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START

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ENGINEERING CHANGE NOTICE

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Proj. ECN

2. ECN Category (mark one)	3. Originator's Name, Organization, MSIN, and Telephone No.	4. USQ Required?	5. Date
Supplemental [] Direct Revision [X] Change ECN [] Temporary [] Standby [] Supersedure [] Cancel/Void []	John H. Baldwin, Data Assessment and Interpretation, R2-12, 373-4533	[] Yes [X] No	01/27/97
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As-Found	[X]	Facilitate Const	[]	Const. Error/Omission	[]	Design Error/Omission	[]

14b. Justification Details

This document was revised per Department of Energy performance agreements and direction from the Washington State Department of Ecology to revise 23 tank characterization reports (letter dated 7/6/95).

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

See attached distribution.

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ENGINEERING CHANGE NOTICE

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16. Design Verification Required	17. Cost Impact				18. Schedule Impact (days)	
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[X] No	Savings	[] $	Savings	[] $	Delay	[]

19. Change Impact Review: Indicate the related documents (other than the engineering documents identified on Side 1) that will be affected by the change described in Block 13. Enter the affected document number in Block 20.

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

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

Document Number/Revision	Document Number/Revision	Document Number Revision
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21. Approvals

	Signature	Date		Signature	Date
Design Authority			Design Agent		
Cog. Eng.	J.H. Baldwin *John Baldwin*	1/27/97	PE		
Cog. Mgr.	K.M. Hall *Kathleen M. Hall*	1/27/97	QA		
QA			Safety		
Safety			Design		
Environ.			Environ.		
Other	R.J. Cash *R.J. Cash*	1/27/97	Other		
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Tank Characterization Report for Double-Shell Tank 241-AP-102

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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-AP-102. This report supports the requirements of the Tri-Party Agreement Milestone M-44-05.

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Tank Characterization Report for Double-Shell Tank 241-AP-102

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LIST OF TERMS

AA	atomic absorption
ANOVA	analysis of variance
Btu/hr	British thermal units per hour
Ci	curies
Ci/L	curies per liter
CLP	Contract Laboratory Program
cm	centimeters
CP	concentrated phosphate
DQO	data quality objective
DSC	differential scanning calorimetry
EDTA	ethylene diaminetetraacetic acid
EPA	United States Environmental Protection Agency
ft	feet
g	grams
gal/min	gallons per minutes
g/cm^3	grams per cubic centimeter
g/L	grams per liter
g/mL	grams per milliliter
GEA	gamma energy analysis
HEDTA	N-(hydroxyethyl)-ethylenediaminetriacetic acid
HDW	Hanford Defined Waste
HPLC	high-pressure liquid chromatography
HTCE	Hanford Tank Content Estimate
IC	ion chromatography
ICP	inductively coupled plasma atomic emission spectrometry
in.	inches
kg	kilograms
kgal	kilogallons
kL	kiloliters
LANL	Los Alamos National Laboratory
LF	laser fluorimetry
LL	lower limit
L/min	liters per minute
m	meters
m^3	cubic meters
$\underline{M}$	moles per liter
mg	milligram
mg/L	milligrams per liter
mL	milliliters
mm	millimeters
ppm	particles per million
MT	metric tons

LIST OF TERMS (Continued)

NA	not applicable
PNNL	Pacific Northwest National Laboratory
PUREX	Plutonium-Uranium Extraction Plant
QC	quality control
REML	restricted maximum likelihood
RPD	relative percent difference
SAP	sampling and analysis plan
Spec	spectroscopy
SpG	specific gravity
SVOA	semivolatile organic analysis
TCR	tank characterization report
TGA	thermogravimetric analysis
TIC	total inorganic carbon
TOC	total organic carbon
TWRS	Tank Waste Remediation System
UL	upper limit
VOA	volatile organic analysis
W	watts
W/Ci	watts pr curie
WHC	Westinghouse Hanford Company
$\hat{\sigma}^2_\mu$	estimate of the variance of the mean concentration
μ	mean
μCi/g	microcuries per gram
μCi/L	microcuries per liter
μCi/mL	microcuries per milliliter
μeq/g	microequivalents per gram
μg/g	micrograms per gram
μg/L	micrograms per liter
μg/mL	micrograms per milliliter

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1.0 INTRODUCTION

One of the major functions 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 appendices serve as the TCR for double-shell tank 241-AP-102. The objectives of this report are: 1) to use characterization data in response to technical issues associated with tank 241-AP-102 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 appendices. This report also supports the requirements of the *Hanford Federal Facility Agreement and Consent Order* (Ecology et al. 1996) milestone M-44-05.

1.1 SCOPE

Characterization information presented in this report originated from sample analyses and known (historical) sources. The safety screening and waste compatibility data quality objectives (DQOs) require that technical issues be resolved using results from sampling events (listed in Table 1-1 below); however, other information could be used to support (or question) conclusions derived from these results. Historical information for tank 241-AP-102, 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 results from sampling events listed in Table 1-1 are summarized in Appendix B. The results of the 1993 sampling events, also reported in Welsh (1994), satisfied the data requirements specified in the tank waste remediation system tank waste characterization plan (Bell 1993), and in the grout disposal program characterization plan (Hendrickson et al. 1993). The numerical manipulation of data used in issue resolution is reported in Appendix C. Appendix D contains the evaluation to establish the best basis for the inventory estimate and the statistical analysis performed for this evaluation. A bibliography that resulted from an in-depth literature search of all known information sources applicable to tank 241-AP-102 and its respective waste types is contained in Appendix E. The reports listed in Appendix E may be found in the Tank Characterization Resource Center, central files, the Fluor Daniel Northwest library, document control centers and electronic data bases such as the Remote Management Information System.

Table 1-1. Summary of Recent Sampling.

Sample/date	Phase	Location
4/93	Liquid	Risers: 1 (NE) 30°, 1 (SE) 150°, 1 (W) 270°
4/89 (Prior to transfer to 241-AP-102)	Liquid	241-AN-106 Risers 22A, 1B, 16C*

Note:

*No transfers were made into or out of tank 241-AN-106 between the time of the 4/89 sampling and the time of the transfer of all but 98 kL (26 kgal) to tank 241-AP-102. Data from this sample event increase confidence in data obtained in the 4/93 tank 241-AP-102 sampling event.

1.2 TANK BACKGROUND

Tank 241-AP-102 is one of eight double-shell tanks located in the AP tank farm in the 200 East Area of the Hanford Site. The tanks were constructed to hold a maximum volume of 4,390 kL (1,160 kgal) of concentrated supernate waste, at a maximum temperature of 149 °C (300 °F) (Brevick et al. 1995). The tank entered service in the third quarter of 1986 by receiving flush water, nearly reaching capacity in 1988 with dilute phosphate waste and waste from miscellaneous sources. The tank served as the feed tank for the Grout Treatment Facility and was equipped with a mixer pump to blend grout feed. The tank was nearly emptied from the third quarter of 1988 to the third quarter of 1989 during Grout Campaign 101 and was then filled with 4,180 kL (1,104 kgal) of waste from tank 241-AN-106. The waste volume has decreased since that time to 4,160 kL (1,098 kgal) (Hanlon 1996). The waste presently contained by the tank is categorized as concentrated phosphate waste. The tank is not currently on a Watch List (Hanlon 1996). A description of tank 241-AP-102 is summarized in Table 1-2.

Table 1-2. Description of Tank 241-AP-102.

TANK DESCRIPTION	
Type	Double-shell
Constructed	1983-1986
In-service	Third quarter 1986
Diameter	22.9 m (75.0 ft)
Operating depth	10.7 m (35.2 ft)
Capacity	4,390 kL (1,160 kgal)
Bottom Shape	Flat
Ventilation	Active
TANK STATUS	
Waste classification	Concentrated phosphate
Total waste volume[1]	4,152 kL (1,097 kgal)
Supernatant volume	4,152 kL (1,097 kgal)
Saltcake volume	0 kL (0 kgal)
Sludge volume	0 kL (0 kgal)
Drainable interstitial liquid volume	0 kL (0 kgal)
Waste surface level (9/24/96)	10.1 m (399.5 in.)
Temperature (7/89 to 9/96)	5.5 °C (42 °F) to 30 °C (86 °F)
Integrity	Sound
Watch List	None
SAMPLING DATES	
Grab samples (241-AP-102)	4/93

Note:
[1]Waste volume is estimated from surface level measurements (Hanlon 1996).

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2.0 RESPONSE TO TECHNICAL ISSUES

One technical issue has been identified for tank 241-AP-102:

- Does the waste pose or contribute to any recognized potential safety problems?

The safety screening DQO (Dukelow et al. 1995) provides the sampling requirements and the types of analysis used to address the above issue. Data from the analysis of two grab sampling events, as well as available historical information, provided the means to respond to these issues. This response is detailed in Sections 2.1 and 2.2. See Appendix B for sample and analysis data for tank 241-AP-102.

2.1 SAFETY SCREENING

The data needed to screen the waste in tanks for three potential safety problems are documented in the tank safety screening DQO (Dukelow et al. 1995). The first potential safety problem is the potential for a propagating exothermic reaction; the second is flammable gases in the headspace; and the third is the potential for a critical nuclear reaction. These three conditions are addressed separately below. Specific gravity, which is required by Dukelow et al. (1995) for the purpose of calculating total alpha activity limits, was measured on the 1993 grab samples. The safety screening DQO did not exist at the time of the 1993 sampling of tank 241-AP-102.

2.1.1 Exothermic Conditions (Energetics)

The first requirement outlined in the safety screening DQOs is to ensure that there is no fuel with sufficient exothermic constituents (organic or ferrocyanide) to cause a safety hazard. Measurements of the fuel content of the waste were not required at the time of the 1993 sampling of tank 241-AP-102. Analysis of the energetics will be needed before this requirement of the safety screening DQO can be met.

2.1.2 Flammable Gas

Vapor phase measurements, normally taken in the tank headspace prior to sampling, were not required at the time of the 1993 sampling of tank 241-AP-102. Vapor phase measurements will be needed to complete the requirements of the safety screening DQO.

2.1.3 Criticality

The safety threshold limit is 1 g ^{239}Pu per liter of waste. Assuming that all alpha is from ^{239}Pu and assuming a density of 1.20 g/mL, 1 g/L of ^{239}Pu is equivalent to 51.2 μCi/mL of alpha activity. Total alpha activity was not measured on the 1993 grab samples. The only alpha-emitting radionuclide measured at a detectable level was ^{241}Am, which exhibited a mean activity of 4.32E-04 μCi/mL. Plutonium-239 was below the detection limit of 51.2 μCi/mL at < 7.48E-05 μCi/mL; therefore, there is no criticality concern.

2.2 OTHER TECHNICAL ISSUES

2.2.1 Heat Load from Radioactive Decay

A factor in assessing tank safety is the heat generation from radioactive decay. The heat load value calculated using the data from the 1993 grab sampling effort (Welsh 1994) was 4,510 W (15,400 Btu/hr). The HTCE (Agnew et al. 1996) prediction for heat load is 4,060 W (13,900 Btu/hr), and the estimate according to Kummerer (1995) was 0.0146 W (0.05 Btu/hr). All of these estimates are well below the design specification limit of 20,500 W (70,000 Btu/hr) for the 241-AP tank farm (Harris 1994). Because a maximum temperature has been exhibited (Section A4.2), it may be concluded that any heat generated from radioactive sources is dissipated throughout the year. The heat load was calculated using ^{137}Cs and $^{89/90}$Sr, which have the highest contributions to the heat load. Other radionuclides exhibited activities greater than the detection limit, but at a level which did not change the total when calculated to three significant figures. The calculated heat load is given in Table 2-1.

Table 2-1. Tank 241-AP-102 Radionuclide Inventory and Projected Heat Load.

Radionuclide	Projected Inventory (Ci)	Decay Heat Generation Rate (W/Ci)	Decay Heat Generation (W)
^{137}Cs	9.48E+05	0.00472	4,470
$^{89/90}$Sr	5,990	0.00670	40.1
Total Watts			4,510

2.2.2 Mixer Pump Operation

The mixer pump installed in tank 241-AP-102 was operated for 53 days prior to the 1993 grab sampling event. One goal of the analysis of the 1993 grab samples was to evaluate the ability of the pump to thoroughly mix, or homogenize, the tank contents. The purpose of the evaluation was to ensure that the grab samples were representative of the tank contents. Representative samples are important because the waste in the tank originally consisted of three layers: two layers from tank 241-AN-106 and one already present in tank 241-AP-102. Another consideration is the possibility of the precipitation of phosphates. Although the grout program has been canceled, it is nonetheless valuable to know the capabilities of the mixer pump.

The following discussion of homogeneity in tank 241-AP-102 was taken from Welsh (1994).

The characterization test plan required that the homogeneity of the waste in tank 241-AP-102 be determined based on the analytical results of sodium, ^{137}Cs, and phosphate. Differences between the analytical results at the 15 locations sampled within tank 241-AP-102 were used to address this request. The composite analytical results are included as a sixteenth location for the statistical analysis and random analytical error estimate calculation.

A statistical procedure known as the analysis of variance (ANOVA) was used to analyze the data. An F test was used to determine if the variability between locations ($\hat{\sigma}_L^2$) is significantly greater than zero. If the test indicates that $\hat{\sigma}_L^2$ is significantly greater than zero, then it is concluded that the tank is not homogenous with respect to that analyte. If the test indicates that $\hat{\sigma}_L^2$ is not significantly different from zero, then it is concluded that the tank is homogenous with respect to that analyte. These tests, one for each analyte (sodium, ^{137}Cs, and phosphate), were conducted at the 0.05 level of significance. The p-values from the statistical tests were 0.7952 for sodium, 0.5178 for ^{137}Cs, and 0.2447 for phosphate; if the p-value was less than 0.05 then $\hat{\sigma}_L^2$ is significantly different than zero.

For all three analytes the ANOVA indicated that $\hat{\sigma}_L^2$ is not significantly different from zero. Therefore, based on the sodium, ^{137}Cs, and phosphate analytical results, the contents of tank 241-AP-102 are considered to be homogenous.

The ANOVA procedure was used to analyze the sample results for the remaining analytes that were reported at concentrations greater than the detection limit. The results from the ANOVA indicated that $\hat{\sigma}_L^2$ is not significantly different from zero at the 0.05 level of significance for aluminum, barium, cadmium, chromium, iron, nickel, potassium, phosphorus, chloride, nitrite, nitrate, sulfate, total organic carbon (TOC), percent water, hydroxide, ^{90}Sr, ^{14}C, ^{99}Tc, ^{241}Am, selenium, HEDTA, EDTA, and citrate. Also, $\hat{\sigma}_L^2$ is significantly different from zero for beryllium and total inorganic carbon (TIC).

2.3 SUMMARY

The requirements of the safety screening DQO have not been met. The sole safety screening analyte directly measured was specific gravity, required by Dukelow et al. (1995). Differential scanning calorimetry, thermogravimetric analysis (TGA), total alpha activity, and flammability of the vapor headspace were not measured. The weight percent water of the waste was measured by gravimetric analysis rather than TGA. The high water content of the waste makes the occurrence of a propagating exothermic reaction incredible. The fissile content of the waste was estimated by the $^{239/240}Pu$ activity rather than total alpha. The highest $^{239,240}Pu$ non-detected value was < 7.48E-05 μCi/mL which precludes the occurrence of a nuclear criticality. Table 2-2 presents a summary of safety screening analyses and results.

Table 2-2. Summary of Safety Screening Analytical Results.

Issue	Sub-issue	Result
Safety screening	Energetics	Not measured
	Flammable gas	Not measured
	Criticality	$^{239/240}Pu$ highest non-detected activity < 7.48E-05 μCi/mL

While the requirements of the safety screening DQO have not been explicitly met, energetics is not an issue with this tank because TOC was measured and is only 1.2 wt% (dry) and the tank is 75 percent water. The only outstanding safety issue is flammable gas.

Resolution of the safety of tank 241-AP-102 could be met with a measurement of the lower flammability level (LFL) of the tank headspace. A resampling of the tank is not necessary.

3.0 BEST-BASIS 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. 1996). 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 et al. 1995). As part of this effort, an evaluation of available chemical information for tank 241-AP-102 was performed that included:

- Data from analyses of 15 grab samples collected from tank 241-AP-102 in April 1993 (Welsh 1994).
- Data from the analysis of grab samples from tank 241-AN-106 collected in April 1989 (Hendrickson et al. 1993).
- The solids composite inventory estimate for this tank generated from the LANL model (Agnew et al. 1996), also referred to as the historical tank content estimate (HTCE) (Agnew et al. 1996).

The results from this evaluation support using the sample results as the basis for the best estimate inventory of tank 241-AP-102 for the following reasons:

1. Data from samples of essentially the same waste taken at two different times in two different tanks show excellent agreement. Waste in tank 241-AN-106 was sampled, transferred to tank 241-AP-102 and resampled from tank 241-AP-102.
2. The contents of tank 241-AP-102 were well mixed before sampling and the elevated temperature that resulted from this mixing should have dissolved precipitated salts.

Best-basis inventory estimates for tank 241-AP-102 are presented in Tables 3-1 and 3-2. Quality estimates for each analyte are shown as high (H), medium (M), or low (L). Radionuclide values are decayed to January 1, 2000.

Table 3-1. Best Basis Inventory Estimates for Nonradioactive Components in Tank 241-AP-102 as of October 21, 1996.

Analyte	Total Inventory (kg)	Basis (S, M_H, or E)[1]	Comment
Al	48,500	S	
Bi	< 606	NA	
Ca	334	S	
Cl^-	12,100	S	
CO_3^{2-}	1.12E+05	S	
Cr	2,580	S	
F	< 702	NA	
Fe	15.9	S	
Hg	< 0.0209	NA	
K	5,390	S	
La	NA		
Mn	233	S	
Na	4.26E+05	S	
Ni	111	S	
NO_2^-	1.59E+05	S	
NO_3^-	3.27E+05	S	
OH^-	38,200	S	
Pb	13.8	S	
PO_4^{3-}	48,500	S	*
Si	2.01	S	
SO_4^{2-}	18,900	S	*
Sr	NR	S	
TOC	13,700	S	
U	19.3	S	
Zr	< 116	NA	

Notes:

NA = Not applicable
[1]S = Sample-based
M_H = Hanford Defined Waste model-based (see Section A3.2)
E = Engineering-based

*Some precipitates may be unaccounted for.

Table 3-2. Best-Basis Inventory Estimates for Radioactive Components in Tank 241-AP-102 as of October 21, 1996. (2 sheets)

Analyte	Total Inventory[1] (Ci)	Basis (S, M_B, or E)[2]	Comment
^{3}H	10.9	S	
^{14}C	2.09	S	
^{59}Ni	NR	NA	
^{60}Co	319	S	
^{63}Ni	NR	NA	
^{79}Se	0.882	S	
^{90}Sr	5,014	S	
^{90}Y	5,014	S	
^{93}Zr	NR	NA	
^{93m}Nb	NR	NA	
^{99}Tc	358	S	
^{106}Ru	NR	NA	
^{113m}Cd	NR	NA	
^{125}Sb	NR	NA	
^{126}Sn	NR	NA	
^{129}I	NR	NA	
^{134}Cs	NR	NA	
^{137}Cs	7.99E+05	S	
^{137m}Ba	7.59E+05	S	
^{151}Sm	NR	NA	
^{152}Eu	NR	NA	
^{154}Eu	NR	NA	
^{155}Eu	NR	NA	
^{226}Ra	NR	NA	
^{227}Ac	NR	NA	
^{228}Ra	NR	NA	
^{229}Th	NR	NA	
^{231}Pa	NR	NA	
^{232}Th	NR	NA	
^{232}U	NR	NA	

Table 3-2. Best-Basis Inventory Estimates for Radioactive Components in Tank 241-AP-102 as of October 21, 1996. (2 sheets)

Analyte	Total Inventory[1] (Ci)	Basis (S, M_H, or E)[2]	Comment
^{234}U	NR	NA	
^{235}U	NR	NA	
^{236}U	NR	NA	
^{237}Np	< 4.18	S	
^{238}Pu	< 0.641	S	
^{238}U	NR	NA	
$^{239/240}Pu$	< 0.313	S	
^{241}Am	1.73	S	
^{241}Pu	NR	NA	
^{242}Cm	0.00468	S	
^{242}Pu	NR	NA	
^{243}Am	NR	NA	
^{243}Cm	0.173	S	
^{244}Cm	< 0.266	S	

Notes:

NR = Not recorded

[1]Decayed to January 1, 2000

[2]S = Sample-based
M_H = Hanford Defined Waste model-based (see Section A3.2)
E = Engineering-based

4.0 RECOMMENDATIONS

The waste was characterized for the purposes of the grout program. The requirements of the safety screening DQO were not explicitly met, because total alpha activity, TGA, differential scanning calorimetry (DSC), and flammable gas were not specifically measured. The activities of the predominant alpha-emitting radionuclides were measured, with results well below the DQO limits. A sample-based, best-basis inventory was developed for the tank contents.

Table 4-1 summarizes the status of 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; this question 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-AP-102 Sampling and Analysis.

Issue	Evaluation Performed	PHMC Program Acceptance
Safety Screening DQO	No	Yes

Table 4-2 summarizes the status of PHMC Program review and acceptance of the evaluations and other characterization information contained in this report. The evaluations specifically outlined in this report are the best-basis inventory evaluation and the evaluation to determine whether the tank is safe, conditionally safe, or unsafe. Column one lists the different evaluations performed in this report.

Table 4-2. Acceptance of Evaluation of Characterization Data and Information for Tank 241-AP-102.

Issue	Evaluation Performed	PHMC Program Acceptance
Safety categorization	No	No

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. The safety categorization analysis of the tank is listed as "no" in Table 4-2 because the required analyses have not been performed. However, energetics is not an issue with this tank because TOC was measured and is only 1.2 wt% (dry) and the tank is approximately 75 percent water. The only outstanding safety issue is flammable gas. Resolution of the safety of tank 241-AP-102 could be met with a measurement of the LFL of the tank headspace. A resampling of the tank is not necessary.

5.0 REFERENCES

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APPENDIX A

HISTORICAL TANK INFORMATION

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APPENDIX A

HISTORICAL TANK INFORMATION

Appendix A describes tank 241-AP-102 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 may be useful for supporting or challenging conclusions based on sampling and analysis.

This appendix contains the following information:

- **Section A1:** Current status of the tank, including the current waste level.
- **Section A2:** Information about the tank's design.
- **Section A3:** Process knowledge of the tank; i.e., the waste transfer history and estimated contents of the tank based on modeling the data.
- **Section A4:** Surveillance data for tank 241-AP-102, including surface-level readings and temperatures.
- **Section A5:** References for Appendix A.

A1.0 CURRENT TANK STATUS

As of August 31, 1996, tank 241-AP-102 contained 4,152 kL (1,097 kgal) of concentrated phosphate waste (Hanlon 1996). The waste volumes were estimated using a liquid-level gauge and a manual tape. The volumes of the waste phases found in the tank are shown in Table A1-1.

The tank is actively ventilated, is not on any Watch List (Public Law 101-510), and its integrity is classified as sound. Although tank 241-AP-102 remains in service for waste management operations, no waste transfer activity has been associated with this tank since 1992.

Table A1-1. Estimated Tank Contents. (Hanlon 1996)

Waste Form	Estimated Volume	
	kL	kgal
Total waste	4,152	1,097
Supernatant liquid	4,152	1,097
Sludge	0	0
Saltcake	0	0
Drainable interstitial liquid	0	0
Drainable liquid remaining	4,152	1,097
Pumpable liquid remaining	4,152	1,097

Note:
For definitions and calculation methods refer to Appendix C of Hanlon (1996).

A2.0 TANK DESIGN AND BACKGROUND

The AP Tank Farm was constructed from 1983 to 1986 in the 200 East Area (Leach and Stahl 1993). The tank farm contains eight double-shell tanks. Each tank has a capacity of 4,390 kL (1,160 kgal), a diameter of 22.9 m (75.0 ft), and an operating depth of 10.7 m (35.2 ft). These tanks were designed to hold concentrated supernatant. The maximum design temperature for liquid storage is 149 °C (300 °F) (Brevick et al. 1995). Tank 241-AP-102 entered service in 1986 as the feed tank for the Grout Treatment Facility.

Tank 241-AP-102 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 460 mm (1.5 ft) thick and the dome is 380 mm (1.25 ft) thick. The tank has a flat bottom. The bottoms of the primary and secondary liners are separated by an insulating concrete layer. A grid of drain slots in the concrete foundation beneath the secondary steel liner collects any waste that may leak from the tank and diverts it to the leak detection well (Brevick et al. 1995).

Because tank 241-AP-102 was selected as the feed tank for the Grout Treatment Facility, it is equipped with a 150-horsepower pump to mix the tank contents (Raymond 1989). The submersible multi-stage turbine pump has two 6-cm (2.5-in.)-diameter nozzles located about 30 cm (1 ft) above the tank bottom. The pump has a flow-through capability of

10,220 L/min (2,700 gal/min) and the entire pump assembly can be rotated to generate a sweeping action to suspend solids.

A tank cross section showing the approximate waste level, along with a schematic of the tank equipment, is shown in Figure A2-1. Tank 241-AP-102 has 29 risers ranging in diameter from 100 mm (4 in.) to 1.1 m (42 in.) that provide access to the primary tank and 42 risers that provide access to the annulus. Table A2-1 shows numbers, diameters, and descriptions of the risers (annular risers not included). A plan view depicting the riser configuration is shown as Figure A2-2. Nine 100-mm (4-in.) diameter risers (no. 2a-c 15, 21, three no. 27's, and no. 28) and three 305-mm (12-inch) diameter risers (no. 7a, two no. 10a, and no. 12), are risers tentatively available for sampling (Lipnicki 1996).

Table A2-1. Tank 241-AP-102 Risers. (Brevick et al. 1995) (2 sheets)

Riser Number	Diameter (Inches)	Description and comments
1 (NE) 30°	4	Sludge measuring port
1 (SE) 150°	4	Sludge measuring port
1 (W) 270°	4	Sludge measuring port
2	4	Liquid level, level indicating transmitter
3	12	Supernatant pump, central pump pit
4	12	Thermocouple probe
5	42	Manhole; riser plug
5	42	Manhole; riser plug
7	12	Spare; riser plug
7	12	Primary tank exhaust
10	12	Spare; riser plug
10	12	Tank pressure
11	42	Slurry distributor, central pit pump
12	12	Observation port, spare
13	12	Grout feed pump
14	4	Supernatant return
15	4	Spare; riser plug
16 (NE) 30°	12	Sludge measuring port
16 (SE) 150°	12	Sludge measuring port
16 (W) 270°	12	Sludge measuring port
21	4	Spare; riser plug

Table A2-1. Tank 241-AP-102 Risers. (Brevick et al. 1995) (2 sheets)

Riser Number	Diameter (Inches)	Description and comments
22	4	Sludge measuring port
24	4	Spare; riser plug
25	4	High liquid level sensor
26	4	Liquid level indicator
27 (NW) 315°	4	Spare; riser plug
27 (W) 270°	4	Spare; riser plug
27 (SW) 225°	4	Spare; riser plug
28	4	Spare; riser plug

Note:

[1]Brevick et al. (1995)

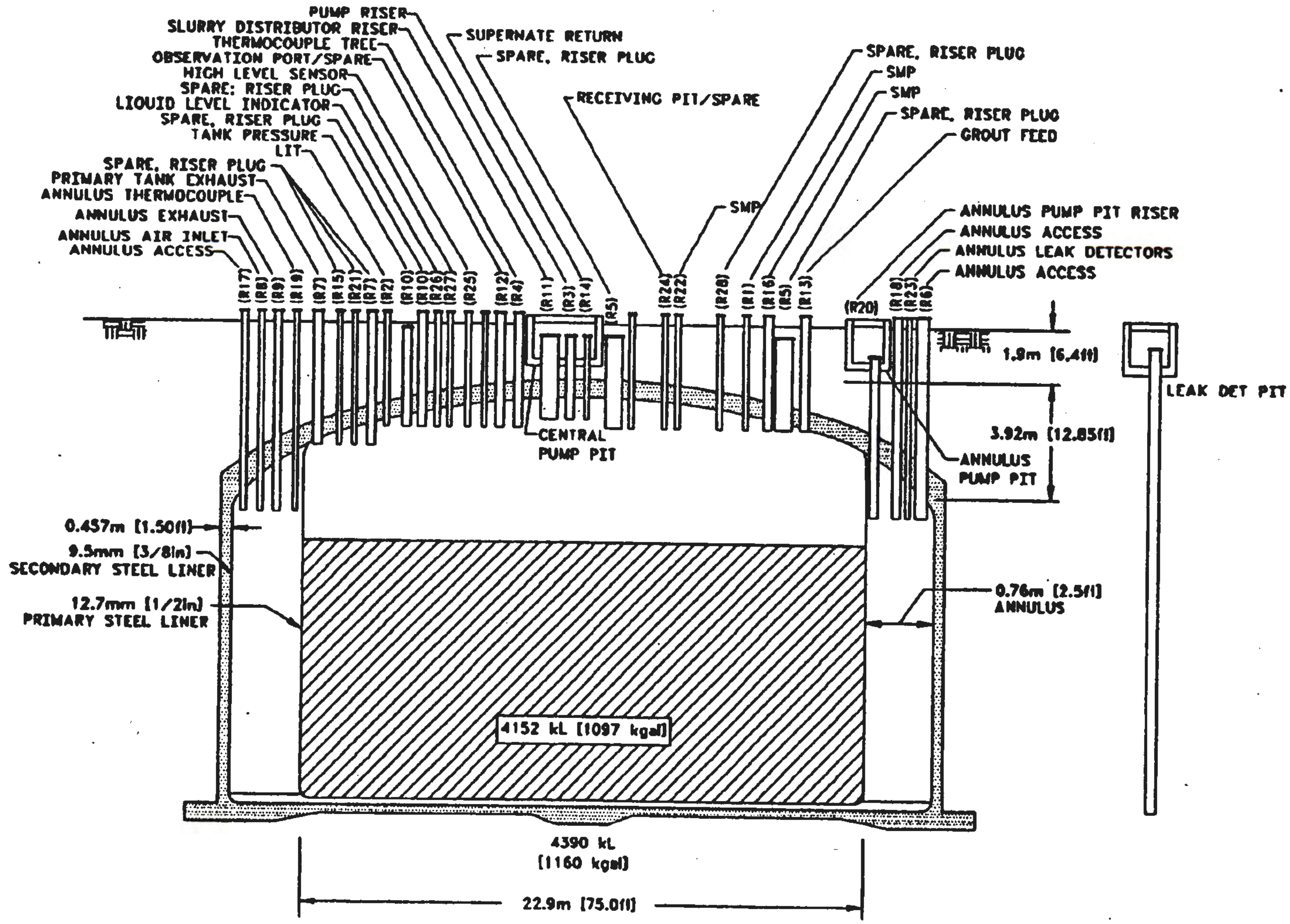
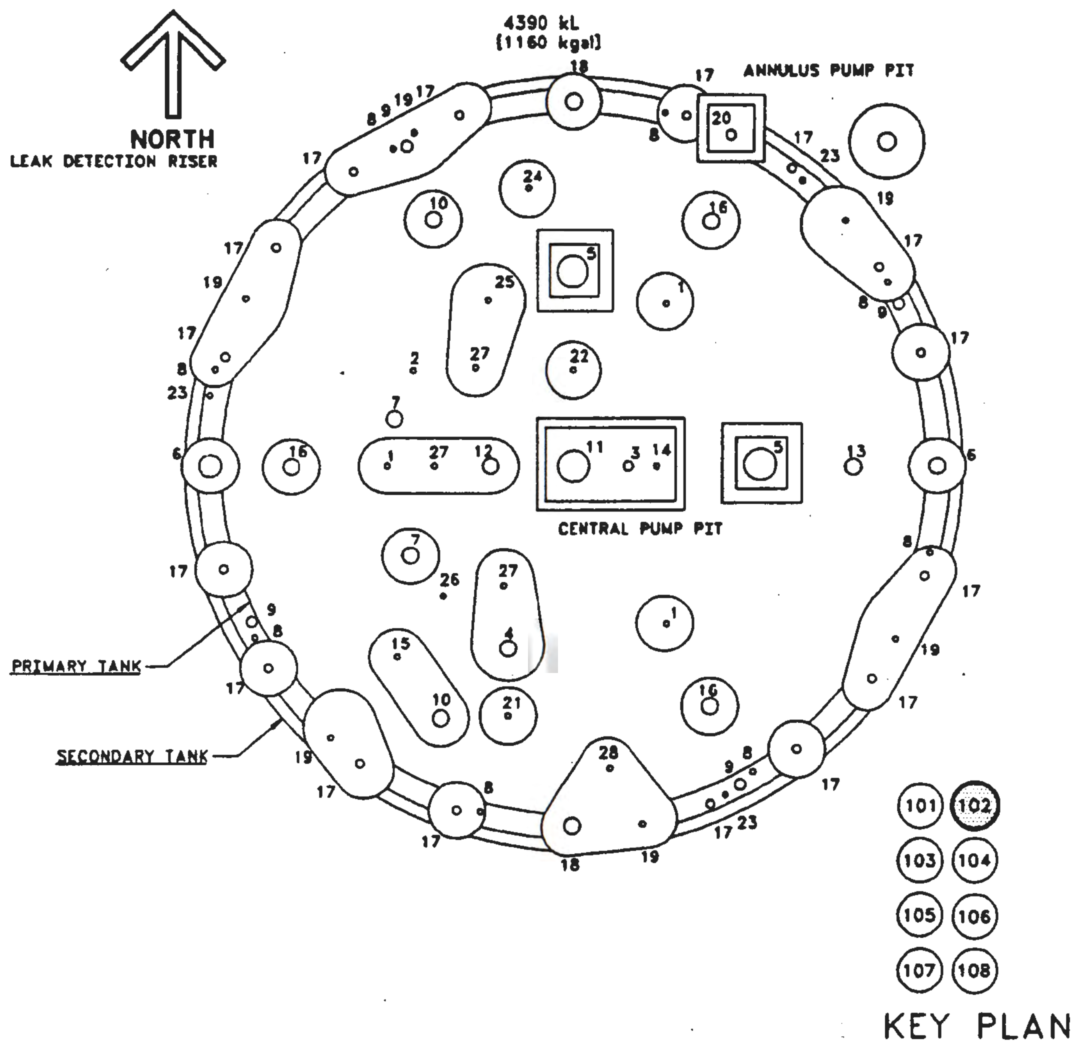


Figure A2-1. Tank 241-AP-102 Cross Section and Schematic.

Figure A2-2. Riser Configuration for Tank 241-AP-102.



A3.0 PROCESS KNOWLEDGE

The sections below: 1) provide information about the transfer history of tank 241-AP-102; 2) describe the process wastes that made up the transfers; and 3) give an estimate of the current tank contents based on transfer history.

A3.1 WASTE TRANSFER HISTORY

Table A3-1 summarizes the waste transfer history of tank 241-AP-102. The tank entered service during the third quarter of 1986 with the addition of 64 kL (17 kgal) of flush water (Agnew et al. 1996b). From 1986 to 1988 the tank was nearly filled with dilute phosphate waste (originating from N Reactor decontamination activities) from tank 241-AP-104 and flush water from miscellaneous sources. Supernate (3,650 kL [963 kgal]) was transferred from tank 241-AP-102 to tank 241-AW-102 in 1988.

Grout Campaign 101 began in the third quarter of 1988 and continued through the third quarter of 1989. During this campaign, nearly all of the waste from tank 241-AP-102 was retrieved and grouted; a residual heel of about 273 kL (72 kgal) of the dilute phosphate feed material remained in the tank (Hendrickson et al. 1993).

About 220 kL (60 kgal) of excess liquid and leachate from Grout Disposal Vault 101 were returned to tank 241-AP-102 from 1989 to 1990. As a result of uncertainties in waste pH compatibility, two small transfers (for a total of 5 kgal) of sodium nitrite/sodium hydroxide solution from the Plutonium-Uranium Extraction (PUREX) Plant were directed to tank 241-AP-102 during the second and third quarters of 1989 to protect the tank's steel liner (Hendrickson et al. 1993).

Tank 241-AP-102 received 6 kgal of waste of unknown origin in 1991 and 4 kgal of waste of unknown origin in 1992. Tank 241-AP-102 contained about 519 kL (137 kgal) of dilute phosphate waste in the beginning of the third quarter of 1992. During the third and fourth quarters of 1992, tank 241-AP-102 received about 3,680 kL (972 kgal) of concentrated phosphate waste from tank 241-AN-106. This waste consisted of partially evaporated waste resulting from the decontamination of N Reactor.

Table A3-1. Summary of Tank 241-AP-102 Major Waste Transfers. (Agnew et al. 1996b)

Transfer Source	Transfer Destination	Waste Type	Time Period	Estimated Waste Volume[1]	
				kL	kgal
Miscellaneous sources	241-AP-102	Flush water	1986 - 1988	3,740	987
241-AP-102	241-AW-102	Supernatant	1988	-3,650	-963
241-AP-104	241-AP-102	Dilute phosphate waste	1988	3,970	1,050
241-AP-102	Grout Treatment Facility	Supernatant	1988 - 1989	-3,780	-998
PUREX Plant	241-AP-102	Sodium nitrite/ sodium hydroxide solution	1989	19	5
Miscellaneous sources and Grout Treatment Facility	241-AP-102	Flush water and grout vault leachate	1989 - 1990	220	58
241-AN-106	241-AP-102	Concentrated phosphate waste	1992	3,680	972

Note:

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

A3.2 HANFORD DEFINED WASTES MODEL ESTIMATION OF TANK CONTENTS

The following is an estimate of the contents of tank 241-AP-102 based on historical transfer data found in the *Waste Status and Transaction Record Summary (WSTRS Rev. 2)* (Agnew et al. 1996b) and presented in the *Hanford Tank Chemical and Radionuclide Inventories: Hanford Defined Wastes (HDW) Model Rev. 3* (Agnew et al. 1996a). The HDW Model Rev. 3 is composed of three parts: 1) a combination of process information and some transaction information to derive compositions for about 50 Hanford defined wastes, each of which has both solid and liquid phases; 2) a derivation of solids histories for each tank, called the tank layer model, based on the non-evaporator related primary additions of waste;

and 3) a weighted percentage calculation of supernatant blending and saltcake content called the supernatant mixing model.

This information is combined in a spreadsheet to produce the historical tank content estimate for each of the 177 tanks. These predictions have not been validated and should be used with caution. In some cases, the available data are incomplete, thus reducing the reliability of the transfer data and the modeling results derived from them. Thus, these predictions can only be considered estimates that require further evaluation using analytical data.

The historical tank content estimate for tank 241-AP-102 is based on a 1994 total waste volume of 4,160 kL (1,100 kgal), which the model defines as consisting entirely of supernatant. Figure A3-1 shows a graphical representation of the estimated waste type and volume. Table A3-2 presents the historical tank content estimate of the expected waste constituents and concentrations of tank 241-AP-102 as of January 1, 1994.

Figure A3-1. Hanford Defined Wastes Model for Tank 241-AP-102.

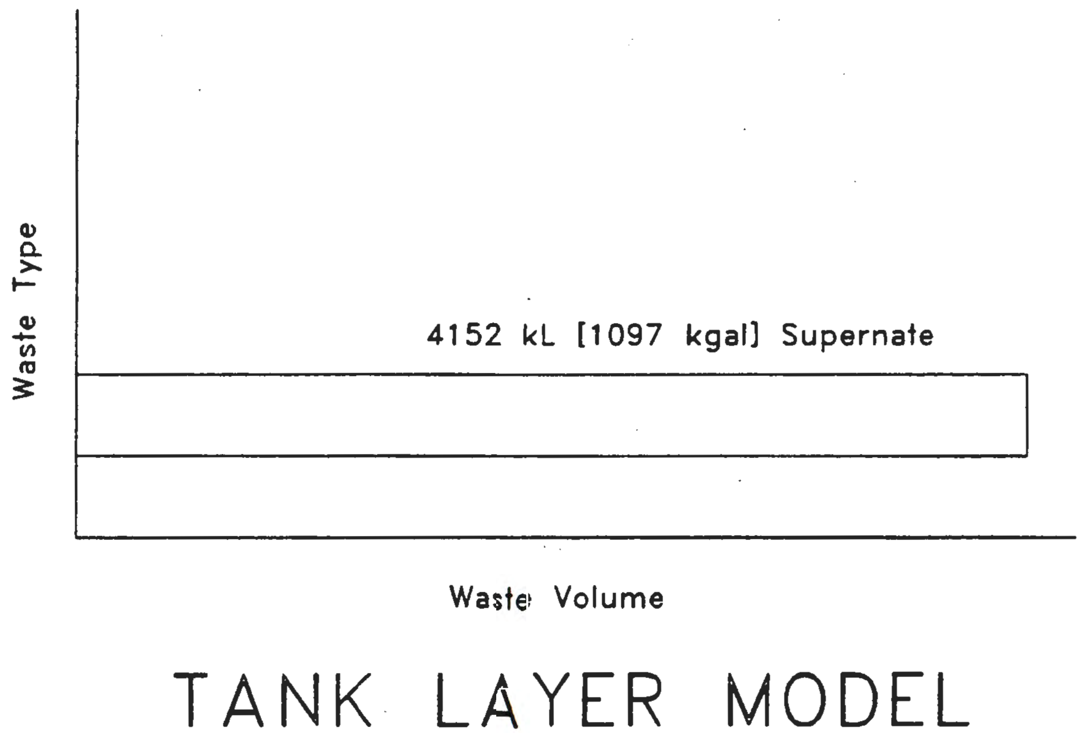


Table A3-2. Tank 241-AP-102 Historical Tank Content Estimate. (Agnew et al. 1996a) (2 sheets)

Total Inventory Estimate[1]			
Physical Properties			
Total waste	5.33E+06 kg (1,100 kgal)		
Heat load	4,060 W (13,900 Btu/hr)		
Bulk density[2]	1.28 (g/mL)		
Water wt%[2]	61.9		
TOC wt% C (wet)[2]	0.659		
Chemical Constituents	**M**	**$\mu g/g$**	**kg**
Na^{+}	5.96	1.07E+05	5.72E+05
Al^{3+}	0.776	16,400	87,400
Fe^{3+} (total Fe)	0.00457	200	1,070
Cr^{3+}	0.0299	1,220	6,490
Bi^{3+}	5.93E-04	97.1	517
La^{3+}	1.31E-05	1.43	7.61
Hg^{2+}	4.43E-06	0.696	3.71
Zr (as $ZrO(OH)_2$)	3.69E-04	26.4	140
Pb^{2+}	5.49E-04	89.1	475
Ni^{2+}	0.00392	180	960
Sr^{2+}	4.37E-06	0.30	1.60
Mn^{4+}	0.00202	87.0	463
Ca^{2+}	0.0207	650	3,460
K^{+}	0.0282	863	4,600
OH^{-}	3.42	45,500	2.43E+05
NO_3^{-}	2.40	1.17E+05	6.22E+05
NO_2^{-}	1.12	40,500	2.16E+05
CO_3^{2-}	0.238	11,200	59,600
PO_4^{3-}	0.134	10,000	53,300
SO_4^{2-}	0.128	9,610	51,200
Si (as SiO_3^{2-})	0.0371	817	4,350
F^{-}	0.0356	530	2,820
Cl^{-}	0.102	2,820	15,000
$C_6H_5O_7^{3-}$	0.015	2,220	11,800
$EDTA^{4-}$	0.0122	2,760	14,700

Table A3-2. Tank 241-AP-102 Historical Tank Content Estimate. (Agnew et al. 1996a) (2 sheets)

Total Inventory Estimate[1]			
Chemical Constituents	**M**	**µg/g**	**kg**
$HEDTA^{3-}$	0.0221	4,740	25,200
$Glycolate^{-}$	0.0594	3,490	18,600
$Acetate^{-}$	0.00767	355	1,890
$Oxalate^{2-}$	1.12E-05	0.774	4.12
DBP	0.0111	1,400	7,480
Butanol	0.0111	646	3,440
NH_3	0.0248	330	1,760
$Fe(CN)_6^{4-}$	0	0	0
Radiological Constituents	**Ci/L**	**µCi/g**	**Ci**
Pu	---	0.0295	2.62 (kg)
U	0.00544 (M)	1,010 µg/g	5,410 (kg)
Cs	0.130	102	5.42E+05
Sr	0.054	42.3	2.25E+05

Notes:

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

[2]Volume average for density, mass average water wt%, and TOC wt% C.

A4.0 SURVEILLANCE DATA

Tank 241-AP-102 surveillance data consists of surface level measurements (liquid and solid), temperature monitoring inside the tank (waste and headspace), and leak detection well monitoring for radioactive liquids outside the primary tank. Liquid level measurements indicate major leaks into or out of the tank. Leak detection systems within the annulus of the tank will detect leaks from the primary tank. These data provide the basis for determining tank integrity.

A4.1 SURFACE LEVEL READINGS

Waste surface level monitoring is performed with a Food Instrument Corporation gauge and a manual tape. The waste surface level on September 24, 1996, was 10.1 m (399.5 in.), which equals about 4,152 kL (1,097 kgal) of waste. A graphical representation of the volume measurements is presented as a level history graph in Figure A4-1.

A4.2 INTERNAL TANK TEMPERATURES

Temperature data for tank 241-AP-102 are recorded by 18 thermocouples on one thermocouple tree located in riser 4 (Tran 1993). Data for this tank are recorded weekly. The minimum temperature inside the primary tank on September 9, 1996, was 20.8 °C (69.4 °F) at thermocouple 3; the maximum temperature on the same date was 21.4 °C (70.6 °F) at thermocouple 1.

Temperature data from the Surveillance Analysis Computer System are available from July 1989 to September 1996 for 14 of the 18 thermocouples. In addition, not all thermocouples have data covering the entire period. The average temperature during this period was 20°C (68.4°F) with a minimum of 5.5 °C (42 °F) and a maximum of 30 °C (86 °F). The average temperature for the period October 1995 to October 1996 was 20.2 °C (68.4 °F), with a minimum of 13.6 °C (56.4 °F) and a maximum of 23.3 °C (74 °F). A graph of the weekly high temperatures is shown in Figure A4-2.

Additional temperature data are available on magnetic tape and are included in the *Supporting Document for the SW Quadrant HTCE for the AP Tank Farm* (Brevick et al. 1995).

A4.3 TANK 241-AP-102 PHOTOGRAPHS

No interior photographs available of this tank are available.

Figure A4-1. Tank 241-AP-102 Level History.

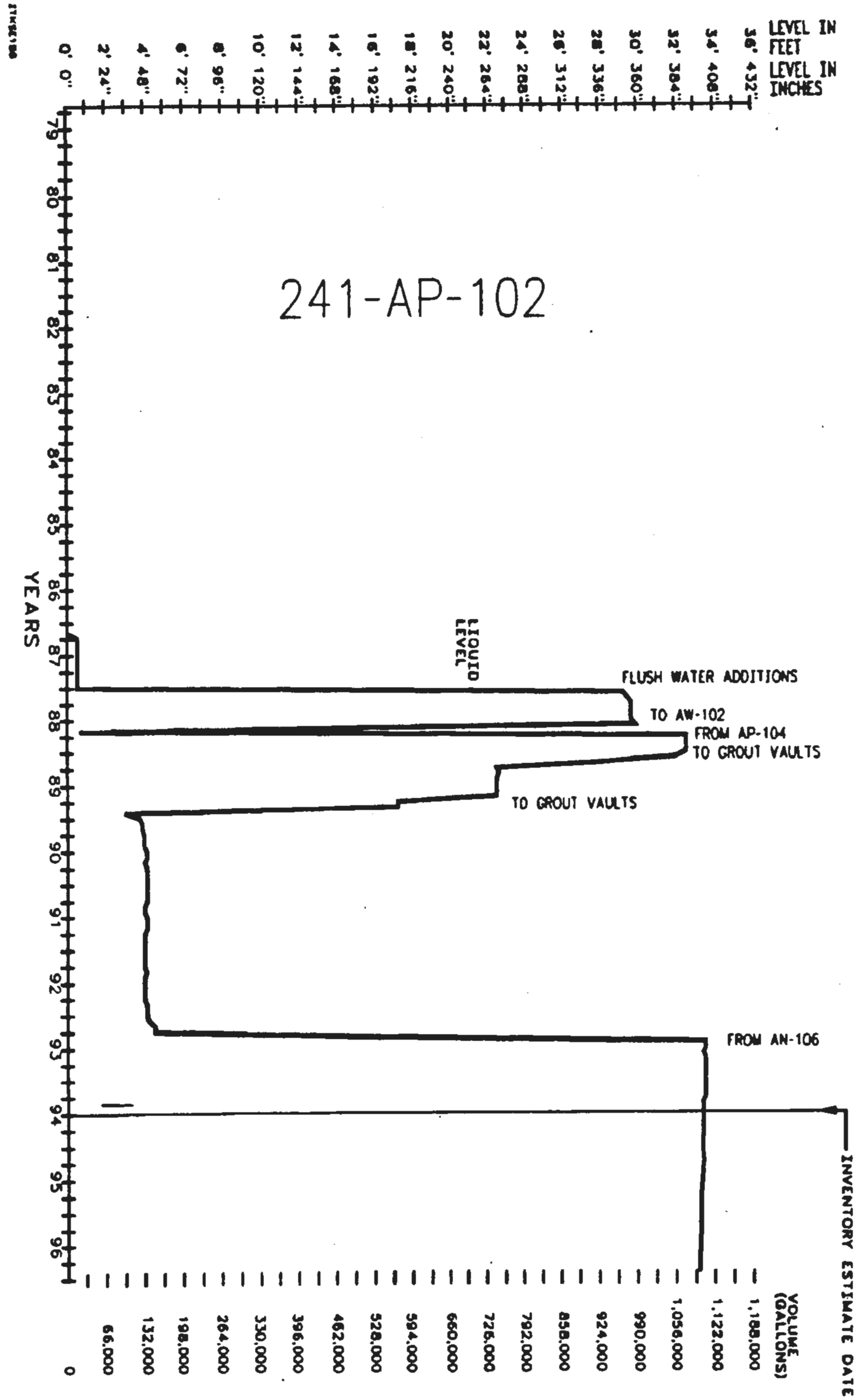
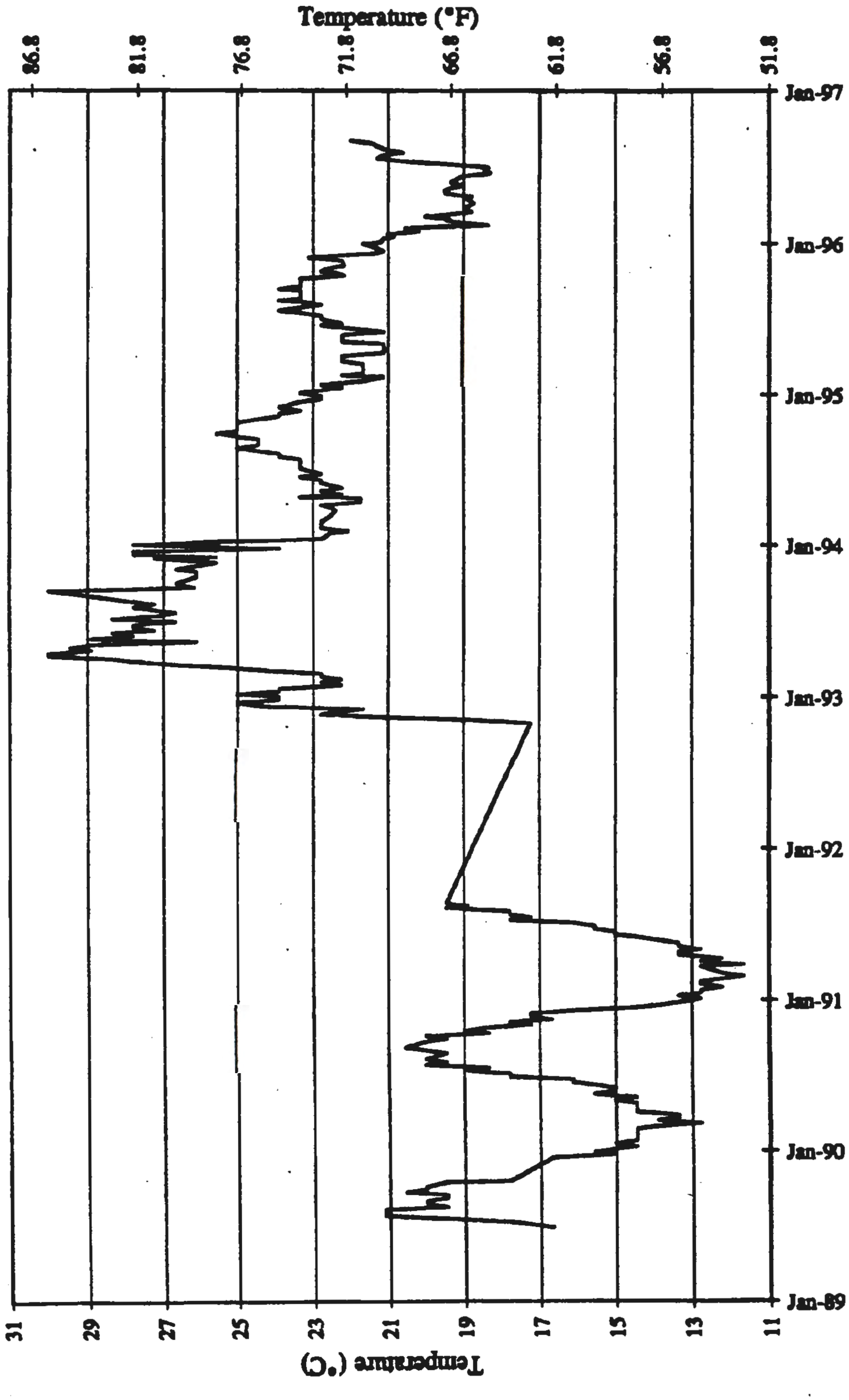


Figure A4-2. Tank 241-AP-102 High Temperature Plot.



A5.0 APPENDIX A REFERENCES

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APPENDIX B

SAMPLING OF TANK 241-AP-102

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APPENDIX B

SAMPLING OF TANK 241-AP-102

Appendix B provides sampling and analysis information for each known sampling event for tank 241-AP-102 and provides an assessment of the "bottle-on-a-string" sample results.

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

Future sampling of tank 241-AP-102 will be appended to the above list.

B1.0 TANK SAMPLING OVERVIEW

This section describes the April 1993 sampling and analysis events for tank 241-AP-102. Twenty-five samples were taken using the "bottle-on-a-string" method. As directed in the Tank Waste Remediation System Tank Waste Characterization Plan (Bell 1993) and the *Hanford Grout Disposal Program Campaign 102 Characterization and Test Plan* (Hendrickson et al. 1993), the tank was characterized for permitting purposes and to show that the contents were suitable as feed for the grout process. In addition, the tank was sampled to demonstrate that the action of the in-tank mixer pump was sufficient to homogenize the tank wastes.

B1.1 DESCRIPTION OF SAMPLING EVENT

Tank 241-AP-102 was sampled April 28 through 30, 1993. To ensure sampling homogeneity, the tank was mixed for 53 days before sampling. The absence of a sludge layer was confirmed by the sound of a weighted tape hitting the metal bottom of the tank (Welsh 1993).

Samples were obtained in 125-mL bottles using the "bottle-on-a-string" method. To be consistent with safety procedures that help to limit personnel exposure to hazardous ionizing radiation, no attempt was made to ensure completely full bottles; as a result, the potential for headspace existed in all sample bottles.

A test to demonstrate tank homogeneity was performed (Duchsherer 1993). Eighteen samples were collected at 15 randomly selected depths from three fixed, vertical 10-cm (4-in.) risers (Riser Type 1), located 120 degrees apart at a radius of 6 m (20 ft) from the tank center.

A vertical profile is used to satisfy the safety screening data quality objective (DQO). Safety screening analyses include: total alpha to determine criticality, differential scanning calorimetry (DSC) to ascertain the fuel energy value, thermogravimetric analysis (TGA) to obtain the total moisture content, specific gravity for the calculation of the total alpha activity limit and flammable gas concentration. The safety screening DQO did not exist at the time this sampling event occurred; therefore, none of these analyses were performed, except for specific gravity.

Sampling and analytical requirements from the safety screening and the waste compatibility DQOs are summarized in Table B1-1 and are presented for information only. Neither DQO existed at the time of sampling for tank 241-AP-102, and many of these analyses have not been made.

Table B1-1. Integrated Data Quality Objective Requirements for Tank 241-AP-102.

Sampling Event	Applicable DQOs	Sampling Requirements	Analytical Requirements
Liquid sampling	Safety screening	Samples from a minimum of two risers separated radially to the maximum extent possible.	▸Energetics ▸Moisture content ▸Total alpha ▸Specific gravity
	Waste compatibility	Grab samples from different depths	▸Energetics ▸Moisture content ▸Visual check for organic layer ▸Metals by ICP ▸Anions by IC ▸Radionuclides ▸TIC, TOC ▸Hydroxide ▸Specific gravity ▸pH ▸Percent solids
Combustible gas meter reading	Safety screening	Measurement in a minimum of one location within tank vapor space.	▸Flammable gas concentration

Notes:

IC = ion chromatography
ICP = inductively coupled plasma atomic emission spectrometry

B1.2 SAMPLE HANDLING

Eighteen samples (five per riser, plus three duplicates) were submitted to the Westinghouse Hanford Company 222-S Process and Analytical Laboratory for analysis. Table B1-2 presents the laboratory numbers for these samples along with sampling location within the tank. These sample results were used to characterize the inorganic and radiochemical properties of the tank. In addition, seven samples (two samples per riser plus one duplicate) were shipped to the Pacific Northwest National Laboratory (PNNL) for organic analyses. Table B1-3 displays the numbers assigned to the samples by the laboratory along with the sampling location in the tank.

Tank 241-AP-102 samples were delivered to the Westinghouse Hanford Company 222-S Process and Analytical Laboratory on May 1, 1993 and placed in the care of laboratory personnel. Aliquots were then submitted to the 222-S Laboratory for analysis. The acid digestion for the individual inductively coupled plasma (ICP) samples was conducted on May 20, 1993 and ICP analyses were completed on July 15, 1993. A composite sample was prepared on May 14, 1993 by bringing the original 15 samples to ambient conditions by incubating them in an ultrasonic water bath for about 30 minutes and vigorously agitating them for the last 5 minutes of the 30-minute period. At the conclusion of the incubating/mixing period, 70-mL aliquots from each of the 15 original samples were taken and combined to form the composite sample. The acid digestion of the composite was completed on May 18, 1993. The ICP metal analysis for the composite was completed on July 1, 1993.

At the time the samples were collected, all samples were a clear, yellowish liquid free of solids (Duchsherer 1993). The samples were stored outdoors at ambient temperatures for the first 24 hours. During this initial storage period, a white precipitate formed in the bottom of each sample bottle. The samples were subsequently moved indoors and stored at room temperature in an effort to redissolve the precipitate. However, the solid precipitate remained in the sample bottles.

From this observation, it was assumed that low temperature conditions will likely lead to the formation of solid precipitates in tank 241-AP-102. The waste previously contained in tank 241-AN-106, the predominant source of the waste in tank 241-AP-102, existed in two layers: high phosphate salts on top and high sodium salts on bottom. When the two layers are mixed at temperatures below 27 °C (81 °F), such as occurred after tank sampling, a solid precipitate forms. However, this precipitate can be redissolved upon heating to at least 40 °C (104 °F). The waste was transferred from tank 241-AN-106 "in place," to minimize mixing of the two layers and possible precipitation of solids. Prior to sampling tank 241-AP-102, the tank was mixed and the temperature elevated from 22 °C (71 °F) to 27 °C (81 °F). It was predicted that, during this mixing prior to sampling, some solid precipitation of hydrated sodium phosphate may have occurred (Hendrickson et al. 1993).

Westinghouse Hanford Company 222-S Process and Analytical Laboratory personnel described the solid precipitate crystals as approximately 3 to 5 mm long, prismatic in shape, with the length exceeding the width by a factor of 5 to 10. Inspection by polarized light microscopy of one of the smaller crystals revealed six-sided prisms, typical for hydrated sodium phosphate ($Na_3PO_4 \cdot 12H_2O$) crystals. This observation was supported by the birefringence (difference between refractive indexes in x and y directions), which was characteristic of hydrated sodium phosphate. Based upon this evidence and the chemistry of the sample, it was concluded that the precipitate was hydrated sodium phosphate (Duchsherer 1993).

Eight samples from tank 241-AP-102 were delivered to PNNL for volatile organic analysis (VOA), semivolatile organic analysis (SVOA), glycolate, oxalate, EDTA/HEDTA, and citrate analyses. All analyses were completed within a 14-day holding time based on sample receipt (Duchsherer 1993).

Table B1-2. Tank 241-AP-102 WHC Sample Numbers. (Welsh 1993)

Riser, Angle	Depth (inches from the bottom of the tank)	Tank Farm Sample Number	Laboratory Sample Number
1(NE), 30°	306	G299	G342, G509[1]
1(NE), 30°	271	G301	G449, G523[1]
1(NE), 30°	182	G302	G450, G477[1]
1(NE), 30°	125	G303	G348, G510[1]
1(NE), 30°	34	G305	G349, G511[1]
1(NE), 30°	34	G306	G352, G521[1]
1(SE), 150°	391	G307	G453, G527[1]
1(SE), 150°	334	G308	G353, G522[1]
1(SE), 150°	334	G309	G358, G515[1]
1(SE), 150°	208	G310	G454, G471[1]
1(SE), 150°	162	G311	G359, G516[1]
1(SE), 150°	18	G313	G363, G533
1(W), 270°	372	G315	G364, G534[1]
1(W), 270°	334	G317	G333, G528[1]
1(W), 270°	226	G318	G459, G517[1]
1(W), 270°	226	G319	G460, G536[1]
1(W), 270°	148	G322	G338, G529[1]
1(W), 270°	99	G323	G341, G476[1]
Composite	---	---	G443, G470[1]

Notes:
[1]Heated sample

Table B1-3. PNNL Sample Numbers. (Welsh 1993)

Riser, Angle	Depth (inches from the bottom of the tank)	Position	Tank Farm Sample Number	PNNL Laboratory Sample Number
1(NE), 30°	306	1	G300	93-06634
1(NE), 30°	125	4	G304	93-06635
1(SE), 150°	162	9	G312	93-06636
1(SE), 150°	18	10	G314	93-06637
1(W), 270°	372	11	G316	93-06638
1(W), 270°	226	13A	G320	93-06639
1(W), 270°	226	13B	G321	93-06640
Field Blank	---	---	G324	93-06641

Note:
[1]Welsh (1993)

B1.3 SAMPLE ANALYSIS

Routine sample preparation procedures are discussed in the *Tank Characterization Reference Guide* (De Lorenzo et al. 1994). Additional procedures specific to this tank are described below.

B1.3.1 Adjustments Due to Solid Precipitate

The presence of solid precipitate in samples taken from tank 241-AP-102 required an evaluation of the analytical methods. This evaluation was necessary to determine if the presence of the precipitate skewed the analytical results, and if so, what corrective actions needed to be taken. A description of the activities that took place at the 222-S Laboratory as a result of the solid precipitate is given below.

A technique was developed to keep the solids in solution prior to subsequent analysis. This technique involved gentle heating of the samples immediately prior to sample analysis, followed by a brief cooling period in order to obtain accurate volume measurements. This procedure was not communicated to all personnel working within the 222-S Laboratory, and analyses were performed on samples containing solids. Recognition of this error resulted in the development of a recovery plan that included the following items (Duchsherer 1993):

- Each analytical method was reviewed to determine which ones would likely dissolve solids as part of the procedural steps. It was found that only ICP and atomic absorption methods employed an acid digest (heating/dilution) preparation step to adequately dissolve any solids prior to analysis.

- All samples were reanalyzed for those elements that comprised the solid compound.

- Four samples were picked at random to be reanalyzed for the full protocol of constituents. The only constituents that were omitted were those in which the analytical method employed a digestion/heating step. This was performed in order to demonstrate that no constituents other than those found comprising the hydrated sodium phosphate were carried down or co-precipitated with the solids.

Based on the results of the sodium phosphate precipitate crystals (see section B1.2), the laboratory concluded that as long as no other constituents co-precipitated, sodium and phosphorous were the only analytes that needed to be redetermined. Sodium and elemental phosphorous were determined by ICP from samples prepared by acid digestion; therefore they were not reanalyzed. New samples, heated aliquots from each parent sample, were obtained for redetermination of phosphate by ion chromatography (IC) analysis. Special handling instructions accompanied the new aliquots to prevent the reformation of solids. To determine if any other anions precipitated with the sodium phosphate, four of the above samples submitted for IC analyses were reanalyzed for all constituents in the grout characterization protocol.

As discussed in section B1.2, results from the analyses performed on the heated samples revealed consistently higher concentrations of both phosphate and sulfate anions. Therefore, the final reported concentrations of both phosphate and sulfate within tank 241-AP-102 are based on results from the heated samples. Interpretation and discussion of the results from the heated samples are addressed in Appendix B3 of this report.

B1.3.2 Analytical Methods

This section briefly describes the analytical methods used to characterize the waste in tank 241-AP-102.

B1.3.2.1 Physical Tests. Physical tests performed on the samples included weight percent water and specific gravity (SpG). The weight percent water procedure used approximately 1 mL of sample, which was heated in an oven at 120 °C (248 °F) for 18 $\pm$ 2 hours. The weight percent water was performed on all individual and composite samples in duplicate. The specific gravity analysis was performed on samples submitted for full characterization and the composite samples.

B1.3.2.2 Homogeneity of Waste. Statistical analysis of the sodium, phosphate, and ^{137}Cs results was performed to determine the homogeneity of tank 241-AP-102. Data from 18 of the 25 samples taken from tank 241-AP-102 were used to determine if the tank contents were homogeneous. The 18 samples consisted of 15 original samples and 3 duplicates. The following analyses were performed by the 222-S Laboratory on the samples: gamma energy analysis (GEA) for ^{137}Cs; ICP for sodium; and IC for phosphate. The tank waste was determined to be homogeneous, based on ^{137}Cs, Na and phosphate, after an analysis of variance was performed on the results. The statistical method and results of this analysis may be found in Welsh (1994).

B1.3.2.3 Chemical and Radionuclide Constituent Analysis. For chemical and radionuclide constituent analysis, 14 samples plus the composite were analyzed [4 samples from riser 1 (NE), 4 from 1 (SE), 3 from 1 (W), plus 1 duplicate from each riser]. Also only one sample per riser, plus the composite, were analyzed for U, NH_3, As, CN, and Hg.

B1.3.2.4 Volatile and Semivolatile Organic Constituent Analysis. Seven samples of waste from tank 241-AP-102 were analyzed for volatile and semivolatile constituents by the PNNL. The seven samples (six samples plus one duplicate) were tested using gas chromatography and mass spectrometry (Hendrickson et al. 1993).

B1.4 DESCRIPTION OF HISTORICAL SAMPLING DATA

By reviewing the historical characterization data for tank 241-AP-102, a preliminary estimate of its present waste constituents can be made and used as a baseline for comparison. Descriptions of the data used to create the estimate and the historical concentration and inventory estimates follow.

As explained in Section A3.1, about 88 percent of the waste currently held in tank 241-AP-102 resulted from transfers of concentrated phosphate waste from tank 241-AN-106. Table B1-4 shows the estimated waste composition of tank 241-AN-106 when it was fully mixed (using an in-tank mixer) prior to its transfer to tank 241-AP-102 (Welsh 1991). Results are reported to three significant digits; those reported with a less than (<) sign were below the detection limit of the analytical procedure.

Table B1-5 presents the estimated waste composition of tank 241-AP-102 prior to the transfer from tank 241-AN-106 (Winters 1988). About 12 percent of the tank's current contents is comprised of dilute phosphate waste that occupied the tank prior to the tank 241-AN-106 transfer of concentrated phosphate waste in the fourth quarter of 1992. Historical sample results are available for tank 241-AP-102 from April 1988, prior to Grout Campaign 101. The analytical results from these samples can be used as a basis for the characterization of the tank's contents prior to the addition of the concentrated phosphate waste. It should be noted that these results can only provide an estimated characterization of the tank waste prior to the transfer because numerous transfers involving large percentages of the tank's contents took place between the sampling in 1988 and the addition of the concentrated phosphate waste in 1992. However, the 1988 samples were the most recent results prior to the 1992 transfer and were, therefore, considered the best available source for characterization.

Table B1-6 presents the final historical estimated waste composition of tank 241-AP-102 based on historical sample results. This result has been derived for each constituent by taking a weighted sum of the two sets of characterization data. Specifically, the historical analytical estimate is derived by adding 88 percent of the value in Table B1-4 and 12 percent of the value in Table B1-5. Several assumptions were necessary in deriving these final values. First, in the case where an analyte was present at a value less than the instrument detection limit, the detection limit value was maintained as the tank estimate. This provides a conservative estimate that does not attempt to alter the predetermined lower limit of quantitation. Second, the number of analytes reported in Table B1-5 is considerably smaller than those reported in Table B1-6 because only a limited number of analyses were requested in the earlier characterization of tank 241-AP-102. Because these constituents were not analyzed, they were assumed to be zero (even though they may be present), and 88 percent of the result in Table B1-4 was taken as the historical estimate of the concentration of that particular analyte in the tank.

Table B1-4. Characterization of Tank 241-AN-106 Constituents. (Welsh 1993) (3 sheets)

Analyte	Analytical Data Result Composite Mean
METALS	µg/L
Al	9.28 E+06
As	72
Ba	< 11,100
Bi	< 1.45E+05
Cd	< 49,600
Ca	90,200
Cr	5.64E+05
Cu	< 3,750
Fe	< 6,900
Pb	< 4.60E+05
Mg	2,780

Table B1-4. Characterization of Tank 241-AN-106 Constituents. (Welsh 1993) (3 sheets)

Analyte	Analytical Data Result Composite Mean
METALS (Continued)	μg/L
Mn	< 55,700
Hg	< 50
Mo	< 66,600
P	6.11 E+06
K	1.08 E+06
Se	134
Ag	< 3,630
Na	9.03 E+07
Ti	< 3,510
U	4,000
Zn	< 9,440
Zr	< 27,800
IONS	μg/L
NH_3	1.23E+05
CO_3^{2-}	1.962E+07
Cl^-	2.46E+06
CN^-	6,000
OH^-	8.06E+06
F^-	< 61,600
NO_2^-	2.96E+07
NO_3^-	6.85E+07
PO_4^{3-}	1.84E+07
SO_4^{2-}	2.15E+06

Table B1-4. Characterization of Tank 241-AN-106 Constituents. (Welsh 1993) (3 sheets)

Analyte	Analytical Data Result Composite Mean
RADIONUCLIDES	**μCi/L**
^{241}Am	0.606
^{14}C	0.335
^{134}Cs	< 24
^{137}Cs	2.05E+05
^{60}Co	< 9
^{243}Cm	0.0470
^{129}I	< 0.0750
^{94}Nb	< 23
^{238}Pu	0.0200
$^{239/240}$Pu	0.0378
^{106}Ru/Rh	< 1,390
^{79}Se	0.240
^{90}Sr	2,230
^{99}Tc	69
^{3}H	3
PHYSICAL PROPERTIES	
Water	77.6%
Density	1.23 g/cm^3
TOC	3.26E+06 μg/L

Table B1-5. Estimated Constituent Concentrations of the Dilute Phosphate Waste in Tank 241-AP-102 Prior to Transfer. (Hendrickson et al. 1993)

Analyte	Analytical Data Result
METALS[1]	**μg/L**
B	5,000
Ca	5,300
Cr	1,700
Fe	1,900
Mg	1,500
P	5.59E+06
Si	4,000
Na	1.25E+07
IONS	**μg/L**
CO_3^{2-}	2.01E+06
Cl^-	< 15,500
F^-	< 12,600
NO_2^-	810
NO_3^-	1.23E+05
PO_4^{3-}	1.48E+07
SO_4^{2-}	1.42E+06
RADIONUCLIDES[2]	**μCi/L**
^{241}Am	0.00744
^{137}Cs	0.489
^{60}Co	6.35
$^{243/242}$Cm	0.00934
^{244}Cm	0.0366
^{90}Sr	0.0341
Total alpha	0.0333

Notes:

[1]Values reported for metals and anions based on single sample result.

[2]Values reported for radionuclides based on highest reported activity of four sample results.

Table B1-6. Estimated[1] Historical Waste Composition of Tank 241-AP-102. (3 sheets)

Analyte	Final Estimated Result
METALS	**μg/L**
Al	8.17E+06
As	63.4
Ba	< 11,100
Bi	< 1.45E+05
B	600
Cd	< 49,600
Ca	80,000
Cr	4.96E+05
Cu	< 3,750
Fe	< 6,900
Pb	< 4.60E+05
Mg	2,630
Mn	< 55,700
Hg	< 50
Mo	< 66,600
P	6.05E+06
K	9.50E+05
Se	118
Si	480
Ag	< 3,630
Na	8.10E+07
Ti	< 3,510
U	3,520
Zn	< 9,440
Zr	< 27,800
IONS	**μg/L**
NH_3	1.08E+05
CO_3^{2-}	1.74E+07
Cl^-	2.16E+06
CN^-	5,280
OH^-	7.09E+06

Table B1-6. Estimated[1] Historical Waste Composition of Tank 241-AP-102. (3 sheets)

Analyte	Final Estimated Result
IONS	**$\mu g/L$**
F^-	< 61,600
NO_2^-	2.6E+07
NO_3^-	6.03E+07
PO_4^{3-}	1.8E+07
SO_4^{2-}	2.06E+06
RADIONUCLIDES	**$\mu Ci/L$**
^{241}Am	0.534
^{14}C	0.295
^{134}Cs	< 24
^{137}Cs	1.80E+05
^{60}Co	< 9
^{242}Cm	0.00112
^{243}Cm	0.0414
^{244}Cm	0.00439
^{129}I	< 0.0750
^{94}Nb	< 23
^{238}Pu	0.0176
$^{239/240}Pu$	0.0333
$^{106}Ru/Rh$	< 1,390
^{79}Se	0.211
$^{89/90}Sr$	1,960
Tc^{99}	60.7
Total alpha	0.00400
^{3}H	2.6

Table B1-6. Estimated[1] Historical Waste Composition of Tank 241-AP-102. (3 sheets)

Analyte	Final Estimated Result
PHYSICAL PROPERTIES	
Water[2]	77.6%
pH[2]	13.62
Density[2]	1.23 g/cm^3
TOC	2.87E+06 μg/L

Note:

[1]Estimated waste composition is based on 1988 sample data.

[2]These values were not multiplied by 88 percent, rather this value was assumed to be constant for the entire contents of the tank.

B2.0 ANALYTICAL RESULTS

This section presents a summary of the analytical results associated with the April 1993 sampling and analysis of tank 241-AP-102. The sampling and analysis events were performed to characterize the waste in preparation for Grout Campaign 102, to ensure that the waste was compatible with the waste contained in other tanks and systems, and to ensure that the waste posed no unknown or unacceptable safety risks. In order to ensure uniformity of the grout feed and to minimize the possibility of precipitation of phosphates, the samples were collected after the waste had been thoroughly blended with a mixer pump. Sample analysis was performed at the Westinghouse Hanford Company 222-S Laboratory and at PNNL.

B2.1 OVERVIEW

The analytical results from the April 1993 sampling of tank 241-AP-102 reported in this section were taken from *Tank 241-AP-102 Characterization and Grout Product Test Results* (Welsh 1994). The chemical, radiochemical, physical, and organic complexant results associated with tank 241-AP-102 are presented in tables B2-2 through B2-162.

The three quality control (QC) parameters assessed in conjunction with the tank 241-AP-102 samples were standard recoveries, spike recoveries, duplicate analyses, and relative percent differences (RPDs). The QC criteria identified in Hendrickson et al. (1993) for these parameters were: standard recoveries - 75 to 125 percent; matrix spike recoveries - 75 to 125 percent; and RPD $\leq$ 3 times the analytical error of the standard.

Sample and duplicate pairs in which any of the QC parameters were outside of these limits are superscripted in the sample mean column of the data summary tables as follows:

- "a" indicates that the standard recovery was below the QC limit.
- "b" indicates that the standard recovery was above the QC limit.
- "c" indicates that the spike recovery was below the QC limit.
- "d" indicates that the spike recovery was above the QC limit.
- "e" indicates that the RPD was above the QC limit.
- "f" indicates that the blank was contaminated.

B2.2 INORGANIC ANALYSES

B2.2.1 Metals by ICP

Samples were prepared by acid digestion. The following analytes were analyzed by ICP: aluminum, antimony, barium, beryllium, cadmium, chromium, iron, nickel, potassium, sodium, phosphorus, lead, and silver. The ICP analyses were performed in accordance with procedures LA-503-156 or LA-505-151. The concentrations of metals as measured by ICP are shown in tables B2-2 through B2-14.

B2.2.2 Ion Chromatography

The following anions were determined by IC using procedure LA-533-105: fluoride, chloride, nitrate, nitrite, phosphate, and sulfate. The samples were analyzed directly. The concentrations of anions as measured by IC are presented in tables B2-15 through B2-20.

B2.2.3 Uranium by Laser Fluorimetry

Procedure number LA-925-106 was used to analyze the samples for uranium. Uranium concentrations are presented in Table B2-21.

B2.2.4 Other Metals

Arsenic and selenium were analyzed by gaseous hydride atomic absorption spectroscopy, using procedure numbers LA-355-131 and LA-365-131, respectively. The samples were prepared with an acid digestion. Mercury was analyzed by cold vapor atomic spectroscopy, using procedure number LA-325-102. The samples were prepared with an acid digestion. The results of the analysis of arsenic, selenium, and mercury are listed in Tables B2-23, B2-27, and B2-26, respectively.

B2.2.5 Ammonia by Kjeldahl

Ammonia was analyzed by the Kjeldahl method, which consisted of addition of caustic to the sample, distillation, and subsequent capture in a boric acid solution. The number of the procedure used was LA-634-102. The analytical results are presented in Table B2-22.

B2.2.6 Cyanide by Distillation and Spectroscopy

Cyanide was determined using distillation and spectroscopy procedure number LA-695-102. The results are presented in Table B2-24.

B2.2.7 Hydroxide by Potentiometric Autotitration

Hydroxide was determined by potentiometric autotitration, using procedure number LA-661-102. Following pretreatment with barium chloride as a complexing agent for interfering anions, the titration was carried out to a pH of < 5. The results are presented in Table B2-25.

B2.3 ORGANIC ANALYSES

B2.3.1 Organic Complexant Analyses

Organic complexants HEDTA, EDTA, and citrate were measured using high performance liquid chromatography. The results are presented in tables B2-140, 138, and 136, respectively. The procedure was in the development stage and had no number at the time of analysis. Glycolate and oxalate were measured with ion chromatography, using procedure number PNL-ALO-212. The analytical results are presented in Tables B2-138 and 140, respectively.

B2.3.2 Semivolatile Organic Analyses

Semivolatile organic compounds were analyzed using procedure number PNL-ALO-345. Some minor quality control problems were noted in the analysis. The analytical results of the volatile semi-organic analysis are presented in Tables B2-28 through B2-96.

B2.3.3 Volatile Organic Analyses

Volatile organic compounds were analyzed using procedure number PNL-ALO-345. The analysis followed procedures noted in the statement of work for the sample and analysis event for analysis of volatile compounds with a heated purge. Analytical results of the VOA analysis are listed in Table B2-97 through B2-135.

B2.4 CARBON

B2.4.1 Total Inorganic Carbon

Total inorganic carbon (TIC) was determined after acidifying, purging, and heating the samples, followed by coulometry to detect CO_2. The procedure used was number LA-622-102, and the results are listed in Table B2-141.

B2.4.2 Total Organic Carbon

Total organic carbon (TOC) was measured using procedure number LA-344-105. The total organic carbon concentration is listed in Table B2-142.

B2.5 RADIONUCLIDES

B2.5.1 Fission Products by Gamma Energy Analysis

Gamma energy analysis, procedure number LA-548-121, was used to measure the activity of ^{134}Cs, ^{137}Cs, ^{94}Nb, $^{106}Rh/Ru$, ^{125}Sb, ^{144}Ce, and ^{60}Co. The samples were either analyzed directly or were diluted as necessary to reduce radiation levels or remove interferences. Gamma energy analytical results are listed in Tables B2-143 through B2-149.

B2.5.2 Fission Products by Separation and Counting

Fission products not measured directly by GEA were analyzed by separation and counting. ^{90}Sr, ^{99}Tc, ^{14}C, ^{129}I, and ^{3}H were analyzed by methods that chemically or physically separated them from the other constituents in the waste. ^{99}Tc, ^{14}C, and ^{3}H were measured by liquid scintillation counting after separation. ^{90}Sr was measured by beta proportional counting after separation. Separation followed by low energy GEA was used to measure the concentration of ^{129}I. Table B2-1 presents the analytical methods and procedure numbers used to analyze the fission products. The results are presented in Tables B2-155 through B2-159.

Table B2-1. Radiochemical Analytical Procedures. (Hendrickson et al. 1993)

Analyte	Method	Procedure Number
^{90}Sr	Separation and beta proportional counting	LA-220-101
^{99}Tc	Separation and liquid scintillation counting	LA-438-101
^{14}C	Separation and liquid scintillation counting	LA-348-104
^{129}I	Separation and low energy gamma energy analysis	LA-378-103
^{3}H	Separation and liquid scintillation counting	LA-218-104

B2.5.3 Transuranic Radionuclides by Separation and Counting

Transuranic radionuclides were measured by separation followed by alpha proportional counting and alpha energy analysis. Procedure number LA-503-156 was used to measure ^{241}Am, ^{238}Pu, $^{239/240}$Pu, and $^{243/244}$Cm. Procedure number LA-933-141 was used to measure ^{237}Np. The results of the separation and counting analysis are presented in Tables B2-150 through B2-154.

B2.6 PHYSICAL PROPERTIES

B2.6.1 Specific Gravity and Percent Water

The specific gravity results from the tank samples agreed within 3 percent. Table B2-160 reports the specific gravity of the samples. The procedure number for the specific gravity measurement was not available. As mentioned earlier, thermogravimetric analysis of the samples was not performed. The moisture content was estimated using gravimetric analysis, procedure LA-560-101. Gravimetric analysis was performed on all samples from the tank. The percent water results are presented in Table B2-161.

Table B2-2. Tank 241-AP-102 Analytical Results: Aluminum (ICP).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids: acid digest			µg/mL	µg/mL	µg/mL
G348	Riser 1NE	WHOLE	11,800	11,600	11,700
G342		WHOLE	11,500	11,400	11,450
G349		WHOLE	12,100	11,700	11,900
G352		WHOLE	11,500	11,500	11,500
G449		WHOLE	11,600	11,500	11,550
G450		WHOLE	11,700	11,800	11,750
G353	Riser 1SE	WHOLE	11,300	11,400	11,350
G358		WHOLE	11,600	11,100	11,350
G359		WHOLE	11,200	11,100	11,150
G363		WHOLE	11,400	11,300	11,350
G453		WHOLE	11,500	11,900	11,700
G454		WHOLE	11,700	11,700	11,700
G333	Riser 1W	WHOLE	11,400	11,400	11,400
G338		WHOLE	11,700	11,700	11,700
G341		WHOLE	11,600	11,500	11,550
G364		WHOLE	11,600	11,400	11,500
G459		WHOLE	11,700	11,700	11,700
G460		WHOLE	11,600	11,400	11,500
G443	Riser NA	COMPOSITE	11,600	11,600	11,600
G470		COMPOSITE	11,900	11,800	11,850

Table B2-3. Tank 241-AP-102 Analytical Results: Antimony (ICP).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids: acid digest			µg/mL	µg/mL	µg/mL
G348	Riser 1NE	WHOLE	< 5.25	< 5.25	< 5.25
G342		WHOLE	7.57	6.34	6.955
G349		WHOLE	< 5.25	< 5.25	< 5.25
G352		WHOLE	< 5.25	< 5.25	< 5.25
G449		WHOLE	< 5.25	< 5.25	< 5.25
G450		WHOLE	< 5.25	6	< 5.625
G353	Riser 1SE	WHOLE	< 5.25	< 5.25	< 5.25
G358		WHOLE	< 5.25	< 5.25	< 5.25
G359		WHOLE	< 5.25	6.58	< 5.915
G363		WHOLE	9.47	5.53	7.5[QC:e]
G453		WHOLE	5.98	< 5.25	< 5.615
G454		WHOLE	5.37	5.39	5.38
G333	Riser 1W	WHOLE	5.82	< 5.25	< 5.535
G338		WHOLE	6.56	< 5.25	< 5.905
G341		WHOLE	6	< 5.25	< 5.625
G364		WHOLE	< 5.25	< 5.25	< 5.25
G459		WHOLE	< 5.25	< 5.25	< 5.25
G460		WHOLE	< 5.25	< 5.25	< 5.25
G443	Riser NA	COMPOSITE	< 5.25	< 5.25	< 5.25
G470		COMPOSITE	< 5.25	< 5.25	< 5.25

Table B2-4. Tank 241-AP-102 Analytical Results: Barium (ICP).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids: acid digest			µg/mL	µg/mL	µg/mL
G348	Riser 1NE	WHOLE	0.26	0.268	0.264
G342		WHOLE	0.17	0.258	0.214[QC:e]
G349		WHOLE	0.322	0.342	0.332
G352		WHOLE	0.314	0.248	0.281[QC:e]
G449		WHOLE	0.338	0.343	0.3405
G450		WHOLE	0.354	0.359	0.3565
G353	Riser 1SE	WHOLE	0.248	0.237	0.2425
G358		WHOLE	0.284	0.342	0.313
G359		WHOLE	0.309	0.3	0.3045
G363		WHOLE	0.289	0.286	0.2875
G453		WHOLE	0.211	0.335	0.273[QC:e]
G454		WHOLE	0.34	0.327	0.3335
G333	Riser 1W	WHOLE	0.288	0.345	0.3165
G338		WHOLE	0.365	0.419	0.392
G341		WHOLE	0.283	0.139	0.211[QC:e]
G364		WHOLE	0.0902	0.17	0.1301[QC:e]
G459		WHOLE	0.273	0.252	0.2625
G460		WHOLE	0.252	0.207	0.2295
G443	Riser NA	COMPOSITE	0.248	0.14	0.194[QC:e]

Table B2-5. Tank 241-AP-102 Analytical Results: Beryllium (ICP).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids: acid digest			µ/mL	µ/mL	µg/mL
G348	Riser 1NE	WHOLE	0.145	0.15	0.1475
G342		WHOLE	0.146	0.146	0.146
G349		WHOLE	0.145	0.143	0.144
G352		WHOLE	0.147	0.143	0.145
G449		WHOLE	0.145	0.109	0.127[QC:e]
G450		WHOLE	0.127	0.129	0.128
G353	Riser 1SE	WHOLE	0.127	0.149	0.138
G358		WHOLE	0.147	0.143	0.145
G359		WHOLE	0.132	0.139	0.1355
G363		WHOLE	0.136	0.147	0.1415
G453		WHOLE	0.151	0.159	0.155
G454		WHOLE	0.152	0.168	0.16
G333	Riser 1W	WHOLE	0.158	0.158	0.158
G338		WHOLE	0.154	0.163	0.1585
G341		WHOLE	0.146	0.154	0.15
G364		WHOLE	0.161	0.135	0.148
G459		WHOLE	0.14	0.163	0.1515
G460		WHOLE	0.149	0.158	0.1535
G443	Riser NA	COMPOSITE	0.14	0.152	0.146

Table B2-6. Tank 241-AP-102 Analytical Results: Cadmium (ICP).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids: acid digest			µg/mL	µg/mL	µg/mL
G348	Riser 1NE	WHOLE	1.36	1.36	1.36
G342		WHOLE	1.46	1.44	1.45
G349		WHOLE	1.54	1.54	1.54
G352		WHOLE	1.47	1.3	1.385
G449		WHOLE	1.39	1.4	1.395
G450		WHOLE	1.32	1.53	1.425
G353	Riser 1SE	WHOLE	1.47	1.46	1.465
G358		WHOLE	1.48	1.31	1.395
G359		WHOLE	1.33	1.34	1.335
G363		WHOLE	1.45	1.52	1.485
G453		WHOLE	1.51	1.79	1.65
G454		WHOLE	1.41	1.78	1.595[QC:f]
G333	Riser 1W	WHOLE	1.43	1.5	1.465
G338		WHOLE	1.5	1.5	1.5
G341		WHOLE	1.47	1.47	1.47
G364		WHOLE	1.65	1.48	1.565
G459		WHOLE	1.42	1.52	1.47
G460		WHOLE	1.45	1.5	1.475
G443	Riser NA	COMPOSITE	1.52	1.47	1.495

Table B2-7. Tank 241-AP-102 Analytical Results: Chromium (ICP).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids: acid digest			µg/mL	µg/mL	µg/mL
G348	Riser 1NE	WHOLE	634	637	635.5
G342		WHOLE	622	604	613
G349		WHOLE	655	646	650.5
G352		WHOLE	627	605	616
G449		WHOLE	601	612	606.5
G450		WHOLE	597	616	606.5
G353	Riser 1SE	WHOLE	614	624	619
G358		WHOLE	616	603	609.5
G359		WHOLE	608	591	599.5
G363		WHOLE	609	611	610
G453		WHOLE	638	622	630
G454		WHOLE	607	622	614.5
G333	Riser 1W	WHOLE	618	632	625
G338		WHOLE	619	629	624
G341		WHOLE	625	621	623
G364		WHOLE	631	602	616.5
G459		WHOLE	604	635	619.5
G460		WHOLE	619	628	623.5
G443	Riser NA	COMPOSITE	631	615	623
G470		COMPOSITE	716	708	712[QC:c]

Table B2-8. Tank 241-AP-102 Analytical Results: Iron (ICP).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids: acid digest			µg/mL	µg/mL	µg/mL
G348	Riser 1NE	WHOLE	6.16	6.01	6.085
G342		WHOLE	3.41	4.14	3.775
G349		WHOLE	2.98	2.97	2.975
G352		WHOLE	3.11	2.79	2.95
G449		WHOLE	3.65	2.6	3.125[QC:f]
G450		WHOLE	3.14	3.06	3.1
G353	Riser 1SE	WHOLE	3.99	4.38	4.185
G358		WHOLE	10.5	2.51	6.505[QC:f]
G359		WHOLE	3.36	2.92	3.14
G363		WHOLE	2.89	3.37	3.13
G453		WHOLE	7.16	4.65	5.905[QC:f]
G454		WHOLE	3.45	3.49	3.47
G333	Riser 1W	WHOLE	3.19	2.63	2.91
G338		WHOLE	3.04	3.93	3.485[QC:f]
G341		WHOLE	3.87	3.09	3.48[QC:f]
G364		WHOLE	3.36	3.87	3.615
G459		WHOLE	3.31	2.9	3.105
G460		WHOLE	4.16	3.78	3.97
G443	Riser NA	COMPOSITE	6.44	4.78	5.61[QC:f]
G470		COMPOSITE	<15	<15	<15

Table B2-9. Tank 241-AP-102 Analytical Results: Lead (ICP).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids: acid digest			**µg/mL**	**µg/mL**	**µg/mL**
G348	Riser 1NE	WHOLE	< 1.55	< 1.55	< 1.55
G342		WHOLE	< 1.55	< 1.55	< 1.55
G349		WHOLE	< 1.55	< 2.64	< 2.095[QC:f]
G352		WHOLE	< 1.55	< 1.55	< 1.55
G449		WHOLE	< 1.55	< 1.55	< 1.55
G450		WHOLE	< 1.55	< 1.55	< 1.55
G353	Riser 1SE	WHOLE	< 1.55	< 1.55	< 1.55
G358		WHOLE	< 1.55	< 1.55	< 1.55
G359		WHOLE	< 3.22	< 1.55	< 2.385[QC:f]
G363		WHOLE	< 1.55	< 1.55	< 1.55
G453		WHOLE	< 1.55	< 1.55	< 1.55
G454		WHOLE	< 1.55	1.95	< 1.75[QC:f]
G333	Riser 1W	WHOLE	< 1.55	< 1.55	< 1.55
G338		WHOLE	< 1.55	< 1.55	< 1.55
G341		WHOLE	< 1.55	< 1.55	< 1.55
G364		WHOLE	< 5.33	< 1.55	< 3.44[QC:f]
G459		WHOLE	< 1.55	< 1.55	< 1.55
G460		WHOLE	< 1.55	< 1.55	< 1.55
G443	Riser NA	COMPOSITE	< 1.55	< 1.55	< 1.55
G470		COMPOSITE	< 1.55	< 1.55	< 1.55

Table B2-10. Tank 241-AP-102 Analytical Results: Nickel (ICP).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids: acid digest			µg/mL	µg/mL	µg/mL
G348	Riser 1NE	WHOLE	27.4	27.5	27.45
G342		WHOLE	26.8	25.9	26.35
G349		WHOLE	28.2	27.7	27.95
G352		WHOLE	26.7	25.8	26.25
G449		WHOLE	25.8	26.1	25.95
G450		WHOLE	25.6	26.7	26.15
G353	Riser 1SE	WHOLE	26.3	26.6	26.45
G358		WHOLE	26.6	26	26.3
G359		WHOLE	26.3	25.6	25.95
G363		WHOLE	26.3	26.6	26.45
G453		WHOLE	27.4	26.8	27.1
G454		WHOLE	26.2	27.1	26.65
G333	Riser 1W	WHOLE	26.6	27.1	26.85
G338		WHOLE	26.7	27	26.85
G341		WHOLE	26.9	26.8	26.85
G364		WHOLE	27.3	25.8	26.55
G459		WHOLE	26	27.3	26.65
G460		WHOLE	26.4	26.9	26.65
G443	Riser NA	COMPOSITE	27.5	26.4	26.95
G470		COMPOSITE	34.5	27.8	31.15[QC:e]

Table B2-11. Tank 241-AP-102 Analytical Results: Phosphorus (ICP).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids: acid digest			µg/mL	µg/mL	µg/mL
G348	Riser 1NE	WHOLE	2,960	3,030	2,995
G342		WHOLE	3,070	2,990	3,030
G349		WHOLE	3,300	3,070	3,185
G352		WHOLE	2,810	2,940	2,875
G449		WHOLE	2,810	3,060	2,935
G450		WHOLE	2,980	3,080	3,030
G353	Riser 1SE	WHOLE	2,890	2,790	2,840
G358		WHOLE	2,950	2,900	2,925
G359		WHOLE	3,060	3,010	3,035
G363		WHOLE	2,680	2,590	2,635
G453		WHOLE	3,300	3,530	3,415[QC:f]
G454		WHOLE	3,420	3,380	3,400[QC:f]
G333	Riser 1W	WHOLE	3,250	3,290	3,270
G338		WHOLE	3,440	3,440	3,440
G341		WHOLE	3,050	3,080	3,065
G364		WHOLE	2,680	2,530	2,605
G459		WHOLE	3,250	3,190	3,220
G460		WHOLE	3,120	3,130	3,125
G443	Riser NA	COMPOSITE	2,860	2,860	2,860[QC:d]
G470		COMPOSITE	3,880	3,550	3,715[QC:d]

Table B2-12. Tank 241-AP-102 Analytical Results: Potassium (ICP).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids: acid digest			µg/mL	µg/mL	µg/mL
G348	Riser 1NE	WHOLE	1,250	1,260	1,255
G342		WHOLE	1,310	1,290	1,300
G349		WHOLE	1,290	1,280	1,285
G352		WHOLE	1,260	1,230	1,245[QC:d]
G449		WHOLE	1,270	1,310	1,290
G450		WHOLE	1,280	1,320	1,300
G353	Riser 1SE	WHOLE	1,250	1,270	1,260[QC:d]
G358		WHOLE	1,220	1,200	1,210
G359		WHOLE	1,210	1,190	1,200
G363		WHOLE	1,290	1,300	1,295
G453		WHOLE	1,320	1,330	1,325
G454		WHOLE	1,290	1,330	1,310
G333	Riser 1W	WHOLE	1,300	1,330	1,315
G338		WHOLE	1,320	1,350	1,335
G341		WHOLE	1,310	1,330	1,320
G364		WHOLE	1,350	1,300	1,325
G459		WHOLE	1,260	1,340	1,300
G460		WHOLE	1,310	1,340	1,325
G443	Riser NA	COMPOSITE	1,330	1,310	1,320
G470		COMPOSITE	1,400	1,370	1,385

Table B2-13. Tank 241-AP-102 Analytical Results: Silver (ICP).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids: acid digest			**µg/mL**	**µg/mL**	**µg/mL**
G348	Riser 1NE	WHOLE	< 0.125	< 0.125	< 0.125
G342		WHOLE	< 0.125	< 0.125	< 0.125
G349		WHOLE	< 0.125	< 0.125	< 0.125
G352		WHOLE	< 0.125	< 0.125	< 0.125
G449		WHOLE	< 0.125	< 0.125	< 0.125
G450		WHOLE	< 0.125	< 0.125	< 0.125
G353	Riser 1SE	WHOLE	< 0.125	< 0.125	< 0.125
G358		WHOLE	< 0.125	< 0.125	< 0.125
G359		WHOLE	< 0.125	< 0.125	< 0.125
G363		WHOLE	< 0.125	< 0.125	< 0.125[QC:c]
G453		WHOLE	< 0.125	< 0.125	< 0.125
G333	Riser 1W	WHOLE	< 0.125	< 0.125	< 0.125[QC:a]
G338		WHOLE	< 0.125	< 0.125	< 0.125[QC:a]
G341		WHOLE	< 0.125	< 0.125	< 0.125
G364		WHOLE	< 0.125	< 0.125	< 0.125[QC:c]
G459		WHOLE	< 0.125	< 0.125	< 0.125
G460		WHOLE	< 0.125	< 0.125	< 0.125
G443	Riser NA	COMPOSITE	< 0.125	< 0.125	< 0.125[QC:c]
G470		COMPOSITE	< 0.125	< 0.125	< 0.125[QC:c]

Table B2-14. Tank 241-AP-102 Analytical Results: Sodium (ICP).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids: acid digest			µg/mL	µg/mL	µg/mL
G348	Riser 1NE	WHOLE	1.030E+05	1.020E+05	1.025E+05
G342		WHOLE	1.000E+05	1.000E+05	1.000E+05
G349		WHOLE	1.060E+05	1.020E+05	1.040E+05
G352		WHOLE	1.020E+05	1.010E+05	1.015E+05
G449		WHOLE	1.020E+05	1.010E+05	1.015E+05
G450		WHOLE	1.040E+05	1.040E+05	1.040E+05
G353	Riser 1SE	WHOLE	1.000E+05	1.010E+05	1.005E+05
G358		WHOLE	1.030E+05	98,800	1.009E+05
G359		WHOLE	99,100	98,000	98,550
G363		WHOLE	1.010E+05	99,900	1.005E+05
G453		WHOLE	1.020E+05	1.050E+05	1.035E+05
G454		WHOLE	1.030E+05	1.030E+05	1.030E+05
G333	Riser 1W	WHOLE	99,700	1.000E+05	99,850
G338		WHOLE	1.030E+05	1.030E+05	1.030E+05
G341		WHOLE	1.010E+05	1.010E+05	1.010E+05
G364		WHOLE	1.030E+05	1.000E+05	1.015E+05
G459		WHOLE	1.020E+05	1.020E+05	1.020E+05
G460		WHOLE	1.020E+05	1.000E+05	1.010E+05
G443	Riser NA	COMPOSITE	1.020E+05	1.020E+05	1.020E+05
G470		COMPOSITE	1.060E+05	1.050E+05	1.055E+05

Table B2-15. Tank 241-AP-102 Analytical Results: Chloride (IC). (2 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
G348	Riser 1NE	WHOLE	2,750	2,670	2,710
G510		WHOLE	2,540	2,730	2,635
G342		WHOLE	2,850	2,730	2,790
G349		WHOLE	2,840	2,740	2,790
G352		WHOLE	2,800	2,880	2,840
G449		WHOLE	2,990	2,960	2,975
G450		WHOLE	3,050	2,970	3,010
G477		WHOLE	2,680	2,630	2,655
G477		WHOLE	2,720	3,080	2,900[QC:c]
G509		WHOLE	2,710	2,730	2,720
G511		WHOLE	2,740	2,690	2,715
G521		WHOLE	2,810	2,780	2,795
G523		WHOLE	2,660	2,610	2,635
G353	Riser 1SE	WHOLE	2,740	2,890	2,815
G358		WHOLE	2,780	2,820	2,800
G359		WHOLE	2,800	2,830	2,815
G363		WHOLE	2,830	2,920	2,875
G453		WHOLE	3,020	2,940	2,980
G454		WHOLE	2,910	2,900	2,905
G471		WHOLE	2,990	2,780	2,885[QC:c]
G515		WHOLE	2,650	2,810	2,730
G516		WHOLE	2,390	2,780	2,585
G516		WHOLE	2,840	2,810	2,825
G522		WHOLE	2,850	2,810	2,830
G527		WHOLE	2,820	2,360	2,590
G527		WHOLE	2,900	2,920	2,910
G533		WHOLE	2,800	2,700	2,750

Table B2-15. Tank 241-AP-102 Analytical Results: Chloride (IC). (2 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
G333	Riser 1W	WHOLE	2,900	2,930	2,915
G338		WHOLE	3,000	3,020	3,010
G341		WHOLE	2,760	2,830	2,795
G364		WHOLE	2,940	2,940	2,940
G459		WHOLE	2,830	2,870	2,850
G460		WHOLE	3,630	3,570	3,600
G476		WHOLE	2,960	2,820	2,890[QC:e]
G517		WHOLE	2,820	2,780	2,800
G528		WHOLE	2,420	2,550	2,485
G529		WHOLE	2,580	2,660	2,620
G534		WHOLE	2,730	2,680	2,705
G536		WHOLE	2,690	2,670	2,680
G443	Riser NA[1]	COMPOSITE	4,360	4,560	4,460
G470		COMPOSITE	3,150	3,120	3,135[QC:e]

Table B2-16. Tank 241-AP-102 Analytical Results: Fluoride (IC).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
G348	Riser 1NE	WHOLE	< 168	< 168	< 168
G342		WHOLE	< 168	< 168	< 168
G349		WHOLE	< 168	< 168	< 168
G352		WHOLE	< 168	< 168	< 168
G449		WHOLE	< 168	< 168	< 168
G450		WHOLE	< 168	< 168	< 168
G477		WHOLE	< 168	< 168	< 168[QC:c]
G353	Riser 1SE	WHOLE	< 168	< 168	< 168
G358		WHOLE	< 168	< 168	< 168
G359		WHOLE	< 168	< 168	< 168
G363		WHOLE	< 168	< 168	< 168
G453		WHOLE	< 168	< 168	< 168
G454		WHOLE	< 168	< 168	< 168
G471		WHOLE	< 168	< 168	< 168[QC:c]
G333	Riser 1W	WHOLE	< 209	< 209	< 209
G338		WHOLE	< 168	< 168	< 168
G341		WHOLE	< 168	< 168	< 168
G364		WHOLE	< 168	< 168	< 168
G459		WHOLE	< 168	< 168	< 168
G460		WHOLE	< 168	< 168	< 168
G476		WHOLE	< 168	< 168	< 168[QC:c]
G443	Riser NA	COMPOSITE	< 168	< 168	< 168
G470		COMPOSITE	< 168	< 168	< 168[QC:c]

Table B2-17. Tank 241-AP-102 Analytical Results: Nitrate (IC). (2 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
G348	Riser 1NE	WHOLE	75,500	76,300	75,900
G510		WHOLE	69,700	77,700	73,700
G342		WHOLE	76,800	75,000	75,900
G349		WHOLE	76,000	76,400	76,200
G352		WHOLE	74,200	77,500	75,850
G449		WHOLE	77,400	78,600	78,000
G450		WHOLE	79,000	79,400	79,200
G477		WHOLE	75,500	83,400	79,450
G477		WHOLE	75,800	76,300	76,050[QC:d]
G509		WHOLE	76,100	79,000	77,550
G511		WHOLE	75,800	75,200	75,500
G521		WHOLE	77,300	74,200	75,750
G523		WHOLE	72,700	72,100	72,400
G353	Riser 1SE	WHOLE	75,000	77,200	76,100
G358		WHOLE	75,800	75,900	75,850
G359		WHOLE	76,900	77,400	77,150
G363		WHOLE	77,600	77,500	77,550
G453		WHOLE	80,500	78,300	79,400
G454		WHOLE	78,400	78,700	78,550
G471		WHOLE	82,200	77,900	80,050
G515		WHOLE	75,700	79,100	77,400
G516		WHOLE	65,200	78,000	71,600
G516		WHOLE	77,600	77,400	77,500
G522		WHOLE	78,200	79,200	78,700
G527		WHOLE	76,800	77,200	77,000
G527		WHOLE	84,000	64,500	74,250[QC:e]
G533		WHOLE	77,500	77,600	77,550

Table B2-17. Tank 241-AP-102 Analytical Results: Nitrate (IC). (2 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
G333	Riser 1W	WHOLE	79,500	79,200	79,350
G338		WHOLE	78,000	79,300	78,650
G341		WHOLE	74,900	78,100	76,500
G364		WHOLE	78,400	78,500	78,450
G459		WHOLE	75,800	77,100	76,450
G460		WHOLE	96,800	97,300	97,050
G476		WHOLE	82,500	75,900	79,200
G517		WHOLE	78,100	78,300	78,200
G528		WHOLE	66,800	71,800	69,300
G529		WHOLE	73,000	73,600	73,300
G534		WHOLE	75,900	75,900	75,900
G536		WHOLE	75,300	75,800	75,550
G443	Riser NA	COMPOSITE	55,800	53,700	54,750
G470		COMPOSITE	85,200	83,400	84,300

Table B2-18. Tank 241-AP-102 Analytical Results: Nitrite (IC). (2 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
G348	Riser 1NE	WHOLE	37,000	36,500	36,750
G510		WHOLE	32,600	37,000	34,800
G342		WHOLE	36,900	36,000	36,450
G349		WHOLE	37,600	36,900	37,250
G352		WHOLE	36,400	37,000	36,700
G449		WHOLE	38,400	38,700	38,550
G450		WHOLE	38,000	38,300	38,150
G477		WHOLE	35,000	35,600	35,300
G477		WHOLE	36,200	41,000	38,600
G509		WHOLE	35,700	36,500	36,100
G511		WHOLE	35,400	35,800	35,600
G521		WHOLE	35,800	34,300	35,050
G523		WHOLE	34,200	33,800	34,000
G353	Riser 1SE	WHOLE	35,800	37,200	36,500
G358		WHOLE	36,500	36,500	36,500
G359		WHOLE	37,400	37,000	37,200
G363		WHOLE	37,900	37,600	37,750
G453		WHOLE	39,400	38,000	38,700
G454		WHOLE	38,400	38,500	38,450
G471		WHOLE	40,300	38,300	39,300
G515		WHOLE	34,900	37,000	35,950
G516		WHOLE	31,300	36,900	34,100
G516		WHOLE	37,600	37,600	37,600
G522		WHOLE	36,700	36,300	36,500
G527		WHOLE	36,400	30,900	33,650
G527		WHOLE	37,400	38,200	37,800
G533		WHOLE	36,000	35,500	35,750

Table B2-18. Tank 241-AP-102 Analytical Results: Nitrite (IC). (2 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
G333	Riser 1W	WHOLE	38,800	39,100	38,950
G338		WHOLE	37,800	38,400	38,100
G341		WHOLE	37,000	38,400	37,700
G364		WHOLE	38,100	38,000	38,050
G459		WHOLE	36,900	37,900	37,400
G460		WHOLE	47,500	47,000	47,250
G476		WHOLE	40,800	37,000	38,900
G517		WHOLE	36,500	37,000	36,750
G528		WHOLE	31,500	34,100	32,800
G529		WHOLE	34,000	34,900	34,450
G534		WHOLE	35,200	35,000	35,100
G536		WHOLE	35,300	34,800	35,050
G443	Riser NA	COMPOSITE	54,500	55,100	54,800[QC:c]
G470		COMPOSITE	41,800	41,500	41,650

Table B2-19. Tank 241-AP-102 Analytical Results: Phosphate (IC). (2 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
G348	Riser 1NE	WHOLE	8,550	8,790	8,670
G510		WHOLE	10,700	11,800	11,250
G342		WHOLE	8,730	8,590	8,660
G349		WHOLE	10,400	10,400	10,400
G352		WHOLE	8,760	8,870	8,815
G449		WHOLE	9,200	9,300	9,250
G450		WHOLE	9,220	9,190	9,205
G477		WHOLE	10,600	10,700	10,650
G477		WHOLE	11,400	12,900	12,150
G509		WHOLE	11,900	12,200	12,050
G511		WHOLE	11,300	11,100	11,200
G521		WHOLE	12,300	12,000	12,150
G523		WHOLE	11,600	11,500	11,550
G353	Riser 1SE	WHOLE	8,690	8,840	8,765
G358		WHOLE	9,150	9,050	9,100
G359		WHOLE	8,850	8,870	8,860
G363		WHOLE	8,770	8,850	8,810
G453		WHOLE	9,600	9,390	9,495
G454		WHOLE	9,900	9,860	9,880
G471		WHOLE	12,800	11,900	12,350
G515		WHOLE	11,500	12,300	11,900
G516		WHOLE	10,300	12,000	11,150
G516		WHOLE	12,100	12,000	12,050
G522		WHOLE	12,400	12,400	12,400
G527		WHOLE	8,090	8,270	8,180
G527		WHOLE	12,400	10,200	11,300
G533		WHOLE	12,200	12,200	12,200

Table B2-19. Tank 241-AP-102 Analytical Results: Phosphate (IC). (2 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
G333	Riser 1W	WHOLE	9,950	9,690	9,820
G338		WHOLE	9,510	9,650	9,580
G341		WHOLE	8,510	8,750	8,630
G364		WHOLE	9,190	9,050	9,120
G459		WHOLE	9,340	9,260	9,300
G460		WHOLE	11,900	11,800	11,850
G476		WHOLE	12,800	11,900	12,350
G517		WHOLE	11,400	11,600	11,500
G528		WHOLE	10,500	11,000	10,750
G529		WHOLE	11,300	11,300	11,300
G534		WHOLE	12,000	11,800	11,900
G536		WHOLE	11,800	11,900	11,850
G443	Riser NA	COMPOSITE	13,300	13,200	13,250
G470		COMPOSITE	12,900	13,700	13,300

Table B2-20. Tank 241-AP-102 Analytical Results: Sulfate (IC). (2 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
G348	Riser 1NE	WHOLE	3,580	3,660	3,620
G510		WHOLE	4,650	4,840	4,745
G342		WHOLE	3,600	3,570	3,585
G349		WHOLE	3,650	3,650	3,650
G352		WHOLE	3,560	3,700	3,630
G449		WHOLE	3,720	3,720	3,720
G450		WHOLE	3,710	3,750	3,730
G477		WHOLE	3,540	3,910	3,725
G477		WHOLE	4,770	4,780	4,775
G509		WHOLE	4,770	4,850	4,810
G511		WHOLE	4,730	4,760	4,745
G521		WHOLE	4,690	4,630	4,660
G523		WHOLE	4,600	4,550	4,575
G353	Riser 1SE	WHOLE	3,610	3,740	3,675
G358		WHOLE	3,590	3,660	3,625
G359		WHOLE	3,660	3,680	3,670
G363		WHOLE	3,700	3,750	3,725
G453		WHOLE	3,740	3,740	3,740
G454		WHOLE	3,750	3,720	3,735
G471		WHOLE	3,760	3,660	3,710
G515		WHOLE	4,790	4,860	4,825
G516		WHOLE	4,430	4,850	4,640
G516		WHOLE	4,460	4,500	4,480
G522		WHOLE	4,750	4,770	4,760
G527		WHOLE	4,490	4,500	4,495
G527		WHOLE	5,170	4,400	4,785
G533		WHOLE	4,590	4,570	4,580

Table B2-20. Tank 241-AP-102 Analytical Results: Sulfate (IC). (2 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
G333	Riser 1W	WHOLE	3,930	3,960	3,945
G338		WHOLE	3,650	3,670	3,660
G341		WHOLE	3,590	3,660	3,625
G364		WHOLE	3,730	3,700	3,715
G459		WHOLE	3,610	3,660	3,635
G460		WHOLE	4,530	4,530	4,530
G476		WHOLE	3,920	3,630	3,775
G517		WHOLE	4,830	4,860	4,845
G528		WHOLE	4,490	4,610	4,550
G529		WHOLE	4,630	4,670	4,650
G534		WHOLE	4,650	4,550	4,600
G536		WHOLE	4,520	4,550	4,535
G443	Riser NA	COMPOSITE	4,990	5,030	5,010
G470		COMPOSITE	3,930	3,890	3,910

Table B2-21. Tank 241-AP-102 Analytical Results: Total Uranium (LF).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
G477	Riser 1NE	WHOLE	4.05	4.05	4.05
G471	Riser 1SE	WHOLE	4.99	4.55	4.77
G476	Riser 1W	WHOLE	5.54	4.99	5.265
G443	Riser NA	COMPOSITE	7.09	6.31	6.7
G443		COMPOSITE	2.58	2.15	2.365
G470		COMPOSITE	4.55	4.5	4.525

Table B2-22. Tank 241-AP-102 Analytical Results: Ammonium (Distillation (NH3)).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
G477	Riser 1NE	WHOLE	272	272	272
G471	Riser 1SE	WHOLE	302	308	305[QC:d]
G471		WHOLE	413	410	411.5[QC:c]
G476	Riser 1W	WHOLE	201	201	201
G476		WHOLE	192	195	193.5[QC:d]
G443	Riser NA	COMPOSITE	< 40	< 40	< 40
G443		COMPOSITE	< 160	164	< 162
G470		COMPOSITE	258	265	261.5

Table B2-23. Tank 241-AP-102 Analytical Results: Arsenic (AA (As)).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
G477	Riser 1NE	WHOLE	< 0.25	< 0.25	< 0.25[QC:b]
G471	Riser 1SE	WHOLE	< 0.25	< 0.25	< 0.25[QC:b]
G471		WHOLE	< 0.25	< 0.25	< 0.25[QC:b]
G476	Riser 1W	WHOLE	< 0.25	< 0.25	< 0.25
G443	Riser NA	COMPOSITE	0.0759	0.102	0.08895[QC:b,e]
G470		COMPOSITE	< 0.25	< 0.25	< 0.25[QC:b]
G470		COMPOSITE	< 0.25	< 0.25	< 0.25[QC:b]

Table B2-24. Tank 241-AP-102 Analytical Results: Cyanide (Spec (CN)).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
G477	Riser 1NE	WHOLE	23.2	22.6	22.9
G471	Riser 1SE	WHOLE	24.4	23	23.7
G476	Riser 1W	WHOLE	23.2	24.1	23.65
G443	Riser NA	COMPOSITE	24.6	24.6	24.6
G470		COMPOSITE	23.2	24.6	23.9

Table B2-25. Tank 241-AP-102 Analytical Results: Hydroxide (OH Automatic).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
G348	Riser 1NE	WHOLE	8,940	9,130	9,035
G342		WHOLE	9,080	8,940	9,010
G349		WHOLE	9,010	9,520	9,265
G352		WHOLE	9,200	9,470	9,335
G477		WHOLE	8,810	7,910	8,360
G477		WHOLE	9,330	9,330	9,330
G353	Riser 1SE	WHOLE	9,200	9,080	9,140
G358		WHOLE	9,080	9,400	9,240
G359		WHOLE	9,080	9,080	9,080
G363		WHOLE	9,200	9,200	9,200
G471		WHOLE	8,940	8,690	8,815
G341	Riser 1W	WHOLE	9,400	8,940	9,170
G364		WHOLE	9,150	9,330	9,240
G459		WHOLE	9,270	9,080	9,175
G460		WHOLE	9,080	9,080	9,080
G476		WHOLE	9,080	8,810	8,945
G443	Riser NA	COMPOSITE	9,010	9,200	9,105
G470		COMPOSITE	8,620	8,810	8,715

Table B2-26. Tank 241-AP-102 Analytical Results: Mercury (AA CLP (Hg)).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
G477	Riser 1NE	WHOLE	< 0.01	< 0.01	< 0.01
G471	Riser 1SE	WHOLE	< 0.01	< 0.01	< 0.01
G476	Riser 1W	WHOLE	< 0.01	< 0.01	< 0.01
G443	Riser NA	COMPOSITE	< 0.005	< 0.005	< 0.005[QC:c]
G470		COMPOSITE	< 0.005	< 0.005	< 0.005

Table B2-27. Tank 241-AP-102 Analytical Results: Selenium (AA (Se)).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
G348	Riser 1NE	WHOLE	0.34	0.317	0.3285
G342		WHOLE	0.34	0.388	0.364
G349		WHOLE	0.312	0.291	0.3015
G352		WHOLE	0.469	0.456	0.4625[QC:b]
G353	Riser 1SE	WHOLE	0.456	0.464	0.46[QC:b]
G358		WHOLE	0.398	0.395	0.3965
G359		WHOLE	0.374	0.369	0.3715
G363		WHOLE	0.422	0.468	0.445[QC:b]
G471		WHOLE	0.679	0.588	0.6335[QC:b,d]
G341	Riser 1W	WHOLE	0.341	0.351	0.346
G364		WHOLE	0.256	0.264	0.26[QC:b]
G459		WHOLE	0.383	0.357	0.37
G460		WHOLE	0.372	0.384	0.378
G476		WHOLE	0.593	0.563	0.578[QC:b]
G443	Riser NA	COMPOSITE	0.424	0.4	0.412[QC:c]
G470		COMPOSITE	0.595	0.602	0.5985[QC:b,d]

Table B2-28. Tank 241-AP-102 Analytical Results: 1,2,4-Trichlorobenzene (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1[QC:c]
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1[QC:c]
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-29. Tank 241-AP-102 Analytical Results: 1,2-Dichlorobenzene (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			μg/mL	μg/mL	μg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-30. Tank 241-AP-102 Analytical Results: 1,3-Dichlorobenzene (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-31. Tank 241-AP-102 Analytical Results: 1,4-Dichlorobenzene (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1[QC:c]
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-32. Tank 241-AP-102 Analytical Results: 1-Butanol (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	0.37	0.47	0.42[QC:e]
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	0.75	---	0.75
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	0.82	---	0.82
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	0.6	0.69	0.645
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	0.73	---	0.73[QC:e]
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	0.51	---	0.51
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-33. Tank 241-AP-102 Analytical Results: 2,4,5-Trichlorophenol (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-34. Tank 241-AP-102 Analytical Results: 2,4,6-Trichlorophenol (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-35. Tank 241-AP-102 Analytical Results: 2,4-Dichlorophenol (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-36. Tank 241-AP-102 Analytical Results: 2,4-Dimethylphenol (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-37. Tank 241-AP-102 Analytical Results: 2,4-Dinitrophenol (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-38. Tank 241-AP-102 Analytical Results: 2,4-Dinitrotoluene (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1[QC:c]
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1[QC:c]
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-39. Tank 241-AP-102 Analytical Results: 2,6-Dinitrotoluene (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-40. Tank 241-AP-102 Analytical Results: 2-Chloronaphthalene (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-41. Tank 241-AP-102 Analytical Results: 2-Chlorophenol (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2[QC:d]
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1[QC:c]
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-42. Tank 241-AP-102 Analytical Results: 2-Methylnaphthalene (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-43. Tank 241-AP-102 Analytical Results: 2-Methylphenol (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-44. Tank 241-AP-102 Analytical Results: 2-Nitroaniline (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-45. Tank 241-AP-102 Analytical Results: 2-Nitrophenol (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-46. Tank 241-AP-102 Analytical Results: 3,3-Dichlorobenzidine (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-47. Tank 241-AP-102 Analytical Results: 3-Nitroaniline (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-48. Tank 241-AP-102 Analytical Results: 4,6-Dinitro-o-cresol (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-49. Tank 241-AP-102 Analytical Results: 4-Bromophenylphenyl ether (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-50. Tank 241-AP-102 Analytical Results: 4-Chloro-3-methylphenol (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2[QC:d]
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1[QC:c]
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-51. Tank 241-AP-102 Analytical Results: 4-Chloroaniline (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-52. Tank 241-AP-102 Analytical Results: 4-Chlorophenylphenyl ether (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-53. Tank 241-AP-102 Analytical Results: 4-Methylphenol (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-54. Tank 241-AP-102 Analytical Results: 4-Nitroaniline (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-55. Tank 241-AP-102 Analytical Results: 4-Nitrophenol (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1[QC:c]
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1[QC:c]
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-56. Tank 241-AP-102 Analytical Results: Acenaphthene (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1[QC:c]
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1[QC:c]
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-57. Tank 241-AP-102 Analytical Results: Acenaphthylene (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-58. Tank 241-AP-102 Analytical Results: Anthracene (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-59. Tank 241-AP-102 Analytical Results: Benzo(a)anthracene (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-60. Tank 241-AP-102 Analytical Results: Benzo(a)pyrene (SVOA)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-61. Tank 241-AP-102 Analytical Results: Benzo(b)fluoranthene (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-62. Tank 241-AP-102 Analytical Results: Benzo(ghi)perylene (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-63. Tank 241-AP-102 Analytical Results: Benzo(k)fluoranthene (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			μg/mL	μg/mL	μg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-64. Tank 241-AP-102 Analytical Results: Benzoic acid (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-65. Tank 241-AP-102 Analytical Results: Benzyl alcohol (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-66. Tank 241-AP-102 Analytical Results: Bis(2-Chloroethoxy)methane (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-67. Tank 241-AP-102 Analytical Results: Bis(2-Chloroisopropyl) ether (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-68. Tank 241-AP-102 Analytical Results: Bis(2-chloroethyl) ether (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-69. Tank 241-AP-102 Analytical Results: Bis(2-ethylhexyl) phthalate (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	0.33	< 0.665
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-70. Tank 241-AP-102 Analytical Results: Butylbenzylphthalate (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-71. Tank 241-AP-102 Analytical Results: Chrysene (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-72. Tank 241-AP-102 Analytical Results: Cyclohexene (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			μg/mL	μg/mL	μg/mL
93-06634	Riser 1NE	WHOLE	11	---	11
93-06634PPT		WHOLE	17	20	18.5
93-06635		WHOLE	23	---	23
93-06635PPT		WHOLE	5.1	---	5.1
93-06636PPT	Riser 1SE	WHOLE	5.6	---	5.6
93-06637PPT		WHOLE	4.9	---	4.9
93-06638	Riser 1W	WHOLE	22	25	23.5
93-06638PPT		WHOLE	18	7	12.5[QC:e]
93-06639PPT		WHOLE	26	--	26
93-06640PPT		WHOLE	25	---	25
93-06641		WHOLE	19	---	19

Table B2-73. Tank 241-AP-102 Analytical Results: Di-n-butylphthalate (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-74. Tank 241-AP-102 Analytical Results: Di-n-octylphthalate (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-75. Tank 241-AP-102 Analytical Results: Dibenz[a,h]anthracene (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-76. Tank 241-AP-102 Analytical Results: Dibenzofuran (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-77. Tank 241-AP-102 Analytical Results: Diethylphthalate (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-78. Tank 241-AP-102 Analytical Results: Dimethyl phthalate (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			μg/mL	μg/mL	μg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-79. Tank 241-AP-102 Analytical Results: Fluoranthene (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-80. Tank 241-AP-102 Analytical Results: Fluorene (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			μg/mL	μg/mL	μg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-81. Tank 241-AP-102 Analytical Results: Hexachlorobenzene (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-82. Tank 241-AP-102 Analytical Results: Hexachlorobutadiene (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-83. Tank 241-AP-102 Analytical Results: Hexachlorocyclopentadiene (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-84. Tank 241-AP-102 Analytical Results: Hexachloroethane (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-85. Tank 241-AP-102 Analytical Results: Indeno(1,2,3-cd)pyrene (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-86. Tank 241-AP-102 Analytical Results: Isophorone (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-87. Tank 241-AP-102 Analytical Results: N-Nitroso-di-n-dipropylamine (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			μg/mL	μg/mL	μg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2[QC:d]
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1[QC:c]
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-88. Tank 241-AP-102 Analytical Results: N-Nitrosodiphenylamine (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-89. Tank 241-AP-102 Analytical Results: Naphthalene (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-90. Tank 241-AP-102 Analytical Results: Nitrobenzene (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-91. Tank 241-AP-102 Analytical Results: Pentachlorophenol (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1[QC:c]
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1[QC:c]
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-92. Tank 241-AP-102 Analytical Results: Phenanthrene (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-93. Tank 241-AP-102 Analytical Results: Phenol (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			μg/mL	μg/mL	μg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1[QC:c]
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1[QC:c]
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-94. Tank 241-AP-102 Analytical Results: Pyrene (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1[QC:c]
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1[QC:c]
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-95. Tank 241-AP-102 Analytical Results: Pyridine (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			μg/mL	μg/mL	μg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1[QC:c]
93-06636PPT		WHOLE	< 2	---	< 2
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1[QC:c]
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-96. Tank 241-AP-102 Analytical Results: Tri-butyl phosphate (SVOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 1	< 1	< 1
93-06634PPT		WHOLE	< 2.2	---	< 2.2
93-06635		WHOLE	< 1	---	< 1
93-06635PPT		WHOLE	< 2	---	< 2
93-06636	Riser 1SE	WHOLE	< 1	---	< 1
93-06636PPT		WHOLE	< 2	---	< 2[QC:d]
93-06637		WHOLE	< 1	---	< 1
93-06637PPT		WHOLE	< 2	---	< 2
93-06638	Riser 1W	WHOLE	< 1	< 1	< 1
93-06638PPT		WHOLE	< 2	< 2.1	< 2.05
93-06639		WHOLE	< 1	---	< 1
93-06639PPT		WHOLE	< 2	---	< 2
93-06640		WHOLE	< 1	---	< 1
93-06640PPT		WHOLE	< 2.3	---	< 2.3
93-06641		WHOLE	< 1	---	< 1

Table B2-97. Tank 241-AP-102 Analytical Results: 1,1,1-Trichloroethane (VOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 0.25	---	< 0.25
93-06635		WHOLE	< 0.25	---	< 0.25
93-06636	Riser 1SE	WHOLE	< 0.25	---	< 0.25
93-06637MS		WHOLE	< 0.25	< 0.25	< 0.25
93-06638	Riser 1W	WHOLE	< 0.25	---	< 0.25
93-06639		WHOLE	< 0.25	---	< 0.25
93-06640		WHOLE	< 0.25	---	< 0.25
93-06641		WHOLE	< 0.25	---	< 0.25

Table B2-98. Tank 241-AP-102 Analytical Results: 1,1,2,2-Tetrachloroethane (VOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 0.25	---	< 0.25
93-06635		WHOLE	< 0.25	---	< 0.25
93-06636	Riser 1SE	WHOLE	< 0.25	---	< 0.25
93-06637MS		WHOLE	< 0.25	< 0.25	< 0.25
93-06638	Riser 1W	WHOLE	< 0.25	---	< 0.25
93-06639		WHOLE	< 0.25	---	< 0.25
93-06640		WHOLE	< 0.25	---	< 0.25
93-06641		WHOLE	< 0.25	---	< 0.25

Table B2-99. Tank 241-AP-102 Analytical Results: 1,1,2-Trichloroethane (VOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 0.25	---	< 0.25
93-06635		WHOLE	< 0.25	---	< 0.25
93-06636	Riser 1SE	WHOLE	< 0.25	---	< 0.25
93-06637MS		WHOLE	< 0.25	< 0.25	< 0.25
93-06638	Riser 1W	WHOLE	< 0.25	---	< 0.25
93-06639		WHOLE	< 0.25	---	< 0.25
93-06640		WHOLE	< 0.25	---	< 0.25
93-06641		WHOLE	< 0.25	---	< 0.25

Table B2-100. Tank 241-AP-102 Analytical Results: 1,1-Dichloroethane (VOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			μg/mL	μg/mL	μg/mL
93-06634	Riser 1NE	WHOLE	< 0.25	---	< 0.25
93-06635		WHOLE	< 0.25	---	< 0.25
93-06636	Riser 1SE	WHOLE	< 0.25	---	< 0.25
93-06637MS		WHOLE	< 0.25	< 0.25	< 0.25
93-06638	Riser 1W	WHOLE	< 0.25	---	< 0.25
93-06639		WHOLE	< 0.25	---	< 0.25
93-06640		WHOLE	< 0.25	---	< 0.25
93-06641		WHOLE	< 0.25	---	< 0.25

Table B2-101. Tank 241-AP-102 Analytical Results: 1,1-Dichloroethene (VOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			μg/mL	μg/mL	μg/mL
93-06634	Riser 1NE	WHOLE	< 0.25	---	< 0.25
93-06635		WHOLE	< 0.25	---	< 0.25
93-06636	Riser 1SE	WHOLE	< 0.25	---	< 0.25
93-06637MS		WHOLE	< 0.25	< 0.25	< 0.25
93-06638	Riser 1W	WHOLE	< 0.25	---	< 0.25
93-06639		WHOLE	< 0.25	---	< 0.25
93-06640		WHOLE	< 0.25	---	< 0.25
93-06641		WHOLE	< 0.25	---	< 0.25

Table B2-102. Tank 241-AP-102 Analytical Results: 1,2,3-Trimethylbenzene (VOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 0.25	---	< 0.25
93-06635		WHOLE	< 0.25	---	< 0.25
93-06636	Riser 1SE	WHOLE	< 0.25	---	< 0.25
93-06637MS		WHOLE	< 0.25	< 0.25	< 0.25
93-06638	Riser 1W	WHOLE	< 0.25	---	< 0.25
93-06639		WHOLE	< 0.25	---	< 0.25
93-06640		WHOLE	< 0.25	---	< 0.25
93-06641		WHOLE	< 0.25	---	< 0.25

Table B2-103. Tank 241-AP-102 Analytical Results: 1,2,4-Trimethylbenzene (VOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 0.25	---	< 0.25
93-06635		WHOLE	< 0.25	---	< 0.25
93-06636	Riser 1SE	WHOLE	< 0.25	---	< 0.25
93-06637MS		WHOLE	< 0.25	< 0.25	< 0.25
93-06638	Riser 1W	WHOLE	< 0.25	---	< 0.25
93-06639		WHOLE	< 0.25	---	< 0.25
93-06640		WHOLE	< 0.25	---	< 0.25
93-06641		WHOLE	< 0.25	---	< 0.25

Table B2-104. Tank 241-AP-102 Analytical Results: 1,2-Dichloroethane (VOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 0.25	---	< 0.25
93-06635		WHOLE	< 0.25	---	< 0.25
93-06636	Riser 1SE	WHOLE	< 0.25	---	< 0.25
93-06637MS		WHOLE	< 0.25	< 0.25	< 0.25
93-06638	Riser 1W	WHOLE	< 0.25	---	< 0.25
93-06639		WHOLE	< 0.25	---	< 0.25
93-06640		WHOLE	< 0.25	---	< 0.25
93-06641		WHOLE	< 0.25	---	< 0.25

Table B2-105. Tank 241-AP-102 Analytical Results: 1,2-Dichloroethylene (VOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 0.25	---	< 0.25
93-06635		WHOLE	< 0.25	---	< 0.25
93-06636	Riser 1SE	WHOLE	< 0.25	---	< 0.25
93-06637MS		WHOLE	< 0.25	< 0.25	< 0.25
93-06638	Riser 1W	WHOLE	< 0.25	---	< 0.25
93-06639		WHOLE	< 0.25	---	< 0.25
93-06640		WHOLE	< 0.25	---	< 0.25
93-06641		WHOLE	< 0.25	---	< 0.25

Table B2-106. Tank 241-AP-102 Analytical Results: 1,2-Dichloropropane (VOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 0.25	---	< 0.25
93-06635		WHOLE	< 0.25	---	< 0.25
93-06636	Riser 1SE	WHOLE	< 0.25	---	< 0.25
93-06637MS		WHOLE	< 0.25	< 0.25	< 0.25
93-06638	Riser 1W	WHOLE	< 0.25	---	< 0.25
93-06639		WHOLE	< 0.25	---	< 0.25
93-06640		WHOLE	< 0.25	---	< 0.25
93-06641		WHOLE	< 0.25	---	< 0.25

Table B2-107. Tank 241-AP-102 Analytical Results: 1,3,5-Trimethylbenzene (VOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 0.25	---	< 0.25
93-06635		WHOLE	< 0.25	---	< 0.25
93-06636	Riser 1SE	WHOLE	< 0.25	---	< 0.25
93-06637MS		WHOLE	< 0.25	< 0.25	< 0.25
93-06638	Riser 1W	WHOLE	< 0.25	---	< 0.25
93-06639		WHOLE	< 0.25	---	< 0.25
93-06640		WHOLE	< 0.25	---	< 0.25
93-06641		WHOLE	< 0.25	---	< 0.25

Table B2-108. Tank 241-AP-102 Analytical Results: 2-Hexanone (VOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 0.5	---	< 0.5
93-06635		WHOLE	< 0.5	---	< 0.5
93-06636	Riser 1SE	WHOLE	< 0.5	---	< 0.5
93-06637MS		WHOLE	< 0.5	< 0.5	< 0.5
93-06638	Riser 1W	WHOLE	< 0.5	---	< 0.5
93-06639		WHOLE	< 0.5	---	< 0.5
93-06640		WHOLE	< 0.5	---	< 0.5
93-06641		WHOLE	< 0.5	---	< 0.5

Table B2-109. Tank 241-AP-102 Analytical Results: 2-butanone (VOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 0.5	---	< 0.5
93-06635		WHOLE	< 0.5	---	< 0.5
93-06636	Riser 1SE	WHOLE	< 0.5	---	< 0.5
93-06637MS		WHOLE	0.59	< 0.5	< 0.545
93-06638	Riser 1W	WHOLE	< 0.5	---	< 0.5
93-06639		WHOLE	< 0.5	---	< 0.5
93-06640		WHOLE	< 0.5	---	< 0.5
93-06641		WHOLE	< 0.5	---	< 0.5

Table B2-110. Tank 241-AP-102 Analytical Results: Acetone (VOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 0.5	---	< 0.5
93-06635		WHOLE	< 0.5	---	< 0.5
93-06636	Riser 1SE	WHOLE	< 0.5	---	< 0.5
93-06637MS		WHOLE	0.23	< 0.5	< 0.365
93-06638	Riser 1W	WHOLE	< 0.5	---	< 0.5
93-06639		WHOLE	< 0.5	---	< 0.5
93-06640		WHOLE	< 0.5	---	< 0.5
93-06641		WHOLE	< 0.5	---	< 0.5

Table B2-111. Tank 241-AP-102 Analytical Results: Benzene (VOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 0.25	---	< 0.25
93-06635		WHOLE	< 0.25	---	< 0.25
93-06636	Riser 1SE	WHOLE	< 0.25	---	< 0.25
93-06637MS		WHOLE	< 0.25	< 0.25	< 0.25
93-06638	Riser 1W	WHOLE	< 0.25	---	< 0.25
93-06639		WHOLE	< 0.25	---	< 0.25
93-06640		WHOLE	< 0.25	---	< 0.25
93-06641		WHOLE	< 0.25	---	< 0.25

Table B2-112. Tank 241-AP-102 Analytical Results: Bromodichloromethane (VOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 0.25	---	< 0.25
93-06635		WHOLE	< 0.25	---	< 0.25
93-06636	Riser 1SE	WHOLE	< 0.25	---	< 0.25
93-06637MS		WHOLE	< 0.25	< 0.25	< 0.25
93-06638	Riser 1W	WHOLE	< 0.25	---	< 0.25
93-06639		WHOLE	< 0.25	---	< 0.25
93-06640		WHOLE	< 0.25	---	< 0.25
93-06641		WHOLE	< 0.25	---	< 0.25

Table B2-113. Tank 241-AP-102 Analytical Results: Bromoform (VOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 0.25	---	< 0.25
93-06635		WHOLE	< 0.25	---	< 0.25
93-06636	Riser 1SE	WHOLE	< 0.25	---	< 0.25
93-06637MS		WHOLE	< 0.25	< 0.25	< 0.25
93-06638	Riser 1W	WHOLE	< 0.25	---	< 0.25
93-06639		WHOLE	< 0.25	---	< 0.25
93-06640		WHOLE	< 0.25	---	< 0.25
93-06641		WHOLE	< 0.25	---	< 0.25

Table B2-114. Tank 241-AP-102 Analytical Results: Bromomethane (VOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 0.5	---	< 0.5
93-06635		WHOLE	< 0.5	---	< 0.5
93-06636	Riser 1SE	WHOLE	< 0.5	---	< 0.5
93-06637MS		WHOLE	< 0.5	< 0.5	< 0.5
93-06638	Riser 1W	WHOLE	< 0.5	---	< 0.5
93-06639		WHOLE	< 0.5	---	< 0.5
93-06640		WHOLE	< 0.5	---	< 0.5
93-06641		WHOLE	< 0.5	---	< 0.5

Table B2-115. Tank 241-AP-102 Analytical Results: Carbon disulfide (VOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 0.25	---	< 0.25
93-06635		WHOLE	< 0.25	---	< 0.25
93-06636	Riser 1SE	WHOLE	< 0.25	---	< 0.25
93-06637MS		WHOLE	< 0.25	< 0.25	< 0.25
93-06638	Riser 1W	WHOLE	< 0.25	---	< 0.25
93-06639		WHOLE	< 0.25	---	< 0.25
93-06640		WHOLE	< 0.25	---	< 0.25
93-06641		WHOLE	< 0.25	---	< 0.25

Table B2-116. Tank 241-AP-102 Analytical Results: Carbon tetrachloride (VOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 0.25	---	< 0.25
93-06635		WHOLE	< 0.25	---	< 0.25
93-06636	Riser 1SE	WHOLE	< 0.25	---	< 0.25
93-06637MS		WHOLE	< 0.25	< 0.25	< 0.25
93-06638	Riser 1W	WHOLE	< 0.25	---	< 0.25
93-06639		WHOLE	< 0.25	---	< 0.25
93-06640		WHOLE	< 0.25	---	< 0.25
93-06641		WHOLE	< 0.25	---	< 0.25

Table B2-117. Tank 241-AP-102 Analytical Results: Chlorobenzene (VOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 0.25	---	< 0.25
93-06635		WHOLE	< 0.25	---	< 0.25
93-06636	Riser 1SE	WHOLE	< 0.25	---	< 0.25
93-06637MS		WHOLE	< 0.25	< 0.25	< 0.25
93-06638	Riser 1W	WHOLE	< 0.25	---	< 0.25
93-06639		WHOLE	< 0.25	---	< 0.25
93-06640		WHOLE	< 0.25	---	< 0.25
93-06641		WHOLE	< 0.25	---	< 0.25

Table B2-118. Tank 241-AP-102 Analytical Results: Chloroethane (VOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 0.5	---	< 0.5
93-06635		WHOLE	< 0.5	---	< 0.5
93-06636	Riser 1SE	WHOLE	< 0.5	---	< 0.5
93-06637MS		WHOLE	< 0.5	< 0.5	< 0.5
93-06638	Riser 1W	WHOLE	< 0.5	---	< 0.5
93-06639		WHOLE	< 0.5	---	< 0.5
93-06640		WHOLE	< 0.5	---	< 0.5
93-06641		WHOLE	< 0.5	---	< 0.5

Table B2-119. Tank 241-AP-102 Analytical Results: Chloroform (VOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 0.25	---	< 0.25
93-06635		WHOLE	< 0.25	---	< 0.25
93-06636	Riser 1SE	WHOLE	< 0.25	---	< 0.25
93-06637MS		WHOLE	< 0.25	< 0.25	< 0.25
93-06638	Riser 1W	WHOLE	< 0.25	---	< 0.25
93-06639		WHOLE	< 0.25	---	< 0.25
93-06640		WHOLE	< 0.25	---	< 0.25
93-06641		WHOLE	< 0.25	---	< 0.25

Table B2-120. Tank 241-AP-102 Analytical Results: Chloromethane (VOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 0.5	---	< 0.5
93-06635		WHOLE	< 0.5	---	< 0.5
93-06636	Riser 1SE	WHOLE	< 0.5	---	< 0.5
93-06637MS		WHOLE	< 0.5	< 0.5	< 0.5
93-06638	Riser 1W	WHOLE	< 0.5	---	< 0.5
93-06639		WHOLE	< 0.5	---	< 0.5
93-06640		WHOLE	< 0.5	---	< 0.5
93-06641		WHOLE	< 0.5	---	< 0.5

Table B2-121. Tank 241-AP-102 Analytical Results: Dibromochloromethane (VOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 0.25	---	< 0.25
93-06635		WHOLE	< 0.25	---	< 0.25
93-06636	Riser 1SE	WHOLE	< 0.25	---	< 0.25
93-06637MS		WHOLE	< 0.25	< 0.25	< 0.25
93-06638	Riser 1W	WHOLE	< 0.25	---	< 0.25
93-06639		WHOLE	< 0.25	---	< 0.25
93-06640		WHOLE	< 0.25	---	< 0.25
93-06641		WHOLE	< 0.25	---	< 0.25

Table B2-122. Tank 241-AP-102 Analytical Results: Ethylbenzene (VOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 0.25	---	< 0.25
93-06635		WHOLE	< 0.25	---	< 0.25
93-06636	Riser 1SE	WHOLE	< 0.25	---	< 0.25
93-06637MS		WHOLE	< 0.25	< 0.25	< 0.25
93-06638	Riser 1W	WHOLE	< 0.25	---	< 0.25
93-06639		WHOLE	< 0.25	---	< 0.25
93-06640		WHOLE	< 0.25	---	< 0.25
93-06641		WHOLE	< 0.25	---	< 0.25

Table B2-123. Tank 241-AP-102 Analytical Results: Hexone (VOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 0.5	---	< 0.5
93-06635		WHOLE	< 0.5	---	< 0.5
93-06636	Riser 1SE	WHOLE	< 0.5	---	< 0.5
93-06637MS		WHOLE	< 0.5	< 0.5	< 0.5
93-06638	Riser 1W	WHOLE	< 0.5	---	< 0.5
93-06639		WHOLE	< 0.5	---	< 0.5
93-06640		WHOLE	< 0.5	---	< 0.5
93-06641		WHOLE	< 0.5	---	< 0.5

Table B2-124. Tank 241-AP-102 Analytical Results: Isopropylbenzene (VOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 0.25	---	< 0.25
93-06635		WHOLE	< 0.25	---	< 0.25
93-06636	Riser 1SE	WHOLE	< 0.25	---	< 0.25
93-06637MS		WHOLE	< 0.25	< 0.25	< 0.25
93-06638	Riser 1W	WHOLE	< 0.25	---	< 0.25
93-06639		WHOLE	< 0.25	---	< 0.25
93-06640		WHOLE	< 0.25	---	< 0.25
93-06641		WHOLE	< 0.25	---	< 0.25

Table B2-125. Tank 241-AP-102 Analytical Results: Methylenechloride (VOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 0.25	---	< 0.25
93-06635		WHOLE	< 0.25	---	< 0.25
93-06636	Riser 1SE	WHOLE	< 0.25	---	< 0.25
93-06637MS		WHOLE	< 0.25	< 0.25	< 0.25
93-06638	Riser 1W	WHOLE	< 0.25	---	< 0.25
93-06639		WHOLE	< 0.25	---	< 0.25
93-06640		WHOLE	< 0.25	---	< 0.25
93-06641		WHOLE	< 0.25	---	< 0.25

Table B2-126. Tank 241-AP-102 Analytical Results: Styrene (VOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 0.25	---	< 0.25
93-06635		WHOLE	< 0.25	---	< 0.25
93-06636	Riser 1SE	WHOLE	< 0.25	---	< 0.25
93-06637MS		WHOLE	< 0.25	< 0.25	< 0.25
93-06638	Riser 1W	WHOLE	< 0.25	---	< 0.25
93-06639		WHOLE	< 0.25	---	< 0.25
93-06640		WHOLE	< 0.25	---	< 0.25
93-06641		WHOLE	< 0.25	---	< 0.25

Table B2-127. Tank 241-AP-102 Analytical Results: Tetrachloroethene (VOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 0.25	---	< 0.25
93-06635		WHOLE	< 0.25	---	< 0.25
93-06636	Riser 1SE	WHOLE	< 0.25	---	< 0.25
93-06637MS		WHOLE	< 0.25	< 0.25	< 0.25
93-06638	Riser 1W	WHOLE	< 0.25	---	< 0.25
93-06639		WHOLE	< 0.25	---	< 0.25
93-06640		WHOLE	< 0.25	---	< 0.25
93-06641		WHOLE	< 0.25	---	< 0.25

Table B2-128. Tank 241-AP-102 Analytical Results: Toluene (VOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 0.25	---	< 0.25
93-06635		WHOLE	< 0.25	---	< 0.25
93-06636	Riser 1SE	WHOLE	< 0.25	---	< 0.25
93-06637MS		WHOLE	0.14	< 0.25	< 0.195
93-06638	Riser 1W	WHOLE	0.043	---	0.043
93-06639		WHOLE	< 0.25	---	< 0.25
93-06640		WHOLE	< 0.25	---	< 0.25
93-06641		WHOLE	< 0.25	---	< 0.25

Table B2-129. Tank 241-AP-102 Analytical Results: Trichloroethene (VOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 0.25	---	< 0.25
93-06635		WHOLE	< 0.25	---	< 0.25
93-06636	Riser 1SE	WHOLE	< 0.25	---	< 0.25
93-06637MS		WHOLE	< 0.25	< 0.25	< 0.25
93-06638	Riser 1W	WHOLE	< 0.25	---	< 0.25
93-06639		WHOLE	< 0.25	---	< 0.25
93-06640		WHOLE	< 0.25	---	< 0.25
93-06641		WHOLE	< 0.25	---	< 0.25

Table B2-130. Tank 241-AP-102 Analytical Results: Vinyl acetate (VOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			μg/mL	μg/mL	μg/mL
93-06634	Riser 1NE	WHOLE	< 0.5	---	< 0.5
93-06635		WHOLE	< 0.5	---	< 0.5
93-06636	Riser 1SE	WHOLE	< 0.5	---	< 0.5
93-06637MS		WHOLE	< 0.5	< 0.5	< 0.5
93-06638	Riser 1W	WHOLE	< 0.5	---	< 0.5
93-06639		WHOLE	< 0.5	---	< 0.5
93-06640		WHOLE	< 0.5	---	< 0.5
93-06641		WHOLE	< 0.5	---	< 0.5

Table B2-131. Tank 241-AP-102 Analytical Results: Vinyl chloride (VOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			μg/mL	μg/mL	μg/mL
93-06634	Riser 1NE	WHOLE	< 0.5	---	< 0.5
93-06635		WHOLE	< 0.5	---	< 0.5
93-06636	Riser 1SE	WHOLE	< 0.5	---	< 0.5
93-06637MS		WHOLE	< 0.5	< 0.5	< 0.5
93-06638	Riser 1W	WHOLE	< 0.5	---	< 0.5
93-06639		WHOLE	< 0.5	---	< 0.5
93-06640		WHOLE	< 0.5	---	< 0.5
93-06641		WHOLE	< 0.5	---	< 0.5

Table B2-132. Tank 241-AP-102 Analytical Results: Xylenes (total) (VOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			μg/mL	μg/mL	μg/mL
93-06634	Riser 1NE	WHOLE	< 0.5	---	< 0.5
93-06635		WHOLE	< 0.5	---	< 0.5
93-06636	Riser 1SE	WHOLE	< 0.5	---	< 0.5
93-06637MS		WHOLE	< 0.5	< 0.5	< 0.5
93-06638	Riser 1W	WHOLE	< 0.5	---	< 0.5
93-06639		WHOLE	< 0.5	---	< 0.5
93-06640		WHOLE	< 0.5	---	< 0.5
93-06641		WHOLE	< 0.5	---	< 0.5

Table B2-133. Tank 241-AP-102 Analytical Results: cis-1,2-Dichloroethene (VOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			μg/mL	μg/mL	μg/mL
93-06634	Riser 1NE	WHOLE	< 0.25	---	< 0.25
93-06635		WHOLE	< 0.25	---	< 0.25
93-06636	Riser 1SE	WHOLE	< 0.25	---	< 0.25
93-06637MS		WHOLE	< 0.25	< 0.25	< 0.25
93-06638	Riser 1W	WHOLE	< 0.25	---	< 0.25
93-06639		WHOLE	< 0.25	---	< 0.25
93-06640		WHOLE	< 0.25	---	< 0.25
93-06641		WHOLE	< 0.25	---	< 0.25

Table B2-134. Tank 241-AP-102 Analytical Results: cis-1,3-Dichloropropene (VOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 0.25	---	< 0.25
93-06635		WHOLE	< 0.25	---	< 0.25
93-06636	Riser 1SE	WHOLE	< 0.25	---	< 0.25
93-06637MS		WHOLE	< 0.25	< 0.25	< 0.25
93-06638	Riser 1W	WHOLE	< 0.25	---	< 0.25
93-06639		WHOLE	< 0.25	---	< 0.25
93-06640		WHOLE	< 0.25	---	< 0.25
93-06641		WHOLE	< 0.25	---	< 0.25

Table B2-135. Tank 241-AP-102 Analytical Results: trans-1,3-Dichloropropene (VOA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
93-06634	Riser 1NE	WHOLE	< 0.25	---	< 0.25
93-06635		WHOLE	< 0.25	---	< 0.25
93-06636	Riser 1SE	WHOLE	< 0.25	---	< 0.25
93-06637MS		WHOLE	< 0.25	< 0.25	< 0.25
93-06638	Riser 1W	WHOLE	< 0.25	---	< 0.25
93-06639		WHOLE	< 0.25	---	< 0.25
93-06640		WHOLE	< 0.25	---	< 0.25
93-06641		WHOLE	< 0.25	---	< 0.25

Table B2-136. Tank 241-AP-102 Analytical Data: Citrate (HPLC).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			mg/L	mg/L	mg/L
93-06634	Riser 1NE	WHOLE	670	470	570
93-06635		WHOLE	560	640	600
93-06636	Riser 1SE	WHOLE	590	530	560
93-06637		WHOLE	540	550	545
93-06638	Riser 1W	WHOLE	450	400	425
93-06639		WHOLE	430	400	415
93-06640		WHOLE	500	480	490

Table B2-137. Tank 241-AP-102 Analytical Data: EDTA (HPLC).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			mg/L	mg/L	mg/L
93-06634	Riser 1NE	WHOLE	460	440	450
93-06635		WHOLE	550	490	520
93-06636	Riser 1SE	WHOLE	500	87.0	294
93-06637		WHOLE	510	490	500
93-06638	Riser 1W	WHOLE	510	500	505
93-06639		WHOLE	550	510	530
93-06640		WHOLE	780	470	625

Table B2-138. Tank 241-AP-102 Analytical Data: Glycolate (IC).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			mg/L	mg/L	mg/L
93-06634	Riser 1NE	WHOLE	1,100	---	---
93-06635		WHOLE	1,100	---	---
93-06636	Riser 1SE	WHOLE	1,100	---	---
93-06637		WHOLE	1,100	---	---
93-06638	Riser 1W	WHOLE	1,100	---	---
93-06639		WHOLE	1,100	---	---
93-06640		WHOLE	1,100	---	---

Table B2-139. Tank 241-AP-102 Analytical Data: HEDTA (HPLC).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			mg/L	mg/L	mg/L
93-06634	Riser 1NE	WHOLE	90.0	96.0	93.0
93-06635		WHOLE	74.0	210	142
93-06636	Riser 1SE	WHOLE	160	23.0	91.5
93-06637		WHOLE	88.0	71.0	79.5
93-06638	Riser 1W	WHOLE	76.0	93.0	84.5
93-06639		WHOLE	93.0	81.0	87.0
93-06640		WHOLE	150	110	130

Table B2-140. Tank 241-AP-102 Analytical Data: Oxalate (IC).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			mg/L	mg/L	mg/L
93-06634	Riser 1NE	WHOLE	800	---	---
93-06635		WHOLE	800	---	---
93-06636	Riser 1SE	WHOLE	800	---	---
93-06637		WHOLE	700	---	---
93-06638	Riser 1W	WHOLE	700	---	---
93-06639		WHOLE	800	700	---
93-06640		WHOLE	800	---	---

Table B2-141. Tank 241-AP-102 Analytical Results: Total inorganic carbon (TIC).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
G348	Riser 1NE	WHOLE	5,080	5,130	5,105
G342		WHOLE	5,650	5,430	5,540
G349		WHOLE	5,210	5,170	5,190
G352		WHOLE	5,170	5,410	5,290
G477		WHOLE	5,110	5,160	5,135
G353	Riser 1SE	WHOLE	4,800	5,240	5,020
G353		WHOLE	5,270	5,470	5,370
G358		WHOLE	5,190	5,270	5,230
G359		WHOLE	5,740	5,660	5,700
G363		WHOLE	5,390	5,260	5,325
G471		WHOLE	5,230	5,260	5,245
G333	Riser 1W	WHOLE	4,960	5,160	5,060
G338		WHOLE	5,130	5,120	5,125
G341		WHOLE	5,960	5,720	5,840
G364		WHOLE	5,940	5,810	5,875
G459		WHOLE	5,080	4,640	4,860
G460		WHOLE	4,530	4,360	4,445
G460		WHOLE	5,100	5,040	5,070[QC:f]
G476		WHOLE	4,950	5,210	5,080
G470	Riser NA	COMPOSITE	5,290	5,320	5,305

Table B2-142. Tank 241-AP-102 Analytical Results: Total organic carbon (Furnace Oxidation [TOC]).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µg/mL	µg/mL	µg/mL
G348	Riser 1NE	WHOLE	3,210	3,260	3,235
G342		WHOLE	3,170	3,180	3,175
G349		WHOLE	3,070	3,050	3,060
G352		WHOLE	3,320	3,360	3,340
G477		WHOLE	3,290	3,280	3,285
G353	Riser 1SE	WHOLE	3,360	3,320	3,340
G358		WHOLE	3,570	3,390	3,480
G359		WHOLE	3,510	3,330	3,420
G363		WHOLE	3,260	3,090	3,175
G363		WHOLE	5,570	5,140	5,355
G471		WHOLE	3,000	3,000	3,000
G341	Riser 1W	WHOLE	3,360	3,280	3,320
G364		WHOLE	3,270	3,810	3,540
G364		WHOLE	3,360	3,320	3,340
G459		WHOLE	3,050	3,070	3,060
G460		WHOLE	3,300	3,270	3,285
G476		WHOLE	3,370	3,260	3,315
G443	Riser NA	COMPOSITE	3,220	3,260	3,240
G470		COMPOSITE	3,060	3,090	3,075

Table B2-143. Tank 241-AP-102 Analytical Results: Antimony-125 (GEA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µCi/mL	µCi/mL	µCi/mL
G348	Riser 1NE	WHOLE	< 0.418	< 0.405	< 0.4115
G342		WHOLE	< 0.419	< 0.427	< 0.423[QC:b]
G349		WHOLE	< 0.422	< 0.427	< 0.4245
G352		WHOLE	< 0.291	< 0.29	< 0.2905
G449		WHOLE	< 0.42	< 0.419	< 0.4195
G450		WHOLE	< 0.418	< 0.425	< 0.4215
G477		WHOLE	< 0.735	< 0.734	< 0.7345
G353	Riser 1SE	WHOLE	< 0.41	< 0.417	< 0.4135
G353		WHOLE	< 0.292	< 0.293	< 0.2925
G358		WHOLE	< 0.284	< 0.286	< 0.285
G358		WHOLE	< 0.407	< 0.414	< 0.4105
G359		WHOLE	< 0.29	< 0.291	< 0.2905
G363		WHOLE	< 0.424	< 0.427	< 0.4255
G453		WHOLE	< 0.295	< 0.295	< 0.295
G454		WHOLE	< 0.295	< 0.294	< 0.2945
G471		WHOLE	< 0.284	< 0.282	< 0.283
G333	Riser 1W	WHOLE	< 0.292	< 0.29	< 0.291
G338		WHOLE	< 0.29	< 0.293	< 0.2915
G341		WHOLE	< 0.421	< 0.425	< 0.423[QC:b]
G364		WHOLE	< 0.414	< 0.414	< 0.414
G459		WHOLE	< 0.284	< 0.288	< 0.286
G460		WHOLE	< 0.284	< 0.285	< 0.2845
G476		WHOLE	< 0.731	< 0.746	< 0.7385
G443	Riser NA	COMPOSITE	< 0.392	< 0.398	< 0.395
G443		COMPOSITE	< 0.431	< 0.426	< 0.4285
G470		COMPOSITE	< 0.284	< 0.288	< 0.286

Table B2-144. Tank 241-AP-102 Analytical Results: Ce/Pr-144 (GEA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µCi/mL	µCi/mL	µCi/mL
G348	Riser 1NE	WHOLE	< 0.997	< 0.987	< 0.992
G342		WHOLE	< 1	< 1.02	< 1.01[QC:b]
G349		WHOLE	< 1.01	< 1.03	< 1.02
G352		WHOLE	< 0.534	< 0.535	< 0.5345
G449		WHOLE	< 1	< 1	< 1
G450		WHOLE	< 1	< 1.01	< 1.005
G477		WHOLE	< 1.36	< 1.36	< 1.36
G353	Riser 1SE	WHOLE	< 0.533	< 0.533	< 0.533
G353		WHOLE	< 0.987	< 0.996	< 0.9915
G358		WHOLE	< 0.517	< 0.522	< 0.5195
G358		WHOLE	< 0.976	< 0.983	< 0.9795
G359		WHOLE	< 0.53	< 0.533	< 0.5315
G363		WHOLE	< 1.02	< 1.02	< 1.02
G453		WHOLE	< 0.541	< 0.541	< 0.541
G454		WHOLE	< 0.535	< 0.53	< 0.5325
G471		WHOLE	< 0.515	< 0.511	< 0.513
G333	Riser 1W	WHOLE	< 0.53	< 0.532	< 0.531
G338		WHOLE	< 0.531	< 0.531	< 0.531
G341		WHOLE	< 1.01	< 1.02	< 1.015[QC:b]
G364		WHOLE	< 0.979	< 0.979	< 0.979
G459		WHOLE	< 0.522	< 0.526	< 0.524
G460		WHOLE	< 0.519	< 0.522	< 0.5205
G476		WHOLE	< 1.36	< 1.39	< 1.375
G443	Riser NA	COMPOSITE	< 1.03	< 1.02	< 1.025
G443		COMPOSITE	< 0.943	< 0.951	< 0.947
G470		COMPOSITE	< 0.518	< 0.521	< 0.5195

Table B2-145. Tank 241-AP-102 Analytical Results: Cesium-134 (GEA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µCi/mL	µCi/mL	µCi/mL
G348	Riser 1NE	WHOLE	< 0.0295	< 0.024	< 0.02675
G342		WHOLE	< 0.0255	< 0.028	< 0.02675[QC:b]
G349		WHOLE	< 0.0268	< 0.0285	< 0.02765
G352		WHOLE	< 0.0156	< 0.0153	< 0.01545
G449		WHOLE	< 0.0285	< 0.028	< 0.02825
G450		WHOLE	< 0.0272	< 0.0266	< 0.0269
G477		WHOLE	< 0.0493	< 0.0493	< 0.0493
G353	Riser 1SE	WHOLE	< 0.0145	< 0.0157	< 0.0151
G353		WHOLE	< 0.0282	< 0.0289	< 0.02855
G358		WHOLE	< 0.0263	< 0.027	< 0.02665
G358		WHOLE	< 0.0145	< 0.0148	< 0.01465
G359		WHOLE	< 0.0159	< 0.0141	< 0.015
G363		WHOLE	< 0.0254	< 0.0242	< 0.0248
G453		WHOLE	< 0.0159	< 0.0147	< 0.0153
G454		WHOLE	< 0.0153	< 0.0158	< 0.01555
G471		WHOLE	< 0.0152	< 0.0147	< 0.01495
G333	Riser 1W	WHOLE	< 0.0162	< 0.015	< 0.0156
G338		WHOLE	< 0.0147	< 0.0146	< 0.01465
G341		WHOLE	< 0.0266	< 0.0314	< 0.029[QC:b]
G364		WHOLE	< 0.0238	< 0.0255	< 0.02465
G459		WHOLE	< 0.0144	< 0.015	< 0.0147
G460		WHOLE	< 0.0148	< 0.0138	< 0.0143
G476		WHOLE	< 0.0568	< 0.056	< 0.0564
G443	Riser NA	COMPOSITE	< 0.0255	< 0.0252	< 0.02535
G443		COMPOSITE	< 0.0298	< 0.0279	< 0.02885
G470		COMPOSITE	< 0.0146	< 0.0165	< 0.01555

Table B2-146. Tank 241-AP-102 Analytical Results: Cesium-137 (GEA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µCi/mL	µCi/mL	µCi/mL
G348	Riser 1NE	WHOLE	232	217	224.5
G342		WHOLE	232	235	233.5[QC:b]
G349		WHOLE	236	238	237
G352		WHOLE	225	225	225
G449		WHOLE	230	230	230
G450		WHOLE	229	235	232
G477		WHOLE	220	222	221
G353	Riser 1SE	WHOLE	222	224	223
G353		WHOLE	228	228	228
G358		WHOLE	217	223	220
G358		WHOLE	215	216	215.5
G359		WHOLE	225	225	225
G363		WHOLE	237	235	236
G453		WHOLE	233	233	233
G454		WHOLE	229	228	228.5
G471		WHOLE	215	210	212.5
G333	Riser 1W	WHOLE	225	224	224.5
G338		WHOLE	226	227	226.5
G341		WHOLE	234	236	235[QC:b]
G364		WHOLE	225	222	223.5
G459		WHOLE	215	219	217
G460		WHOLE	212	216	214
G476		WHOLE	224	225	224.5
G443	Riser NA	COMPOSITE	203	208	205.5
G443		COMPOSITE	241	242	241.5
G470		COMPOSITE	215	217	216

Table B2-147. Tank 241-AP-102 Analytical Results: Cobalt-60 (GEA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µCi/mL	µCi/mL	µCi/mL
G348	Riser 1NE	WHOLE	< 0.0163	< 0.0135	< 0.0149
G342		WHOLE	< 0.0169	< 0.0629	< 0.0399[QC:b,e]
G349		WHOLE	< 0.0169	< 0.0169	< 0.0169
G352		WHOLE	< 0.0123	< 0.0115	< 0.0119
G449		WHOLE	< 0.0181	< 0.0163	< 0.0172
G450		WHOLE	< 0.0157	< 0.0109	< 0.0133
G477		WHOLE	< 0.0531	< 0.0447	< 0.0489
G353	Riser 1SE	WHOLE	0.0749	0.0684	0.07165
G353		WHOLE	< 0.0123	< 0.0108	< 0.01155
G358		WHOLE	< 0.0112	< 0.0108	< 0.011
G358		WHOLE	< 0.0169	0.0809	< 0.0489
G359		WHOLE	< 0.00818	< 0.0112	< 0.00969
G363		WHOLE	< 0.0197	< 0.0175	< 0.0186
G453		WHOLE	< 0.0117	< 0.0117	< 0.0117
G454		WHOLE	< 0.0138	< 0.0117	< 0.01275
G471		WHOLE	< 0.013	< 0.0123	< 0.01265
G333	Riser 1W	WHOLE	< 0.0106	< 0.011	< 0.0108
G338		WHOLE	< 0.0115	< 0.0123	< 0.0119
G341		WHOLE	< 0.0135	< 0.0169	< 0.0152[QC:b,e]
G364		WHOLE	< 0.015	< 0.0181	< 0.01655
G459		WHOLE	< 0.013	< 0.011	< 0.012
G460		WHOLE	< 128	< 0.0136	< 64.0068
G476		WHOLE	< 0.046	< 0.0419	< 0.04395
G443	Riser NA	COMPOSITE	< 0.0135	< 0.0163	< 0.0149
G443		COMPOSITE	< 0.0157	< 0.0207	< 0.0182
G470		COMPOSITE	< 0.0131	< 0.0101	< 0.0116

Table B2-148. Tank 241-AP-102 Analytical Results: Niobium-94 (GEA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µCi/mL	µCi/mL	µCi/mL
G348	Riser 1NE	WHOLE	< 0.0215	< 0.0235	< 0.0225
G342		WHOLE	< 0.0217	< 0.0246	< 0.02315[QC:b]
G349		WHOLE	< 0.0236	< 0.0224	< 0.023
G352		WHOLE	< 0.0141	< 0.0152	< 0.01465
G449		WHOLE	< 0.0232	< 0.0237	< 0.02345
G450		WHOLE	< 0.0257	< 0.0235	< 0.0246
G477		WHOLE	< 0.0462	< 0.0435	< 0.04485
G353	Riser 1SE	WHOLE	< 0.0159	< 0.0149	< 0.0154
G353		WHOLE	< 0.0221	< 0.0238	< 0.02295
G358		WHOLE	< 0.0141	< 0.0139	< 0.014
G358		WHOLE	< 0.0232	< 0.0225	< 0.02285
G359		WHOLE	< 0.0151	< 0.015	< 0.01505
G363		WHOLE	< 0.0241	< 0.0221	< 0.0231
G453		WHOLE	< 0.0153	< 0.0161	< 0.0157
G454		WHOLE	< 0.0158	< 0.0162	< 0.016
G471		WHOLE	< 0.0148	< 0.0144	< 0.0146
G333	Riser 1W	WHOLE	< 0.0157	< 0.0144	< 0.01505
G338		WHOLE	< 0.0148	< 0.015	< 0.0149
G341		WHOLE	< 0.0234	< 0.0246	< 0.024[QC:b]
G364		WHOLE	< 0.0232	< 0.0236	< 0.0234
G459		WHOLE	< 0.0146	< 0.0143	< 0.01445
G460		WHOLE	< 0.015	< 0.0161	< 0.01555
G476		WHOLE	< 0.0497	< 0.0449	< 0.0473
G443	Riser NA	COMPOSITE	< 0.0201	< 0.022	< 0.02105
G443		COMPOSITE	< 0.0235	< 0.0246	< 0.02405
G470		COMPOSITE	< 0.0153	< 0.0144	< 0.01485

Table B2-149. Tank 241-AP-102 Analytical Results: Ruthenium/Rhodium-106 (GEA).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µCi/mL	µCi/mL	µCi/mL
G348	Riser 1NE	WHOLE	< 1.35	< 1.31	< 1.33
G342		WHOLE	< 1.33	< 1.35	< 1.34[QC:b]
G349		WHOLE	< 1.39	< 1.34	< 1.365
G352		WHOLE	< 1.03	< 1.02	< 1.025
G449		WHOLE	< 1.33	< 1.33	< 1.33
G450		WHOLE	< 1.34	< 1.32	< 1.33
G477		WHOLE	< 2.52	< 2.49	< 2.505
G353	Riser 1SE	WHOLE	< 1.33	< 1.3	< 1.315
G353		WHOLE	< 1.03	< 1.02	< 1.025
G358		WHOLE	< 1.28	< 1.32	< 1.3
G358		WHOLE	< 1.01	< 0.997	< 1.0035
G359		WHOLE	< 1.03	< 1.01	< 1.02
G363		WHOLE	< 1.36	< 1.39	< 1.375
G453		WHOLE	< 1.04	< 1.03	< 1.035
G454		WHOLE	< 1.04	< 1.01	< 1.025
G471		WHOLE	< 0.993	< 0.992	< 0.9925
G333	Riser 1W	WHOLE	< 1.03	< 1.03	< 1.03
G338		WHOLE	< 1.03	< 1.01	< 1.02
G341		WHOLE	< 1.33	< 1.39	< 1.36[QC:b]
G364		WHOLE	< 1.31	< 1.32	< 1.315
G459		WHOLE	< 1.01	< 1.01	< 1.01
G460		WHOLE	< 1	< 1.01	< 1.005
G476		WHOLE	< 2.47	< 2.45	< 2.46
G443	Riser NA	COMPOSITE	< 1.23	< 1.27	< 1.25
G443		COMPOSITE	< 1.37	< 1.38	< 1.375
G470		COMPOSITE	< 1.01	< 1	< 1.005

Table B2-150. Tank 241-AP-102 Analytical Results: Americium-241 (Spectroscopy).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids: acid digest			**µCi/mL**	**µCi/mL**	**µCi/mL**
G348	Riser 1NE	WHOLE	2.260E-04	2.490E-04	2.375E-04
G342		WHOLE	3.230E-04	3.280E-04	3.255E-04
G342		WHOLE	5.390E-04	0.00149	0.0010145[QC:f]
G349		WHOLE	5.270E-04	4.250E-04	4.760E-04[QC:f]
G352		WHOLE	4.320E-04	4.840E-04	4.580E-04[QC:f]
G477		WHOLE	2.860E-04	2.910E-04	2.885E-04
G477		WHOLE	4.120E-04	3.060E-04	3.590E-04[QC:e]
G353	Riser 1SE	WHOLE	5.010E-04	4.760E-04	4.885E-04[QC:f]
G358		WHOLE	7.140E-04	9.830E-04	8.485E-04[QC:f]
G359		WHOLE	5.790E-04	8.590E-04	7.190E-04[QC:f]
G363		WHOLE	2.110E-04	2.590E-04	2.350E-04
G471		WHOLE	3.730E-04	3.180E-04	3.455E-04[QC:f]
G341	Riser 1W	WHOLE	3.890E-04	3.510E-04	3.700E-04
G341		WHOLE	4.490E-04	6.690E-04	5.590E-04[QC:e]
G341		WHOLE	5.390E-04	2.150E-04	3.770E-04[QC:f]
G364		WHOLE	2.330E-04	2.570E-04	2.450E-04
G459		WHOLE	4.260E-04	4.500E-04	4.380E-04[QC:f]
G460		WHOLE	3.400E-04	4.080E-04	3.740E-04[QC:f]
G476		WHOLE	2.860E-04	2.710E-04	2.785E-04
G476		WHOLE	3.640E-04	3.280E-04	3.460E-04
G443	Riser NA	COMPOSITE	3.690E-04	3.790E-04	3.740E-04
G443		COMPOSITE	3.350E-04	4.390E-04	3.870E-04[QC:b,e]
G470		COMPOSITE	4.880E-04	3.720E-04	4.300E-04[QC:f]

Table B2-151. Tank 241-AP-102 Analytical Data: Curium-243/244 ($^{234/244}$Cm).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids: Acid digest			µCi/mL	µCi/mL	µCi/mL
G348	Riser 1NE	WHOLE	< 7.62E-05	< 2.35E-04	< 1.56E-04
G342		WHOLE	< 1.70E-04	< 3.41E-04	< 2.56E-04
G349		WHOLE	< 6.37E-04	< 4.85E-04	< 5.61E-04
G352		WHOLE	< 1.71E-04	< 6.37E-04	< 4.04E-04
G477		WHOLE	< 2.02E-05	2.43E-05	< 2.23E-05
G353	Riser 1SE	WHOLE	< 2.30E-04	< 7.96E-05	< 1.55E-04
G358		WHOLE	< 1.58E-04	< 1.00E-04	< 1.29E-04
G359		WHOLE	< 1.80E-04	< 5.14E-04	< 3.47E-04
G363		WHOLE	< 7.81E-05	8.81E-05	< 8.31E-05
G471		WHOLE	< 8.12E-05	< 1.21E-04	< 1.01E-04
G341	Riser 1W	WHOLE	< 1.09E-04	< 6.37E-05	< 1.07E-04
G364		WHOLE	< 6.37E-05	< 6.37E-05	< 6.37E-05
G459		WHOLE	< 2.55E-04	< 1.50E-04	< 2.03E-04
G460		WHOLE	< 1.04E-04	< 2.55E-04	< 1.80E-04
G476		WHOLE	1.75E-05	2.02E-05	1.84E-05
G470	Riser NA	COMPOSITE	< 5.28E-05	< 1.54E-04	< 1.03E-04
G443		COMPOSITE	8.13E-05	< 7.58E-05	< 7.86E-05

Table B2-152. Tank 241-AP-102 Analytical Results: Neptunium-237 (Np237).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids: acid digest			µCi/mL	µCi/mL	µCi/mL
G348	Riser 1NE	WHOLE	< 3.890E-04	< 3.890E-04	< 3.890E-04[QC:f]
G342		WHOLE	< 3.890E-05	0.001	< 5.195E-04[QC:a]
G349		WHOLE	< 3.890E-04	< 3.890E-04	< 3.890E-04[QC:f]
G352		WHOLE	< 3.890E-04	< 3.890E-04	< 3.890E-04[QC:a]
G477		WHOLE	< 4.640E-04	< 4.320E-04	< 4.480E-04[QC:a]
G353	Riser 1SE	WHOLE	< 2.810E-04	< 3.890E-04	< 3.350E-04[QC:a]
G358		WHOLE	< 4.650E-04	< 2.810E-04	< 3.730E-04[QC:c]
G359		WHOLE	< 0.00634	< 2.810E-04	< 0.0033105[QC:c]
G359		WHOLE	< 3.890E-04	< 2.810E-04	< 3.350E-04
G363		WHOLE	< 4.320E-04	< 2.810E-04	< 3.565E-04
G471		WHOLE	< 2.810E-04	< 4.650E-04	< 3.730E-04[QC:a]
G341	Riser 1W	WHOLE	< 4.320E-04	< 3.890E-04	< 4.105E-04[QC:a]
G364		WHOLE	< 2.810E-04	< 2.810E-04	< 2.810E-04
G459		WHOLE	< 4.320E-04	< 3.460E-04	< 3.890E-04
G460		WHOLE	< 4.320E-04	< 3.460E-04	< 3.890E-04[QC:c]
G476		WHOLE	< 4.640E-04	< 3.890E-04	< 4.265E-04[QC:a]
G470	Riser NA	COMPOSITE	< 4.320E-04	< 2.810E-04	< 3.565E-04[QC:a]

Table B2-153. Tank 241-AP-102 Analytical Results: Plutonium-238 (Spectroscopy).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids: acid digest			µCi/mL	µCi/mL	µCi/mL
G348	Riser 1NE	WHOLE	< 9.640E-05	< 9.480E-05	< 9.560E-05
G342		WHOLE	< 9.080E-05	< 1.000E-04	< 9.540E-05
G342		WHOLE	< 9.080E-05	< 1.000E-04	< 9.540E-05
G349		WHOLE	< 9.820E-05	< 9.870E-05	< 9.845E-05
G352		WHOLE	< 1.010E-04	< 1.110E-04	< 1.060E-04
G477		WHOLE	< 9.500E-05	< 9.340E-05	< 9.420E-05
G353	Riser 1SE	WHOLE	< 1.140E-04	< 1.230E-04	< 1.185E-04
G358		WHOLE	< 1.560E-04	< 1.630E-04	< 1.595E-04
G359		WHOLE	< 9.060E-05	< 1.500E-04	< 1.203E-04
G363		WHOLE	< 9.400E-05	< 9.880E-05	< 9.640E-05
G471		WHOLE	< 2.170E-04	< 1.420E-04	< 1.795E-04
G341	Riser 1W	WHOLE	< 1.080E-04	< 8.990E-05	< 9.895E-05
G364		WHOLE	< 9.340E-05	< 1.220E-04	< 1.077E-04
G459		WHOLE	< 1.010E-04	< 9.030E-05	< 9.565E-05
G460		WHOLE	< 1.020E-04	< 9.750E-05	< 9.975E-05
G476		WHOLE	< 1.010E-04	< 8.800E-05	< 9.450E-05
G470	Riser NA	COMPOSITE	< 9.110E-05	< 1.250E-04	< 1.081E-04

Table B2-154. Tank 241-AP-102 Analytical Results: Plutonium-239/40 (Spectroscopy).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids: acid digest			µCi/mL	µCi/mL	µCi/mL
G348	Riser 1NE	WHOLE	< 6.960E-05	< 6.870E-05	< 6.915E-05
G342		WHOLE	< 0.000E+00	< 0.007	< 0.0035
G342		WHOLE	< 6.710E-05	< 6.720E-05	< 6.715E-05
G349		WHOLE	< 6.960E-05	< 6.860E-05	< 6.910E-05
G352		WHOLE	< 6.640E-05	< 6.640E-05	< 6.640E-05
G477		WHOLE	< 6.900E-05	< 6.780E-05	< 6.840E-05
G353	Riser 1SE	WHOLE	< 6.740E-05	< 6.690E-05	< 6.715E-05
G358		WHOLE	< 6.820E-05	< 6.720E-05	< 6.770E-05
G359		WHOLE	< 6.770E-05	< 6.810E-05	< 6.790E-05
G363		WHOLE	< 6.860E-05	< 6.800E-05	< 6.830E-05
G471		WHOLE	< 6.590E-05	< 6.700E-05	< 6.645E-05[QC:a]
G341	Riser 1W	WHOLE	< 7.480E-05	< 7.440E-05	< 7.460E-05
G364		WHOLE	< 6.890E-05	< 6.990E-05	< 6.940E-05
G459		WHOLE	< 6.880E-05	< 6.900E-05	< 6.890E-05
G460		WHOLE	< 6.620E-05	< 6.860E-05	< 6.740E-05
G476		WHOLE	< 6.790E-05	< 6.880E-05	< 6.835E-05
G470	Riser NA	COMPOSITE	< 6.600E-05	< 6.690E-05	< 6.645E-05[QC:a]

Table B2-155. Tank 241-AP-102 Analytical Results: Carbon-14 (C14).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µCi/mL	µCi/mL	µCi/mL
G348	Riser 1NE	WHOLE	5.180E-04	5.180E-04	5.180E-04[QC:a]
G342		WHOLE	5.140E-04	4.310E-04	4.725E-04
G349		WHOLE	5.120E-04	4.990E-04	5.055E-04[QC:a]
G352		WHOLE	3.900E-04	5.210E-04	4.555E-04[QC:e]
G352		WHOLE	4.800E-04	5.070E-04	4.935E-04[QC:a]
G352		WHOLE	7.380E-04	4.830E-04	6.105E-04[QC:e]
G477	Riser 1NE	WHOLE	4.080E-04	5.050E-04	4.565E-04[QC:f]
G477		WHOLE	4.710E-04	4.440E-04	4.575E-04[QC:a]
G353	Riser 1SE	WHOLE	4.370E-04	5.390E-04	4.880E-04
G353		WHOLE	4.740E-04	4.590E-04	4.665E-04
G358		WHOLE	4.770E-04	5.550E-04	5.160E-04
G358		WHOLE	4.280E-04	5.040E-04	4.660E-04[QC:f]
G359		WHOLE	5.200E-04	5.200E-04	5.200E-04
G363		WHOLE	3.830E-04	4.910E-04	4.370E-04[QC:e]
G363		WHOLE	4.810E-04	5.220E-04	5.015E-04[QC:a]
G363		WHOLE	3.140E-04	4.170E-04	3.655E-04[QC:a,e]
G471		WHOLE	4.160E-04	5.210E-04	4.685E-04[QC:e]
G471		WHOLE	4.910E-04	4.880E-04	4.895E-04[QC:a]
G341	Riser 1W	WHOLE	4.710E-04	5.610E-04	5.160E-04
G364		WHOLE	5.010E-04	5.440E-04	5.225E-04[QC:a]
G459		WHOLE	4.020E-04	4.720E-04	4.370E-04
G459		WHOLE	5.610E-04	7.170E-04	6.390E-04[QC:e]
G460		WHOLE	4.590E-04	5.030E-04	4.810E-04[QC:a]
G476		WHOLE	5.360E-04	5.390E-04	5.375E-04
G470	Riser NA	COMPOSITE	3.930E-04	5.160E-04	4.545E-04[QC:e]
G470		COMPOSITE	4.750E-04	4.980E-04	4.865E-04[QC:a]

Table B2-156. Tank 241-AP-102 Analytical Results: Iodine-129 (I129).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µCi/mL	µCi/mL	µCi/mL
G477	Riser 1NE	WHOLE	< 5.490E-05	---	< 5.490E-05
G477		WHOLE	< 5.050E-05	< 4.830E-05	< 4.940E-05
G471	Riser 1SE	WHOLE	< 4.730E-05	< 4.700E-05	< 4.715E-05
G471		WHOLE	< 4.730E-05	< 6.440E-06	< 2.687E-05
G476	Riser 1W	WHOLE	< 5.330E-05	< 4.380E-05	< 4.855E-05
G443	Riser NA	COMPOSITE	< 3.330E-05	< 3.710E-05	< 3.520E-05
G470		COMPOSITE	< 4.780E-05	< 4.910E-05	< 4.845E-05

Table B2-157. Tank 241-AP-102 Analytical Results: Strontium-90 (Sr). (2 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µCi/mL	µCi/mL	µCi/mL
G348	Riser 1NE	WHOLE	1.23	1.25	1.24
G348		WHOLE	1.75	1.4	1.575[QC:e]
G342		WHOLE	1.46	1.43	1.445
G342		WHOLE	1.64	1.59	1.615
G349		WHOLE	1.46	1.49	1.475
G352		WHOLE	1.36	1.37	1.365
G352		WHOLE	1.41	1.58	1.495
G477		WHOLE	0.759	0.834	0.7965
G348	Riser 1SE	WHOLE	1.4	1.38	1.39
G358		WHOLE	1.36	1.47	1.415[QC:f]
G359		WHOLE	1.53	1.48	1.505
G359		WHOLE	1.41	1.45	1.43[QC:f]
G363		WHOLE	1.39	1.39	1.39
G471		WHOLE	0.754	0.778	0.766
G341	Riser 1W	WHOLE	1.38	1.4	1.39
G341		WHOLE	1.5	1.53	1.515
G364		WHOLE	1.43	1.41	1.42
G364		WHOLE	1.61	1.45	1.53

Table B2-157. Tank 241-AP-102 Analytical Results: Strontium-90 (Sr). (2 sheets)

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µCi/mL	µCi/mL	µCi/mL
G459	Riser NA	WHOLE	1.44	1.39	1.415
G460		WHOLE	1.37	1.42	1.395
G476		WHOLE	0.589	0.577	0.583
G476		WHOLE	0.779	1.1	0.9395[QC:f]
G443		COMPOSITE	1.47	1.52	1.495
G443		COMPOSITE	4.86	4.93	4.895
G470		COMPOSITE	0.719	0.7	0.7095

Table B2-158. Tank 241-AP-102 Analytical Results: Technetium-99 (Te).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µCi/mL	µCi/mL	µCi/mL
G348	Riser 1NE	WHOLE	0.0871	0.0897	0.0884
G342		WHOLE	0.0872	0.0925	0.08985[QC:a]
G349		WHOLE	0.0877	0.0902	0.08895
G352		WHOLE	0.0895	0.0782	0.08385[QC:a,d]
G477		WHOLE	0.0759	0.0903	0.0831[QC:a]
G353	Riser 1SE	WHOLE	0.0127	0.014	0.01335[QC:a]
G353		WHOLE	0.0892	0.0924	0.0908[QC:a]
G358		WHOLE	0.0844	0.0769	0.08065
G358		WHOLE	0.017	0.0172	0.0171[QC:d]
G359		WHOLE	0.0219	0.0239	0.0229
G359		WHOLE	0.0876	0.0811	0.08435[QC:a,c]
G363		WHOLE	0.0854	0.0904	0.0879[QC:d]
G363		WHOLE	0.0781	0.0871	0.0826[QC:a,d]
G471		WHOLE	0.0898	0.0766	0.0832
G341	Riser 1W	WHOLE	0.0889	0.0908	0.08985[QC:a]
G364		WHOLE	0.0859	0.0783	0.0821[QC:d]
G364		WHOLE	0.0857	0.0936	0.08965[QC:f]
G459		WHOLE	0.0814	0.0834	0.0824
G460		WHOLE	0.0697	0.0684	0.06905
G476		WHOLE	0.0699	0.0875	0.0787[QC:a,e]
G443	Riser NA	COMPOSITE	0.0847	0.291	0.18785[QC:e]
G443		COMPOSITE	0.0902	0.0942	0.0922[QC:d]
G443		COMPOSITE	0.0949	0.102	0.09845[QC:f]
G470		COMPOSITE	0.0838	0.0855	0.08465
G470		COMPOSITE	0.0639	0.0884	0.07615[QC:e]

Table B2-159. Tank 241-AP-102 Analytical Results: Tritium (Scintillation).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			µCi/mL	µCi/mL	µCi/mL
G477	Riser 1NE	WHOLE	0.00255	0.00235	0.00245
G477		WHOLE	0.00293	0.00418	0.003555[QC:e]
G477		WHOLE	0.00354	0.00949	0.006515[QC:e]
G471	Riser 1SE	WHOLE	0.0015	0.0095	0.0055[QC:f]
G471		WHOLE	0.00264	0.00598	0.00431[QC:e]
G471		WHOLE	0.00182	0.0025	0.00216[QC:a,e]
G471		WHOLE	0.00265	0.00206	0.002355[QC:e]
G471		WHOLE	0.00347	0.00497	0.00422[QC:a,e]
G476	Riser 1W	WHOLE	0.00406	0.00358	0.00382
G476		WHOLE	0.00399	0.00382	0.003905
G476		WHOLE	0.00198	0.0693	0.03564[QC:e]
G443	Riser NA	COMPOSITE	1.92	0.0104	0.9652[QC:f]
G443		COMPOSITE	0.0173	0.0192	0.01825[QC:d]
G443		COMPOSITE	0.0309	0.0171	0.024[QC:d,e]
G443		COMPOSITE	0.0025	0.00229	0.002395[QC:c]
G443		COMPOSITE	0.00889	0.00607	0.00748[QC:e]
G470		COMPOSITE	0.00233	0.00209	0.00221[QC:a]
G470		COMPOSITE	0.00222	0.00815	0.005185[QC:e]
G470		COMPOSITE	0.00343	0.00524	0.004335[QC:f]

Table B2-160. Tank 241-AP-102 Analytical Results: Specific gravity (SpG).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			unitless	unitless	unitless
G348	Riser 1NE	WHOLE	1.21	1.21	1.21
G342		WHOLE	1.2	1.2	1.2
G349		WHOLE	1.2	1.2	1.2
G352		WHOLE	1.2	1.2	1.2
G477		WHOLE	1.2	1.19	1.195
G353	Riser 1SE	WHOLE	1.21	1.2	1.205
G358		WHOLE	1.2	1.2	1.2
G359		WHOLE	1.2	1.2	1.2
G363		WHOLE	1.2	1.19	1.195
G471		WHOLE	1.19	1.2	1.195
G341	Riser 1W	WHOLE	1.2	1.2	1.2
G364		WHOLE	1.19	1.19	1.19
G459		WHOLE	1.2	1.21	1.205
G460		WHOLE	1.2	1.2	1.2
G476		WHOLE	1.21	1.21	1.21
G443	Riser NA	COMPOSITE	1.2	1.2	1.2
G470		COMPOSITE	1.19	1.19	1.19

Table B2-161. Tank 241-AP-102 Analytical Results: Percent Water (Percent Solids).

Sample Number	Sample Location	Sample Portion	Result	Duplicate	Mean
Liquids			%	%	%
G348	Riser 1NE	WHOLE	75.5	75.3	75.4
G342		WHOLE	74.8	74.5	74.65
G349		WHOLE	75.5	75	75.25
G352		WHOLE	74.8	75.2	75
G477		WHOLE	74.8	74.7	74.75
G353	Riser 1SE	WHOLE	75.5	75.2	75.35
G358		WHOLE	75.2	75.5	75.35
G359		WHOLE	75.5	75.3	75.4
G363		WHOLE	74.7	74.7	74.7
G471		WHOLE	75.1	75.7	75.4
G341	Riser 1W	WHOLE	75	75.6	75.3
G364		WHOLE	74.6	74.6	74.6
G459		WHOLE	74	74.2	74.1
G460		WHOLE	75.3	74.7	75
G476		WHOLE	74.7	75	74.85
G443	Riser NA	COMPOSITE	74.3	74.2	74.25
G470		COMPOSITE	74.4	74.8	74.6

B3.0 ASSESSMENT OF CHARACTERIZATION RESULTS

The purpose of this section is to discuss the overall quality and consistency of the current sampling results for tank 241-AP-102 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) requirement that vertical profiles be obtained from at least two widely spaced risers was fulfilled. Tank waste homogeneity and the absence of solids were shown by the sound of a weighted tape striking the tank bottom.

Sample containers of volatile and semivolatile compounds used for permitting are required to have no headspace or empty void at the top of the container in which organic vapors may collect. All sample bottles had the potential for headspace. Samples were also required to be acidified and refrigerated to minimize degradation of the samples prior to analysis. Minimizing exposure to ionizing radiation, however, made compliance with these requirements difficult. Noncompliance with the requirements was not seen as a serious detriment to the data quality, as the waste is normally stored at ambient temperature or slightly above and has been recirculated in the tank for nearly two months prior to sampling.

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 1993 grab samples, allowing a full assessment regarding the accuracy and precision of the data. The TCP (Bell 1993) established the specific criteria for all analytes. Sample and duplicate pairs that had one or more QC results outside the specified criteria were identified by superscripts 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. Greater than

25 percent of standard recoveries were outside the target level for arsenic, selenium, ^{14}C, ^{237}Np, and ^{99}Tc. Precision as measured by the sample-duplicate RPD was outside the target level in greater than 25 percent of the sample-duplicate pairs for barium, ^{14}C, ^{60}Co, and ^{3}H. Measurement of the concentrations of waste constituents contained in the laboratory reagents or on the surface of laboratory equipment gives a measure of the amount of background activity or blank contamination that must be accounted for when interpreting the analytical results. Blank contamination occurred in greater than 25 percent of the sample-duplicate pairs for iron and ^{241}Am. Other analytes exhibited some quality control results outside the target level, but at very low levels of occurrence. This is especially true of the SVOA and VOA analyses, in which many analytes displayed no quality control results outside the target levels.

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

B3.3 DATA CONSISTENCY CHECKS

Comparisons of different analytical methods can help to assess the consistency and quality of the data. Two correlations were feasible with the data provided by the 1993 grab samples: a comparison of phosphorus as measured by ICP with the measurement of phosphate by IC, and a mass and charge balance.

B3.3.1 Comparison of Phosphorus by ICP with Phosphate by IC

The following data consistency check compares the results from two different analytical methods. A close correlation between the two methods strengthens the credibility of both results, whereas a poor correlation brings the reliability of the data into question. All analytical mean results were taken from Table B3-4.

The analytical phosphorus mean result as determined by ICP was 3,060 μg/mL, which converts to 9,360 μg/mL phosphate. The phosphate by IC value was 11,600 μg/mL. The agreement was not as close as expected, since the waste in the tank is thought to be entirely liquid, and all waste constituents in solution.

B3.3.2 Mass and Charge Balance

The principle objective in performing a mass and charge balance is to determine if the measurements were self-consistent. In calculating the balances, only those metals and anions listed in Table B3-4 which were detected at a level greater than 500 μg/g were considered. All analytical means were converted to the units of μg/g for the comparison using a specific gravity of 1.20.

Because the tank contains no appreciable solid waste, all constituents were assumed to be ionized and in solution. The carbonate data were derived from the total inorganic carbon analysis. Total organic carbon was assumed to exist as glycolate and oxalate. Results from the analysis of the heated samples were used for the concentrations of chloride, nitrate, nitrite, phosphate, and sulfate (see notes 1 and 2 in Table B3-4). The concentrations of the cationic and anionic species in Tables B3-1 and B3-2 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 $\mu g/g$ to weight percent.

Mass balance = % Water + 0.0001 x {Total Analyte Concentration}
= % Water + 0.0001 x $\{[Cr^{2+}] + [K^+] + [Na^+] + [Al(OH)_4^-] + [Cl^-] + [CO_3^{2-}] + [C_2H_3O_3^-] + [OH^-] + [NO_3^-] + [NO_2^-] + [(COO)_2^{2-}] + [PO_4^{3-}] + [SO_4^{2-}]\}$

The total of the analyte concentrations calculated from the above equation is 1,014,600 $\mu g/g$. The mean weight percent water obtained from thermogravimetric analysis reported in Table B3-4 is 75.0 percent, or 750,000 $\mu g/g$. The mass balance resulting from adding the percent water to the total analyte concentration is 101 percent (Table B3-3).

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

Total cations ($\mu eq/g$) $= [Cr^{2+}]/26.0 + [K^+]/39.1 + [Na^+]/23.0 = 3,750$ $\mu eq/g$

Total anions ($\mu eq/g$) $= [Al(OH)_4^-]/95.0 + [Cl^-]/35.5 + [CO_3^{2-}]/30.0 + [C_2H_3O_3^-]/75.0 + [OH^-]/17 + [NO_3^-]/62.0 + [NO_2^-]/46.0 + [(COO)_2^{2-}]/44.0 + [PO_4^{3-}]/31.7 + [SO_4^{2-}]/48.1 = 3,750$ $\mu eq/g$.

The charge balance obtained by dividing the sum of the positive charge by the sum of the negative charge was 1.00.

In summary, the above calculations yield excellent results for the charge balance and the mass balance.

Table B3-1. Cation Mass and Charge Data.

Analyte	Concentration	Assumed Species	Concentration of Assumed Species	Charge
	μg/g		μg/g	μeq/g
Chromium	515	Cr^{2+}	515	19.8
Potassium	1,080	K^{+}	1,080	27.6
Sodium	85,000	Na^{+}	85,000	3,700
Total			86,600	3,750

Table B3-2. Anion Mass and Charge Data.

Analyte	Concentration	Assumed Species	Concentration of Assumed Species	Charge
	μg/g		μg/g	μeq/g
Aluminum	9,580	$Al(OH)_4^-$	33,700	355
TIC	4,440	CO_3^{2-}	22,200	740
Chloride	2,280	Cl^-	2,280	64.2
TOC (Glycolate)	917	$C_2H_3O_3^-$	2,870	38.3
Hydroxide	7,630	OH^-	7,630	449
Nitrate	63,300	NO_3^-	63,300	1,020
Nitrite	29,900	NO_2^-	29,900	650
TOC (Oxalate)	636	$(COO)_2^{2-}$	2,330	53
Phosphate	9,670	PO_4^{3-}	9,670	305
Sulfate	3,770	SO_4^{2-}	3,770	78.4
Total			178,000	3,750

Table B3-3. Mass Balance Totals.

Totals	Concentrations µg/g
Total from Table B3-1	86,600
Total from Table B3-2	178,000
Percent water	750,000
Grand Total	≈1,010,000

B3.4 CALCULATION OF ANALYTICAL BASED MEANS AND INVENTORY

The following evaluation was performed on the analytical data from the grab samples from double-shell tank 241-AP-102. The data were obtained from Welsh (1993). The statistical analysis and inventory estimates are used to support the characterization best-basis inventory given in Appendix D.

Since an inventory estimate is needed without comparing it to a threshold value, two-sided 95 percent confidence intervals on the mean inventory are computed.

The lower limit (LL) to a two-sided 95% confidence interval for the mean is

$$LL = \hat{\mu} - t_{(df,0.975)} \times \sqrt{\sigma^2_{\hat{\mu}}}$$

and the upper limit (UL) to a two-sided 95% confidence interval for the mean is

$$UL = \hat{\mu} + t_{(df,0.975)} \times \sqrt{\sigma^2_{\hat{\mu}}}.$$

In these equations, $\hat{\mu}$ is the estimate of the mean concentration, $\hat{\sigma}^2_{\hat{\mu}}$ is the estimate of the variance of the mean concentration, and $t_{(df,0.975)}$ is the quantile from Student's t distribution with *df* degrees of freedom for a two-sided 95% confidence interval (Snedecor and Cochran 1980).

The mean, $\hat{\mu}$, and the variance, $\hat{\sigma}^2_{\hat{\mu}}$, were estimated using restricted maximum likelihood estimation (REML) methods (Harville 1977). The degrees of freedom (*df*), for tank 241-AP-102, is the number of locations sampled minus one. This number varied from analyte to analyte because not all analytes were measured for each sample.

Table B3-4 gives the upper and lower limits to the 95 percent confidence intervals on the mean for analytes detected in tank 241-AP-102. Some analytes had a computed lower limit (LL) less than 0. Because an inventory estimate less than 0 is not possible, the lower limit was recorded as 0 whenever the lower limit was negative.

Table B3-4. 95% Two-Sided Confidence Interval for the Mean Concentration. (2 sheets)

Analyte	$\hat{\mu}$	$\hat{\sigma}^2_{\hat{\mu}}$	df	LL	UL
Al (μg/L)	1.15E+07	2.04E+09	14	1.14E+07	1.16E+07
^{241}Am (μCi/mL)	4.32E-04	3.40E-09	8	2.97E-04	5.66E-04
Ba (μg/L)	283	264	14	248	318
Be (μg/L)	146	6.46	14	141	152
^{14}C (μCi/mL)	4.95E-04	1.62E-10	8	4.66E-04	5.25E-04
Cd (μg/L)	1,470	374	14	1,430	1,510
Citrate (mg/L)	522	847	5	447	597
Cl^- (μg/mL) [1]	2,910	2,050	14	2,810	3,010
Cl^- - Heat (μg/mL) [2]	2,730	518	14	2,680	2,780
Cr (μg/L)	6.19E+05	7.90E+06	14	6.13E+05	6.25E+05
^{137}Cs (μCi/mL)	228	2.63	14	224	231
EDTA (mg/L)	484	1,720	5	377	591
Fe (μg/L)	3,820	78,900	14	3,220	4,420
HEDTA (mg/L)	101	148	5	69.7	132
K (μg/L)	1.29E+06	9.76E+07	14	1.27E+06	1.31E+06
NO_2^- (μg/mL) [1]	38,100	3.24E+05	14	36,900	39,400
NO_2^- - Heat (μg/mL) [2]	35,900	1.14E+05	14	35,100	36,600
NO_3^- (μg/mL) [1]	78,500	1.29E+06	14	76,000	80,900
NO_3^- - Heat (μg/mL) [2]	76,000	4.08E+05	14	74,600	77,400
Na (μg/L)	1.02E+08	1.39E+11	14	1.01E+08	1.02E+08
Ni (μg/L)	26,600	14,200	14	26,400	26,900
OH^- (μg/mL)	9,160	1,100	8	9,090	9,240
Oxalate (mg/L)	763	335	5	715	810
P (μg/L)	3.06E+06	3.98E+09	14	2.93E+06	3.20E+06
PO_4^{3-} (μg/mL) [1]	9,350	34,900	14	8,940	9,750
PO_4^{3-} - Heat (μg/mL) [2]	11,600	36,100	14	11,200	12,000
SO_4^{2-} (μg/mL) [1]	3,730	7,000	14	3,630	3,840
SO_4^{2-} - Heat (μg/mL) [2]	4,520	7,000	14	4,340	4,690
Se (μg/mL)	0.374	3.18E-04	8	0.332	0.415

Table B3-4. 95% Two-Sided Confidence Interval for the Mean Concentration. (2 sheets)

Analyte	$\hat{\mu}$	$\hat{\sigma}^2_{\hat{\mu}}$	df	LL	UL
SpG	1.20	2.95E-06	8	1.20	1.20
^{90}Sr (µCi/mL)	1.44	2.84E-04	8	1.41	1.48
TIC (µg/mL)	5,330	11,200	9	5,100	5,570
TOC (µg/mL) [3]	3,280	1,700	8	3,190	3,380
^{99}Tc (µCi/mL)	0.0851	2.90E-06	8	0.0811	0.0890
Water - Grav (wt%)	75.0	0.0161	8	74.7	75.3
Glycolate (mg/L) [4]	1,100	NA	5	NA	NA
CN (mg/L) [4,5]	24.6	NA	1	NA	NA
U (mg/L) [5]	4.53	3.20	3	0.00	10.2
As (µg/L) [5]	89.0	170	1	0.00	255
^{3}H (µCi/mL) [5,6]	0.0130	1.22E-05	7	0.00474	0.0213

Notes:

[1]Solids precipitated in the original aliquots of sample. The analytical results may not be valid.

[2]New aliquots of sample were submitted for IC analysis. The sample aliquots were kept heated to prevent solids precipitation.

[3]Some of the analytical results were deleted from the statistical analysis. The analytical results were outliers.

[4]All the analytical results were the same value. Therefore, $\hat{\sigma}^2_{\hat{\mu}} = 0$.

[5]The analytical results were obtained from analyzing only the composite sample. The confidence intervals were not derived from the statistical model described below.

[6]The validity of the analytical data is in question.

A statistical model is needed to account for the spatial and measurement variability in $\hat{\sigma}^2_{\hat{\mu}}$. This cannot be done using an ordinary standard deviation of the data (Snedecor and Cochran 1980).

The statistical model used to describe the structure of the data is

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

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

where

Y_{ijk} = laboratory results from the k^{th} duplicate from the j^{th} sample of the i^{th} location in the tank,

μ = the grand mean

L_i = the effect of the i^{th} location (measuring spatial variability)

S_{ij} = the effect of the j^{th} sample at the i^{th} location (measuring local sampling variability)

A_{ijk} = the effect of the k^{th} analytical result from the j^{th} sample in the i^{th} location (measurement variability)

a = the number of sample locations

b_i = the number of samples at the i^{th} location

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

The variables L_i and S_{ij} are assumed to be random effects. These variables, as well as A_{ijk}, are assumed to be uncorrelated and normally distributed with means zero and variances $\sigma^2(L)$, $\sigma^2(S)$, and $\sigma^2(A)$, respectively. Estimates of $\sigma^2(L)$, $\sigma^2(S)$, 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).

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APPENDIX C

STATISTICAL ANALYSIS FOR ISSUE RESOLUTION

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APPENDIX C

STATISTICAL ANALYSIS FOR ISSUE RESOLUTION

C1.0 NUMERICAL MANIPULATIONS FOR SAFETY SCREENING AND WASTE COMPATIBILITY DQOS

In Appendix C, the analyses required for the applicable data quality objective (DQO) reports for tank 241-AP-102 would normally be performed. Specifically, statistical and other numerical manipulations required in the DQO reports are performed and documented in this appendix. No safety screening analyses were performed on the 1993 grab samples from tank 241-AP-102 with the exception of specific gravity, which requires no statistical analysis. Therefore, no statistical analyses were performed.

The calculation of the heat load was performed by multiplying the inventories of the two most abundant radionuclides by their respective conversion factor from Curies to Watts. The example given is for ^{137}Cs.

$$(9.48E{+}05\ Ci)\left[\frac{0.00472\ W}{Ci}\right] = 4{,}470\ W.$$

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APPENDIX D

EVALUATION TO ESTABLISH BEST-BASIS INVENTORY FOR DOUBLE-SHELL TANK 241-AP-102

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APPENDIX D

EVALUATION TO ESTABLISH BEST-BASIS INVENTORY FOR DOUBLE-SHELL TANK 241-AP-102

An effort is underway to provide waste inventory estimates that will serve as standard characterization source terms for the various waste management activities (Kupfer et al. 1995). As part of this effort, an evaluation of available chemical information for tank 241-AP-102 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 242-AP-102 is as follows:

- De Lorenzo et al. (1995) provides characterization results from the 1993 "bottle-on-a-string" sampling event and summarizes the results of the statistical analysis of data from the sample event.

- The characterization and test plan for the grouting of the waste in 241-AP-102 (Hendrickson et al. 1993) provides data on the waste heel in that tank before the receipt of waste from tank 241-AN-106.

- Characterization results for the waste existing in tank 241-AN-106 before being transferred to tank 241-AP-102 (Welsh 1991) was used to compare with the characterization results from the latest sampling event for tank 241-AP-102.

- 242A Evaporator Post Run Documents provide information about the waste before it was sent to tank 241-AN-106 (Certa 1983, Gratny 1984a, 1984b).

- The HDW model document (Agnew et al. 1996) 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

Sample-based inventories derived from analytical concentration data, and HDW model inventories generated by the HDW model (Agnew et al. 1996), are compared in Tables D2-1 and D2-2. A tank volume of 4,180 m^3 (1,097 kgal) is used by both sources. The density used to calculate the sample-based inventory is 1.20 g/mL, which is slightly lower than the HDW model prediction of 1.28 g/mL.

The HDW model estimates are higher for all major components with the exception of ^{137}Cs and potassium. Some components like sodium, phosphate, and nitrate agree very well, while others, particularly iron and chromium, two components that are derived primarily from suspect corrosion estimates made by Agnew (1996), show poor agreement. The largest disparity is found with silicon; the HDW model estimate is over three orders of magnitude larger than the sample-based silicon inventory.

Table D2-1. Sampling and Hanford Defined Waste Model Inventory Estimates for Nonradioactive Components in Double-Shell Tank 241-AP-102. (2 sheets)

Analyte	Sampling Inventory Estimate[1] (MT)	HDW Inventory Estimate[2] (MT)	Analyte	Sampling Inventory Estimate[1] (MT)	HDW Inventory Estimate[2] (MT)
Al	48.5	87.4	NO_3	327	622
As	3.71E-04	NR	Ni	0.111	0.960
Ba	0.00119	NR	Pb	0.0138	0.475
Be	6.10E-04	NR	Se	0.00153	NR
B	0.00251	NR	Si	0.00201	4.35
Cd	0.00614	NR	Ti	0.0147	NR
Ca	0.0334	NR	U	0.0193	5.41
Ce	NR	NR	Zn	NR	NR
Cr	2.58	6.49	Zr	NR	NR
Cu	< 0.0157	NR	NH_3	1.14	NR
Fe	0.0159	1.07	CO_3	112	59.6
K	5.39	4.60	Cl	1.21	1.50
Mg	0.0110	NR	NO_2	159	216
Mn	0.0233	0.0463	PO_4	48.5	53.3
Na	426	572	SO_4	18.9	51.2

Table D2-1. Sampling and Hanford Defined Waste Model Inventory Estimates for Nonradioactive Components in Double-Shell Tank 241-AP-102. (2 sheets)

Analyte	Sampling Inventory Estimate[1] (MT)	HDW Inventory Estimate[2] (MT)	Analyte	Sampling Inventory Estimate[1] (MT)	HDW Inventory Estimate[2] (MT)
CN	0.103	NR	TOC	13.7	35.1
F	< 0.710	2.82			
OH	38.2	243			

Notes:

MT = metric tons

[1]De Lorenzo et al. (1994)
[2]Agnew et al. (1996)

Table D2-2. Sampling and Hanford Defined Waste Model Inventory Estimates for Radioactive Components in Double-Shell Tank 241-AP-102. (Decayed to January 1, 2000)

Analyte	Sampling inventory estimate[1] (Ci)	HDW inventory estimate[2] (Ci)	Analyte	Sampling inventory estimate[1] (Ci)	HDW inventory estimate[2] (Ci)
^{241}Am	1.75	NR	$^{239/240}$Pu	NR	162
^{14}C	2.09	NR	^{79}Se	0.882	NR
^{137}Cs	8.17E+05	4.72E+05	$^{89/90}$Sr	6,020	1.95E+05
^{60}Co	132	NR	^{99}Tc	358	NR
^{242}Cm	0.00468	NR	^{3}H	7.49	NR
^{243}Cm	0.173	NR			

Notes:
[1]De Lorenzo et al. (1994)
[2]Agnew et al. (1996)

D2.1 REVIEW AND EVALUATION OF COMPONENT INVENTORIES

The following evaluation of tank contents is performed in order to identify potential errors and/or missing information that would influence the sampling-based and HDW model component inventories.

D2.1.1 Evaluation of Historical Data

Tank 241-AP-102 was last sampled in April 1993. Approximately 88 volume percent of the waste in tank 241-AP-102, or 3,679 m^3 (972 kgal) was transferred from tank 241-AN-106 in 1992. Samples were taken of this waste at both locations; tank 241-AN-106 was sampled in 1989 and tank 241-AP-102 in 1993. A comparison of inventory estimates, using composite concentrations reported from both sampling events and taking into consideration the dilute phosphate heel in tank 241-AP-102 that mixed with the incoming waste from tank 241-AN-106, shows that the historic concentration estimates developed from the data for tank 241-AN-106 and data for the heel are usually 70 percent to 80 percent of the concentrations in the TCR for tank 241-AP-102 as indicated in Table D2-3.

Table D2-3. Estimated and Analytical Composition for Waste in Tank 241-AP-102.

Analyte	Historical estimate (μg/L)	Reported analytical composite[1] (μg/L)	Historic/ analytical
Al	8.17E+06	1.16E+07	0.70
Cr	4.96E+05	6.18E+05	0.80
K	9.50E+05	1.29E+06	0.74
Na	8.10E+07	1.02E+08	0.79
U	3,520	4,620	0.76
NH_3	1.08E+05	2.73E+05	0.40
CO_3	1.74E+07	2.68E+07	0.65
Cl	2.16E+06	2.90E+06	0.74
OH	7.09E+06	9.15E+06	0.77
NO_3	6.03E+07	7.82E+07	0.77
NO_2	2.60E+07	3.80E+07	0.68
PO_4	1.80E+07	1.16E+07	1.55
SO_4	2.06E+06	4.51E+06	0.46
^{137}Cs (μCi/L)	1.41E+05	1.94E+05	0.73
$^{89/90}$Sr (μCi/L)	1,510	1,230	1.23

Note:

[1]De Lorenzo et al. (1994)

Prior to being transferred to tank 241-AP-102, the phosphate-rich waste had stratified into two layers, the result of pouring two batches of phosphate waste with markedly different specific gravities into the tank. After transfer to tank 241-AP-102, this waste, with the addition of the more-dilute phosphate heel, had been mixed for 53 days prior to sampling to homogenize the waste and to ensure that the resulting temperature increase from the heat of mixing had dissolved most of the salt crystals. Both sampling events used bottles attached to strings to collect multiple samples from the entire depth of the waste.

Provisions were made in the sampling plan for the characterization of tank 241-AN-106 to obtain samples that did not over-represent any one layer. An objective of the characterization effort was to locate the interface between these layers. A statistical analysis of the data could not determine with confidence the location of the interface; furthermore, the analysis concluded that equal volumes of each sample would represent the contents of the tank (Welsh 1991), the inference being that the interface was in the mid-level of the waste. This assumption does not hold up under scrutiny. Data from the samples of concentrated phosphate (CP) waste taken from tank 241-AN-106 are shown in Table D2-4, supposedly in increasing depth from the bottom of the tank. Sample 10, labeled by the sampling crew as having been taken 533 cm (210 in.) from the bottom, has concentrations very much like samples from the bottom rather than the top, which may indicate that the sample's location was misidentified. Alternatively, it may be that sample 10 is labeled correctly and samples 7 and 11 between sample 10 and the bottom of the tank are out of place and belong above sample 10.

The latter explanation is more likely the truth. The density for sample 7 corresponds with the upper layer. The concentrations in sample 11 appear to reflect the interface region because they lie between the concentrations found in the upper and lower regions. Additionally, a study of the 242A Evaporator records indicates that 508 cm (200 in) of CP waste with a density of 1.35 g/cm^3, and constituent concentrations similar to samples taken from the bottom of tank 241-AN-106, were transferred to tank 241-AN-106 after Campaign 83-5 (Certa 1983). A comparison of Table 11.2-4 with Table 11.2-5 shows that the composition of the product from the 83-5 evaporator campaign compares very well with samples taken from the lower layer tank 241-AN-106 represented by samples 3, 4, 8, 10 and 12.

Following evaporator campaigns 84-1 and 84-2, two additional batches totaling 394 cm (155 in.) were transferred from the 242A Evaporator to tank 241-AN-106. This waste had a lower average specific gravity than the first batch and the average concentrations for these batches are not unlike the concentrations of the upper layer in tank 241-AN-106. The Evaporator data for the 84-1 and 84-2 campaigns are shown in Table D2-5. The higher concentrations in the upper layer of the tank 241-AN-106 data (Table D2-4) are likely due to diffusion of waste from the bottom layer to the region of lower concentration.

Table D2-4. Mean Sample Data from 1989 Sampling of Tank 241-AN-106. (Welsh 1993)

Sample Number	Sample Depth[1] (cm)	Na (mg/L)	Al (mg/L)	P (mg/L)	K (mg/L)	NO_3 (mg/L)	Cr (mg/L)	CO_3 (M)
9	930	38,400	1,410	9,600	288	16,200	106	0.18
1	841	39,500	1,460	10,300	294	17,900	105	0.14
5	742	40,200	1,480	9,910	292	16,400	106	0.15
6	569	42,700	2,520	8,060	401	22,300	169	0.18
2	559	40,700	1,460	9,720	323	18,300	104	0.14
10	559	1.04E+05	13,800	3,680	1,250	95,800	831	0.44
7	348	37,200	1,420	9,150	308	15,000	101	0.13
11	290	88,100	10,300	5,870	1,040	76,900	649	0.35
3	254	1.65E+05	20,700	1,410	2,010	1.62E+05	1,150	0.61
8	124	1.55E+05	20,400	1,360	1,940	1.66E+05	1,170	0.55
4	51	1.64E+05	19,700	4,700	2,010	1.55E+05	1,160	0.62
12	41	1.57E+05	20,400	1,420	2,090	1.36E+05	1,180	0.72

Sample Number	Sample Depth (cm)	OH (M)	NO_2 (M)	SO_4 (mg/L)	^{137}Cs (µCi/L)	Ca (mg/L)	Cl (mg/L)	Density (g/m^3)
9	930	0.25	0.14	893	33,462	24	646	1.12
1	841	0.09	0.14	2,820	33,462	11	1,160	1.11
5	742	0.09	0.10	499	32,916	11	595	1.12
6	569	0.14	0.18	840	49,452	18	939	1.13
2	559	0.09	0.14	2,710	34,398	11	1,060	1.11
10	559	0.51	0.84	3,120	2.28E+05	124	3,290	1.41
7	348	0.07	0.10	534	32,292	10	685	1.09
11	290	0.40	0.67	2,420	1.68E+05	97	2,700	1.41

Table D2-4. Mean Sample Data from 1989 Sampling of Tank 241-AN-106. (Welsh 1993)

Sample Number	Sample Depth (cm)	OH (M)	NO_2 (M)	SO_4 (mg/L)	^{137}Cs (μCi/L)	Ca (mg/L)	Cl (mg/L)	Density (g/m^3)
3	254	1.11	1.23	4,430	3.42E+05	160	5,430	1.37
8	124	1.12	1.26	4,570	3.48E+05	145	4,700	1.36
4	51	0.78	1.18	3,650	3.35E+05	155	4,020	1.60
12	41	1.16	1.23	4,380	3.42E+05	162	4,850	1.35

Note:

[1]Depth from bottom of the tank.

Table D2-5. Evaporator Post Run Data.

Analyte	Campaign 83-5 Analytical Mean (mg/L)	Campaign 84-1 and 84-2 Analytical Mean (mg/L)
Al	23,500	213
OH	21,300	635
NO_2	67,200	1,495
NO_3	1.77E+05	3,418
PO_4	4,460	21,130
SO_4	23,100	439
CO_3	38,400	484
TOC	6,600	800
^{137}Cs (μCi/L)	4.56E+05	27,180
^{90}Sr (μCi/L)	7,770	2.13
Density (g/cm^3)	1.35	1.053

It is evident from these observations that the interface for the two layers in tank 241-AN-106 should have been at about 508 cm (200 in.). A new historic estimate recognizing the correct location of the interface could be done at this point; however, there are other considerations that may have contributed to the differences between the tank 241-AN-106 samples and those samples taken from tank 241-AP-102. These factors are discussed below.

First of all, the volume in tank 241-AN-106 decreased about 94 m^3 (25 kgal), or about 3 percent, during the period after it was sampled and before the transfer to tank 241-AP-102 (Koreski 1994). Transfer records label these losses as unknowns, but the loss is likely due to in-tank evaporation over the three-year period.

Secondly, the TCR for tank 241-AN-106 indicates that about 64 m^3 (17 kgal) of solids formed in that tank before its contents were sent to tank 241-AP-102. This may mean that solids also precipitated from the samples while they were in holding at the laboratory. Precipitated solids in sampling containers were not always included in laboratory characterization work at that time. Welsh does not mention whether or not solids were detected in the samples. Furthermore, it is not unlikely that a significant fraction of the solids in tank 241-AN-106 were transferred to tank 241-AP-102, given that the tank was pumped from the bottom. These solids would likely have been redissolved in tank 241-AP-102 during homogenization (mixing), especially considering that the heat of mixing increased the temperature above 27 °C (81 °F)--the temperature at which Na_3PO_4, the predominant species in the solid phase of wastes of this type are observed to dissolve.

Another reason that may account for some of the variance between the historical estimate and the sample data from tank 241-AP-102 is that the waste in tank 241-AN-106 was not mixed before transfer. Because the lower layer of waste was pumped out first, the liquid heel that was left on top of the accumulated solids consisted mostly of the upper waste layer. If the volume of waste transferred to tank 241-AP-102 was 3,679 m^3 (972 kgal) (De Lorenzo et al. 1994) out of a total volume of 3,929 m^3 (1,038 kgal) (Douglas et al. 1996), then the residual heel in tank 241-AN-106 was 249 m^3 (66 kgal) of which 185 m^3 (49 kgal) were liquids.

D2.1.2 Predicted Waste Inventories

A new historical estimate, based on information in the previous discussion, was established and compared to the results of the 1993 sampling event. The following assumptions and observations were used to generate the historical estimate:

- The location of the interface between the waste layers in tank 241-AN-106 before transfer was located at 508 cm (200 in.) from the bottom of the tank.
- Samples 7 and 11 from the 1989 sampling of tank 241-AN-106 are assumed to have come from the upper layer of the tank.
- The volume in tank 241-AN-106 decreased 3 percent from evaporation before the transfer to tank 241-AP-102. The total volume at the time of transfer was 3,929 m^3 (1,038 kgal).
- 64.3 m^3 (17 kgal) of solids precipitated in tank 241-AN-106 before the transfer of liquids to tank 241-AP-102. No assumptions were made about the amount of solids transferred with the liquid to tank 241-AP-102 or its composition.
- 185 m^3 (49 kgal) of liquid composed of waste from the upper layer of tank 241-AN-106 was left in tank 241-AN-106 after the transfer to tank 241-AP-102.
- No radiolysis of nitrate to nitrite and no addition of nitrite to the waste for corrosion purposes are factored into this assessment.
- 88 percent of the waste volume in tank 241-AP-102 is from the waste transferred from tank 241-AN-106; the remainder is the dilute phosphate heel from previous waste additions.

Average concentrations for both the upper and lower waste layers were calculated from the data in Table D2-4. Bottom-layer concentrations (< 508 cm [200 in.] from the bottom) were multiplied by 2,082 m^3 (508 cm [200 in.] of waste) and the results were added to the top-layer concentrations (> 508 cm [200 in.] from the bottom) multiplied by the remaining volume of 1,749 m^3 (427 cm [168 in.] of waste). This volume was calculated by subtracting both the volume of the 508-cm (200-in.) bottom layer and the volume of the top layer assumed to have been left in tank 241-AN-106 after the transfer, from the total waste volume in tank 241-AN-106 at the time it was sampled. To finally arrive at the corrected concentrations, the resulting inventories were divided by the waste volume in tank 241-AN-106 at the time when it was transferred to tank 241-AP-102. It should be noted that this volume was 3 percent lower than the volume recorded four years earlier at the time of the sampling event.

The corrected concentration estimates for wastes sent from tank 241-AN-106 were combined with data for the 12 volume percent heel in tank 241-AP-102 (Winters 1988) by adding 88 percent of the values from the transferred waste to 12 percent of the values from the heel. The resulting historical estimate of the composition of the waste in tank 241-AP-102 are compared in Table D2-6 to the results of the 1993 sampling event for tank 241-AP-102.

Table D2-6. Comparison of Historical Estimate and Analytical Estimates of the Composition of Waste in Tank 241-AP-102.

Analyte	Historical Estimate (μg/L)	Reported Analytical Composite[1] (μg/L)	Historical/ Analytical
Al	1.11E+07	1.16E+07	0.96
Cr	6.45E+05	6.18E+05	1.04
K	1.16E+06	1.29E+06	0.90
Na	9.72E+07	1.02E+08	0.95
U[2]	3,520	4,620	0.76
NH_3[2]	1.08E+05	2.73E+05	0.40
CO_3	2.60E+07	2.68E+07	0.97
Cl	2.79E+06	2.90E+06	0.96
OH	9.99E+06	9.15E+06	1.09
NO_3	8.67E+07	7.82E+07	1.11
NO_2	3.15E+07	3.80E+07	0.83
PO_4	1.68E+07	1.16E+07	1.45
SO_4	2.97E+06	4.51E+06	0.66
^{137}Cs[3] (μCi/L)	1.40E+05	1.94E+05	0.72
$^{89/90}Sr$[2,3] (μCi/L)	1,510	1,230	1.23

Notes:

[1]De Lorenzo et al. (1994)

[2]Constituent concentrations reported for the heel only.

[3]Decayed to January 1, 2000.

The two estimates are in agreement with each other for most components. Phosphate, sulfate, and ammonia appear to have the largest discrepancies. The phosphate and sulfate differences are probably due to solids formation; these and other discrepancies are discussed below.

Because of the agreement between the sampling events, and the extensive sampling preparations for the 1993 sampling of tank 241-AP-102 (such as mixing for 53 days, temperature controls, the sample-based data is a better basis than the HDW model although the HDW estimates for several major components like sodium and phosphate are reasonably close to the sample estimates.

D3.0 COMPONENT INVENTORY EVALUATION

D3.1 PHOSPHATE

The PO_4 inventory predicted by the historical data is 45 percent higher than the tank 241-AP-102 sample result. Sodium phosphate salts have been observed to crystallize from CP waste on many occasions. During evaporator operations, sodium phosphate solids were found plated on the walls of the evaporator receipt tank; sodium phosphate solids were also found in samples taken from tank 241-AN-106 and 241-AP-102. The lower phosphate concentrations in the sample result likely reflect the formation of sodium phosphate salts in tank 241-AN-106 before the transfer. Salts that may have precipitated in tank 241-AP-102 should have been redissolved when the temperature was elevated above 80 degrees Fahrenheit although it's conceivable that smaller patches of solid material remained plated to the walls of the tank. It's more likely that phosphate salts continued to form in tank 241-AN-106 before the waste was transferred. This explanation does account for the lower phosphate concentrations in the tank 241-AP-102 samples. The HDW model value agrees very well with the sample; it is 10 percent higher. The sample value is assumed to be correct.

D3.2 SULFATE

The sulfate inventory predicted by the corrected historical estimate is only 2/3 of the sample value. The sulfate concentrations in samples taken from tank 241-AN-106 (Table 11.2-4) indicate a sporadic distribution that is suspect. Sulfate concentrations increased after heating the samples. The increase was attributed to salts that may have been present in solids obtained from the samples, or to the fact that sulfate was a ligand of a complex ion that could have dissociated after heating. While it is part of a complex ion, sulfate cannot be detected by chromatography. If a complex ion containing sulfate were present during the 1989 sampling of tank 241-AN-106 then it would not have been detected. Because measures were taken in 1993 to ensure the entire sample was analyzed, the sample value is assumed to be correct.

D3.3 ALUMINUM

The aluminum in tank 241-AP-102 did not come from the CP waste in significant quantities; rather, it was part of the waste heels in the evaporator feed and receipt tanks that were mixed with the CP waste before processing in the 242A evaporator. This mixing is reflected in the higher cation concentrations in the lower layer of the waste when it was in tank 241-AN-106; this layer contained about 14 volume percent of waste from other processes (Certa 1983). The HDW model is in agreement in assuming no significant quantities of aluminum in the CP waste, but the HDW model prediction for aluminum is 80 percent higher than the sample-based value. The aluminum inventory predicted by this engineering assessment and the sample-based inventory are statistically identical and for that reason the sample-based value is considered to be the best basis.

D3.4 SODIUM

The sodium inventory predicted by the corrected historical estimate is only 5 percent lower than the TCR results, lending more credence to the assumption that the sample-based estimates are the better basis. The HDW model estimate for sodium is 34 percent higher than the TCR results, which is respectable agreement. In the HDW model, about 93 percent of the sodium came from sources other than CP waste. In defining the liquid phase composition for these source terms, the HDW model overpredicts the solubility of most components. This accounts for much of the higher concentrations being observed in this and other waste tanks.

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

The results from this evaluation support using the sample results as the basis for the best estimate inventory to tank 241-AP-102 for the following reasons:

1. Data from samples of essentially the same waste taken at two different times in two different tanks show excellent agreement.

2. The contents of tank 241-AP-102 were well mixed before sampling and the elevated temperature that resulted from this mixing should have dissolved precipitated salts.

Best-basis inventory estimates for tank 241-AP-102 are presented in Tables D4-1 and D4-2. Quality estimates for each analyte are shown as high (H), medium (M), or low (L). Radionuclide values are decayed to January 1, 2000.

Table D4-1. Best-Basis Inventory Estimates for Nonradioactive Components in Tank 241-AP-102 as of October 21, 1996.

Analyte	Total inventory (kg)	Basis (S, M_H, or E)[1]	Comment	Quality of estimate (H, M, or L)[2]
Al	48,500	S		H
Bi	< 606	NA		NA
Ca	334	S		H
Cl	12,100	S		H
CO_3	1.12E+05	S		H
Cr	2,580	S		H
F	< 702	NA		NA
Fe	15.9	S		H
Hg	< 0.0209	NA		NA
K	5,390	S		H
La	NR	NA		NA
Mn	233	S		H
Na	4.26E+05	S		H
Ni	111	S		H
NO_2	1.59E+05	S		H
NO_3	3.27E+05	S		H
OH	38,200	S		H
Pb	13.8	S		H
PO_4	48,500	S	*	M
Si	2.01	S		H
SO_4	18,900	S	*	M
Sr	NR	S		H
TOC	13,700	S		H
U	19.3	S		H
Zr	< 116	NA		NA

Notes:

[1]S=Sample-based, M_H=Hanford Defined Waste model-based, E=Engineering assessment-based
[2]H=high, M=medium, L=low.

*Some precipitate may be unaccounted for.

Table D4-2. Best-Basis Inventory Estimates for Radioactive Components in Tank 241-AP-102 as of October 21, 1996. (2 Sheets)

Analyte	Total inventory (Ci)[1]	Basis (S, M, or E)[2]	Comment	Quality of estimate (H, M, or L)[3]
^{3}H	10.9	S		H
^{14}C	2.09	S		H
^{59}Ni	NR	NA		NA
^{60}Co	319	S		H
^{63}Ni	NR	NA		NA
^{79}Se	0.882	S		H
^{90}Sr	5,014	S		H
^{90}Y	5,014	S		H
^{93}Zr	NR	NA		NA
^{93m}Nb	NR	NA		NA
^{99}Tc	358	S		H
^{106}Ru	NR	NA		NA
^{113m}Cd	NR	NA		NA
^{125}Sb	NR	NA		NA
^{126}Sn	NR	NA		NA
^{129}I	NR	NA		NA
^{134}Cs	NR	NA		NA
^{137}Cs	7.99E+05	S		H
^{137m}Ba	7.59E+05	S		H
^{151}Sm	NR	NA		NA
^{152}Eu	NR	NA		NA
^{154}Eu	NR	NA		NA
^{155}Eu	NR	NA		NA
^{226}Ra	NR	NA		NA
^{227}Ac	NR	NA		NA
^{228}Ra	NR	NA		NA
^{229}Th	NR	NA		NA
^{231}Pa	NR	NA		NA
^{232}Th	NR	NA		NA

Table D4-2. Best-Basis Inventory Estimates for Radioactive Components in Tank 241-AP-102 as of October 21, 1996. (2 Sheets)

Analyte	Total inventory (Ci)[1]	Basis (S, M, or E)[2]	Comment	Quality of estimate (H, M, or L)[3]
^{232}U	NR	NA		NA
^{233}U	NR	NA		NA
^{234}U	NR	NA		NA
^{235}U	NR	NA		NA
^{236}U	NR	NA		NA
^{237}Np	< 4.18	S		H
^{238}Pu	< 0.641	S		H
^{238}U	NR	NA		NA
$^{239/240}Pu$	< 0.313	S		H
^{241}Am	1.73	S		H
^{241}Pu	NR	NA		NA
^{242}Cm	0.00468	S		H
^{242}Pu	NR	NA		NA
^{243}Am	NR	NA		NA
^{243}Cm	0.173	S		H
^{244}Cm	< 0.266	S		H

Notes:

[1]Decayed to January 1, 2000.

[2]S=sample based, M_H=Hanford Defined Waste-model based, E=engineering based.

[2]H=high, M=medium, L=low.

D5.0 APPENDIX D REFERENCES

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

Certa, P. J., 1983, *242-A Evaporator/Crystallizer FY 83 Campaign, Run 83-5 Post Run Document*, SD-RE-PE-003, Rev.0, Rockwell Hanford Operations, Richland, Washington.

De Lorenzo, D. S., A. DiCenso, L. Amato, M. Weyns-Rollosson, and D. Smith, 1994, *Tank Characterization Report for Double-Shell Tank 241-AP-102*, WHC-SD-WM-ER-358, Rev. 0, Los Alamos Technical Associates, Richland, Washington.

Douglas, J. G., B. Morris, T. Tran, 1996, *Tank Characterization Report for Double-Shell Tank 241-AN-106 Rev. 0*, WHC-SD-WM-ER-569, Westinghouse Hanford Company, Richland, Washington.

Gratny, E. G., 1984a, *242-A Evaporator/Crystallizer FY84 Campaign Run 84-1 Post Run Document*, SD-WM-PE-015, Rev. 0, Rockwell Hanford Operations, Richland, Washington.

Gratny, E. G., 1984b, *242-A Evaporator/Crystallizer FY '84 Campaign Run 84-2 Post Run Document*, SD-WM-PE-016, Rev. 0., Rockwell Hanford Operations, Richland, Washington.

Hendrickson, D. W., D. Nguyen, and T. Welsh, 1993, *Hanford Grout Disposal Program Campaign 102 Characterization and Test Plan Rev. 0*, WHC-SD-WM-TP-136, Westinghouse Hanford Company, Richland, Washington.

Koreski, G. M., 1994, *Operational Waste Volume Projections*, WHC-SD-WM-ER-029, Rev. 20, Westinghouse Hanford Company, Richland, Washington.

Kupfer, M. J., W. W. Schulte, and J. T. Slankas, 1995, *Strategy for Sampling Hanford Site Tank Wastes for Development of Disposal Technology*, WHC-SD-TA-154, Rev. 1, Westinghouse Hanford Company, Richland, Washington.

Welsh, T. L., 1991, *Tank 241-AN-106 Characterization Results*, WHC-SD-CP-TP-065, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

Winters, D. I., 1988, *Final Report on Tank 241-AP-102 Characterization*, (internal memorandum 12221-ASL88-154 to W. G. Richmond, June 8), Westinghouse Hanford Company, Richland, Washington.

APPENDIX E

BIBLIOGRAPHY FOR TANK 241-AP-102

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APPENDIX E

BIBLIOGRAPHY FOR TANK 241-AP-102

Appendix E provides a bibliography of information that supports the characterization of tank 241-AP-102. 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-AP-102 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

- II. Sampling of Tank 241-AP-102

III. COMBINED ANALYTICAL/NON-ANALYTICAL DATA

- IIIa. Inventories from Campaign and Analytical Information
- IIIb. Documents Containing Physical and Chemical Data

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 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, 1996, *Hanford Tank Chemical and Radionuclide Inventories: HDW Model Rev. 3*, LA-UR-96-858, Rev. 0, Los Alamos National Laboratory, Los Alamos, New Mexico.

- 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, 1994, *Waste Status and Transaction Record Summary for the Southeast Quadrant of the Hanford 200 East Area*, WHC-SD-WM-TI-689, Rev. 1, Los Alamos National Laboratory, Los Alamos, New Mexico.

- Document contains spreadsheets depicting all available data on tank additions/transfers for the southeast quadrant.

Bowman, M., 1992, *Process Memo - LCT Transfer to AP-102*, (internal memo #PM-92-01 to R. T. Rimura, March 18), Westinghouse Hanford Company, Richland, Washington.

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

Koreski, G. M., and J.N. Strode, 1994, *Operational Waste Volume Projections*, WHC-SD-WM-ER-029, Rev. 20, 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

Hanlon, D. G., 1980, *Heat Content in 241-AP Tank Farm*, internal letter #65410-80-111, to R. O. Guenther on September 30) Rockwell International.

- Internal letter contains anticipated heat loads in 241-AP tank.

Lipnicki, J., 1996, *Waste Tank Risers Available for Sampling*, WHC-SD-WM-TI-710, Rev. 3, Westinghouse Hanford Company, Richland, Washington.

- Document gives an assessment of all risers available per tank.

Salazar, B. E., 1994, *Double-Shell Underground Waste Storage Tanks-Riser Survey*, WHC-SD-RE-TI-093, Rev. 3, Westinghouse Hanford Company, Richland, Washington.

- Document shows tank riser locations in relation to tank aerial view as well as a description of riser and its contents.

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., T. J. Kunthara, and J. W. Hunt, 1996, *Tank Waste Characterization Basis*, WHC-SD-WM-TA-164, Rev. 2, Westinghouse Hanford Company, Richland, Washington.

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

Winkelman, W. D., J. W. Hunt, L. J. Fergestrom, 1996, *Fiscal Year 1997 Tank Waste Analysis Plan*, WHC-SD-WM-PLN-120, Rev. 1, Westinghouse Hanford Company, Richland, Washington.

- Document gives a brief overview of characterization issues for nuclear waste stored in Hanford Site waste tanks and outlines 40 TCRs to be produced for FY 1997.

Winters, W. I., 1993, *Technical Project Plan for the 222-S Laboratory in Support of the Grout Treatment Facility Sampling and Characterization Plans for Tanks 105-AP, 106-AP and 102-AP*, WHC-SD-WM-TAP-008, Westinghouse Hanford Company, Richland, Washington.

- Document takes Grout Program needs from tank AP-102, AP-105 and AP-105 sampling and analysis plans and SOWs and incorporates them into a feasible techncial project plan.

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

Carothers, K. G., 1994, *Data Quality Objectives for the Waste Compatibility Program,* WHC-SD-WM-DQO-001, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

- Document provides requirements for safe and efficient combination of waste from different tanks and tank systems.

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

- Document is an updated version of Rev. 0. Since the publication of Revision 0, the limit for weight percent water has been deleted and the requirements for the measurement of headspace vapor flammability and density have been added.

Hendrickson, D. W., T. L. Welsh, and D. M. Nguyen, 1993, *Hanford Grout Disposal Program Campaign 102 Characterization and Test Plan,* WHC-SD-WM-TP-136, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

- Document presents a projection of the waste composition of tank 241-AP-102, and criteria for testing of grout product.

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

IIa. Sampling of Tank 241-AP-102

Denis, R. St., 1993, *222-S Laboratory Grout Facility Characterization Project, Tank 102AP - Data Package and Validation Summaries*, SD-WM-DP-046, Westinghouse Hanford Company, Richland, Washington.

- Document contains data package for AP-102 sample analyses.

Douglas, J. G., 1988, *Additional Analytical Data for 241-AP-102 Tank Mixing Test*, (internal memo #12221-ASL88-056, to V. L. Hunter, on January 25), Westinghouse Hanford Company, Richland, Washington.

- Memo contains information on disodium fluorescein, suspended solids, and sulfate from AP-102 samples.

Douglas, J. G., 1987, *Physical Data for Tank 241-AP-102 Samples Taken 08/24/87*, (internal memo #65452-87-232, to V. L. Hunter, September 3), Westinghouse Hanford Company, Richland, Washington.

- Memo contains pH, density, viscosity, and suspended solids information on sample from 1987 sample event.

Hendrickson, D. W., T. L. Welsh, and D. M. Nguyen, 1993, *Hanford Grout Disposal Program Campaign 102 Characterization and Test Plan,* WHC-SD-WM-TP-136, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

- Document discusses requirements for testing the feed tank for the grout campaign and the grout product. Waste sources for tank 241-AN-106 and 241-AP-102 are discussed. The heel remaining from Grout Campaign 101 is briefly described, as well as the dX,d,iC transfers from Vault 101 after Grout Campaign 102.

Welsh, T. L., 1993, *Tank 241-AP-102 Characterization and Grout Product Test Results*, WHC-SD-WM-TRP-168, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

- Document contains the results of the analysis of the feed tank for the grout campaign, and the results of the tests of the grout product. The document also presents a discussion of the statistical treatment of the data.

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- Memo contains updated Am-241 and Curium isotope results as well as additional tritium results.

Winters, W. I., 1988, *Results on Chemical Analysis of Tank 241-AP-102*, (Internal memo #12221-ASL88-139, to W. G. Richmond, May 18), Westinghouse Hanford Company, Richland, Washington.

- Memo contains sample results from 1988 sampling event including visual sample inspection, sample handling and preparation.

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, 1995, *Hanford Tank Chemical and Radionuclide Inventories: HDW Rev. 3*, LA-UR-96-858, 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.

Brevick, C. H., L. A. Gaddis, and S. D. Consort, 1995, *Supporting Document for the Historical Tank Content Estimate for AP Tank Farm*, WHC-SD-WM-ER-315, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

- Document contains summary tank farm and tank write-ups on historical data and solids inventory estimates as well as appendices for the data. The appendices contain the following information: Appendix C - level history AutoCAD sketch; Appendix D - temperature graphs; Appendix E - surface level graph; Appendix F, pg F-1 - cascade/ drywell chart; Appendix G - riser configuration drawing and table; Appendix I - in-tank photos; and Appendix K - tank layer model bar chart and spreadsheet.

Brevick, C. H., L. A. Gaddis, and S. D. Consort, 1995, *Supporting Document for the Southeast Quadrant Historical Tank Farm Estimate for AP Tank Farm*, WHC-SD-WM-ER-315, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

- Document contains descriptions of riser locations and tank construction for the AP Tank Farm. It also contains descriptions of the process and temperature histories as well as the results from past sampling events.

Hanlon, B. M., 1996, *Waste Tank Summary Report for the Month Ending June 30, 1996*, WHC-EP-0182-99, Westinghouse Hanford Company, Richland, Washington.

- These documents contain a monthly summary of fill volumes, Watch List tanks, occurrences, integrity information, equipment readings, equipment status, tank location, and other miscellaneous tank information.

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- Document contains a global component inventory for 200 Area waste tanks, currently inventoried are 14 chemical and 2 radionuclide components.

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IIIb. Documents Containing Physical and Chemical Data

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- Document contains 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 solid (including the interstitial liquid) composite inventory estimates.

Brevick, C. H., L. A. Gaddis, and S. D. Consort, 1995, *Supporting Document for the Historical Tank Content Estimate for AP Tank Farm*, WHC-SD-WM-ER-315, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

- This document contains summary tank farm and tank write-ups on historical data and solid inventory estimates as well as appendices for the data. The appendices contain the following information: App. C - level history AutoCAD sketch, App. D - temperature graphs, App. E - surface Level Graph, App. F, pg F-1 - Cascade/Drywell Chart, App. G - Riser configuration drawing and table, App. I - in-tank photos, and App. K - tank layer model bar chart and spreadsheet.

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. 0A, 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.

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

- Document gives general background information on 200 Area waste tanks and summarizes characterization issues for nuclear waste stored in Hanford Site waste tanks.

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- This document contains a monthly summary of: fill volumes, Watch List tanks, occurrences, integrity information, equipment readings, equipment status, tank location, and other miscellaneous tank information.

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- Document discusses requirements for testing the feed tank for the grout campaign and the grout product. Waste sources for feed tank 241-AN-106 and 241-AP-102 are discussed.

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- Document contains in-tank photos as well as summaries on the tank description, leak detection system, and tank status.

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- Document gives assessment of relative dryness between tanks.

Hartley, S. A., G. Chen, C. A. LoPresti, T. A. Ferryman, A. M. Liebetrau, K. M. Remund, S. A. Allen, and B. C. Simpson, 1996, *A Comparison of Historical Tank Content Estimate (HTCE) and Sample Based Estimate of Hanford Waste Tank Contents*, Pacific Northwest National Laboratory, Richland, Washington.

- Document contains a statistical evaluation of the HDW inventory estimate against analytical values from 17 existing TCR reports using a select component data set. Also contains estimates of variability for 23 analytes in 74 tanks.

Remund, K. M., and B. C. Simpson, 1996, *Hanford Waste Tank Grouping Study*, Pacific Northwest National Laboratory, Richland, Washington.

- Document contains grouping of 41 tanks into 6 data cluster analysis tank groups.

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- Memo contains an tank inventory estimate based on analytical information.

Van Vleet, R. J., 1993, *Radionuclide and Chemical Inventories for the Double Shell Tanks*, WHC-SD-WM-TI-543, Rev. 1, Westinghouse Hanford Company, Richland, Washington.

- Document contains selected sample analysis tables prior to 1993 for double-shell tanks.

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