland, Washington.

- Contains 1988 evaporator run planning information.

III. COMBINED ANALYTICAL/NON-ANALYTICAL DATA

IIIa. Inventories from Campaign and Analytical Information

Agnew, S. F., J. Boyer, R. A. Corbin, T. B. Duran, J. R. Fitzpatrick, K. A. Jurgensen, T. P. Ortiz, and B. L. Young, 1997, *Hanford Tank Chemical and Radionuclide Inventories: HDW Rev. 4*, LA-UR-96-3680, Rev. 0, Los Alamos National Laboratory, Los Alamos, New Mexico.

- Contains waste type summaries and primary chemical compound/analyte and radionuclide estimates for sludge, supernatant, and solids.

IIIb. Compendium of data from other sources physical and chemical

Agnew, S. F., and J. G. Watkin, 1994, *Estimation of Limiting Solubilities for Ionic Species in Hanford Waste Tank Supernates*, LAUR-94-3590, Los Alamos National Laboratory, Los Alamos, New Mexico.

- Provides solubility ranges used for key chemical and radionuclide components based on supernatant sample analyses.

Brevick, C. H., L. A. Gaddis, and E. D. Johnson, 1995, *Tank Waste Source Term Inventory Validation, Vol I & II.*, WHC-SD-WM-ER-400, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

- Contains a quick reference to sampling information in spreadsheet or graphical form for 23 chemicals and 11 radionuclides for all tanks.

Brevick, C. H., L. A. Gaddis, and S. D. Consort, 1995, *Supporting Document for the Southeast Quadrant Historical Tank Content Estimate for AN Tank Farm (Vol I and II)*, WHC-SD-WM-ER-314, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

- Describes the AN Tank Farm.

Hanlon, B. M., 1997, *Waste Tank Summary Repeat for Month Ending May 31, 1997*, HNF-EP-0182-110, Lockheed Martin Hanford Corp., for Fluor Daniel Hanford Inc., Richland, Washington.

- Describes the waste tank summary report.

Husa, E. I., 1993, *Hanford Site Waste Storage Tank Information Notebook*, WHC-EP-0625, Westinghouse Hanford Company, Richland, Washington.

- Contains in-tank photos and summaries on the tank description, leak detection system, and tank status.

Husa, E. I., 1995, *Hanford Waste Tank Preliminary Dryness Evaluation*, WHC-SD-WM-TI-703, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

- Assesses relative dryness between tanks.

Olson, N. J., 1989, *Electrochemical Testing A537 Carbon Steel Purex Scrub Solutions For Corrosion Behavior -Preliminary Report*, (letter LET-011689 to D. A. Reynolds, January 16), Pacific Northwest Laboratory, Richland, Washington.

- Presents the results from corrosion testing with scrub solutions for corrosion behavior.

Shelton, L. W., 1995, *Chemical and Radionuclide Inventory for Single- and Double-Shell Tanks*, (internal memorandum 74A20-96-30 to D. J. Washenfelder, February 28), Westinghouse Hanford Company, Richland, Washington.

- Contains a tank inventory estimate based on analytical information.

Shelton, L. W., 1995, *Chemical and Radionuclide Inventory for Single- and Double-Shell Tanks*, (internal memorandum 75520-95-007 to R. M. Orme, August 8), Westinghouse Hanford Company, Richland, Washington.

- Contains a tank inventory estimate based on analytical information.

Shelton, L. W., 1995, *Chemical and Radionuclide Inventory for Single- and Double-Shell Tanks*, (internal memorandum 71320-95-002 to F. M. Cooney, February 14), Westinghouse Hanford Company, Richland, Washington.

- Contains a tank estimate based on analytical information.

Van Vleet, R. J., 1993, *Radionuclide and Chemical Inventories for Double-Shell Tanks*, WHC-SD-WM-TI-543, Rev. 1, Westinghouse Hanford Company, Richland, Washington.

- Contains radionuclide chemical inventories for double-shell tanks.

This page intentionally left blank.

DISTRIBUTION SHEET

To	From	Page 1 of 2
Distribution	Data Assessment and Interpretation	Date 05/08/97
Project Title/Work Order		EDT No. EDT-617664
Tank Characterization Report for Double-Shell Tank 241-AN-104, HNF-SD-WM-ER-690, Rev. 0		ECN No. N/A

Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only
OFFSITE					
Sandia National Laboratory P.O. Box 5800 MS-0744, Dept. 6404 Albuquerque, NM 87815					
D. Powers		X			
Nuclear Consulting Services Inc. P. O. Box 29151 Columbus, OH 43229-01051					
J. L. Kovach		X			
Chemical Reaction Sub-TAP P.O. Box 271 Lindsborg, KS 67456					
B. C. Hudson		X			
SAIC 20300 Century Boulevard, Suite 200-B Germantown, MD 20874					
H. Sutter		X			
Los Alamos Laboratory CST-14 MS-J586 P. O. Box 1663 Los Alamos, NM 87545					
S. F. Agnew		X			
Los Alamos Technical Associates T. T. Tran	B1-44	X			
Tank Advisory Panel 102 Windham Road Oak Ridge, TN 37830					
D. O. Campbell		X			

DISTRIBUTION SHEET

To	From	Page 2 of 2
Distribution	Data Assessment and Interpretation	Date 05/08/97
Project Title/Work Order		EDT No. EDT-617664
Tank Characterization Report for Double-Shell Tank 241-AN-104, HNF-SD-WM-ER-690, Rev. 0		ECN No. N/A

Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only
ONSITE					
Department of Energy - Richland Operations					
J. F. Thompson	S7-54	X			
W. S. Liou	S7-54	X			
J. A. Poppiti	S7-54	X			
N. W. Willis	S7-54	X			
DE&S Hanford, Inc.					
R. J. Cash	S7-14	X			
W. L. Cowley	R2-54	X			
G. L. Dunford	A2-34	X			
G. D. Johnson	S7-14	X			
J. E. Meacham	S7-14	X			
Fluor Daniel Northwest					
J. L. Stroup	S3-09	X			
Lockheed Martin Hanford, Corp.					
K. M. Hodgson	H0-34	X			
T. A. Hu	R2-12	X			
T. J. Kelley	S7-21	X			
L. M. Sasaki	R2-12	X			
B. C. Simpson	R2-12	X			
L. R. Webb	R2-12	X			
ERC (Environmental Resource Center)	R1-51	X			
T.C.S.R.C.	R1-10	5			
Lockheed Martin Services, Inc.					
B. G. Lauzon	R1-08	X			
Central Files	A3-88	X			
EDMC	H6-08	X			
Numatec Hanford Corporation					
J. S. Garfield	H5-49	X			
J. S. Hertzel	H5-61	X			
R. A. Kirkbride	H5-27	X			
D. L. Lamberd	H5-61	X			
Pacific Northwest National Laboratory					
A. F. Noonan	K9-91	X			
Rust Federal Services of Hanford, Inc.					
C. T. Narquis	T6-16	X			