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BD-7400-172-1R

Tank Characterization Report for Double-Shell Tank 241-AN-103

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U.S. Department of Energy Contract DE-AC06-87RL10930

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Abstract: This document summarizes the information on the historical uses, present status, and the sampling and analysis results of waste stored in Tank 241-AN-103. This report supports the requirements of the Tri-Party Agreement Milestone M-44-10.

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Tank Characterization Report for Double-Shell Tank 241-AN-103

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Project Hanford Management Contractor for the
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LIST OF TERMS

1C	first cycle decontamination waste
AEA	alpha energy analysis
ANOVA	analysis of variance
AT	alpha total
Btu/hr	British thermal units per hour
Ci	curies
Ci/L	curies per liter
CI	confidence interval
cm	centimeter
cm/s	centimeters per second
cP	centipoise
DQO	data quality objectives
DSC	differential scanning calorimetry
DSSF	double-shell slurry feed
DSS	double-shell slurry
FIC	Food Instrument Corporation
ft	feet
GEA	gramma energy analysis
g	gram
g/cc	grams per cubic centimeter
g/L	grams per liter
g/mL	grams per milliliter
HDW	Hanford defined waste
HTCE	historical tank content estimate
IC	ion chromatography
ICP	inductively coupled plasma spectroscopy
in.	inch
J/g	joules per gram
kg	kilogram
kgal	kilogallon
kL	kiloliter
kW	kilowatt
LANL	Los Alamos National Laboratory
LAW	low activity waste
LEL	lower explosive limit
LFL	lower flammability limit
LL	lower limit
m	meter
M	moles per liter
M^3	cubic meters
mg	milligram
MIT	Multifunctional Instrument Tree

LIST OF TERMS (Continued)

mL	milliliter
mm	millimeter
mol%	mole percent
NA	not available
n/a	not applicable
n/d	not detected
ND	not determined
NR	not reported
PHMC	Project Hanford Management Contractor
ppm	parts per million
ppmv	parts per million volume
QC	quality control
REML	restricted maximum likelihood estimation methods
RGS	retained gas sampler
RPD	relative percent difference
SACS	Surveillance Analysis Computer System
SAP	sampling and analysis plan
Seg.	segment
SMM	supernatant mixing model
STP	standard temperature and pressure
TB	total beta
TCD	Tank Characterization Database
TCP	tank characterization plan
TCR	tank characterization report
TGA	thermogravimetric analysis
TIC	total inorganic carbon
TLM	tank layer model
TOC	total organic carbon
TSAP	Tank Sampling and Analysis Plan
TWRS	Tank Waste Remediation System
UL	upper limit
VFI	void fraction instrument
W	watts
W/Ci	watts per curies
WSTRS	waste status and transaction record summary
wt%	weight percent
°C	degrees Centigrade
°F	degrees Fahrenheit

LIST OF TERMS (Continued)

μCi/g	microcuries per gram
μCi/mL	microcuries per milliliter
μeq/g	microequivalents per gram
μg/mL	micrograms per milliliter
μg/g	micrograms per gram
μmole/g	micromole per gram

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-103.

The objectives of this report are: 1) to use characterization data in response to technical issues associated with tank 241-AN-103 waste; and 2) to provide a standard characterization of this waste in terms of a best-basis inventory estimate. The response to technical issues is summarized in Section 2.0, and the best-basis inventory estimate is presented in Section 3.0. Recommendations regarding safety status and additional sampling needs are provided in Section 4.0. Supporting data and information are contained in the appendixes. 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

Characterization information presented in this report originated from sample analyses and known historical sources. While 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. Historical information for tank 241-AN-103, provided in Appendix A, includes surveillance information, records pertaining to waste transfers and tank operations, and expected tank contents derived from a process knowledge model. The recent sampling events listed in Table 1-1, as well as sample data obtained before 1989, are summarized in Appendix B. The results of the 1996 sampling event, also reported in the laboratory data package (Steen 1997), satisfied the data requirements specified in the tank characterization plan (TCP) for this tank (Kruger and Winkelman 1996). The statistical analysis of data used in issue resolution are reported in Appendixes B and C. Appendix D contains the evaluation to establish the best basis for the inventory estimate. A bibliography that resulted from an in-depth literature search of all known information sources applicable to tank 241-AN-103 and its respective waste types is contained in Appendix E.

Table 1-1. Summary of Recent Sampling.

Sample/date	Phase	Location	Segmentation	% Recovery
Push mode core (9/13/96-9/17/96) Core 166	Solid/ Liquid	Riser 12A	19 segments RGS segments (2,5, and 14)	79 - 100 percent
	Solid		Upper/lower half, 15 segments	
	Liquid		Recovered in segments 3 through 12 (only a few solids in these segments)	
Push mode core (9/18/96 - 9/23/96) Core 167	Solid/ Liquid	Riser 21A	18 segments RGS segments (10, 13, 16, and 18)	79 - 100 percent
			Upper/lower half 14 segments	
			Recovered in segments 2 - 11 (only a few solids in those segments)	
Combustible Gas Test	Gas	Tank headspace, Risers 12A and 21A, 6.1 m (20 ft) below top of risers	n/a	n/a

Notes:

n/a = not applicable

Dates are provided in the mm/dd/yy format.

1.2 TANK BACKGROUND

Tank 241-AN-103 is located in the 200 East Area AN Tank Farm on the Hanford Site. The tank went into service in the first quarter of 1982, receiving raw water. The tank received non-complexed waste from tank 241-SY-102 and water from miscellaneous sources during the fourth quarter of 1982. Waste was sent to tank 241-AW-102 from tank 241-AN-103 during the fourth quarter of 1982 and the first quarter of 1983. Non-complexed waste from the 300 and 400 Areas was sent to tank 241-AN-103 during the third quarter of 1983. In the third quarter of 1983 and 1984, the tank received liquid from the salt well pumping of several single-shell tanks in the 200 East and West Areas. The tank also received non-complexed waste from B Plant cesium processing during the first quarter of 1984. Non-complexed waste from 241-AN-104 and water from miscellaneous sources was sent to tank 241-AN-103 during the third quarter of 1984. Tank 241-AN-103 sent waste to tank 241-AN-101 during the fourth quarter of 1984. Tank 241-AN-103 exchanged non-complexed waste with tank 241-AW-102 (the 242-A Evaporator feed tank) during the first and fourth quarters of 1984 and the first quarter of 1986. No further waste transfers have involved tank 241-AN-103 from the third quarter of 1986 to the present.

A description of tank 241-AN-103 is summarized in Table 1-2. The tank has an operating capacity of 4,390 kL (1,160 kgal), and presently contains an estimated 3,615 kL (955 kgal) of double-shell slurry waste (Hanlon 1997) made up of three layers: a floating crust, a convective layer, and a non-convective layer. The tank is on the Flammable Gas Watch List (Public Law 101-510).

Table 1-2. Description of Tank 241-AN-103.[1,2]

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
Total waste volume	3,615 kL (955 kgal)
Supernatant volume	2,063 kL (545 kgal)
Double-shell slurry	1,552 kL (410 kgal)
Saltcake volume	0 kL (0 kgal)
Sludge volume	0 kL (0 kgal)
Drainable interstitial liquid volume	0 kL (0 kgal)
Waste surface level (March 31, 1997)	8.82 m (28.9 ft)
Temperature (Jan. 1995 to Dec. 1996)	28.9 °C (84 °F) to 47.2 °C (117 °F)
Integrity	Sound
Watch List	Flammable Gas
SAMPLING DATE	
Push mode core sample	September 1996
SERVICE STATUS	
Active	1982 to present

Notes:

[1]Waste volumes are based on Hanlon (1997).

[2]This is an active tank, any new waste transferred into this tank may change the data presented in this table.

2.0 RESPONSE TO TECHNICAL ISSUES

Four technical issues have been identified for tank 241-AN-103 (Brown et al. 1996). They are:

- **Safety Screening:** Does the waste pose or contribute to any recognized potential safety problems?
- **Flammable Gas:** Data from the push core samples are needed to provide an understanding of the tank contents so that: (1) insight may be obtained on the mechanisms within the waste for gas generation, retention, and release, (2) models of the 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 release of gases into the dome space, and subsequent potential for ignition in the dome space, can be done to support hazard analyses.
- **Organic Solvents Screening:** Does an organic solvent pool exist that may cause a fire or ignition of organic solvents in entrained waste solids?
- **Privatization:** Do the September 1996 push core samples taken from tank 241-AN-103, and the subsequent laboratory analysis, meet the needs of the privatization low activity waste (LAW) DQO (Jones and Wiemers 1996)?

The Tank Characterization Plan (Kruger and Winkelman 1996) and the Tank Safety and Analysis Plan (TSAP) (Kruger 1996) provide the types of sampling and analysis used to address the above issues. Data from the recent analysis of two push core samples and tank vapor space flammability measurements, as well as available historical information, provided the means to respond to these two issues. This response is detailed in the following sections. See Appendix B for sample and analysis data for tank 241-AN-103.

2.1 SAFETY SCREENING

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

2.1.1 Exothermic Conditions (Energetics)

The first requirement outlined in the safety screening DQO (Dukelow et al. 1995) is to ensure that there are not sufficient exothermic constituents in tank 241-AN-103 to cause a safety hazard. Because of this requirement, energetics in the tank 241-AN-103 waste were evaluated. The safety screening DQO required that solid samples be tested for energetics every 24 cm (9.5 in.) to determine if the energetics exceed the safety threshold limit. Note that the first 12 segments from core 166 and the first 9 segments from core 167 were mostly composed of drainable liquid and therefore, were not subdivided into upper and lower samples (see Table B1-2a).

Results obtained using differential scanning calorimetry (DSC) indicated that exotherms were well below notification limits of 480 J/g on a dry weight basis. The maximum DSC value measured was 268 J/g (dry). The upper limits of the one-sided 95 percent confidence interval for the DSC results were below the notification limit (480 J/g dry) except for core 167, segment 7, drainable liquid, which had an upper limit of 629 J/g (dry). The upper limit was high because of difference in the exotherms found for the two samples (result: 0 J/g, duplicate 172.0 J/g). The total organic carbon (TOC) results for this sample were 2,500 μg/g and 2,720 μg/g, well below the limit of 30,000 μg/g. Therefore, energetics is not a concern for this tank.

2.1.2 Flammable Gas

Vapor phase measurements, taken in the tank headspace prior to the push core samples in September 1996, indicated that no flammable gas was detected (0 percent of the lower flammability limit [LFL]). Data from these vapor phase measurements are presented in Appendix B. However, before this sampling event there has been one gas release event and the resulting peak hydrogen concentration was 0.3 vol%, which is less than 25 percent of the LFL (Wilkins et al. 1997). Tank 241-AN-103 is on the flammable gas watch list. Additional information on the flammable gas tank safety evaluation is provided in Section 2.2.

2.1.3 Criticality

The safety threshold limit is 1 g ^{239}Pu per liter of waste. As part of the safety screening DQO, the potential for a criticality event in a tank is assessed using the total alpha activity data. The safety screening DQO identifies the total alpha activity safety threshold limit as 1 gram of fissile material per liter of waste. This limit was converted into the laboratory-reported solid units of microcuries per gram by assuming that all fissile material (alpha activity) exists as ^{239}Pu and by using the maximum bulk density of 1.93 g/mL found from the tank 241-AN-103 samples. The assumption that all fissile material exists as ^{239}Pu was made because ^{239}Pu is the radioisotope of concern with respect to the criticality issue. The maximum density value was used because it produces the minimum threshold limit and is therefore the most conservative estimate. For tank 241-AN-103, 1 gram of ^{239}Pu per liter of waste is equivalent to 32.1 $\mu Ci/g$ of alpha activity for solid subsamples. There is no density correction for liquids because the results are reported by the laboratory in microcuries per milliliter. The gram to microcurie conversion for liquid samples, assuming all alpha activity is from ^{239}Pu, results in a safety threshold limit of 61.5 $\mu Ci/mL$.

Waste samples were tested for total alpha activity for each push core sample. Concentrations in all samples were well below the threshold limit with a maximum value of 0.18 $\mu Ci/mL$. Additionally, the upper limit of the one-sided 95 percent confidence interval for these results was less than 61.5 $\mu Ci/mL$, with a maximum value of 0.534 $\mu Ci/mL$. The method used to calculate confidence limits is contained in Appendix C. The data show that there is no criticality concern with this tank.

2.2 FLAMMABLE GAS TANK SAFETY EVALUATION

The purpose of the flammable gas tank safety evaluation is to obtain data to develop mitigation methods, to support tank behavior models needed for making safety analyses, and to support evaluations of chemical mechanisms for gas production and release. These data needs were met by the sampling event and retained gas sampler (RGS) analysis in September 1996, and by the ball rheometer and void fraction instrument (VFI) deployed in May 1996.

Tank 241-AN-103 was the fifth double-shell tank sampled for retained gases. The RGS was used in two risers within this tank to obtain seven segments. The waste level at time of sampling was about 884 cm (348 in.) and consisted of a nonconvective layer of about 378 $\pm$ 29 cm (149 $\pm$ 12 in.) in depth, 414 $\pm$ 37 cm (163 $\pm$ 14 in.) of convective liquid, and a floating crust 92 $\pm$ 8 cm (36 $\pm$ 3 in.) thick. The head space volume in tank 241-AN-103 is about 1,723 m^3 (61,000 ft^3) (Shekarriz et al. 1997).

Retained gas measurements and estimated solubilities show three major constituents in the gas/vapor phase (free gas) in the waste. The major components of gas in the nonconvective layer are hydrogen (62.0 $\pm$ 6.6 mol%), nitrogen (33.1 $\pm$ 3.5 mol%) and nitrous oxide (3.8 $\pm$ 0.4 mol%). Gas in the convective layer consists of mostly nitrogen (76.3 $\pm$ 47 mol%), hydrogen (18.4 $\pm$ 10 mol%) and nitrous oxide (2.2 $\pm$ 1.2 mol%). The remainder of the gas in both layers is composed of ammonia, methane, and other hydrocarbons (Shekarriz et al. 1997).

The measured local ammonia concentrations in tank 241-AN-103 ranged from 1260 $\pm$ 350 to 3820 $\pm$ 3150 μmole/liter of waste. More than 99.9 percent of the ammonia is dissolved in the waste. The RGS analysis of ammonia is believed to underestimate the actual ammonia content in the tank by a factor of 2 to 3 (Shekarriz et al. 1997).

The extraction results show that the insoluble gases were primarily retained in the lower, nonconvective layer. Based on the estimated solubilities and RGS measurements of gas concentrations, about 7.7 percent by volume (in-situ) of the nonconvective layer was filled with free gas, while 0.4 percent by volume (in-situ) of the convective (upper) layer was filled with free gas. Local calculated void fractions based on RGS data did not agree closely with the VFI results. The VFI data show a maximum of approximately 0.15 void fraction at an elevation of 200 cm (80 in.). The maximum void fraction found with the RGS in the non-convective layer is 0.094. The calculated hydrogen inventory in both phases of the nonconvective and convective layers of tank 241-AN-103 is 136 m^3 (4,800 ft^3), based on integrated RGS measurements (Shekarriz et al. 1997). The total stored gas inventory is 380 m^3, the highest of any of the double-shell tanks.

X-rays of the RGS segments, prior to extrusion, showed large gas pockets in tank 241-AN-103 that account for a large portion of the measured void fraction. This contrasts with the observations made for tank 241-AW-101 waste, where the major portion of the gas was observed to be smaller than the detection threshold of the x-ray imaging system (< 0.5 mm). No fractures or irregularly shaped bubbles were observed in this tank, unlike what was observed in tank 241-A-101 waste. Estimated densities of the five segments in the nonconvective layer in this tank, based on x-ray images, ranged from 1.85 to 2.06 g/cc (Shekarriz et al. 1997).

The ball rheometer and VFI were run in tank 241-AN-103 in riser 16B on May 7 and 14, 1996, and in riser 1B on May 9 and 16, 1995, respectively. Three traverses were accomplished with the VFI in riser 1B and two in 16B. The ball sank to within about 2 m (79 in.) of the tank bottom in riser 16B and to within about 63 cm (25 in.) of the bottom in 1B. No significant gas releases were observed on the waste surface or on the gas monitoring equipment during VFI operation (Stewart et al. 1996).

Tank 241-AN-103 has the highest void fraction of the six flammable gas Watch List tanks tested with the VFI. It also shows the least scatter in the void measurements. The data show a trend of almost linear decreasing void fraction at waste depths below about 250 cm (Stewart et al. 1996).

The viscosity of the convective layer in risers 1B and 16B was calculated to be 10 centipoise (cP), bounded above by 60 cP and below by 2 cP. At all the elevations from which data could be obtained, the yield stress in riser 16B is slightly higher than that in riser 1B. The apparent viscosities were also higher in riser 16B than in riser 1B (Stewart et al. 1996).

Preliminary evaluations of flammable gas analytical results for tank 241-AN-103 were conducted by Meyer et al. (1997). Additional evaluations are in progress. Preliminary indications are that gas is still being generated, and future releases are possible because of the large volume of gas stored in the convective layer and the thick layer of crust which prevents gasses from escaping to the tank dome space.

2.3 ORGANIC SOLVENTS SCREENING

The data required to support the organic solvent screening issue are documented in the 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 non-methane hydrocarbon, to determine if 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 non-methane organic hydrocarbon have not been conducted. Vapor samples are scheduled for FY 1998.

2.4 PRIVATIZATION

Tank 241-AN-103 is in the scope of the privatization LAW DQO (Jones and Wiemers 1996). However, sampling was performed before issuing this DQO. The sampling and analytical results are being assessed by the privatization program to determine whether the 1996 sample meets the needs of the privatization LAW 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 from the 1996 sample events was 10.6 kW (36,300 Btu/hr), as shown in Table 2-1. The heat load estimate based on the tank process history was 6.69 kW (22,800 Btu/hr) (Agnew et al. 1997). The heat load estimate based on the tank headspace temperature was 13.2 kW (45,000 Btu/hr) (Kummerer 1995). These estimates are well below the limit of the maximum heat load, 20.5 kW (70,000 Btu/hr), allowed for double-shell tanks (Heubach 1996).

Table 2-1. Heat Load for Tank 241-AN-103 Based on Radionuclide Content.

Radionuclide[1]	Specific Activity µCi/mL	Projected Inventory Ci	Decay Heat Rate W/Ci	Heat Load from Radioactive Decay[2] W
^{137}Cs	638	2.31E+06	0.00472	10,900
Total				10,900

Notes:

[1]Include daughter radionuclides.

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

2.6 SUMMARY

The results from all analyses performed to address potential safety issues showed that no primary analyte exceeded safety decision threshold limits with the exception of two samples. These samples exceeded the notification limit at the upper limit of the 95 percent confidence interval. Total organic carbon analyses are pending. The analyses for the flammable gas were completed to obtain data to develop mitigation methods, to support tank behavior models needed for making safety analyses, and to support evaluations of chemical mechanisms for gas production and release. The analyses results are summarized in Table 2-2.

Table 2-2. Summary of Safety Screening, Organic Solvents Screening and Flammable Gas Results.

Issue	Sub-issue	Result
Safety screening	Energetics	All exothermic reactions below 480 J/g. Highest 95 percent confidence interval upper limit = 629 J/g. The average TOC for this sample was 2,610, well below 30,000 μg/g.
	Flammable gas	Vapor measurement reported 0 percent of lower flammability limit. (Combustible gas meter).
	Criticality	All analyses well below 32 μCi/g total alpha (within 95 percent confidence limit on each sample).
Flammable Gas	Mechanisms for generation retention and release Waste Models	7.7 percent void filled with retained gases in the nonconvective layer (314 m^3), 62 percent hydrogen content. High ammonia concentration in the waste. Preliminary assessments of flammable gas generation, retention and release mechanisms, and waste behavior modeling results are reported in Meyer et al. (1997). Additional evaluations to assess potential impacts and waste behavior in tank 241-AN-103 are in progress.
Organic Solvent	Total Non-Methane Hydrocarbon	Evaluation in progress based on TOC sniff test results.
Privatization	Low Activity Waste	Results of 1996 push core sample are being evaluated to determine if they meet the needs of the privatization (LAW) DQO (Jones and Wiemers 1996).

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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 Los Alamos National Laboratory (LANL) (Agnew et al. 1997). Information derived from these two different approaches is often inconsistent.

An effort is underway to provide waste inventory estimates that will serve as standard characterization information for the various waste management activities (Hodgson and LeClair 1996). As part of this effort, an evaluation of available information for tank 241-AN-103 was performed:

- A report by Steen (1997) and Appendix B of this report provide 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-103 based on a 1986 push core sample. (Hendrickson 1994).
- The HDW model document (Agnew et al. 1997) provides tank content estimates derived from the LANL model, 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-103 for the following reasons:

- The September 1996 sampling event provides the most recent data for the waste.
- Estimates based on the 1986 core sampling event agree with the September 1996 data.
- The HDW model estimates, although in reasonable agreement with the 1996 sampling data, do not compare as well with the 1986 data.

Best-basis total inventory estimates for tank 241-AN-103 are presented in Tables 3-1 and 3-2. Best-basis inventory estimates for the supernatant, salt slurry, and crust layers are included in Appendix B (Tables D4-1 through D4-6). Radionuclide values are decayed to January 1, 1994.

The inventory values reported in Tables 3-1 and 3-2 are subject to change. Refer to the Tank Characterization Database (TCD) for the most current inventory values.

Best-basis tank inventory values are derived for 46 key radionuclides (as defined in Section 3.1 of Kupfer et al. 1997), all decayed to a common report date of 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, and so forth, have been infrequently reported. For this reason it has been necessary to derive most of the 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. (These computer models are described in Kupfer et al. 1997, Section 6.1 and in Watrous and Wootan 1997.) Model generated values for radionuclides in any of 177 tanks are reported in the Hanford Defined Waste Rev. 4 model results (Agnew et al. 1997). The best-basis value for any one analyte may be either a model result or a sample or engineering assessment-based result if available. (No attempt has been made to ratio or normalize model results for all 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, see Kupfer et al. 1997, Section 6.1.10.

Table 3-1. Best-Basis Total Inventory Estimates for Nonradioactive Components in Tank 241-AN-103 as of May 31, 1997. (2 sheets)

Analyte	Total Inventory (kg)	Basis (S, M, or E)[1,2]	Comment
Al	239,000	S	
Bi	<1,120	S	
Ca	<6,100	S	
Cl	27,500	S	
TIC as CO_3	84,600	S	
Cr	2,820	S	
F	3,860	S	
Fe	<774	S	
K	46,300	S	
La	<811	S	

Table 3-1. Best-Basis Total Inventory Estimates for Nonradioactive Components in Tank 241-AN-103 as of May 31, 1997. (2 sheets)

Analyte	Total Inventory (kg)	Basis (S, M, or E)[1,2]	Comment
Mn	<112	S	
Na	1.27E+06	S	
Ni	<225	S	
NO_2	494,000	S	
NO_3	771,000	S	
OH	999,000	S	
Pb	<795	S	
PO_4	9,800	S	
Si	2,350	S	
SO_4	13,200	S	
Sr	<112	S	
TOC	12,000	S	
U_{TOTAL}	<5,620	S	
Zr	<113	S	
% Water	48.0	S	
Density, g/mL	1.54	S	

Notes:

TIC = total inorganic carbon

[1]S = Sample-based, M = HDW model-based, and E = Engineering assessment-based.

[2] Based on a sample volume of 3,615 kL (995 Kgal).

Table 3-2. Best-Basis Total Inventory Estimates for Radioactive Components in Tank 241-AN-103 as of May 31, 1997. (Decayed to January 1, 1994) (2 Sheets)

Analyte	Total Inventory (Ci)	Basis (S, M, or E)[1]	Comment
^{3}H	9.31	S	Slurry/Crust only
^{14}C	112	S	
^{59}Ni	7.58	M	
^{60}Co	<112	S	
^{63}Ni	747	M	
^{79}Se	12.3	M	
^{90}Sr	8,030	S	
^{90}Y	8,030	S	Referenced to ^{90}Sr
^{93}Zr	59.6	M	
^{93m}Nb	43.2	M	
^{99}Tc	456	S	
^{106}Ru	0.0533	M	
^{113m}Cd	302	M	
^{125}Sb	865	M	
^{126}Sn	18.8	M	
^{129}I	8.32	S	
^{134}Cs	189	M	
^{137}Cs	2.31E+06	S	
^{137m}Ba	2.19E+06	S	Referenced to ^{137}Cs
^{151}Sm	43,600	M	
^{152}Eu	15.8	M	
^{154}Eu	<604	S	
^{155}Eu	<3,300	S	
^{226}Ra	5.81E-04	M	
^{227}Ac	0.00355	M	
^{228}Ra	1.05	M	
^{229}Th	0.0243	M	
^{231}Pa	0.0143	M	
^{232}Th	0.103	M	

Table 3-2. Best-Basis Total Inventory Estimates for Radioactive Components in Tank 241-AN-103 as of May 31, 1997. (Decayed to January 1, 1994) (2 Sheets)

Analyte	Total Inventory (Ci)	Basis (S, M, or E)[1]	Comment
^{232}U	3.59	M	
^{233}U	13.8	M	
^{234}U	4.87	M	
^{235}U	0.189	M	
^{236}U	0.285	M	
^{237}Np	<31.0	S	
^{238}Pu	12.6	M	
^{238}U	4.84	M	
$^{239/240}Pu$	12.3	S	
^{241}Am	21.7	S	
^{241}Pu	1,060	M	
^{242}Cm	0.623	M	
^{242}Pu	0.00497	M	
^{243}Am	0.00209	M	
^{243}Cm	<4.85	S	
^{244}Cm	<13.0	S	

Note:

[1]S = Sample-based, M = HDW model-based, and E = Engineering assessment-based.

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4.0 RECOMMENDATIONS

With the exception of two samples, analytical results for the safety screening DQO (Dukelow et al. 1995) were within the safety notification limits. One sample had upper limits of the one-sided 95 percent confidence interval above the notification limit for DSC results. The average TOC for this sample was 2,610 μg/g. Well below the limit of 30,000 μg/g for TOC, indicating that energetics is not an issue for this tank. The sampling and analysis activities performed for tank 241-AN-103 have met all requirements for the safety screening DQOs. Retained Gas Sampler samples were obtained to address the flammable gas DQO (McDuffie and Johnson 1995). Large gas pockets were found in the non-convective layer of the tank waste. Additional evaluation of RGS results and flammable gas issues are in progress to determine the safety status for the tank. Vapor samples to address the organic solvents screening DQO have not been obtained, but are scheduled for FY 1998.

The privatization LAW DQO (Jones and Wiemers 1996) also applies to tank 241-AN-103. Sampling and analytical results are being assessed by the privatization program to determine whether the 1996 push core sample meets the needs of the privatization LAW DQO.

Table 4-1 summarizes the status of the Project Hanford Management Contractor (PMHC) TWRS Program review and acceptance of the sampling and analysis results reported in this tank characterization report. All DQO issues required to be addressed by sampling and analysis are listed in column one of Table 4-1. The second column indicates whether the requirements of the DQO were met by the sampling and analysis activities performed and is answered with a "yes" or a "no." The third column indicates concurrence and acceptance by the program in TWRS that is responsible for the DQO that the sampling and analysis activities performed adequately meet the needs of the DQO. A "yes" or "no" in column three indicates acceptance or disapproval of the sampling and analysis information presented in the TCR.

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

Issue	Sampling and Analysis Performed	TWRS[1] Program Acceptance
Safety Screening DQO	Yes	Yes
Flammable Gas Tank Safety Program	Yes	Yes
Organic Solvents Screening	No	No
Privatization LAW DQO	ND	ND

Notes:

ND = not determined

[1] PHMC Program Office.

Table 4-2 summarizes the status of PHMC TWRS Program review and acceptance of the evaluations and other characterization information contained in this report. Column one lists the different evaluations performed in this report. Columns two and three are in the same format as Table 4-1. The manner in which concurrence and acceptance are summarized is also the same as that in Table 4-1.

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

Issue	Evaluation Performed	TWRS[1] Program Acceptance
Safety categorization (not determined)	No	ND
Flammable Gas Tank Safety Program	In Progress	ND
Organic Solvent Screening	No	ND
Applicability of Privatization Data	In Progress	ND

Note:

ND = not determined

[1] PHMC Program Office.

The waste currently in tank 241-AN-103 should be monitored continuously because of gas release events. Vapor samples to further assess the organic solvent screening issue are scheduled for FY 1998. No additional liquid and solid characterization samples are needed at this time.

An evaluation of RGS results, to assess tank safety, is in progress.

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APPENDIX A

HISTORICAL TANK INFORMATION

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APPENDIX A

HISTORICAL TANK INFORMATION

Appendix A describes tank 241-AN-103 based on historical information. For this report, historical information includes any information about the fill history, waste types, surveillance, or modeling data about the tank. This information is necessary for providing a balanced assessment of the sampling and analytical results.

This appendix contains the following information:

- **Section A1:** Current status of the tank, including the current waste levels as well as the stabilization and isolation status of the tank.
- **Section A2**: Information about the design of the tank.
- **Section A3**: Process knowledge of the tank, that is, the waste transfer history and the estimated contents of the tank based on modeling data.
- **Section A4**: Surveillance data for tank 241-AN-103, including surface-level readings, temperatures, and a description of the waste surface based on photographs.
- **Section A5**: References for Appendix A.

Historical sampling results (results from samples obtained prior to 1989) are included in Appendix B.

A1.0 CURRENT TANK STATUS

As of March 31, 1997, tank 241-AN-103 contained an estimated 3615 kL (955 kgal) of waste classified as double-shell slurry (Hanlon 1997). Liquid waste volumes are estimated using a level measurement gauge. The solid waste volumes are estimated using a sludge level measurement device. The solid waste volume was last updated on March 31, 1997. The amounts of various waste phases in the tank are presented in Table A1-1.

Tank 241-AN-103 is categorized as sound and is actively ventilated. The tank is classified as a concentrated waste holding tank. The tank is on the Hydrogen/Flammable Gas Watch List (Hanlon 1997). All monitoring systems were in compliance with documented standards as of March 31, 1997 (Hanlon 1997).

Table A1-1. Tank Contents Status Summary.[1]

Waste Type	kL (kgal)
Total waste	3615 (955)
Supernatant liquid	2,063 (545)
Double-shell slurry	1,552 (410)
Sludge	0 (0)
Saltcake	0 (0)
Drainable interstitial liquid	0 (0)
Drainable liquid remaining	2,063 (545)
Pumpable liquid remaining	2,063 (545)

Note:

[1]Hanlon (1997).

A2.0 TANK DESIGN AND BACKGROUND

The 241-AN Tank Farm was constructed from 1980 to 1981 in the 200 East Area. The tank farm contains seven double-shell tanks. These tanks have a capacity of 4,390 kL (1,160 kgal) and a diameter of 22.9 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-103 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 457 mm (1.5 ft) thick and the dome is 381 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 any waste that may leak from the tank and divert it to the leak detection well.

Tank 241-AN-103 has 22 risers ranging in diameter from 102 mm (4 in.) to 1.07 m (42 in.) that provide access to the tank and 37 risers that provide access to the annulus. Table A2-1 shows numbers, diameters, and descriptions of the risers (annular risers are not included). A plan view that depicts the riser configuration is shown as Figure A2-1. Risers 10A and 21A (each 102 mm [4 in.] in diameter) and risers 7B and 12A (each 305 mm [12 in.] in diameter) are available for use in sampling (Lipnicki 1997). A tank cross-section showing the approximate waste level along with a schematic of the tank equipment is in Figure A2-2.

Figure A2-1. Riser Configuration for Tank 241-AN-103.

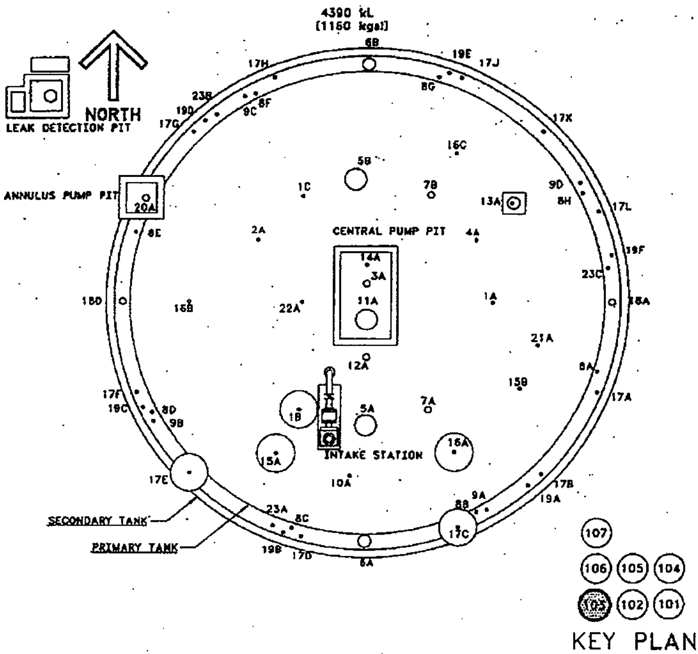


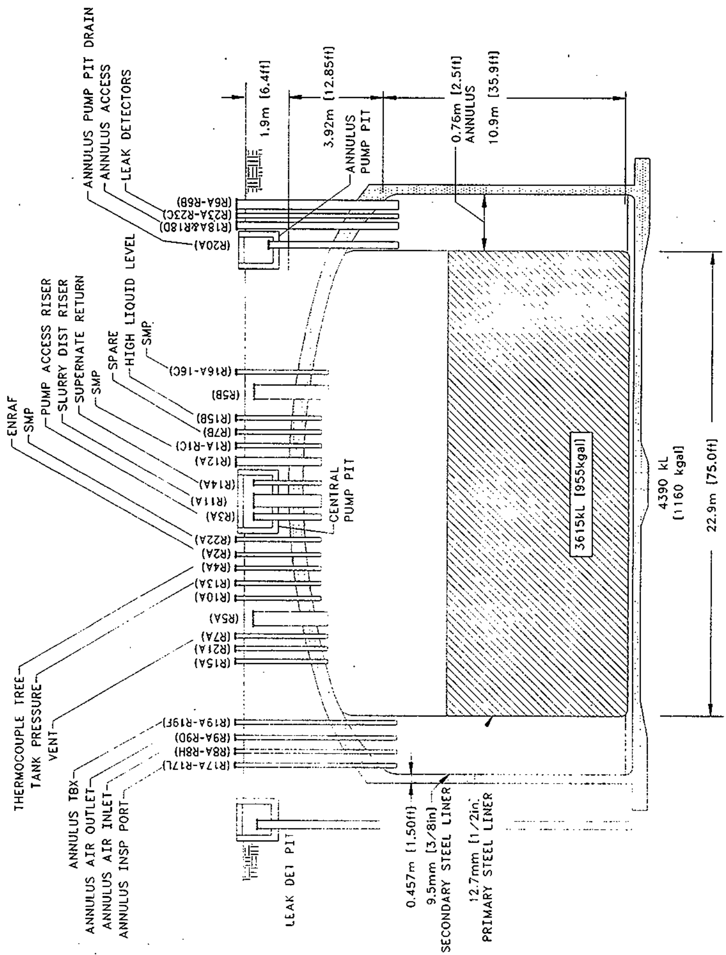
Table A2-1. Tank 241-AN-103 Risers.[1,2,3,4]

New Riser	Old Riser	Diameter (Inches)	Description and Comments
102	R1A	4	Level Indicator (Manual Tape)[5]
103	R1B	4	Sludge Measurement Port
101	R1C	4	Sludge Measurement Port, (12 inch cover)
104	R2A	4	ENRAF[6]
105	R3A	12	Supernatant Pump, Central Pump Pit (Pit)
106	R4A	4	Thermocouple Tree
108	R5A	42	Manhole
107	R5B	42	Color video camera[7]
112	R7A	12	Tank Ventilation (Standard Hydrogen Monitoring System[8])
111[10]	R7B	12	Spare
125[10]	R10A	4	Spare
126	R11A	42	Slurry Distributor, Central Pump Pit
127[10]	R12A	12	Observation Port, Spare
128	R13A	4	Tank Pressure
129	R14A	4	Supernatant Return, Central Pump Pit
131	R15A	4	Multifunctional Instrument Tree[9]
130	R15B	4	High Liquid Level Sensor
134	R16A	4	Sludge Measurement Port
132	R16B	4	Sludge Measurement Port
133	R16C	4	Sludge Measurement Port, (12 inch cover)
155[10]	R21A	4	Spare
156	R22A	4	Sludge Measurement Port

Notes:

[1]Salazar 1994
[2]Tran 1993
[3]WHC (1996a)
[4]WHC(1996b)
[5]RHO (1983)
[6]KEH (1996)
[7]WHC (1995b)
[8]WHC (1995a)
[9]WHC (1995c)
[10]Denotes risers tentatively available for sampling (Lipnicki 1997).

Figure A2-2. Tank 241-AN-103 Cross Section and Schematic.



A3.0 PROCESS KNOWLEDGE

The sections below: 1) provide information about the history of the major waste transfers that involved tank 241-AN-103, 2) describe the process wastes that were transferred, and 3) estimate 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-103 (Agnew et al. 1997b). Waste was initially added to tank 241-AN-103 in the second quarter of 1982 with the addition of water to test the tank's integrity. In the fourth quarter of 1982, more water was added and non-complexed waste was sent from tank 241-SY-102. During the fourth quarter of 1982 and the first quarter of 1983, waste was sent to tank 241-AW-102 from tank 241-AN-103. Dilute, non-complexed waste from the 300 and 400 Areas was transferred to tank 241-AN-103 during the third quarter of 1983.

During the fourth quarter of 1984, tank 241-AN-103 began receiving waste from the single-shell salt well pumping occurring in the 200 East and West Areas. Salt well liquor was received from various single-shell tanks listed in Table A3-1. Tanks 241-S-106 and 241-B-102 sent the salt well pumped waste to tank 241-AN-103 during the first and third quarters of 1984, respectively. Tank 241-AN-103 received dilute, non-complexed waste from B Plant cesium processing and wash water during the first quarter of 1984.

Tank 241-AN-104 sent non-complexed waste to tank 241-AN-103 during the third quarter of 1984. Tank 241-AN-103 sent waste to tank 241-AN-101 during the fourth quarter of 1984. Tank 241-AN-103 exchanged non-complexed waste with tank 241-AW-102 (242-A Evaporator Feed Tank) during the first and fourth quarters of 1984 and the first quarter of 1986.

No further waste transfers have involved tank 241-AN-103 since the third quarter of 1986. Level changes that have occurred since 1986 are due to water additions and slurry fluctuations caused by gas generation within the waste.

Table A3-1. Tank 241-AN-103 Major Waste Transfers.[1,2]

Transfer Source	Transfer Destination	Waste Type	Time Period	Estimated Waste Volume	
				kiloliters	kilogallons
Misc. Sources		Water	1982-1983	750	198
241-SY-102		DN	1982	3653	965
	241-AW-102	DN	1982 - 1984	-11200	-2959
300 and 400 Areas		L3A4A	1983	961	254
* see below		SWLIQ	1983-1984	1461	386
B Plant		BPLCS	1984	238	63
Misc. Sources		Water	1984	53	14
241-AW-102		DN	1984	6329	1672
241-AN-104		DN	1984	731	193
	241-AN-101	DN	1984	-454	-120
241-AW-102		DN	1986	2509	663
	241-AW-102	DN	1986	-2593	-685

Notes:

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

BPLCS = Dilute, non-complexed waste from B Plant high cesium processing
DN = Dilute, non-complexed waste (that is, contains no complexants) defined as waste with TOC < 1 wt% (10 g/L)
L3A4A = Dilute, non-complexed laboratory wastes from 300 and 400 Areas
SWLIQ = Dilute, non-complexed waste from single-shell tanks

[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]Transfer sources for salt well pumping were as follows:
241-B-102, 241-B-111, 241-B-112, 241-BX-103, 241-BY-102, 241-C-102, 241-C-110, 241-C-112, 241-S-104, 241-S-106, 241-S-110, 241-T-103, 241-T-106, 241-T-110, 241-TX-117, 241-U-101, 241-U-104, and Unknown.

A3.2 HISTORICAL ESTIMATION OF TANK CONTENTS

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

- Waste Status and Transaction Record Summary (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], the Tank Layer Model [TLM] and the Historical Tank Inventory Estimates.
- Hanford Defined Waste List (HDW List): The HDW list is comprised of approximately 50 waste types defined by concentration for major analytes/compounds for both 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 the WSTRS, the TLM and the HDW list to describe the supernatants and concentrates in each tank. Together the WSTRS, HDW, 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 HDW model, tank 241-AN-103 contains 3607 kL (953 kgal) of waste comprised of a bottom solids layer of 8 kL (2 kgal) of B Plant low level waste (BL) with a top layer of 3,540 kL (935 kgal) of concentrated supernatant solids waste (SMMA2) and a 61 kL (16 kgal) layer of supernatant (SU) liquid above the solids waste. Figure A3-1 shows a graphical representation of the estimated solids waste types and volumes for each tank layer. Note that this is inconsistent with Hanlon (1997) which reports a total waste volume of 3615 kL (955 kgal) and separates the top layer reported by Agnew (1997a) into supernatant and double-shell slurry (DSS) waste, based on current tank sample information and surface level adjustments.

Tables A3-3 and A3-4 show estimates of the expected analyte and radionuclide waste constituents and concentrations, respectively.

Figure A3-1. Tank Layer Model.

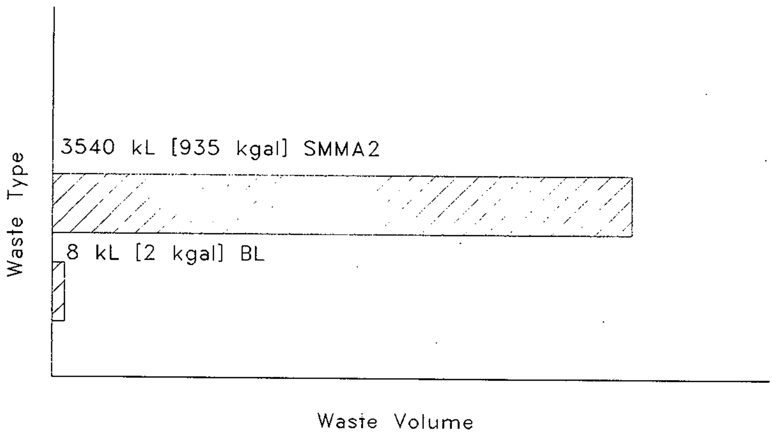


Table A3-2. Historical Tank Inventory Estimate Analytes.[1,2] (2 sheets)

Total Inventory Estimate					
Physical Properties				-95 CI	+95 CI
Total Waste	5.79E+06 (kg) (953 kgal)				
Heat Load	6.69 (kW) (2.28E+04 Btu/hr)			6.30	7.13
Bulk Density	1.60 (g/cc)			1.55	1.66
Water wt%	32.6			29.0	36.1
TOC wt% C (wet)	1.04			0.740	1.33
Chemical Constituents	**mole/L**	**ppm**	**kg**[3]	**-95 CI (mole/L)**	**+95 CI (mole/L)**
Na^+	14.2	2.04E+05	1.18E+06	12.8	15.6
Al^{3+}	1.57	2.63E+04	1.52E+05	1.39	1.68
Fe^{3+} (total Fe)	1.71E-02	595	3.44E+03	1.61E-02	1.81E-02
Cr^{3+}	0.111	3.59E+03	2.08E+04	9.70E-02	0.119
Bi^{3+}	1.16E-03	151	874	1.09E-03	1.23E-03
La^{3+}	1.24E-05	1.07	6.19	9.13E-06	1.56E-05
Hg^{2+}	1.38E-05	1.73	10.0	1.03E-05	1.44E-05
Zr (as $ZrO(OH)_2$)	1.72E-03	97.8	566	8.91E-04	1.93E-03
Pb^{2+}	1.15E-03	149	862	9.68E-04	1.34E-03
Ni^{2+}	1.06E-02	389	2.25E+03	9.96E-03	1.08E-02
Sr^{2+}	0	0	0	0	0
Mn^{4+}	9.24E-03	316	1.83E+03	5.75E-03	1.22E-02
Ca^{2+}	4.71E-02	1.18E+03	6.81E+03	4.25E-02	5.06E-02
K^+	0.185	4.50E+03	2.61E+04	6.90E-02	0.305
OH^-	9.40	9.96E+04	5.77E+05	8.41	10.4
NO_3^-	4.97	1.92E+05	1.11E+06	4.62	5.33
NO_2^-	1.99	5.70E+04	3.30E+05	1.69	2.23
CO_3^{2-}	0.674	2.52E+04	1.46E+05	0.560	0.770
PO_4^{3-}	0.162	9.62E+03	5.57E+04	0.122	0.203
SO_4^{2-}	0.245	1.47E+04	8.50E+04	0.210	0.273
Si (as SiO_3^{2-})	8.22E-02	1.44E+03	8.33E+03	6.84E-02	8.98E-02
F^-	0.185	2.19E+03	1.27E+04	6.50E-02	0.224
Cl^-	0.242	5.34E+03	3.09E+04	0.215	0.269
$C_6H_5O_7^{3-}$	3.22E-02	3.79E+03	2.20E+04	2.58E-02	3.86E-02

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

Total Inventory Estimate					
Chemical Constituents	mole/L	ppm	kg[3]	-95 CI (mole/L)	+95 CI (mole/L)
$EDTA^{4-}$	1.82E-02	3.28E+03	1.90E+04	6.42E-03	3.03E-02
$HEDTA^{3-}$	3.16E-02	5.39E+03	3.12E+04	7.92E-03	5.56E-02
$glycolate^{-}$	0.196	9.14E+03	5.29E+04	0.110	0.281
$acetate^{-}$	1.57E-02	578	3.34E+03	1.28E-02	2.02E-02
$oxalate^{2-}$	1.62E-05	0.888	5.14	1.44E-05	1.79E-05
DBP	2.26E-02	2.96E+03	1.71E+04	1.99E-02	2.67E-02
Butanol	2.26E-02	1.04E+03	6.04E+03	1.99E-02	2.67E-02
NH_3	0.462	4.90E+03	2.83E+04	5.90E-02	0.883
$Fe(CN)_6^{4-}$	0	0	0	0	0

Notes:

[1]Agnew et al. (1997a), Note: this total waste inventory differs from Hanlon (1997). Estimated analyte concentrations are current, but analyte inventories should be adjusted based on the Hanlon (1997) waste volume of 1650 kL (955 kgal).

[2]The historical tank content estimate (HTCE) predictions have not been validated and should be used with caution.

[3]Differences exist among the inventories in this column and the inventories calculated from the two sets of concentrations.

Table A3-3. Historical Tank Inventory Estimate Radionuclides.[1,2] (2 sheets)

Total Inventory Estimate					
Physical Properties				-95 CI	+95 CI
Total Waste	5.79E+06 (kg) (953 kgal)				
Heat Load	6.69 (kW) (2.28E+04 Btu/hr)			6.30	7.13
Bulk Density	1.60 (g/cc)			1.55	1.66
Water wt%	32.6			29.0	36.1
TOC wt% C (wet)	1.04			0.740	1.33
Radiological Constituents	Ci/L	μCi/g	Ci	-95 CI (Ci/L)	+95 CI (Ci/L)
H-3	2.23E-04	0.139	805	1.59E-04	2.49E-04
C-14	2.91E-05	1.82E-02	105	1.57E-05	3.00E-05
Ni-59	2.10E-06	1.31E-03	7.58	1.47E-06	2.16E-06
Ni-63	2.07E-04	0.129	747	1.45E-04	2.13E-04
Co-60	3.85E-05	2.40E-02	139	2.31E-05	4.06E-05
Se-79	3.42E-06	2.13E-03	12.3	2.56E-06	4.02E-06
Sr-90	0.123	76.7	4.44E+05	0.110	0.127
Y-90	0.123	76.8	4.44E+05	9.36E-02	0.127
Zr-93	1.65E-05	1.03E-02	59.6	1.23E-05	1.96E-05
Nb-93m	1.21E-05	7.56E-03	43.8	9.14E-06	1.43E-05
Tc-99	2.17E-04	0.135	784	1.67E-04	2.71E-04
Ru-106	1.48E-08	9.20E-06	5.33E-02	1.28E-08	1.66E-08
Cd-113m	8.37E-05	5.22E-02	302	5.80E-05	1.02E-04
Sb-125	2.40E-04	0.149	865	1.73E-04	2.90E-04
Sn-126	5.20E-06	3.24E-03	18.8	3.92E-06	6.11E-06
I-129	4.20E-07	2.62E-04	1.51	3.23E-07	5.24E-07
Cs-134	5.23E-05	3.26E-02	189	3.07E-05	7.48E-05
Cs-137	0.219	136	7.89E+05	0.198	0.245
Ba-137m	0.207	129	7.46E+05	0.177	0.225
Sm-151	1.21E-02	7.53	4.36E+04	9.09E-03	1.42E-02
Eu-152	4.39E-06	2.74E-03	15.8	3.33E-06	5.04E-06
Eu-154	6.10E-04	0.380	2.20E+03	3.96E-04	7.18E-04
Eu-155	2.75E-04	0.171	991	2.12E-04	3.14E-04

Table A3-3. Historical Tank Inventory Estimate Radionuclides.[1,2] (2 sheets)

Total Inventory Estimate					
Radiological Constituents	Ci/L	μCi/g	Ci	-95 CI (Ci/L)	+95 CI (Ci/L)
Ra-226	1.61E-10	1.00E-07	5.79E-04	1.34E-10	1.79E-10
Ra-228	2.90E-07	1.81E-04	1.05	1.24E-07	3.81E-07
Ac-227	9.83E-10	6.12E-07	3.54E-03	8.29E-10	1.09E-09
Pa-231	3.97E-09	2.47E-06	1.43E-02	3.11E-09	4.58E-09
Th-229	6.73E-09	4.20E-06	2.43E-02	2.89E-09	8.73E-09
Th-232	2.85E-08	1.77E-05	0.103	7.89E-09	3.95E-08
U-232	9.97E-07	6.21E-04	3.59	6.99E-07	1.36E-06
U-233	3.82E-06	2.38E-03	13.8	2.68E-06	5.21E-06
U-234	1.35E-06	8.42E-04	4.87	1.12E-06	1.40E-06
U-235	5.24E-08	3.27E-05	0.189	4.35E-08	5.42E-08
U-236	7.89E-08	4.92E-05	0.285	5.96E-08	8.27E-08
U-238	1.34E-06	8.37E-04	4.84	1.18E-06	1.37E-06
Np-237	7.82E-07	4.87E-04	2.82	6.18E-07	9.56E-07
Pu-238	3.48E-06	2.17E-03	12.6	2.74E-06	4.22E-06
Pu-239	6.51E-05	4.06E-02	235	5.91E-05	7.11E-05
Pu-240	1.35E-05	8.44E-03	48.9	1.17E-05	1.54E-05
Pu-241	2.93E-04	0.183	1.06E+03	2.18E-04	3.69E-04
Pu-242	1.38E-09	8.59E-07	4.97E-03	1.10E-09	1.66E-09
Am-241	8.55E-05	5.33E-02	308	7.40E-05	9.46E-05
Am-243	5.79E-09	3.61E-06	2.09E-02	3.68E-09	6.95E-09
Cm-242	1.73E-07	1.08E-04	0.623	1.29E-07	1.97E-07
Cm-243	1.75E-08	1.09E-05	6.32E-02	1.34E-08	2.00E-08
Cm-244	2.39E-07	1.49E-04	0.863	1.96E-07	2.70E-07
Totals	M	μg/g	kg	-95 CI (M or g/L)	+95 CI (M or g/L)
Pu	9.35E-04 (g/L)	----	3.37	8.30E-04	1.04E-03
U	1.33E-02	1.98E+03	1.14E+04	1.13E-02	1.37E-02

Notes:

[1]Agnew et al. (1997b)

[2]The HTCE predictions have not been validated and should be used with caution.

A4.0 SURVEILLANCE DATA

Tank 241-AN-103 surveillance includes surface level measurements and temperature monitoring inside the tank (waste and vapor space). 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).

A4.1 SURFACE LEVEL READINGS

A Food Instrument Corporation (FIC) gauge was used to monitor the waste surface level in tank 241-AN-103 through riser 2A until April 14, 1995. The FIC was replaced with a manual ENRAF system that began recording on August 2, 1995. A manual tape was installed in riser 1A and began recording on April 9, 1995. On March 31, 1997, the waste surface level was 8.82 m (347 in.), as measured by the ENRAF[1] system and was 8.84 m (348 in.) as measured by the manual tape. A graphical representation of the volume measurements is presented as a level history graph in Figure A4-1.

A4.2 INTERNAL TANK TEMPERATURES

Tank 241-AN-103 has a thermocouple tree, located in riser 4A, with 18 thermocouples to monitor the waste temperature. Temperature data recorded from January 1, 1995 through December 23, 1996 were obtained from the Surveillance Analysis Computer System (SACS) (LMHC 1997) for all thermocouples. The average temperature of the SACS data is 40.6 °C (105 °F), the minimum is 28.9 °C (84 °F), and the maximum is 47.2 °C (117 °F). The average temperature of the SACS data over the last year (December 1995 through December 1996) was 40.0 °C (104 °F), the minimum was 28.9 °C (84 °F), and the maximum was 45.6 °C (114 °F). The maximum temperature on December 23, 1996 was 44.4 °C (112 °F) on thermocouple 5 and the minimum was 29.4 °C (85 °F) on thermocouples 17 and 18. Thermocouple 5 is located in the waste while thermocouples 17 and 18 are in the vapor space. A graph of the weekly high temperatures can be found in Figure A4-2. Plots of the individual thermocouple readings can be found in the AN Tank Farm Supporting Document for the HTCE (Brevick et al. 1997).

The tank also has a Multifunctional Instrument Tree (MIT), located in riser 15A, that has 22 thermocouples. Temperature data from July 22, 1996 through March 10, 1997 were

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

recorded manually once per week. The average temperature of the MIT data is 38.3 °C (101 °F), the minimum is 25.0 °C (77 °F), and the maximum is 43.9 °C (111 °F). The maximum temperature on March 10, 1997, was 42.8 °C (109 °F) on thermocouple 8, and the minimum was 27.2 °C (81 °F) on thermocouples 20 and 22. Thermocouple 8 is located in the waste, and thermocouples 20 and 22 are located in the vapor space.

A4.3 TANK 241-AN-103 VIDEO

A video camera is located in riser 5B. A video was recorded on February 27, 1996, that shows a light, cream colored crust (Harding 1996). The crust is broken in some areas, and a dark brown liquid can be seen underneath the chunks of crust.

Figure A4-1. Tank 241-AN-103 Level History.

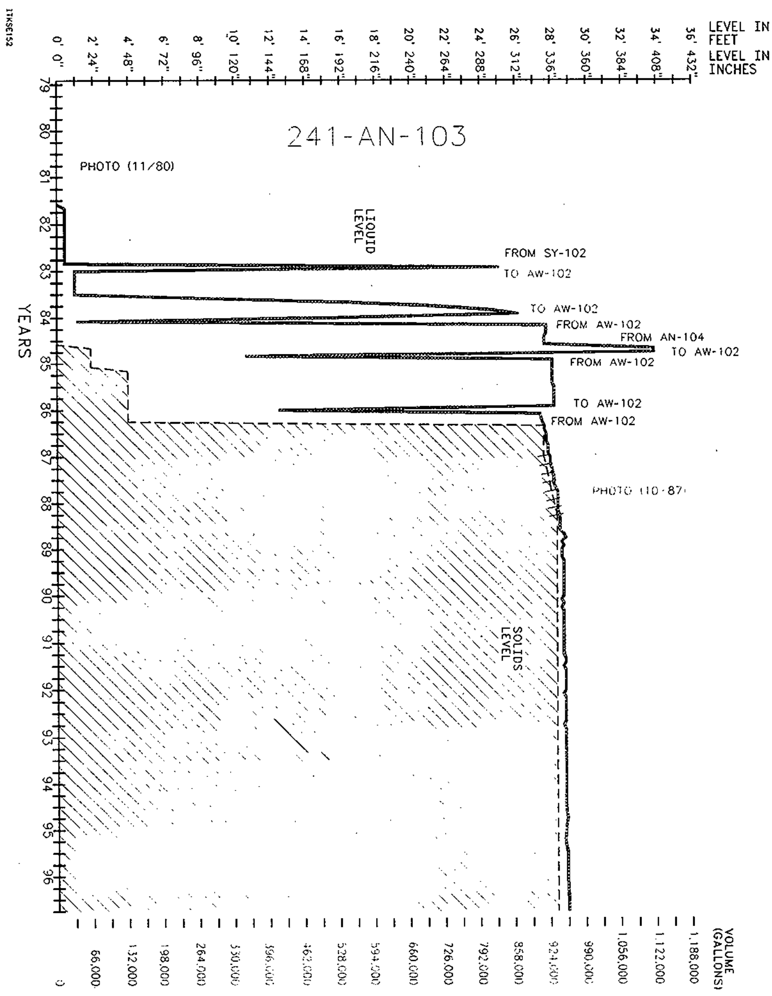
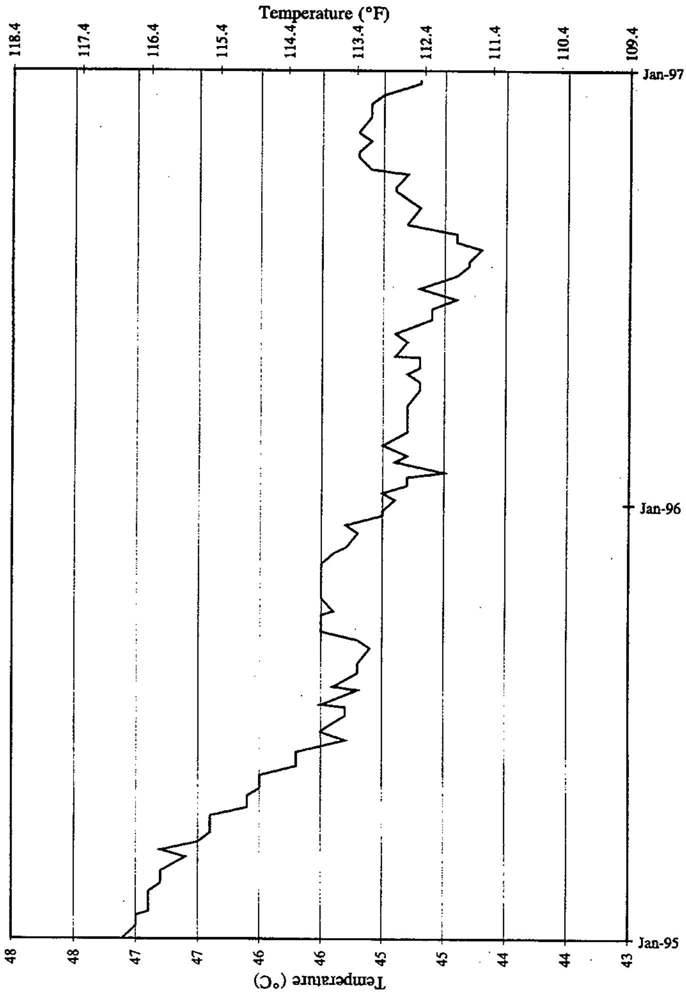


Figure A4-2. Tank 241-AN-103 Weekly High Temperature Plot.



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APPENDIX B

SAMPLING OF TANK 241-AN-103

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APPENDIX B

SAMPLING OF TANK 241-AN-103

Appendix B provides sampling and analysis information for each known sampling event for tank 241-AN-103 and provides an assessment of the push core sample results.

- **Section B1**: Tank Sampling Overview
- **Section B2**: Sampling Events
  - **B2.1**: 1996 Push Core Samples
  - **B2.2**: 1995 Vapor Phase Measurement
  - **B2.3**: Historical samples
- **Section B3**: Assessment of Characterization Results
- **Section B4**: References for Appendix B.

Future sampling of tank 241-AN-103 will be appended to the above list.

B1.0 TANK SAMPLING OVERVIEW

This section describes the September 1996 sampling and analysis events for tank 241-AN-103. Push core samples were taken 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 in accordance with the *Tank 241-AN-103 Push Mode Core Sampling and Analysis Plan* (Kruger 1996). In addition, the Organic Solvent Screening Issue (DOE-RL 1996, Cash 1996a) and privatization LAW DQO (Jones and Wiemers 1996) apply to this tank. Vapor samples to address the organic solvent screening DQO are scheduled to be obtained in FY 1998. The Privatization LAW DQO has been applied since the 1996 push core sampling event.

Sampling and analytical requirements for tank 241-AN-103 are summarized in Table B1-1.

Table B1-1. Integrated Data Quality Objective Requirements for Tank 241-AN-103.[1]

Sampling Event	Applicable DQOs	Sampling Requirements	Applicable References
Vapor sampling	-Organic Solvent Screening (DOE-RL 1996a, Cash 1996b)	Steel canisters	Organic Vapors
Push mode core sample	-Safety Screening DQO -Flammable Gas DQO -Privatization LAW DQO	Push core samples from 2 risers separated radially to the maximum extent possible (Grab samples may be used to obtailn supernatant. Combustible Gas Measurement	Flammability, Energetics, Moisture, Total alpha activity, Anions, Cations, Radionuclides, Density, Physical properties, pH, Total Organic Carbon, Total Inorganic Carbon, Cr(VI)

Notes:

[1]Kruger 1996

B2.0 SAMPLING EVENTS

Sampling events are described in this section. Analytical results are presented in Tables B2-5 through B2-70. These include 1996 push core sample results, vapor phase measurements from during sniff tests, and historical sample results.

In September 1995, an attempt was made to obtain grab samples. However, no sample could be obtained because of the thick saltcake crust in the tank.

B2.1 1996 PUSH CORE SAMPLE

Nineteen push mode core segments were removed from tank 241-AN-103 riser 12A (core 166) between September 13, 1996, and September 17, 1996. Segments were received by the 222-S Laboratory between September 20, 1996, and September 30, 1996. Selected segments (2, 5, and 14) were sampled using the Retained Gas Sampler (RGS) and extruded by the Process Chemistry and Statistical Analysis Group. The sample jar for the drainable liquid portion of segment 4 was dropped and broken during the subsampling process, and the sample was not retrievable.

Eighteen push mode core segments were removed from tank 241-AN-103 riser 21A (core 167) between September 18, 1996, and September 23, 1996. Tank Farm Operations were unsuccessful in obtaining segment 19 due to the high downforce encountered during sampling. Segments were received by the 222-S Laboratory between September 23, 1996, and September 30, 1996. Selected segments (10, 13, 16 and 18) were sampled using the Retained Gas Sampler and extruded by the Process Chemistry and Statistical Analysis Group.

The delay between the field sampling and sample extrusion in the lab was about a month. Solids were found throughout the convective layer, and these solids probably precipitated due to cooling of the samples.

A field blank was provided to the 222-S Laboratory with core 166. It underwent the same analysis as the drainable liquid as instructed by the TSAP (Kruger 1996).

Lithium bromide solution, used as hydrostatic head fluid during sampling, was provided to the 222-S Laboratory with core 166. It underwent Inductively Coupled Plasma Spectroscopy (ICP) and Ion Chromatography (IC) analyses as instructed by the TSAP (Kruger 1996).

Safety screening analyses include: total alpha to determine criticality, differential scanning calorimetry (DSC) to ascertain the fuel energy value, and thermogravimetric analysis (TGA) to obtain the total moisture content. In addition, combustible gas meter readings in the tank headspace were performed to measure flammability.

Tank 241-AN-103 also was evaluated for the Flammable Gas Tank Safety Program. The specified analyses include: DSC, TGA, bulk density, viscosity, void fraction, TIC, TOC, hydroxide, formate, oxalate, ICP, IC, and radiochemistry.

B2.1.1 SAMPLE HANDLING

The push 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 and lower half-segments. The material was homogenized and subsampled for laboratory analyses and archiving. Subsamples of each half-segment were then recombined and subsampled for core composite analyses.
Tables B1-2a and B1-2b gives the subsampling scheme and sample description for core 166 and 167, respectively.

Table B2-1a. Sample Receipt and Extrusion Information for Tank 241-AN-103, Core 166. (6 sheets)

Sample Number	Seg.	Date Sampled[1]	Date Received	Date Extruded	Inches Extruded[2]	Liquid Recovered (g)	Solids Recovered (g)	Sample Description
Field blank (H_2O)	FB	9/16/96	9/27/96	10/7/96	0	252.0-Drainable	0.0	The liquid was clear and colorless. Collected 250 mL of liquid. No organic layer was observed.
96-445	1	9/13/96	9/26/96	10/23/96	2.5	0.0	58.0 - Lower half	The solids were light gray in color and resembled a wet salt.
96-446	2	9/13/96	9/20/96	n/a	n/a	n/a	n/a	This segment was sampled using the Retained Gas Sampler and extruded by the Process Chemistry and Statistical Analysis Group.
96-447	3	9/13/96	9/27/96	10/21/96	0.0	409.5-Drainable	0.0	Collected 260 mL of drainable liquid. The liquid was blue-green in color and opaque. No organic layer was observed.

Table B2-1a. Sample Receipt and Extrusion Information for Tank 241-AN-103, Core 166. (6 sheets)

Sample Number	Seg.	Date Sampled[1]	Date Received	Date Extruded	Inches Extruded[2]	Liquid Recovered (g)	Solids Recovered (g)	Sample Description
96-448	4	9/13/96	9/26/96	10/21/96	2.0	368.6-Drainable	64.2 - Lower half	Collected 250 mL of drainable liquid. The liquid was blue-green in color and opaque. The solids were white in color and resembled a salt slurry. No organic layer was observed.
96-449	5	9/13/96	9/20/96	n/a	n/a	n/a	n/a	This segment was sampled using the Retained Gas Sampler and extruded by the Process Chemistry and Statistical Analysis Group.
96-450	6	9/14/96	9/26/96	10/23/96	2.0	357.8-Drainable	62.9 - Lower half	Collected 250 mL of liquid. The liquid was blue-green in color and opaque. No organic layer was observed. The solids were white in color and resembled a salt slurry.

Table B2-1a. Sample Receipt and Extrusion Information for Tank 241-AN-103, Core 166. (6 sheets)

Sample Number	Seg.	Date Sampled[1]	Date Received	Date Extruded	Inches Extruded[2]	Liquid Recovered (g)	Solids Recovered (g)	Sample Description
96-451	7	9/14/96	9/26/96	10/31/96	4.0	368.9-Drainable	64.7 - Lower half	Collected 250 mL of liquid. The liquid was blue-green in color and opaque. No organic layer was observed. The solids were white in color and resembled a salt slurry.
96-452	8	9/14/96	9/26/96	10/31/96	4.0	370.4-Drainable	48.1 - Lower half	Collected 250 mL of liquid. The liquid was blue-green in color and opaque. No organic layer was observed. The solids were white in color and resembled a salt slurry.
96-453	9	9/14/96	9/26/96	10/21/96	3.0	383.4-Drainable	59.5 - Lower half	Collected 260 mL of liquid. The liquid was blue-green in color and opaque. No organic layer was observed. The solids were white in color and resembled a salt slurry.

Table B2-1a. Sample Receipt and Extrusion Information for Tank 241-AN-103, Core 166. (6 sheets)

Sample Number	Seg.	Date Sampled[1]	Date Received	Date Extruded	Inches Extruded[2]	Liquid Recovered (g)	Solids Recovered (g)	Sample Description
96-454	10	9/14/96	9/26/96	10/21/96	2.0	387.5-Drainable	58.1 - Lower half	Collected 260 mL of liquid. The liquid was blue-green in color and opaque. No organic layer was observed. The solids were white in color and resembled a salt slurry.
96-455	11	9/14/96	9/30/96	10/23/96	1.0	360.1-Drainable	48.8 - Lower half	Collected 260 mL of liquid. The liquid was blue-green in color and opaque. No organic layer was observed. The solids were white in color and resembled a salt slurry.
96-456	12	9/14/96	9/30/96	10/23/96	3.0	344.0-Drainable	59.9 - Lower half	Collected 250 mL of liquid. The liquid was blue-green in color and opaque. No organic layer was observed. The solids were white in color and resembled a salt slurry.

Table B2-1a. Sample Receipt and Extrusion Information for Tank 241-AN-103, Core 166. (6 sheets)

Sample Number	Seg.	Date Sampled[1]	Date Received	Date Extruded	Inches Extruded[2]	Liquid Recovered (g)	Solids Recovered (g)	Sample Description
96-457	13	9/14/96	9/30/96	10/26/96	19.0	0.0	235.7-Upper half 216.5-Lower half	The solids were light gray in color and resembled a wet salt.
96-458	14	9/16/96	9/23/96	n/a	n/a	n/a	n/a	This segment was sampled using the Retained Gas Sampler and extruded by the Process Chemistry and Statistical Analysis Group.
96-459	15	9/16/96	9/27/96	10/7/96	19.0	0.0	240.6-Upper half 216.8-Lower half	The solids were light gray in color and resembled a wet salt.
96-460	16	9/16/96	9/30/96	10/23/96	19.0	0.0	226.9-Upper half 208.4-Lower half	The solids were light gray in color and resembled a moist salt.
96-461	17	9/16/96	9/27/96	10/7/96	19.0	0.0	201.8-Upper half 202.8-Lower half	The solids were light gray in color and resembled a moist salt.
96-462	18	9/16/96	9/26/96	10/24/96	19.0	0.0	217.1-Upper half 198.4-Lower half	The solids were light tan-gray in color and resembled a moist salt.

Table B2-1a. Sample Receipt and Extrusion Information for Tank 241-AN-103, Core 166. (6 sheets)

Sample Number	Seg.	Date Sampled[1]	Date Received	Date Extruded	Inches Extruded[2]	Liquid Recovered (g)	Solids Recovered (g)	Sample Description
96-463	19	9/17/96	9/26/96	10/31/96	19.0	0.0	216.9-Upper half 173.7-Lower half	The solids were gray in color and resembled a salt slurry.

Notes:

n/a = not applicable
Seg. = segment

[1]Dates are provided in the mm/dd/yy format.
[2]Approximate inches extruded.

Table B2-1b. Sample Receipt and Extrusion Information for Tank 241-AN-103, Core 167. (6 sheets)

Sample Number	Seg.	Date Sampled[1]	Date Received	Date Extruded	Inches Extruded[2]	Liquid Recovered (g)	Solids Recovered (g)	Sample Description
96-464	1	9/18/96	9/27/96	10/28/96	14.0	0.0	147.6-Upper half 177.1-Lower half	The solids were light gray in color and resembled a moist salt.
96-465	2	9/18/96	9/26/96	10/31/96	6.0	265.5-Drainable	112.0-Lower half	Collected 190 mL of liquid. No organic layer was observed. The liquid was blue-green in color and opaque. The solids were white to gray in color and resembled a salt slurry.
96-466	3	9/19/96	9/26/96	10/28/96	1.0	368.1-Drainable	30.6-Lower half	Collected 250 mL of liquid. No organic layer was observed. The liquid was blue-green in color and opaque. The solids were white in color and resembled a salt slurry.

Table B2-1b. Sample Receipt and Extrusion Information for Tank 241-AN-103, Core 167. (6 sheets)

Sample Number	Seg.	Date Sampled[1]	Date Received	Date Extruded	Inches Extruded[2]	Liquid Recovered (g)	Solids Recovered (g)	Sample Description
96-467	4	9/19/96	9/26/96	10/28/96	1.0	359.9-Drainable	29.9-Lower half	Collected 250 mL of liquid. No organic layer was observed. The liquid was blue-green in color and opaque. The jar for the drainable liquid portion was dropped and broken during the subsampling process. The solids were white in color and resembled a salt slurry.
96-468	5	9/19/96	9/29/96	10/7/96	5.0	348.0-Drainable	79.5-Lower half	Collected 250 mL of liquid. No organic layer was observed. The liquid was blue-green in color and opaque. The solids were white in color and resembled a salt slurry.

Table B2-1b. Sample Receipt and Extrusion Information for Tank 241-AN-103, Core 167. (6 sheets)

Sample Number	Seg.	Date Sampled[1]	Date Received	Date Extruded	Inches Extruded[2]	Liquid Recovered (g)	Solids Recovered (g)	Sample Description
96-469	6	9/19/96	9/27/96	10/7/96	3.0	348.6-Drainable	74.6-Lower half	Collected 250 mL of liquid. No organic layer was observed. The liquid was blue-green in color and opaque. The solids were white in color and resembled a wet salt.
96-470	7	9/19/96	9/27/96	10/28/96	2.0	370.8-Drainable	42.7-Lower half	Collected 250 mL of liquid. No organic layer was observed. The liquid was blue-green in color and opaque. The solids were white in color and resembled a salt slurry.
96-471	8	9/19/96	9/27/96	10/29/96	1.5	378.0-Drainable	44.7-Lower half	Collected 260 mL of liquid. No organic layer was observed. The liquid was blue-green in color and opaque. The solids were gray in color and resembled a salt slurry.

Table B2-1b. Sample Receipt and Extrusion Information for Tank 241-AN-103, Core 167. (6 sheets)

Sample Number	Seg.	Date Sampled[1]	Date Received	Date Extruded	Inches Extruded[2]	Liquid Recovered (g)	Solids Recovered (g)	Sample Description
96-472	9	9/20/96	9/26/96	10/31/96	5.5	363.8-Drainable	64.1-Lower half	Collected 250 mL of liquid. No organic layer was observed. The liquid was blue-green in color and opaque. The solids were white in color and resembled a salt slurry.
96-473	10	9/20/96	9/24/96	n/a	n/a	n/a	n/a	This segment was sampled using the Retained Gas Sampler and extruded by the Process Chemistry and Statistical Analysis Group.
96-474	11	9/20/96	9/26/96	10/24/96	16.0	52.5-Drainable	212.4-Upper half 162.7-Lower half	Collected 40 mL of liquid. The liquid was gray in color and opaque. No organic layer was observed. The solids were light gray in color and resembled a wet salt.
96-475	12	9/20/96	9/27/96	10/2/96	18.0	0.0	270.3-Upper half 181.7-Lower half	The solids were light gray in color and resembled a salt slurry.

Table B2-1b. Sample Receipt and Extrusion Information for Tank 241-AN-103, Core 167. (6 sheets)

Sample Number	Seg.	Date Sampled[1]	Date Received	Date Extruded	Inches Extruded[2]	Liquid Recovered (g)	Solids Recovered (g)	Sample Description
96-476	13	9/20/96	9/23/96	n/a	n/a	n/a	n/a	This segment was sampled using the Retained Gas Sampler and extruded by the Process Chemistry and Statistical Analysis Group.
96-477	14	9/20/96	9/30/96	10/7/96	15.0	0.0	210.8-Lower half 195.1-Upper half	The solids were light gray in color and resembled a wet salt.
96-478	15	9/20/96	9/27/96	10/11/96	18.0	0.0	237.7-Upper half 206.9-Lower half	The solids were gray in color and resembled a moist salt.
96-479	16	9/20/96	9/24/96	n/a	n/a	n/a	n/a	This segment was sampled using the Retained Gas Sampler and extruded by the Process Chemistry and Statistical Analysis Group.
96-480	17	9/20/96	9/30/96	10/15/96	14.0	0.0	154.5-Upper half 144.3-Lower half	The solids were light gray in color and resembled a moist salt.

Table B2-1b. Sample Receipt and Extrusion Information for Tank 241-AN-103, Core 167. (6 sheets)

Sample Number	Seg.	Date Sampled[1]	Date Received	Date Extruded	Inches Extruded[2]	Liquid Recovered (g)	Solids Recovered (g)	Sample Description
96-481	18	9/23/96	9/24/96	n/a	n/a	n/a	n/a	This segment was sampled using the Retained Gas Sampler and extruded by the Process Chemistry and Statistical Analysis Group.

Notes:

[1]Dates are provided in the mm/dd/yy format.
[2]Approximate inches extruded.

B2.1.2 SAMPLE ANALYSIS

The analyses performed on the push core samples were limited to those required by the safety screening DQO and the flammable gas DQO. The analyses required by the safety screening DQO included 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 to be analyzed by IC and ICP as well as TOC, TIC and various radionuclides.

Differential scanning calorimetry and TGA were performed on 7.887-mg to 61.272-mg samples. Quality control tests included performing the analyses in duplicate, and the use of 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 then dissolved in acid. The resulting solution was then 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 (SAP) required that 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 SAP required that the full suite of ICP elements be analyzed.

All reported analyses were performed in accordance with approved laboratory procedures. A list of the sample numbers and applicable analyses is presented in Table B2-2. The sample preparation procedure numbers and analysis procedure numbers are presented in Table B2-3.

Table B2-2. Tank 241-AN-103 Sample Analysis Summary. (9 Sheets)

Segment	Segment Portion	Waste Matrix	Sample Number	Analyses
166: 1	Lower half	Solids	S96T005578	DSC, TGA
			S96T005608	ICP, Total Alpha
			S96T005609	ICP
			S96T005610	IC
166:2				RGS
166:3	Drainable liquid	Liquid	S96T005539	DSC, SpG, TGA, ICP, IC, total alpha
166:4	Lower half	Solids	S96T005542	DSC, TGA
			S96T005568	ICP, Total Alpha
			S96T005570	ICP
			S96T005572	IC
166:4	Drainable liquid	Liquid	S96T005540	DSC, SpG, TGA, ICP, IC, total alpha
			S97T000163	IC
166:5				RGS
166:6	Lower half	Solids	S96T005579	DSC, TGA
			S96T005611	ICP, total alpha
			S96T005615	ICP
			S96T005619	IC
166:6	Drainable liquid	Liquid	S96T005599	DSC, SpG, TGA, ICP, IC, total alpha
166:7	Lower half	Solids	S96T005820	DSC, TGA
			S96T005835	ICP, total alpha
			S96T005839	ICP
			S96T005843	IC
166:7	Drainable liquid	Liquid	S96T005816	DSC, SpG, TGA, ICP, IC, total alpha

Table B2-2. Tank 241-AN-103 Sample Analysis Summary. (9 Sheets)

Segment	Segment Portion	Waste Matrix	Sample Number	Analyses
166:8	Lower half	Solids	S96T005821	DSC, TGA
			S96T005836	ICP, total alpha
			S96T005840	ICP
			S96T005844	IC
166:8	Drainable liquid	Liquid	S96T005817	DSC, SpG, TGA, ICP, IC, total alpha
166:9	Lower half	Solids	S96T005543	DSC, TGA
			S96T005574	ICP, total alpha
			S96T005575	ICP
			S96T005576	IC
166:9	Drainable liquid	Liquid	S96T005541	DSC, SpG, TGA, ICP, IC, total alpha
166: 10	Lower half	Solids	S96T005564	DSC, TGA
			S96T005569	ICP, total alpha
			S96T005571	ICP
			S96T005573	IC
166: 10	Drainable liquid	Liquid	S96T005566	DSC, SpG, TGA, ICP, IC, total alpha
166: 11	Lower half	Solids	S96T005580	DSC, TGA
			S96T005586	bulk density
			S96T005612	ICP, total alpha
			S96T005616	ICP
			S96T005620	IC
166: 11	Drainable liquid	Liquid	S96T005600	DSC, TGA, SpG, ICP, IC, total alpha
166: 12	Lower half	Solids	S96T005581	DSC, TGA
			S96T005613	ICP, total alpha
			S96T005617	ICP
			S96T005621	IC

Table B2-2. Tank 241-AN-103 Sample Analysis Summary. (9 Sheets)

Segment	Segment Portion	Waste Matrix	Sample Number	Analyses
166: 12	Drainable liquid	Liquid	S96T005601	DSC, SpG, TGA, ICP, IC, total alpha
166: 13	Upper half	Solids	S96T005629	bulk density
			S96T005636	DSC, TGA
			S96T005714	ICP
			S96T005716	ICP
			S96T005718	IC
166: 13	Lower half	Solids	S96T005632	bulk density
			S96T005637	DSC, TGA
			S96T005720	ICP, total alpha
			S96T005722	ICP
			S96T005724	IC
166: 14				RGS
166: 15	Upper half	Solids	S96T005371	bulk density
			S96T005398	DSC, TGA
			S96T005414	ICP
			S96T005416	ICP
			S96T005418	IC
166: 15	Lower half	Solids	S96T005369	bulk density
			S96T005399	DSC, TGA
			S96T005408	ICP, total alpha
			S96T005412	IC
			S97T000459	ICP
166: 16	Upper half	Solids	S96T005582	DSC, TGA
			S96T005588	bulk density
			S96T005623	ICP
			S96T005624	ICP
			S96T005625	IC

Table B2-2. Tank 241-AN-103 Sample Analysis Summary. (9 Sheets)

Segment	Segment Portion	Waste Matrix	Sample Number	Analyses
166: 16	Lower half	Solids	S96T005583	DSC, TGA
			S96T005589	bulk density
			S96T005614	ICP, total alpha
			S96T005618	ICP
			S96T005622	IC
166: 17	Upper half	Solids	S96T005372	bulk density
			S96T005400	DSC, TGA
			S96T005415	ICP
			S96T005417	ICP
			S96T005419	IC
166: 17	Lower half	Solids	S96T005370	bulk density
			S96T005401	DSC, TGA
			S96T005409	ICP, total alpha
			S96T005411	ICP
			S96T005413	IC
166: 18	Upper half	Solids	S96T005631	bulk density
			S96T005638	DSC, TGA
			S96T005715	ICP
			S96T005717	ICP
			S96T005719	IC
166: 18	Lower half	Solids	S96T005634	bulk density
			S96T005639	DSC, TGA
			S96T005721	ICP
			S96T005723	ICP
			S96T005725	IC
166: 19	Upper half	Solids	S96T005812	bulk density
			S96T005822	DSC, TGA
			S96T005837	ICP
			S96T005841	ICP
			S96T005845	IC

Table B2-2. Tank 241-AN-103 Sample Analysis Summary. (9 Sheets)

Segment	Segment Portion	Waste Matrix	Sample Number	Analyses
166: 19	Lower half	Solids	S96T005813	bulk density
			S96T005823	DSC, TGA
			S96T005838	ICP
			S96T005842	ICP
			S96T005846	IC
166	Core composite	Solids	S96T005983	bulk density
			S96T005984	DSC, TGA, TIC, TOC
			S96T005986	^{99}Tc, $^{89/90}$Sr, $^{239/240}$Pu, GEA, ^{241}Am, $^{243/244}$Cm, total alpha, total beta
			S96T005988	Cr(VI), OH
			S97T000023	IC, I129, H3
			S97T000460	ICP
166	Drainable liquid composite	Liquid	S96T005990	DSC, TGA, TIC, TOC
			S96T005991	ICP, IC
			S96T005992	Cr(VI), $^{239/240}$Pu, ^{241}Am, $^{243/244}$Cm
			S96T005993	OH, SpG, U
			S97T000020	^{99}Tc, ^{90} Sr, ^{129}I
			S97T000388	H3
FB	Field blank	Liquid	S96T005406	DSC, SpG, TGA, ICP, IC, total alpha
HHF	Hydrostatic head fluid	Liquid	S96T005235	ICP, IC
167: 1	Upper half	Solids	S96T005660	bulk density
			S96T005667	DSC, TGA
			S96T005705	ICP
			S96T005708	ICP
			S96T005711	IC

Table B2-2. Tank 241-AN-103 Sample Analysis Summary. (9 Sheets)

Segment	Segment Portion	Waste Matrix	Sample Number	Analyses
167: 1	Lower half	Solids	S96T005661	bulk density
			S96T005668	DSC, TGA
			S96T005687	ICP, total alpha
			S96T005693	ICP
			S96T005699	IC
167:2	Lower half	Solids	S96T005847	bulk density
			S96T005851	DSC, TGA
			S96T005855	ICP, total alpha
			S96T005857	ICP
			S96T005859	IC
167:2	Drainable liquid	Liquid	S96T005861	DSC, SpG, TGA, ICP, IC, total alpha
167:3	Lower half	Solids	S96T005669	DSC, TGA
			S96T005688	ICP, total alpha
			S96T005694	ICP
			S96T005700	IC
167:3	Drainable liquid	Liquid	S96T005673	DSC, SpG, TGA, ICP, IC, total alpha
167:4	Lower half	Solids	S96T005675	DSC, TGA
			S96T005689	ICP, total alpha
			S96T005695	ICP
			S96T005701	IC
167:5	Lower half	Solids	S96T005374	bulk density
			S96T005424	DSC, TGA
			S96T005436	ICP, total alpha
			S96T005438	ICP
			S96T005440	IC
167:5	Drainable liquid	Liquid	S96T005420	DSC, SpG, TGA, ICP, IC, total alpha

Table B2-2. Tank 241-AN-103 Sample Analysis Summary. (9 Sheets)

Segment	Segment Portion	Waste Matrix	Sample Number	Analyses
167:6	Lower half	Solids	S96T005375	bulk density
			S96T005425	DSC, TGA
			S96T005448	ICP, total alpha
			S96T005450	ICP
			S96T005452	IC
167:6	Drainable liquid	Liquid	S96T005421	DSC, SpG, TGA, ICP, IC, total alpha
167:7	Lower half	Solids	S96T005685	DSC, TGA
			S96T005690	ICP, total alpha
			S96T005696	ICP
			S96T005702	IC
167:7	Drainable liquid	Liquid	S96T005683	DSC, SpG, TGA, ICP, IC, total alpha
167:8	Lower half	Solids	S96T005734	DSC, TGA
			S96T005736	ICP, total alpha
			S96T005737	ICP
			S96T005738	IC
167:8	Drainable liquid	Liquid	S96T005732	DSC, TGA, SpG, ICP, IC, total alpha
167:9	Lower half	Solids	S96T005852	DSC, TGA, SpG
			S96T005856	ICP, total alpha
			S96T005858	ICP
			S96T005860	IC
167:9	Drainable liquid	Liquid	S96T005862	DSC, SpG, TGA, ICP, IC, total alpha
167: 10				RGS
167: 11	Upper half	Solids	S96T005644	bulk density
			S96T005646	DSC, TGA
			S96T005706	ICP
			S96T005709	ICP
			S96T005712	IC

Table B2-2. Tank 241-AN-103 Sample Analysis Summary. (9 Sheets)

Segment	Segment Portion	Waste Matrix	Sample Number	Analyses
167: 11	Lower half	Solids	S96T005645	bulk density
			S96T005647	DSC, TGA
			S96T005691	ICP, total alpha
			S96T005697	ICP
			S96T005703	IC
167: 11	Drainable liquid	Liquid	S96T005650	DSC, SpG, TGA, ICP, IC, total alpha
167: 12	Upper half	Solids	S96T005378	bulk density
			S96T005432	DSC, TGA
			S96T005442	ICP
			S96T005444	ICP
			S96T005446	IC
167: 12	Lower half	Solids	S96T005376	bulk density
			S96T005426	DSC, TGA
			S96T005449	ICP, total alpha
			S96T005451	ICP
			S96T005453	IC
167: 13				RGS
167: 14	Upper half	Solids	S96T005379	bulk density
			S96T005433	DSC, TGA
			S96T005443	ICP
			S96T005445	ICP
			S96T005447	IC
167: 14	Lower half	Solids	S96T005377	bulk density
			S96T005427	DSC, TGA
			S96T005437	ICP, total alpha
			S96T005439	ICP
			S96T005441	IC

Table B2-2. Tank 241-AN-103 Sample Analysis Summary. (9 Sheets)

Segment	Segment Portion	Waste Matrix	Sample Number	Analyses
167: 15	Upper half	Solids	S96T005653	bulk density
			S96T005655	DSC, TGA
			S96T005707	ICP
			S96T005710	ICP
			S96T005713	IC
167: 15	Lower half	Solids	S96T005654	bulk density
			S96T005656	DSC, TGA
			S96T005692	ICP, total alpha
			S96T005698	ICP
			S96T005704	IC
167: 16				RGS
167: 17	Upper half	Solids	S96T005490	bulk density
			S96T005492	DSC, TGA
			S96T005496	ICP
			S96T005498	ICP
			S96T005500	IC
167: 17	Lower half	Solids	S96T005491	bulk density
			S96T005493	DSC, TGA
			S96T005497	ICP, total alpha
			S96T005499	ICP
			S96T005501	IC

Notes:

SpG = specific gravity
GEA = gamma evergy analysis

Table B2-3. Analytical Procedures. (2 sheets)

Analysis	Sample Portion	Preparation Procedure	Analysis Procedure
DSC	Solid/liquid	n/a	LA-514-114 Rev. D-0 LA-514-113 Rev. C-1
TGA	Solid/liquid	n/a	LA-514-114 Rev. D-0 LA-560-112 Rev. C-0
Bulk Density	Solid	n/a	LO-160-103 Rev. B-0
SpG	Liquid	n/a	LA-510-112 Rev. C-3
U	Solid/liquid	LA-549-141 Rev. F-0 n/a	LA-925-009 Rev. A-1
IC	Solid/liquid	LA-504-101 Rev. E-0 n/a	LA-533-105 Rev. D-1
ICP	Solid/liquid	LA-505-159 Rev. D-0 LA-549-141 Rev. F-0 n/a	LA-505-151 Rev. D-3 LA-505-161 Rev. B-1
OH-	Solid/liquid	LA-504-101 Rev. E-0 n/a	LA-211-102 Rev. C-0
TIC/TOC	Solid/liquid	n/a	LA-342-100 Rev. E-0
Cr(VI)	Solid/liquid	LA-504-101 Rev. E-0 n/a	LA-265-101 Rev. B-0
^{3}H	Solid/liquid	LA-504-101 Rev. E-0 n/a	LA-218-114 Rev. B-0
^{129}I	Solid/liquid	LA-504-101 Rev. E-0 n/a	LA-378-103 Rev. C-0
^{99}Tc	Solid/liquid	LA-549-141 Rev. F-0 n/a	LA-438-101 Rev. D-2
AT/TB	Solid/liquid	LA-549-101 Rev. F-0 n/a	LA-508-101 Rev. E-1
GEA	Solid/liquid	LA-549-101 Rev. F-0 n/a	LA-548-121 Rev. E-0
$^{241}Am/^{244}Cm$	Solid/liquid	LA-549-101 Rev. F-0 n/a	LA-953-103 Rev. B-0

Table B2-3. Analytical Procedures. (2 sheets)

Analysis	Sample Portion	Preparation Procedure	Analysis Procedure
^{90}Sr	Solid/liquid	LA-549-141 Rev. F-0 n/a	LA-220-101 Rev. D-1
^{239}Pu	Solid/liquid	LA-549-101 Rev. F-0 n/a	LA-943-128 Rev. B-0

Note:
n/a = not applicable (these are direct samples)
AT = alpha total
TB = total beta

B2.1.3 ANALYTICAL RESULTS

This section summarizes the sampling and analytical results associated with the June 1996 sampling and analysis of tank 241-AN-103. Table B2-4 lists the analyses and the table numbers where the results are located. These results are documented in Steen (1997).

Table B2-4. Analytical Presentation Tables.

Analysis	Table number
Radiochemical analyses	B2-5 through B2-18
Percent water by TGA and corrected TGA	B2-19 and B2-20
Energetics by DSC	B2-21
Bulk Density and specific gravity	B2-22 and B2-23
Metals by ICP	B2-24 through B2-50
Anions by IC	B2-51 through B2-60
Total uranium	B2-61
Hydroxide	B2-62
Hexavalent chromium	B2-63
TOC/TIC	B2-64 and B2-65
Vapor measurements	B2-66
Historical Samples	B2-67 through B2-70

For most analytes (except for some physical and rheological measurements), the data tables consist of six columns. The first column lists the sample number. Note that 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 the tank 241-AN-103 samples were standard recoveries, spike recoveries, duplicate analyses (relative percent difference [RPDs]), and blanks. The QC criteria were as specified in the TSAP (Kruger 1996). The only QC parameter for which limits were not specified in the TSAP is blank contamination. The limits for blanks are set forth in guidelines followed by the laboratory, and all data results presented in this report have met those guidelines. Sample and duplicate pairs in which any of the QC parameters were outside of these limits are footnoted in the sample mean column of the following 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.

B2.1.3.1 Total Alpha Activity. Total alpha activity analyses were measured on the solids and liquids using alpha spectroscopy. The analyses were performed according to procedure LA-508-101. Total alpha activities ranged from 0.0048 to 0.0429 μCi/g for the solids and from 0.0039 to 0.18 μCi/mL (0.023 to 0.12 μCi/g) for the liquids. Mostly the results were at or below detection limits. There was also a result of <6.71E-04 μCi/g in core 167, segment 7 solids.

B2.1.3.2 Total Beta. Total beta activity was measured on the core composite samples according to procedure LA-508-101. Total beta activities were 622 μCi/mL (418 μCi/g) for the liquid and 29.55 μCi/g for the solid. The sample results are in Table B2-3. These results do not agree well with ^{137}Cs concentrations, the only beta emitter of significant magnitude present. ^{137}Cs concentrations were 739 μCi/mL in the liquid composite and 274 μCi/g in the solid composite.

B2.1.3.3 Strontium 90. Strontium-90 was measured in the core composite using procedure LA-220-101. The activities were 0.0208 μCi/mL (0.014 μCi/g) in the liquid and 2.66 μCi/g in the solid.

B2.1.3.4 Gamma Energy Analysis. Gamma energy analysis (GEA), procedure number LA-548-121, was used to measure the activity of ^{241}Am, ^{137}Cs, ^{60}Co ^{154}Eu, and ^{155}Eu in the core composite. ^{137}Cs was the dominant radionuclide.

B2.1.3.5 Iodine 129. ^{129}I analyses were performed on the core composite using procedure LA-378-103. The mean results were 3.790E-04 μCi/mL (2.545E-04 μCi/g) in the liquid and < 0.0027 μCi/g in the solid.

B2.1.3.6 Technetium-99. ^{99}Tc analyses were performed on the core composite using procedure LA-438-101. The mean results were 1.675E-4 μCi/mL (1.125E-4 μCi/g) in the liquid and 0.1445 μCi/g in the solid.

B2.1.3.7. Alpha Energy Analysis. ^{241}Am, $^{243/244}$Cm, and $^{239/240}$Pu were measured on core composite samples using alpha energy analysis (AEA). All results were below detection limits.

B2.1.3.8 Tritium. Tritium was measured using liquid scintillation (procedure LA-218-114). The mean results were 0.00284 μCi/g in the solid and 0.0015675 μCi/mL (1.0527E-3 μCi/g) in the liquid.

B2.13.9 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, either through evaporation or through a reaction that forms gas phase products. The moisture content is estimated by assuming that all TGA sample weight loss up to a certain temperature (typically 150 to 200 °C) is because of 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-103 samples were analyzed by TGA using either a Perkin-Elmer[1] TGA 7 instrument, or a Mettler[2] TG 50 instrument. Typically, TGA results are determined by summing the weight loss steps that occur below 250 °C; weight loss steps above this are not used to determine the result. However, for tank 241-AN-103, approximately 40 percent of the thermograms showed continuous weight loss beyond 250 °C. This weight loss was not the result of additional weight loss steps above 250 °C and was included in the calculation of the results.

The results for thirty-two of the fifty-eight subsamples were the sum of two or more weight loss steps. The weight percent water values for the tank supernatant and salt slurry were

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

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

between 14.3 and 50.1. Relative percent differences greater than 30 percent were reported for five of the sixty-three subsamples. Selected samples were reanalyzed. The reruns resulted in RPDs of less than 30 percent. Several thermograms showed small sharp peaks. These were the result of instrument vibration and were not used in the calculation of the result. The standard recoveries for this analysis were within the required limits.

Eight segments were contaminated by the hydrostatic head fluid (see Tables B2-36 and B2-51 for the lithium and bromide results). The solid portion from four additional segments in the convective layer showed contamination, but the liquid portion did not. Corrected TGA results for the affected subsamples are listed in Table B2-20.

B2.1.3.10 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-103 were performed using either procedure LA-514-113 on a Mettler™ DSC 20 instrument or procedure LA-514-114 on a Perkin-Elmer™ DSC 7 instrument.

One sample exceeded the safety screening DQO decision criteria threshold of 480 J/g (dry weight basis). The lower half of segment 2 (solids) from core 167 had a sample result of 160 J/g and a duplicate of 586 J/g. Because the difference between the sample and duplicate results was large (Relative Percent Difference: 114 percent), the sample and duplicate were reanalyzed and found to exhibit exotherms of 152.0 and 83.7 J/g, respectively. This sample had the highest exothermic results for solids. The total organic carbon from this core was 2,440 μg/g. The highest individual sample exothermic results for liquids (dry weight basis) was 268 J/g.

High RPDs (> 30 percent) were reported for twenty-seven of the sixty-one subsamples. The RPDs can be attributed to the small exotherms and the heterogenous nature of the samples. Thermograms for several subsamples showed small sharp peaks near 200 °C that indicated a decomposition of a pure compound. The standard recoveries for this analysis were within the required limits.

B2.1.3.11 Density and Specific Gravity. Density/specific gravity measurements were performed on all subsegments. The subsegment-level results for salt slurry densities ranged from 1.59 to 1.93 g/mL. The specific gravity measurements for the liquid samples ranged from 1.34 to 1.54. The initial specific gravity measurements for the drainable liquid from segment 6 of core 167 was 2.7 for the result and 2.8 for the duplicate. This sample was rerun and the results were 1.462 for the result and 1.475 for the duplicate[3]. The statistical analysis (Section B.4) was performed prior to the rerun. In the analysis, the specific gravity measurement for the drainable liquid from core 166, segment 7 was substituted for the

[3]Electronic mail message from F. H. Steen, RFSH, June 17, 1997, "AN-103 DSC Results."

measurements from segment 6 of core 167. These segments were sampled from about the same elevation in the tank. The specific gravity measurements for core 166, segment 7 are 1.459 and 1.458.

B2.1.3.12 Inductively Coupled Plasma. The ICP analyses were performed per procedures LA-505-161, or LA-505-151, depending on the ICP instrument used. A full suite of analytes were 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 both an acid digest and a fusion. The results from two preparation methods, fusion and acid, are presented for the metals.

The results indicate that there are three phases in the tank (crust, liquid, and solid). Aluminum and chromium concentrations show a linear correlation of 0.74 and a quadratic correlation of 0.94. Changes in Al and Cr concentration correspond with changing regions in the tank. The concentrations change near the bottom of the tank, indicating that the bottom solids may be two distinct materials. Several analytes (Al, Cr, Pb, F, Si, and P) appear to be at saturation concentrations in the liquid.

B2.1.3.13 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 ion chromatography were performed in duplicate per procedure LA-533-105. Chloride concentrations were relatively high (> 1 percent in the solids).

B2.1.3.14 Total Uranium. Uranium was measured in the core composite using procedure LA-925-009. The mean results were 1.835 μg/mL (1.23 μg/g) in the liquid and 45.1 μg/g in the solid.

B2.1.3.15 OH. The OH analyses were performed on the core composite using procedure LA-211-102. The mean results were 98,200 μg/mL (65,950 μg/g) in the liquid and 32,900 μg/g in the solid.

B2.1.3.16 Chromium VI. The Cr(VI) analyses were performed on the core composite using procedure LA-265-101. The mean results were 74.9 μg/g for the liquid and 99.7 μg/g for the solid.

B2.1.3.17 Total Inorganic Carbon/Total Organic Carbon (TIC/TOC). TIC/TOC by persulfate/coulometry analyses were performed on the core composite samples. The maximum results for TIC were 1,155 μg/mL (775.7 μg/g) for the liquid and 5,770 μg/g for the solid. None of the results exceeded the TOC notification limit of 30,000 μg/g. The mean results for TOC are 3,045 μg/mL (2,045 μg/g) for the liquid and 2,440 μg/g for the solid.

B2.2 VAPOR PHASE MEASUREMENT

During September 1996, tank dome space gas samples were taken from tank 241-AN-103. These measurements supported the safety screening DQO (Dukelow et al. 1995). The vapor phase measurements were taken 20 ft below risers 12A and 21A in the dome space of the tank and results were obtained in the field (that is, no gas sample was sent to the laboratory for analysis). The average results of the vapor phase measurements are provided in Table B2-66.

B2.3 HISTORICAL SAMPLES

Tank 241-AN-103 was the receiver tank for the 242-A Evaporator during the 86-2 Campaign. The results from a February 10, 1986 sludge sample are shown in Table B2-67. This sludge sample was taken prior to filling the tank with double-shell slurry to characterize the sludge heel. It was "pea-green" with about 5 percent supernatant, 85 percent settled solids, and 10 percent foam. The sample was separated by filtration and each phase was analyzed.

Several evaporator slurry samples were taken during the 86-2 evaporator campaign before waste was sent to tank 241-AN-103. The main constituents of samples taken are shown in Table B2-68.

Following the 86-2 campaign tank 241-AN-103 was push core sampled during December 1986. Eighteen segments were recovered. A composite of the push core sample was sent to Pacific Northwest Laboratory for chemical analysis (Toste 1987). The main constituents are listed in Table B2-69. Radionuclide measurements are listed in Table B2-70. An organic analysis was also completed and physical property measurements were obtained. These results are discussed and described in Toste (1987). Results of dissolution studies performed on the push core sample are reported in Prignano (1988).

1996 PUSH CORE SAMPLES

Table B2-5. Tank 241-AN-103 Analytical Results: Total Alpha (Alpha Rad). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µCi/mL	µCi/mL	µCi/mL
S96T005539	166: 3	Drainable liquid	<0.00579	<0.00506	<0.00542
S96T005540	166: 4	Drainable liquid	<0.00361	<0.00506	<0.00433
S96T005599	166: 6	Drainable liquid	<0.0202	<0.012	<0.0161
S96T005816	166: 7	Drainable liquid	<0.012	<0.023	<0.0175

Table B2-5. Tank 241-AN-103 Analytical Results: Total Alpha (Alpha Rad). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
S96T005817	166: 8	Drainable liquid	<0.012	<0.012	<0.012
S96T005541	166: 9	Drainable liquid	0.0039	<0.00479	<0.00434[QC:e]
S96T005566	166: 10	Drainable liquid	<0.00431	<0.00579	<0.00505
S96T005600	166: 11	Drainable liquid	<0.0174	<0.023	<0.0202
S96T005601	166: 12	Drainable liquid	<0.0468	0.18	<0.113[QC:e]
S96T005861	167: 2	Drainable liquid	<0.0804	<0.0535	<0.0669
S96T005673	167: 3	Drainable liquid	<0.0224	<0.0195	<0.0209
S96T005420	167: 5	Drainable liquid	<0.182	<0.165	<0.173
S96T005421	167: 6	Drainable liquid	<0.0514	<0.0514	<0.0514
S96T005683	167: 7	Drainable liquid	0.0397	0.0369	0.0383
S96T005732	167: 8	Drainable liquid	<0.0378	0.034	<0.0359
S96T005862	167: 9	Drainable liquid	<0.0737	0.0514	<0.0625[QC:e]
S96T005650	167: 11	Drainable liquid	<0.0169	<0.016	<0.0164
S96T005991	Core 166	Liquid composite	<0.00653	<0.00653	<0.00653
Solids: fusion			**µCi/g**	**µCi/g**	**µCi/g**
S96T005608	166: 1	Lower half	<0.011	<0.00926	<0.01013
S96T005568	166: 4	Lower half	<0.00837	0.00764	<0.00800[QC:c,]
S96T005611	166: 6	Lower half	<0.00612	<0.00961	<0.00786
S96T005835	166: 7	Lower half	0.00656	<0.00508	<0.00582[QC:c,f]
S96T005836	166: 8	Lower half	0.0048	<0.00658	<0.00569[QC:c,e]
S96T005574	166: 9	Lower half	<0.00781	<0.00868	<0.008245[QC:f]
S96T005569	166: 10	Lower half	<0.00938	<0.00649	<0.00793
S96T005612	166: 11	Lower half	<0.00881	<0.0061	<0.00745
S96T005613	166: 12	Lower half	<0.00917	<0.00482	<0.00699
S96T005720	166: 13	Lower half	0.0175	<0.0344	<0.0259[QC:e]
S96T005408	166: 15	Lower half	<0.0121	<0.0131	<0.0126[QC:e]
S96T005614	166: 16	Lower half	<0.00423	0.00724	<0.00573[QC:e]
S96T005409	166: 17	Lower half	<0.0111	<0.0129	<0.012[QC:e,f]
S96T005721	166: 18	Lower half	0.0429	0.0156	0.0292[QC:e,f]

Table B2-5. Tank 241-AN-103 Analytical Results: Total Alpha (Alpha Rad). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
S96T005838	166: 19	Lower half	0.023	0.0151	0.0190[QC:c]
S96T005687	167: 1	Lower half	<0.0279	<0.0346	<0.03125
S96T005855	167: 2	Lower half	<0.00755	0.00605	<0.0068[QC:e]
S96T005688	167: 3	Lower half	<0.0131	<0.00927	<0.0112
S96T005689	167: 4	Lower half	<0.00755	<0.00768	<0.00761
S96T005436	167: 5	Lower half	<0.136	<0.12	<0.128[QC:c]
S96T005448	167: 6	Lower half	<0.0906	<0.0736	<0.0821
S96T005690	167: 7	Lower half	<6.710E-04	<0.00149	<0.00108
S96T005736	167: 8	Lower half	<0.00582	<0.00347	<0.00464
S96T005856	167: 9	Lower half	<0.0114	<0.00961	<0.0105
S96T005691	167: 11	Lower half	<0.00648	<0.00208	<0.00428
S96T005449	167: 12	Lower half	0.0283	0.0346	0.0314[QC:f]
S96T005437	167: 14	Lower half	<0.0181	<0.0214	<0.0197[QC:f]
S96T005692	167: 15	Lower half	<0.011	<0.0131	<0.0120
S96T005497	167: 17	Lower half	<0.0168	<0.011	<0.0139
S96T005986	Core 166	Solid composite	<0.00224	<0.00257	<0.0024[QC:c]

Table B2-6. Tank 241-AN-103 Analytical Results: Total Beta.

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			μCi/mL	μCi/mL	μCi/mL
S96T005991	Core 166	Liquid composite	626	618	622
Solids: fusion			μCi/g	μCi/g	μCi/g
S96T005986	Core 166	Solid composite	31.9	27.2	29.55

Table B2-7. Tank 241-AN-103 Analytical Results: Strontium-89/90 (Sr).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µCi/mL	µCi/mL	µCi/mL
S97T000020	Core 166	Liquid composite	0.0208	0.0208	0.0208[QC:f]
Solids: fusion			µCi/g	µCi/g	µCi/g
S96T005986	Core 166	Solid composite	2.58	2.74	2.66[QC:f]

Table B2-8. Tank 241-AN-103 Analytical Results: Americium-241 (GEA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µCi/mL	µCi/mL	µCi/mL
S96T005991	Core 166	Liquid composite	<1.517	<1.51	<1.513
Solids: fusion			µCi/g	µCi/g	µCi/g
S96T005986	Core 166	Solid composite	<1.041	<0.951	<0.996

Table B2-9. Tank 241-AN-103 Analytical Results: Cesium-137 (GEA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µCi/mL	µCi/mL	µCi/mL
S96T005991	Core 166	Liquid composite	739	738	738
Solids: fusion			µCi/g	µCi/g	µCi/g
S96T005986	Core 166	Solid composite	297	251	274

Table B2-10. Tank 241-AN-103 Analytical Results: Cobalt-60 (GEA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µCi/mL	µCi/mL	µCi/mL
S96T005991	Core 166	Liquid composite	<0.0184	<0.0206	<0.0195
Solids: fusion			µCi/g	µCi/g	µCi/g
S96T005986	Core 166	Solid composite	<0.0141	<0.0108	<0.0124

Table B2-11. Tank 241-AN-103 Analytical Results: Europium-154 (GEA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µCi/mL	µCi/mL	µCi/mL
S96T005991	Core 166	Liquid composite	<0.156	<0.138	<0.147
Solids: fusion			µCi/g	µCi/g	µCi/g
S96T005986	Core 166	Solid composite	<0.0676	<0.0597	<0.0636

Table B2-12. Tank 241-AN-103 Analytical Results: Europium-155 (GEA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µCi/mL	µCi/mL	µCi/mL
S96T005991	Core 166	Liquid composite	<0.576	<0.577	<0.577
Solids: fusion			µCi/g	µCi/g	µCi/g
S96T005986	Core 166	Solid composite	<0.398	<0.363	<0.381

Table B2-13. Tank 241-AN-103 Analytical Results: Iodine-129 (I129).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µCi/mL	µCi/mL	µCi/mL
S97T000020	Core 166	Liquid composite	3.940E-04	3.640E-04	3.790E-04
Solids: water digest			µCi/g	µCi/g	µCi/g
S97T000023	Core 166	Solid composite	<0.0034	0.00201	<0.00270[QC:e]

Table B2-14. Tank 241-AN-103 Analytical Results: Technetium-99 (Tc).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µCi/mL	µCi/mL	µCi/mL
S97T000020	Core 166	Liquid composite	1.790E-04	1.560E-04	1.67E-04
Solids: fusion			µCi/g	µCi/g	µCi/g
S96T005986	Core 166	Solid composite	0.156	0.133	0.144

Table B2-15. Tank 241-AN-103 Analytical Results: Americium-241 (Am241).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			μCi/mL	μCi/mL	μCi/mL
S96T005992	Core 166	Liquid composite	<0.00617	<0.00526	<0.005715
Solids: fusion			μCi/g	μCi/g	μCi/g
S96T005986	Core 166	Solid composite	<0.00347	0.00359	<0.00353

Table B2-16. Tank 241-AN-103 Analytical Results: Curium-243/244.

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			μCi/mL	μCi/mL	μCi/mL
S96T005992	Core 166	Liquid composite	<0.00617	<0.00526	<0.005715
Solids: fusion			μCi/g	μCi/g	μCi/g
S96T005986	Core 166	Solid composite	<0.00347	<0.00299	<0.00323

Table B2-17. Tank 241-AN-103 Analytical Results: Plutonium-239/240 (Pu239/240).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids			μCi/g	μCi/g	μCi/g
S96T005986	Core 166	Solid composite	<0.00173	<0.00181	<0.00177
Liquids			μCi/mL	μCi/mL	μCi/mL
S96T005992	Core 166	Liquid composite	<0.00352	<0.00382	<0.00367

Table B2-18. Tank 241-AN-103 Analytical Results: Tritium (Liquid Scintillation).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: water digest			μCi/g	μCi/g	μCi/g
S97T000023	Core 166	Solid composite	0.00247	0.00321	0.00284[QC:e]
Liquids			μCi/mL	μCi/mL	μCi/mL
S97T000388	Core 166	Liquid composite	7.850E-04	0.00235	0.001567[QC:e]

Table B2-19. Tank 241-AN-103 Analytical Results: Percent Water (TGA). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			%	%	%
S96T005539	166: 3	Drainable liquid	48.67	48.6	48.6
S96T005540	166: 4	Drainable liquid	48.52	47.86	48.2
S96T005599	166: 6	Drainable liquid	49.28	49.3	49.3
S96T005816	166: 7	Drainable liquid	49.3	49.0	49.1
S96T005817	166: 8	Drainable liquid	49.4	49.0	49.2
S96T005541	166: 9	Drainable liquid	48.5	48.5	48.5
S96T005566	166: 10	Drainable liquid	48.2	48.1	48.1
S96T005600	166: 11	Drainable liquid	48.8	48.8	48.8
S96T005601	166: 12	Drainable liquid	49.7	49.4	49.6
S96T005861	167: 2	Drainable liquid	49.3	49.0	49.2
S96T005673[1]	167: 3	Drainable liquid	48.3	48.3	48.3
S96T005420	167: 5	Drainable liquid	50.1	50.2	50.1
S96T005421	167: 6	Drainable liquid	49.9	49.9	49.9
S96T005683[1]	167: 7	Drainable liquid	48.8	48.0	48.4
S96T005732[1]	167: 8	Drainable liquid	48.5	48.3	48.4
S96T005862	167: 9	Drainable liquid	49.4	49.3	49.3
S96T005650[1]	167: 11	Drainable liquid	49.2	49.1	49.2
S96T005990[1]	Core 166	Liquid composite	48.5	48.4	48.4
Solids			%	%	%
S96T005578	166: 1	Lower half	28.8	35.8	32.3
S96T005542	166: 4	Lower half	32.9	24.7	28.8
S96T005579[1]	166: 6	Lower half	21.5	30.7	26.1[QC:e]
S96T005820	166: 7	Lower half	15.4	19.7	17.5
S96T005821	166: 8	Lower half	19.21	17.55	18.4
S96T005543	166: 9	Lower half	43.8	44.8	44.3
S96T005564	166: 10	Lower half	27.3	38.7	33.0[QC:e]
S96T005580	166: 11	Lower half	22.5	20.2	21.4
S96T005581	166: 12	Lower half	24.6	30.4	27.5

Table B2-19. Tank 241-AN-103 Analytical Results: Percent Water (TGA). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids (Cont'd)			%	%	%
S96T005636	166: 13	Upper half	41.4	46.6	44.0
S96T005637		Lower half	34.0	45.4	39.7
S96T005398	166: 15	Upper half	33.7	33.7	33.7
S96T005399		Lower half	33.5	29.8	31.6
S96T005582	166: 16	Upper half	22.8	43.4	33.1[QC:e]
S96T005582.1		Upper half	30.9	27.1	29.0
S96T005583		Lower half	38.1	37.3	37.7
S96T005400[1]	166: 17	Upper half	31.1	33.1	32.1
S96T005401		Lower half	30.0	30.1	30.1
S96T005638[1]	166: 18	Upper half	30.7	30.3	30.5
S96T005639		Lower half	38.7	40.1	39.4
S96T005822	166: 19	Upper half	39.8	40.1	40.0
S96T005823		Lower half	41.3	42.1	41.7
S96T005667	167: 1	Upper half	32.8	32.8	32.8
S96T005668		Lower half	35.8	35.8	35.8
S96T005851[1]	167: 2	Lower half	38.1	39.8	38.9
S96T005669[1]	167: 3	Lower half	33.3	42.0	37.6
S96T005675	167: 4	Lower half	29.5	18.0	23.7[QC:e]
S96T005675.1[1]		Lower half	24.3	20.8	22.6
S96T005424[1]	167: 5	Lower half	32.0	29.1	30.5
S96T005425	167: 6	Lower half	39.7	32.5	36.1
S96T005685	167: 7	Lower half	49.6	18.9	34.2[QC:e]
S96T005685.1		Lower half	18.1	18.5	18.3
S96T005734	167: 8	Lower half	14.3	16.1	15.185
S96T005852	167: 9	Lower half	19.8	19.65	19.2
S96T005646	167: 11	Upper half	45.9	45.8	45.9
S96T005647		Lower half	46.3	46.8	46.6
S96T005432	167: 12	Upper half	45.8	41.6	43.7
S96T005426		Lower half	38.3	36.7	37.5

Table B2-19. Tank 241-AN-103 Analytical Results: Percent Water (TGA). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids (Cont'd)			%	%	%
S96T005433	167: 14	Upper half	30.5	30.4	30.4
S96T005427		Lower half	22.0	27.7	24.8
S96T005655	167: 15	Upper half	23.2	24.3	23.7
S96T005656		Lower half	26.0	27.2	26.6
S96T005492[1]	167: 17	Upper half	23.0	24.5	23.8
S96T005493		Lower half	38.2	33.0	35.6
S96T005984	Core 166	Solid composite	33.0	33.1	33.0

Note:
[1]Sample was contaminated with hydrostatic head fluid. See Table B2-20 for a corrected percent water.

Table B2-20. Corrected Thermogravimetric Analysis Measurements.

Sample Number	Sample Location	Sample Portion	Corrected Percent Water (TGA)
S97T005579	166:6	Solids - Lower half	20.9
S96T005400	166: 17	Solids - Upper half	29.5
S96T005638	166: 18	Solids - Upper half	27.8
S97T005492	167: 17	Solids - Upper half	14.7
S96T005851	167:2	Solids - Lower half	34.7
S96T005669	167:3	Solids - Lower half	29.7
S96T005675.1	167:4	Solids - Lower half	12.5
S96T005424	167:5	Solids - Lower half	26.0
S97T005990	Core 166	Drainable liquid composite	45.1
S96T005673	167:3	Drainable liquid	44.3
S96T005683	167:7	Drainable liquid	44.1
S96T005732	167:8	Drainable liquid	44.5
S96T005650	167: 11	Drainable liquid	41.7

Table B2-21. Tank 241-AN-103 Analytical Results: Exotherm (Differential Scanning Calorimetry, Dry). (2 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids			J/g	J/g	J/g
S96T005578	166: 1	Lower half	67.8	83.0	75.4
S96T005543	166: 9	Lower half	0	91.9	45.95[QC:e]
S96T005580	166: 11	Lower half	2.16	0	1.08[QC:e]
S96T005581	166: 12	Lower half	26.8	29.5	28.15
S96T005636	166: 13	Upper half	0	44.3	22.15[QC:e]
S96T005398	166: 15	Upper half	8.0	57.8	32.9[QC:e]
S96T005399		Lower half	74.1	30.1	52.1[QC:e]
S96T005582	166: 16	Upper half	66.9	50.3	58.6
S96T005583		Lower half	82.0	66.0	74.0
S96T005400	166: 17	Upper half	38.9	30.2	34.55
S96T005401		Lower half	32.7	53.5	43.1[QC:e]
S96T005639	166: 18	Lower half	13.2	20.3	16.75[QC:e]
S96T005822	166: 19	Upper half	0	0	0
S96T005823		Lower half	52.0	26.6	39.3[QC:e]
S96T005984	Core 166	Core composite	15.4	38.5	26.95[QC:e]
S96T005668	167: 1	Lower half	16.4	16.3	16.35
S96T005851	167: 2	Lower half	152.0	83.7	118.1[QC:e]
S96T005669	167: 3	Lower half	82.4	45.5	63.95[QC:e]
S96T005685	167: 7	Lower half	145.0	34.0	89.5[QC:e]
S96T005852	167: 9	Lower half	13.5	0	6.75[QC:e]
S96T005646	167: 11	Upper half	12.2	6.84	9.52[QC:e]
S96T005647		Lower half	8.05	15.9	11.98[QC:e]
S96T005432	167: 12	Upper half	7.64	78.2	42.92[QC:e]
S96T005433	167: 14	Upper half	46.3	32.5	39.4[QC:e]
S96T005655	167: 15	Upper half	40.8	106.0	73.4[QC:e]

Table B2-21. Tank 241-AN-103 Analytical Results: Exotherm (Differential Scanning Calorimetry, Dry). (2 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			J/g	J/g	J/g
S96T005539	166: 3	Drainable liquid	53.4	0	26.7[QC:e]
S96T005816	166: 7	Drainable liquid	142.0	118.0	130.0
S96T005817	166: 8	Drainable liquid	39.6	44.7	42.15
S96T005541	166: 9	Drainable liquid	35.5	0	17.75[QC:e]
S96T005566	166: 10	Drainable liquid	195.0	107.0	151.0[QC:e]
S96T005990	Core 166	Drainable liquid composite	171.0	231.0	201.0[QC:e]
S96T005861	167: 2	Drainable liquid	193.0	268.0	230.5[QC:e]
S96T005421	167: 6	Drainable liquid	0	55.7	27.85[QC:e]
S96T005683	167: 7	Drainable liquid	0	172.0	86.0[QC:e]
S96T005862	167: 9	Drainable liquid	185.0	229.0	207.0[QC:e]
S96T005650	167: 11	Drainable liquid	41.3	106.0	73.65[QC:e]

Table B2-22. Tank 241-AN-103 Analytical Results: Bulk density. (2 sheets)

Sample Number	Sample Location	Sample Portion	Result
Solids			g/mL
S96T005586	166: 11	Lower half	1.75
S96T005629	166: 13	Upper half	1.64
S96T005632		Lower half	1.65
S96T005371	166: 15	Upper half	1.73
S96T005369		Lower half	1.79
S96T005588	166: 16	Upper half	1.69
S96T005589		Lower half	1.67
S96T005372	166: 17	Upper half	1.8
S96T005370		Lower half	1.8
S96T005631	166: 18	Upper half	1.67
S96T005634		Lower half	1.61

Table B2-22. Tank 241-AN-103 Analytical Results: Bulk density. (2 sheets)

Sample Number	Sample Location	Sample Portion	Result
Solids (Cont'd)			g/mL
S96T005812	166: 19	Upper half	1.59
S96T005813		Lower half	1.6
S96T005660	167: 1	Upper half	1.68
S96T005661		Lower half	1.72
S96T005847	167: 2	Lower half	1.59
S96T005374	167: 5	Lower half	1.83
S96T005375	167: 6	Lower half	1.8
S96T005644	167: 11	Upper half	1.69
S96T005645		Lower half	1.67
S96T005378	167: 12	Upper half	1.7
S96T005376		Lower half	1.69
S96T005379	167: 14	Upper half	1.88
S96T005377		Lower half	1.93
S96T005653	167: 15	Upper half	1.92
S96T005654		Lower half	1.88
S96T005490	167: 17	Upper half	1.71
S96T005491		Lower half	1.7
S96T005983	Core 166	Solid composite	1.69

Table B2-23. Tank 241-AN-103 Analytical Results: Specific Gravity (SpG).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			unitless	unitless	unitless
S96T005539	166: 3	Drainable liquid	1.46	1.47	1.47
S96T005540	166: 4	Drainable liquid	1.46	1.46	1.46
S96T005599	166: 6	Drainable liquid	1.48	1.48	1.48
S96T005816	166: 7	Drainable liquid	1.46	1.46	1.46
S96T005817	166: 8	Drainable liquid	1.47	1.46	1.47
S96T005541	166: 9	Drainable liquid	1.45	1.44	1.44
S96T005566	166: 10	Drainable liquid	1.51	1.34	1.43
S96T005600	166: 11	Drainable liquid	1.40	1.39	1.3955
S96T005601	166: 12	Drainable liquid	1.47	1.44	1.4545
S96T005861	167: 2	Drainable liquid	1.46	1.46	1.459
S96T005673	167: 3	Drainable liquid	1.54	1.53	1.53
S96T005420	167: 5	Drainable liquid	1.40	1.40	1.40
S96T005421	167: 6	Drainable liquid	2.67[1]	2.77[1]	2.72[1]
S97T001258			1.46	1.47	1.47
S96T005683	167: 7	Drainable liquid	1.45	1.46	1.46
S96T005732	167: 8	Drainable liquid	1.47	1.47	1.47
S96T005862	167: 9	Drainable liquid	1.47	1.47	1.47
S96T005650	167: 11	Drainable liquid	1.44	1.50	1.48
S96T005993	Core 166	Liquid composite	1.49	1.49	1.49

Note:

[1] Identified as an extreme value, therefore a rerun was requested. Sample S97T001258 results replace these values.

Table B2-24. Tank 241-AN-103 Analytical Results: Aluminum (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005609	166: 1	Lower half	92,000	81,000	86,500
S96T005570	166: 4	Lower half	7,060	7,780	7,420[QC:c]
S96T005615	166: 6	Lower half	8,670	8,630	8,650
S96T005839	166: 7	Lower half	7,190	7,360	7,280
S96T005840	166: 8	Lower half	7,290	7,270	7,280[QC:a]
S96T005575	166: 9	Lower half	14,200	12,300	13,200
S96T005571	166: 10	Lower half	10,400	10,400	10,400
S96T005616	166: 11	Lower half	7,300	6,600	6,950
S96T005617	166: 12	Lower half	6,700	7,120	6,910
S96T005716	166: 13	Upper half	52,700	56,600	54,600
S96T005722		Lower half	55,900	59,900	57,900
S96T005416	166: 15	Upper half	68,900	73,200	71,000
S97T000459		Lower half	67,700	78,500	73,100[QC:d]
S96T005624	166: 16	Upper half	83,700	81,800	82,700
S96T005618		Lower half	75,900	76,700	76,300
S96T005417	166: 17	Upper half	88,800	91,700	90,200
S96T005411		Lower half	75,600	65,500	70,500[QC:c]
S96T005717	166: 18	Upper half	33,400	33,700	33,500
S96T005723		Lower half	21,700	22,700	22,200
S96T005841	166: 19	Upper half	26,000	25,500	25,700[QC:a]
S96T005842		Lower half	23,400	23,200	23,300[QC:a]
S96T005708	167: 1	Upper half	55,300	84,700	70,000[QC:e]
S96T005693		Lower half	74,100	78,800	76,400
S96T005857	167: 2	Lower half	57,500	57,700	57,600
S96T005694	167: 3	Lower half	12,800	8,820	10,800[QC:e]
S96T005695	167: 4	Lower half	11,400	12,600	12,000
S96T005438	167: 5	Lower half	15,200	14,200	14,700[QC:c]
S96T005450	167: 6	Lower half	12,700	13,200	12,900
S96T005696	167: 7	Lower half	6,930	7,490	7,210

Table B2-24. Tank 241-AN-103 Analytical Results: Aluminum (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest (Cont'd)			µg/g	µg/g	µg/g
S96T005737	167: 8	Lower half	8,280	7,280	7,780
S96T005858	167: 9	Lower half	7,830	7,980	7,900
S96T005709	167: 11	Upper half	51,200	51,800	51,500
S96T005697		Lower half	59,200	54,300	56,700
S96T005444	167: 12	Upper half	60,500	62,200	61,300
S96T005451		Lower half	69,300	66,500	67,900
S96T005445	167: 14	Upper half	91,200	76,400	83,800
S96T005439		Lower half	84,900	98,200	91,500[QC:d]
S96T005710	167: 15	Upper half	77,300	77,900	77,600
S96T005698		Lower half	1.03E+05	1.05E+05	1.04E+05
S96T005498	167: 17	Upper half	16,600	16,200	16,400
S96T005499		Lower half	10,800	11,900	11,300
S97T000460	Core 166	Solid composite	37,100	39,300	38,200
Liquids			µg/mL	µg/mL	µg/mL
S96T005539	166: 3	Drainable liquid	31,200	28,300	29,700
S96T005540	166: 4	Drainable liquid	27,000	24,800	25,900
S96T005599	166: 6	Drainable liquid	33,700	31,700	32,700[QC:c]
S96T005816	166: 7	Drainable liquid	32,500	33,500	33,000[QC:d]
S96T005817	166: 8	Drainable liquid	31,000	33,700	32,300
S96T005541	166: 9	Drainable liquid	31,500	30,900	31,200[QC:c]
S96T005566	166: 10	Drainable liquid	30,600	30,100	30,300
S96T005600	166: 11	Drainable liquid	31,800	30,600	31,200
S96T005601	166: 12	Drainable liquid	33,200	33,200	33,200[QC:c]
S96T005861	167: 2	Drainable liquid	32,100	32,800	32,400
S96T005673	167: 3	Drainable liquid	29,400	28,900	29,100
S96T005420	167: 5	Drainable liquid	32,500	32,700	32,600[QC:d]
S96T005421	167: 6	Drainable liquid	31,600	31,400	31,500
S96T005683	167: 7	Drainable liquid	33,200	32,900	33,000

Table B2-24. Tank 241-AN-103 Analytical Results: Aluminum (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids (Cont'd)			µg/mL	µg/mL	µg/mL
S96T005732	167: 8	Drainable liquid	33,100	32,600	32,800
S96T005862	167: 9	Drainable liquid	32,300	32,600	32,400
S96T005650	167: 11	Drainable liquid	31,600	31,700	31,600
S96T005991	Core 166	Liquid composite	32,000	32,200	32,100[QC:e]
Solids: fusion			µg/g	µg/g	µg/g
S96T005608	166: 1	Lower half	94,200	95,600	94,900
S96T005568	166: 4	Lower half	8,550	9,220	8,880
S96T005611	166: 6	Lower half	8,740	7,610	8,170
S96T005835	166: 7	Lower half	9,560	9,560	9,560
S96T005836	166: 8	Lower half	6,920	5,390	6,150[QC:e]
S96T005574	166: 9	Lower half	15,100	15,100	15,100
S96T005569	166: 10	Lower half	10,000	8,560	9,280
S96T005612	166: 11	Lower half	6,410	6,550	6,480
S96T005613	166: 12	Lower half	6,370	4,960	5,660[QC:e]
S96T005714	166: 13	Upper half	71,400	71,000	71,200
S96T005720		Lower half	76,700	76,700	76,700
S96T005414	166: 15	Upper half	21,200	20,300	20,700
S96T005408		Lower half	23,700	23,500	23,600
S96T005623	166: 16	Upper half	1.05E+05	1.02E+05	1.03E+05
S96T005614		Lower half	72,400	73,300	72,800
S96T005415	166: 17	Upper half	27,500	28,400	27,900
S96T005409		Lower half	86,800	87,000	86,900
S96T005715	166: 18	Upper half	43,800	45,700	44,700
S96T005721		Lower half	31,000	29,400	30,200
S96T005837	166: 19	Upper half	23,500	23,600	23,500
S96T005838		Lower half	23,900	24,100	24,000
S96T005705	167: 1	Upper half	1.02E+05	1.04E+05	1.03E+05
S96T005687		Lower half	75,400	63,900	69,600
S96T005855	167: 2	Lower half	74,600	73,200	73,900

Table B2-24. Tank 241-AN-103 Analytical Results: Aluminum (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion (Cont'd)			µg/g	µg/g	µg/g
S96T005688	167: 3	Lower half	8,660	7,810	8,230
S96T005689	167: 4	Lower half	8,680	9,310	8,990
S96T005436	167: 5	Lower half	14,600	12,600	13,600
S96T005448	167: 6	Lower half	15,700	14,000	14,800
S96T005690	167: 7	Lower half	9,110	8,640	8,870
S96T005736	167: 8	Lower half	8,800	8,000	8,400
S96T005856	167: 9	Lower half	10,100	10,400	10,200
S96T005706	167: 11	Upper half	61,500	63,600	62,500
S96T005691		Lower half	71,100	72,600	71,800
S96T005442	167: 12	Upper half	86,200	81,900	84,000
S96T005449		Lower half	67,700	69,600	68,600
S96T005443	167: 14	Upper half	84,800	87,900	86,300
S96T005437		Lower half	93,000	96,500	94,700
S96T005707	167: 15	Upper half	1.01E+05	1.03E+05	1.02E+05
S96T005692		Lower half	1.22E+05	1.25E+05	1.23E+05
S96T005496	167: 17	Upper half	19,700	27,400	23,550[QC:e]
S96T005497		Lower half	10,000	13,900	11,950[QC:e]

Table B2-25. Tank 241-AN-103 Analytical Results: Antimony (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			μg/g	μg/g	μg/g
S96T005609	166: 1	Lower half	<88.6	<90.5	<89.55
S96T005570	166: 4	Lower half	<108	<108	<108
S96T005615	166: 6	Lower half	<82.9	<82.9	<82.9
S96T005839	166: 7	Lower half	<121	<123	<122
S96T005840	166: 8	Lower half	<118	<118	<118
S96T005575	166: 9	Lower half	<117	<119	<118
S96T005571	166: 10	Lower half	<92.1	<86.7	<89.4
S96T005616	166: 11	Lower half	<86.8	<81.6	<84.2
S96T005617	166: 12	Lower half	<84.6	<84.4	<84.5
S96T005716	166: 13	Upper half	<116	<118	<117
S96T005722		Lower half	<123	<124	<123.5
S96T005416	166: 15	Upper half	<123	<114	<118.5
S97T000459		Lower half	<34.1	<33.4	<33.75
S96T005624	166: 16	Upper half	<126	<129	<127.5
S96T005618		Lower half	<85.1	<87.3	<86.2
S96T005417	166: 17	Upper half	<135	<123	<129
S96T005411		Lower half	<114	<106	<110
S96T005717	166: 18	Upper half	<125	<121	<123
S96T005723		Lower half	<121	<119	<120
S96T005841	166: 19	Upper half	<116	<118	<117
S96T005842		Lower half	<107	<118	<112.5
S96T005708	167: 1	Upper half	<108	<123	<115.5
S96T005693		Lower half	<133	<105	<119
S96T005857	167: 2	Lower half	<100	<104	<102
S96T005694	167: 3	Lower half	<108	<112	<110
S96T005695	167: 4	Lower half	<119	<123	<121
S96T005438	167: 5	Lower half	<31	<33.1	<32.05
S96T005450	167: 6	Lower half	<33.2	<31.3	<32.25
S96T005696	167: 7	Lower half	<115	<113	<114

Table B2-25. Tank 241-AN-103 Analytical Results: Antimony (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest (Cont'd)			µg/g	µg/g	µg/g
S96T005737	167: 8	Lower half	<117	<120	<118.5
S96T005858	167: 9	Lower half	<125	<105	<115
S96T005709	167: 11	Upper half	<108	<112	<110
S96T005697		Lower half	<119	<113	<116
S96T005444	167: 12	Upper half	<33.2	<32.7	<32.95
S96T005451		Lower half	<34.1	<35	<34.55
S96T005445	167: 14	Upper half	<31.7	<33	<32.35
S96T005439		Lower half	<34.1	<35	<34.55
S96T005710	167: 15	Upper half	<112	<107	<109.5
S96T005698		Lower half	<109	<113	<111
S96T005498	167: 17	Upper half	<110	<117	<113.5
S96T005499		Lower half	<107	<116	<111.5
S97T000460	Core 166	Solid composite	<33.8	<33	<33.4
Liquids			µg/mL	µg/mL	µg/mL
S96T005539	166: 3	Drainable liquid	<24.1	<24.1	<24.1
S96T005540	166: 4	Drainable liquid	<24.1	<24.1	<24.1
S96T005599	166: 6	Drainable liquid	<36.1	<36.1	<36.1
S96T005816	166: 7	Drainable liquid	<36.1	<36.1	<36.1
S96T005817	166: 8	Drainable liquid	<36.1	<36.1	<36.1
S96T005541	166: 9	Drainable liquid	<36.1	<36.1	<36.1
S96T005566	166: 10	Drainable liquid	<24.1	<24.1	<24.1
S96T005600	166: 11	Drainable liquid	<36.1	<36.1	<36.1
S96T005601	166: 12	Drainable liquid	<36.1	<36.1	<36.1
S96T005861	167: 2	Drainable liquid	<36.1	<36.1	<36.1
S96T005673	167: 3	Drainable liquid	<36.1	<36.1	<36.1
S96T005420	167: 5	Drainable liquid	<36.1	<36.1	<36.1
S96T005421	167: 6	Drainable liquid	<36.1	<36.1	<36.1
S96T005683	167: 7	Drainable liquid	<36.1	<36.1	<36.1

Table B2-25. Tank 241-AN-103 Analytical Results: Antimony (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids (Cont'd)			μg/mL	μg/mL	μg/mL
S96T005732	167: 8	Drainable liquid	<36.1	<36.1	<36.1
S96T005862	167: 9	Drainable liquid	<36.1	<36.1	<36.1
S96T005650	167: 11	Drainable liquid	<36.1	<36.1	<36.1
S96T005991	Core 166	Liquid composite	<72.1	<72.1	<72.1
Solids: fusion			μg/g	μg/g	μg/g
S96T005608	166: 1	Lower half	<1,260	<1,240	<1,250
S96T005568	166: 4	Lower half	<1,360	<1,330	<1,345
S96T005611	166: 6	Lower half	<1,260	<1,280	<1,270
S96T005835	166: 7	Lower half	<1,260	<1,270	<1,265
S96T005836	166: 8	Lower half	<1,180	<1,230	<1,205
S96T005574	166: 9	Lower half	<1,080	1,240	<1,160
S96T005569	166: 10	Lower half	<1,250	<1,240	<1,245
S96T005612	166: 11	Lower half	<1,180	<1,220	<1,200
S96T005613	166: 12	Lower half	<1,230	<1,210	<1,220
S96T005714	166: 13	Upper half	1,420	<1,270	<1,345
S96T005720		Lower half	<1,220	<1,210	<1,215
S96T005414	166: 15	Upper half	<274	<280	<277
S96T005408		Lower half	<288	<278	<283
S96T005623	166: 16	Upper half	<1,310	1,620	<1,465[QC:e]
S96T005614		Lower half	<1,230	<1,200	<1,215
S96T005415	166: 17	Upper half	<314	<317	<315.5
S96T005409		Lower half	<1,270	<1,250	<1,260
S96T005715	166: 18	Upper half	<1,210	<1,230	<1,220
S96T005721		Lower half	<1,220	<1,190	<1,205
S96T005837	166: 19	Upper half	<1,240	<1,260	<1,250
S96T005838		Lower half	<1,170	<1,180	<1,175
S96T005705	167: 1	Upper half	<1,190	<1,200	<1,195
S96T005687		Lower half	<1,250	<1,250	<1,250
S96T005855	167: 2	Lower half	<1,210	<1,190	<1,200

Table B2-25. Tank 241-AN-103 Analytical Results: Antimony (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion (Cont'd)			µg/g	µg/g	µg/g
S96T005688	167: 3	Lower half	<1,350	<1,280	<1,315
S96T005689	167: 4	Lower half	<1,260	<1,270	<1,265
S96T005436	167: 5	Lower half	2,120	3,120	2,620[QC:e]
S96T005448	167: 6	Lower half	<1,260	1,850	<1,555[QC:e]
S96T005690	167: 7	Lower half	1,630	1,610	1,620
S96T005736	167: 8	Lower half	1,490	<1,120	<1,305[QC:e]
S96T005856	167: 9	Lower half	<1,100	<1,270	<1,185
S96T005706	167: 11	Upper half	1,440	<1,330	<1,385
S96T005691		Lower half	1,630	<1,100	<1,365[QC:e]
S96T005442	167: 12	Upper half	1,450	2,780	2,115[QC:e]
S96T005449		Lower half	<1,190	<1,210	<1,200
S96T005443	167: 14	Upper half	<1,320	<1,270	<1,295
S96T005437		Lower half	<1,230	<1,220	<1,225
S96T005707	167: 15	Upper half	1,620	<1,100	<1,360[QC:e]
S96T005692		Lower half	<1,100	<1,310	<1,205
S96T005496	167: 17	Upper half	<1,270	<1,260	<1,265
S96T005497		Lower half	<1,260	<1,260	<1,260

Table B2-26. Tank 241-AN-103 Analytical Results: Beryllium (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005609	166: 1	Lower half	<7.38	<7.54	<7.46
S96T005570	166: 4	Lower half	<8.97	<8.97	<8.97
S96T005615	166: 6	Lower half	<6.91	<6.91	<6.91
S96T005839	166: 7	Lower half	<10.1	<10.2	<10.15
S96T005840	166: 8	Lower half	<9.84	<9.83	<9.835[QC:a]
S96T005575	166: 9	Lower half	<9.78	<9.94	<9.86
S96T005571	166: 10	Lower half	<7.67	<7.23	<7.45
S96T005616	166: 11	Lower half	<7.23	<6.8	<7.015
S96T005617	166: 12	Lower half	<7.05	<7.04	<7.045
S96T005716	166: 13	Upper half	<9.69	<9.81	<9.75
S96T005722		Lower half	<10.3	<10.3	<10.3
S96T005416	166: 15	Upper half	12.6	<9.52	<11.06[QC:e]
S97T000459		Lower half	<2.84	<2.78	<2.81
S96T005624	166: 16	Upper half	<10.5	<10.8	<10.65
S96T005618		Lower half	<7.09	<7.28	<7.185
S96T005417	166: 17	Upper half	<11.3	<10.2	<10.75
S96T005411		Lower half	<9.51	<8.8	<9.155
S96T005717	166: 18	Upper half	<10.4	<10.1	<10.25
S96T005723		Lower half	<10.1	<9.9	<10
S96T005841	166: 19	Upper half	<9.63	<9.81	<9.72[QC:a]
S96T005842		Lower half	<8.9	<9.81	<9.355[QC:a]
S96T005708	167: 1	Upper half	<8.96	<10.3	<9.63
S96T005693		Lower half	<11.1	<8.77	<9.935
S96T005857	167: 2	Lower half	<8.34	<8.69	<8.515
S96T005694	167: 3	Lower half	<8.99	<9.36	<9.175
S96T005695	167: 4	Lower half	<9.9	<10.2	<10.05
S96T005438	167: 5	Lower half	<2.58	<2.75	<2.665
S96T005450	167: 6	Lower half	<2.77	<2.61	<2.69
S96T005696	167: 7	Lower half	<9.6	<9.4	<9.5

Table B2-26. Tank 241-AN-103 Analytical Results: Beryllium (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest (Cont'd)			**µg/g**	**µg/g**	**µg/g**
S96T005737	167: 8	Lower half	<9.79	<9.99	<9.89
S96T005858	167: 9	Lower half	<10.4	<8.75	<9.575
S96T005709	167: 11	Upper half	<9	<9.33	<9.165
S96T005697		Lower half	<9.92	<9.41	<9.665
S96T005444	167: 12	Upper half	<2.76	<2.73	<2.745
S96T005451		Lower half	<2.84	<2.92	<2.88
S96T005445	167: 14	Upper half	<2.64	<2.75	<2.695
S96T005439		Lower half	<2.84	<2.92	<2.88
S96T005710	167: 15	Upper half	<9.32	<8.95	<9.135
S96T005698		Lower half	<9.11	<9.4	<9.255
S96T005498	167: 17	Upper half	<9.16	<9.74	<9.45
S96T005499		Lower half	<8.91	<9.65	<9.28
S97T000460	Core 166	Solid composite	<2.82	<2.75	<2.785
Liquids			**µg/mL**	**µg/mL**	**µg/mL**
S96T005539	166: 3	Drainable liquid	<2	<2	<2
S96T005540	166: 4	Drainable liquid	<2	<2	<2
S96T005599	166: 6	Drainable liquid	<3	<3	<3
S96T005816	166: 7	Drainable liquid	<3	<3	<3
S96T005817	166: 8	Drainable liquid	<3	<3	<3
S96T005541	166: 9	Drainable liquid	<3	<3	<3
S96T005566	166: 10	Drainable liquid	<2	<2	<2
S96T005600	166: 11	Drainable liquid	<3	<3	<3
S96T005601	166: 12	Drainable liquid	<3	<3	<3
S96T005861	167: 2	Drainable liquid	<3	<3	<3
S96T005673	167: 3	Drainable liquid	<3	<3	<3
S96T005420	167: 5	Drainable liquid	<3	<3	<3
S96T005421	167: 6	Drainable liquid	<3	<3	<3
S96T005683	167: 7	Drainable liquid	<3	<3	<3

Table B2-26. Tank 241-AN-103 Analytical Results: Beryllium (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids (Cont'd)			μg/mL	μg/mL	μg/mL
S96T005732	167: 8	Drainable liquid	<3	<3	<3
S96T005862	167: 9	Drainable liquid	<3	<3	<3
S96T005650	167: 11	Drainable liquid	<3	<3	<3
S96T005991	Core 166	Liquid composite	<6	<6	<6
Solids: fusion			μg/g	μg/g	μg/g
S96T005608	166: 1	Lower half	<105	<103	<104
S96T005568	166: 4	Lower half	<113	<111	<112
S96T005611	166: 6	Lower half	<105	<107	<106
S96T005835	166: 7	Lower half	<105	<106	<105.5
S96T005836	166: 8	Lower half	<98.1	<103	<100.55
S96T005574	166: 9	Lower half	<89.6	<97	<93.3
S96T005569	166: 10	Lower half	<105	<103	<104
S96T005612	166: 11	Lower half	<98.7	<102	<100.35
S96T005613	166: 12	Lower half	<103	<101	<102
S96T005714	166: 13	Upper half	<101	<105	<103
S96T005720		Lower half	<101	<101	<101
S96T005414	166: 15	Upper half	<22.8	<23.3	<23.05
S96T005408		Lower half	<24	<23.2	<23.6
S96T005623	166: 16	Upper half	<109	<105	<107
S96T005614		Lower half	<102	<100	<101
S96T005415	166: 17	Upper half	<26.2	<26.4	<26.3
S96T005409		Lower half	<106	<104	<105
S96T005715	166: 18	Upper half	<101	<103	<102
S96T005721		Lower half	<101	<99.4	<100.2
S96T005837	166: 19	Upper half	<104	<105	<104.5
S96T005838		Lower half	<97.8	<98.2	<98
S96T005705	167: 1	Upper half	<99.4	<100	<99.7
S96T005687		Lower half	<104	<104	<104

Table B2-26. Tank 241-AN-103 Analytical Results: Beryllium (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion (Cont'd)			µg/g	µg/g	µg/g
S96T005855	167: 2	Lower half	<101	<98.8	<99.9
S96T005688	167: 3	Lower half	<112	<107	<109.5
S96T005689	167: 4	Lower half	<105	<106	<105.5
S96T005436	167: 5	Lower half	<93.1	<93.9	<93.5
S96T005448	167: 6	Lower half	<105	<102	<103.5
S96T005690	167: 7	Lower half	<98.2	<109	<103.6
S96T005736	167: 8	Lower half	<111	<93.7	<102.35
S96T005856	167: 9	Lower half	<92	<105	<98.5
S96T005706	167: 11	Upper half	<93.3	<111	<102.15
S96T005691		Lower half	<92.5	<92.1	<92.3
S96T005442	167: 12	Upper half	<108	<96.9	<102.45
S96T005449		Lower half	<98.8	<101	<99.9
S96T005443	167: 14	Upper half	<110	<105	<107.5
S96T005437		Lower half	<103	<101	<102
S96T005707	167: 15	Upper half	<107	<91.9	<99.45
S96T005692		Lower half	<91.6	<109	<100.3
S96T005496	167: 17	Upper half	<106	<105	<105.5
S96T005497		Lower half	<105	<105	<105

Table B2-27. Tank 241-AN-103 Analytical Results: Boron (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005609	166: 1	Lower half	107	114	110.5
S96T005570	166: 4	Lower half	124	109	116.5
S96T005615	166: 6	Lower half	85.9	91.5	88.7
S96T005839	166: 7	Lower half	138	121	129.5
S96T005840	166: 8	Lower half	131	157	144
S96T005575	166: 9	Lower half	162	168	165
S96T005571	166: 10	Lower half	109	96.2	102.6
S96T005616	166: 11	Lower half	86.9	93.4	90.15
S96T005617	166: 12	Lower half	99.6	90	94.8
S96T005716	166: 13	Upper half	182	176	179
S96T005722		Lower half	162	163	162.5
S96T005416	166: 15	Upper half	194	148	171[QC:e]
S97T000459		Lower half	137	153	145
S96T005624	166: 16	Upper half	177	198	187.5
S96T005618		Lower half	102	115	108.5
S96T005417	166: 17	Upper half	152	169	160.5
S96T005411		Lower half	120	122	121
S96T005717	166: 18	Upper half	153	175	164
S96T005723		Lower half	153	153	153
S96T005841	166: 19	Upper half	<96.3	<98.1	<97.2
S96T005842		Lower half	<89	138	<113.5[QC:e]
S96T005708	167: 1	Upper half	117	134	125.5
S96T005693		Lower half	152	140	146
S96T005857	167: 2	Lower half	134	<86.9	<110.45[QC:e]
S96T005694	167: 3	Lower half	109	115	112
S96T005695	167: 4	Lower half	118	128	123
S96T005438	167: 5	Lower half	131	143	137
S96T005450	167: 6	Lower half	141	146	143.5
S96T005696	167: 7	Lower half	154	142	148

Table B2-27. Tank 241-AN-103 Analytical Results: Boron (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest (Cont'd)			µg/g	µg/g	µg/g
S96T005737	167: 8	Lower half	146	153	149.5
S96T005858	167: 9	Lower half	126	133	129.5
S96T005709	167: 11	Upper half	147	176	161.5
S96T005697		Lower half	157	143	150
S96T005444	167: 12	Upper half	136	132	134
S96T005451		Lower half	204	141	172.5[QC:e]
S96T005445	167: 14	Upper half	153	178	165.5
S96T005439		Lower half	121	36	78.5[QC:e]
S96T005710	167: 15	Upper half	128	155	141.5
S96T005698		Lower half	158	157	157.5
S96T005498	167: 17	Upper half	121	140	130.5
S96T005499		Lower half	124	124	124
S97T000460	Core 166	Solid composite	132	118	125
Liquids			µg/mL	µg/mL	µg/mL
S96T005539	166: 3	Drainable liquid	63.6	62.3	62.95
S96T005540	166: 4	Drainable liquid	53.8	46	49.9
S96T005599	166: 6	Drainable liquid	70.3	65.2	67.75
S96T005816	166: 7	Drainable liquid	66.1	69.7	67.9
S96T005817	166: 8	Drainable liquid	68.8	73.8	71.3
S96T005541	166: 9	Drainable liquid	66.2	62.1	64.15
S96T005566	166: 10	Drainable liquid	69.5	63	66.25
S96T005600	166: 11	Drainable liquid	68.3	64.9	66.6
S96T005601	166: 12	Drainable liquid	66	67.8	66.9
S96T005861	167: 2	Drainable liquid	68.8	71.4	70.1
S96T005673	167: 3	Drainable liquid	56.4	56.4	56.4
S96T005420	167: 5	Drainable liquid	68.9	68.9	68.9
S96T005421	167: 6	Drainable liquid	62.3	62.3	62.3
S96T005683	167: 7	Drainable liquid	62.8	67.2	65

Table B2-27. Tank 241-AN-103 Analytical Results: Boron (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids (Cont'd)			μg/mL	μg/mL	μg/mL
S96T005732	167: 8	Drainable liquid	61.3	63.1	62.2
S96T005862	167: 9	Drainable liquid	69.7	71.1	70.4
S96T005650	167: 11	Drainable liquid	54.1	54.9	54.5
S96T005991	Core 166	Liquid composite	<60.1	<60.1	<60.1
Solids: fusion			μg/g	μg/g	μg/g
S96T005608	166: 1	Lower half	<1,050	<1,030	<1,040
S96T005568	166: 4	Lower half	<1,130	<1,110	<1,120
S96T005611	166: 6	Lower half	<1,050	<1,070	<1,060
S96T005835	166: 7	Lower half	<1,050	<1,060	<1,055
S96T005836	166: 8	Lower half	<981	<1,030	<1,005.5
S96T005574	166: 9	Lower half	<896	<970	<933
S96T005569	166: 10	Lower half	<1,050	<1,030	<1,040
S96T005612	166: 11	Lower half	<987	<1,020	<1,003.5
S96T005613	166: 12	Lower half	<1,030	<1,010	<1,020
S96T005714	166: 13	Upper half	<1,010	<1,050	<1,030
S96T005720		Lower half	<1,010	<1,010	<1,010
S96T005414	166: 15	Upper half	<228	<233	<230.5
S96T005408		Lower half	<240	<232	<236
S96T005623	166: 16	Upper half	<1,090	<1,050	<1,070
S96T005614		Lower half	<1,020	<1,000	<1,010
S96T005415	166: 17	Upper half	<262	<264	<263
S96T005409		Lower half	<1,060	<1,040	<1,050
S96T005715	166: 18	Upper half	<1,010	<1,030	<1,020
S96T005721		Lower half	<1,010	<994	<1,002
S96T005837	166: 19	Upper half	<1,040	<1,050	<1,045
S96T005838		Lower half	<978	<982	<980
S96T005705	167: 1	Upper half	<994	<1,000	<997
S96T005687		Lower half	<1,040	<1,040	<1,040
S96T005855	167: 2	Lower half	<1,010	<988	<999

Table B2-27. Tank 241-AN-103 Analytical Results: Boron (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion Cont'd)			µg/g	µg/g	µg/g
S96T005688	167: 3	Lower half	<1,120	<1,070	<1,095
S96T005689	167: 4	Lower half	<1,050	<1,060	<1,055
S96T005436	167: 5	Lower half	<931	<939	<935
S96T005448	167: 6	Lower half	<1,050	<1,020	<1,035
S96T005690	167: 7	Lower half	<982	<1,090	<1,036
S96T005736	167: 8	Lower half	<1,110	<937	<1,023.5
S96T005856	167: 9	Lower half	<920	<1,050	<985
S96T005706	167: 11	Upper half	<933	<1,110	<1,021.5
S96T005691		Lower half	<925	<921	<923
S96T005442	167: 12	Upper half	<1,080	<969	<1,024.5
S96T005449		Lower half	<988	<1,010	<999
S96T005443	167: 14	Upper half	<1,100	<1,050	<1,075
S96T005437		Lower half	<1,030	<1,010	<1,020
S96T005707	167: 15	Upper half	<1,070	<919	<994.5
S96T005692		Lower half	<916	<1,090	<1,003
S96T005496	167: 17	Upper half	<1,060	<1,050	<1,055
S96T005497		Lower half	<1,050	<1,050	<1,050

Table B2-28. Tank 241-AN-103 Analytical Results: Cadmium (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005609	166: 1	Lower half	16.1	12.9	14.5[QC:e]
S96T005570	166: 4	Lower half	<8.97	<8.97	<8.97
S96T005615	166: 6	Lower half	<6.91	<6.91	<6.91
S96T005839	166: 7	Lower half	<10.1	<10.2	<10.15
S96T005840	166: 8	Lower half	<9.84	<9.83	<9.835[QC:a]
S96T005575	166: 9	Lower half	9.89	<9.94	<9.915
S96T005571	166: 10	Lower half	<7.67	<7.23	<7.45
S96T005616	166: 11	Lower half	<7.23	<6.8	<7.015
S96T005617	166: 12	Lower half	<7.05	<7.04	<7.045
S96T005716	166: 13	Upper half	13.9	10.1	12[QC:e]
S96T005722		Lower half	<10.3	<10.3	<10.3
S96T005416	166: 15	Upper half	19.9	<9.52	<14.71[QC:e]
S97T000459		Lower half	6.3	6.88	6.59
S96T005624	166: 16	Upper half	11.2	<10.8	<11
S96T005618		Lower half	8.98	8.42	8.7
S96T005417	166: 17	Upper half	11.4	<10.2	<10.8
S96T005411		Lower half	<9.51	10.7	<10.105
S96T005717	166: 18	Upper half	13.9	12.4	13.15
S96T005723		Lower half	12.3	<9.9	<11.1[QC:e]
S96T005841	166: 19	Upper half	<9.63	<9.81	<9.72[QC:a]
S96T005842		Lower half	10.1	<9.81	<9.955[QC:a]
S96T005708	167: 1	Upper half	<8.96	<10.3	<9.63
S96T005693		Lower half	<11.1	10.1	<10.6
S96T005857	167: 2	Lower half	<8.34	8.97	<8.655
S96T005694	167: 3	Lower half	<8.99	<9.36	<9.175
S96T005695	167: 4	Lower half	<9.9	<10.2	<10.05
S96T005438	167: 5	Lower half	<2.58	<2.75	<2.665[QC:a]
S96T005450	167: 6	Lower half	<2.77	<2.61	<2.69[QC:a]
S96T005696	167: 7	Lower half	<9.6	<9.4	<9.5

Table B2-28. Tank 241-AN-103 Analytical Results: Cadmium (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest (Cont'd)			µg/g	µg/g	µg/g
S96T005737	167: 8	Lower half	<9.79	<9.99	<9.89
S96T005858	167: 9	Lower half	<10.4	<8.75	<9.575
S96T005709	167: 11	Upper half	<9	<9.33	<9.165
S96T005697		Lower half	10.1	<9.41	<9.755
S96T005444	167: 12	Upper half	5.46	5.79	5.625[QC:a]
S96T005451		Lower half	5.92	6.16	6.04[QC:a]
S96T005445	167: 14	Upper half	5.54	4.57	5.055[QC:a]
S96T005439		Lower half	5.18	5.88	5.53[QC:a]
S96T005710	167: 15	Upper half	<9.32	<8.95	<9.135
S96T005698		Lower half	<9.11	<9.4	<9.255
S96T005498	167: 17	Upper half	<9.16	<9.74	<9.45
S96T005499		Lower half	<8.91	10.5	<9.705
S97T000460	Core 166	Solid composite	3.95	4.39	4.17
Liquids			µg/mL	µg/mL	µg/mL
S96T005539	166: 3	Drainable liquid	4.44	4.13	4.285
S96T005540	166: 4	Drainable liquid	4.31	<2	<3.155[QC:e]
S96T005599	166: 6	Drainable liquid	4.73	4.84	4.785
S96T005816	166: 7	Drainable liquid	4.19	5.1	4.645
S96T005817	166: 8	Drainable liquid	5.45	4.67	5.06
S96T005541	166: 9	Drainable liquid	4.15	4.03	4.09
S96T005566	166: 10	Drainable liquid	4.29	4.03	4.16
S96T005600	166: 11	Drainable liquid	4.94	4.22	4.58
S96T005601	166: 12	Drainable liquid	4.88	4.39	4.635
S96T005861	167: 2	Drainable liquid	4.46	3.66	4.06
S96T005673	167: 3	Drainable liquid	3.72	4.37	4.045
S96T005420	167: 5	Drainable liquid	5.49	4.23	4.86[QC:e]
S96T005421	167: 6	Drainable liquid	5.03	4.23	4.63
S96T005683	167: 7	Drainable liquid	4.6	5.09	4.845
S96T005732	167: 8	Drainable liquid	4.67	4.83	4.75

Table B2-28. Tank 241-AN-103 Analytical Results: Cadmium (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids (Cont'd)			μg/mL	μg/mL	μg/mL
S96T005862	167: 9	Drainable liquid	4.78	4.87	4.825
S96T005650	167: 11	Drainable liquid	<3	3.37	<3.185
S96T005991	Core 166	Liquid composite	<6	<6	<6
Solids: fusion			μg/g	μg/g	μg/g
S96T005608	166: 1	Lower half	<105	<103	<104
S96T005568	166: 4	Lower half	<113	<111	<112
S96T005611	166: 6	Lower half	<105	<107	<106
S96T005835	166: 7	Lower half	<105	<106	<105.5
S96T005836	166: 8	Lower half	<98.1	<103	<100.55
S96T005574	166: 9	Lower half	<89.6	<97	<93.3
S96T005569	166: 10	Lower half	<105	<103	<104
S96T005612	166: 11	Lower half	<98.7	<102	<100.35
S96T005613	166: 12	Lower half	<103	<101	<102
S96T005714	166: 13	Upper half	<101	<105	<103
S96T005720		Lower half	<101	<101	<101
S96T005414	166: 15	Upper half	<22.8	<23.3	<23.05
S96T005408		Lower half	<24	<23.2	<23.6
S96T005623	166: 16	Upper half	<109	<105	<107
S96T005614		Lower half	<102	<100	<101
S96T005415	166: 17	Upper half	<26.2	<26.4	<26.3
S96T005409		Lower half	<106	<104	<105
S96T005715	166: 18	Upper half	<101	<103	<102
S96T005721		Lower half	<101	<99.4	<100.2
S96T005837	166: 19	Upper half	<104	<105	<104.5
S96T005838		Lower half	<97.8	<98.2	<98
S96T005705	167: 1	Upper half	<99.4	<100	<99.7
S96T005687		Lower half	<104	<104	<104
S96T005855	167: 2	Lower half	<101	<98.8	<99.9
S96T005688	167: 3	Lower half	<112	<107	<109.5

Table B2-28. Tank 241-AN-103 Analytical Results: Cadmium (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion (Cont'd)			µg/g	µg/g	µg/g
S96T005689	167: 4	Lower half	<105	<106	<105.5
S96T005436	167: 5	Lower half	<93.1	<93.9	<93.5
S96T005448	167: 6	Lower half	<105	<102	<103.5
S96T005690	167: 7	Lower half	<98.2	<109	<103.6
S96T005736	167: 8	Lower half	<111	<93.7	<102.35
S96T005856	167: 9	Lower half	<92	<105	<98.5
S96T005706	167: 11	Upper half	<93.3	<111	<102.15
S96T005691		Lower half	<92.5	<92.1	<92.3
S96T005442	167: 12	Upper half	<108	<96.9	<102.45
S96T005449		Lower half	<98.8	<101	<99.9
S96T005443	167: 14	Upper half	<110	<105	<107.5
S96T005437		Lower half	<103	<101	<102
S96T005707	167: 15	Upper half	<107	<91.9	<99.45
S96T005692		Lower half	<91.6	<109	<100.3
S96T005496	167: 17	Upper half	<106	<105	<105.5
S96T005497		Lower half	<105	<105	<105

Table B2-29. Tank 241-AN-103 Analytical Results: Calcium (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			μg/g	μg/g	μg/g
S96T005609	166: 1	Lower half	<148	<151	<149.5
S96T005570	166: 4	Lower half	<179	<179	<179
S96T005615	166: 6	Lower half	<138	<138	<138
S96T005839	166: 7	Lower half	<202	<205	<203.5
S96T005840	166: 8	Lower half	<197	<197	<197[QC:a]
S96T005575	166: 9	Lower half	<196	<199	<197.5
S96T005571	166: 10	Lower half	<153	<145	<149
S96T005616	166: 11	Lower half	<145	<136	<140.5
S96T005617	166: 12	Lower half	<141	<141	<141
S96T005716	166: 13	Upper half	<194	<196	<195
S96T005722		Lower half	<206	<206	<206
S96T005416	166: 15	Upper half	<204	<190	<197
S97T000459		Lower half	<56.9	<55.7	<56.3
S96T005624	166: 16	Upper half	<210	<215	<212.5
S96T005618		Lower half	<142	<146	<144
S96T005417	166: 17	Upper half	<225	<205	<215
S96T005411		Lower half	<190	<176	<183
S96T005717	166: 18	Upper half	<208	<202	<205
S96T005723		Lower half	290	207	248.5[QC:c]
S96T005841	166: 19	Upper half	<193	197	<195[QC:a]
S96T005842		Lower half	383	227	305[QC:a,c]
S96T005708	167: 1	Upper half	<179	<205	<192
S96T005693		Lower half	<222	<175	<198.5[QC:c]
S96T005857	167: 2	Lower half	<167	<174	<170.5
S96T005694	167: 3	Lower half	<180	<187	<183.5
S96T005695	167: 4	Lower half	<198	<204	<201
S96T005438	167: 5	Lower half	<51.7	<55.1	<53.4
S96T005450	167: 6	Lower half	<55.3	<52.2	<53.75
S96T005696	167: 7	Lower half	<192	<188	<190

Table B2-29. Tank 241-AN-103 Analytical Results: Calcium (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005737	167: 8	Lower half	<196	<200	<198
S96T005858	167: 9	Lower half	<208	<175	<191.5
S96T005709	167: 11	Upper half	<180	<187	<183.5
S96T005697		Lower half	<198	<188	<193
S96T005444	167: 12	Upper half	<55.3	<54.5	<54.9
S96T005451		Lower half	<56.8	<58.4	<57.6
S96T005445	167: 14	Upper half	<52.8	95.1	<73.95[QC:e]
S96T005439		Lower half	<56.8	<58.4	<57.6
S96T005710	167: 15	Upper half	<186	<179	<182.5
S96T005698		Lower half	<182	<188	<185
S96T005498	167: 17	Upper half	<183	<195	<189
S96T005499		Lower half	<178	<193	<185.5
S97T000460	Core 166	Solid composite	<56.3	<55.1	<55.7
Liquids			µg/mL	µg/mL	µg/mL
S96T005539	166: 3	Drainable liquid	<40.1	<40.1	<40.1
S96T005540	166: 4	Drainable liquid	<40.1	<40.1	<40.1
S96T005599	166: 6	Drainable liquid	<60.1	<60.1	<60.1
S96T005816	166: 7	Drainable liquid	<60.1	<60.1	<60.1
S96T005817	166: 8	Drainable liquid	<60.1	<60.1	<60.1
S96T005541	166: 9	Drainable liquid	<60.1	<60.1	<60.1
S96T005566	166: 10	Drainable liquid	<40.1	<40.1	<40.1
S96T005600	166: 11	Drainable liquid	<60.1	<60.1	<60.1
S96T005601	166: 12	Drainable liquid	<60.1	<60.1	<60.1
S96T005861	167: 2	Drainable liquid	<60.1	<60.1	<60.1
S96T005673	167: 3	Drainable liquid	<60.1	<60.1	<60.1
S96T005420	167: 5	Drainable liquid	<60.1	<60.1	<60.1
S96T005421	167: 6	Drainable liquid	<60.1	<60.1	<60.1
S96T005683	167: 7	Drainable liquid	<60.1	<60.1	<60.1
S96T005732	167: 8	Drainable liquid	<60.1	<60.1	<60.1

Table B2-29. Tank 241-AN-103 Analytical Results: Calcium (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids (Cont'd)			µg/mL	µg/mL	µg/mL
S96T005862	167: 9	Drainable liquid	<60.1	<60.1	<60.1
S96T005650	167: 11	Drainable liquid	<60.1	<60.1	<60.1
S96T005991	Core 166	Liquid composite	<120	<120	<120
Solids: fusion			µg/g	µg/g	µg/g
S96T005608	166: 1	Lower half	<2,100	<2,060	<2,080
S96T005568	166: 4	Lower half	<2,270	<2,220	<2,245
S96T005611	166: 6	Lower half	<2,100	<2,140	<2,120
S96T005835	166: 7	Lower half	<2,100	<2,120	<2,110
S96T005836	166: 8	Lower half	<1,960	<2,060	<2,010
S96T005574	166: 9	Lower half	<1,790	<1,940	<1,865
S96T005569	166: 10	Lower half	<2,090	<2,070	<2,080
S96T005612	166: 11	Lower half	<1,970	<2,040	<2,005
S96T005613	166: 12	Lower half	<2,050	<2,020	<2,035
S96T005714	166: 13	Upper half	<2,010	<2,110	<2,060
S96T005720		Lower half	<2,030	<2,010	<2,020
S96T005414	166: 15	Upper half	<456	<466	<461
S96T005408		Lower half	<480	<463	<471.5
S96T005623	166: 16	Upper half	<2,180	<2,100	<2,140
S96T005614		Lower half	<2,040	<2,010	<2,025
S96T005415	166: 17	Upper half	<523	<528	<525.5
S96T005409		Lower half	<2,110	<2,080	<2,095
S96T005715	166: 18	Upper half	<2,010	<2,060	<2,035
S96T005721		Lower half	<2,030	<1,990	<2,010
S96T005837	166: 19	Upper half	<2,070	<2,100	<2,085
S96T005838		Lower half	<1,960	<1,960	<1,960
S96T005705	167: 1	Upper half	<1,990	<2,000	<1,995
S96T005687		Lower half	<2,080	<2,090	<2,085
S96T005855	167: 2	Lower half	<2,020	<1,980	<2,000
S96T005688	167: 3	Lower half	<2,250	<2,130	<2,190

Table B2-29. Tank 241-AN-103 Analytical Results: Calcium (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion (Cont'd)			µg/g	µg/g	µg/g
96T005689	167: 4	Lower half	<2,100	<2,110	<2,105
S96T005436	167: 5	Lower half	<1,860	<1,880	<1,870
S96T005448	167: 6	Lower half	<2,110	<2,040	<2,075
S96T005690	167: 7	Lower half	<1,960	<2,180	<2,070
S96T005736	167: 8	Lower half	<2,210	<1,870	<2,040
S96T005856	167: 9	Lower half	<1,840	<2,110	<1,975
S96T005706	167: 11	Upper half	<1,870	<2,220	<2,045
S96T005691		Lower half	<1,850	<1,840	<1,845
S96T005442	167: 12	Upper half	<2,160	<1,940	<2,050
S96T005449		Lower half	<1,980	<2,020	<2,000
S96T005443	167: 14	Upper half	<2,200	<2,110	<2,155
S96T005437		Lower half	<2,050	<2,030	<2,040
S96T005707	167: 15	Upper half	<2,130	<1,840	<1,985
S96T005692		Lower half	<1,830	<2,180	<2,005
S96T005496	167: 17	Upper half	<2,120	<2,100	<2,110
S96T005497		Lower half	<2,100	<2,110	<2,105

Table B2-30. Tank 241-AN-103 Analytical Results: Chromium (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005609	166: 1	Lower half	882	771	826.5
S96T005570	166: 4	Lower half	133	143	138
S96T005615	166: 6	Lower half	169	167	168
S96T005839	166: 7	Lower half	138	145	141.5
S96T005840	166: 8	Lower half	132	131	131.5[QC:a]
S96T005575	166: 9	Lower half	273	227	250
S96T005571	166: 10	Lower half	200	193	196.5
S96T005616	166: 11	Lower half	139	123	131
S96T005617	166: 12	Lower half	126	133	129.5
S96T005716	166: 13	Upper half	618	609	613.5
S96T005722		Lower half	576	642	609
S96T005416	166: 15	Upper half	646	672	659
S97T000459		Lower half	600	715	657.5
S96T005624	166: 16	Upper half	625	604	614.5
S96T005618		Lower half	708	705	706.5
S96T005417	166: 17	Upper half	455	458	456.5
S96T005411		Lower half	431	450	440.5
S96T005717	166: 18	Upper half	642	662	652
S96T005723		Lower half	456	421	438.5
S96T005841	166: 19	Upper half	301	313	307[QC:a]
S96T005842		Lower half	317	330	323.5[QC:a]
S96T005708	167: 1	Upper half	532	829	680.5[QC:c]
S96T005693		Lower half	640	691	665.5
S96T005857	167: 2	Lower half	513	597	555[QC:a]
S96T005694	167: 3	Lower half	225	148	186.5[QC:c]
S96T005695	167: 4	Lower half	210	242	226
S96T005438	167: 5	Lower half	289	271	280[QC:a]
S96T005450	167: 6	Lower half	245	257	251[QC:a]
S96T005696	167: 7	Lower half	138	149	143.5

Table B2-30. Tank 241-AN-103 Analytical Results: Chromium (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest (Cont'd)			μg/g	μg/g	μg/g
S96T005737	167: 8	Lower half	166	167	166.5
S96T005858	167: 9	Lower half	136	148	142[QC:a]
S96T005709	167: 11	Upper half	564	573	568.5
S96T005697		Lower half	667	647	657
S96T005444	167: 12	Upper half	622	642	632[QC:a]
S96T005451		Lower half	654	635	644.5[QC:a]
S96T005445	167: 14	Upper half	398	343	370.5[QC:a]
S96T005439		Lower half	379	475	427[QC:a,c]
S96T005710	167: 15	Upper half	413	411	412
S96T005698		Lower half	352	351	351.5
S96T005498	167: 17	Upper half	475	453	464
S96T005499		Lower half	695	573	634
S97T000460	Core 166	Solid composite	423	453	438
Liquids			μg/mL	μg/mL	μg/mL
S96T005539	166: 3	Drainable liquid	583	570	576.5
S96T005540	166: 4	Drainable liquid	535	511	523
S96T005599	166: 6	Drainable liquid	635	614	624.5
S96T005816	166: 7	Drainable liquid	617	638	627.5
S96T005817	166: 8	Drainable liquid	607	644	625.5
S96T005541	166: 9	Drainable liquid	598	590	594
S96T005566	166: 10	Drainable liquid	606	594	600
S96T005600	166: 11	Drainable liquid	621	608	614.5
S96T005601	166: 12	Drainable liquid	611	612	611.5
S96T005861	167: 2	Drainable liquid	569	576	572.5
S96T005673	167: 3	Drainable liquid	576	566	571
S96T005420	167: 5	Drainable liquid	656	621	638.5
S96T005421	167: 6	Drainable liquid	619	614	616.5
S96T005683	167: 7	Drainable liquid	608	608	608

Table B2-30. Tank 241-AN-103 Analytical Results: Chromium (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids (Cont'd)			μg/mL	μg/mL	μg/mL
96T005732	167: 8	Drainable liquid	609	598	603.5
S96T005862	167: 9	Drainable liquid	617	633	625
S96T005650	167: 11	Drainable liquid	427	429	428
S96T005991	Core 166	Liquid composite	553	567	560
Solids: fusion			μg/g	μg/g	μg/g
S96T005608	166: 1	Lower half	999	913	956
S96T005568	166: 4	Lower half	<227	<222	<224.5
S96T005611	166: 6	Lower half	<210	<214	<212
S96T005835	166: 7	Lower half	<210	219	<214.5
S96T005836	166: 8	Lower half	<196	<206	<201
S96T005574	166: 9	Lower half	238	329	283.5[QC:e]
S96T005569	166: 10	Lower half	<209	<207	<208
S96T005612	166: 11	Lower half	<197	<204	<200.5
S96T005613	166: 12	Lower half	<205	<202	<203.5
S96T005714	166: 13	Upper half	869	757	813
S96T005720		Lower half	818	916	867
S96T005414	166: 15	Upper half	205	207	206
S96T005408		Lower half	208	196	202
S96T005623	166: 16	Upper half	947	819	883
S96T005614		Lower half	787	771	779
S96T005415	166: 17	Upper half	128	144	136
S96T005409		Lower half	552	656	604
S96T005715	166: 18	Upper half	857	898	877.5
S96T005721		Lower half	540	530	535
S96T005837	166: 19	Upper half	303	307	305
S96T005838		Lower half	321	343	332
S96T005705	167: 1	Upper half	1,050	1,080	1,065
S96T005687		Lower half	835	762	798.5
S96T005855	167: 2	Lower half	740	743	741.5

Table B2-30. Tank 241-AN-103 Analytical Results: Chromium (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion (Cont'd)			µg/g	µg/g	µg/g
S96T005688	167: 3	Lower half	<225	219	<222
96T005689	167: 4	Lower half	219	<211	<215
S96T005436	167: 5	Lower half	352	328	340
S96T005448	167: 6	Lower half	387	277	332[QC:e]
S96T005690	167: 7	Lower half	265	<218	<241.5
S96T005736	167: 8	Lower half	273	219	246[QC:e]
S96T005856	167: 9	Lower half	<184	<211	<197.5
S96T005706	167: 11	Upper half	843	826	834.5
S96T005691		Lower half	946	974	960
S96T005442	167: 12	Upper half	1,050	973	1,011.5
S96T005449		Lower half	744	793	768.5
S96T005443	167: 14	Upper half	455	466	460.5
S96T005437		Lower half	519	527	523
S96T005707	167: 15	Upper half	599	596	597.5
S96T005692		Lower half	438	535	486.5
S96T005496	167: 17	Upper half	607	781	694[QC:e]
S96T005497		Lower half	591	677	634

Table B2-31. Tank 241-AN-103 Analytical Results: Cobalt (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			μg/g	μg/g	μg/g
S96T005609	166: 1	Lower half	52.6	49.9	51.25
S96T005570	166: 4	Lower half	57.4	61	59.2
S96T005615	166: 6	Lower half	67	66.5	66.75
S96T005839	166: 7	Lower half	67.7	59.9	63.8
S96T005840	166: 8	Lower half	68.2	48.3	58.25[QC:a,e]
S96T005575	166: 9	Lower half	<39.1	66.6	<52.85[QC:e]
S96T005571	166: 10	Lower half	54.8	60.4	57.6
S96T005616	166: 11	Lower half	56.9	50.9	53.9
S96T005617	166: 12	Lower half	61.8	67.1	64.45
S96T005716	166: 13	Upper half	45.3	48.2	46.75
S96T005722		Lower half	64.2	51	57.6[QC:e]
S96T005416	166: 15	Upper half	77	64.8	70.9
S97T000459		Lower half	<11.4	<11.1	<11.25
S96T005624	166: 16	Upper half	82.7	71.4	77.05
S96T005618		Lower half	67.7	62.1	64.9
S96T005417	166: 17	Upper half	49.5	49.7	49.6
S96T005411		Lower half	55.5	76.5	66[QC:e]
S96T005717	166: 18	Upper half	48.1	75.5	61.8[QC:e]
S96T005723		Lower half	50.9	46.7	48.8
S96T005841	166: 19	Upper half	52.3	60.1	56.2[QC:a]
S96T005842		Lower half	52.7	43.5	48.1[QC:a]
S96T005708	167: 1	Upper half	49.8	<41.1	<45.45
S96T005693		Lower half	67	56.5	61.75
S96T005857	167: 2	Lower half	65.6	54.8	60.2
S96T005694	167: 3	Lower half	<35.9	45.9	<40.9[QC:e]
S96T005695	167: 4	Lower half	60.1	57.6	58.85
S96T005438	167: 5	Lower half	<10.3	<11	<10.65[QC:a]
S96T005450	167: 6	Lower half	<11.1	<10.4	<10.75[QC:a]
S96T005696	167: 7	Lower half	<38.4	<37.6	<38

Table B2-31. Tank 241-AN-103 Analytical Results: Cobalt (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest (Cont'd)			µg/g	µg/g	µg/g
S96T005737	167: 8	Lower half	64.8	57.2	61
S96T005858	167: 9	Lower half	45.1	46.2	45.65
S96T005709	167: 11	Upper half	45.8	55.7	50.75
S96T005697		Lower half	62.3	51.6	56.95
S96T005444	167: 12	Upper half	<11.1	<10.9	<11[QC:a]
S96T005451		Lower half	<11.4	<11.7	<11.55[QC:a]
S96T005445	167: 14	Upper half	<10.6	<11	<10.8[QC:a]
S96T005439		Lower half	<11.4	<11.7	<11.55[QC:a]
S96T005710	167: 15	Upper half	64.3	43.5	53.9[QC:e]
S96T005698		Lower half	43.9	49.3	46.6
S96T005498	167: 17	Upper half	68.5	<38.9	<53.7[QC:e]
S96T005499		Lower half	<35.7	45.2	<40.45[QC:e]
S97T000460	Core 166	Solid composite	<11.3	<11	<11.15
Liquids			µg/mL	µg/mL	µg/mL
S96T005539	166: 3	Drainable liquid	<8.02	<8.02	<8.02
S96T005540	166: 4	Drainable liquid	<8.02	<8.02	<8.02
S96T005599	166: 6	Drainable liquid	<12	<12	<12
S96T005816	166: 7	Drainable liquid	<12	<12	<12
S96T005817	166: 8	Drainable liquid	<12	<12	<12
S96T005541	166: 9	Drainable liquid	<12	<12	<12
S96T005566	166: 10	Drainable liquid	<8.02	<8.02	<8.02
S96T005600	166: 11	Drainable liquid	<12	<12	<12
S96T005601	166: 12	Drainable liquid	<12	<12	<12
S96T005861	167: 2	Drainable liquid	<12	<12	<12
S96T005673	167: 3	Drainable liquid	<12	<12	<12
S96T005420	167: 5	Drainable liquid	<12	<12	<12
S96T005421	167: 6	Drainable liquid	<12	<12	<12
S96T005683	167: 7	Drainable liquid	<12	<12	<12

Table B2-31. Tank 241-AN-103 Analytical Results: Cobalt (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids (Cont'd)			µg/mL	µg/mL	µg/mL
S96T005732	167: 8	Drainable liquid	<12	<12	<12
S96T005862	167: 9	Drainable liquid	<12	<12	<12
S96T005650	167: 11	Drainable liquid	<12	<12	<12
S96T005991	Core 166	Liquid composite	55.1	66.6	60.85
Solids: fusion			µg/g	µg/g	µg/g
S96T005608	166: 1	Lower half	<420	<413	<416.5
S96T005568	166: 4	Lower half	<453	<445	<449
S96T005611	166: 6	Lower half	<419	<428	<423.5
S96T005835	166: 7	Lower half	<421	<425	<423
S96T005836	166: 8	Lower half	<392	<411	<401.5
S96T005574	166: 9	Lower half	<358	402	<380
S96T005569	166: 10	Lower half	<418	<414	<416
S96T005612	166: 11	Lower half	<395	<407	<401
S96T005613	166: 12	Lower half	<411	<405	<408
S96T005714	166: 13	Upper half	<403	<422	<412.5
S96T005720		Lower half	<405	<403	<404
S96T005414	166: 15	Upper half	<91.3	<93.2	<92.25
S96T005408		Lower half	<96	<92.7	<94.35
S96T005623	166: 16	Upper half	<436	<420	<428
S96T005614		Lower half	<409	<402	<405.5
S96T005415	166: 17	Upper half	<105	<106	<105.5
S96T005409		Lower half	<422	453	<437.5
S96T005715	166: 18	Upper half	<403	<411	<407
S96T005721		Lower half	<405	<398	<401.5
S96T005837	166: 19	Upper half	<414	<420	<417
S96T005838		Lower half	<391	<393	<392
S96T005705	167: 1	Upper half	<398	<401	<399.5
S96T005687		Lower half	<416	<417	<416.5
S96T005855	167: 2	Lower half	<404	<395	<399.5

Table B2-31. Tank 241-AN-103 Analytical Results: Cobalt (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion (Cont'd)			μg/g	μg/g	μg/g
S96T005688	167: 3	Lower half	<450	<426	<438
S96T005689	167: 4	Lower half	<420	<422	<421
S96T005436	167: 5	Lower half	<372	<376	<374
S96T005448	167: 6	Lower half	<421	<409	<415
S96T005690	167: 7	Lower half	<393	<436	<414.5
S96T005736	167: 8	Lower half	<442	<375	<408.5
S96T005856	167: 9	Lower half	<368	<422	<395
S96T005706	167: 11	Upper half	<373	<444	<408.5
S96T005691		Lower half	<370	434	<402
S96T005442	167: 12	Upper half	<432	<388	<410
S96T005449		Lower half	<395	<404	<399.5
S96T005443	167: 14	Upper half	<441	<422	<431.5
S96T005437		Lower half	<411	<406	<408.5
S96T005707	167: 15	Upper half	<427	<368	<397.5
S96T005692		Lower half	<366	<435	<400.5
S96T005496	167: 17	Upper half	<424	<419	<421.5
S96T005497		Lower half	<420	<421	<420.5

Table B2-32. Tank 241-AN-103 Analytical Results: Copper (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005609	166: 1	Lower half	<14.8	<15.1	<14.95
S96T005570	166: 4	Lower half	<17.9	<17.9	<17.9
S96T005615	166: 6	Lower half	<13.8	<13.8	<13.8
S96T005839	166: 7	Lower half	<20.2	<20.5	<20.35
S96T005840	166: 8	Lower half	<19.7	<19.7	<19.7[QC:a]
S96T005575	166: 9	Lower half	<19.6	<19.9	<19.75
S96T005571	166: 10	Lower half	<15.3	<14.5	<14.9
S96T005616	166: 11	Lower half	<14.5	<13.6	<14.05
S96T005617	166: 12	Lower half	<14.1	<14.1	<14.1
S96T005716	166: 13	Upper half	<19.4	<19.6	<19.5
S96T005722		Lower half	<20.6	<20.6	<20.6
S96T005416	166: 15	Upper half	<20.4	<19	<19.7
S97T000459		Lower half	6.94	<5.57	<6.255[QC:a,e]
S96T005624	166: 16	Upper half	<21	<21.5	<21.25
S96T005618		Lower half	<14.2	<14.6	<14.4
S96T005417	166: 17	Upper half	<22.5	<20.5	<21.5
S96T005411		Lower half	<19	<17.6	<18.3
S96T005717	166: 18	Upper half	<20.8	<20.2	<20.5
S96T005723		Lower half	<20.2	<19.8	<20
S96T005841	166: 19	Upper half	<19.3	<19.6	<19.45[QC:a]
S96T005842		Lower half	<17.8	<19.6	<18.7[QC:a]
S96T005708	167: 1	Upper half	<17.9	<20.5	<19.2
S96T005693		Lower half	<22.2	<17.5	<19.85
S96T005857	167: 2	Lower half	<16.7	<17.4	<17.05
S96T005694	167: 3	Lower half	<18	<18.7	<18.35
S96T005695	167: 4	Lower half	<19.8	<20.4	<20.1
S96T005438	167: 5	Lower half	<5.17	<5.51	<5.34[QC:a]
S96T005450	167: 6	Lower half	<5.53	<5.22	<5.375[QC:a]
S96T005696	167: 7	Lower half	<19.2	<18.8	<19

Table B2-32. Tank 241-AN-103 Analytical Results: Copper (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest (Cont'd)			µg/g	µg/g	µg/g
S96T005737	167: 8	Lower half	<19.6	<20	<19.8
S96T005858	167: 9	Lower half	<20.8	<17.5	<19.15
S96T005709	167: 11	Upper half	<18	<18.7	<18.35
S96T005697		Lower half	<19.8	<18.8	<19.3
S96T005444	167: 12	Upper half	6.96	<5.45	<6.205[QC:a,c]
S96T005451		Lower half	5.87	<5.84	<5.855[QC:a]
S96T005445	167: 14	Upper half	8.11	7.64	7.875[QC:a]
S96T005439		Lower half	9.01	10	9.505[QC:a]
S96T005710	167: 15	Upper half	<18.6	<17.9	<18.25
S96T005698		Lower half	<18.2	<18.8	<18.5
S96T005498	167: 17	Upper half	<18.3	<19.5	<18.9
S96T005499		Lower half	<17.8	<19.3	<18.55
S97T000460	Core 166	Solid composite	<5.63	<5.51	<5.57[QC:a]
Liquids			µg/mL	µg/mL	µg/mL
S96T005539	166: 3	Drainable liquid	<4.01	<4.01	<4.01
S96T005540	166: 4	Drainable liquid	<4.01	<4.01	<4.01
S96T005599	166: 6	Drainable liquid	<6.01	<6.01	<6.01
S96T005816	166: 7	Drainable liquid	<6.01	<6.01	<6.01
S96T005817	166: 8	Drainable liquid	10.2	<6.01	<8.105[QC:e]
S96T005541	166: 9	Drainable liquid	<6.01	<6.01	<6.01
S96T005566	166: 10	Drainable liquid	<4.01	<4.01	<4.01
S96T005600	166: 11	Drainable liquid	<6.01	<6.01	<6.01
S96T005601	166: 12	Drainable liquid	<6.01	<6.01	<6.01
S96T005861	167: 2	Drainable liquid	<6.01	<6.01	<6.01
S96T005673	167: 3	Drainable liquid	<6.01	<6.01	<6.01
S96T005420	167: 5	Drainable liquid	25.7	<6.01	<15.855[QC:e]
S96T005421	167: 6	Drainable liquid	<6.01	<6.01	<6.01
S96T005683	167: 7	Drainable liquid	<6.01	<6.01	<6.01

Table B2-32. Tank 241-AN-103 Analytical Results: Copper (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids (Cont'd)			μg/mL	μg/mL	μg/mL
S96T005732	167: 8	Drainable liquid	<6.01	<6.01	<6.01
S96T005862	167: 9	Drainable liquid	<6.01	<6.01	<6.01
S96T005650	167: 11	Drainable liquid	<6.01	<6.01	<6.01
S96T005991	Core 166	Liquid composite	<12	<12	<12
Solids: fusion			μg/g	μg/g	μg/g
S96T005608	166: 1	Lower half	<210	<206	<208
S96T005568	166: 4	Lower half	<227	<222	<224.5
S96T005611	166: 6	Lower half	<210	<214	<212
S96T005835	166: 7	Lower half	<210	<212	<211
S96T005836	166: 8	Lower half	<196	<206	<201
S96T005574	166: 9	Lower half	<179	208	<193.5
S96T005569	166: 10	Lower half	<209	<207	<208
S96T005612	166: 11	Lower half	<197	<204	<200.5
S96T005613	166: 12	Lower half	<205	<202	<203.5
S96T005714	166: 13	Upper half	<201	<211	<206
S96T005720		Lower half	<203	<201	<202
S96T005414	166: 15	Upper half	<45.6	<46.6	<46.1
S96T005408		Lower half	<48	<46.3	<47.15
S96T005623	166: 16	Upper half	<218	<210	<214
S96T005614		Lower half	<204	<201	<202.5
S96T005415	166: 17	Upper half	<52.3	<52.8	<52.55
S96T005409		Lower half	<211	<208	<209.5
S96T005715	166: 18	Upper half	<201	<206	<203.5
S96T005721		Lower half	<203	<199	<201
S96T005837	166: 19	Upper half	<207	<210	<208.5
S96T005838		Lower half	<196	<196	<196
S96T005705	167: 1	Upper half	<199	<200	<199.5
S96T005687		Lower half	<208	<209	<208.5
S96T005855	167: 2	Lower half	<202	<198	<200

Table B2-32. Tank 241-AN-103 Analytical Results: Copper (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion (Cont'd)			µg/g	µg/g	µg/g
S96T0056881	167: 3	Lower half	<225	<213	<219
S96T005689	167: 4	Lower half	<210	<211	<210.5
S96T005436	167: 5	Lower half	<186	<188	<187
S96T005448	167: 6	Lower half	<211	<204	<207.5
S96T005690	167: 7	Lower half	<196	<218	<207
S96T005736	167: 8	Lower half	<221	<187	<204
S96T005856	167: 9	Lower half	<184	<211	<197.5
S96T005706	167: 11	Upper half	<187	<222	<204.5
S96T005691		Lower half	<185	<184	<184.5
S96T005442	167: 12	Upper half	<216	<194	<205
S96T005449		Lower half	<198	<202	<200
S96T005443	167: 14	Upper half	<220	<211	<215.5
S96T005437		Lower half	<205	<203	<204
S96T005707	167: 15	Upper half	<213	<184	<198.5
S96T005692		Lower half	<183	<218	<200.5
S96T005496	167: 17	Upper half	<212	<210	<211
S96T005497		Lower half	<210	<211	<210.5

Table B2-33. Tank 241-AN-103 Analytical Results: Iron (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005609	166: 1	Lower half	<73.8	<75.4	<74.6
S96T005570	166: 4	Lower half	<89.7	<89.7	<89.7
S96T005615	166: 6	Lower half	<69.1	<69.1	<69.1
S96T005839	166: 7	Lower half	<101	<102	<101.5
S96T005840	166: 8	Lower half	<98.4	<98.3	<98.35[QC:a]
S96T005575	166: 9	Lower half	<97.8	<99.4	<98.6
S96T005571	166: 10	Lower half	<76.7	<72.3	<74.5
S96T005616	166: 11	Lower half	<72.3	<68	<70.15
S96T005617	166: 12	Lower half	<70.5	<70.4	<70.45
S96T005716	166: 13	Upper half	<96.9	<98.1	<97.5
S96T005722		Lower half	<103	<103	<103
S96T005416	166: 15	Upper half	<102	<95.2	<98.6
S97T000459		Lower half	34.5	41.5	38[QC:a]
S96T005624	166: 16	Upper half	<105	<108	<106.5
S96T005618		Lower half	<70.9	<72.8	<71.85
S96T005417	166: 17	Upper half	<113	<102	<107.5
S96T005411		Lower half	<95.1	<88	<91.55
S96T005717	166: 18	Upper half	234	240	237
S96T005723		Lower half	<101	<99	<100
S96T005841	166: 19	Upper half	<96.3	<98.1	<97.2[QC:a]
S96T005842		Lower half	<89	<98.1	<93.55[QC:a]
S96T005708	167: 1	Upper half	1,600	428	1,014[QC:c]
S96T005693		Lower half	<111	<87.7	<99.35
S96T005857	167: 2	Lower half	<83.4	<86.9	<85.15
S96T005694	167: 3	Lower half	<89.9	<93.6	<91.75
S96T005695	167: 4	Lower half	<99	<102	<100.5
S96T005438	167: 5	Lower half	<25.8	<27.5	<26.65[QC:a]
S96T005450	167: 6	Lower half	29.8	32.1	30.95[QC:a]
S96T005696	167: 7	Lower half	<96	<94	<95

Table B2-33. Tank 241-AN-103 Analytical Results: Iron (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest (Cont'd)			µg/g	µg/g	µg/g
S96T005737	167: 8	Lower half	<97.9	116	<106.95
S96T005858	167: 9	Lower half	<104	<87.5	<95.75
S96T005709	167: 11	Upper half	<90	<93.3	<91.65
S96T005697		Lower half	<99.2	<94.1	<96.65
S96T005444	167: 12	Upper half	39.5	49.2	44.35[QC:a,e]
S96T005451		Lower half	39.1	38.3	38.7[QC:a]
S96T005445	167: 14	Upper half	41.3	44.1	42.7[QC:a]
S96T005439		Lower half	379	546	462.5[QC:a,e]
S96T005710	167: 15	Upper half	352	446	399[QC:e]
S96T005698		Lower half	<91.1	<94	<92.55
S96T005498	167: 17	Upper half	542	444	493
S96T005499		Lower half	<89.1	<96.5	<92.8
S97T000460	Core 166	Solid composite	48.6	48.4	48.5[QC:a]
Liquids			µg/mL	µg/mL	µg/mL
S96T005539	166: 3	Drainable liquid	<20.1	<20.1	<20.1
S96T005540	166: 4	Drainable liquid	<20.1	<20.1	<20.1
S96T005599	166: 6	Drainable liquid	<30.1	<30.1	<30.1
S96T005816	166: 7	Drainable liquid	<30.1	<30.1	<30.1
S96T005817	166: 8	Drainable liquid	<30.1	<30.1	<30.1
S96T005541	166: 9	Drainable liquid	<30.1	<30.1	<30.1
S96T005566	166: 10	Drainable liquid	<20.1	<20.1	<20.1
S96T005600	166: 11	Drainable liquid	<30.1	<30.1	<30.1
S96T005601	166: 12	Drainable liquid	<30.1	<30.1	<30.1
S96T005861	167: 2	Drainable liquid	<30.1	<30.1	<30.1
S96T005673	167: 3	Drainable liquid	<30.1	<30.1	<30.1
S96T005420	167: 5	Drainable liquid	52.9	<30.1	<41.5[QC:e]
S96T005421	167: 6	Drainable liquid	<30.1	<30.1	<30.1
S96T005683	167: 7	Drainable liquid	<30.1	<30.1	<30.1

Table B2-33. Tank 241-AN-103 Analytical Results: Iron (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids (Cont'd)			µg/mL	µg/mL	µg/mL
S96T005732	167: 8	Drainable liquid	<30.1	<30.1	<30.1
S96T005862	167: 9	Drainable liquid	<30.1	<30.1	<30.1
S96T005650	167: 11	Drainable liquid	<30.1	<30.1	<30.1
S96T005991	Core 166	Liquid composite	<60.1	<60.1	<60.1
Solids: fusion			µg/g	µg/g	µg/g
S96T005608	166: 1	Lower half	<1,050	<1,030	<1,040
S96T005568	166: 4	Lower half	<1,130	<1,110	<1,120
S96T005611	166: 6	Lower half	<1,050	<1,070	<1,060
S96T005835	166: 7	Lower half	<1,050	<1,060	<1,055
S96T005836	166: 8	Lower half	<981	<1,030	<1,005.5
S96T005574	166: 9	Lower half	<896	<970	<933
S96T005569	166: 10	Lower half	<1,050	<1,030	<1,040
S96T005612	166: 11	Lower half	<987	<1,020	<1,003.5
S96T005613	166: 12	Lower half	<1,030	<1,010	<1,020
S96T005714	166: 13	Upper half	<1,010	<1,050	<1,030
S96T005720		Lower half	<1,010	<1,010	<1,010
S96T005414	166: 15	Upper half	<228	<233	<230.5
S96T005408		Lower half	<240	<232	<236
S96T005623	166: 16	Upper half	<1,090	<1,050	<1,070
S96T005614		Lower half	<1,020	<1,000	<1,010
S96T005415	166: 17	Upper half	<262	<264	<263
S96T005409		Lower half	<1,060	<1,040	<1,050
S96T005715	166: 18	Upper half	<1,010	<1,030	<1,020
S96T005721		Lower half	<1,010	<994	<1,002
S96T005837	166: 19	Upper half	<1,040	<1,050	<1,045
S96T005838		Lower half	<978	<982	<980
S96T005705	167: 1	Upper half	<994	<1,000	<997
S96T005687		Lower half	<1,040	<1,040	<1,040
S96T005855	167: 2	Lower half	<1,010	<988	<999

Table B2-33. Tank 241-AN-103 Analytical Results: Iron (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion (Cont'd)			µg/g	µg/g	µg/g
S96T005688	167: 3	Lower half	<1,120	<1,070	<1,095
S96T005689	167: 4	Lower half	<1,050	<1,060	<1,055
S96T005436	167: 5	Lower half	<931	<939	<935
S96T005448	167: 6	Lower half	<1,050	<1,020	<1,035
S96T005690	167: 7	Lower half	<982	<1,090	<1,036
S96T005736	167: 8	Lower half	<1,110	<937	<1,023.5
S96T005856	167: 9	Lower half	<920	<1,050	<985
S96T005706	167: 11	Upper half	<933	<1,110	<1,021.5
S96T005691		Lower half	<925	<921	<923
S96T005442	167: 12	Upper half	<1,080	<969	<1,024.5
S96T005449		Lower half	<988	<1,010	<999
S96T005443	167: 14	Upper half	<1,100	<1,050	<1,075
S96T005437		Lower half	<1,030	<1,010	<1,020
S96T005707	167: 15	Upper half	<1,070	<919	<994.5
S96T005692		Lower half	<916	<1,090	<1,003
S96T005496	167: 17	Upper half	1,810	<1,050	<1,430[QC:e]
S96T005497		Lower half	<1,050	<1,050	<1,050

Table B2-34. Tank 241-AN-103 Analytical Results: Lanthanum (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005609	166: 1	Lower half	<73.8	<75.4	<74.6
S96T005570	166: 4	Lower half	<89.7	<89.7	<89.7
S96T005615	166: 6	Lower half	<69.1	<69.1	<69.1
S96T005839	166: 7	Lower half	<101	<102	<101.5
S96T005840	166: 8	Lower half	<98.4	<98.3	<98.35[QC:a]
S96T005575	166: 9	Lower half	<97.8	<99.4	<98.6
S96T005571	166: 10	Lower half	<76.7	<72.3	<74.5
S96T005616	166: 11	Lower half	<72.3	<68	<70.15
S96T005617	166: 12	Lower half	<70.5	<70.4	<70.45
S96T005716	166: 13	Upper half	<96.9	<98.1	<97.5
S96T005722		Lower half	<103	<103	<103
S96T005416	166: 15	Upper half	<102	<95.2	<98.6
S97T000459		Lower half	<28.4	<27.8	<28.1
S96T005624	166: 16	Upper half	<105	<108	<106.5
S96T005618		Lower half	<70.9	<72.8	<71.85
S96T005417	166: 17	Upper half	<113	<102	<107.5
S96T005411		Lower half	<95.1	<88	<91.55
S96T005717	166: 18	Upper half	<104	<101	<102.5
S96T005723		Lower half	<101	<99	<100
S96T005841	166: 19	Upper half	<96.3	<98.1	<97.2[QC:a]
S96T005842		Lower half	<89	<98.1	<93.55[QC:a]
S96T005708	167: 1	Upper half	<89.6	<103	<96.3
S96T005693		Lower half	<111	<87.7	<99.35[QC:c]
S96T005857	167: 2	Lower half	<83.4	<86.9	<85.15
S96T005694	167: 3	Lower half	<89.9	<93.6	<91.75
S96T005695	167: 4	Lower half	<99	<102	<100.5
S96T005438	167: 5	Lower half	<25.8	<27.5	<26.65
S96T005450	167: 6	Lower half	<27.7	<26.1	<26.9
S96T005696	167: 7	Lower half	<96	<94	<95

Table B2-34. Tank 241-AN-103 Analytical Results: Lanthanum (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest (Cont'd)			µg/g	µg/g	µg/g
S96T005737	167: 8	Lower half	<97.9	<99.9	<98.9
S96T005858	167: 9	Lower half	<104	<87.5	<95.75
S96T005709	167: 11	Upper half	<90	<93.3	<91.65
S96T005697		Lower half	<99.2	<94.1	<96.65
S96T005444	167: 12	Upper half	<27.6	<27.3	<27.45
S96T005451		Lower half	<28.4	<29.2	<28.8
S96T005445	167: 14	Upper half	<26.4	<27.5	<26.95
S96T005439		Lower half	<28.4	<29.2	<28.8
S96T005710	167: 15	Upper half	<93.2	<89.5	<91.35
S96T005698		Lower half	<91.1	<94	<92.55
S96T005498	167: 17	Upper half	<91.6	<97.4	<94.5
S96T005499		Lower half	<89.1	<96.5	<92.8
S97T000460	Core 166	Solid composite	<28.2	<27.5	<27.85
Liquids			µg/mL	µg/mL	µg/mL
S96T005539	166: 3	Drainable liquid	<20.1	<20.1	<20.1
S96T005540	166: 4	Drainable liquid	<20.1	<20.1	<20.1
S96T005599	166: 6	Drainable liquid	<30.1	<30.1	<30.1
S96T005816	166: 7	Drainable liquid	<30.1	<30.1	<30.1
S96T005817	166: 8	Drainable liquid	<30.1	<30.1	<30.1
S96T005541	166: 9	Drainable liquid	<30.1	<30.1	<30.1
S96T005566	166: 10	Drainable liquid	<20.1	<20.1	<20.1
S96T005600	166: 11	Drainable liquid	<30.1	<30.1	<30.1
S96T005601	166: 12	Drainable liquid	<30.1	<30.1	<30.1
S96T005861	167: 2	Drainable liquid	<30.1	<30.1	<30.1
S96T005673	167: 3	Drainable liquid	<30.1	<30.1	<30.1
S96T005420	167: 5	Drainable liquid	<30.1	<30.1	<30.1
S96T005421	167: 6	Drainable liquid	<30.1	<30.1	<30.1
S96T005683	167: 7	Drainable liquid	<30.1	<30.1	<30.1

Table B2-34. Tank 241-AN-103 Analytical Results: Lanthanum (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids (Cont'd)			µg/mL	µg/mL	µg/mL
S96T005732	167: 8	Drainable liquid	<30.1	<30.1	<30.1
S96T005862	167: 9	Drainable liquid	<30.1	<30.1	<30.1
S96T005650	167: 11	Drainable liquid	<30.1	<30.1	<30.1
S96T005991	Core 166	Liquid composite	<60.1	<60.1	<60.1
Solids: fusion			µg/g	µg/g	µg/g
S96T005608	166: 1	Lower half	<1,050	<1,030	<1,040
S96T005568	166: 4	Lower half	<1,130	<1,110	<1,120
S96T005611	166: 6	Lower half	<1,050	<1,070	<1,060
S96T005835	166: 7	Lower half	<1,050	<1,060	<1,055
S96T005836	166: 8	Lower half	<981	<1,030	<1,005.5
S96T005574	166: 9	Lower half	<896	<970	<933
S96T005569	166: 10	Lower half	<1,050	<1,030	<1,040
S96T005612	166: 11	Lower half	<987	<1,020	<1,003.5
S96T005613	166: 12	Lower half	<1,030	<1,010	<1,020
S96T005714	166: 13	Upper half	<1,010	<1,050	<1,030
S96T005720		Lower half	<1,010	<1,010	<1,010
S96T005414	166: 15	Upper half	<228	<233	<230.5
S96T005408		Lower half	<240	<232	<236
S96T005623	166: 16	Upper half	<1,090	<1,050	<1,070
S96T005614		Lower half	<1,020	<1,000	<1,010
S96T005415	166: 17	Upper half	<262	<264	<263
S96T005409		Lower half	<1,060	<1,040	<1,050
S96T005715	166: 18	Upper half	<1,010	<1,030	<1,020
S96T005721		Lower half	<1,010	<994	<1,002
S96T005837	166: 19	Upper half	<1,040	<1,050	<1,045
S96T005838		Lower half	<978	<982	<980
S96T005705	167: 1	Upper half	<994	<1,000	<997
S96T005687		Lower half	<1,040	<1,040	<1,040
S96T005855	167: 2	Lower half	<1,010	<988	<999

Table B2-34. Tank 241-AN-103 Analytical Results: Lanthanum (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion (Cont'd)			µg/g	µg/g	µg/g
S96T005688	167: 3	Lower half	<1,120	<1,070	<1,095
S96T005689	167: 4	Lower half	<1,050	<1,060	<1,055
S96T005436	167: 5	Lower half	<931	<939	<935
S96T005448	167: 6	Lower half	<1,050	<1,020	<1,035
S96T005690	167: 7	Lower half	<982	<1,090	<1,036
S96T005736	167: 8	Lower half	<1,110	<937	<1,023.5
S96T005856	167: 9	Lower half	<920	<1,050	<985
S96T005706	167: 11	Upper half	<933	<1,110	<1,021.5
S96T005691		Lower half	<925	<921	<923
S96T005442	167: 12	Upper half	<1,080	<969	<1,024.5
S96T005449		Lower half	<988	<1,010	<999
S96T005443	167: 14	Upper half	<1,100	<1,050	<1,075
S96T005437		Lower half	<1,030	<1,010	<1,020
S96T005707	167: 15	Upper half	<1,070	<919	<994.5
S96T005692		Lower half	<916	<1,090	<1,003
S96T005496	167: 17	Upper half	<1,060	<1,050	<1,055
S96T005497		Lower half	<1,050	<1,050	<1,050

Table B2-35. Tank 241-AN-103 Analytical Results: Lead (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005609	166: 1	Lower half	<148	<151	<149.5
S96T005570	166: 4	Lower half	<179	<179	<179
S96T005615	166: 6	Lower half	<138	<138	<138
S96T005839	166: 7	Lower half	<202	<205	<203.5
S96T005840	166: 8	Lower half	<197	<197	<197[QC:a]
S96T005575	166: 9	Lower half	<196	<199	<197.5
S96T005571	166: 10	Lower half	<153	<145	<149
S96T005616	166: 11	Lower half	<145	<136	<140.5
S96T005617	166: 12	Lower half	<141	<141	<141
S96T005716	166: 13	Upper half	<194	<196	<195
S96T005722		Lower half	<206	<206	<206
S96T005416	166: 15	Upper half	<204	<190	<197
S97T000459		Lower half	<56.9	<55.7	<56.3
S96T005624	166: 16	Upper half	<210	<215	<212.5
S96T005618		Lower half	<142	<146	<144
S96T005417	166: 17	Upper half	<225	<205	<215
S96T005411		Lower half	<190	<176	<183
S96T005717	166: 18	Upper half	<208	<202	<205
S96T005723		Lower half	<202	<198	<200
S96T005841	166: 19	Upper half	<193	1,180	<686.5[QC:a,c]
S96T005842		Lower half	<178	<196	<187[QC:a]
S96T005708	167: 1	Upper half	<179	<205	<192
S96T005693		Lower half	<222	<175	<198.5[QC:c]
S96T005857	167: 2	Lower half	<167	<174	<170.5[QC:a]
S96T005694	167: 3	Lower half	<180	<187	<183.5
S96T005695	167: 4	Lower half	<198	<204	<201
S96T005438	167: 5	Lower half	60.9	63.2	62.05[QC:a]
S96T005450	167: 6	Lower half	<55.3	62.2	<58.75[QC:a]

Table B2-35. Tank 241-AN-103 Analytical Results: Lead (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest (Cont'd)			µg/g	µg/g	µg/g
S96T005696	167: 7	Lower half	<192	<188	<190
S96T005737	167: 8	Lower half	<196	<200	<198
S96T005858	167: 9	Lower half	<208	<175	<191.5[QC:a]
S96T005709	167: 11	Upper half	<180	232	<206[QC:c]
S96T005697		Lower half	<198	<188	<193
S96T005444	167: 12	Upper half	63.6	68.9	66.25[QC:a]
S96T005451		Lower half	<56.8	<58.4	<57.6[QC:a]
S96T005445	167: 14	Upper half	<52.8	<55.1	<53.95[QC:a]
S96T005439		Lower half	<56.8	<58.4	<57.6[QC:a]
S96T005710	167: 15	Upper half	<186	<179	<182.5
S96T005698		Lower half	<182	<188	<185
S96T005498	167: 17	Upper half	<183	<195	<189
S96T005499		Lower half	<178	<193	<185.5
S97T000460	Core 166	Solid composite	<56.3	<55.1	<55.7
Liquids			µg/mL	µg/mL	µg/mL
S96T005539	166: 3	Drainable liquid	141	133	137
S96T005540	166: 4	Drainable liquid	136	140	138
S96T005599	166: 6	Drainable liquid	165	160	162.5
S96T005816	166: 7	Drainable liquid	128	140	134
S96T005817	166: 8	Drainable liquid	130	152	141
S96T005541	166: 9	Drainable liquid	138	130	134
S96T005566	166: 10	Drainable liquid	147	157	152
S96T005600	166: 11	Drainable liquid	184	149	166.5[QC:c]
S96T005601	166: 12	Drainable liquid	142	146	144
S96T005861	167: 2	Drainable liquid	132	128	130
S96T005673	167: 3	Drainable liquid	139	147	143
S96T005420	167: 5	Drainable liquid	131	144	137.5
S96T005421	167: 6	Drainable liquid	142	145	143.5

Table B2-35. Tank 241-AN-103 Analytical Results: Lead (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids (Cont'd)			μg/mL	μg/mL	μg/mL
S96T005683	167: 7	Drainable liquid	135	142	138.5
S96T005732	167: 8	Drainable liquid	143	141	142
S96T005862	167: 9	Drainable liquid	136	142	139
S96T005650	167: 11	Drainable liquid	143	139	141
S96T005991	Core 166	Liquid composite	156	<120	<138[QC:e]
Solids: fusion			μg/g	μg/g	μg/g
S96T005608	166: 1	Lower half	<2,100	<2,060	<2,080
S96T005568	166: 4	Lower half	<2,270	<2,220	<2,245
S96T005611	166: 6	Lower half	<2,100	<2,140	<2,120
S96T005835	166: 7	Lower half	<2,100	<2,120	<2,110
S96T005836	166: 8	Lower half	<1,960	<2,060	<2,010
S96T005574	166: 9	Lower half	<1,790	<1,940	<1,865
S96T005569	166: 10	Lower half	<2,090	<2,070	<2,080
S96T005612	166: 11	Lower half	<1,970	<2,040	<2,005
S96T005613	166: 12	Lower half	<2,050	<2,020	<2,035
S96T005714	166: 13	Upper half	<2,010	<2,110	<2,060
S96T005720		Lower half	<2,030	<2,010	<2,020
S96T005414	166: 15	Upper half	<456	<466	<461
S96T005408		Lower half	<480	<463	<471.5
S96T005623	166: 16	Upper half	<2,180	<2,100	<2,140
S96T005614		Lower half	<2,040	<2,010	<2,025
S96T005415	166: 17	Upper half	<523	<528	<525.5
S96T005409		Lower half	<2,110	<2,080	<2,095
S96T005715	166: 18	Upper half	<2,010	<2,060	<2,035
S96T005721		Lower half	<2,030	<1,990	<2,010
S96T005837	166: 19	Upper half	<2,070	<2,100	<2,085
S96T005838		Lower half	<1,960	<1,960	<1,960
S96T005705	167: 1	Upper half	<1,990	2,880	<2,435[QC:e]
S96T005687		Lower half	<2,080	<2,090	<2,085

Table B2-35. Tank 241-AN-103 Analytical Results: Lead (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion (Cont'd)			µg/g	µg/g	µg/g
S96T005855	167: 2	Lower half	<2,020	<1,980	<2,000
S96T005688	167: 3	Lower half	<2,250	<2,130	<2,190
S96T005689	167: 4	Lower half	<2,100	<2,110	<2,105
S96T005436	167: 5	Lower half	<1,860	<1,880	<1,870
S96T005448	167: 6	Lower half	<2,110	<2,040	<2,075
S96T005690	167: 7	Lower half	<1,960	<2,180	<2,070
S96T005736	167: 8	Lower half	<2,210	<1,870	<2,040
S96T005856	167: 9	Lower half	<1,840	<2,110	<1,975
S96T005706	167: 11	Upper half	<1,870	<2,220	<2,045
S96T005691		Lower half	<1,850	<1,840	<1,845
S96T005442	167: 12	Upper half	<2,160	<1,940	<2,050
S96T005449		Lower half	<1,980	<2,020	<2,000
S96T005443	167: 14	Upper half	<2,200	<2,110	<2,155
S96T005437		Lower half	<2,050	<2,030	<2,040
S96T005707	167: 15	Upper half	<2,130	<1,840	<1,985
S96T005692		Lower half	<1,830	<2,180	<2,005
S96T005496	167: 17	Upper half	<2,120	<2,100	<2,110
S96T005497		Lower half	<2,100	<2,110	<2,105

Table B2-36. Tank 241-AN-103 Analytical Results: Lithium (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005609	166: 1	Lower half	<14.8	<15.1	<14.95
S96T005570	166: 4	Lower half	<17.9	<17.9	<17.9
S96T005615	166: 6	Lower half	17.8	18.2	18
S96T005839	166: 7	Lower half	<20.2	<20.5	<20.35
S96T005840	166: 8	Lower half	<19.7	<19.7	<19.7[QC:a]
S96T005575	166: 9	Lower half	<19.6	<19.9	<19.75
S96T005571	166: 10	Lower half	<15.3	<14.5	<14.9
S96T005616	166: 11	Lower half	<14.5	<13.6	<14.05
S96T005617	166: 12	Lower half	<14.1	<14.1	<14.1
S96T005716	166: 13	Upper half	<19.4	<19.6	<19.5
S96T005722		Lower half	<20.6	<20.6	<20.6
S96T005416	166: 15	Upper half	28	19.6	23.8[QC:c]
S97T000459		Lower half	<5.69	<5.57	<5.63
S96T005624	166: 16	Upper half	<21	<21.5	<21.25
S96T005618		Lower half	<14.2	<14.6	<14.4
S96T005417	166: 17	Upper half	<22.5	<20.5	<21.5
S96T005411		Lower half	<19	<17.6	<18.3
S96T005717	166: 18	Upper half	302	291	296.5
S96T005723		Lower half	<20.2	<19.8	<20
S96T005841	166: 19	Upper half	<19.3	<19.6	<19.45[QC:a]
S96T005842		Lower half	<17.8	<19.6	<18.7[QC:a]
S96T005708	167: 1	Upper half	<17.9	<20.5	<19.2
S96T005693		Lower half	<22.2	<17.5	<19.85
S96T005857	167: 2	Lower half	110	105	107.5
S96T005694	167: 3	Lower half	67.2	45.4	56.3[QC:c]
S96T005695	167: 4	Lower half	51.8	59.4	55.6
S96T005438	167: 5	Lower half	41.1	29.5	35.3[QC:c]
S96T005450	167: 6	Lower half	27.3	27	27.15

Table B2-36. Tank 241-AN-103 Analytical Results: Lithium (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest (Cont'd)			µg/g	µg/g	µg/g
S96T005696	167: 7	Lower half	22.2	24.6	23.4
S96T005737	167: 8	Lower half	32.6	36.8	34.7
S96T005858	167: 9	Lower half	<20.8	<17.5	<19.15
S96T005709	167: 11	Upper half	<18	<18.7	<18.35
S96T005697		Lower half	<19.8	<18.8	<19.3
S96T005444	167: 12	Upper half	11.4	11.2	11.3
S96T005451		Lower half	<5.68	<5.84	<5.76
S96T005445	167: 14	Upper half	<5.28	<5.51	<5.395
S96T005439		Lower half	33.8	40.1	36.95
S96T005710	167: 15	Upper half	167	174	170.5
S96T005698		Lower half	<18.2	<18.8	<18.5
S96T005498	167: 17	Upper half	516	508	512
S96T005499		Lower half	84.5	96.2	90.35
S97T000460	Core 166	Solid composite	22.6	26	24.3
Liquids			µg/mL	µg/mL	µg/mL
S96T005539	166: 3	Drainable liquid	17.9	17.6	17.75
S96T005540	166: 4	Drainable liquid	10.2	10.9	10.55
S96T005599	166: 6	Drainable liquid	31.1	30.2	30.65
S96T005816	166: 7	Drainable liquid	12.5	13	12.75
S96T005817	166: 8	Drainable liquid	12.3	13.3	12.8
S96T005541	166: 9	Drainable liquid	14.7	15	14.85
S96T005566	166: 10	Drainable liquid	17.2	16.9	17.05
S96T005600	166: 11	Drainable liquid	19.8	19.6	19.7
S96T005601	166: 12	Drainable liquid	18	18	18
S96T005861	167: 2	Drainable liquid	17.7	17.1	17.4
S96T005673	167: 3	Drainable liquid	17.8	17.5	17.65
S96T005420	167: 5	Drainable liquid	17.3	16.9	17.1
S96T005421	167: 6	Drainable liquid	19.8	19.3	19.55

Table B2-36. Tank 241-AN-103 Analytical Results: Lithium (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids (Cont'd)			μg/mL	μg/mL	μg/mL
S96T005683	167: 7	Drainable liquid	40.1	40.1	40.1
S96T005732	167: 8	Drainable liquid	27.3	26.6	26.95
S96T005862	167: 9	Drainable liquid	27.9	29.1	28.5
S96T005650	167: 11	Drainable liquid	62.7	63.1	62.9
S96T005991	Core 166	Liquid composite	15.3	15	15.15
Solids: fusion			μg/g	μg/g	μg/g
S96T005608	166: 1	Lower half	<210	<206	<208
S96T005568	166: 4	Lower half	<227	<222	<224.5
S96T005611	166: 6	Lower half	<210	<214	<212
S96T005835	166: 7	Lower half	<210	<212	<211
S96T005836	166: 8	Lower half	<196	<206	<201
S96T005574	166: 9	Lower half	<179	<194	<186.5
S96T005569	166: 10	Lower half	<209	<207	<208
S96T005612	166: 11	Lower half	<197	<204	<200.5
S96T005613	166: 12	Lower half	<205	<202	<203.5
S96T005714	166: 13	Upper half	<201	<211	<206
S96T005720		Lower half	<203	<201	<202
S96T005414	166: 15	Upper half	<45.6	<46.6	<46.1
S96T005408		Lower half	<48	<46.3	<47.15
S96T005623	166: 16	Upper half	<218	<210	<214
S96T005614		Lower half	<204	<201	<202.5
S96T005415	166: 17	Upper half	<52.3	<52.8	<52.55
S96T005409		Lower half	<211	<208	<209.5
S96T005715	166: 18	Upper half	377	391	384
S96T005721		Lower half	<203	<199	<201
S96T005837	166: 19	Upper half	<207	<210	<208.5
S96T005838		Lower half	<196	<196	<196
S96T005705	167: 1	Upper half	<199	<200	<199.5
S96T005687		Lower half	<208	<209	<208.5

Table B2-36. Tank 241-AN-103 Analytical Results: Lithium (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion			µg/g	µg/g	µg/g
S96T005855	167: 2	Lower half	<202	<198	<200
S96T005688	167: 3	Lower half	<225	<213	<219
S96T005689	167: 4	Lower half	<210	<211	<210.5
S96T005436	167: 5	Lower half	<186	<188	<187
S96T005448	167: 6	Lower half	<211	<204	<207.5
S96T005690	167: 7	Lower half	<196	<218	<207
S96T005736	167: 8	Lower half	<221	<187	<204
S96T005856	167: 9	Lower half	<184	<211	<197.5
S96T005706	167: 11	Upper half	<187	<222	<204.5
S96T005691		Lower half	<185	<184	<184.5
S96T005442	167: 12	Upper half	<216	<194	<205
S96T005449		Lower half	<198	<202	<200
S96T005443	167: 14	Upper half	<220	<211	<215.5
S96T005437		Lower half	<205	<203	<204
S96T005707	167: 15	Upper half	266	259	262.5
S96T005692		Lower half	<183	<218	<200.5
S96T005496	167: 17	Upper half	597	833	715[QC:e]
S96T005497		Lower half	<210	<211	<210.5

Table B2-37. Tank 241-AN-103 Analytical Results: Manganese (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005609	166: 1	Lower half	<14.8	<15.1	<14.95
S96T005570	166: 4	Lower half	<17.9	<17.9	<17.9
S96T005615	166: 6	Lower half	<13.8	<13.8	<13.8
S96T005839	166: 7	Lower half	<20.2	<20.5	<20.35
S96T005840	166: 8	Lower half	<19.7	<19.7	<19.7[QC:a]
S96T005575	166: 9	Lower half	<19.6	<19.9	<19.75
S96T005571	166: 10	Lower half	<15.3	<14.5	<14.9
S96T005616	166: 11	Lower half	<14.5	<13.6	<14.05
S96T005617	166: 12	Lower half	<14.1	<14.1	<14.1
S96T005716	166: 13	Upper half	<19.4	<19.6	<19.5
S96T005722		Lower half	<20.6	<20.6	<20.6
S96T005416	166: 15	Upper half	<20.4	<19	<19.7
S97T000459		Lower half	<5.69	6.79	<6.24
S96T005624	166: 16	Upper half	<21	<21.5	<21.25
S96T005618		Lower half	<14.2	<14.6	<14.4
S96T005417	166: 17	Upper half	<22.5	<20.5	<21.5
S96T005411		Lower half	<19	<17.6	<18.3
S96T005717	166: 18	Upper half	<20.8	<20.2	<20.5
S96T005723		Lower half	<20.2	<19.8	<20
S96T005841	166: 19	Upper half	<19.3	<19.6	<19.45[QC:a]
S96T005842		Lower half	20.4	22	21.2[QC:a]
S96T005708	167: 1	Upper half	<17.9	<20.5	<19.2
S96T005693		Lower half	<22.2	<17.5	<19.85[QC:e]
S96T005857	167: 2	Lower half	<16.7	<17.4	<17.05
S96T005694	167: 3	Lower half	<18	<18.7	<18.35
S96T005695	167: 4	Lower half	<19.8	<20.4	<20.1
S96T005438	167: 5	Lower half	<5.17	<5.51	<5.34[QC:a]
S96T005450	167: 6	Lower half	<5.53	<5.22	<5.375[QC:a]
S96T005696	167: 7	Lower half	<19.2	<18.8	<19

Table B2-37. Tank 241-AN-103 Analytical Results: Manganese (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest (Cont'd)			µg/g	µg/g	µg/g
S96T005737	167: 8	Lower half	<19.6	<20	<19.8
S96T005858	167: 9	Lower half	<20.8	<17.5	<19.15
S96T005709	167: 11	Upper half	<18	<18.7	<18.35
S96T005697		Lower half	<19.8	<18.8	<19.3
S96T005444	167: 12	Upper half	<5.53	<5.45	<5.49[QC:a]
S96T005451		Lower half	<5.68	<5.84	<5.76[QC:a]
S96T005445	167: 14	Upper half	<5.28	<5.51	<5.395[QC:a]
S96T005439		Lower half	6.24	8.35	7.295[QC:a,c]
S96T005710	167: 15	Upper half	<18.6	<17.9	<18.25
S96T005698		Lower half	<18.2	<18.8	<18.5
S96T005498	167: 17	Upper half	<18.3	<19.5	<18.9
S96T005499		Lower half	<17.8	<19.3	<18.55
S97T000460	Core 166	Solid composite	<5.63	5.51	<5.57
Liquids			µg/mL	µg/mL	µg/mL
S96T005539	166: 3	Drainable liquid	<4.01	<4.01	<4.01
S96T005540	166: 4	Drainable liquid	<4.01	<4.01	<4.01
S96T005599	166: 6	Drainable liquid	<6.01	<6.01	<6.01
S96T005816	166: 7	Drainable liquid	<6.01	<6.01	<6.01
S96T005817	166: 8	Drainable liquid	<6.01	<6.01	<6.01
S96T005541	166: 9	Drainable liquid	<6.01	<6.01	<6.01
S96T005566	166: 10	Drainable liquid	<4.01	<4.01	<4.01
S96T005600	166: 11	Drainable liquid	<6.01	<6.01	<6.01
S96T005601	166: 12	Drainable liquid	<6.01	<6.01	<6.01
S96T005861	167: 2	Drainable liquid	<6.01	<6.01	<6.01
S96T005673	167: 3	Drainable liquid	<6.01	<6.01	<6.01
S96T005420	167: 5	Drainable liquid	<6.01	<6.01	<6.01
S96T005421	167: 6	Drainable liquid	<6.01	<6.01	<6.01
S96T005683	167: 7	Drainable liquid	<6.01	<6.01	<6.01

Table B2-37. Tank 241-AN-103 Analytical Results: Manganese (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
S96T005732	167: 8	Drainable liquid	<6.01	<6.01	<6.01
S96T005862	167: 9	Drainable liquid	<6.01	<6.01	<6.01
S96T005650	167: 11	Drainable liquid	<6.01	<6.01	<6.01
S96T005991	Core 166	Liquid composite	<12	<12	<12
Solids: fusion			µg/g	µg/g	µg/g
S96T005608	166: 1	Lower half	<210	<206	<208
S96T005568	166: 4	Lower half	459	515	487
S96T005611	166: 6	Lower half	<210	<214	<212
S96T005835	166: 7	Lower half	<210	<212	<211
S96T005836	166: 8	Lower half	<196	<206	<201
S96T005574	166: 9	Lower half	1,910	1,900	1,905
S96T005569	166: 10	Lower half	<209	<207	<208
S96T005612	166: 11	Lower half	<197	<204	<200.5
S96T005613	166: 12	Lower half	<205	<202	<203.5
S96T005714	166: 13	Upper half	<201	<211	<206
S96T005720		Lower half	<203	386	<294.5[QC:e]
S96T005414	166: 15	Upper half	72	67.1	69.55
S96T005408		Lower half	107	<46.3	<76.65[QC:e]
S96T005623	166: 16	Upper half	<218	<210	<214
S96T005614		Lower half	<204	<201	<202.5
S96T005415	166: 17	Upper half	236	<52.8	<144.4[QC:e]
S96T005409		Lower half	<211	<208	<209.5
S96T005715	166: 18	Upper half	<201	<206	<203.5
S96T005721		Lower half	<203	<199	<201
S96T005837	166: 19	Upper half	<207	<210	<208.5
S96T005838		Lower half	<196	<196	<196
S96T005705	167: 1	Upper half	<199	<200	<199.5
S96T005687		Lower half	<208	<209	<208.5
S96T005855	167: 2	Lower half	<202	<198	<200

Table B2-37. Tank 241-AN-103 Analytical Results: Manganese (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion (Cont'd)			μg/g	μg/g	μg/g
S96T005688	167: 3	Lower half	<225	<213	<219
S96T005689	167: 4	Lower half	<210	<211	<210.5
S96T005436	167: 5	Lower half	<186	<188	<187
S96T005448	167: 6	Lower half	<211	<204	<207.5
S96T005690	167: 7	Lower half	<196	<218	<207
S96T005736	167: 8	Lower half	<221	<187	<204
S96T005856	167: 9	Lower half	<184	<211	<197.5
S96T005706	167: 11	Upper half	<187	<222	<204.5
S96T005691		Lower half	<185	<184	<184.5
S96T005442	167: 12	Upper half	<216	<194	<205
S96T005449		Lower half	<198	<202	<200
S96T005443	167: 14	Upper half	<220	<211	<215.5
S96T005437		Lower half	<205	<203	<204
S96T005707	167: 15	Upper half	<213	<184	<198.5
S96T005692		Lower half	<183	<218	<200.5
S96T005496	167: 17	Upper half	<212	<210	<211
S96T005497		Lower half	<210	<211	<210.5

Table B2-38. Tank 241-AN-103 Analytical Results: Molybdenum (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005609	166: 1	Lower half	<73.8	<75.4	<74.6
S96T005570	166: 4	Lower half	<89.7	<89.7	<89.7
S96T005615	166: 6	Lower half	<69.1	<69.1	<69.1
S96T005839	166: 7	Lower half	<101	<102	<101.5
S96T005840	166: 8	Lower half	<98.4	<98.3	<98.35
S96T005575	166: 9	Lower half	<97.8	<99.4	<98.6
S96T005571	166: 10	Lower half	<76.7	<72.3	<74.5
S96T005616	166: 11	Lower half	<72.3	<68	<70.15
S96T005617	166: 12	Lower half	<70.5	<70.4	<70.45
S96T005716	166: 13	Upper half	<96.9	<98.1	<97.5
S96T005722		Lower half	<103	<103	<103
S96T005416	166: 15	Upper half	<102	<95.2	<98.6
S97T000459		Lower half	35.7	44.5	40.1[QC:e]
S96T005624	166: 16	Upper half	<105	<108	<106.5
S96T005618		Lower half	<70.9	<72.8	<71.85
S96T005417	166: 17	Upper half	<113	<102	<107.5
S96T005411		Lower half	<95.1	<88	<91.55
S96T005717	166: 18	Upper half	<104	<101	<102.5
S96T005723		Lower half	<101	<99	<100
S96T005841	166: 19	Upper half	<96.3	<98.1	<97.2
S96T005842		Lower half	<89	<98.1	<93.55
S96T005708	167: 1	Upper half	<89.6	<103	<96.3
S96T005693		Lower half	<111	<87.7	<99.35
S96T005857	167: 2	Lower half	<83.4	<86.9	<85.15
S96T005694	167: 3	Lower half	<89.9	<93.6	<91.75
S96T005695	167: 4	Lower half	<99	<102	<100.5
S96T005438	167: 5	Lower half	53	51.3	52.15
S96T005450	167: 6	Lower half	44.5	47.5	46
S96T005696	167: 7	Lower half	<96	<94	<95

Table B2-38. Tank 241-AN-103 Analytical Results: Molybdenum (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest (Cont'd)			µg/g	µg/g	µg/g
S96T005737	167: 8	Lower half	<97.9	<99.9	<98.9
S96T005858	167: 9	Lower half	<104	<87.5	<95.75
S96T005709	167: 11	Upper half	<90	<93.3	<91.65
S96T005697		Lower half	<99.2	<94.1	<96.65
S96T005444	167: 12	Upper half	56.3	53.7	55
S96T005451		Lower half	46.4	46	46.2
S96T005445	167: 14	Upper half	33.1	28.3	30.7
S96T005439		Lower half	<28.4	29.2	<28.8
S96T005710	167: 15	Upper half	<93.2	<89.5	<91.35
S96T005698		Lower half	<91.1	<94	<92.55
S96T005498	167: 17	Upper half	<91.6	<97.4	<94.5
S96T005499		Lower half	<89.1	<96.5	<92.8
S97T000460	Core 166	Solid composite	42	43.3	42.65
Liquids			µg/mL	µg/mL	µg/mL
S96T005539	166: 3	Drainable liquid	117	112	114.5
S96T005540	166: 4	Drainable liquid	107	102	104.5
S96T005599	166: 6	Drainable liquid	125	117	121
S96T005816	166: 7	Drainable liquid	117	121	119
S96T005817	166: 8	Drainable liquid	111	123	117
S96T005541	166: 9	Drainable liquid	116	114	115
S96T005566	166: 10	Drainable liquid	119	113	116
S96T005600	166: 11	Drainable liquid	118	116	117
S96T005601	166: 12	Drainable liquid	118	117	117.5
S96T005861	167: 2	Drainable liquid	112	116	114
S96T005673	167: 3	Drainable liquid	110	111	110.5
S96T005420	167: 5	Drainable liquid	116	118	117
S96T005421	167: 6	Drainable liquid	117	116	116.5
S96T005683	167: 7	Drainable liquid	117	119	118

Table B2-38. Tank 241-AN-103 Analytical Results: Molybdenum (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
S96T005732	167: 8	Drainable liquid	117	115	116
S96T005862	167: 9	Drainable liquid	117	120	118.5
S96T005650	167: 11	Drainable liquid	98.9	101	99.95
S96T005991	Core 166	Liquid composite	109	109	109
Solids: fusion			µg/g	µg/g	µg/g
S96T005608	166: 1	Lower half	<1,050	<1,030	<1,040
S96T005568	166: 4	Lower half	<1,130	<1,110	<1,120
S96T005611	166: 6	Lower half	<1,050	<1,070	<1,060
S96T005835	166: 7	Lower half	<1,050	<1,060	<1,055
S96T005836	166: 8	Lower half	<981	<1,030	<1,005.5
S96T005574	166: 9	Lower half	<896	<970	<933
S96T005569	166: 10	Lower half	<1,050	<1,030	<1,040
S96T005612	166: 11	Lower half	<987	<1,020	<1,003.5
S96T005613	166: 12	Lower half	<1,030	<1,010	<1,020
S96T005714	166: 13	Upper half	<1,010	<1,050	<1,030
S96T005720		Lower half	<1,010	<1,010	<1,010
S96T005414	166: 15	Upper half	<228	<233	<230.5
S96T005408		Lower half	<240	<232	<236
S96T005623	166: 16	Upper half	<1,090	<1,050	<1,070
S96T005614		Lower half	<1,020	<1,000	<1,010
S96T005415	166: 17	Upper half	<262	<264	<263
S96T005409		Lower half	<1,060	<1,040	<1,050
S96T005715	166: 18	Upper half	<1,010	<1,030	<1,020
S96T005721		Lower half	<1,010	<994	<1,002
S96T005837	166: 19	Upper half	<1,040	<1,050	<1,045
S96T005838		Lower half	<978	<982	<980
S96T005705	167: 1	Upper half	<994	<1,000	<997
S96T005687		Lower half	<1,040	<1,040	<1,040
S96T005855	167: 2	Lower half	<1,010	<988	<999

Table B2-38. Tank 241-AN-103 Analytical Results: Molybdenum (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion (Cont'd)			µg/g	µg/g	µg/g
S96T005688	167: 3	Lower half	<1,120	<1,070	<1,095
S96T005689	167: 4	Lower half	<1,050	<1,060	<1,055
S96T005436	167: 5	Lower half	<931	<939	<935
S96T005448	167: 6	Lower half	<1,050	<1,020	<1,035
S96T005690	167: 7	Lower half	<982	<1,090	<1,036
S96T005736	167: 8	Lower half	<1,110	<937	<1,023.5
S96T005856	167: 9	Lower half	<920	<1,050	<985
S96T005706	167: 11	Upper half	<933	<1,110	<1,021.5
S96T005691		Lower half	<925	<921	<923
S96T005442	167: 12	Upper half	<1,080	<969	<1,024.5
S96T005449		Lower half	<988	<1,010	<999
S96T005443	167: 14	Upper half	<1,100	<1,050	<1,075
S96T005437		Lower half	<1,030	<1,010	<1,020
S96T005707	167: 15	Upper half	<1,070	<919	<994.5
S96T005692		Lower half	<916	<1,090	<1,003
S96T005496	167: 17	Upper half	<1,060	<1,050	<1,055
S96T005497		Lower half	<1,050	<1,050	<1,050

Table B2-39. Tank 241-AN-103 Analytical Results: Nickel (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005609	166: 1	Lower half	44.6	33.2	38.9[QC:e]
S96T005570	166: 4	Lower half	<35.9	<35.9	<35.9
S96T005615	166: 6	Lower half	<27.6	<27.6	<27.6
S96T005839	166: 7	Lower half	<40.5	<41	<40.75
S96T005840	166: 8	Lower half	<39.4	<39.3	<39.35[QC:a]
S96T005575	166: 9	Lower half	<39.1	<39.8	<39.45
S96T005571	166: 10	Lower half	<30.7	<28.9	<29.8
S96T005616	166: 11	Lower half	<28.9	<27.2	<28.05
S96T005617	166: 12	Lower half	<28.2	<28.1	<28.15
S96T005716	166: 13	Upper half	<38.8	<39.2	<39
S96T005722		Lower half	<41.1	<41.3	<41.2
S96T005416	166: 15	Upper half	<40.8	<38.1	<39.45
S97T000459		Lower half	18.9	28.5	23.7[QC:e]
S96T005624	166: 16	Upper half	<41.9	<43	<42.45
S96T005618		Lower half	29.2	32.8	31
S96T005417	166: 17	Upper half	<45.1	<40.9	<43
S96T005411		Lower half	<38.1	<35.2	<36.65
S96T005717	166: 18	Upper half	<41.7	<40.4	<41.05
S96T005723		Lower half	<40.5	<39.6	<40.05
S96T005841	166: 19	Upper half	<38.5	<39.2	<38.85[QC:a]
S96T005842		Lower half	<35.6	<39.2	<37.4[QC:a]
S96T005708	167: 1	Upper half	<35.8	<41.1	<38.45
S96T005693		Lower half	<44.4	<35.1	<39.75[QC:e]
S96T005857	167: 2	Lower half	<33.4	<34.8	<34.1
S96T005694	167: 3	Lower half	<35.9	<37.4	<36.65
S96T005695	167: 4	Lower half	<39.6	<40.8	<40.2
S96T005438	167: 5	Lower half	<10.3	<11	<10.65[QC:a]
S96T005450	167: 6	Lower half	<11.1	<10.4	<10.75[QC:a]
S96T005696	167: 7	Lower half	<38.4	<37.6	<38

Table B2-39. Tank 241-AN-103 Analytical Results: Nickel (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest (Cont'd)			µg/g	µg/g	µg/g
S96T005737	167: 8	Lower half	<39.2	<40	<39.6
S96T005858	167: 9	Lower half	<41.6	<35	<38.3
S96T005709	167: 11	Upper half	<36	<37.3	<36.65
S96T005697		Lower half	<39.7	<37.6	<38.65
S96T005444	167: 12	Upper half	17	17.9	17.45[QC:a]
S96T005451		Lower half	23.8	18.1	20.95[QC:a,c]
S96T005445	167: 14	Upper half	13.8	12	12.9[QC:a]
S96T005439		Lower half	18.6	19.9	19.25[QC:a]
S96T005710	167: 15	Upper half	<37.3	<35.8	<36.55
S96T005698		Lower half	<36.4	<37.6	<37
S96T005498	167: 17	Upper half	<36.6	<38.9	<37.75
S96T005499		Lower half	<35.7	<38.6	<37.15
S97T000460	Core 166	Solid composite	<11.3	<11	<11.15
Liquids			µg/mL	µg/mL	µg/mL
S96T005539	166: 3	Drainable liquid	<8.02	<8.02	<8.02
S96T005540	166: 4	Drainable liquid	<8.02	<8.02	<8.02
S96T005599	166: 6	Drainable liquid	<12	<12	<12
S96T005816	166: 7	Drainable liquid	<12	<12	<12
S96T005817	166: 8	Drainable liquid	<12	<12	<12
S96T005541	166: 9	Drainable liquid	<12	<12	<12
S96T005566	166: 10	Drainable liquid	8.06	<8.02	<8.04
S96T005600	166: 11	Drainable liquid	<12	<12	<12
S96T005601	166: 12	Drainable liquid	<12	<12	<12
S96T005861	167: 2	Drainable liquid	<12	<12	<12
S96T005673	167: 3	Drainable liquid	<12	<12	<12
S96T005420	167: 5	Drainable liquid	12.3	<12	<12.15
S96T005421	167: 6	Drainable liquid	<12	<12	<12
S96T005683	167: 7	Drainable liquid	<12	<12	<12

Table B2-39. Tank 241-AN-103 Analytical Results: Nickel (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids (Cont'd)			µg/mL	µg/mL	µg/mL
S96T005732	167: 8	Drainable liquid	<12	<12	<12
S96T005862	167: 9	Drainable liquid	<12	<12	<12
S96T005650	167: 11	Drainable liquid	<12	<12	<12
S96T005991	Core 166	Liquid composite	<24	<24	<24
Solids: fusion[1]			µg/g	µg/g	µg/g
S96T005608	166: 1	Lower half	525	1,420	972.5[QC:e]
S96T005568	166: 4	Lower half	1.880E+05	2.130E+05	2.005E+05
S96T005611	166: 6	Lower half	1,390	754	1,072[QC:e]
S96T005835	166: 7	Lower half	2,810	4,010	3,410[QC:e]
S96T005836	166: 8	Lower half	30,900	15,200	23,050[QC:e]
S96T005574	166: 9	Lower half	7.610E+05	7.650E+05	7.630E+05
S96T005569	166: 10	Lower half	1,450	530	990[QC:e]
S96T005612	166: 11	Lower half	1,160	1,010	1,085
S96T005613	166: 12	Lower half	<411	<405	<408
S96T005714	166: 13	Upper half	5,620	12,000	8,810[QC:e]
S96T005720		Lower half	4,000	1.630E+05	83,500[QC:e]
S96T005414	166: 15	Upper half	27,400	25,700	26,550
S96T005408		Lower half	43,300	5,630	24,465[QC:e]
S96T005623	166: 16	Upper half	3,480	3,190	3,335
S96T005614		Lower half	1,450	1,450	1,450
S96T005415	166: 17	Upper half	96,600	2,010	49,305[QC:e]
S96T005409		Lower half	1,910	76,100	39,005[QC:e]
S96T005715	166: 18	Upper half	2,270	3,420	2,845[QC:e]
S96T005721		Lower half	1,670	2,250	1,960[QC:e]
S96T005837	166: 19	Upper half	11,400	25,100	18,250[QC:e]
S96T005838		Lower half	1,310	1,980	1,645[QC:e]
S96T005705	167: 1	Upper half	3,560	1,110	2,335[QC:e]
S96T005687		Lower half	1,710	1,040	1,375[QC:e]
S96T005855	167: 2	Lower half	523	635	579

Table B2-39. Tank 241-AN-103 Analytical Results: Nickel (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion (Cont'd)			µg/g	µg/g	µg/g
S96T005688	167: 3	Lower half	481	832	656.5[QC:e]
S96T005689	167: 4	Lower half	585	664	624.5
S96T005436	167: 5	Lower half	389	958	673.5[QC:e]
S96T005448	167: 6	Lower half	<421	<409	<415
S96T005690	167: 7	Lower half	<393	598	<495.5[QC:e]
S96T005736	167: 8	Lower half	1,620	1,430	1,525
S96T005856	167: 9	Lower half	539	<422	<480.5[QC:e]
S96T005706	167: 11	Upper half	1,550	1,880	1,715
S96T005691		Lower half	635	434	534.5[QC:e]
S96T005442	167: 12	Upper half	1,730	1,590	1,660
S96T005449		Lower half	426	842	634[QC:e]
S96T005443	167: 14	Upper half	1,410	853	1,131.5[QC:e]
S96T005437		Lower half	542	1,270	906[QC:e]
S96T005707	167: 15	Upper half	3,190	1,040	2,115[QC:e]
S96T005692		Lower half	2,460	1,570	2,015[QC:e]
S96T005496	167: 17	Upper half	1,020	587	803.5[QC:e]
S96T005497		Lower half	1,380	1,260	1,320

Note:

[1]The fusion was performed in a nickel crucible. Therefore, these results should be considered an upper bound.

Table B2-40. Tank 241-AN-103 Analytical Results: Phosphorous (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005609	166: 1	Lower half	716	383	549.5[QC:e]
S96T005570	166: 4	Lower half	1,370	917	1,143.5[QC:c,e]
S96T005615	166: 6	Lower half	1,340	1,310	1,325
S96T005839	166: 7	Lower half	1,900	1,900	1,900
S96T005840	166: 8	Lower half	1,200	1,190	1,195
S96T005575	166: 9	Lower half	2,230	1,910	2,070
S96T005571	166: 10	Lower half	1,790	1,750	1,770
S96T005616	166: 11	Lower half	1,700	1,550	1,625
S96T005617	166: 12	Lower half	1,400	1,620	1,510
S96T005716	166: 13	Upper half	570	527	548.5
S96T005722		Lower half	499	554	526.5
S96T005416	166: 15	Upper half	442	480	461
S97T000459		Lower half	397	456	426.5
S96T005624	166: 16	Upper half	449	441	445
S96T005618		Lower half	505	490	497.5
S96T005417	166: 17	Upper half	<451	465	<458
S96T005411		Lower half	477	449	463[QC:e]
S96T005717	166: 18	Upper half	594	2,120	1,357[QC:e]
S96T005723		Lower half	3,010	1,220	2,115[QC:e]
S96T005841	166: 19	Upper half	1,080	1,140	1,110
S96T005842		Lower half	1,200	1,280	1,240
S96T005708	167: 1	Upper half	446	463	454.5
S96T005693		Lower half	742	426	584[QC:e]
S96T005857	167: 2	Lower half	950	951	950.5
S96T005694	167: 3	Lower half	1,750	1,620	1,685
S96T005695	167: 4	Lower half	2,010	2,200	2,105
S96T005438	167: 5	Lower half	2,120	1,700	1,910[QC:c,e]
S96T005450	167: 6	Lower half	1,370	1,530	1,450
S96T005696	167: 7	Lower half	1,590	1,480	1,535

Table B2-40. Tank 241-AN-103 Analytical Results: Phosphorous (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest (Cont'd)			µg/g	µg/g	µg/g
S96T005737	167: 8	Lower half	1,770	1,980	1,875
S96T005858	167: 9	Lower half	2,060	1,830	1,945
S96T005709	167: 11	Upper half	569	543	556
S96T005697		Lower half	495	450	472.5
S96T005444	167: 12	Upper half	460	464	462
S96T005451		Lower half	465	444	454.5
S96T005445	167: 14	Upper half	392	306	349[QC:e]
S96T005439		Lower half	320	379	349.5
S96T005710	167: 15	Upper half	<373	<358	<365.5
S96T005698		Lower half	365	434	399.5
S96T005498	167: 17	Upper half	477	531	504
S96T005499		Lower half	1,790	2,970	2,380[QC:e]
S97T000460	Core 166	Solid composite	1,180	1,110	1,145
Liquids			µg/mL	µg/mL	µg/mL
S96T005539	166: 3	Drainable liquid	295	274	284.5
S96T005540	166: 4	Drainable liquid	253	268	260.5
S96T005599	166: 6	Drainable liquid	308	316	312
S96T005816	166: 7	Drainable liquid	287	297	292
S96T005817	166: 8	Drainable liquid	396	300	348[QC:e]
S96T005541	166: 9	Drainable liquid	276	281	278.5
S96T005566	166: 10	Drainable liquid	283	279	281
S96T005600	166: 11	Drainable liquid	292	295	293.5
S96T005601	166: 12	Drainable liquid	301	298	299.5
S96T005861	167: 2	Drainable liquid	280	295	287.5
S96T005673	167: 3	Drainable liquid	281	294	287.5
S96T005420	167: 5	Drainable liquid	286	298	292
S96T005421	167: 6	Drainable liquid	295	291	293
S96T005683	167: 7	Drainable liquid	290	294	292

Table B2-40. Tank 241-AN-103 Analytical Results: Phosphorous (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids (Cont'd)			μg/mL	μg/mL	μg/mL
S96T005732	167: 8	Drainable liquid	308	284	296
S96T005862	167: 9	Drainable liquid	292	295	293.5
S96T005650	167: 11	Drainable liquid	278	279	278.5
S96T005991	Core 166	Liquid composite	266	282	274
Solids: fusion			μg/g	μg/g	μg/g
S96T005608	166: 1	Lower half	<4,200	<4,130	<4,165
S96T005568	166: 4	Lower half	<4,530	<4,450	<4,490
S96T005611	166: 6	Lower half	<4,190	<4,280	<4,235
S96T005835	166: 7	Lower half	<4,210	<4,250	<4,230
S96T005836	166: 8	Lower half	<3,920	<4,110	<4,015
S96T005574	166: 9	Lower half	<3,580	<3,880	<3,730
S96T005569	166: 10	Lower half	<4,180	<4,140	<4,160
S96T005612	166: 11	Lower half	<3,950	<4,070	<4,010
S96T005613	166: 12	Lower half	<4,110	<4,050	<4,080
S96T005714	166: 13	Upper half	<4,030	<4,220	<4,125
S96T005720		Lower half	<4,050	<4,030	<4,040
S96T005414	166: 15	Upper half	<913	<932	<922.5
S96T005408		Lower half	<960	<927	<943.5
S96T005623	166: 16	Upper half	<4,360	<4,200	<4,280
S96T005614		Lower half	<4,090	<4,020	<4,055
S96T005415	166: 17	Upper half	<1,050	<1,060	<1,055
S96T005409		Lower half	<4,220	<4,150	<4,185
S96T005715	166: 18	Upper half	<4,030	<4,110	<4,070
S96T005721		Lower half	<4,050	<3,980	<4,015
S96T005837	166: 19	Upper half	<4,140	<4,200	<4,170
S96T005838		Lower half	<3,910	<3,930	<3,920
S96T005705	167: 1	Upper half	<3,980	<4,010	<3,995
S96T005687		Lower half	<4,160	<4,170	<4,165
S96T005855	167: 2	Lower half	<4,040	<3,950	<3,995

Table B2-40. Tank 241-AN-103 Analytical Results: Phosphorous (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion (Cont'd)			µg/g	µg/g	µg/g
S96T005688	167: 3	Lower half	<4,500	<4,260	<4,380
S96T005689	167: 4	Lower half	<4,200	<4,220	<4,210
S96T005436	167: 5	Lower half	<3,720	<3,760	<3,740
S96T005448	167: 6	Lower half	<4,210	<4,090	<4,150
S96T005690	167: 7	Lower half	<3,930	<4,360	<4,145
S96T005736	167: 8	Lower half	<4,420	<3,750	<4,085
S96T005856	167: 9	Lower half	<3,680	<4,220	<3,950
S96T005706	167: 11	Upper half	<3,730	<4,440	<4,085
S96T005691		Lower half	<3,700	<3,680	<3,690
S96T005442	167: 12	Upper half	<4,320	<3,880	<4,100
S96T005449		Lower half	<3,950	<4,040	<3,995
S96T005443	167: 14	Upper half	<4,410	<4,220	<4,315
S96T005437		Lower half	<4,110	<4,060	<4,085
S96T005707	167: 15	Upper half	<4,270	<3,680	<3,975
S96T005692		Lower half	<3,660	<4,350	<4,005
S96T005496	167: 17	Upper half	<4,240	<4,190	<4,215
S96T005497		Lower half	<4,200	11,400	<7,800[QC:e]

Table B2-41. Tank 241-AN-103 Analytical Results: Potassium (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005609	166: 1	Lower half	6,610	5,830	6,220
S96T005570	166: 4	Lower half	3,960	4,230	4,095
S96T005615	166: 6	Lower half	4,770	4,880	4,825
S96T005839	166: 7	Lower half	3,990	4,320	4,155
S96T005840	166: 8	Lower half	4,100	4,040	4,070[QC:a]
S96T005575	166: 9	Lower half	7,680	6,790	7,235
S96T005571	166: 10	Lower half	5,750	5,630	5,690
S96T005616	166: 1	Lower half	4,410	3,870	4,140
S96T005617	166: 2	Lower half	3,960	4,240	4,100
S96T005716	166: 3	Upper half	8,970	9,070	9,020
S96T005722		Lower half	7,270	9,080	8,175[QC:c]
S96T005416	166: 5	Upper half	6,740	7,420	7,080
S97T000459		Lower half	5,740	6,670	6,205[QC:d]
S96T005624	166: 6	Upper half	6,680	6,960	6,820
S96T005618		Lower half	7,060	6,960	7,010
S96T005417	166: 7	Upper half	5,590	5,560	5,575
S96T005411		Lower half	5,000	5,530	5,265
S96T005717	166: 8	Upper half	5,730	5,740	5,735
S96T005723		Lower half	5,670	5,880	5,775
S96T005841	166: 9	Upper half	5,990	6,090	6,040[QC:a]
S96T005842		Lower half	5,680	5,630	5,655[QC:a]
S96T005708	167: 1	Upper half	4,590	6,330	5,460[QC:c]
S96T005693		Lower half	6,600	6,770	6,685
S96T005857	167: 2	Lower half	6,140	6,360	6,250
S96T005694	167: 3	Lower half	6,350	4,300	5,325[QC:e]
S96T005695	167: 4	Lower half	5,770	6,360	6,065
S96T005438	167: 5	Lower half	8,770	8,210	8,490[QC:a,c]
S96T005450	167: 6	Lower half	7,290	7,660	7,475[QC:a]
S96T005696	167: 7	Lower half	4,060	4,090	4,075

Table B2-41. Tank 241-AN-103 Analytical Results: Potassium (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest (Cont'd)			µg/g	µg/g	µg/g
S96T005737	167: 8	Lower half	4,410	3,980	4,195
S96T005858	167: 9	Lower half	4,250	4,220	4,235
S96T005709	167: 1	Upper half	8,630	9,370	9,000
S96T005697		Lower half	8,330	7,690	8,010
S96T005444	167: 2	Upper half	8,780	8,630	8,705[QC:a]
S96T005451		Lower half	7,300	7,360	7,330[QC:a]
S96T005445	167: 4	Upper half	5,460	4,660	5,060[QC:a]
S96T005439		Lower half	4,110	4,830	4,470[QC:a]
S96T005710	167: 5	Upper half	4,840	4,840	4,840
S96T005698		Lower half	5,020	5,640	5,330
S96T005498	167: 7	Upper half	5,010	4,840	4,925
S96T005499		Lower half	4,870	5,550	5,210
S97T000460	Core 166	Solid composite	6,280	6,800	6,540
Liquids			µg/mL	µg/mL	µg/mL
S96T005539	166: 3	Drainable liquid	17,900	17,600	17,750
S96T005540	166: 4	Drainable liquid	15,600	14,200	14,900
S96T005599	166: 6	Drainable liquid	19,000	18,400	18,700[QC:c]
S96T005816	166: 7	Drainable liquid	18,000	18,600	18,300[QC:d]
S96T005817	166: 8	Drainable liquid	17,100	18,300	17,700
S96T005541	166: 9	Drainable liquid	17,400	17,100	17,250[QC:c]
S96T005566	166: 10	Drainable liquid	17,800	17,300	17,550
S96T005600	166: 1	Drainable liquid	17,900	17,500	17,700
S96T005601	166: 2	Drainable liquid	18,900	19,000	18,950[QC:c]
S96T005861	167: 2	Drainable liquid	17,200	17,700	17,450
S96T005673	167: 3	Drainable liquid	16,600	16,600	16,600
S96T005420	167: 5	Drainable liquid	18,100	18,400	18,250[QC:d]
S96T005421	167: 6	Drainable liquid	17,200	17,200	17,200
S96T005683	167: 7	Drainable liquid	18,900	18,500	18,700

Table B2-41. Tank 241-AN-103 Analytical Results: Potassium (ICP). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids (Cont'd)			μg/mL	μg/mL	μg/mL
S96T005732	167: 8	Drainable liquid	18,800	18,500	18,650
S96T005862	167: 9	Drainable liquid	17,600	17,800	17,700
S96T005650	167: 1	Drainable liquid	15,500	15,200	15,350
S96T005991	Core 166	Liquid composite	17,200	17,300	17,250

Table B2-42. Tank 241-AN-103 Analytical Results: Selenium (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005609	166: 1	Lower half	171	< 151	<161[QC:a]
S96T005570	166: 4	Lower half	<179	<179	<179
S96T005615	166: 6	Lower half	<138	<138	<138[QC:a]
S96T005839	166: 7	Lower half	<202	<205	<203.5[QC:a]
S96T005840	166: 8	Lower half	<197	216	<206.5[QC:a]
S96T005575	166: 9	Lower half	<196	<199	<197.5
S96T005571	166: 10	Lower half	<153	<145	<149[QC:a]
S96T005616	166: 1	Lower half	<145	<136	<140.5[QC:a]
S96T005617	166: 2	Lower half	<141	<141	<141[QC:a]
S96T005716	166: 3	Upper half	<194	<196	<195[QC:a]
S96T005722		Lower half	<206	<206	<206[QC:a]
S96T005416	166: 5	Upper half	<204	<190	<197
S97T000459		Lower half	<56.9	<55.7	<56.3[QC:a]
S96T005624	166: 6	Upper half	<210	<215	<212.5[QC:a]
S96T005618		Lower half	<142	<146	<144[QC:a]
S96T005417	166: 7	Upper half	<225	<205	<215
S96T005411		Lower half	<190	<176	<183
S96T005717	166: 8	Upper half	<208	<202	<205[QC:a]
S96T005723		Lower half	<202	<198	<200[QC:a]
S96T005841	166: 9	Upper half	<193	<196	<194.5[QC:a]
S96T005842		Lower half	<178	265	<221.5[QC:a,e]
S96T005708	167: 1	Upper half	251	268	259.5
S96T005693		Lower half	357	203	280[QC:e]
S96T005857	167: 2	Lower half	250	337	293.5[QC:e]
S96T005694	167: 3	Lower half	<180	<187	<183.5
S96T005695	167: 4	Lower half	<198	<204	<201
S96T005438	167: 5	Lower half	<51.7	<55.1	<53.4[QC:a]
S96T005450	167: 6	Lower half	<55.3	<52.2	<53.75[QC:a]
S96T005696	167: 7	Lower half	<192	<188	<190[QC:a]

Table B2-42. Tank 241-AN-103 Analytical Results: Selenium (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest (Cont'd)			µg/g	µg/g	µg/g
S96T005737	167: 8	Lower half	<196	<200	<198[QC:a]
S96T005858	167: 9	Lower half	246	176	211[QC:e]
S96T005709	167: 1	Upper half	<180	<187	<183.5[QC:a]
S96T005697		Lower half	<198	<188	<193[QC:a]
S96T005444	167: 2	Upper half	<55.3	<54.5	<54.9[QC:a]
S96T005451		Lower half	<56.8	<58.4	<57.6[QC:a]
S96T005445	167: 4	Upper half	<52.8	<55.1	<53.95[QC:a]
S96T005439		Lower half	<56.8	<58.4	<57.6[QC:a]
S96T005710	167: 5	Upper half	<186	<179	<182.5[QC:a]
S96T005698		Lower half	<182	<188	<185[QC:a]
S96T005498	167: 7	Upper half	<183	215	<199
S96T005499		Lower half	275	239	257
S97T000460	Core 166	Solid composite	<56.3	<55.1	<55.7[QC:a]
Liquids			µg/mL	µg/mL	µg/mL
S96T005539	166: 3	Drainable liquid	<40.1	<40.1	<40.1
S96T005540	166: 4	Drainable liquid	<40.1	56.2	<48.15[QC:e]
S96T005599	166: 6	Drainable liquid	<60.1	<60.1	<60.1
S96T005816	166: 7	Drainable liquid	<60.1	<60.1	<60.1
S96T005817	166: 8	Drainable liquid	<60.1	<60.1	<60.1
S96T005541	166: 9	Drainable liquid	<60.1	<60.1	<60.1
S96T005566	166: 10	Drainable liquid	<40.1	<40.1	<40.1
S96T005600	166: 1	Drainable liquid	<60.1	<60.1	<60.1
S96T005601	166: 2	Drainable liquid	<60.1	<60.1	<60.1
S96T005861	167: 2	Drainable liquid	<60.1	<60.1	<60.1
S96T005673	167: 3	Drainable liquid	<60.1	<60.1	<60.1
S96T005420	167: 5	Drainable liquid	<60.1	<60.1	<60.1
S96T005421	167: 6	Drainable liquid	<60.1	<60.1	<60.1
S96T005683	167: 7	Drainable liquid	<60.1	<60.1	<60.1

Table B2-42. Tank 241-AN-103 Analytical Results: Selenium (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids (Cont'd)			**µg/mL**	**µg/mL**	**µg/mL**
S96T005732	167: 8	Drainable liquid	<60.1	<60.1	<60.1
S96T005862	167: 9	Drainable liquid	<60.1	<60.1	<60.1
S96T005650	167: 1	Drainable liquid	<60.1	<60.1	<60.1
S96T005991	Core 166	Liquid composite	126	<120	<123
Solids: fusion			**µg/g**	**µg/g**	**µg/g**
S96T005608	166: 1	Lower half	<2,100	<2,060	<2,080
S96T005568	166: 4	Lower half	<2,270	<2,220	<2,245
S96T005611	166: 6	Lower half	<2,100	<2,140	<2,120
S96T005835	166: 7	Lower half	<2,100	<2,120	<2,110
S96T005836	166: 8	Lower half	<1,960	<2,060	<2,010
S96T005574	166: 9	Lower half	<1,790	<1,940	<1,865
S96T005569	166: 10	Lower half	<2,090	<2,070	<2,080
S96T005612	166: 1	Lower half	<1,970	<2,040	<2,005
S96T005613	166: 2	Lower half	<2,050	<2,020	<2,035
S96T005714	166: 3	Upper half	<2,010	<2,110	<2,060
S96T005720		Lower half	<2,030	<2,010	<2,020
S96T005414	166: 5	Upper half	<456	<466	<461
S96T005408		Lower half	<480	<463	<471.5
S96T005623	166: 6	Upper half	<2,180	<2,100	<2,140
S96T005614		Lower half	<2,040	<2,010	<2,025
S96T005415	166: 7	Upper half	<523	<528	<525.5
S96T005409		Lower half	<2,110	<2,080	<2,095
S96T005715	166: 8	Upper half	<2,010	<2,060	<2,035
S96T005721		Lower half	<2,030	<1,990	<2,010
S96T005837	166: 9	Upper half	<2,070	<2,100	<2,085
S96T005838		Lower half	<1,960	<1,960	<1,960
S96T005705	167: 1	Upper half	<1,990	<2,000	<1,995
S96T005687		Lower half	<2,080	<2,090	<2,085
S96T005855	167: 2	Lower half	<2,020	<1,980	<2,000

Table B2-42. Tank 241-AN-103 Analytical Results: Selenium (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion (Cont'd)			µg/g	µg/g	µg/g
S96T005688	167: 3	Lower half	<2,250	<2,130	<2,190
S96T005689	167: 4	Lower half	<2,100	<2,110	<2,105
S96T005436	167: 5	Lower half	<1,860	<1,880	<1,870
S96T005448	167: 6	Lower half	<2,110	<2,040	<2,075
S96T005690	167: 7	Lower half	<1,960	<2,180	<2,070
S96T005736	167: 8	Lower half	<2,210	<1,870	<2,040
S96T005856	167: 9	Lower half	<1,840	<2,110	<1,975
S96T005706	167: 1	Upper half	<1,870	<2,220	<2,045
S96T005691		Lower half	<1,850	<1,840	<1,845
S96T005442	167: 2	Upper half	<2,160	<1,940	<2,050
S96T005449		Lower half	<1,980	<2,020	<2,000
S96T005443	167: 4	Upper half	<2,200	<2,110	<2,155
S96T005437		Lower half	<2,050	<2,030	<2,040
S96T005707	167: 5	Upper half	<2,130	<1,840	<1,985
S96T005692		Lower half	<1,830	<2,180	<2,005
S96T005496	167: 7	Upper half	<2,120	<2,100	<2,110
S96T005497		Lower half	<2,100	<2,110	<2,105

Table B2-43. Tank 241-AN-103 Analytical Results: Silicon (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005609	166: 1	Lower half	642	651	646.5[QC:b]
S96T005570	166: 4	Lower half	104	178	141[QC:a,c]
S96T005615	166: 6	Lower half	297	310	303.5[QC:b]
S96T005839	166: 7	Lower half	1,000	1,040	1,020[QC:b]
S96T005840	166: 8	Lower half	348	589	468.5[QC:b,c]
S96T005575	166: 9	Lower half	199	211	205[QC:a]
S96T005571	166: 10	Lower half	380	363	371.5[QC:b]
S96T005616	166: 1	Lower half	316	366	341[QC:b]
S96T005617	166: 2	Lower half	317	367	342[QC:b]
S96T005716	166: 3	Upper half	691	594	642.5[QC:b]
S96T005722		Lower half	618	665	641.5[QC:b]
S96T005416	166: 5	Upper half	307	306	306.5[QC:a]
S97T000459		Lower half	785	999	892[QC:b,c]
S96T005624	166: 6	Upper half	659	639	649[QC:b]
S96T005618		Lower half	469	361	415[QC:b,c]
S96T005417	166: 7	Upper half	321	385	353[QC:a]
S96T005411		Lower half	327	296	311.5[QC:a,c]
S96T005717	166: 8	Upper half	563	632	597.5[QC:b]
S96T005723		Lower half	604	587	595.5[QC:b]
S96T005841	166: 9	Upper half	204	217	210.5[QC:b]
S96T005842		Lower half	451	624	537.5[QC:b,c]
S96T005708	167: 1	Upper half	375	672	523.5[QC:b,c]
S96T005693		Lower half	656	746	701[QC:b]
S96T005857	167: 2	Lower half	466	629	547.5[QC:b,c]
S96T005694	167: 3	Lower half	553	403	478[QC:b,c]
S96T005695	167: 4	Lower half	301	518	409.5[QC:b,c]
S96T005438	167: 5	Lower half	666	486	576[QC:b,c]
S96T005450	167: 6	Lower half	407	654	530.5[QC:b,c]
S96T005696	167: 7	Lower half	617	555	586[QC:b]

Table B2-43. Tank 241-AN-103 Analytical Results: Silicon (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest (Cont'd)			µg/g	µg/g	µg/g
S96T005737	167: 8	Lower half	756	683	719.5[QC:b]
S96T005858	167: 9	Lower half	258	318	288[QC:b,c]
S96T005709	167: 1	Upper half	442	553	497.5[QC:b,c]
S96T005697		Lower half	553	630	591.5[QC:b]
S96T005444	167: 2	Upper half	496	534	515[QC:b]
S96T005451		Lower half	682	854	768[QC:b,c]
S96T005445	167: 4	Upper half	630	630	630[QC:b]
S96T005439		Lower half	551	407	479[QC:b,c]
S96T005710	167: 5	Upper half	657	667	662[QC:b]
S96T005698		Lower half	693	766	729.5[QC:b]
S96T005498	167: 7	Upper half	400	533	466.5[QC:b,c]
S96T005499		Lower half	463	413	438[QC:b]
S97T000460	Core 166	Solid composite	839	837	838[QC:b]
Liquids			µg/mL	µg/mL	µg/mL
S96T005539	166: 3	Drainable liquid	241	227	234
S96T005540	166: 4	Drainable liquid	241	237	239
S96T005599	166: 6	Drainable liquid	253	234	243.5
S96T005816	166: 7	Drainable liquid	330	355	342.5[QC:d]
S96T005817	166: 8	Drainable liquid	282	296	289
S96T005541	166: 9	Drainable liquid	218	216	217
S96T005566	166: 10	Drainable liquid	231	222	226.5
S96T005600	166: 1	Drainable liquid	243	243	243
S96T005601	166: 2	Drainable liquid	280	281	280.5
S96T005861	167: 2	Drainable liquid	329	331	330
S96T005673	167: 3	Drainable liquid	217	214	215.5
S96T005420	167: 5	Drainable liquid	247	243	245
S96T005421	167: 6	Drainable liquid	234	231	232.5
S96T005683	167: 7	Drainable liquid	235	235	235

Table B2-43. Tank 241-AN-103 Analytical Results: Silicon (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids (Cont'd)			**µg/mL**	**µg/mL**	**µg/mL**
S96T005732	167: 8	Drainable liquid	213	209	211
S96T005862	167: 9	Drainable liquid	242	254	248
S96T005650	167: 1	Drainable liquid	218	225	221.5
S96T005991	Core 166	Liquid composite	190	191	190.5
Solids: fusion			**µg/g**	**µg/g**	**µg/g**
S96T005608	166: 1	Lower half	1,500	1,520	1,510
S96T005568	166: 4	Lower half	<1,130	<1,110	<1,120
S96T005611	166: 6	Lower half	<1,050	<1,070	<1,060
S96T005835	166: 7	Lower half	2,610	2,160	2,385
S96T005836	166: 8	Lower half	<981	<1,030	<1,005.5
S96T005574	166: 9	Lower half	1,460	1,160	1,310[QC:e]
S96T005569	166: 10	Lower half	1,220	1,060	1,140
S96T005612	166: 1	Lower half	1,090	<1,020	<1,055
S96T005613	166: 2	Lower half	1,040	1,080	1,060
S96T005714	166: 3	Upper half	<1,010	<1,050	<1,030
S96T005720		Lower half	<1,010	<1,010	<1,010
S96T005414	166: 5	Upper half	<228	<233	<230.5
S96T005408		Lower half	279	232	255.5
S96T005623	166: 6	Upper half	<1,090	<1,050	<1,070
S96T005614		Lower half	1,410	<1,000	<1,205[QC:e]
S96T005415	166: 7	Upper half	276	<264	<270
S96T005409		Lower half	<1,060	<1,040	<1,050
S96T005715	166: 8	Upper half	<1,010	<1,030	<1,020
S96T005721		Lower half	1,070	<994	<1,032
S96T005837	166: 9	Upper half	<1,040	<1,050	<1,045
S96T005838		Lower half	<978	988	<983
S96T005705	167: 1	Upper half	<994	<1,000	<997
S96T005687		Lower half	1,250	<1,040	<1,145
S96T005855	167: 2	Lower half	1,150	1,050	1,100

Table B2-43. Tank 241-AN-103 Analytical Results: Silicon (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion (Cont'd)			µg/g	µg/g	µg/g
S96T005688	167: 3	Lower half	1,240	1,380	1,310
S96T005689	167: 4	Lower half	1,130	<1,060	<1,095
S96T005436	167: 5	Lower half	<931	<939	<935
S96T005448	167: 6	Lower half	1,060	<1,020	<1,040
S96T005690	167: 7	Lower half	<982	<1,090	<1,036
S96T005736	167: 8	Lower half	1,390	1,270	1,330
S96T005856	167: 9	Lower half	<920	<1,050	<985
S96T005706	167: 1	Upper half	<933	<1,110	<1,021.5
S96T005691		Lower half	<925	<921	<923
S96T005442	167: 2	Upper half	<1,080	<969	<1,024.5
S96T005449		Lower half	<988	1,140	<1,064
S96T005443	167: 4	Upper half	<1,100	<1,050	<1,075
S96T005437		Lower half	<1,030	<1,010	<1,020
S96T005707	167: 5	Upper half	<1,070	<919	<994.5
S96T005692		Lower half	<916	<1,090	<1,003
S96T005496	167: 7	Upper half	<1,060	1,210	<1,135
S96T005497		Lower half	<1,050	<1,050	<1,050

Table B2-44. Tank 241-AN-103 Analytical Results: Silver (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			μg/g	μg/g	μg/g
S96T005609	166: 1	Lower half	<14.8	<15.1	<14.95
S96T005570	166: 4	Lower half	<17.9	<17.9	<17.9[QC:a,c]
S96T005615	166: 6	Lower half	<13.8	<13.8	<13.8
S96T005839	166: 7	Lower half	<20.2	<20.5	<20.35[QC:a]
S96T005840	166: 8	Lower half	<19.7	<19.7	<19.7[QC:a]
S96T005575	166: 9	Lower half	24.7	<19.9	<22.3[QC:a,c]
S96T005571	166: 10	Lower half	<15.3	<14.5	<14.9
S96T005616	166: 1	Lower half	<14.5	<13.6	<14.05
S96T005617	166: 2	Lower half	<14.1	<14.1	<14.1
S96T005716	166: 3	Upper half	<19.4	<19.6	<19.5[QC:a]
S96T005722		Lower half	<20.6	<20.6	<20.6[QC:a]
S96T005416	166: 5	Upper half	49.6	24.6	37.1[QC:a,c]
S97T000459		Lower half	13.6	15.2	14.4[QC:a]
S96T005624	166: 6	Upper half	<21	<21.5	<21.25[QC:a]
S96T005618		Lower half	<14.2	<14.6	<14.4
S96T005417	166: 7	Upper half	29.1	<20.5	<24.8[QC:a,c]
S96T005411		Lower half	<19	<17.6	<18.3[QC:a,c]
S96T005717	166: 8	Upper half	<20.8	<20.2	<20.5[QC:a]
S96T005723		Lower half	<20.2	<19.8	<20[QC:a]
S96T005841	166: 9	Upper half	<19.3	<19.6	<19.45[QC:a]
S96T005842		Lower half	<17.8	<19.6	<18.7[QC:a]
S96T005708	167: 1	Upper half	<17.9	<20.5	<19.2
S96T005693		Lower half	<22.2	<17.5	<19.85
S96T005857	167: 2	Lower half	<16.7	<17.4	<17.05
S96T005694	167: 3	Lower half	<18	<18.7	<18.35
S96T005695	167: 4	Lower half	<19.8	<20.4	<20.1
S96T005438	167: 5	Lower half	14.9	14.5	14.7[QC:a,c]
S96T005450	167: 6	Lower half	15.7	15.2	15.45[QC:a]
S96T005696	167: 7	Lower half	<19.2	<18.8	<19

Table B2-44. Tank 241-AN-103 Analytical Results: Silver (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
S96T005737	167: 8	Lower half	<19.6	<20	<19.8
S96T005858	167: 9	Lower half	<20.8	<17.5	<19.15
S96T005709	167: 1	Upper half	<18	<18.7	<18.35
S96T005697		Lower half	<19.8	<18.8	<19.3
S96T005444	167: 2	Upper half	17.5	16	16.75[QC:a]
S96T005451		Lower half	14.3	14.2	14.25[QC:a]
S96T005445	167: 4	Upper half	15.4	15.7	15.55[QC:a]
S96T005439		Lower half	15.8	15.5	15.65[QC:a]
S96T005710	167: 5	Upper half	<18.6	<17.9	<18.25
S96T005698		Lower half	<18.2	<18.8	<18.5
S96T005498	167: 7	Upper half	<18.3	<19.5	<18.9
S96T005499		Lower half	<17.8	<19.3	<18.55
S97T000460	Core 166	Solid composite	16.4	15.7	16.05[QC:a]
Liquids			μg/mL	μg/mL	μg/mL
S96T005539	166: 3	Drainable liquid	19.6	18.8	19.2
S96T005540	166: 4	Drainable liquid	15.5	8.91	12.205[QC:c]
S96T005599	166: 6	Drainable liquid	20	18.6	19.3
S96T005816	166: 7	Drainable liquid	18.6	19.6	19.1
S96T005817	166: 8	Drainable liquid	18.2	20.2	19.2
S96T005541	166: 9	Drainable liquid	18.9	18.9	18.9
S96T005566	166: 10	Drainable liquid	20.5	18.6	19.55
S96T005600	166: 1	Drainable liquid	20.2	18.7	19.45
S96T005601	166: 2	Drainable liquid	19.9	20.3	20.1
S96T005861	167: 2	Drainable liquid	18.9	19	18.95
S96T005673	167: 3	Drainable liquid	16.4	17.4	16.9
S96T005420	167: 5	Drainable liquid	19	19.7	19.35
S96T005421	167: 6	Drainable liquid	17.9	17.2	17.55
S96T005683	167: 7	Drainable liquid	19.7	21.1	20.4
S96T005732	167: 8	Drainable liquid	19.5	20.3	19.9
S96T005862	167: 9	Drainable liquid	19.5	19.3	19.4

Table B2-44. Tank 241-AN-103 Analytical Results: Silver (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
S96T005650	167: 1	Drainable liquid	17.6	16.6	17.1
S96T005991	Core 166	Liquid composite	<12	<12	<12
Solids: fusion			µg/g	µg/g	µg/g
S96T005608	166: 1	Lower half	<210	<206	<208
S96T005568	166: 4	Lower half	<227	<222	<224.5
S96T005611	166: 6	Lower half	<210	<214	<212
S96T005835	166: 7	Lower half	<210	<212	<211
S96T005836	166: 8	Lower half	<196	<206	<201
S96T005574	166: 9	Lower half	<179	<194	<186.5
S96T005569	166: 10	Lower half	<209	<207	<208
S96T005612	166: 1	Lower half	<197	<204	<200.5
S96T005613	166: 2	Lower half	<205	<202	<203.5
S96T005714	166: 3	Upper half	<201	<211	<206
S96T005720		Lower half	<203	<201	<202
S96T005414	166: 5	Upper half	<45.6	<46.6	<46.1
S96T005408		Lower half	<48	<46.3	<47.15[QC:c]
S96T005623	166: 6	Upper half	<218	<210	<214[QC:c]
S96T005614		Lower half	<204	<201	<202.5
S96T005415	166: 7	Upper half	<52.3	<52.8	<52.55
S96T005409		Lower half	<211	<208	<209.5
S96T005715	166: 8	Upper half	<201	<206	<203.5
S96T005721		Lower half	<203	<199	<201
S96T005837	166: 9	Upper half	<207	<210	<208.5
S96T005838		Lower half	<196	<196	<196
S96T005705	167: 1	Upper half	<199	<200	<199.5
S96T005687		Lower half	<208	<209	<208.5
S96T005855	167: 2	Lower half	<202	<198	<200
S96T005688	167: 3	Lower half	<225	<213	<219
S96T005689	167: 4	Lower half	<210	<211	<210.5
S96T005436	167: 5	Lower half	<186	<188	<187

Table B2-44. Tank 241-AN-103 Analytical Results: Silver (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
S96T005448	167: 6	Lower half	<211	<204	<207.5
S96T005690	167: 7	Lower half	<196	<218	<207
S96T005736	167: 8	Lower half	<221	<187	<204
S96T005856	167: 9	Lower half	<184	<211	<197.5
S96T005706	167: 1	Upper half	<187	<222	<204.5
S96T005691		Lower half	<185	<184	<184.5
S96T005442	167: 2	Upper half	<216	<194	<205
S96T005449		Lower half	<198	<202	<200
S96T005443	167: 4	Upper half	<220	<211	<215.5
S96T005437		Lower half	<205	<203	<204
S96T005707	167: 5	Upper half	<213	<184	<198.5
S96T005692		Lower half	<183	<218	<200.5
S96T005496	167: 7	Upper half	<212	<210	<211
S96T005497		Lower half	<210	<211	<210.5

Table B2-45. Tank 241-AN-103 Analytical Results: Sodium (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005609	166: 1	Lower half	1.910E+05	1.860E+05	1.885E+05
S96T005570	166: 4	Lower half	2.440E+05	2.410E+05	2.425E+05[QC:b,c]
S96T005615	166: 6	Lower half	2.410E+05	2.390E+05	2.400E+05
S96T005839	166: 7	Lower half	2.280E+05	2.360E+05	2.320E+05
S96T005840	166: 8	Lower half	2.470E+05	2.530E+05	2.500E+05
S96T005575	166: 9	Lower half	2.160E+05	2.320E+05	2.240E+05[QC:b]
S96T005571	166: 10	Lower half	2.310E+05	2.320E+05	2.315E+05
S96T005616	166: 1	Lower half	2.410E+05	2.500E+05	2.455E+05
S96T005617	166: 2	Lower half	2.400E+05	2.410E+05	2.405E+05
S96T005716	166: 3	Upper half	1.930E+05	2.040E+05	1.985E+05
S96T005722		Lower half	1.800E+05	1.950E+05	1.875E+05
S96T005416	166: 5	Upper half	2.080E+05	1.980E+05	2.030E+05[QC:b]
S97T000459		Lower half	1.920E+05	2.100E+05	2.010E+05[QC:d]
S96T005624	166: 6	Upper half	2.120E+05	2.060E+05	2.090E+05
S96T005618		Lower half	2.040E+05	2.080E+05	2.060E+05
S96T005417	166: 7	Upper half	2.100E+05	2.160E+05	2.130E+05[QC:b]
S96T005411		Lower half	2.150E+05	2.190E+05	2.170E+05[QC:b,c]
S96T005717	166: 8	Upper half	1.960E+05	2.090E+05	2.025E+05
S96T005723		Lower half	2.120E+05	2.040E+05	2.080E+05
S96T005841	166: 9	Upper half	2.060E+05	2.050E+05	2.055E+05
S96T005842		Lower half	1.980E+05	2.040E+05	2.010E+05
S96T005708	167: 1	Upper half	2.590E+05	2.190E+05	2.390E+05
S96T005693		Lower half	2.070E+05	2.090E+05	2.080E+05
S96T005857	167: 2	Lower half	1.990E+05	2.010E+05	2.000E+05
S96T005694	167: 3	Lower half	2.330E+05	2.510E+05	2.420E+05
S96T005695	167: 4	Lower half	2.230E+05	2.220E+05	2.225E+05
S96T005438	167: 5	Lower half	2.120E+05	2.110E+05	2.115E+05[QC:d]
S96T005450	167: 6	Lower half	2.220E+05	2.150E+05	2.185E+05
S96T005696	167: 7	Lower half	2.480E+05	2.440E+05	2.460E+05

Table B2-45. Tank 241-AN-103 Analytical Results: Sodium (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest (Cont'd)			μg/g	μg/g	μg/g
S96T005737	167: 8	Lower half	2.350E+05	2.360E+05	2.355E+05
S96T005858	167: 9	Lower half	2.550E+05	2.480E+05	2.515E+05
S96T005709	167: 1	Upper half	1.970E+05	1.880E+05	1.925E+05
S96T005697		Lower half	2.000E+05	2.000E+05	2.000E+05
S96T005444	167: 2	Upper half	2.050E+05	2.040E+05	2.045E+05
S96T005451		Lower half	2.080E+05	2.060E+05	2.070E+05
S96T005445	167: 4	Upper half	2.190E+05	2.230E+05	2.210E+05
S96T005439		Lower half	2.230E+05	2.190E+05	2.210E+05[QC:d]
S96T005710	167: 5	Upper half	2.130E+05	2.150E+05	2.140E+05
S96T005698		Lower half	2.150E+05	2.180E+05	2.165E+05
S96T005498	167: 7	Upper half	2.280E+05	2.340E+05	2.310E+05
S96T005499		Lower half	2.440E+05	2.270E+05	2.355E+05
S97T000460	Core 166	Solid composite	2.200E+05	2.130E+05	2.165E+05
Liquids			μg/mL	μg/mL	μg/mL
S96T005539	166: 3	Drainable liquid	2.670E+05	2.620E+05	2.645E+05
S96T005540	166: 4	Drainable liquid	2.240E+05	2.010E+05	2.125E+05
S96T005599	166: 6	Drainable liquid	2.740E+05	2.610E+05	2.675E+05[QC:c]
S96T005816	166: 7	Drainable liquid	2.610E+05	2.690E+05	2.650E+05[QC:d]
S96T005817	166: 8	Drainable liquid	2.490E+05	2.700E+05	2.595E+05
S96T005541	166: 9	Drainable liquid	2.560E+05	2.500E+05	2.530E+05[QC:c]
S96T005566	166: 10	Drainable liquid	2.570E+05	2.490E+05	2.530E+05
S96T005600	166: 1	Drainable liquid	2.640E+05	2.560E+05	2.600E+05
S96T005601	166: 2	Drainable liquid	2.700E+05	2.700E+05	2.700E+05[QC:c]
S96T005861	167: 2	Drainable liquid	2.600E+05	2.640E+05	2.620E+05
S96T005673	167: 3	Drainable liquid	2.420E+05	2.400E+05	2.410E+05
S96T005420	167: 5	Drainable liquid	2.590E+05	2.630E+05	2.610E+05[QC:d]
S96T005421	167: 6	Drainable liquid	2.450E+05	2.430E+05	2.440E+05
S96T005683	167: 7	Drainable liquid	2.770E+05	2.730E+05	2.750E+05

Table B2-45. Tank 241-AN-103 Analytical Results: Sodium (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids (Cont'd)			µg/mL	µg/mL	µg/mL
S96T005732	167: 8	Drainable liquid	2.710E+05	2.670E+05	2.690E+05
S96T005862	167: 9	Drainable liquid	2.600E+05	2.630E+05	2.615E+05
S96T005650	167: 1	Drainable liquid	2.330E+05	2.340E+05	2.335E+05
S96T005991	Core 166	Liquid composite	2.630E+05	2.620E+05	2.625E+05[QC:c]
Solids: fusion			µg/g	µg/g	µg/g
S96T005608	166: 1	Lower half	2.300E+05	2.500E+05	2.400E+05
S96T005568	166: 4	Lower half	3.830E+05	3.430E+05	3.630E+05[QC:c]
S96T005611	166: 6	Lower half	2.900E+05	2.980E+05	2.940E+05
S96T005835	166: 7	Lower half	3.660E+05	3.590E+05	3.625E+05
S96T005836	166: 8	Lower half	2.730E+05	2.780E+05	2.755E+05[QC:c]
S96T005574	166: 9	Lower half	3.330E+05	3.410E+05	3.370E+05
S96T005569	166: 10	Lower half	2.860E+05	2.820E+05	2.840E+05[QC:d]
S96T005612	166: 1	Lower half	2.720E+05	2.760E+05	2.740E+05
S96T005613	166: 2	Lower half	2.620E+05	1.760E+05	2.190E+05[QC:e]
S96T005714	166: 3	Upper half	2.980E+05	2.990E+05	2.985E+05
S96T005720		Lower half	2.990E+05	2.850E+05	2.920E+05
S96T005414	166: 5	Upper half	77,400	78,300	77,850
S96T005408		Lower half	75,400	78,000	76,700[QC:c]
S96T005623	166: 6	Upper half	3.070E+05	3.030E+05	3.050E+05
S96T005614		Lower half	2.460E+05	2.440E+05	2.450E+05
S96T005415	166: 7	Upper half	84,300	82,300	83,300
S96T005409		Lower half	3.130E+05	3.140E+05	3.135E+05[QC:d]
S96T005715	166: 8	Upper half	3.040E+05	3.110E+05	3.075E+05
S96T005721		Lower half	3.150E+05	3.070E+05	3.110E+05[QC:c]
S96T005837	166: 9	Upper half	2.580E+05	2.460E+05	2.520E+05
S96T005838		Lower half	2.450E+05	2.440E+05	2.445E+05
S96T005705	167: 1	Upper half	2.930E+05	3.000E+05	2.965E+05
S96T005687		Lower half	2.250E+05	2.500E+05	2.375E+05[QC:d]
S96T005855	167: 2	Lower half	3.090E+05	2.970E+05	3.030E+05

Table B2-45. Tank 241-AN-103 Analytical Results: Sodium (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion (Cont'd)			µg/g	µg/g	µg/g
S96T005688	167: 3	Lower half	2.580E+05	2.610E+05	2.595E+05
S96T005689	167: 4	Lower half	2.570E+05	2.640E+05	2.605E+05
S96T005436	167: 5	Lower half	3.240E+05	3.180E+05	3.210E+05
S96T005448	167: 6	Lower half	3.140E+05	3.260E+05	3.200E+05
S96T005690	167: 7	Lower half	3.300E+05	3.690E+05	3.495E+05
S96T005736	167: 8	Lower half	3.580E+05	3.050E+05	3.315E+05
S96T005856	167: 9	Lower half	3.640E+05	3.480E+05	3.560E+05
S96T005706	167: 1	Upper half	2.870E+05	3.000E+05	2.935E+05
S96T005691		Lower half	2.890E+05	2.790E+05	2.840E+05
S96T005442	167: 2	Upper half	2.990E+05	2.920E+05	2.955E+05
S96T005449		Lower half	2.450E+05	2.380E+05	2.415E+05
S96T005443	167: 4	Upper half	2.510E+05	2.570E+05	2.540E+05
S96T005437		Lower half	2.470E+05	2.460E+05	2.465E+05[QC:c]
S96T005707	167: 5	Upper half	3.240E+05	3.070E+05	3.155E+05
S96T005692		Lower half	3.170E+05	3.100E+05	3.135E+05
S96T005496	167: 7	Upper half	3.200E+05	4.380E+05	3.790E+05[QC:e]
S96T005497		Lower half	3.330E+05	3.120E+05	3.225E+05

Table B2-46. Tank 241-AN-103 Analytical Results: Sulfur (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005609	166: 1	Lower half	997	892	944.5
S96T005570	166: 4	Lower half	<179	<179	<179
S96T005615	166: 6	Lower half	<138	<138	<138
S96T005839	166: 7	Lower half	<202	<205	<203.5
S96T005840	166: 8	Lower half	<197	<197	<197
S96T005575	166: 9	Lower half	240	<199	<219.5
S96T005571	166: 10	Lower half	161	172	166.5
S96T005616	166: 1	Lower half	<145	<136	<140.5
S96T005617	166: 2	Lower half	<141	<141	<141
S96T005716	166: 3	Upper half	856	901	878.5
S96T005722		Lower half	702	760	731
S96T005416	166: 5	Upper half	919	932	925.5
S97T000459		Lower half	939	1,140	1,039.5
S96T005624	166: 6	Upper half	1,020	1,060	1,040
S96T005618		Lower half	973	978	975.5
S96T005417	166: 7	Upper half	1,180	1,210	1,195
S96T005411		Lower half	1,570	1,930	1,750[QC:c]
S96T005717	166: 8	Upper half	1,540	1,620	1,580
S96T005723		Lower half	2,100	1,910	2,005
S96T005841	166: 9	Upper half	1,400	1,490	1,445
S96T005842		Lower half	1,480	1,630	1,555
S96T005708	167: 1	Upper half	660	921	790.5[QC:c]
S96T005693		Lower half	1,110	1,210	1,160
S96T005857	167: 2	Lower half	964	1,120	1,042
S96T005694	167: 3	Lower half	<180	<187	<183.5
S96T005695	167: 4	Lower half	<198	<204	<201
S96T005438	167: 5	Lower half	229	216	222.5[QC:a]
S96T005450	167: 6	Lower half	188	192	190[QC:a]
S96T005696	167: 7	Lower half	<192	<188	<190

Table B2-46. Tank 241-AN-103 Analytical Results: Sulfur (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest (Cont'd)			µg/g	µg/g	µg/g
S96T005737	167: 8	Lower half	<196	<200	<198
S96T005858	167: 9	Lower half	<208	<175	<191.5
S96T005709	167: 1	Upper half	645	645	645
S96T005697		Lower half	774	691	732.5
S96T005444	167: 2	Upper half	789	809	799[QC:a]
S96T005451		Lower half	979	862	920.5[QC:a]
S96T005445	167: 4	Upper half	805	687	746[QC:a]
S96T005439		Lower half	635	761	698[QC:a]
S96T005710	167: 5	Upper half	788	798	793
S96T005698		Lower half	1,010	1,030	1,020
S96T005498	167: 7	Upper half	1,120	1,090	1,105
S96T005499		Lower half	1,640	1,630	1,635
S97T000460	Core 166	Solid composite	809	847	828
Liquids			µg/mL	µg/mL	µg/mL
S96T005539	166: 3	Drainable liquid	425	307	366[QC:e]
S96T005540	166: 4	Drainable liquid	352	292	322
S96T005599	166: 6	Drainable liquid	490	418	454
S96T005816	166: 7	Drainable liquid	477	482	479.5
S96T005817	166: 8	Drainable liquid	466	489	477.5
S96T005541	166: 9	Drainable liquid	485	486	485.5
S96T005566	166: 10	Drainable liquid	372	383	377.5
S96T005600	166: 1	Drainable liquid	433	395	414
S96T005601	166: 2	Drainable liquid	466	451	458.5
S96T005861	167: 2	Drainable liquid	464	480	472
S96T005673	167: 3	Drainable liquid	429	400	414.5
S96T005420	167: 5	Drainable liquid	475	455	465
S96T005421	167: 6	Drainable liquid	463	456	459.5
S96T005683	167: 7	Drainable liquid	469	465	467

Table B2-46. Tank 241-AN-103 Analytical Results: Sulfur (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids (Cont'd)			µg/mL	µg/mL	µg/mL
S96T005732	167: 8	Drainable liquid	462	453	457.5
S96T005862	167: 9	Drainable liquid	466	473	469.5
S96T005650	167: 1	Drainable liquid	398	386	392
S96T005991	Core 166	Liquid composite	431	445	438
Solids: fusion			µg/g	µg/g	µg/g
S96T005608	166: 1	Lower half	<2,100	<2,060	<2,080
S96T005568	166: 4	Lower half	<2,270	<2,220	<2,245
S96T005611	166: 6	Lower half	<2,100	<2,140	<2,120
S96T005835	166: 7	Lower half	<2,100	<2,120	<2,110
S96T005836	166: 8	Lower half	<1,960	<2,060	<2,010
S96T005574	166: 9	Lower half	<1,790	<1,940	<1,865
S96T005569	166: 10	Lower half	<2,090	<2,070	<2,080
S96T005612	166: 1	Lower half	<1,970	<2,040	<2,005
S96T005613	166: 2	Lower half	<2,050	<2,020	<2,035
S96T005714	166: 3	Upper half	<2,010	<2,110	<2,060
S96T005720		Lower half	<2,030	<2,010	<2,020
S96T005414	166: 5	Upper half	<456	<466	<461
S96T005408		Lower half	<480	<463	<471.5
S96T005623	166: 6	Upper half	<2,180	<2,100	<2,140
S96T005614		Lower half	<2,040	<2,010	<2,025
S96T005415	166: 7	Upper half	<523	<528	<525.5
S96T005409		Lower half	<2,110	2,280	<2,195
S96T005715	166: 8	Upper half	2,080	2,540	2,310
S96T005721		Lower half	2,870	2,510	2,690
S96T005837	166: 9	Upper half	<2,070	<2,100	<2,085
S96T005838		Lower half	<1,960	<1,960	<1,960
S96T005705	167: 1	Upper half	<1,990	<2,000	<1,995
S96T005687		Lower half	<2,080	<2,090	<2,085
S96T005855	167: 2	Lower half	<2,020	<1,980	<2,000

Table B2-46. Tank 241-AN-103 Analytical Results: Sulfur (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion (Cont'd)			µg/g	µg/g	µg/g
S96T005688	167: 3	Lower half	<2,250	<2,130	<2,190
S96T005689	167: 4	Lower half	<2,100	<2,110	<2,105
S96T005436	167: 5	Lower half	<1,860	<1,880	<1,870
S96T005448	167: 6	Lower half	<2,110	<2,040	<2,075
S96T005690	167: 7	Lower half	<1,960	<2,180	<2,070
S96T005736	167: 8	Lower half	<2,210	<1,870	<2,040
S96T005856	167: 9	Lower half	<1,840	<2,110	<1,975
S96T005706	167: 1	Upper half	<1,870	<2,220	<2,045
S96T005691		Lower half	<1,850	<1,840	<1,845
S96T005442	167: 2	Upper half	<2,160	<1,940	<2,050
S96T005449		Lower half	<1,980	<2,020	<2,000
S96T005443	167: 4	Upper half	<2,200	<2,110	<2,155
S96T005437		Lower half	<2,050	<2,030	<2,040
S96T005707	167: 5	Upper half	<2,130	<1,840	<1,985
S96T005692		Lower half	<1,830	<2,180	<2,005
S96T005496	167: 7	Upper half	<2,120	<2,100	<2,110
S96T005497		Lower half	<2,100	<2,110	<2,105

Table B2-47. Tank 241-AN-103 Analytical Results: Titanium (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005609	166: 1	Lower half	<14.8	<15.1	<14.95[QC:a]
S96T005570	166: 4	Lower half	<17.9	<17.9	<17.9[QC:c]
S96T005615	166: 6	Lower half	<13.8	<13.8	<13.8[QC:a]
S96T005839	166: 7	Lower half	<20.2	<20.5	<20.35[QC:a]
S96T005840	166: 8	Lower half	<19.7	<19.7	<19.7[QC:a]
S96T005575	166: 9	Lower half	<19.6	<19.9	<19.75
S96T005571	166: 10	Lower half	<15.3	<14.5	<14.9[QC:a]
S96T005616	166: 1	Lower half	<14.5	<13.6	<14.05[QC:a]
S96T005617	166: 2	Lower half	<14.1	<14.1	<14.1[QC:a]
S96T005716	166: 3	Upper half	<19.4	<19.6	<19.5[QC:a]
S96T005722		Lower half	<20.6	<20.6	<20.6[QC:a]
S96T005416	166: 5	Upper half	<20.4	<19	<19.7
S97T000459		Lower half	<5.69	<5.57	<5.63[QC:a]
S96T005624	166: 6	Upper half	<21	<21.5	<21.25[QC:a]
S96T005618		Lower half	<14.2	<14.6	<14.4[QC:a]
S96T005417	166: 7	Upper half	<22.5	<20.5	<21.5
S96T005411		Lower half	<19	<17.6	<18.3
S96T005717	166: 8	Upper half	<20.8	<20.2	<20.5[QC:a]
S96T005723		Lower half	<20.2	<19.8	<20[QC:a]
S96T005841	166: 9	Upper half	<19.3	<19.6	<19.45[QC:a]
S96T005842		Lower half	<17.8	<19.6	<18.7[QC:a]
S96T005708	167: 1	Upper half	<17.9	<20.5	<19.2
S96T005693		Lower half	<22.2	<17.5	<19.85[QC:c]
S96T005857	167: 2	Lower half	<16.7	<17.4	<17.05[QC:a]
S96T005694	167: 3	Lower half	<18	<18.7	<18.35
S96T005695	167: 4	Lower half	<19.8	<20.4	<20.1
S96T005438	167: 5	Lower half	<5.17	<5.51	<5.34[QC:a]
S96T005450	167: 6	Lower half	<5.53	<5.22	<5.375[QC:a]
S96T005696	167: 7	Lower half	<19.2	<18.8	<19

Table B2-47. Tank 241-AN-103 Analytical Results: Titanium (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest (Cont'd)			µg/g	µg/g	µg/g
S96T005737	167: 8	Lower half	<19.6	<20	<19.8
S96T005858	167: 9	Lower half	<20.8	<17.5	<19.15[QC:a]
S96T005709	167: 1	Upper half	<18	<18.7	<18.35
S96T005697		Lower half	<19.8	<18.8	<19.3
S96T005444	167: 2	Upper half	<5.53	<5.45	<5.49[QC:a]
S96T005451		Lower half	<5.68	<5.84	<5.76[QC:a]
S96T005445	167: 4	Upper half	<5.28	<5.51	<5.395[QC:a]
S96T005439		Lower half	<5.68	<5.84	<5.76[QC:a]
S96T005710	167: 5	Upper half	<18.6	<17.9	<18.25
S96T005698		Lower half	<18.2	<18.8	<18.5
S96T005498	167: 7	Upper half	<18.3	<19.5	<18.9
S96T005499		Lower half	<17.8	<19.3	<18.55
S97T000460	Core 166	Solid composite	<5.63	<5.51	<5.57[QC:a]
Liquids			µg/mL	µg/mL	µg/mL
S96T005539	166: 3	Drainable liquid	<4.01	<4.01	<4.01
S96T005540	166: 4	Drainable liquid	<4.01	<4.01	<4.01
S96T005599	166: 6	Drainable liquid	<6.01	<6.01	<6.01
S96T005816	166: 7	Drainable liquid	<6.01	<6.01	<6.01
S96T005817	166: 8	Drainable liquid	<6.01	<6.01	<6.01
S96T005541	166: 9	Drainable liquid	<6.01	<6.01	<6.01
S96T005566	166: 10	Drainable liquid	<4.01	<4.01	<4.01
S96T005600	166: 1	Drainable liquid	<6.01	<6.01	<6.01
S96T005601	166: 2	Drainable liquid	<6.01	<6.01	<6.01
S96T005861	167: 2	Drainable liquid	<6.01	<6.01	<6.01
S96T005673	167: 3	Drainable liquid	<6.01	<6.01	<6.01
S96T005420	167: 5	Drainable liquid	<6.01	<6.01	<6.01
S96T005421	167: 6	Drainable liquid	<6.01	<6.01	<6.01
S96T005683	167: 7	Drainable liquid	<6.01	<6.01	<6.01

Table B2-47. Tank 241-AN-103 Analytical Results: Titanium (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids (Cont'd)			μg/mL	μg/mL	μg/mL
S96T005732	167: 8	Drainable liquid	<6.01	<6.01	<6.01
S96T005862	167: 9	Drainable liquid	<6.01	<6.01	<6.01
S96T005650	167: 1	Drainable liquid	<6.01	<6.01	<6.01
S96T005991	Core 166	Liquid composite	<12	<12	<12
Solids: fusion			μg/g	μg/g	μg/g
S96T005608	166: 1	Lower half	<210	<206	<208
S96T005568	166: 4	Lower half	<227	<222	<224.5
S96T005611	166: 6	Lower half	<210	<214	<212
S96T005835	166: 7	Lower half	<210	<212	<211
S96T005836	166: 8	Lower half	<196	<206	<201
S96T005574	166: 9	Lower half	293	261	277
S96T005569	166: 10	Lower half	<209	<207	<208
S96T005612	166: 1	Lower half	<197	<204	<200.5
S96T005613	166: 2	Lower half	<205	<202	<203.5
S96T005714	166: 3	Upper half	<201	<211	<206
S96T005720		Lower half	<203	<201	<202
S96T005414	166: 5	Upper half	<45.6	<46.6	<46.1
S96T005408		Lower half	<48	<46.3	<47.15
S96T005623	166: 6	Upper half	<218	<210	<214
S96T005614		Lower half	<204	<201	<202.5[QC:a]
S96T005415	166: 7	Upper half	<52.3	<52.8	<52.55
S96T005409		Lower half	<211	<208	<209.5
S96T005715	166: 8	Upper half	<201	<206	<203.5
S96T005721		Lower half	<203	<199	<201
S96T005837	166: 9	Upper half	<207	<210	<208.5
S96T005838		Lower half	<196	<196	<196
S96T005705	167: 1	Upper half	<199	<200	<199.5
S96T005687		Lower half	<208	<209	<208.5
S96T005855	167: 2	Lower half	<202	<198	<200

Table B2-47. Tank 241-AN-103 Analytical Results: Titanium (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion (Cont'd)			µg/g	µg/g	µg/g
S96T005688	167: 3	Lower half	<225	<213	<219
S96T005689	167: 4	Lower half	<210	<211	<210.5
S96T005436	167: 5	Lower half	<186	<188	<187
S96T005448	167: 6	Lower half	<211	<204	<207.5
S96T005690	167: 7	Lower half	<196	<218	<207
S96T005736	167: 8	Lower half	<221	<187	<204
S96T005856	167: 9	Lower half	<184	<211	<197.5
S96T005706	167: 1	Upper half	<187	<222	<204.5
S96T005691		Lower half	<185	<184	<184.5
S96T005442	167: 2	Upper half	<216	<194	<205
S96T005449		Lower half	<198	<202	<200
S96T005443	167: 4	Upper half	<220	<211	<215.5
S96T005437		Lower half	<205	<203	<204
S96T005707	167: 5	Upper half	<213	<184	<198.5
S96T005692		Lower half	<183	<218	<200.5
S96T005496	167: 7	Upper half	<212	<210	<211
S96T005497		Lower half	<210	<211	<210.5

Table B2-48. Tank 241-AN-103 Analytical Results: Zinc (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005609	166: 1	Lower half	<14.8	17.8	<16.3
S96T005570	166: 4	Lower half	<17.9	20.1	<19
S96T005615	166: 6	Lower half	<13.8	<13.8	<13.8
S96T005839	166: 7	Lower half	<20.2	<20.5	<20.35
S96T005840	166: 8	Lower half	34.8	19.9	27.35[QC:a,c]
S96T005575	166: 9	Lower half	22.1	20.1	21.1
S96T005571	166: 10	Lower half	29.4	<14.5	<21.95[QC:c]
S96T005616	166: 1	Lower half	<14.5	<13.6	<14.05
S96T005617	166: 2	Lower half	<14.1	<14.1	<14.1
S96T005716	166: 3	Upper half	<19.4	<19.6	<19.5
S96T005722		Lower half	<20.6	<20.6	<20.6
S96T005416	166: 5	Upper half	22.7	21.3	22
S97T000459		Lower half	<5.69	<5.57	<5.63[QC:a]
S96T005624	166: 6	Upper half	<21	22.8	<21.9
S96T005618		Lower half	<14.2	39.7	<26.95[QC:c]
S96T005417	166: 7	Upper half	23.2	<20.5	<21.85
S96T005411		Lower half	23.1	<17.6	<20.35[QC:c]
S96T005717	166: 8	Upper half	68.6	70.3	69.45
S96T005723		Lower half	<20.2	<19.8	<20
S96T005841	166: 9	Upper half	30.5	22	26.25[QC:a,c]
S96T005842		Lower half	24.7	35.3	30[QC:a,c]
S96T005708	167: 1	Upper half	84.1	87.1	85.6
S96T005693		Lower half	67	41.2	54.1[QC:c]
S96T005857	167: 2	Lower half	29.8	27.2	28.5
S96T005694	167: 3	Lower half	18.9	44.8	31.85[QC:c]
S96T005695	167: 4	Lower half	65.6	31.6	48.6[QC:c]
S96T005438	167: 5	Lower half	9.57	7.95	8.76[QC:a]
S96T005450	167: 6	Lower half	7.07	8.4	7.735[QC:a]
S96T005696	167: 7	Lower half	27.8	20.2	24[QC:c]

Table B2-48. Tank 241-AN-103 Analytical Results: Zinc (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest (Cont'd)			µg/g	µg/g	µg/g
S96T005737	167: 8	Lower half	26	66.5	46.25[QC:e]
S96T005858	167: 9	Lower half	<20.8	28.1	<24.45[QC:e]
S96T005709	167: 1	Upper half	23.9	38.5	31.2[QC:e]
S96T005697		Lower half	51.1	36.3	43.7[QC:e]
S96T005444	167: 2	Upper half	6.15	11	8.575[QC:a,e]
S96T005451		Lower half	6.32	<5.84	<6.08[QC:a]
S96T005445	167: 4	Upper half	10	5.96	7.98[QC:a,e]
S96T005439		Lower half	17.2	19.2	18.2[QC:a]
S96T005710	167: 5	Upper half	57.3	50.9	54.1
S96T005698		Lower half	42.2	25.3	33.75[QC:e]
S96T005498	167: 7	Upper half	142	117	129.5
S96T005499		Lower half	31	33.6	32.3
S97T000460	Core 166	Solid composite	7.3	6.94	7.12[QC:a]
Liquids			µg/mL	µg/mL	µg/mL
S96T005539	166: 3	Drainable liquid	10.8	10.3	10.55
S96T005540	166: 4	Drainable liquid	14.3	13.4	13.85
S96T005599	166: 6	Drainable liquid	<6.01	<6.01	<6.01
S96T005816	166: 7	Drainable liquid	7.04	7.44	7.24
S96T005817	166: 8	Drainable liquid	7.33	8.19	7.76
S96T005541	166: 9	Drainable liquid	10.2	9.56	9.88
S96T005566	166: 10	Drainable liquid	11.6	11.2	11.4
S96T005600	166: 1	Drainable liquid	6.44	<6.01	<6.225
S96T005601	166: 2	Drainable liquid	<6.01	<6.01	<6.01
S96T005861	167: 2	Drainable liquid	7.46	7.4	7.43
S96T005673	167: 3	Drainable liquid	<6.01	<6.01	<6.01
S96T005420	167: 5	Drainable liquid	11.6	11.8	11.7
S96T005421	167: 6	Drainable liquid	14.9	14.1	14.5
S96T005683	167: 7	Drainable liquid	6.53	6.47	6.5

Table B2-48. Tank 241-AN-103 Analytical Results: Zinc (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids (Cont'd)			µg/mL	µg/mL	µg/mL
S96T005732	167: 8	Drainable liquid	21.7	21.1	21.4
S96T005862	167: 9	Drainable liquid	8.59	8.72	8.655
S96T005650	167: 1	Drainable liquid	13.9	14	13.95
S96T005991	Core 166	Liquid composite	<12	<12	<12
Solids: fusion			µg/g	µg/g	µg/g
S96T005608	166: 1	Lower half	<210	<206	<208
S96T005568	166: 4	Lower half	811	952	881.5
S96T005611	166: 6	Lower half	<210	<214	<212
S96T005835	166: 7	Lower half	<210	<212	<211
S96T005836	166: 8	Lower half	<196	<206	<201
S96T005574	166: 9	Lower half	3,000	2,940	2,970
S96T005569	166: 10	Lower half	<209	<207	<208
S96T005612	166: 1	Lower half	<197	<204	<200.5
S96T005613	166: 2	Lower half	<205	<202	<203.5
S96T005714	166: 3	Upper half	<201	<211	<206
S96T005720		Lower half	<203	658	<430.5[QC:e]
S96T005414	166: 5	Upper half	177	114	145.5[QC:e]
S96T005408		Lower half	177	46.6	111.8[QC:e]
S96T005623	166: 6	Upper half	<218	<210	<214
S96T005614		Lower half	<204	<201	<202.5
S96T005415	166: 7	Upper half	369	<52.8	<210.9[QC:e]
S96T005409		Lower half	<211	343	<277[QC:e]
S96T005715	166: 8	Upper half	<201	<206	<203.5
S96T005721		Lower half	<203	<199	<201
S96T005837	166: 9	Upper half	<207	<210	<208.5
S96T005838		Lower half	<196	<196	<196
S96T005705	167: 1	Upper half	466	209	337.5[QC:e]
S96T005687		Lower half	<208	<209	<208.5
S96T005855	167: 2	Lower half	<202	<198	<200

Table B2-48. Tank 241-AN-103 Analytical Results: Zinc (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion (Cont'd)			µg/g	µg/g	µg/g
S96T005688	167: 3	Lower half	<225	<213	<219
S96T005689	167: 4	Lower half	<210	<211	<210.5
S96T005436	167: 5	Lower half	223	<188	<205.5
S96T005448	167: 6	Lower half	<211	375	<293[QC:c]
S96T005690	167: 7	Lower half	<196	<218	<207
S96T005736	167: 8	Lower half	<221	<187	<204
S96T005856	167: 9	Lower half	<184	<211	<197.5
S96T005706	167: 1	Upper half	<187	<222	<204.5
S96T005691		Lower half	<185	<184	<184.5
S96T005442	167: 2	Upper half	<216	<194	<205
S96T005449		Lower half	<198	<202	<200
S96T005443	167: 4	Upper half	<220	<211	<215.5
S96T005437		Lower half	<205	<203	<204
S96T005707	167: 5	Upper half	<213	189	<201
S96T005692		Lower half	<183	<218	<200.5
S96T005496	167: 7	Upper half	296	231	263.5[QC:c]
S96T005497		Lower half	<210	<211	<210.5

Table B2-49. Tank 241-AN-103 Analytical Results: Zirconium (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest			µg/g	µg/g	µg/g
S96T005609	166: 1	Lower half	<14.8	<15.1	<14.95
S96T005570	166: 4	Lower half	<17.9	<17.9	<17.9
S96T005615	166: 6	Lower half	<13.8	<13.8	<13.8
S96T005839	166: 7	Lower half	<20.2	<20.5	<20.35
S96T005840	166: 8	Lower half	<19.7	<19.7	<19.7
S96T005575	166: 9	Lower half	<19.6	<19.9	<19.75
S96T005571	166: 10	Lower half	<15.3	<14.5	<14.9
S96T005616	166: 1	Lower half	<14.5	<13.6	<14.05
S96T005617	166: 2	Lower half	<14.1	<14.1	<14.1
S96T005716	166: 3	Upper half	<19.4	<19.6	<19.5
S96T005722		Lower half	<20.6	<20.6	<20.6
S96T005416	166: 5	Upper half	<20.4	<19	<19.7
S97T000459		Lower half	<5.69	<5.57	<5.63
S96T005624	166: 6	Upper half	<21	<21.5	<21.25
S96T005618		Lower half	<14.2	<14.6	<14.4
S96T005417	166: 7	Upper half	<22.5	<20.5	<21.5
S96T005411		Lower half	<19	<17.6	<18.3^QC:c
S96T005717	166: 8	Upper half	<20.8	<20.2	<20.5
S96T005723		Lower half	<20.2	<19.8	<20
S96T005841	166: 9	Upper half	<19.3	<19.6	<19.45
S96T005842		Lower half	<17.8	<19.6	<18.7
S96T005708	167: 1	Upper half	<17.9	<20.5	<19.2
S96T005693		Lower half	<22.2	<17.5	<19.85^QC:e
S96T005857	167: 2	Lower half	<16.7	<17.4	<17.05
S96T005694	167: 3	Lower half	<18	<18.7	<18.35
S96T005695	167: 4	Lower half	<19.8	<20.4	<20.1
S96T005438	167: 5	Lower half	<5.17	<5.51	<5.34
S96T005450	167: 6	Lower half	<5.53	<5.22	<5.375
S96T005696	167: 7	Lower half	<19.2	<18.8	<19

Table B2-49. Tank 241-AN-103 Analytical Results: Zirconium (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: acid digest (Cont'd)			µg/g	µg/g	µg/g
S96T005737	167: 8	Lower half	<19.6	<20	<19.8
S96T005858	167: 9	Lower half	<20.8	<17.5	<19.15
S96T005709	167: 1	Upper half	<18	<18.7	<18.35
S96T005697		Lower half	<19.8	<18.8	<19.3
S96T005444	167: 2	Upper half	<5.53	<5.45	<5.49
S96T005451		Lower half	<5.68	<5.84	<5.76
S96T005445	167: 4	Upper half	<5.28	<5.51	<5.395
S96T005439		Lower half	<5.68	<5.84	<5.76
S96T005710	167: 5	Upper half	<18.6	<17.9	<18.25
S96T005698		Lower half	<18.2	<18.8	<18.5
S96T005498	167: 7	Upper half	<18.3	<19.5	<18.9
S96T005499		Lower half	<17.8	<19.3	<18.55
S97T000460	Core 166	Solid composite	<5.63	<5.51	<5.57
Liquids			µg/mL	µg/mL	µg/mL
S96T005539	166: 3	Drainable liquid	6.11	6.55	6.33
S96T005540	166: 4	Drainable liquid	8.4	12.2	10.3[QC:e]
S96T005599	166: 6	Drainable liquid	7.21	8.82	8.015[QC:e]
S96T005816	166: 7	Drainable liquid	6.34	6.38	6.36
S96T005817	166: 8	Drainable liquid	6.09	6.63	6.36
S96T005541	166: 9	Drainable liquid	7.06	7.39	7.225
S96T005566	166: 10	Drainable liquid	7.81	7.85	7.83
S96T005600	166: 1	Drainable liquid	9.11	9.79	9.45
S96T005601	166: 2	Drainable liquid	<6.01	<6.01	<6.01
S96T005861	167: 2	Drainable liquid	6.36	7.24	6.8
S96T005673	167: 3	Drainable liquid	11.7	11.8	11.75
S96T005420	167: 5	Drainable liquid	<6.01	<6.01	<6.01
S96T005421	167: 6	Drainable liquid	8.13	8.13	8.13
S96T005683	167: 7	Drainable liquid	<6.01	<6.01	<6.01

Table B2-49. Tank 241-AN-103 Analytical Results: Zirconium (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids (Cont'd)			µg/mL	µg/mL	µg/mL
S96T005732	167: 8	Drainable liquid	<6.01	<6.01	<6.01
S96T005862	167: 9	Drainable liquid	6.72	6.49	6.605
S96T005650	167: 1	Drainable liquid	10	10.5	10.25
S96T005991	Core 166	Liquid composite	<12	<12	<12
Solids: fusion			µg/g	µg/g	µg/g
S96T005608	166: 1	Lower half	<210	<206	<208
S96T005568	166: 4	Lower half	<227	<222	<224.5
S96T005611	166: 6	Lower half	<210	<214	<212
S96T005835	166: 7	Lower half	<210	<212	<211
S96T005836	166: 8	Lower half	<196	<206	<201
S96T005574	166: 9	Lower half	<179	<194	<186.5
S96T005569	166: 10	Lower half	<209	<207	<208
S96T005612	166: 1	Lower half	<197	<204	<200.5
S96T005613	166: 2	Lower half	<205	<202	<203.5
S96T005714	166: 3	Upper half	<201	<211	<206
S96T005720		Lower half	<203	<201	<202
S96T005414	166: 5	Upper half	<45.6	<46.6	<46.1
S96T005408		Lower half	<48	<46.3	<47.15
S96T005623	166: 6	Upper half	<218	<210	<214
S96T005614		Lower half	<204	<201	<202.5
S96T005415	166: 7	Upper half	<52.3	<52.8	<52.55
S96T005409		Lower half	<211	<208	<209.5
S96T005715	166: 8	Upper half	<201	<206	<203.5
S96T005721		Lower half	<203	<199	<201
S96T005837	166: 9	Upper half	<207	<210	<208.5
S96T005838		Lower half	<196	<196	<196
S96T005705	167: 1	Upper half	<199	<200	<199.5
S96T005687		Lower half	<208	<209	<208.5
S96T005855	167: 2	Lower half	<202	<198	<200

Table B2-49. Tank 241-AN-103 Analytical Results: Zirconium (ICP). (4 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion (Cont'd)			μg/g	μg/g	μg/g
S96T005688	167: 3	Lower half	<225	<213	<219
S96T005689	167: 4	Lower half	<210	<211	<210.5
S96T005436	167: 5	Lower half	<186	<188	<187
S96T005448	167: 6	Lower half	<211	<204	<207.5
S96T005690	167: 7	Lower half	<196	<218	<207
S96T005736	167: 8	Lower half	<221	<187	<204
S96T005856	167: 9	Lower half	<184	<211	<197.5
S96T005706	167: 1	Upper half	<187	<222	<204.5
S96T005691		Lower half	<185	<184	<184.5
S96T005442	167: 2	Upper half	<216	<194	<205
S96T005449		Lower half	<198	<202	<200
S96T005443	167: 4	Upper half	<220	<211	<215.5
S96T005437		Lower half	<205	<203	<204
S96T005707	167: 5	Upper half	<213	<184	<198.5
S96T005692		Lower half	<183	<218	<200.5
S96T005496	167: 7	Upper half	<212	<210	<211
S96T005497		Lower half	<210	<211	<210.5

Table B2-50. Tank 241-AN-103 Inductively Coupled Plasma Results with Less Than Value.

Analytes	Maximum "Less Than" Value (µg\g)
Arsenic	<2270
Barium	<1130
Bismuth	<2270
Cerium	<2270
Magnesium	<2270
Neodymium	<2270
Samarium	<2270
Strontium	<227
Thallium	<4530
Total Uranium	<11,300
Vanadium	<1130

Table B2-51. Tank 241-AN-103 Analytical Results: Bromide (IC). (2 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: water digest			µg/g	µg/g	µg/g
S96T005610	166: 1	Lower half	<1,105	<1,080	<1,092.5
S96T005572	166: 4	Lower half	<1,087	<1,030	<1,058.5
S96T005619	166: 6	Lower half	<1,128	<1,130	<1,129
S96T005843	166: 7	Lower half	<997.9	<986	<991.95
S96T005844	166: 8	Lower half	<1,016	<1,010	<1,013
S96T005576	166: 9	Lower half	<997.1	<946	<971.55
S96T005573	166: 10	Lower half	<1,123	<1,090	<1,106.5
S96T005620	166: 1	Lower half	<2,489	<2,480	<2,484.5
S96T005621	166: 2	Lower half	<2,481	<2,530	<2,505.5
S96T005718	166: 3	Upper half	<1,081	<1,100	<1,090.5
S96T005724		Lower half	<497.4	507	<502.2
S96T005418	166: 5	Upper half	713.3	662	687.65
S96T005412		Lower half	<1,023	<1,000	<1,011.5
S96T005625	166: 6	Upper half	<927.3	<925	<926.15
S96T005622		Lower half	<1,022	<1,030	<1,026
S96T005419	166: 7	Upper half	663.7	628	645.85
S96T005413		Lower half	<1,029	<1,120	<1,074.5
S96T005719	166: 8	Upper half	650.9	624	637.45
S96T005725		Lower half	<479.1	<470	<474.55
S96T005845	166: 9	Upper half	348.3	450	399.15[QC:e]
S96T005846		Lower half	381.7	512	446.85[QC:e]
S96T005711	167: 1	Upper half	<1,630	<1,700	<1,665
S96T005699		Lower half	<1,721	<1,640	<1,680.5
S96T005859	167: 2	Lower half	1,123	1,100	1,111.5
S96T005700	167: 3	Lower half	1,920	1,960	1,940
S96T005701	167: 4	Lower half	1,877	2,070	1,973.5
S96T005440	167: 5	Lower half	1,123	988	1,055.5
S96T005452	167: 6	Lower half	<952.6	<962	<957.3
S96T005702	167: 7	Lower half	<1,162	<1,270	<1,216
S96T005738	167: 8	Lower half	<944.4	<937	<940.7
S96T005860	167: 9	Lower half	<474.9	<520	<497.45

Table B2-51. Tank 241-AN-103 Analytical Results: Bromide (IC). (2 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: water digest (Cont')			µg/g	µg/g	µg/g
S96T005712	167: 1	Upper half	<970.3	<1,010	<990.15
S96T005703		Lower half	<514.4	<495	<504.7
S96T005446	167: 2	Upper half	<494.1	<518	<506.05
S96T005453		Lower half	<506.4	<508	<507.2
S96T005447	167: 4	Upper half	<485.8	<470	<477.9
S96T005441		Lower half	<1,178	<1,180	<1,179
S96T005713	167: 5	Upper half	<980.5	<961	<970.75
S96T005704		Lower half	<1,015	<990	<1,002.5
S96T005500	167: 7	Upper half	<1,694	1,820	<1,757
S96T005501		Lower half	<1,712	<1,630	<1,671
S97T000023	Core 166	Solid composite	491.4	402	446.7
Liquids			µg/mL	µg/mL	µg/mL
S96T005539	166: 3	Drainable liquid	<1,275	<1,280	<1,277.5
S96T005540	166: 4	Drainable liquid	<1,275	<1,280	<1,277.5
S96T005599	166: 6	Drainable liquid	971.2	743	857.1[QC:c]
S96T005816	166: 7	Drainable liquid	795.1	788	791.55
S96T005817	166: 8	Drainable liquid	764.4	751	757.7
S96T005541	166: 9	Drainable liquid	408.7	419	413.85
S96T005566	166: 10	Drainable liquid	436.2	435	435.6
S96T005600	166: 1	Drainable liquid	992.2	976	984.1
S96T005601	166: 2	Drainable liquid	808.4	710	759.2
S96T005861	167: 2	Drainable liquid	1,081	1,090	1,085.5
S96T005673	167: 3	Drainable liquid	1,902	1,890	1,896
S96T005420	167: 5	Drainable liquid	931.9	944	937.95
S96T005421	167: 6	Drainable liquid	768.3	750	759.15
S96T005683	167: 7	Drainable liquid	1,947	1,910	1,928.5
S96T005732	167: 8	Drainable liquid	1,805	1,790	1,797.5
S96T005862	167: 9	Drainable liquid	910.7	901	905.85
S96T005650	167: 1	Drainable liquid	3,273	3,270	3,271.5
S96T005991	Core 166	Liquid composite	1,567	1,590	1,578.5

Table B2-52. Tank 241-AN-103 Analytical Results: Chloride (IC). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: water digest			µg/g	µg/g	µg/g
S96T005610	166: 1	Lower half	2,695	3,580	3,137.5[QC:e]
S96T005572	166: 4	Lower half	2,748	3,120	2,934[QC:c]
S96T005619	166: 6	Lower half	2,908	2,800	2,854
S96T005843	166: 7	Lower half	2,369	2,020	2,194.5
S96T005844	166: 8	Lower half	1,987	2,310	2,148.5
S96T005576	166: 9	Lower half	3,751	3,970	3,860.5
S96T005573	166: 10	Lower half	2,742	2,990	2,866
S96T005620	166: 1	Lower half	2,265	2,150	2,207.5
S96T005621	166: 2	Lower half	2,383	2,770	2,576.5
S96T005718	166: 3	Upper half	5,228	5,640	5,434
S96T005724		Lower half	5,365	4,850	5,107.5
S96T005418	166: 5	Upper half	4,102	3,660	3,881
S96T005412		Lower half	4,136	3,330	3,733[QC:e]
S96T005625	166: 6	Upper half	3,726	4,000	3,863
S96T005622		Lower half	4,118	3,950	4,034
S96T005419	166: 7	Upper half	3,042	3,120	3,081[QC:d]
S96T005413		Lower half	3,644	3,450	3,547
S96T005719	166: 8	Upper half	4,070	3,820	3,945
S96T005725		Lower half	4,356	4,140	4,248
S96T005845	166: 9	Upper half	3,741	4,370	4,055.5
S96T005846		Lower half	3,986	4,210	4,098
S96T005711	167: 1	Upper half	3,789	4,060	3,924.5[QC:d]
S96T005699		Lower half	3,760	3,640	3,700
S96T005859	167: 2	Lower half	3,016	3,130	3,073
S96T005700	167: 3	Lower half	4,150	4,120	4,135
S96T005701	167: 4	Lower half	4,577	4,520	4,548.5
S96T005440	167: 5	Lower half	4,757	4,020	4,388.5
S96T005452	167: 6	Lower half	3,833	4,350	4,091.5
S96T005702	167: 7	Lower half	1,959	1,950	1,954.5

Table B2-52. Tank 241-AN-103 Analytical Results: Chloride (IC). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: water digest (Cont'd)			µg/g	µg/g	µg/g
S96T005738	167: 8	Lower half	2,363	1,760	2,061.5[QC:e]
S96T005860	167: 9	Lower half	1,156	1,110	1,133
S96T005712	167: 1	Upper half	6,416	6,640	6,528
S96T005703		Lower half	5,194	5,040	5,117
S96T005446	167: 2	Upper half	5,077	4,840	4,958.5
S96T005453		Lower half	2,633	2,520	2,576.5
S96T005447	167: 4	Upper half	1,322	1,540	1,431
S96T005441		Lower half	2,322	2,480	2,401
S96T005713	167: 5	Upper half	2,994	2,790	2,892
S96T005704		Lower half	6,010	5,930	5,970
S96T005500	167: 7	Upper half	2,852	2,970	2,911[QC:d]
S96T005501		Lower half	4,195	4,130	4,162.5[QC:d]
S97T000023	Core 166	Solid composite	3,784	3,680	3,732
Liquids			µg/mL	µg/mL	µg/mL
S96T005539	166: 3	Drainable liquid	12,490	12,200	12,345
S96T005540	166: 4	Drainable liquid	11,380	11,300	11,340
S96T005599	166: 6	Drainable liquid	7,574	8,080	7,827
S96T005816	166: 7	Drainable liquid	11,450	11,400	11,425
S96T005817	166: 8	Drainable liquid	8,432	8,250	8,341
S96T005541	166: 9	Drainable liquid	11,790	11,500	11,645
S96T005566	166: 10	Drainable liquid	11,050	11,000	11,025
S96T005600	166: 1	Drainable liquid	6,598	6,930	6,764
S96T005601	166: 2	Drainable liquid	5,448	7,830	6,639[QC:e]
S96T005861	167: 2	Drainable liquid	10,170	10,200	10,185
S96T005673	167: 3	Drainable liquid	10,970	11,400	11,185
S96T005420	167: 5	Drainable liquid	9,865	10,000	9,932.5
S96T005421	167: 6	Drainable liquid	11,040	10,900	10,970
S96T005683	167: 7	Drainable liquid	11,220	11,100	11,160

Table B2-52. Tank 241-AN-103 Analytical Results: Chloride (IC). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids (Cont'd)			µg/mL	µg/mL	µg/mL
S96T005732	167: 8	Drainable liquid	12,470	12,700	12,585
S96T005862	167: 9	Drainable liquid	9,378	9,580	9,479
S96T005650	167: 1	Drainable liquid	10,360	10,500	10,430
S96T005991	Core 166	Liquid composite	9,770	10,000	9,885

Table B2-53. Tank 241-AN-103 Analytical Results: Fluoride (IC). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: water digest			µg/g	µg/g	µg/g
S96T005610	166: 1	Lower half	692.2	836	764.1
S96T005572	166: 4	Lower half	422.9	624	523.45[QC:e]
S96T005619	166: 6	Lower half	589.4	483	536.2
S96T005843	166: 7	Lower half	528.2	548	538.1
S96T005844	166: 8	Lower half	313.4	406	359.7[QC:e]
S96T005576	166: 9	Lower half	809.7	900	854.85
S96T005573	166: 10	Lower half	423.4	705	564.2[QC:e]
S96T005620	166: 1	Lower half	781.5	952	866.75
S96T005621	166: 2	Lower half	1,014	1,210	1,112
S96T005718	166: 3	Upper half	646.4	649	647.7
S96T005724		Lower half	715.6	351	533.3[QC:e]
S96T005418	166: 5	Upper half	602.1	543	572.55
S96T005412		Lower half	823.6	702	762.8
S96T005625	166: 6	Upper half	632.5	606	619.25
S96T005622		Lower half	499.2	497	498.1
S96T005419	166: 7	Upper half	645.2	753	699.1
S96T005413		Lower half	679.2	676	677.6
S96T005719	166: 8	Upper half	1,295	989	1,142[QC:e]
S96T005725		Lower half	1,527	1,550	1,538.5
S96T005845	166: 9	Upper half	880.9	902	891.45
S96T005846		Lower half	1,159	1,040	1,099.5[QC:e]
S96T005711	167: 1	Upper half	911	961	936[QC:d]
S96T005699		Lower half	964.6	892	928.3
S96T005859	167: 2	Lower half	434.8	423	428.9
S96T005700	167: 3	Lower half	850	786	818
S96T005701	167: 4	Lower half	659.8	987	823.4[QC:e]
S96T005440	167: 5	Lower half	1,932	1,710	1,821
S96T005452	167: 6	Lower half	1,703	637	1,170[QC:e]
S96T005702	167: 7	Lower half	840.3	916	878.15

Table B2-53. Tank 241-AN-103 Analytical Results: Fluoride (IC). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: water digest (Cont'd)			**µg/g**	**µg/g**	**µg/g**
S96T005738	167: 8	Lower half	1,107	1,000	1,053.5
S96T005860	167: 9	Lower half	670.4	621	645.7
S96T005712	167: 1	Upper half	719.4	728	723.7
S96T005703		Lower half	293	282	287.5
S96T005446	167: 2	Upper half	372.3	373	372.65
S96T005453		Lower half	386.4	367	376.7
S96T005447	167: 4	Upper half	269.7	268	268.85
S96T005441		Lower half	286.9	315	300.95
S96T005713	167: 5	Upper half	405.8	1,270	837.9[QC:c]
S96T005704		Lower half	703.8	663	683.4
S96T005500	167: 7	Upper half	1,897	1,790	1,843.5
S96T005501		Lower half	4,114	3,980	4,047[QC:d]
S97T000023	Core 166	Solid composite	3,925	4,350	4,137.5
Liquids			**µg/mL**	**µg/mL**	**µg/mL**
S96T005539	166: 3	Drainable liquid	572.4	538	555.2
S96T005540	166: 4	Drainable liquid	634.3	633	633.65
S96T005599	166: 6	Drainable liquid	409.1	391	400.05
S96T005816	166: 7	Drainable liquid	491.5	539	515.25
S96T005817	166: 8	Drainable liquid	389.3	355	372.15
S96T005541	166: 9	Drainable liquid	653	639	646
S96T005566	166: 10	Drainable liquid	674.1	610	642.05
S96T005600	166: 1	Drainable liquid	440.6	443	441.8
S96T005601	166: 2	Drainable liquid	426.8	447	436.9
S96T005861	167: 2	Drainable liquid	461	424	442.5
S96T005673	167: 3	Drainable liquid	646.6	619	632.8
S96T005420	167: 5	Drainable liquid	708.4	702	705.2
S96T005421	167: 6	Drainable liquid	801.5	826	813.75
S96T005683	167: 7	Drainable liquid	713.1	660	686.55

Table B2-53. Tank 241-AN-103 Analytical Results: Fluoride (IC). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids (Liquids)			μg/mL	μg/mL	μg/mL
S96T005732	167: 8	Drainable liquid	714	708	711
S96T005862	167: 9	Drainable liquid	402.7	393	397.85
S96T005650	167: 1	Drainable liquid	658.5	637	647.75
S96T005991	Core 166	Liquid composite	590.2	602	596.1

Table B2-54. Tank 241-AN-103 Analytical Results: Formate (IC). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: water digest			µg/g	µg/g	µg/g
S96T005610	166: 1	Lower half	732.3	871	801.65
S96T005572	166: 4	Lower half	531.5	439	485.25
S96T005619	166: 6	Lower half	655	670	662.5
S96T005843	166: 7	Lower half	508	561	534.5
S96T005844	166: 8	Lower half	501.7	541	521.35
S96T005576	166: 9	Lower half	<167.5	590	<378.75[QC:e]
S96T005573	166: 10	Lower half	667.5	740	703.75
S96T005620	166: 1	Lower half	603.9	561	582.45
S96T005621	166: 2	Lower half	583.8	576	579.9
S96T005718	166: 3	Upper half	1,031	1,050	1,040.5
S96T005724		Lower half	940.3	1,010	975.15
S96T005418	166: 5	Upper half	799	778	788.5
S96T005412		Lower half	860.7	776	818.35
S96T005625	166: 6	Upper half	812.9	838	825.45
S96T005622		Lower half	906.1	946	926.05
S96T005419	166: 7	Upper half	818.7	<89.5	<454.1[QC:e]
S96T005413		Lower half	825.2	883	854.1
S96T005719	166: 8	Upper half	885.4	838	861.7
S96T005725		Lower half	769.5	797	783.25
S96T005845	166: 9	Upper half	713.1	826	769.55
S96T005846		Lower half	842.6	941	891.8
S96T005711	167: 1	Upper half	842.7	873	857.85
S96T005699		Lower half	818.6	921	869.8
S96T005859	167: 2	Lower half	708.8	745	726.9
S96T005700	167: 3	Lower half	776.2	796	786.1
S96T005701	167: 4	Lower half	822.8	838	830.4
S96T005440	167: 5	Lower half	760.7	686	723.35
S96T005452	167: 6	Lower half	624.3	665	644.65
S96T005702	167: 7	Lower half	<769.7	<838	<803.85

Table B2-54. Tank 241-AN-103 Analytical Results: Formate (IC). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: water digest (Cont'd)			µg/g	µg/g	µg/g
S96T005738	167: 8	Lower half	529.4	475	502.2
S96T005860	167: 9	Lower half	511.9	547	529.45
S96T005712	167: 1	Upper half	816.4	880	848.2
S96T005703		Lower half	<827.2	2,290	<1,558.6[QC:e]
S96T005446	167: 2	Upper half	730.3	746	738.15
S96T005453		Lower half	766.2	743	754.6
S96T005447	167: 4	Upper half	466.6	539	502.8
S96T005441		Lower half	488.1	561	524.55
S96T005713	167: 5	Upper half	697.7	712	704.85
S96T005704		Lower half	814	701	757.5
S96T005500	167: 7	Upper half	901.6	806	853.8
S96T005501		Lower half	1,073	790	931.5[QC:e]
S97T000023	Core 166	Solid composite[1]	1,276	1,300	1,288
Liquids			µg/mL	µg/mL	µg/mL
S96T005539	166: 3	Drainable liquid	1,585	1,530	1,557.5
S97T000163	166: 4	Drainable liquid	11,410	5,460	8,435[QC:e]
S96T005599	166: 6	Drainable liquid	1,575	1,600	1,587.5
S96T005816	166: 7	Drainable liquid	1,950	2,220	2,085
S96T005817	166: 8	Drainable liquid	2,195	2,210	2,202.5
S96T005541	166: 9	Drainable liquid	1,052	982	1,017
S96T005566	166: 10	Drainable liquid	1,762	1,570	1,666
S96T005600	166: 1	Drainable liquid	4,704	4,760	4,732
S96T005601	166: 2	Drainable liquid	1,773	1,770	1,771.5
S96T005861	167: 2	Drainable liquid	5,019	4,890	4,954.5
S96T005673	167: 3	Drainable liquid	1,555	1,590	1,572.5
S96T005420	167: 5	Drainable liquid	1,689	1,720	1,704.5
S96T005421	167: 6	Drainable liquid	1,699	1,740	1,719.5
S96T005683	167: 7	Drainable liquid	3,343	3,380	3,361.5

Table B2-54. Tank 241-AN-103 Analytical Results: Formate (IC). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids (Cont'd)			μg/mL	μg/mL	μg/mL
S96T005732	167: 8	Drainable liquid	4,248	3,840	4,044
S96T005862	167: 9	Drainable liquid	10,670	9,740	10,205
S96T005650	167: 1	Drainable liquid	1,473	1,460	1,466.5
S96T005991	Core 166	Liquid composite	1,508	1,750	1,629

Note:

Composite sample results are higher than most segment samples, this may be because of sample heterogeneity or incomplete homogenization.

Table B2-55. Tank 241-AN-103 Analytical Results: Nitrate (IC). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: water digest			µg/g	µg/g	µg/g
S96T005610	166: 1	Lower half	2.413E+05	79,000	1.602E+05[QC:e]
S96T005572	166: 4	Lower half	3.015E+05	2.930E+05	2.973E+05[QC:e]
S96T005619	166: 6	Lower half	3.019E+05	2.830E+05	2.925E+05
S96T005843	166: 7	Lower half	3.147E+05	3.210E+05	3.179E+05
S96T005844	166: 8	Lower half	3.290E+05	2.840E+05	3.065E+05
S96T005576	166: 9	Lower half	2.332E+05	2.330E+05	2.331E+05
S96T005573	166: 10	Lower half	2.564E+05	2.250E+05	2.407E+05
S96T005620	166: 1	Lower half	2.954E+05	3.280E+05	3.117E+05
S96T005621	166: 2	Lower half	3.030E+05	2.900E+05	2.965E+05
S96T005718	166: 3	Upper half	87,830	88,900	88,365
S96T005724		Lower half	94,600	90,100	92,350
S96T005418	166: 5	Upper half	1.432E+05	1.330E+05	1.381E+05
S96T005412		Lower half	1.374E+05	1.700E+05	1.537E+05[QC:e]
S96T005625	166: 6	Upper half	1.306E+05	1.160E+05	1.233E+05
S96T005622		Lower half	1.252E+05	1.430E+05	1.341E+05
S96T005419	166: 7	Upper half	1.782E+05	1.190E+05	1.486E+05[QC:d,e]
S96T005413		Lower half	1.380E+05	1.380E+05	1.380E+05
S96T005719	166: 8	Upper half	1.895E+05	2.080E+05	1.988E+05
S96T005725		Lower half	1.282E+05	1.240E+05	1.261E+05
S96T005845	166: 9	Upper half	85,490	93,000	89,245
S96T005846		Lower half	89,340	99,800	94,570
S96T005711	167: 1	Upper half	1.566E+05	1.610E+05	1.588E+05[QC:d]
S96T005699		Lower half	1.450E+05	1.390E+05	1.420E+05
S96T005859	167: 2	Lower half	1.174E+05	1.240E+05	1.207E+05
S96T005700	167: 3	Lower half	2.796E+05	2.790E+05	2.793E+05
S96T005701	167: 4	Lower half	2.168E+05	3.000E+05	2.584E+05[QC:e]
S96T005440	167: 5	Lower half	1.877E+05	2.040E+05	1.959E+05
S96T005452	167: 6	Lower half	2.738E+05	2.410E+05	2.574E+05[QC:e]
S96T005702	167: 7	Lower half	3.721E+05	3.510E+05	3.616E+05[QC:e]

Table B2-55. Tank 241-AN-103 Analytical Results: Nitrate (IC). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: water digest (Cont'd)			µg/g	µg/g	µg/g
S96T005738	167: 8	Lower half	3.120E+05	3.380E+05	3.250E+05[QC:c]
S96T005860	167: 9	Lower half	1.344E+05	1.310E+05	1.327E+05
S96T005712	167: 1	Upper half	1.132E+05	1.210E+05	1.171E+05
S96T005703		Lower half	98,760	1.030E+05	1.009E+05
S96T005446	167: 2	Upper half	87,030	98,900	92,965
S96T005453		Lower half	59,040	51,100	55,070
S96T005447	167: 4	Upper half	1.438E+05	93,100	1.185E+05[QC:c]
S96T005441		Lower half	3.099E+05	2.730E+05	2.915E+05
S96T005713	167: 5	Upper half	2.336E+05	2.440E+05	2.388E+05
S96T005704		Lower half	1.010E+05	99,400	1.002E+05
S96T005500	167: 7	Upper half	4.184E+05	4.340E+05	4.262E+05[QC:d]
S96T005501		Lower half	3.847E+05	3.640E+05	3.744E+05[QC:d]
S97T000023	Core 166	Solid composite	1.378E+05	1.260E+05	1.319E+05
Liquids			µg/mL	µg/mL	µg/mL
S96T005539	166: 3	Drainable liquid	1.562E+05	1.600E+05	1.581E+05
S96T005540	166: 4	Drainable liquid	1.359E+05	1.370E+05	1.365E+05
S96T005599	166: 6	Drainable liquid	1.273E+05	1.290E+05	1.282E+05
S96T005816	166: 7	Drainable liquid	1.344E+05	1.320E+05	1.332E+05
S96T005817	166: 8	Drainable liquid	93,990	95,200	94,595
S96T005541	166: 9	Drainable liquid	1.402E+05	1.410E+05	1.406E+05
S96T005566	166: 10	Drainable liquid	1.378E+05	1.370E+05	1.374E+05
S96T005600	166: 1	Drainable liquid	1.612E+05	1.640E+05	1.626E+05
S96T005601	166: 2	Drainable liquid	1.373E+05	1.370E+05	1.372E+05
S96T005861	167: 2	Drainable liquid	1.267E+05	1.290E+05	1.279E+05
S96T005673	167: 3	Drainable liquid	1.380E+05	1.380E+05	1.380E+05
S96T005420	167: 5	Drainable liquid	1.192E+05	1.180E+05	1.186E+05
S96T005421	167: 6	Drainable liquid	1.274E+05	1.250E+05	1.262E+05
S96T005683	167: 7	Drainable liquid	1.418E+05	1.420E+05	1.419E+05

Table B2-55. Tank 241-AN-103 Analytical Results: Nitrate (IC). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids (Cont'd)			μg/mL	μg/mL	μg/mL
S96T005732	167: 8	Drainable liquid	1.603E+05	1.600E+05	1.602E+05
S96T005862	167: 9	Drainable liquid	1.137E+05	1.130E+05	1.134E+05
S96T005650	167: 1	Drainable liquid	1.419E+05	1.430E+05	1.425E+05
S96T005991	Core 166	Liquid composite	1.156E+05	1.170E+05	1.163E+05

Table B2-56. Tank 241-AN-103 Analytical Results: Nitrite (IC). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: water digest			μg/g	μg/g	μg/g
S96T005610	166: 1	Lower half	48,880	65,000	56,940[QC:e]
S96T005572	166: 4	Lower half	2.483E+05	2.490E+05	2.487E+05[QC:c]
S96T005619	166: 6	Lower half	2.430E+05	2.650E+05	2.540E+05
S96T005843	166: 7	Lower half	2.774E+05	2.900E+05	2.837E+05
S96T005844	166: 8	Lower half	2.700E+05	3.120E+05	2.910E+05
S96T005576	166: 9	Lower half	2.264E+05	2.030E+05	2.147E+05
S96T005573	166: 10	Lower half	2.996E+05	2.860E+05	2.928E+05
S96T005620	166: 1	Lower half	3.006E+05	2.840E+05	2.923E+05
S96T005621	166: 2	Lower half	2.827E+05	2.940E+05	2.884E+05
S96T005718	166: 3	Upper half	75,640	78,500	77,070
S96T005724		Lower half	84,800	78,500	81,650
S96T005418	166: 5	Upper half	75,400	68,800	72,100
S96T005412		Lower half	77,880	60,800	69,340[QC:d,e]
S96T005625	166: 6	Upper half	61,920	65,100	63,510
S96T005622		Lower half	78,950	74,600	76,775
S96T005419	166: 7	Upper half	61,010	61,000	61,005[QC:d]
S96T005413		Lower half	56,910	55,600	56,255
S96T005719	166: 8	Upper half	72,860	70,800	71,830
S96T005725		Lower half	77,980	77,300	77,640
S96T005845	166: 9	Upper half	67,640	80,100	73,870[QC:d]
S96T005846		Lower half	72,200	77,900	75,050[QC:d]
S96T005711	167: 1	Upper half	60,880	64,700	62,790[QC:d]
S96T005699		Lower half	67,230	63,500	65,365
S96T005859	167: 2	Lower half	93,480	92,400	92,940
S96T005700	167: 3	Lower half	2.672E+05	2.650E+05	2.661E+05[QC:d]
S96T005701	167: 4	Lower half	2.162E+05	2.850E+05	2.506E+05[QC:d,e]
S96T005440	167: 5	Lower half	1.660E+05	1.920E+05	1.790E+05
S96T005452	167: 6	Lower half	1.823E+05	1.790E+05	1.807E+05
S96T005702	167: 7	Lower half	2.459E+05	3.140E+05	2.800E+05[QC:c]

Table B2-56. Tank 241-AN-103 Analytical Results: Nitrite (IC). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: water digest (Cont'd)			µg/g	µg/g	µg/g
S96T005738	167: 8	Lower half	2.751E+05	3.120E+05	2.936E+05
S96T005860	167: 9	Lower half	1.239E+05	1.160E+05	1.200E+05
S96T005712	167: 1	Upper half	1.023E+05	1.060E+05	1.042E+05[QC:d]
S96T005703		Lower half	95,660	96,400	96,030
S96T005446	167: 2	Upper half	76,130	78,000	77,065
S96T005453		Lower half	46,400	42,500	44,450
S96T005447	167: 4	Upper half	24,100	28,400	26,250[QC:d]
S96T005441		Lower half	46,250	49,000	47,625
S96T005713	167: 5	Upper half	57,450	55,400	56,425[QC:d]
S96T005704		Lower half	1.056E+05	1.010E+05	1.033E+05
S96T005500	167: 7	Upper half	51,750	54,200	52,975[QC:d]
S96T005501		Lower half	78,210	75,400	76,805[QC:d]
S97T000023	Core 166	Solid composite	73,030	73,700	73,365[QC:d]
Liquids			µg/mL	µg/mL	µg/mL
S96T005539	166: 3	Drainable liquid	1.650E+05	1.590E+05	1.620E+05
S96T005540	166: 4	Drainable liquid	1.369E+05	1.350E+05	1.360E+05
S96T005599	166: 6	Drainable liquid	1.438E+05	1.430E+05	1.434E+05
S96T005816	166: 7	Drainable liquid	1.450E+05	1.490E+05	1.470E+05
S96T005817	166: 8	Drainable liquid	1.052E+05	1.050E+05	1.051E+05
S96T005541	166: 9	Drainable liquid	1.353E+05	1.340E+05	1.347E+05
S96T005566	166: 10	Drainable liquid	1.313E+05	1.350E+05	1.332E+05
S96T005600	166: 1	Drainable liquid	1.242E+05	1.260E+05	1.251E+05
S96T005601	166: 2	Drainable liquid	1.262E+05	1.260E+05	1.261E+05
S96T005861	167: 2	Drainable liquid	1.452E+05	1.410E+05	1.431E+05
S96T005673	167: 3	Drainable liquid	1.586E+05	1.610E+05	1.598E+05
S96T005420	167: 5	Drainable liquid	1.134E+05	1.150E+05	1.142E+05
S96T005421	167: 6	Drainable liquid	1.214E+05	1.230E+05	1.222E+05
S96T005683	167: 7	Drainable liquid	1.676E+05	1.690E+05	1.683E+05

Table B2-56. Tank 241-AN-103 Analytical Results: Nitrite (IC). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids (Cont'd)			µg/mL	µg/mL	µg/mL
S96T005732	167: 8	Drainable liquid	1.732E+05	1.720E+05	1.726E+05
S96T005862	167: 9	Drainable liquid	1.235E+05	1.230E+05	1.233E+05
S96T005650	167: 1	Drainable liquid	1.150E+05	1.160E+05	1.155E+05
S96T005991	Core 166	Liquid composite	1.307E+05	1.340E+05	1.324E+05

Table B2-57. Tank 241-AN-103 Analytical Results: Phosphate (IC). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: water digest			µg/g	µg/g	µg/g
S96T005610	166: 1	Lower half	<1,060	<1,040	<1,050
S96T005572	166: 4	Lower half	4,776	4,720	4,748
S96T005619	166: 6	Lower half	4,955	5,680	5,317.5
S96T005843	166: 7	Lower half	5,784	5,970	5,877
S96T005844	166: 8	Lower half	3,729	4,240	3,984.5
S96T005576	166: 9	Lower half	6,127	6,900	6,513.5
S96T005573	166: 10	Lower half	4,588	7,560	6,074[QC:e]
S96T005620	166: 1	Lower half	5,059	6,440	5,749.5[QC:e]
S96T005621	166: 2	Lower half	4,490	4,420	4,455
S96T005718	166: 3	Upper half	2,441	1,810	2,125.5[QC:e]
S96T005724		Lower half	1,503	1,430	1,466.5
S96T005418	166: 5	Upper half	1,277	1,130	1,203.5
S96T005412		Lower half	1,715	1,510	1,612.5
S96T005625	166: 6	Upper half	1,530	1,540	1,535
S96T005622		Lower half	<981.3	1,410	<1,195.65[QC:e]
S96T005419	166: 7	Upper half	1,227	1,280	1,253.5
S96T005413		Lower half	1,650	<1,070	<1,360[QC:e]
S96T005719	166: 8	Upper half	4,301	1,610	2,955.5[QC:e]
S96T005725		Lower half	3,435	3,110	3,272.5
S96T005845	166: 9	Upper half	2,240	2,450	2,345
S96T005846		Lower half	3,038	2,870	2,954
S96T005711	167: 1	Upper half	2,724	2,310	2,517
S96T005699		Lower half	<1,653	<1,580	<1,616.5
S96T005859	167: 2	Lower half	2,352	2,850	2,601

Table B2-57. Tank 241-AN-103 Analytical Results: Phosphate (IC). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: water digest (Cont'd)			µg/g	µg/g	µg/g
S96T005700	167: 3	Lower half	6,471	6,230	6,350.5
S96T005701	167: 4	Lower half	4,285	6,290	5,287.5[QC:e]
S96T005440	167: 5	Lower half	5,611	5,500	5,555.5
S96T005452	167: 6	Lower half	4,914	5,730	5,322
S96T005702	167: 7	Lower half	3,307	3,880	3,593.5
S96T005738	167: 8	Lower half	4,848	5,190	5,019
S96T005860	167: 9	Lower half	5,582	4,940	5,261
S96T005712	167: 1	Upper half	1,246	1,260	1,253
S96T005703		Lower half	1,264	1,360	1,312
S96T005446	167: 2	Upper half	1,593	1,350	1,471.5
S96T005453		Lower half	827.4	827	827.2
S96T005447	167: 4	Upper half	<466.4	<452	<459.2
S96T005441		Lower half	<1,131	<1,130	<1,130.5
S96T005713	167: 5	Upper half	<941.3	<923	<932.15
S96T005704		Lower half	1,702	1,810	1,756
S96T005500	167: 7	Upper half	3,121	1,950	2,535.5[QC:e]
S96T005501		Lower half	15,330	14,500	14,915
S97T000023	Core 166	Solid composite	3,437	3,520	3,478.5
Liquids			µg/mL	µg/mL	µg/mL
S96T005539	166: 3	Drainable liquid	<1,224	<1,220	<1,222
S96T005540	166: 4	Drainable liquid	<1,224	<1,220	<1,222
S96T005599	166: 6	Drainable liquid	464.6	502	483.3
S96T005816	166: 7	Drainable liquid	<618.1	<618	<618.05

Table B2-57. Tank 241-AN-103 Analytical Results: Phosphate (IC). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids (Cont'd)			µg/mL	µg/mL	µg/mL
S96T005817	166: 8	Drainable liquid	<618.1	<618	<618.05
S96T005541	166: 9	Drainable liquid	501.3	359	430.15[QC:e]
S96T005566	166: 10	Drainable liquid	388.6	351	369.8
S96T005600	166: 1	Drainable liquid	638	702	670
S96T005601	166: 2	Drainable liquid	607.1	588	597.55
S96T005861	167: 2	Drainable liquid	<618.1	<618	<618.05
S96T005673	167: 3	Drainable liquid	<1,224	<1,220	<1,222
S96T005420	167: 5	Drainable liquid	719.1	617	668.05
S96T005421	167: 6	Drainable liquid	605	999	802[QC:e]
S96T005683	167: 7	Drainable liquid	<1,224	<1,220	<1,222
S96T005732	167: 8	Drainable liquid	<1,224	<1,220	<1,222
S96T005862	167: 9	Drainable liquid	<618.1	<618	<618.05
S96T005650	167: 1	Drainable liquid	<1,224	<1,220	<1,222
S96T005991	Core 166	Liquid composite	<1,224	<1,220	<1,222

Table B2-58. Tank 241-AN-103 Analytical Results: Sulfate (IC). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: water digest			μg/g	μg/g	μg/g
S96T005610	166: 1	Lower half	2,596	3,300	2,948[QC:e]
S96T005572	166: 4	Lower half	<1,200	<1,130	<1,165
S96T005619	166: 6	Lower half	<1,245	<1,240	<1,242.5
S96T005843	166: 7	Lower half	<1,102	<1,090	<1,096
S96T005844	166: 8	Lower half	1,842	1,650	1,746
S96T005576	166: 9	Lower half	<1,101	<1,040	<1,070.5
S96T005573	166: 10	Lower half	<1,240	<1,210	<1,225
S96T005620	166: 1	Lower half	<2,748	<2,740	<2,744
S96T005621	166: 2	Lower half	<2,739	<2,790	<2,764.5
S96T005718	166: 3	Upper half	2,382	3,180	2,781[QC:e]
S96T005724		Lower half	1,488	2,010	1,749[QC:e]
S96T005418	166: 5	Upper half	3,155	2,820	2,987.5
S96T005412		Lower half	4,370	4,020	4,195
S96T005625	166: 6	Upper half	2,876	2,150	2,513[QC:e]
S96T005622		Lower half	1,804	<1,130	<1,467[QC:e]
S96T005419	166: 7	Upper half	3,329	4,030	3,679.5
S96T005413		Lower half	5,440	5,270	5,355
S96T005719	166: 8	Upper half	5,080	4,970	5,025
S96T005725		Lower half	6,289	6,090	6,189.5
S96T005845	166: 9	Upper half	4,326	4,850	4,588
S96T005846		Lower half	5,654	5,000	5,327
S96T005711	167: 1	Upper half	<1,799	<1,880	<1,839.5
S96T005699		Lower half	4,615	4,290	4,452.5
S96T005859	167: 2	Lower half	1,722	1,820	1,771
S96T005700	167: 3	Lower half	<1,749	<1,720	<1,734.5
S96T005701	167: 4	Lower half	<1,810	<1,830	<1,820
S96T005440	167: 5	Lower half	<1,167	<1,070	<1,118.5
S96T005452	167: 6	Lower half	<1,052	<1,060	<1,056
S96T005702	167: 7	Lower half	<1,283	<1,400	<1,341.5

Table B2-58. Tank 241-AN-103 Analytical Results: Sulfate (IC). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: water digest (Cont'd)			µg/g	µg/g	µg/g
S96T005738	167: 8	Lower half	<1,043	<1,030	<1,036.5
S96T005860	167: 9	Lower half	<524.2	<574	<549.1
S96T005712	167: 1	Upper half	2,758	3,260	3,009
S96T005703		Lower half	991.6	1,170	1,080.8
S96T005446	167: 2	Upper half	1,748	1,720	1,734
S96T005453		Lower half	1,390	1,450	1,420
S96T005447	167: 4	Upper half	1,157	1,350	1,253.5
S96T005441		Lower half	2,240	2,390	2,315
S96T005713	167: 5	Upper half	<1,082	<1,060	<1,071
S96T005704		Lower half	2,994	2,930	2,962
S96T005500	167: 7	Upper half	<1,870	<1,940	<1,905
S96T005501		Lower half	5,674	5,020	5,347
S97T000023	Core 166	Solid composite	5,388	5,660	5,524
Liquids			µg/mL	µg/mL	µg/mL
S96T005539	166: 3	Drainable liquid	1,896	2,160	2,028
S96T005540	166: 4	Drainable liquid	<1,408	<1,410	<1,409
S96T005599	166: 6	Drainable liquid	471.8	469	470.4
S96T005816	166: 7	Drainable liquid	<710.8	<711	<710.9
S96T005817	166: 8	Drainable liquid	<710.8	<711	<710.9
S96T005541	166: 9	Drainable liquid	<292.7	<293	<292.85
S96T005566	166: 10	Drainable liquid	<292.7	<293	<292.85
S96T005600	166: 1	Drainable liquid	535.5	560	547.75
S96T005601	166: 2	Drainable liquid	490.7	528	509.35
S96T005861	167: 2	Drainable liquid	752.9	892	822.45
S96T005673	167: 3	Drainable liquid	2,636	2,820	2,728
S96T005420	167: 5	Drainable liquid	800.7	<571	<685.85[QC:c]
S96T005421	167: 6	Drainable liquid	912.1	820	866.05
S96T005683	167: 7	Drainable liquid	3,243	3,260	3,251.5

Table B2-58. Tank 241-AN-103 Analytical Results: Sulfate (IC). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids (Cont'd)			μg/mL	μg/mL	μg/mL
S96T005732	167: 8	Drainable liquid	2,602	2,710	2,656
S96T005862	167: 9	Drainable liquid	729.6	<711	<720.3
S96T005650	167: 1	Drainable liquid	3,372	3,600	3,486
S96T005991	Core 166	Liquid composite	<1,408	<1,410	<1,409

Table B2-59. Tank 241-AN-103 Analytical Results: Acetate (IC). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: water digest			μg/g	μg/g	μg/g
S96T005610	166: 1	Lower half	691.6	1,400	1,045.8[QC:e]
S96T005572	166: 4	Lower half	<173.9	<164	<168.95
S96T005619	166: 6	Lower half	1,141	868	1,004.5[QC:e]
S96T005843	166: 7	Lower half	303.3	484	393.65[QC:e]
S96T005844	166: 8	Lower half	698.9	791	744.95
S96T005576	166: 9	Lower half	<159.5	1,210	<684.75[QC:e]
S96T005573	166: 10	Lower half	700.2	902	801.1[QC:e]
S96T005620	166: 1	Lower half	762	556	659[QC:e]
S96T005621	166: 2	Lower half	771.1	747	759.05
S96T005718	166: 3	Upper half	1,971	1,760	1,865.5
S96T005724		Lower half	1,777	1,790	1,783.5
S96T005418	166: 5	Upper half	1,394	<80.6	<737.3[QC:e]
S96T005412		Lower half	1,412	1,430	1,421
S96T005625	166: 6	Upper half	1,217	980	1,098.5[QC:e]
S96T005622		Lower half	1,441	1,340	1,390.5
S96T005419	166: 7	Upper half	1,509	1,470	1,489.5
S96T005413		Lower half	865.1	1,270	1,067.55[QC:e]
S96T005719	166: 8	Upper half	710.1	748	729.05
S96T005725		Lower half	823	829	826
S96T005845	166: 9	Upper half	1,257	1,500	1,378.5
S96T005846		Lower half	1,425	1,650	1,537.5
S96T005711	167: 1	Upper half	1,504	1,490	1,497
S96T005699		Lower half	705.9	1,340	1,022.95[QC:e]
S96T005859	167: 2	Lower half	804.9	752	778.45
S96T005700	167: 3	Lower half	1,085	1,080	1,082.5
S96T005701	167: 4	Lower half	958.7	966	962.35
S96T005440	167: 5	Lower half	1,357	2,540	1,948.5[QC:e]
S96T005452	167: 6	Lower half	1,183	1,200	1,191.5[QC:e]

Table B2-59. Tank 241-AN-103 Analytical Results: Acetate (IC). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: water digest (Cont'd)			µg/g	µg/g	µg/g
S96T005702	167: 7	Lower half	<733	<798	<765.5
S96T005738	167: 8	Lower half	843	685	764[QC:c,e]
S96T005860	167: 9	Lower half	634.4	443	538.7[QC:e]
S96T005712	167: 1	Upper half	1,615	1,610	1,612.5
S96T005703		Lower half	<787.8	<757	<772.4
S96T005446	167: 2	Upper half	1,398	1,430	1,414
S96T005453		Lower half	1,295	1,330	1,312.5
S96T005447	167: 4	Upper half	630.4	792	711.2[QC:e]
S96T005441		Lower half	883.1	963	923.05
S96T005713	167: 5	Upper half	1,049	615	832[QC:e]
S96T005704		Lower half	694.1	669	681.55
S96T005500	167: 7	Upper half	705.5	1,310	1,007.75[QC:e]
S96T005501		Lower half	1,053	<158	<605.5[QC:e]
S97T000023	Core 166	Solid composite[1]	572.8	558	565.4
Liquids			µg/mL	µg/mL	µg/mL
S96T005539	166: 3	Drainable liquid	2,122	2,300	2,211
S97T000163	166: 4	Drainable liquid	3,594	3,720	3,657
S96T005599	166: 6	Drainable liquid	3,505	3,420	3,462.5
S96T005816	166: 7	Drainable liquid	3,876	3,940	3,908
S96T005817	166: 8	Drainable liquid	3,674	3,750	3,712
S96T005541	166: 9	Drainable liquid	3,817	3,420	3,618.5
S96T005566	166: 10	Drainable liquid	2,964	2,520	2,742
S96T005600	166: 1	Drainable liquid	10,510	10,400	10,455
S96T005601	166: 2	Drainable liquid	3,144	3,480	3,312
S96T005861	167: 2	Drainable liquid	3,458	3,570	3,514
S96T005673	167: 3	Drainable liquid	1,905	2,090	1,997.5
S96T005420	167: 5	Drainable liquid	2,285	2,160	2,222.5
S96T005421	167: 6	Drainable liquid	2,798	2,620	2,709

Table B2-59. Tank 241-AN-103 Analytical Results: Acetate (IC). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids (Cont'd)			µg/mL	µg/mL	µg/mL
S96T005683	167: 7	Drainable liquid	5,587	5,660	5,623.5
S96T005732	167: 8	Drainable liquid	7,745	6,470	7,107.5
S96T005862	167: 9	Drainable liquid	3,713	3,550	3,631.5
S96T005650	167: 1	Drainable liquid	1,942	2,040	1,991
S96T005991	Core 166	Liquid composite	2,824	2,920	2,872

Note:

Composite sample results are lower than most segment samples. This may be because of sample heterogeneity or incomplete homogenization.

Table B2-60. Tank 241-AN-103 Analytical Results: Oxalate (IC). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: water digest			µg/g	µg/g	µg/g
S96T005610	166: 1	Lower half	7,370	9,880	8,625[QC:e]
S96T005572	166: 4	Lower half	<913	<863	<888
S96T005619	166: 6	Lower half	<947.2	<946	<946.6
S96T005843	166: 7	Lower half	<838.2	<828	<833.1
S96T005844	166: 8	Lower half	<853.3	<852	<852.65
S96T005576	166: 9	Lower half	<837.5	<795	<816.25
S96T005573	166: 10	Lower half	<943.5	<920	<931.75
S96T005620	166: 1	Lower half	<2,091	<2,080	<2,085.5
S96T005621	166: 2	Lower half	<2,084	<2,120	<2,102
S96T005718	166: 3	Upper half	7,132	7,110	7,121
S96T005724		Lower half	8,680	9,070	8,875
S96T005418	166: 5	Upper half	6,634	5,730	6,182
S96T005412		Lower half	6,539	5,730	6,134.5
S96T005625	166: 6	Upper half	7,115	9,160	8,137.5[QC:e]
S96T005622		Lower half	7,945	7,960	7,952.5
S96T005419	166: 7	Upper half	2,698	2,890	2,794
S96T005413		Lower half	2,167	2,090	2,128.5
S96T005719	166: 8	Upper half	3,344	3,180	3,262
S96T005725		Lower half	4,865	4,690	4,777.5
S96T005845	166: 9	Upper half	4,235	4,590	4,412.5
S96T005846		Lower half	5,707	4,880	5,293.5
S96T005711	167: 1	Upper half	10,540	10,700	10,620
S96T005699		Lower half	5,956	6,600	6,278
S96T005859	167: 2	Lower half	5,801	5,940	5,870.5
S96T005700	167: 3	Lower half	<1,330	<1,310	<1,320
S96T005701	167: 4	Lower half	<1,377	<1,390	<1,383.5
S96T005440	167: 5	Lower half	<888.2	<815	<851.6
S96T005452	167: 6	Lower half	<800.2	884	<842.1
S96T005702	167: 7	Lower half	<976.5	<1,060	<1,018.25

Table B2-60. Tank 241-AN-103 Analytical Results: Oxalate (IC). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: water digest (Cont'd)			µg/g	µg/g	µg/g
S96T005738	167: 8	Lower half	<793.3	<787	<790.15
S96T005860	167: 9	Lower half	<398.9	<437	<417.95
S96T005712	167: 1	Upper half	5,722	4,830	5,276
S96T005703		Lower half	7,187	7,950	7,568.5
S96T005446	167: 2	Upper half	9,779	9,320	9,549.5
S96T005453		Lower half	4,385	4,260	4,322.5
S96T005447	167: 4	Upper half	2,588	2,810	2,699
S96T005441		Lower half	7,210	7,970	7,590
S96T005713	167: 5	Upper half	2,262	1,830	2,046[QC:e]
S96T005704		Lower half	5,925	5,750	5,837.5
S96T005500	167: 7	Upper half	2,942	3,150	3,046[QC:d]
S96T005501		Lower half	4,552	3,910	4,231
S97T000023	Core 166	Solid composite	9,574	11,200	10,387
Liquids			µg/mL	µg/mL	µg/mL
S96T005539	166: 3	Drainable liquid	<222.7	313	<267.85[QC:e]
S96T005540	166: 4	Drainable liquid	<222.7	359	<290.85[QC:e]
S96T005599	166: 6	Drainable liquid	293.3	250	271.65
S96T005816	166: 7	Drainable liquid	<540.9	<541	<540.95
S96T005817	166: 8	Drainable liquid	<540.9	<541	<540.95
S96T005541	166: 9	Drainable liquid	311.9	354	332.95
S96T005566	166: 10	Drainable liquid	364.1	383	373.55
S96T005600	166: 1	Drainable liquid	302.9	273	287.95
S96T005601	166: 2	Drainable liquid	281.6	258	269.8
S96T005861	167: 2	Drainable liquid	<540.9	<541	<540.95
S96T005673	167: 3	Drainable liquid	<1,071	<1,070	<1,070.5
S96T005420	167: 5	Drainable liquid	<434.8	<435	<434.9
S96T005421	167: 6	Drainable liquid	<434.8	<435	<434.9
S96T005683	167: 7	Drainable liquid	<1,071	<1,070	<1,070.5

Table B2-60. Tank 241-AN-103 Analytical Results: Oxalate (IC). (3 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids (Cont'd)			μg/mL	μg/mL	μg/mL
S96T005732	167: 8	Drainable liquid	<1,071	<1,070	<1,070.5
S96T005862	167: 9	Drainable liquid	<540.9	<541	<540.95
S96T005650	167: 1	Drainable liquid	<1,071	<1,070	<1,070.5
S96T005991	Core 166	Liquid composite	<1,071	<1,070	<1,070.5

Table B2-61. Tank 241-AN-103 Analytical Results: Total Uranium (U).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids: fusion			μg/g	μg/g	μg/g
S96T005986	Core 166	Solid composite	46.5	43.7	45.1
Liquids			μg/mL	μg/mL	μg/mL
S96T005993	Core 166	Liquid composite	1.99	1.68	1.835[QC:e,f]

Table B2-62. Tank 241-AN-103 Analytical Results: Hydroxide (OH Direct).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			μg/mL	μg/mL	μg/mL
S96T005993	Core 166	Liquid composite	96,700	99,700	98,200
Solids: water digest			μg/g	μg/g	μg/g
S96T005988	Core 166	Solid composite	29,800	36,000	32,900[QC:e]

Table B2-63. Tank 241-AN-103 Analytical Results: Hexavalent Chromium (Cr+6).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
S96T005992	Core 166	Liquid composite	113	110	111.5
Solids: water digest			µg/g	µg/g	µg/g
S96T005988	Core 166	Solid composite	97.3	102	99.65

Table B2-64. Tank 241-AN-103 Analytical Results: Total Organic Carbon (TOC).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids			µg/g	µg/g	µg/g
S96T005984	Core 166	Solid composite	2,060	2,820	2,440[QC:e]
Liquids			µg/mL	µg/mL	µg/mL
S96T005990	Core 166	Liquid composite	3,070	3,020	3,045[QC:f]

B2-65. Tank 241-AN-103 Analytical Results: Total Inorganic Carbon (TIC)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Solids			µg/g	µg/g	µg/g
S96T005984	Core 166	Solid composite	5,640	5,900	5,770[QC:d]
Liquids			µg/mL	µg/mL	µg/mL
S96T005990	Core 166	Liquid composite	1,160	1,150	1,155[QC:f]
S97T001500	Core 166:7	Drainable liquid	2,500	2,720	2,610

VAPOR SAMPLES

Table B2-66. Tank 241-AN-103 Vapor Sampling Results.

Measurement	Sample
Total Organic Carbon	1 part per million (ppmv)
Lower Explosive Limit (LEL)	0 percent of LEL
Oxygen	20.9 percent
Ammonia	8 ppm

HISTORICAL SAMPLES

Table B2-67. Composition of Sludge Sample R-8190.[1,2,3] (2 sheets)

Waste Tank 241-AN-103		
Component	**Liquid phase**	**Solid phase**
Physical Data		
Specific gravity	1.48	1.47 (total slurry)
Bulk Density (g/mL)	NA	1.47
% H_2O	48.8	39.0
pH	13.2	NA
Wt% of Filtered solids = 58.4%[4]		
Chemical Analysis	**(*M*)**	**(wt%)**
OH^-	1.05	NA
Al	0.59	NA[5]
Na	10.47	NA
NO_2^-	1.53	11
NO_3^-	2.38	31
CO_3^{2-}	0.15	49
SO_4^{2-}	0.031	3
PO_4^{3-}	0.016	3
TOC (g/L)	3.406	1
EDTA	<5.41E-04	NA
HEDTA	<7.13E-04	NA
NH_3	<0.095	NA
Cl^-	0.24	NA
F	0.051	1
K	0.26	NA[5]

Table B2-67. Composition of Sludge Sample R-8190.[1,2,3] (2 sheets)

Waste Tank 241-AN-103		
Component	Liquid phase	Solid phase
Radiological Analysis		
^{241}Am (μCi/L)	<20.5	NA
^{137}Cs (μCi/L)	7.17E+5	NA
^{237}Np (g/L)	<0.00392	NA
^{147}Pm (μCi/L)	372	NA
$^{239/240}$Pu (g/L)	3.80E-6	NA
$^{89/90}$Sr (μCi/L)	89.4	NA

Notes:

NA = not available

[1]Pre-1989 analytical data have not been validated and should be used with caution.

[2]Mauss (1986)

[3]This is an active tank, the data presented in the table may not represent the most up-to-date information.

[4]The solid phase was primarily composed of nitrate and carbonate solids (probably in their sodium form).

[5]The weight percent of Na and K are included with the anions.

Table B2-68. Main Constituents of Slurry Samples Taken During Campaign 86-2.[1,2,3]

Component	Sample Number, Date Sampled				Average
	R-8117,	R-8118,	R-8119,	R-8120,	
Al (M)	2.87	2.67	2.48	2.50	2.63
OH (M)	5.50	5.75	4.91	5.50	5.42
NO_2 (M)	3.20	3.56	3.21	2.85	3.2
NO_3 (M)	2.54	4.08	3.20	2.81	3.16
CO_3 (M)	0.30	0.27	0.16	0.14	0.22
PO_4 (M)	0.025	0.025	0.023	0.020	0.023
F (M)	0.070	0.105	0.10	0.11	0.096
Cl (M)	0.29	0.99	0.22	0.28	0.45
K (M)	0.31	0.40	0.47	0.49	0.42
Na (M)	16.25	14.10	15.28	15.30	15.23
TOC (g/L)	4.70	6.15	4.33	4.29	4.9
^{137}Cs (μCi/L)	9.25E+05	8.50E+05	6.90E+05	7.65E+05	8.08E+05
Pm (μCi/L)	95.5	NA	NA	NA	NA
$^{239/240}Pu$ (g/L)	8.35E-06	4.10E-06	7.20E-06	3.58E-06	5.8E-06
$^{89/90}Sr$ (μCi/L)	1310	1230	715	530	946
Spec. gravity	NA	1.79	1.51	1.54	1.61
H_2O (%)	45.1	37.4	45.5	47	43.8
pH	13.3	13.3	13.3	13.3	13.3

Notes:

[1]Pre-1989 analytical data have not been validated and should be used with caution.

[2]Mauss (1986)

[3]This is an active tank, the data presented in the table may not represent the most up-to-date information.

Table B2-69. Inorganic Analyses of 241-AN-103 Core Composite.[1,2] (2 sheets)

Ion	(μmole/g)	(μg/g)
Al	1,670	45,000
Ag	<0.090	<10
As	<1.33	<100
Ba	<0.070	<10
Be	<1.11	<10
Bi	<0.480	<100
Ca	2.38	95
Cd	0.090	10
Cr	11.7	610
Cu	0.080	5
Fe	1.38	77
K	231	9,000
Mg	1.04	25
Mn	0.450	25
Mo	0.520	<50
Na	10,300	236,000
Ni	0.340	<20
Pb	0.390	80
Sb	<0.070	<10
Si	10.4	290
Sn	0.840	<100
S	<3.13	<100
Ti	0.210	<10
U	0.220	53
V	1.96	<100
W	0.870	160
Zr	0.220	<20
Zn	0.770	50
Hg [(3)]	0.10	20 ± 1.35
NH_3	12.9	220
CO_3^{2-} [(4)]	92.8	5,570

Table B2-69. Inorganic Analyses of 241-AN-103 Core Composite.[1,2] (2 sheets)

Ion	(μmole/g)	(μg/g)
CN^- (5)	0.850	22
Cl^-	151	5,300
F^-	11.05	210
SO_4^{2-}	18.8	1,800
NO_3^-	1,180	73,000
NO_2^-	1,630	75,000
PO_4^{3-}	9.48	900
OH^-	5.6 *M*	

Notes:

[1]Pre-1989 analytical data have not been validated and should be used with caution.

[2]This is an active tank, the data presented in the table may not represent the most up-to-date information.

[3]Analyzed in replicate.

[4]Computed by difference from carbon analysis: total carbon minus total organic carbon equals inorganic carbon or, at highly basic pH, CO_3^{2-} concentration.

[5]Total CN^- in water soluble portion of waste; free CN^- in same fraction was 2.5 μg/g (0.100 μmole/g).

Table B2-70. Radiochemical Analyses of Tank 241-AN-103.[1]

Radionuclide	Sample Concentration (Ci/L) (DSSF)[2,3]	Detection Limit Required
^{3}H	(8.08 ± 19.5)E-6	4.0E-2
^{14}C	(4.00 ± 4.10)E-6	8.0E-3
^{60}Co	(3.71 ± 1.04)E-5	7.0E-1
^{79}Se	(4.34 ± 3.31)E-5	
^{90}Sr	(2.44 ± 0.05)E-2	4.0E-5
^{94}Nb	(1.94 ± 1.25)E-6	2.0E-4
^{99}Tc	(1.08 ± 0.10)E-4	3.0E-3
^{106}Ru	(6.83 ± 8.56)E-5	
^{129}I	(-1.42 ± 1.01)E-7	8.0E-5
^{134}Cs	(2.17 ± 0.14)E-4	
^{137}Cs	(7.55 ± 0.09)E-1	1.0E-3
^{234}U	(3.65 ± 0.41)E-8	
^{235}U	(7.11 ± 5.81)E-10	
^{238}U	(1.35 ± 0.38)E-8	
^{237}Np	(2.55 ± 1.68)E-8	
^{238}Pu	(5.67 ± 0.48)E-7	
$^{239/240}Pu$	(1.24 ± 0.07)E-6	
^{241}Am	(3.34 ± 0.02)E-6	
^{244}Cm	(3.85 ± 0.34)E-7	3.0E-2
Total Alpha	(7.21 ± 1.92)E-6	1.5E-4
Total Beta	(7.89 ± 0.09)E-1	4.0E-5

Notes:

DSSF = Double-shell slurry feed

[1]Pre-1989 analytical data have not been validated and should be used with caution.

[2]Activity as of August 1987, This is an active tank, the data presented in the table may not represent the most up-to-date information.

[3]Numbers in parentheses are error limits; for example, (5.49 ± 1.57) E-6 in full is $5.49 \pm 1.57 \times 10^{-6}$. If the number in parentheses exceeds the preceding number, the actual value is zero within experimental error.

B3.0 ASSESSMENT OF CHARACTERIZATION RESULTS

The purpose of this chapter is to discuss the overall quality and consistency of the current sampling results for tank 241-AN-103, and to present the results of the calculation of an analytical-based inventory.

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

B3.1 FIELD OBSERVATIONS

The safety screening DQO (Dukelow et al. 1995) requires all vertical waste profiles be from two widely spaced risers. The flammable gas DQO (McDuffie and Johnson 1995) requires at least one complete core will be taken. These requirements were fulfilled. Contamination by hydrostatic head fluid resulted in adjusting the weight percent water results in one phase of 12 subsegments and the core composite. The waste recovered in segments with less than full recovery was assumed to be representative of the whole segment.

B3.2 QUALITY CONTROL ASSESSMENT

The usual quality control 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 the pertinent quality control tests were conducted on the 1996 push core samples, allowing a full assessment regarding the accuracy and precision of the data. The SAP (Kruger 1996) established the specific criteria for all analytes. Sample and duplicate pairs that had one or more quality control (QC) results outside the specified criteria were identified by footnotes in the data summary tables.

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

RPDs greater than 30 percent were reported for twenty-eight of the sixty-one subsamples submitted for differential scanning calorimetry. The high RPDs can be attributed to the small exotherms and the heterogeneous nature of the samples. No reruns were requested. Thermograms for several subsamples showed small sharp peaks near 200 °C, which indicated a decomposition of a pure compound. The standard recoveries for this analysis were within the required limits.

RPDs greater than 30 percent were reported for five of the sixty-one subsamples submitted for thermogravimetric analysis. Selected samples were reanalyzed, and the reruns resulted in RPDs of less than 30 percent. Several thermograms showed small sharp peaks. These were the result of instrument vibration and were not used in the calculation of the result. The standard recoveries for this analysis were within the required limits.

A high RPD was reported for ten of the fifty subsamples submitted for total alpha activity. The sample results were near the detection limit which decreased the precision of the analyses. No reruns were requested because of the low alpha activity in the samples.

High RPDs (greater than 20 percent) were reported for the two samples submitted for tritium analyses. The high RPD for the solid core composite was attributed to sample inhomogeneity. No rerun was requested because of the low tritium activity in the samples. The chemist noted the high RPD for the liquid core composite was because of a small amount of ^{137}Cs contamination present on the duplicate aliquot mount. This contamination is unavoidable in samples containing high levels of ^{137}Cs. The sample was analyzed three times due to ^{137}Cs contamination, and no further reruns were requested. Sr contamination was found in the field blank, but the level was minimal.

Some of the high RPDs for the IC analytes may be attributable to sample homogeneity problems. Spike recoveries outside of the required range were reported for acetate, Cl, Fl, NO_2, NO_3, and oxalate. The chemist noted that the poor spike recoveries were because of matrix interferences. In particular, spike failures for fluoride were because of organic acid interference, and spike failures for NO_2 and NO_3 were because of the high concentration of these analytes in the sample with respect to the amount of spike standard added.

Many of the ICP analytes also had one or more QC parameters outside the specified limits. High RPDs (greater than 20 percent) were reported for several analytes (Al, B, Ca, Cr, Fe, K, Li, Na, Ni, Si, Zn, Zr) and were attributed to sample inhomogeneity. Ca, Fe, Li, Ni, Zn, and Zr were detected at or below detection limits. The Ni fusion results are influenced by sample contamination (the fusion is performed in a nickel crucible). Reruns were not requested. Poor spike recoveries for Al, K, and Na were attributed to the high concentration of these analytes in the samples with respect to the amount of spike standard added. Therefore, the matrix spike recovery results for these three analytes should not be used as a means to determine the accuracy of the results.

A high RPD (greater than 20 percent) for TIC/TOC was reported for the core 166 solid core composite and was attributed to sample inhomogeneity. No rerun was requested. A spike recovery outside of the required range was reported for one sample submitted for uranium analysis. The chemist noted the low spike recovery was because of matrix interferences and no rerun was requested.

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

B3.3 DATA CONSISTENCY CHECKS

Comparisons of different analytical methods can help to assess the consistency and quality of the data. Several comparisons were possible with the data set provided by the two push core samples, including a comparison of phosphorous as analyzed by ICP with phosphate as analyzed by IC, and a comparison of weight percent water by TGA with the weight percent water by gravimetry. 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 different analytical methods. A close comparison between the two methods strengthens the credibility of both results, whereas a poor comparison brings the reliability of the data into question. All analytical mean results were calculated from tables in Section B3.4, using Table B3-10 for the convective layer, Tables B3-12 and B3-13 for the nonconvective layer, and Table B3-14 for the crust.

The analytical phosphorous mean result as determined by ICP for the crust layer was 667 μg/g, which converts to 2,044 μg/g of phosphate. This compared well with the IC phosphate mean result of 1,950 μg/g (Table B3-1). The RPD between these two phosphate results was 4.7 percent. The analytical phosphorus mean result as determined by ICP for the nonconvective layer was 778 μg/g, which converts to 2386 μg/g of phosphate. The IC phosphate result was 2500 μg/g. The RPD between these two phosphate results is 4.7 percent. A comparison was not made for results from the convective layer because the PO_4 measurements were below detection limits.

Table B3-1. Phosphate versus Phosphorus.

Analytes	Crust	Nonconvective Layer
	μg/g	μg/g
P	667	778
PO_4	1,950	2,500

The ICP sulfur value for the crust layer of 984 μg/g, which represents total sulfur, is equivalent to 2,946 μg/g of sulfate. The IC result for sulfate was 2,750 μg/g (Table B3-2), with an RPD between the two values of 6.9 percent. The ICP sulfur value for the nonconvective layer was 1,170 μg/g, which represents 3,503 μg/g of sulfate. The IC result was 3,370 (Table B3-2). The RPD between the two values is 3.9 percent. A comparison was not made of results from the nonconvective layer because the sulfur and sulfate results were below detection limits.

Table B3-2. Sulfate versus Sulfur.

Analytes	Crust	Nonconvective layer
	μg/g	μg/g
S	984	1,170
SO_4	2,750	3,370

B3.3.2 Mass and Charge Balance

The principle objective in performing mass and charge balances is to determine if the measurements are self-consistent. In calculating the balances, only analytes listed in Section B3.4 detected at a concentration of 1,000 μg/g or greater were considered. Separate mass and charge balances were calculated for the supernatant and salt slurry layers because these waste phases were analyzed separately. The results of these comparisons are presented in the following sections.

B3.3.2.1 Mass and Charge Balances for the Supernatant. The anions listed in Table B3-4 were assumed to be present as sodium salts and were expected to balance the positive charge exhibited by the cations.

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

$$\text{Mass balance} = \%\ \text{Water} + 0.0001 \times \{\text{Total Analyte Concentration}\}$$

$$= \%\ \text{Water} + 0.0001 \times Na^+ + K^+ + CH_3COO^- + Al(OH)_4^- + Cl^- + COO^- + NO_2^- + NO_3^- \}$$

The total analyte concentration calculated from the above equation is 526,435 μg/g. The mean weight percent water is 45.9 percent, or 459,000 μg/g. The mass balance resulting from adding the percent water to the total analyte concentration is 98 percent (Table B3-5).

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) = $[K^+]/39 + [Na^+]/23.0 = 8,886\ \mu eq/g$

Total anions (μeq/g) = $[Al(OH)_4^-/95] + [Cl^-]/35.5 + [COO^-]/44.0 + [OH^-]/17.0 + [NO_2^-]/46.0 + [NO_3^-]/62.0 + [CH_3COO^-]/59.0 = 5,334\ \mu eq/g$

The charge balance obtained by dividing the sum of the positive charge by the sum of the negative charge was 1.7 with a net positive charge of 3,552 microequivalents. Boundary conditions for this system are 1.00 for the charge balance with no net charge remaining. This result indicates some cations and/or anions have not been accounted for. Additional assumptions are needed regarding the species present.

The simplest assumption is to set the net charge equal to zero. Assuming the free positive charge is balanced by sufficient hydroxide to make the waste neutral (-3,552 μeq/g OH^-), and additional 60,391 μg/g of hydroxide is added bringing the total mass to approximately 586,826 μg/g (104.6 percent). Table 3-5 shows the balance totals. This assumption is reasonable given the history of the waste and the uncertainty in the measurements, and it provides sufficient charge to acceptably account for the individual analytes that comprise the solids.

With this assumption and the uncertainty regarding these measurements, the mass and charge balance calculations were considered to be consistent.

Table B3-3. Supernatant Cation Mass and Charge Data.

Analyte	Concentration (μg/g)	Assumed Species	Concentration of Assumed Species (μg/g)	Charge (μeq/g)
Potassium	10,700	K^+	10,700	274
Sodium	198,000	Na^+	198,000	8609
Total			208,700	8,880

Table B3-4. Supernatant Anion Mass and Charge Data.

Analyte	Concentration (μg/g)	Assumed Species	Concentration of Assumed Species (μg/g)	Charge (μeq/g)
Aluminum	25,100	$Al(OH)_4$	88,385	930
Chloride	6,130	Cl^-	6,130	173
Formate	1,860	COO^-	1,860	42
Acetate	2,360	CH_3COO^-	2,360	40
Nitrate	109,000	NO_3^-	109,000	1,758
Nitrite	110,000	NO_2^-	110,000	2,391
Total			317,735	5,334

Table B3-5. Mass Balance Totals.

Totals	Concentrations (μg/g)	Charge (μeq/g)
Total from Table B3-3	208,700	8,880
Total from Table B3-4	317,735	-5,334
Water percent	459,000	0
Assumed OH^-	60,400	-3,552
Total	1,045,835	0

B3.3.2.2 Mass and Charge Balances for the Nonconvective Layer. The positive charges attributed to sodium and potassium were expected to balance the negative charges exhibited by the anions. Sulfur was assumed to be 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 in Table B3-6, the anionic species in Table B3-7, and the weight percent water were ultimately used to calculate the mass balance.

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 $\{Al(OH)_4^- + Cr(OH)_3 + Na^+ + K^+ + Cl^- + COO^- + (COO)_2^{2-} + CH_3COO^- + F^- + NO_2^- + NO_3^- + OH^- + PO_4^{-3} + SO_4^{-2}\}$

Table B3-6. Salt Slurry Cation Mass and Charge Data.

Analyte	Concentration ($\mu g/g$)	Assumed Species	Concentration of Assumed Species ($\mu g/g$)	Charge ($\mu eq/g$)
Potassium	6,010	K^+	6,010	154
Sodium	258,000	Na^+	258,000	11,217
Total			264,010	11,371

Table B3-7. Salt Slurry Anion Mass and Charge Data.

Analyte	Concentration ($\mu g/g$)	Assumed Species	Concentration of Assumed Species ($\mu g/g$)	Charge ($\mu eq/g$)
Aluminum	58,200	$Al(OH)_4^-$	205,000	2155
Chloride	3,820	Cl^-	3,820	108
Acetate	1120	CH_3COO^-	1120	19
Nitrate	189,000	NO_3^-	189,000	3,048
Nitrite	67,800	NO_2^-	67,800	1,474
Oxalate	5,140	$(COO)_2^{2-}$	5,140	117
Phosphate	2,500	PO_4^{3-}	2,500	79
Sulfate	3,370	SO_4^{2-}	3,370	70
Total			477,750	7,070

The total analyte concentrations calculated from the above equation is 741,760 $\mu g/g$. The mean weight percent water in nonconvective layer is 31.8 percent, or 318,000 $\mu g/g$. The mass balance resulting from adding the percent water to the total analyte concentration is 106 percent (Table B3-8).

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

Total cations ($\mu eq/g$) = $[K^+]/39 + [Na^+]/23.0 = 11{,}371\ \mu eq/g$

Total anions ($\mu eq/g$) = $[Al(OH)_4^-/95] + [Cl^-]/35.5 + [(COO)_2^{2-}]/44.0 + [CH_3COO^-]/59.0 + [NO_2^-]/46.0 + [NO_3^-]/62.0 + [PO_4^{-3}]/31.7 + [SO_4^{-2}]/48 = 7{,}070\ \mu eq/g$

The charge balance obtained by dividing the sum of the positive charge by the sum of the negative charge was 1.6 with a net positive charge of 4,485 microequivalents. Boundary conditions for this system are 1.00 for the charge balance with no net charge remaining. This result indicated some cations and/or anions have not been accounted for. Additional assumptions are needed regarding the species present.

The simplest assumption is to set the net charge equal to zero. Assuming the free positive charge is balanced by sufficient hydroxide to make the waste neutral (-4,301 μeq/g OH^-), an additional 73,117 μg/g of hydroxide is added bringing the total mass to approximately 814,180 μg/g (113.2 percent). The uncertainties of the principal analytes contribute an uncertainty of about 15 percent. Although the mass balance is biased high, it is within an acceptable range of values. Table B3-8 shows the balance totals.

With this assumption and the uncertainty regarding these measurements, the mass and charge balance calculations were considered to be consistent.

Table B3-8. Mass Balance Totals.

Totals	Concentrations (μg/g)	Charge (μeq/g)
Total from Table B3-6	264,010	11,371
Total from Table B3-7	477,050	-7,070
Water percent	318,000	0
Assumed OH^-	73,117	-4301
Total	1,132,177	0

B3.4 Mean Concentrations and Confidence Intervals

The following statistical evaluation was performed using the analytical data generated from tank 241-AN-103 push core samples. The push core samples were obtained September 1996 from two risers (core 166 and core 167) the full length of the waste in the tank (19 segments). The crust was considered to be the solids from segment 1 and a portion of segment 2. The remainder of segment 2 through segment 11 and a portion of segment 12 were convective layer samples. The remainder of segment 12 through segment 19 were nonconvective layer samples. The three sets of data (crust, convective layer, and nonconvective layer) were analyzed separately.

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

$$\hat{\mu} \pm t_{(df,0.05)} \times \hat{\sigma}_{\hat{\mu}}.$$

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 confidence interval. 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 Convective Layer Data

The statistics in this section were based on analytical data from the 1996 sampling event of tank 241-AN-103. Because of the length of time the convective layer (liquid) samples were stored before being extruded at the laboratory, solids precipitated. The laboratory analyzed both the liquid and solid materials. The following equation was used to provide the analytical concentration of the convective layer material before precipitation. The statistical analysis was performed using (1) the liquid data only and (2) the calculated convective layer data.

$$\frac{\mu g}{g_{cv}} = \frac{\frac{\mu g}{mL}}{\frac{g}{mL}} * wtfrac_{liquid} + \frac{\mu g}{g} * wtfrac_{solids}$$

The 1996 data were statistically evaluated using two different models. The first model used a nested analysis of variance (ANOVA): the data are identified by segment within riser. The second model used one-way ANOVA: the data are 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 both quantitative values and "less than" values, the upper value of the "less than" (for example, 3.5 for < 3.5) was used to represent all "less than" analytical values. This produces a bias of unknown magnitude in both the mean analyte concentration and the variance of 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.

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

The mean concentration estimates for the convective layer (liquid data only), along with the two-sided 95 percent confidence interval for the mean concentration, are given in Table B3-9 (one-way ANOVA) for those analytes with at least 50 percent of the reported data as quantitative values. No difference in the analyte means was observed between the one-way ANOVA and nested ANOVA models, except for Br and SO_4 analytes. This indicates that there was little significant difference in the waste composition for the two risers sampled, and the tank is vertically homogeneous. As a result, except as noted in Tables B3-9 and B3-10, only the results for the one-way ANOVA analysis are presented. The mean concentration estimates for the convective layer (calculated data; liquids and solids), along with the two-sided 95 percent confidence interval for the mean concentration, are given in Table B3-10.

For some of the analytes, the lower limit of the 95 percent confidence interval was a negative value because of the magnitude of the variability. Because the actual concentration of a tank sample cannot be less than zero, the lower limit is reported as zero.

Table B3-9. Summary Statistics: Convective Layer - Liquid Data Only (one-way ANOVA).[1] (2 sheets)

Analyte	Units	$\hat{\mu}$	$\hat{\sigma}_{\hat{\mu}}$	df	LL	UL
% Water.tga	wt%	4.90E+01	1.46E-01	16	4.86E+01	4.93E+01
Acetate.ic	μg/mL	3.87E+03	5.17E+02	16	2.78E+03	4.97E+03
Ag.icp.d	μg/mL	1.86E+01	4.65E-01	16	1.76E+01	1.96E+01
Al.icp.d	μg/mL	3.15E+04	4.54E+02	16	3.05E+04	3.25E+04
B.icp.d	μg/mL	6.43E+01	1.43E+00	16	6.13E+01	6.74E+01
Br^-.ic.lt[1]	μg/mL	1.20E+03	3.66E+02	1	0.00E+00	5.86E+03
Cd.icp.d.lt	μg/mL	4.39E+00	1.35E-01	16	4.10E+00	4.67E+00
Cl^-.ic	μg/mL	1.02E+04	4.40E+02	16	9.26E+03	1.11E+04
Cr.icp.d	μg/mL	5.92E+02	1.23E+01	16	5.66E+02	6.18E+02
DSC.dry	J/g dry	5.84E+01	1.86E+01	16	1.90E+01	9.78E+01
DSC.exo	J/g wet	2.97E+01	9.47E+00	16	9.67E+00	4.98E+01
F^-.ic	μg/mL	5.69E+02	3.25E+01	16	5.01E+02	6.38E+02
Formate.ic	μg/mL	3.18E+03	6.35E+02	16	1.84E+03	4.53E+03
K.icp.d	μg/mL	1.76E+04	2.71E+02	16	1.70E+04	1.81E+04
Li.icp.d	μg/mL	2.26E+01	3.10E+00	16	1.60E+01	2.92E+01

Table B3-9. Summary Statistics: Convective Layer - Liquid Data Only (one-way ANOVA).[1] (2 sheets)

Analyte	Units	$\hat{\mu}$	$\hat{\sigma}_{\hat{\mu}}$	df	LL	UL
Mo.icp.d	µg/mL	1.15E+02	1.29E+00	16	1.12E+02	1.18E+02
NO_2^-.ic	µg/mL	1.37E+05	4.81E+03	16	1.27E+05	1.47E+05
NO_3^-.ic	µg/mL	1.35E+05	4.12E+03	16	1.26E+05	1.44E+05
Na.icp.d	µg/mL	2.56E+05	3.79E+03	16	2.48E+05	2.64E+05
P.icp.d	µg/mL	2.92E+02	4.37E+00	16	2.83E+02	3.02E+02
Pb.icp.d	µg/mL	1.43E+02	2.33E+00	16	1.38E+02	1.48E+02
S.icp.d	µg/mL	4.37E+02	1.16E+01	16	4.13E+02	4.62E+02
SO_4^{2-}.ic.lt[1]	µg/mL	1.33E+03	5.63E+02	16	0.00E+00	8.49E+03
Si.icp.d	µg/mL	2.50E+02	9.31E+00	16	2.30E+02	2.70E+02
SpG	---	1.46E+00	7.59E-03	16	1.44E+00	1.47E+00
Zn.icp.d.lt	µg/mL	9.95E+00	1.02E+00	16	7.79E+00	1.21E+01
Zr.icp.d.lt	µg/mL	7.61E+00	4.37E-01	16	6.69E+00	8.54E+00

Note:

[1] Br and SO4 statistical means were calculated using the nested ANOVA model because variability was observed between the risers for these analytes.

Table B3-10. Summary Statistics: Convective Layer - Calculated.[1] (one-way ANOVA). (2 sheets)

Analyte	Units	$\hat{\mu}$	$\hat{\sigma}_{\hat{\mu}}$	df	LL	UL
% Water.tga	µg/g	4.59E+01	4.41E-01	17	4.49E+01	4.68E+01
Acetate.ic.lt	µg/g	2.36E+03	3.13E+02	17	1.70E+03	3.02E+03
Acetate.ic.nlt	µg/g	2.32E+03	3.41E+02	15	1.60E+03	3.05E+03
Al.icp.a	µg/g	2.49E+04	2.96E+03	17	1.87E+04	3.12E+04
Al.icp.f	µg/g	2.51E+04	3.32E+03	17	1.81E+04	3.21E+04
B.icp.a.lt	µg/g	6.26E+01	6.06E+00	17	4.98E+01	7.54E+01
B.icp.a.nlt	µg/g	6.29E+01	6.11E+00	17	5.00E+01	7.58E+01
Cl^-.ic	µg/g	6.13E+03	3.41E+02	17	5.41E+03	6.85E+03
Cr.icp.a	µg/g	4.00E+02	1.54E+01	17	3.67E+02	4.32E+02
Cr.icp.f.lt	µg/g	4.33E+02	2.94E+01	17	3.71E+02	4.95E+02
Cr.icp.f.nlt	µg/g	4.64E+02	4.74E+01	10	3.58E+02	5.70E+02

Table B3-10. Summary Statistics: Convective Layer - Calculated.[1] (one-way ANOVA). (2 sheets)

Analyte	Units	$\hat{\mu}$	$\hat{\sigma}_{\hat{\mu}}$	df	LL	UL
F^-.ic	µg/g	4.34E+02	2.96E+01	17	3.71E+02	4.96E+02
Formate.ic.lt	µg/g	1.86E+03	3.54E+02	17	1.11E+03	2.60E+03
Formate.ic.nlt	µg/g	1.85E+03	3.75E+02	16	1.05E+03	2.64E+03
K.icp.a	µg/g	1.07E+04	3.97E+02	17	9.90E+03	1.16E+04
NO_2^-.ic	µg/g	1.10E+05	5.85E+03	17	9.76E+04	1.22E+05
NO_3^-.ic	µg/g	1.09E+05	4.76E+03	17	9.90E+04	1.19E+05
Na.icp.a	µg/g	1.82E+05	4.60E+03	17	1.72E+05	1.91E+05
Na.icp.f	µg/g	1.98E+05	5.63E+03	17	1.86E+05	2.10E+05
P.icp.a	µg/g	3.83E+02	1.85E+01	17	3.44E+02	4.23E+02
Si.icp.a	µg/g	2.42E+02	2.82E+01	17	1.83E+02	3.02E+02
Zn.icp.a.lt	µg/g	9.19E+00	9.65E-01	17	7.16E+00	1.12E+01
Zn.icp.a.nlt	µg/g	1.02E+01	1.17E+00	13	7.72E+00	1.28E+01

Note:

[1] Weighted average of liquid and solid concentrations in the convective layer (see equation in Section B3.4.1)

A liquid composite sample was formed from liquid subsamples from Core 166 segments 3-12 (40 mL from segments 3, 4, 6, 7, 8, 9, 10, 11, and 12). The arithmetic mean, the associated variability, and a two-sided 95 percent confidence interval for the mean concentration were calculated for each analyte with at least 50 percent of the reported data as quantitative values. The confidence interval takes into account only the analytical uncertainty. The summary statistics are listed in Table B3-11 and Table B3-16.

Table B3-11. Summary Statistics: Liquid Composite (Core 166, segments 3-12).

Analyte	Units	$\hat{\mu}$	$\hat{\sigma}_{\hat{\mu}}$	df	LL	UL
% Water.tga	wt%	4.85E+01	5.00E-02	1	4.78E+01	4.91E+01
Acetate.ic	μg/mL	2.87E+03	5.00E+01	1	2.23E+03	3.51E+03
Al.icp.d	μg/mL	3.21E+04	1.00E+02	1	3.08E+04	3.34E+04
Br^-.ic	μg/mL	1.58E+03	1.00E+01	1	1.45E+03	1.71E+03
Cl^-.ic	μg/mL	9.89E+03	1.15E+02	1	8.42E+03	1.13E+04
Co.icp.d	μg/mL	6.09E+01	5.75E+00	1	0.00E+00	1.34E+02
Cr(VI)	μg/mL	1.12E+02	1.50E+00	1	9.24E+01	1.31E+02
Cr.icp.d	μg/mL	5.60E+02	7.00E+00	1	4.71E+02	6.49E+02
^{137}Cs.gea	μCi/mL	7.39E+02	5.00E-01	1	7.32E+02	7.45E+02
DSC.dry	J/g dry	2.01E+02	3.00E+01	1	0.00E+00	5.82E+02
DSC.exo	J/g wet	1.03E+02	1.56E+01	1	0.00E+00	3.01E+02
F^-.ic	μg/mL	5.96E+02	6.00E+00	1	5.20E+02	6.72E+02
Formate.ic	μg/mL	1.63E+03	1.20E+02	1	1.05E+02	3.15E+03
^{3}H	μCi/mL	1.57E-03	7.83E-04	1	0.00E+00	1.15E-02
^{129}I	μCi/mL	3.79E-04	1.50E-05	1	1.88E-04	5.70E-04
K.icp.d	μg/mL	1.73E+04	5.00E+01	1	1.66E+04	1.79E+04
Li.icp.d	μg/mL	1.52E+01	1.50E-01	1	1.32E+01	1.71E+01
Mo.icp.d	μg/mL	1.09E+02	0.00E+00	1	1.09E+02	1.09E+02
Na.icp.d	μg/mL	2.63E+05	5.00E+02	1	2.56E+05	2.69E+05
NO_2^-.ic	μg/mL	1.33E+05	1.50E+03	1	1.13E+05	1.52E+05
NO_3^-.ic	μg/mL	1.17E+05	5.00E+02	1	1.10E+05	1.23E+05
OH^-	μg/mL	9.82E+04	1.50E+03	1	7.91E+04	1.17E+05
P.icp.d	μg/mL	2.74E+02	8.00E+00	1	1.72E+02	3.76E+02
Pb.icp.d.lt	μg/mL	1.38E+02	1.80E+01	1	0.00E+00	3.67E+02
S.icp.d	μg/mL	4.38E+02	7.00E+00	1	3.49E+02	5.27E+02
Se.icp.d.lt	μg/mL	1.23E+02	3.00E+00	1	8.49E+01	1.61E+02
Si.icp.d	μg/mL	1.91E+02	5.00E-01	1	1.84E+02	1.97E+02
SpG	---	1.49E+00	2.00E-03	1	1.46E+00	1.51E+00
$^{89/90}$Sr	μCi/mL	2.08E-02	0.00E+00	1	2.08E-02	2.08E-02
^{99}Tc	μCi/mL	1.68E-04	1.15E-05	1	2.14E-05	3.14E-04
TIC	μg/mL	1.16E+03	5.00E+00	1	1.09E+03	1.22E+03
TOC	μg/mL	3.05E+03	2.50E+01	1	2.73E+03	3.36E+03
Total Beta	μCi/mL	6.22E+02	4.00E+00	1	5.71E+02	6.73E+02
U.phos	μg/mL	1.84E+00	1.55E-01	1	0.00E+00	3.80E+00

B3.4.1.2 Nonconvective Layer (Salt Slurry)

The mean concentration estimates for the nonconvective or slurry layer, along with the two-sided 95 percent confidence interval for the mean concentration, are given in Table B3-18 (nested ANOVA without the riser term) for those analytes with at least 50 percent of the reported data as quantitative values. For some of the analytes, the lower limit of the 95 percent confidence interval was a negative value due to the magnitude of the variability. Because the actual concentration of a tank sample cannot be less than zero, the lower limit is reported as zero.

Table B3-12. Summary Statistics: Nonconvective Layer (Slurry) (nested ANOVA without riser). (2 sheets)

Analyte	Units	$\hat{\mu}$	$\hat{\sigma}_{\hat{\mu}}$	df	LL	UL
Acetate.ic.lt	μg/g	1.12E+03	1.23E+02	8	8.32E+02	1.40E+03
Al.icp.a	μg/g	5.92E+04	9.92E+03	8	3.64E+04	8.21E+04
Al.icp.f	μg/g	5.82E+04	1.16E+04	8	3.14E+04	8.50E+04
B.icp.a.lt	μg/g	1.42E+02	7.08E+00	8	1.26E+02	1.59E+02
Cl^-.ic	μg/g	3.82E+03	3.03E+02	8	3.12E+03	4.52E+03
Co.icp.a.lt	μg/g	4.87E+01	5.42E+00	8	3.62E+01	6.12E+01
Cr.icp.a	μg/g	5.08E+02	4.22E+01	8	4.10E+02	6.05E+02
Cr.icp.f	μg/g	5.52E+02	7.54E+01	8	3.78E+02	7.26E+02
DSC.dry	J/g dry	2.70E+01	6.93E+00	8	1.10E+01	4.30E+01
DSC.exo	J/g wet	1.81E+01	4.75E+00	8	7.19E+00	2.91E+01
F^-.ic	μg/g	9.82E+02	2.64E+02	8	3.72E+02	1.59E+03
Formate.ic	μg/g	7.92E+02	4.80E+01	8	6.82E+02	9.03E+02
K.icp.a	μg/g	6.01E+03	4.02E+02	8	5.08E+03	6.94E+03
NO_2^-.ic	μg/g	6.78E+04	4.46E+03	8	5.75E+04	7.80E+04
Na.icp.f	μg/g	2.58E+05	2.70E+04	8	1.95E+05	3.20E+05
Ni.icp.f	μg/g	1.50E+04	6.27E+03	8	5.07E+02	2.94E+04
Oxalate.ic	μg/g	5.14E+03	6.44E+02	8	3.65E+03	6.62E+03
P.icp.a.lt	μg/g	7.78E+02	1.76E+02	8	3.73E+02	1.18E+03
P.icp.a.nlt	μg/g	7.97E+02	1.79E+02	8	3.84E+02	1.21E+03
PO_4^{3-}.ic.lt	μg/g	2.50E+03	8.14E+02	8	6.23E+02	4.38E+03
S.icp.a	μg/g	1.17E+03	1.23E+02	8	8.89E+02	1.46E+03
SO_4^{2-}.ic.lt	μg/g	3.37E+03	4.78E+02	8	2.27E+03	4.47E+03

Table B3-12. Summary Statistics: Nonconvective Layer (Slurry) (nested ANOVA without riser). (2 sheets)

Analyte	Units	$\hat{\mu}$	$\hat{\sigma}_{\hat{\mu}}$	df	LL	UL
Si.icp.a	μg/g	5.31E+02	4.07E+01	8	4.37E+02	6.25E+02
Zn.icp.a.lt	μg/g	3.22E+01	7.19E+00	8	1.57E+01	4.88E+01
Bulk Density	g/mL	1.74E+00	3.76E-02	8	1.65E+00	1.82E+00

A slurry composite sample was formed from slurry subsamples from Core 166 segments 1-19 (10 grams from segments 1 LH, 4 LH, 6 LH, 7 LH, 8 LH, 9 LH, 10 LH, 11 LH, 12 LH, 13 UH, 13 LH, 15 UH, 15 LH, 16 UH, 16 LH, 17 UH, 17 LH, 18 UH, 18 LH, 19 UH, and 19 LH). The arithmetic mean, the associated variability, and a two-sided 95 percent confidence interval for the mean concentration were calculated for each analyte with at least 50 percent of the reported data as quantitative values. The confidence interval takes into account only the analytical uncertainty. The summary statistics are listed in Tables B3-13 and B3-14.

Table B3-13. Summary Statistics: Slurry Composite (Core 166, segments 1 to 19). (2 sheets)

Analyte	Units	$\hat{\mu}$	$\hat{\sigma}_{\hat{\mu}}$	df	LL	UL
% Water.tga	wt%	3.30E+01	4.00E-02	1	3.25E+01	3.35E+01
Acetate.ic	μg/g	5.66E+02	7.50E+00	1	4.70E+02	6.61E+02
Ag.icp.a	μg/g	1.61E+01	3.50E-01	1	1.16E+01	2.05E+01
Al.icp.a	μg/g	3.82E+04	1.10E+03	1	0.00E+00	5.22E+04
^{241}Am.aea[1]	μCi/g	3.53E-03	6.00E-05	1	2.77E-03	4.29E-03
B.icp.a	μg/g	1.25E+02	7.00E+00	1	3.61E+01	2.14E+02
Br^-.ic	μg/g	4.47E+02	4.45E+01	1	0.00E+00	1.01E+03
Bulk Density	g/mL	1.69	NA	1	NA	NA
Cd.icp.a	μg/g	4.17E+00	2.20E-01	1	1.37E+00	6.97E+00
Cl^-.ic	μg/g	3.73E+03	5.00E+01	1	3.09E+03	4.37E+03
Cr(VI)	μg/g	9.97E+01	2.35E+00	1	6.98E+01	1.30E+02
Cr.icp.a	μg/g	4.38E+02	1.50E+01	1	2.47E+02	6.29E+02
^{137}Cs.gea	μCi/g	2.74E+02	2.30E+01	1	0.00E+00	5.66E+02
DSC.dry	J/g dry	2.70E+01	1.16E+01	1	0.00E+00	1.74E+02
DSC.exo	J/g wet	1.81E+01	7.75E+00	1	0.00E+00	1.17E+02

Table B3-13. Summary Statistics: Slurry Composite (Core 166, segments 1 to 19). (2 sheets)

Analyte	Units	$\hat{\mu}$	$\hat{\sigma}_{\hat{\mu}}$	df	LL	UL
F^-.ic	μg/g	4.14E+03	2.15E+02	1	1.40E+03	6.87E+03
Fe.icp.a	μg/g	4.85E+01	1.00E-01	1	4.72E+01	4.98E+01
Formate.ic	μg/g	1.29E+03	1.00E+01	1	1.16E+03	1.42E+03
^{3}H	μCi/g	2.84E-03	3.70E-04	1	0.00E+00	7.54E-03
^{129}I[1]	μCi/g	2.70E-03	7.00E-04	1	0.00E+00	1.16E-02
K.icp.a	μg/g	6.54E+03	2.60E+02	1	0.00E+00	9.84E+03
Li.icp.a	μg/g	2.43E+01	1.70E+00	1	2.70E+00	4.59E+01
Mn.icp.a[1]	μg/g	5.57E+00	6.00E-02	1	4.81E+00	6.33E+00
Mo.icp.a	μg/g	4.27E+01	6.50E-01	1	3.44E+01	5.09E+01
Na.icp.a	μg/g	2.17E+05	3.50E+03	1	1.72E+05	2.61E+05
NO_2^-.ic	μg/g	7.34E+04	3.50E+02	1	6.89E+04	7.78E+04
NO_3^-.ic	μg/g	1.32E+05	6.00E+03	1	5.58E+04	2.08E+05
OH^-	μg/g	3.29E+04	3.10E+03	1	0.00E+00	7.23E+04
Oxalate.ic	μg/g	1.04E+04	8.15E+02	1	2.94E+01	2.07E+04
P.icp.a	μg/g	1.15E+03	3.50E+01	1	7.00E+02	1.59E+03
PO_4^{3-}.ic	μg/g	3.48E+03	4.00E+01	1	2.97E+03	3.99E+03
S.icp.a	μg/g	8.28E+02	1.90E+01	1	0.00E+00	1.07E+03
Si.icp.a	μg/g	8.38E+02	1.00E+00	1	8.25E+02	8.51E+02
SO_4^{2-}.ic	μg/g	5.53E+03	1.35E+02	1	3.81E+03	7.24E+03
$^{89/90}Sr$	μCi/g	2.66E+00	8.00E-02	1	1.64E+00	3.68E+00
^{99}Tc	μCi/g	1.45E-01	1.15E-02	1	0.00E+00	2.91E-01
TIC	μg/g	5.77E+03	1.30E+02	1	4.12E+03	7.42E+03
TOC	μg/g	2.44E+03	3.80E+02	1	0.00E+00	7.27E+03
Total Beta	μCi/g	2.96E+01	2.35E+00	1	0.00E+00	5.94E+01
U.phos	μg/g	4.51E+01	1.40E+00	1	2.73E+01	6.29E+01

Note:

[1]One of the measurements is a "less than" value.

B3.4.1.3 Crust Layer

The mean concentration estimates for the crust layer, along with the two-sided 95 percent confidence interval for the mean concentration, are given in Table B3-14 (nested ANOVA without the riser term) for those analytes with at least 50 percent of the reported data as quantitative values. For the analytes, the lower limit of the 95 percent confidence interval was a negative value due to the magnitude of the variability. Because the actual concentration of a tank sample cannot be less than zero, the lower limit is reported as zero.

Table B3-14. Summary Statistics: Crust Layer (nested ANOVA without the riser term). (2 sheets)

Analyte	Units	$\hat{\mu}$	$\hat{\sigma}_{\hat{\mu}}$	df	LL	UL
% Water.tga	wt%	3.51E+01	1.81E+00	2	2.73E+01	4.29E+01
Acetate.ic	μg/g	1.09E+03	1.49E+02	2	4.43E+02	1.73E+03
Al.icp.a	μg/g	7.25E+04	7.94E+03	2	3.83E+04	1.07E+05
Al.icp.f	μg/g	8.54E+04	8.06E+03	2	5.07E+04	1.20E+05
B.icp.a.lt	μg/g	1.21E+02	9.28E+00	2	8.11E+01	1.61E+02
B.icp.a.nlt	μg/g	1.29E+02	7.77E+00	2	9.53E+01	1.62E+02
Bulk Density	g/mL	1.65E+00	5.50E-02	1	9.48E-01	2.35E+00
Cd.icp.a.lt	μg/g	1.11E+01	1.74E+00	2	3.61E+00	1.85E+01
Cl^-.ic	μg/g	3.36E+03	2.46E+02	2	2.31E+03	4.42E+03
Co.icp.a.lt	μg/g	5.47E+01	3.85E+00	2	3.81E+01	7.12E+01
Co.icp.a.nlt	μg/g	5.64E+01	2.98E+00	2	4.35E+01	6.92E+01
Cr.icp.a	μg/g	6.84E+02	7.40E+01	2	3.66E+02	1.00E+03
Cr.icp.f	μg/g	8.90E+02	7.38E+01	2	5.73E+02	1.21E+03
Cr.icp.f.lt	μg/g	8.90E+02	7.38E+01	2	5.73E+02	1.21E+03
Cr.icp.f.nlt	μg/g	8.94E+02	6.77E+01	2	6.03E+02	1.19E+03
DSC.dry	J/g dry	1.13E+02	7.67E+01	2	0.00E+00	4.43E+02
DSC.exo	J/g wet	7.04E+01	4.66E+01	2	0.00E+00	2.71E+02
F^-.ic	μg/g	7.09E+02	1.48E+02	2	7.25E+01	1.35E+03
Formate.ic	μg/g	8.01E+02	4.05E+01	2	6.27E+02	9.75E+02
K.icp.a	μg/g	6.15E+03	2.54E+02	2	5.06E+03	7.25E+03
NO_2^-.ic	μg/g	7.13E+04	1.09E+04	2	2.42E+04	1.18E+05
NO_3^-.ic	μg/g	1.45E+05	1.65E+04	2	7.44E+04	2.16E+05
Na.icp.a	μg/g	2.08E+05	1.14E+04	2	1.58E+05	2.57E+05

Table B3-14. Summary Statistics: Crust Layer (nested ANOVA without the riser term). (2 sheets)

Analyte	Units	$\hat{\mu}$	$\hat{\sigma}_{\hat{\mu}}$	df	LL	UL
Na.icp.f	μg/g	2.69E+05	1.77E+04	2	1.93E+05	3.45E+05
Ni.icp.f	μg/g	1.25E+03	4.15E+02	2	0.00E+00	3.03E+03
Oxalate.ic	μg/g	7.84E+03	1.10E+03	2	3.11E+03	1.26E+04
P.icp.a	μg/g	6.67E+02	1.37E+02	2	7.78E+01	1.26E+03
PO_4^{3-}.ic.lt	μg/g	1.95E+03	3.72E+02	2	3.43E+02	3.55E+03
PO_4^{3-}.ic.nlt	μg/g	2.56E+03	1.34E+02	1	8.52E+02	4.26E+03
S.icp.a.lt	μg/g	9.84E+02	7.82E+01	2	6.48E+02	1.32E+03
S.icp.a.nlt	μg/g	9.59E+02	6.75E+01	2	6.68E+02	1.25E+03
SO_4^{2-}.ic.lt	μCi/g	2.75E+03	6.28E+02	2	5.09E+01	5.46E+03
SO_4^{2-}.ic.nlt	μCi/g	3.06E+03	7.77E+02	2	0.00E+00	6.40E+03
Si.icp.a	μg/g	6.05E+02	4.29E+01	2	4.20E+02	7.89E+02
Si.icp.f.nlt	μg/g	1.29E+03	1.21E+02	2	7.67E+02	1.81E+03
Zn.icp.a.lt	μg/g	4.10E+01	1.73E+01	2	0.00E+00	1.15E+02
Zn.icp.a.nlt	μg/g	4.20E+01	1.70E+01	2	0.00E+00	1.15E+02

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 Convective Layer

The data were statistically evaluated using two different 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, as well as 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 Restricted Maximum Likelihood Estimation (REML) techniques. This method applied to variance component estimation is described in Harville (1977). The results using the REML techniques 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 $\sigma^2(R)$, $\sigma^2(S)$, and $\sigma^2(A)$) is the number of risers minus one.

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, as well as 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 techniques. The results using the REML techniques 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 Nonconvective Layer (Salt Slurry) and Crust

The data were statistically evaluated using two different 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, as well as 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 techniques. This method applied to variance component estimation is described in Harville (1977). The results using the REML techniques 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} sample
μ	=	the grand mean
S_i	=	the effect of the i^{th} sample
L_{ij}	=	the effect of the j^{th} location from the i^{th} sample
A_{ijk}	=	the effect of the k^{th} analytical result from the j^{th} location from the i^{th} sample
a	=	the number of samples
b_i	=	the number of locations from the i^{th} sample
n_{ij}	=	the number of analytical results from the j^{th} location from the i^{th} sample.

The variables S_i and L_{ij} are assumed to be a random effects. These variables, as well as 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 techniques. This method applied to variance component estimation is described in Harville (1977). The results using the REML techniques 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 samples minus one.

Refer to Appendix D for inventory calculations.

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APPENDIX C

STATISTICAL ANALYSIS FOR ISSUE RESOLUTION

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APPENDIX C

STATISTICAL ANALYSIS FOR ISSUE RESOLUTION

Results of statistical calculations required by the safety screening DQO (Dukelow et al. 1995) are documented in this appendix.

C1.0 STATISTICS FOR SAFETY SCREENING DQO

The safety screening DQO (Dukelow et al. 1995) defines acceptable decision confidence limits in terms of one-sided 95 percent confidence intervals. In this appendix, one-sided confidence limits supporting the safety screening DQO are calculated for tank 241-AN-103. The data in this section are from the 1996 sampling event for tank 241-AN-103.

Confidence intervals were computed for each sample number from tank 241-AN-103 analytical data (Steen 1997). The upper limit (UL) of a one-sided 95 percent confidence interval for 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 confidence interval. For the tank 241-AN-103 data (per sample number), *df* equals the number of observations minus one.

The upper limit of the 95 percent confidence interval was calculated for each subsample which had DSC measurements. The upper limit for each sample number is listed in Table C1.1. Each confidence interval can be used to make the following statement. If the upper limit is less than 480 J/g dry, then one would 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 of the upper limits were less than 480 J/g dry. The UL for Core 167, segment 7, drainable liquid was 629 J/g. Therefore TOC analysis was required. TOC results were well below notification limits. As a result, the high 95 percent CI value for DSC is not of concern.

The upper limit of the 95 percent confidence interval was calculated for each subsample which had at least 50 percent of the reported total alpha data as quantitative values. The sample numbers and the upper limit of the 95 percent confidence intervals are listed in Table C1.2. Each confidence interval can be used to make the following statement. If the upper limit is less than 61.5 μCi/mL or 34.9 μCi/g (conversion used the mean bulk density of 1.76 g/mL observed for the sludge subsamples), then one would reject the null hypothesis that total alpha is greater than or equal to 61.5 μCi/mL (or 34.9 μCi/g) at the 0.05 level of significance. For all the subsamples with at least 50 percent of the reported Total Alpha data as quantitative values, the upper limits were less than 61.5 μCi/mL or 34.9 μCi/g. For the 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 34.9 μCi/g. Thus, the hypothesis that the Total Alpha results are greater than 61.5 μCi/mL or 34.9 μCi/g is rejected for all subsamples, meaning there is no criticality issue.

Table C1-1. Tank 241-AN-103 Differential Scanning Calorimetry Results (J/g dry). (3 sheets)

Sample Number	Core	Segment	Location	$\hat{\mu}$	$\hat{\sigma}_{\hat{\mu}}$	UL
S96T005539	166	3	Drainable liquid	2.67E+01	2.67E+01	1.95E+02
S96T005540	166	4	Drainable liquid	0.00E+00	0.00E+00	0.00E+00
S96T005599	166	6	Drainable liquid	0.00E+00	0.00E+00	0.00E+00
S96T005816	166	7	Drainable liquid	1.30E+02	1.20E+01	2.06E+02
S96T005817	166	8	Drainable liquid	4.22E+01	2.55E+00	5.83E+01
S96T005541	166	9	Drainable liquid	1.78E+01	1.78E+01	1.30E+02
S96T005566	166	10	Drainable liquid	1.51E+02	4.40E+01	4.29E+02
S96T005600	166	11	Drainable liquid	0.00E+00	0.00E+00	0.00E+00
S96T005601	166	12	Drainable liquid	0.00E+00	0.00E+00	0.00E+00
S96T005861	167	2	Drainable liquid	2.31E+02	3.75E+01	4.67E+02
S96T005673	167	3	Drainable liquid	0.00E+00	0.00E+00	0.00E+00
S96T005420	167	5	Drainable liquid	0.00E+00	0.00E+00	0.00E+00
S96T005421	167	6	Drainable liquid	2.79E+01	2.79E+01	2.04E+02
S96T005683[1]	167	7	Drainable liquid	8.60E+01	8.60E+01	6.29E+02
S96T005732	167	8	Drainable liquid	0.00E+00	0.00E+00	0.00E+00
S96T005862	167	9	Drainable liquid	2.07E+02	2.20E+01	3.46E+02
S96T005650	167	11	Drainable liquid	7.37E+01	3.24E+01	2.78E+02
S96T005990	166	Composite	Drainable liquid	2.01E+02	3.00E+01	3.90E+02
S96T005578	166	1	Lower half	7.54E+01	7.60E+00	1.23E+02
S96T005542	166	4	Lower half	0.00E+00	0.00E+00	0.00E+00
S96T005579	166	6	Lower half	0.00E+00	0.00E+00	0.00E+00
S96T005820	166	7	Lower half	0.00E+00	0.00E+00	0.00E+00
S96T005821	166	8	Lower half	0.00E+00	0.00E+00	0.00E+00

Table C1-1. Tank 241-AN-103 Differential Scanning Calorimetry Results (J/g dry). (3 sheets)

Sample Number	Core	Segment	Location	$\hat{\mu}$	$\hat{\sigma}_{\hat{\mu}}$	UL
S96T005543	166	9	Lower half	4.60E+01	4.60E+01	3.36E+02
S96T005564	166	10	Lower half	0.00E+00	0.00E+00	0.00E+00
S96T005580	166	11	Lower half	1.08E+00	1.08E+00	7.90E+00
S96T005581	166	12	Lower half	2.82E+01	1.35E+00	3.67E+01
S96T005637	166	13	Lower half	0.00E+00	0.00E+00	0.00E+00
S96T005636	166	13	Upper half	2.22E+01	2.22E+01	1.62E+02
S96T005399	166	15	Lower half	5.21E+01	2.20E+01	1.91E+02
S96T005398	166	15	Upper half	3.29E+01	2.49E+01	1.90E+02
S96T005583	166	16	Lower half	7.40E+01	8.00E+00	1.25E+02
S96T005582	166	16	Upper half	5.86E+01	8.30E+00	1.11E+02
S96T005401	166	17	Lower half	4.31E+01	1.04E+01	1.09E+02
S96T005400	166	17	Upper half	3.46E+01	4.35E+00	6.20E+01
S96T005639	166	18	Lower half	1.68E+01	3.55E+00	3.92E+01
S96T005638	166	18	Upper half	0.00E+00	0.00E+00	0.00E+00
S96T005823	166	19	Lower half	3.93E+01	1.27E+01	1.19E+02
S96T005822	166	19	Upper half	0.00E+00	0.00E+00	0.00E+00
S96T005668	167	1	Lower half	1.64E+01	5.00E-02	1.67E+01
S96T005667	167	1	Upper half	0.00E+00	0.00E+00	0.00E+00
S96T005851	167	2	Lower half	152	83.7	
S96T005669	167	3	Lower half	6.40E+01	1.85E+01	1.80E+02
S96T005675	167	4	Lower half	0.00E+00	0.00E+00	0.00E+00
S96T005424	167	5	Lower half	0.00E+00	0.00E+00	0.00E+00
S96T005425	167	6	Lower half	0.00E+00	0.00E+00	0.00E+00
S96T005685	167	7	Lower half	8.95E+01	5.55E+01	4.40E+02
S96T005734	167	8	Lower half	0.00E+00	0.00E+00	0.00E+00
S96T005852	167	9	Lower half	6.75E+00	6.75E+00	4.94E+01
S96T005647	167	11	Lower half	1.20E+01	3.93E+00	3.68E+01
S96T005646	167	11	Upper half	9.52E+00	2.68E+00	2.64E+01
S96T005426	167	12	Lower half	0.00E+00	0.00E+00	0.00E+00

Table C1-1. Tank 241-AN-103 Differential Scanning Calorimetry Results (J/g dry). (3 sheets)

Sample Number	Core	Segment	Location	$\hat{\mu}$	$\hat{\sigma}_{\hat{\mu}}$	UL
S96T005432	167	12	Upper half	4.29E+01	3.53E+01	2.66E+02
S96T005427	167	14	Lower half	0.00E+00	0.00E+00	0.00E+00
S96T005433	167	14	Upper half	3.94E+01	6.90E+00	8.30E+01
S96T005656	167	15	Lower half	0.00E+00	0.00E+00	0.00E+00
S96T005655	167	15	Upper half	7.34E+01	3.26E+01	2.79E+02
S96T005493	167	17	Lower half	0.00E+00	0.00E+00	0.00E+00
S96T005492	167	17	Upper half	0.00E+00	0.00E+00	0.00E+00

Notes:

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

Table C1-2. Tank 241-AN-103 Total Alpha Results. (2 sheets)

Sample Number	Core	Segment	Location	$\hat{\mu}$ or Maximum <	$\hat{\sigma}_{\hat{\mu}}$	UL
Liquid Samples						
S96T005539	166	3	Drainable liquid	<5.79E-03	n/a	n/a
S96T005540	166	4	Drainable liquid	<5.06E-03	n/a	n/a
S96T005599	166	6	Drainable liquid	<2.02E-02	n/a	n/a
S96T005816	166	7	Drainable liquid	<2.30E-02	n/a	n/a
S96T005817	166	8	Drainable liquid	<1.20E-02	n/a	n/a
S96T005541[1]	166	9	Drainable liquid	4.35E-03	4.45E-03	7.15E-03
S96T005566	166	10	Drainable liquid	<5.79E-03	n/a	n/a
S96T005600	166	11	Drainable liquid	<2.30E-02	n/a	n/a
S96T005601[1]	166	12	Drainable liquid	1.13E-01	6.66E-02	5.34E-01
S96T005861	167	2	Drainable liquid	<8.04E-02	n/a	n/a
S96T005673	167	3	Drainable liquid	<2.24E-02	n/a	n/a
S96T005420	167	5	Drainable liquid	<1.82E-01	n/a	n/a
S96T005421	167	6	Drainable liquid	<5.14E-02	n/a	n/a
S96T005683	167	7	Drainable liquid	3.83E-02	1.40E-03	4.71E-02
S96T005732[1]	167	8	Drainable liquid	3.59E-02	1.90E-03	4.79E-02
S96T005862[1]	167	9	Drainable liquid	6.26E-02	1.12E-02	1.33E-01
S96T005650	167	11	Drainable liquid	<1.69E-02	n/a	n/a
S96T005991	166	Composite	Drainable liquid	<6.53E-03	n/a	n/a
Sludge samples (μCi/g)						
S96T005608	166	1	Lower half	<1.10E-02	n/a	n/a
S96T005568[1]	166	4	Lower half	8.01E-03	3.65E-04	1.03E-02
S96T005611	166	6	Lower half	<9.61E-03	n/a	n/a
S96T005835[1]	166	7	Lower half	5.82E-03	7.40E-04	1.05E-02
S96T005836[1]	166	8	Lower half	5.69E-03	8.90E-04	1.13E-02
S96T005574	166	9	Lower half	<8.68E-03	n/a	n/a
S96T005569	166	10	Lower half	<9.38E-03	n/a	n/a
S96T005612	166	11	Lower half	<8.81E-03	n/a	n/a
S96T005613	166	12	Lower half	<9.17E-03	n/a	n/a

Table C1-2.Tank 241-AN-103 Total Alpha Results. (2 sheets)

Sample Number	Core	Segment	Location	$\hat{\mu}$ or Maximum <	$\hat{\sigma}_{\hat{\mu}}$	UL
Sludge samples (μCi/g) (Cont'd)						
S96T005720[1]	166	13	Lower half	2.60E-02	8.45E-03	7.93E-02
S96T005408	166	15	Lower half	<1.31E-02	n/a	n/a
S96T005614[1]	166	16	Lower half	5.74E-03	1.51E-03	1.52E-02
S96T005409	166	17	Lower half	<1.29E-02	n/a	n/a
S96T005721	166	18	Lower half	2.93E-02	1.37E-02	1.15E-01
S96T005838	166	19	Lower half	1.91E-02	3.95E-03	4.40E-02
S96T005687	167	1	Lower half	<3.46E-02	n/a	n/a
S96T005855[1]	167	2	Lower half	6.80E-03	7.50E-04	1.15E-02
S96T005688	167	3	Lower half	<1.31E-02	n/a	n/a
S96T005689	167	4	Lower half	<7.68E-03	n/a	n/a
S96T005436	167	5	Lower half	<1.36E-01	n/a	n/a
S96T005448	167	6	Lower half	<9.06E-02	n/a	n/a
S96T005690	167	7	Lower half	<1.49E-03	n/a	n/a
S96T005736	167	8	Lower half	<5.82E-03	n/a	n/a
S96T005856	167	9	Lower half	<1.14E-02	n/a	n/a
S96T005691	167	11	Lower half	<6.48E-03	n/a	n/a
S96T005449	167	12	Lower half	3.15E-02	3.15E-03	5.13E-02
S96T005437	167	14	Lower half	<2.14E-02	n/a	n/a
S96T005692	167	15	Lower half	<1.31E-02	n/a	n/a
S96T005497	167	17	Lower half	<1.68E-02	n/a	n/a

Notes:

n/a = Not applicable

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

C2.0 APPENDIX C REFERENCES

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APPENDIX D

EVALUATION TO ESTABLISH BEST-BASIS INVENTORY FOR DOUBLE-SHELL TANK 241-AN-103

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APPENDIX D

EVALUATION TO ESTABLISH BEST-BASIS INVENTORY FOR DOUBLE-SHELL TANK 241-AN-103

An effort is underway to provide waste inventory estimates that will serve as standard characterization source terms for the various waste management activities (Hodgson and LeClair 1996). As part of this effort, an evaluation of available information for tank 241-AN-103 was performed, and a best-basis inventory was established. This work, detailed in the following sections, follows the methodology that was established by the standard inventory task.

D1.0 CHEMICAL INFORMATION SOURCES

Available composition information for the waste in tank 241-AN-103 is as follows:

- Appendix B of this report 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-103 based on a 1986 push core sample. (Hendrickson 1994).
- The HDW model document (Agnew et al. 1997) provides tank content estimates derived from the LANL model, in terms of component concentrations and inventories. A complete list of data sources used in this evaluation is provided at the end of this section.

D2.0 COMPARISON OF COMPONENT INVENTORY VALUES

There have been no transfers into or out of tank 241-AN-103 since 1986. The HDW model provides composition estimates for the waste in tank 241-AN-103 as of January 1, 1994. Sample-based inventories derived from the September 1996 push core samples are compared to sample based-inventories derived from a 1988 push core sample and inventories generated by the HDW model (Agnew et al. 1997), in Tables D2-1 and D2-2. A tank volume of 3,615 kL (955 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.

The sample-based densities reported in Appendix B are 1.53 g/mL for the liquid and 1.76 g/mL for the slurry. The slurry density is based on measurements of centrifuged solids; it is not necessarily the same as the density of the slurry in the tank. Gases generated in the tank are trapped in the slurry layer and form gas pockets. Because of this, a lower density than was found in the laboratory is expected for the waste in the tank. In tank 241-AN-103, the retained gas is 6.7 vol% of the slurry volume (Shekarriz et al. 1996). The mean slurry density was corrected by multiplying by 0.933 (1 - vol% retained gas). The corrected slurry density is 1.64 g/mL. The HDW model bulk density is 1.60 g/mL.

The slurry volume, determined from temperature profiles, rheometer and push core sample data is 1,552 kL (410 kgal) (Stauffer 1997). Based on the extrusion reports, there is a considerable crust layer in tank 241-AN-103. Approximately 35.6 cm (14 in.) of solids and no drainable liquid was extruded from the first segment of core 167 and 15.2 cm (6 in.) of solids were found in segment two of core 167 with 190 mL of drainable liquid. Segment 1 of core 166 was found to contain only 6.4 cm (2.5 in.) of solids and no drainable liquid. Segment 2 of core 166 was taken for retained gas analysis; the solid content is not known.

Based on core 167, the crust layer would be 50.8 cm (20 in.) deep. However, it is evident that salts precipitated from supernatant after samples were removed from the tank and allowed to cool to ambient temperatures. The average temperature in tank 241-AN-103 is 41.1 °C (106 °F) (Brevick 1997). Samples from both cores that were expected to contain only liquid contained from 1 to 5 inches of solids. It was assumed that 7.6 cm (3 in.) of the 15.2 cm (6 in.) of solids in the second segment of core 167, which contained 15.2 cm (6 in.) of solids, precipitated after the segment was taken from the tank. The fourteen inches of solids in segment 1 of core 167 are assumed to be crust. The total crust layer is assumed therefore to be 43.2 cm (17 in.) or 177 kL (46.7 kgal) with a density of 1.50 (an assumed density that is slightly lower than the mean liquid density).

The supernatant volume, equal to the total volume minus the slurry and crust volumes, is estimated to be 1,885 kL (498 kgal) from these observations. The supernatant volume in Hanlon (1997) of 2,063 kL (545 kgal) is expected to be updated to the newer basis in the future.

Table D2-1. Sampling and Hanford Defined Waste Model Inventory Estimates for Nonradioactive Components in Double-Shell Tank 241-AN-103. (2 sheets)

Analyte	Inventory Based on Segment Data from Both Push Core Samples (kg)	Inventory Based on Composite of Core 166 (kg)	HDW Model Inventory[1] (kg)	Inventory Based on 1986 Push Core Sample[2] (kg)
Al	239,000	181,000	152,000	208,000
Bi	<1,120	<358	874	174
Ca	<6,100	<430	6,810	314
Cl	27,500	29,120	30,900	34,800
CO3	NR	84,600	146,000	32,400
Cr	2,820	2,860	20,800	3,070
F	3,860	11,900	12,700	2,660
Fe	<774	<516	3,440	255
Hg	0	0	10	58
K	46,300	51,100	26,100	55,100
La	<811	<464	6.19	0
Mn	<112	<42.8	1,830	0
Na	1.27E+06	1.12E+06	1.18E+06	1.21E+06
Ni	<225	<86.1	2,250	87
NO2	494,000	458,000	330,000	498,000
NO3	771,000	597,000	1.11E+06	579,000
OH	NR	270,000	577,000	353,000
Pb	<795	<464	862	260
P as PO4	9,800	11,300	55,700	3,360
Si	2,350	2,840	8,330	985
S as SO4	13,200	17,300	85,000	5,810
Sr	<112	<43.0	0	NR
TOC	NR	12,000	60,200	2,220
U	<5,620	413	11,400	1.88

Table D2-1. Sampling and Hanford Defined Waste Model Inventory Estimates for Nonradioactive Components in Double-Shell Tank 241-AN-103. (2 sheets)

Analyte	Inventory Based on Segment Data from Both Push Core Samples (kg)	Inventory Based on Composite of Core 166 (kg)	HDW Model Inventory[1] (kg)	Inventory Based on 1986 Push Core Sample[2] (kg)
Zr	<113	<42.9	566	426
% water	48	41.0	32.6	NR
density, g/mL	1.54	1.62	1.60	1.6

Notes:

NR = not reported

[1] Agnew et al. (1997)
[2] Hendrickson (1994)

Table D2-2. Sampling and Hanford Defined Waste Model Inventory Estimates for Radioactive Components in Double-Shell Tank 241-AN-103 (Decayed to January 1, 1994). (2 sheets)

Analyte	September 1996 Inventory Based on Segment Data from Both Push Core Samples (Ci)	September 1996 Inventory Based on Composite of Core 166 (Ci)	HDW Model Inventory[1] (Ci)	Inventory Based on 1986 Push Core Sample[2] (Ci)
^{3}H	NR	9.31	805	8.8
^{14}C	NR	NR	105	7.2
^{59}Ni	NR	NR	7.58	NR
^{60}Co	NR	<112	139	43.5
^{79}Se	NR	NR	12.3	156
^{90}Sr	NR	8,030	444,000	38,000
^{90}Y	NR	8,030	444,000	NR
^{99}Tc	NR	456	784	616
^{106}Ru	NR	NR	0.0533	0.627
^{129}I	NR	8.32	1.51	1.88
^{134}Cs	NR	NR	189	20.8

Table D2-2. Sampling and Hanford Defined Waste Model Inventory Estimates for Radioactive Components in Double-Shell Tank 241-AN-103 (Decayed to January 1, 1994). (2 sheets)

Analyte	September 1996 Inventory Based on Segment Data from Both Push Core Samples (Ci)	September 1996 Inventory Based on Composite of Core 166 (Ci)	HDW Model Inventory[1] (Ci)	Inventory Based on 1986 Push Core Sample[2] (Ci)
^{137}Cs	NR	2.31E+06	789,000	2.22E+06
^{137m}Ba	NR	2.19E+06	746,000	2.11E+06
^{154}Eu	NR	<604	2,200	NR
^{155}Eu	NR	<3,300	991	NR
^{234}U	NR	NR	4.87	0.192
^{235}U	NR	NR	0.189	0.00398
^{237}Np	NR	<31.0	2.82	0.0724
^{238}Pu	NR	NR	12.6	3.31
^{238}U	NR	NR	4.84	0.051
$^{239/240}Pu$	NR	12.3	284	6.88
^{241}Am	NR	<21.7	308	8.22
^{243}Cm	NR	<4.85	0.0632	NR
^{244}Cm	NR	<13.0	0.863	1.09

Notes:

[1] Agnew et al. (1997)

[2] Hendrickson (1994)

The HDW model estimates for tank 241-AN-103 were derived by combining the supernatant streams that were believed to have been concentrated in the 242-A evaporator and then sent to tank 241-AN-103. This part of the HDW model is called the Supernatant Mixing Model (SMM). The compositions of the supernatants are derived largely from estimates of bulk compositions for process waste streams that left the various processing facilities. To obtain the supernatant fractions, these bulk compositions are multiplied by solubility factors determined from the highest concentrations found among supernatant sample analyses.

In the case of tank 241-AN-103, inventory estimates made by the HDW model are in reasonably good agreement with the sample-based numbers in Table D2-1 for many major (>100,000 kg) waste constituents. Al, CO_3, Na, NO_2, and NO_3 inventories predicted by the HDW model are within a factor of 2 of the sample-based numbers. The HDW model hydroxide estimate is 2.14 times higher than the sample-based result. Cr, Fe, and Ni inventory estimates made by the HDW model are higher than the sample-based inventories because the HDW model overestimates the rate of corrosion in process vessels and storage tanks and it overestimates the solubility of these species in the alkaline environment of Hanford Site tank waste. The model estimate for Ca is much higher than the sample-based result; this is a product of the model overestimating the concentration of Ca in raw water. The agreement for ^{90}Sr and ^{137}Cs is also not close.

An earlier push core sample taken in 1986 offers more data to make comparisons with. Results of this sampling event are published in Hendrickson (1994) and are shown in column 5 of Table D2-1[1]. Less than values were reported as real values in the Hendrickson report. For major components, the agreement between the 1986 push core sample and samples taken more recently is very good (RPDs of less than 30 percent). There is less agreement for minor components, including F, PO_4, Si, SO_4, and U, and TOC. Pre-1989 sample data has not been validated and should be used with caution. However, the 1986 push core samples suggest that the inventories calculated from the 1996 push core sample data are valid.

D3.0 COMPONENT INVENTORY EVALUATION

In Table D3-1, concentrations for the supernatant, slurry, and crust portions based on the means of the segment data for both cores and the composite of core 166 from Appendix B are shown. The calculated liquid values from the one-way ANOVA (Table B3-9) divided by the density of the convective layer (1.46 g/mL) were used to derive the supernatant inventory. The results from the nested ANOVA without the riser term were used to derive the slurry inventory. Core 166 was taken from riser 12A and core 167 was taken from riser 21A. Mean concentrations from segment data are based on segments from both cores. Mean concentrations from composite data are based on a composite of Core 166 only.

[1]Inventories based on a volume of 3,622 kL (957 kgal).

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

Analyte	September 1996 Liquid Mean Concentrations Based on Segment Data From Both Push Core Samples (μg/mL)	September 1996 Liquid Mean Concentrations Based on Composite of Core 166 (μg/mL)	September 1996 Slurry Mean Concentrations Based on Segment Data From Both Push Core Samples (μg/g)	September 1996 Slurry Mean Concentrations Based on Composite of Core 166 (μg/g)	September 1996 Crust Mean Concentrations Based on Segment Data from Both Push Core Samples (μg/g)
Al	36,600	32,100	58,200	38,200	85,400
Bi	<261	<120	<225	<28.2	<222
Ca	<261	<120	<2,200	<56.3	<222
Cl	8,950	9,890	3,820	3,730	3,360
CO3	NR	5,800	NR	28,850	NR
Cr	632	662	552	538	890
F	634	596	982	4,140	709
Fe	<131	<60.1	<48.5 [2]	<48.5	<1,050
Hg	NR	NR	NR	NR	NR
K	15,600	17,300	6,010	6,540	6,150
La	<131	<60.1	<113	<28.2	<111
Mn	<26.1	<12	<22.5	<5.57	<22.1
Na	289,000	263,000	258,000	217,000	269,000
Ni	<52.4	<24	<45.1	<11.3	<44.6
NO2	161,000	133,000	67,800	73,400	71,300
NO3	159,000	117,000	171,000	132,000	145,000

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

Analyte	September 1996 Liquid Mean Concentrations Based on Segment Data From Both Push Core Samples ($\mu g/mL$)	September 1996 Liquid Mean Concentrations Based on Composite of Core 166 ($\mu g/mL$)	September 1996 Slurry Mean Concentrations Based on Segment Data From Both Push Core Samples ($\mu g/g$)	September 1996 Slurry Mean Concentrations Based on Composite of Core 166 ($\mu g/g$)	September 1996 Crust Mean Concentrations Based on Segment Data from Both Push Core Samples ($\mu g/g$)
OH	NR	98,200	NR	32,900	NR
Pb	314	138	<56.3 [2]	<56.3	<222
P as PO4	1,710	840	2,390	3,590	2,045
Si	353	191	531	838	1,290
S as SO4	1,920	1,310	3,510	5,530	2,873
Sr	<26.1	<12	<22.5	<5.63	<22.2
TOC	NR	3,050	NR	2,440	NR
U	<1,310	1.84	<1,130	45.1	<1,110
Zr	26.6	<12	<22.5	<5.63	<22.1
% water	49.0	48.8	31.8	33.0	35.0
density	1.46	1.49	1.76	NR	NR

Notes:

[1]Data taken from Appendix B

[2]Core composite value. No less-than values reported for the segment-based acid digestion.

Acid and fusion digests were performed on the 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 detection limits from the fusion procedure are up to 10 times higher than the limits set in the acid digestion procedure. Although complete digestion does not always occur with the use of acid, the less-than values reported from this procedure for many analytes are more accurate than the fusion digest less-than values.

The mean concentrations from the segment data are a better source of information than the core composite data. The mean concentrations calculated from the segment data were obtained from a large number of data points as opposed to one, and these segments were treated with the more complete fusion digest as opposed to acid digest. Also, the segment data was taken from two cores as opposed to one. The largest discrepancies between the two sets of data occur for F, NO_3 and SO_4. The ratio of the segment inventory to the composite inventory for these three components is 0.33, 1.29, and 0.76, respectively. The fluoride concentration from the core composite (4,140 μg/g) is at least 3 times greater than all the individual segment analyses for fluoride with the exception of segment 17 of core 167 and is therefore not reliable. The differences for NO_3 and SO_4 are not significant; the segment-based data is assumed to be more accurate because there were more analyses.

The composite core data contains information on several chemicals not found in the segment-based data or the analysis of the crust. These analytes include CO_3, OH, and TOC. The composite data is also the only source of individual radionuclide concentrations from the 1996 sampling event. The composite concentrations were used in these instances for both the segment-based inventory and the crust layer.

The best-basis inventory is therefore a combination of both segment level data and core composite data. Core composite concentrations are used for components not included in the segment analyses.

Concentrations for the 43.8 cm (17 in.) of crust are included in Table D3-1 which shows that this material is similar to the slurry below it, except for the higher aluminum concentration in the crust.

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-103 for the following reasons:

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

2. Estimates based on the 1988 core sampling event agree with the September 1996 data.

3. The HDW model estimates, although in reasonable agreement with the 1996 sampling data, do not check as well with the 1988 data.

Total Hydroxide. 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 that 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 inventory estimates for tank 241-AN-103 are presented in Tables D4-1 through D4-8. A tank volume of 3,622 kL (957 kgal) was used to generate the sample-based and HDW inventories (Hanlon 1997). Radionuclide values are decayed to January 1, 1994.

The inventory values reported in Tables D4-1 and D4-2 are subject to change. Refer to the Tank Characterization Database (TCD) for the most current inventory values.

Best-basis tank inventory values are derived for 46 key radionuclides (as defined in Section 3.1 of Kupfer et al. 1997), all decayed to a common report date of 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 has been necessary to derive most of the 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. (These computer models are described in Kupfer et al. 1997, Section 6.1 and in Watrous and Wootan 1997). Model generated values for radionuclides in any of 177 tanks are reported in the Hanford Defined Waste Rev. 4 model results (Agnew et al. 1997). The best-basis value for any one analyte may be either a model result or a sample or engineering assessment-based result, if available. (No attempt has been made to ratio or normalize model results for all 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, see Kupfer et al. 1997, Section 6.1.10.

Table D4-1. Best-Basis Inventory Estimates for Nonradioactive Components in Tank 241-AN-103 Supernatant as of May 31, 1997. (2 sheets)

Analyte	Supernatant Inventory (kg)	Basis (S, M, C, or E)[1]	Comment
Al	69,300	S	
Bi	<495	S	
Ca	<495	S	
Cl	16,900	S	
TIC as CO_3	11,000	S	Not reported in segment-level data.
Cr	1,200	S	
F	1,200	S	
Fe	<248	S	
K	29,600	S	
La	<248	S	
Mn	<49.4	S	
Na	547,000	S	
Ni	<99.2	S	
NO_2	304,000	S	
NO_3	301,000	S	
OH	344,000	C	186,000 kg derived from composite-level data
Pb	<594	S	
P as PO_4	3,240	S	
Si	669	S	
S as SO_4	3,630	S	
Sr	<49.4	S	
TOC	5,770	S	Not reported in segment-level data.
U_{TOTAL}	<2,480	S	

Table D4-1. Best-Basis Inventory Estimates for Nonradioactive Components in Tank 241-AN-103 Supernatant as of May 31, 1997. (2 sheets)

Analyte	Supernatant Inventory (kg)	Basis (S, M, C, or E)[1]	Comment
Zr	<50.3	S	
% Water	51.1	S	
Density, g/mL	1.46	S	

Notes:

Volume basis = 1,885 kL supernatant (498 kgal)

[1]S = Sample-based, M = HDW model-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, and E = Engineering assessment-based.

Table D4-2. Best-Basis Inventory Estimates for Radioactive Components in Tank 241-AN-103 Supernatant as of May 31, 1997 (Decayed to January 1, 1994).

Analyte	Total Inventory (Ci)	Basis (S, M, or E)[1]	Comment
^{60}Co	<55.7	S	
^{90}Sr	42.0	S	
^{90}Y	42.0	S	Referenced to ^{90}Sr.
^{99}Tc	0.318	S	
^{129}I	0.717	S	
^{137}Cs	1.49E+06	S	
^{137m}Ba	1.41E+06	S	Referenced to ^{137}Cs
^{154}Eu	<367	S	
^{155}Eu	<1,630	S	
^{237}Np	<0.048	S	
$^{239/240}Pu$	7.23	S	
^{241}Am	<11.7	S	
^{243}Cm	<0.52	S	
^{244}Cm	<12.5	S	

Notes:

Volume basis = 1,885 kL supernatant (498 kgal)

[1]S = Sample-based, M = HDW model-based, and E = Engineering assessment-based.

Table D4-3. Best-Basis Inventory Estimates for Nonradioactive Components in Tank 241-AN-103 Salt Slurry as of May 31, 1997. (2 sheets)

Analyte	Salt Slurry Inventory (kg)	Basis (S, M, C, or E)[1]	Comment
Al	148,000	S	
Bi	<574	S	
Ca	<5,610	S	
Cl	9,740	S	
TIC as CO_3	73,600	S	Not reported in segment-level data
Cr	1,410	S	
F	2,500	S	
Fe	<251	S	
K	15,300	S	
La	<288	S	
Mn	57.4	S	
Na	658,000	S	
Ni	115	S	
NO_2	173,000	S	
NO_3	436,000	S	
OH	577,000	C	83,900 kg derived from composite-level data
Pb	<144	S	
PO_4	6,080	S	
Si	1,350	S	
SO_4	8,940	S	
Sr	<57.4	S	
TOC	6,220	S	Not reported in segment-level data
U_{TOTAL}	<2,880	S	Not reported in segment-level data

Table D4-3. Best-Basis Inventory Estimates for Nonradioactive Components in Tank 241-AN-103 Salt Slurry as of May 31, 1997. (2 sheets)

Analyte	Salt Slurry Inventory (kg)	Basis (S, M, C, or E)[1]	Comment
Zr	<57.4	S	
% Water	31.8	S	
Density, g/mL	1.62	S	

Notes:

Volume basis = 1,552 kL supernatant (410 kgal)

[1]S = Sample-based, M = HDW model-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, and E = Engineering assessment-based.

Table D4-4. Best-Basis Inventory Estimates for Radioactive Components in Tank 241-AN-103 Salt Slurry as of May 31, 1997 (Decayed to January 1, 1994).

Analyte	Total inventory (Ci)	Basis (S, M, or E)[1]	Comment
^{3}H	8.44	S	
^{60}Co	<51.4	S	
^{90}Sr	7,240	S	
^{90}Y	7,240	S	Referenced to ^{90}Sr
^{99}Tc	413	S	
^{129}I	6.89	S	
^{137}Cs	744,000	S	
^{137m}Ba	707,000	S	Referenced to ^{137}Cs
^{154}Eu	<215	S	
^{155}Eu	<1,510	S	
^{237}Np	<28.1	S	
$^{239/240}Pu$	11.8	S	
^{241}Am	9.04	S	
^{243}Cm	<3.93	S	
^{244}Cm	<94.3	S	

Notes:

Volume basis = 1,552 kL supernatant (410 kgal)

[1]S = Sample-based, M = HDW model-based, and E = Engineering assessment-based.

Table D4-5. Best-Basis Inventory Estimates for Nonradioactive Components in Tank 241-AN-103 Crust as of May 31, 1997. (2 sheets)

Analyte	Crust inventory (kg)	Basis (S, M, C, or E)[1]	Comment
Al	22,700	S	
Bi	<58.9	S	
Ca	<58.9	S	
Cl	892	S	
TIC as CO_3	7,660	S	Assumed to be equal to slurry concentration
Cr	236	S	
F	188	S	
Fe	279	S	
K	1,630	S	
La	<279	S	
Mn	5.87	S	
Na	71,400	S	
Ni	11.8	S	
NO_2	18,900	S	
NO_3	38,500	S	
OH	78,100	C	8,730 kg derived from composite slurry concentration
Pb	<58.9	S	
PO_4	543	S	
Si	342	S	
SO_4	763	S	
Sr	<5.89	S	
TOC	648	S	Assumed to be equal to slurry concentration
U_{TOTAL}	<295	S	

Table D4-5. Best-Basis Inventory Estimates for Nonradioactive Components in Tank 241-AN-103 Crust as of May 31, 1997. (2 sheets)

Analyte	Crust inventory (kg)	Basis (S, M, C, or E)[1]	Comment
Zr	5.87	S	
% Water	35.0	S	
Density, g/mL	1.5	E	

Notes:

Volume basis = 177 kL crust (47 kgal)

[1]S = Sample-based, M = HDW model-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, and E = Engineering assessment-based.

Table D4-6. Best-Basis Inventory Estimates for Radioactive Components in Tank 241-AN-103 Crust as of May 31, 1997 (Decayed to January 1, 1994).

Analyte	Total Inventory (Ci)	Basis (S, M, or E)[1]	Comment
^{3}H	0.878	S	
^{60}Co	<5.35	S	
^{90}Sr	753	S	
^{90}Y	753	S	Referenced to ^{90}Sr
^{99}Tc	43.0	S	
^{129}I	0.717	S	
^{137}Cs	77,400	S	
^{137m}Ba	73,500	S	Referenced to ^{137}Cs
^{154}Eu	<22.3	S	
^{155}Eu	<157	S	
^{237}Np	<2.92	S	
$^{239/240}Pu$	0.480	S	
^{241}Am	0.941	S	
^{243}Cm	<0.409	S	
^{244}Cm	<9.81	S	

Notes:

Volume basis = 177 kL crust (47 kgal)

[1]S = Sample-based, M = HDW model-based, and E = Engineering assessment-based.

Table D4-7. Best-Basis Total Inventory Estimates for Nonradioactive Components in Tank 241-AN-103 as of May 31, 1997. (2 sheets)

Analyte	Total Inventory (kg)	Basis (S, M, C, or E)[1]	Comment
Al	239,000	S	
Bi	<1,120	S	
Ca	<6,100	S	Slurry = 977 kg
Cl	27,500	S	
TIC as CO_3	84,600	S	
Cr	2,820	S	
F	3,860	S	
Fe	<774	S	
K	46,300	S	
La	<811	S	
Mn	<112	S	
Na	1.27E+06	S	
Ni	<225	S	
NO_2	494,000	S	
NO_3	771,000	S	
OH	999,000	C	278,000 kg calculated from sample data
Pb	<795	S	
PO_4	9,800	S	
Si	2,350	S	
SO_4	13,200	S	
Sr	<112	S	
TOC	12,000	S	
U_{TOTAL}	<5,620	S	

Table D4-7. Best-Basis Total Inventory Estimates for Nonradioactive Components in Tank 241-AN-103 as of May 31, 1997. (2 sheets)

Analyte	Total Inventory (kg)	Basis (S, M, C, or E)[1]	Comment
Zr	<113	S	
% Water	48.0	S	
Density, g/mL	1.54	S	

Notes:

Volume basis = 3,622 kL (955 kgal)

[1]S = Sample-based, M = HDW model-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, and E = Engineering assessment-based.

Table D4-8. Best-Basis Inventory Estimates for Radioactive Components in Tank 241-AN-103 as of May 31, 1997 (Decayed to January 1, 1994). (2 sheets)

Analyte	Total Inventory (Ci)	Basis (S, M, or E)[1]	Comment
^{3}H	9.31	S	Slurry/Crust only
^{14}C	112	S	
^{59}Ni	7.58	M	
^{60}Co	< 112	S	
^{63}Ni	747	M	
^{79}Se	12.3	M	
^{90}Sr	8,030	S	
^{90}Y	8,030	S	Referenced to ^{90}Sr
^{93}Zr	59.6	M	
^{93m}Nb	43.2	M	
^{99}Tc	456	S	
^{106}Ru	0.0533	M	
^{113m}Cd	302	M	
^{125}Sb	865	M	
^{126}Sn	18.8	M	
^{129}I	8.32	S	
^{134}Cs	189	M	
^{137}Cs	2.31E+06	S	Referenced to ^{137}Cs
^{137m}Ba	2.19E+06	S	
^{151}Sm	43,600	M	
^{152}Eu	15.8	M	
^{154}Eu	< 604	S	
^{155}Eu	< 3,300	S	
^{226}Ra	5.81E-04	M	
^{227}Ac	0.00355	M	
^{228}Ra	1.05	M	
^{229}Th	0.0243	M	
^{231}Pa	0.0143	M	
^{232}Th	0.103	M	

Table D4-8. Best-Basis Inventory Estimates for Radioactive Components in Tank 241-AN-103 as of May 31, 1997 (Decayed to January 1, 1994). (2 sheets)

Analyte	Total Inventory (Ci)	Basis (S, M, or E)[1]	Comment
^{232}U	3.59	M	
^{233}U	13.8	M	
^{234}U	4.87	M	
^{235}U	0.189	M	
^{236}U	0.285	M	
^{237}Np	<31.0	S	
^{238}Pu	12.6	M	
^{238}U	4.84	M	
$^{239/240}Pu$	12.3	S	
^{241}Am	21.7	S	Slurry = 9.04 Ci
^{241}Pu	1,060	M	
^{242}Cm	0.623	M	
^{242}Pu	0.00497	M	
^{243}Am	0.00209	M	
^{243}Cm	<4.85	S	
^{244}Cm	<13.0	S	

Notes:

Volume basis = 3,615 kL (955 kgal)

[1]S = Sample-based, M = HDW model-based, and E = Engineering assessment-based.

D5.0 REFERENCES

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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, E. R. Siciliano, *Preliminary Retained Gas Sampler Measurement Results for Hanford Waste Tanks 241-AW-101, 241-A-101, 241-AN-105, 241-AN-104, and 241-AN-103*, PNNL-11450, 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), Lockheed Martin Hanford Corporation, Richland, Washington.

Watrous, R. A., and D. W. Wootan, 1997, *Activity of Fuel Batches Processed Through Hanford Separations Plants, 1944 Through 1989*, HNF-SD-WM-TI-794, Rev. 0, Lockheed Martin Hanford Corporation for Fluor Daniel Hanford, Inc., Richland, Washington.

APPENDIX E

BIBLIOGRAPHY FOR TANK 241-AN-103

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APPENDIX E

BIBLIOGRAPHY FOR TANK 241-AN-103

Appendix E provides a bibliography of information that supports the characterization of tank 241-AN-103. This 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-103 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-103
- 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 of material to use, with an annotation at the end of each reference describing the information source. Where possible, a reference is provided for information sources. A majority of the information listed below may be found in the Westinghouse Hanford Company Tank Characterization and Safety 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-96-3860, Rev. 0, Los Alamos National Laboratory, Los Alamos, New Mexico.

- Document contains tank layer and supernatant models and the Historical Tank Content Estimate for Hanford Site underground waste storage tanks, as well as 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, 1997, *Waste Status and Transaction Record Summary (WSTRS) Rev. 4*, LA-UR-97-311, Rev. 0, Los Alamos National Laboratory, Los Alamos, New Mexico.

- Document contains spreadsheets depicting all available data on tank additions/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.

- Document contains account of waste transfers for double-shell tanks, including waste type and volume, source, and destination.

Ic. Surveillance/Tank Configuration

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

- Document describing 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.

- Document contains information pertaining to thermocouple trees installed in the Hanford Site underground waste tanks, such as installation date, material condition, riser number, height of individual thermocouples above the bottom of the tank, high temperature reading, frequency of surveillance, and type of thermocouple.

Id. Sample Planning/Tank Prioritization

Bell, K. E., 1993, *Tank Waste Remediation System Tank Waste Characterization Plan*, WHC-SD-WM-PLN-047, Rev. 1, Westinghouse Hanford Company, Richland, Washington.

- Document 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 Characterization Technical Sampling Basis*, HNF-SD-WM-TA-164, Rev. 3, Lockheed Martin Hanford Company, Richland, Washington.

- Document that summarizes the technical basis for characterizing the waste in the tanks and assigns a priority number to each tank.

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.

Kruger, A. A., 1996, *Tank 241-AN-103 Push Mode Core Sampling and Analysis Plan*, WHC-SD-WM-TSAP-105, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

- Document contains detailed sampling and analysis procedure information for tank 241-AN-103 based on applicable DQOs.

Kruger, A. A., and W. D. Winkelman, 1996, *Tank 241-AN-103 Tank Characterization Plan*, WHC-SD-WM-SD-TP-383, Rev. 3, Lockheed Martin Hanford Corporation, Richland, Washington.

- Document discussed any and all relevant DQOs and how they will be met for tank 241-AN-103.

Mauss, B. M., 1987, *103-AN Core Samples: Proposed Experimental Design for Dissolution Study*, (internal letter 6453-87-047 to D. G. Rodenhizer on April 8), Rockwell Hanford Operations, Richland, Washington.

- Contains historical data for tank 241-AN-103.

Mauss, B. M., 1987, *Revised Experimental Design for 103-Dissolution Study*, (internal letter 65453-97-063 to L. C. Stegen on May 8), Rockwell Hanford Operations, Richland, Washington.

- Contains historical data for tank 241-AN-103.

Richmond, W. G., 1987, *Analysis of Composite Samples from Tank 103-AN*, (external letter to A. P. Toste, PNL, on May 14), Rockwell Hanford Operations, Richland, Washington.

- Contains historical data for tank 241-AN-103.

Shekarriz, A., and J. M. Bates, 1996, *Sampling Plan for Tank 241-AN-103 Retained Gas Sampler Deployment*, TWSMIT:080190, Pacific Northwest National Laboratory, Richland, Washington.

- Letter report providing RGS requirements input for the 241-AN-103 TSAP.

Winkelman, W. D., J. W. Hunt, and L. J. Fergestrom, 1996, *FY 1997 Tank Waste Analysis Plan*, WHC-SD-WM-PLN-120, Rev. 1, Lockheed Martin Hanford Corporation for Fluor Daniel Hanford, Inc., Richland, Washington.

- Document contains Tri-Party Agreement (see Ecology et al. 1994 listing in Section 5.0) requirement-driven TWRS Characterization Program information and a list of tanks addressed in fiscal year 1997.

Ie. Data Quality Objectives (DQO) and Customers of Characterization Data

Cash, R. J., 1996a, *Application of "Flammable Gas Tank Safety Program: Data Requirements for Core Sampling Analysis Developed through the Data Quality Objectives Process" Rev. 2* (internal memorandum 79300-96-028 to S. J. Eberlein, July 12), Westinghouse Hanford Company, Richland, Washington.

- Contains flammable gas retained gas sampler requirements.

Cash, R. J., 1996b, *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.

- Memorandum contains interim requirements for the Organic Solvents issue.

DOE-RL, 1996, Recommendation 93-5 Implementation Plan, DOE/RL-94-0001, Rev. 1, U.S. Department of Energy, Richland, Washington.

- Organic solvent description in the 93-5 implementation Plan.

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.

- DQO used to determine if 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-WA-SP-023, Rev. 0, Westinghouse Hanford Company, 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.

- Document provides data needs for evaluating the flammability issues in the tank.

Mulkey, C. H., and J. M. Jones, 1995, *Double-Shell Tank System Waste Analysis Plan*, WHC-SD-WM-EV-053, Rev. 3, Westinghouse Hanford Company, Richland, Washington.

- Document describing requirements for double-shell tank analyses based on the compatibility and safety screening DQOs.

II. ANALYTICAL DATA - SAMPLING OF TANK WASTE AND WASTE TYPES

IIa. Sampling of tank 241-AN-103

Fow, C. L., 1987, *Characterization of Waste from Double-Shell Tank AN-103*, 7W21-87-1, Pacific Northwest Laboratory, Richland, Washington.

- Letter report containing rheological measurements from three samples from the 1986 push core sample.

Harmon, H. D., 1991, *Watch List for Tanks Which May Have Hydrogen Buildup*, (letter 9001478B R1 to Gerton R.E., February 8, 1991),Westinghouse Hanford Company, Richland, Washington.

- Memorandum reports the results of the slurry growth study of actual waste.

Jansky, M. T., 1984, *Laboratory Support for Tank Farm Samples from Tanks 103 and 104 AN*, (internal letter 6543-84-164 to P. J. Certa on July 2), Rockwell Hanford Operations, Richland, Washington.

Mauss, B. M., 1987, *Laboratory Work to be Performed on AN-103 Core Sample*, (internal memorandum 65453-87-024 to L. C. Stegen, February 17), Rockwell Hanford Operation, Richland, Washington.

- Memorandum contains plans for the analysis of the 1986 push core sample.

Mudge, K. L., 1987, *Core Sample Results 103-AN*, (internal memorandum 65950-87-019 to K. W. Owens, January 12), Rockwell Hanford Operation, Richland, Washington.

- Memorandum reports tank conditions during the 1986 core sampling.

Prignano, A. L., 1988, *Dissolution Study of Composite from Tank AN-103*, (internal memorandum 12221-PCL88-060 to Distribution, January 13), Westinghouse Hanford Company, Richland, Washington.

- Letter reports dissolution results of a waste composite from the 1986 push core sample.

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, *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.

- Document contains the measurements resulting from retained gas sampling tanks.

Steen, F. H., 1997, *Tank 241-AN-103, Cores 166 and 167, Analytical Results for the Final Report,* HNF-SD-WM-DP-223, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

- Document contains sample analyses from 1996 tank 241-AN-103 core sampling event.

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.

- Document presents the results from operating the ball rheometer and void fraction instrument in Hanford Site waste tank 241-AN-103 and the other Flammable Gas Watch List Double-Shell Tanks.

Toste, A. P., 1987, (untitled), (external memorandum to W. G. Richmond, September 25), Pacific Northwest Laboratory, Richland, Washington.

- Memorandum contains analytical data from the 1986 push core sample.

Wilkins, N. E., 1995, *Results of Vapor Space Monitoring of Flammable Gas Watch List Tanks*, WHC-SD-WM-TI-682, Rev. 0A, Westinghouse Hanford Company, Richland, Washington.

- Document describing gas monitoring of double-shell tanks.

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 Corporation for Fluor Daniel Hanford, Inc., Richland, Washington.

- Document contains results of Standard Hydrogen Monitoring Systems, vapor grab sampling, and gas characterization system monitoring of tank 241-AN-103 as well as other Flammable Gas Watch List tanks.

IIb. Sampling of 242-A Evaporator Streams

Certa, P. J., 1985, *242-A Evaporator/Crystallizer FY-84 Campaign Run 84-3 Post Run Document*, RHO-SD-WM-PE-018, Rockwell Hanford Operation, Richland, Washington.

- Document describing evaporator run campaign 84-3.

Kelly, M. G., 1986, *242-A Evaporator/Crystallizer FY-1986 Campaign Run 86-2 Post-Run Document*, RHO-WD-WM-PE-028, Rockwell Hanford Operation, Richland, Washington.

- Document describing evaporator run campaign 86-2.

Mauss, B. M., 1985a, *The 86-2 Evaporator Campaign: Laboratory Results on the Production of Double-Shell Slurry*, (internal memorandum 65453-86-038 to M. G. Kelly, March 28), Rockwell Hanford Operation, Richland, Washington.

- Memorandum containing analytical results of tank 241-103-AN sludge and evaporator process samples.

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

- Contains historical data for tank 241-AN-103.

Mauss, B. M., 1985b, *Laboratory Support of 242-A Evaporator Run 85-2*, (internal letter 65463-85-018 to N. L. Pontions, January 25), Rockwell Hanford Operations, Richland, Washington.

- Contains historical data for tank 241-AN-103.

Pontions, N. L, 1985, *242-A Evaporator/Crystallizer FY 1985 Campaign Run 85-2 Post Run Document*, RHO-SD-WM-PL-020, Rockwell Hanford Operations, Richland, Washington.

- Contains historical data for tank 241-AN-103.

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-96-3860, Rev. 0, Los Alamos National Laboratory, Los Alamos, New Mexico.

- Document contains waste type summaries as well as primary chemical compound/analyte and radionuclide estimates for sludge, supernatant, and solids.

Schmittroth, F. A., *Inventories for Low-Level Tank Waste*, WHC-SD-WM-RPT-164, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

- Document contains a global inventory based on process knowledge and radioactive decay estimations using ORIGEN2. Pu and U waste contribution are taken at 1 percent of the amount used in processes. Also compares information on Tc-99 from both ORIGEN2 and analytical data.

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.

- Document gives 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.

- Document contains a quick reference to sampling information in spreadsheet or graphical form for 23 chemicals and 11 radionuclides for all the tanks.

Brevick, C. H., J. L. Stroup, and J. W. Funk, *Historical Tank Content Estimate for the Southeast Quadrant of the Hanford 200 Areas*, HNF-SD-WM-ER-350, Rev. 1, Fluor Daniel Northwest, Inc. for Fluor Daniel Hanford, Inc., Richland, Washington.

- Document contain summary information from the supporting document for Tank Farms AN, AP, AW, AY, AZ, and SY as well as in-tank photo collages and the total inventory and supernatant composite inventory estimates.

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

- Document contains descriptions of riser locations and tank construction for the AN Tank Farm. It also contains descriptions of the process and temperature histories as well as the results from past sampling events.

Hall, B., 1990, *Toxic Metals Concentrations of DSS and CC Containing Tanks*, DSI to D. D. Stepnewski on May 16, Westinghouse Hanford Company, Richland, Washington.

- Contains toxic metal data for tank 241-AN-103.

Hanlon B. M., 1997, *Waste Tank Summary Report for Month Ending March 31, 1997*, HNF-EP-0182-108, Rev. 0, Lockheed Martin Hanford Corporation for Fluor Daniel Hanford, Inc., Richland, Washington.

- Document summarizing types and amounts of wastes in Hanford Site tanks.

Husa, E. I., 1993, *Hanford Site Waste Storage Tank Information Notebook*, WHC-EP-0625, Westinghouse Hanford Company, Richland, Washington.

- Document contains in-tank photos as well as 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.

- Document gives assessment of 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 National Laboratory, Richland, Washington.

- Letter presents the results from corrosion testing with scrub solutions for corrosion behavior.

Prignano, A. L., 1987, *Dissolution Properties of Composite From Tank 103-AN*, RHO-SD-RE-TP-016, Rockwell Hanford Operation, Richland, Washington.

- Contains historical data for tank 241-AN-103.

Prignano, A. L., 1988, *Dissolution Study of Composite for Tank 103-AN*, (internal letter 12221-PCL88-060 to Distribution on January 13), Westinghouse Hanford Corporation, Richland, Washington.

- Contains historical data for tank 241-AN-103.

Shelton, L. W., 1995a, *Chemical and Radionclide Inventory for Single- and Double-Shell Tanks*, (internal memorandum 74A20-96-30 to D. J. Washenfelder, February 28), Westinghouse Hanford Company, Richland, Washington.

- Contains historical data for tank 241-AN-103.

Shelton, L. W., 1995b, *Chemical and Radionclide Inventory for Single- and Double-Shell Tanks*, (internal memorandum 75520-95007 to R. M. Orme, August 8), Westinghouse Hanford Company, Richland, Washington.

- Memorandum contains a tank inventory estimate based on analytical information.

Shelton, L. W., 1995c, *Radionuclide Inventories for Single- and Double-Shell Tanks*, (internal memorandum 72320-95-002 to F. M. Cooney, February 14), Westinghouse Hanford Company, Richland, Washington.

- Memorandum contains an tank inventory 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.

- Report containing radionuclide chemical inventories for double-shell tanks.

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