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

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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-SY-103. This report supports the requirements of the Tri-Party Agreement Milestone M-44-09.

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

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EXECUTIVE SUMMARY

This tank characterization report summarizes information on the historical uses, current status, and the sampling and analysis results of waste stored in double-shell underground storage tank 241-SY-103 at the Hanford Site. This report also supports the requirements of the *Hanford Federal Facility Agreement and Consent Order* (Ecology et al. 1994), Milestone M-44-09.

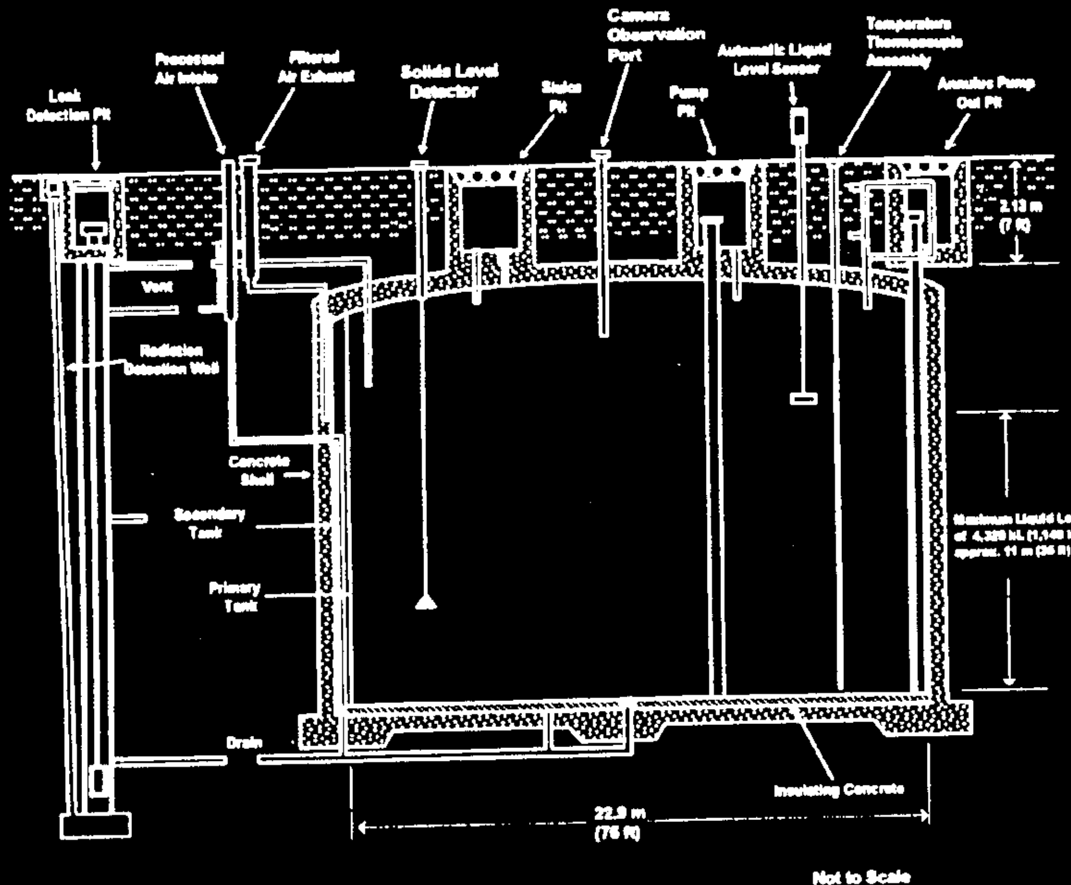
Tank 241-SY-103 is located in the SY Tank Farm in the 200 West Area of the Hanford Site. The tank went into service in 1977 and received concentrated wastes from B Plant cesium and strontium recovery campaigns. In 1980, most of this waste was transferred out, and double-shell slurry was transferred into the tank. In 1985, uranium sludge from ion exchange processing was added to the tank. No transfers from tank 241-SY-103 have occurred since January 1981. Small additions of waste water from many sources were made to the tank between 1981 and 1989. No waste has been added since 1990.

A description and status of the tank are summarized in Table ES-1 and Figure ES-1. The tank is currently in service, but it is prohibited from receiving any waste because it is on the Flammable Gas Watch List. The tank, which has an operational capacity of 4,390 kL (1,160 kgal), is estimated to contain 2,820 kL (745 kgal) of waste in the form of supernate and solids. The tank was last sampled in 1994 and was estimated to contain 1,440 kL (380 kgal) of supernate (convective layer) and 1,370 kL (362 kgal) of solids (nonconvective layer).

Table ES-1. Tank 241-SY-103 Summary Status.

Tank Description	
Type	Double-shell
Constructed	1977
In-service	1977
Diameter	23 m (75 ft)
Usable depth	10.7 m (35 ft)
Operating capacity	4,370 kL (1,160 kgal)
Bottom shape	Flat
Ventilation	Operating exhauster
Tank Status	
Total waste volume (March 1995)	2,830 kL (747 kgal)
Solids volume (1994 core)	1,370 kL (362 kgal)
Supernatant volume (1994 core)	1,440 kL (380 kgal)
ENRAF surface level (1994 core)	686 cm (270 in.)
Temperature	Maximum of 36-39 °C (96-103 °F) in 1994
Integrity category	Sound
Sampling Dates	
1986	1 core
1994	3 auger, 1 core
Service Status	
Restricted	Flammable Gas Watch List

Figure ES-1. Basic Design of a Double-Shell Tank.



This report summarizes three sampling and analysis events. The crust was evaluated for safety concerns using auger solids in 1994. Solids and supernate composition is based on the core sample taken in 1994. The physical properties of the solids presented were taken from 1986 and 1994 core segment samples.

An unresolved safety question raised concern that the crust of the tank waste could become sufficiently hot during intrusive (core) sampling activities to initiate an exothermic reaction or ignite radiolytically produced hydrogen gas present, if present. General safety screening analyses were performed on the crust prior to core sampling in response to the unresolved safety question. Results indicated that it was safe to obtain a push-mode core sample.

Two data quality objectives were applicable to the 1994 core sampling event: the *Flammable Gas Tank Safety Programs: Data Requirements for Core Sample Analysis Developed Through the Data Quality Objective Process* (McDuffie and Johnson 1994) and the *Tank Safety Screening Data Quality Objective* (Babad and Redus 1994). The data will help clarify mechanisms for gas generation, retention, and release. Models of waste behavior will also support development of mitigation methods, if necessary. Discussion of the mechanisms and mitigation efforts is beyond the scope of this report.

The safety screening analyses indicate that fuel is present above the prescribed safety limit of 125 cal/g (dry) (523 J/g) (Babad and Redus 1994) in several levels near the tank bottom. Total organic carbon (TOC) results indicate that significant levels of organics are present. The liquid composite sample had a TOC result of 9.64 g/L (wet weight) and the solids composite sample had a result of 16.6 g/L (wet weight) (1.06E+4 μg/g). The organics are expected to be mainly complexants.

About 50 percent of the waste by volume is in the convective layer, and the moisture level in the bottom solids layer is approximately 39 weight percent, well above the 17 weight percent safety screening criterion. However, one of the subsegment analyses of the unfiltered solids in the liquid layer dropped below the 17 percent criterion. No exotherms were found on the liquid subsegments that are greater than 90 percent liquid.

The heat generated by radioactivity in the tank is estimated to be 5,880 W (20,100 Btu/h). In 1994, tank 241-SY-103 had maximum temperatures ranging from 36 to 39 °C (96 to 103 °F). The trend of the temperature data over time indicates the waste is cooling.

Total alpha results indicate that the tank is well below the criticality safety criteria of 41 μCi/g, but actinide levels in the solids exceed the transuranic classification. A standard hydrogen monitoring system (SHMS) was installed in June 1994. Vapor space sampling does indicate the presence and periodic buildup of hydrogen gas. The highest hydrogen concentration measured was 0.294 volume percent on May 2, 1995.

The tank inventories for the convective and nonconvective layers are summarized in the Table ES-2. The convective layer contains large amounts of sodium, aluminum, chloride, hydroxide, nitrite, nitrate, and complexants. The nonconvective layer contains large amounts of chloride, nitrite, nitrate, phosphate, sulfate, hydroxide, aluminum, chromium, sodium, and complexants.

Table ES-2. Tank 241-SY-103 Inventory. (2 Sheets)

Analyte	Convective layer (kg)	Nonconvective layer (kg)	Total (kg)
Formate	6.12E+3	1.07E+4	1.68E+4
Oxalate	na	4.47E+4	4.47E+4
Cl^-	1.64E+4	1.51E+4	3.15E+4
F^-	na	3.35E+3	3.35E+3
NO_2^-	2.01E+5	1.76E+5	3.77E+5
NO_3^-	2.93E+5	2.11E+5	5.04E+5
PO_4^{3-}	6.99E+3	3.35E+4	4.05E+4
SO_4^{2-}	1.96E+2	1.68E+4	1.70E+4
OH^-	4.01E+4	3.96E+4	7.97E+4
Al	5.99E+4	8.51E+4	1.47E+5
B	1.2E+2	na	1.2E+2
Ca	1.87E+2	7.52E+2	9.39E+2
Cr	4.9E+1	2.19E+4	2.19E+4
K	5.67E+3	7.18E+3	1.28E+4
Na	3.17E+5	4.02E+5	7.19E+5
Ni	7.1E+1	2.19E+2	2.9E+2
Si	1.07E+2	na	1.07E+2
Zn	5	4.9E+1	5.4E+1
Zr	na	1.23E+2	1.23E+2
Fe	7	5.80E+3	5.81E+3
U	4	1.67E+3	1.67E+3
TOC	2.89E+4[1]	9.02E+3[1]	3.79E+4[1]
TIC	na	9.46E+4[2]	9.46+04[2]

Table ES-2. Tank 241-SY-103 Inventory. (2 Sheets)

Analyte	Convective layer activity (Ci)	Nonconvective layer activity (Ci)	Total activity
^{241}Am	2.36	1.44E+3	1.44E+3
^{137}Cs	5.96E+5	5.38E+5	1.13E+6
^{60}Co	na	1.05E+2	1.05E+2
^{154}Eu	na	1.62E+3	1.62E+3
^{155}Eu	na	1.41E+3	1.41E+3
^{129}I	2.58E-1	na	2.58E-1
^{238}Pu	5.75E-1	3.48E+1	3.54E+1
$^{239/240}Pu$	na	1.34E+2	1.34E+2
^{90}Sr	4.21E+3	7.48E+4	7.90E+4
^{99}Tc	2.41E+2	5.25E+2	7.66E+2
Tritium	3.16	na	3.16
Total alpha	na	1.17E+3	1.17E+3
Total beta	5.97E+5	9.29E+5	1.53E+6

Notes:

na = not available

[1]As kg of acetate, corrected for formate and oxalate concentration

[2]As kg of carbonate

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LIST OF TERMS

Btu	British thermal units
C	Celsius
cal	calorie
Ci	curie
cm	centimeter
cm^2	square centimeter
cm^3	cubic centimeter
CCPLX	complexant concentrate
DBP	dibutyl phosphate
DSC	differential scanning calorimetry
DSS	double-shell slurry
DQO	data quality objective
EDTA	ethylenediaminetetraacetate
F	Fahrenheit
ft	foot/feet
ft^2	square foot
g	gram
GEA	gamma energy analysis
GRE	gas release event
hr	hour
HHF	hydrostatic head fluid
IC	ion chromatography
ICP	inductively-coupled plasma
J	joule
kg	kilogram
kgal	kilogallon
kL	kiloliter
kW	kilowatt
L	liter
lb_f	pound force
m	meter
M	molarity
mg	milligram
min	minute
MIT	multifunctional instrument tree
mR	milliroentgen
na	not available or not applicable
nCi	nanocurie
Pa	Pascal
PNNL	Pacific Northwest National Laboratory
R	Roentgen
RPD	relative percent difference

LIST OF TERMS (Continued)

SST	single-shell tank
TCP	tank characterization plan
TGA	thermogravimetric analysis
TIC	total inorganic carbon
TOC	total organic carbon
TRU	transuranic
SHMS	standard hydrogen monitoring system
W	watt
wt%	weight percent
μCi	microcurie
μg	microgram
μmol	micromole

1.0 INTRODUCTION

This tank characterization report provides an overview of the history and waste contents of double-shell tank 241-SY-103. Estimated concentrations and inventories for the waste components are provided based on the most recent analytical data. Historical data and general information about the tank and its contents are also provided. The tank contents were sampled and analyzed in 1986 and in 1994. The correlation of historical information with the 1994 analytical data is discussed. This report supports the requirements of the *Hanford Federal Facility Agreement and Consent Order* (Ecology et al. 1994), Milestone M-44-09.

1.1 PURPOSE

The purpose of this report is to summarize historical information about the tank use and to provide an estimate of its contents. When possible, the information will be used to assess issues associated with safety, operations,, environmental issues, and process development activities. References to additional technical information about the tank and its contents are also provided.

1.2 SCOPE

The three major types of waste expected in tank 241-SY-103 were double-shell slurry (DSS), complexant concentrate (CCPLX), and uranium ion-exchange process sludge. The 1994 sampling centered on safety concerns and the need for data on fundamental chemical, radiological, and physical properties of the tank waste. The data gathered were intended to provide insight on the mechanisms of gas generation, retention, and release. In addition, gas behavior in the tank was to be modeled to support safety analysis and development of mitigation methods.

The goal of the 1986 tank sampling was to determine the physical, rheological, chemical, and radiochemical properties of the tank waste prior to transferring it to tank 241-107-AP. This transfer did not take place.

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2.0 HISTORICAL TANK INFORMATION

Tank 241-SY-103 is in restricted service as a result of safety concerns related to hydrogen gas generation. The current tank status is provided in reports that are routinely updated. This section includes information about tank design, waste transfer history, waste temperature, and the surface-level.

2.1 TANK STATUS

According to Hanlon (1995), tank 241-SY-103 contains 2,830 kL (747 kgal) of complexant waste. This includes 2,170 kL (573 kgal) of double-shell slurry (DSS), 15 kL (4 kgal) of saltcake, and 644 kL (170 kgal) of supernatant liquid. Three layers are expected, similar to the waste in tank 241-SY-101: crust, convective, and nonconvective layers (Fox et al. 1993 and Schreiber 1994b). The integrity of the tank is sound and it is in service; however, tank operations are restricted because the tank is on the Flammable Gas Watch List and has an associated unreviewed safety question.

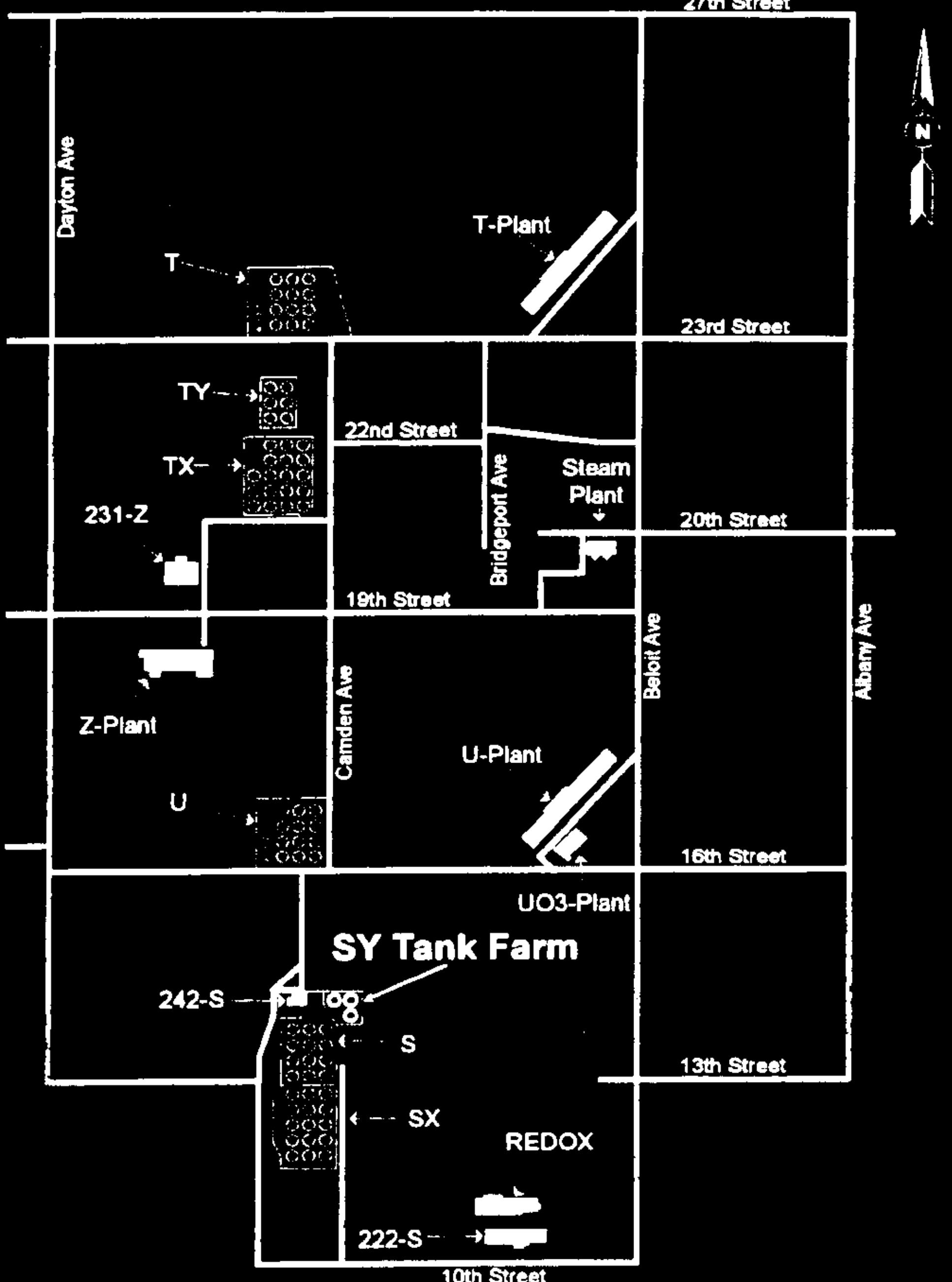
Tank 241-SY-103 is equipped with an automated liquid surface-level gauge and a manual tape. (The manual tape was out of service as this report was compiled [Hanlon 1995].) The waste depth is approximately 690 cm (271 in.). Except for the manual tape, all monitoring systems are in compliance with established standards. Waste levels and temperatures are discussed in Section 2.4.

Most waste stored in tank 241-SY-103 is CCPLX waste and DSS, concentrated process streams associated with waste tank flammable gas safety issues (WHC 1994, McDuffie and Johnson 1994). This tank has been on the Flammable Gas Watch List since January 1991 (Hanlon 1995). A Standard Hydrogen Monitoring System (SHMS) was installed in June 1994. Flammable gas is believed to be generated within the tank waste in quantities that may accumulate to levels approaching the lower flammability limit of hydrogen in air or hydrogen in nitrous oxide (Fox et al. 1993). An unresolved safety question has been declared because a fuel (hydrogen) and an oxidizer (nitrous oxide) may coexist in the waste mass. A related safety issue is a concern that a chemical reaction could occur in the crust layer (crust burn) as a result of gas burn or intrusive activities (Schreiber 1994a).

2.2 TANK DESIGN

Tank 241-SY-103 is one of three double-shell tanks that comprise the SY Tank Farm. The SY Tank Farm contains the only double-shell tanks in the 200 West Area of the Hanford Site (see Figure 2-1). The tanks, which were designed to hold concentrated waste, were completed in 1977. For more information about the SY Tank Farm and double-shell tanks, refer to the *Tank Characterization Reference Guide* (De Lorenzo et al. 1994).

Figure 2-1. Location of the SY Tank Farm.



Like other double-shell tanks, tank 241-SY-103 was fabricated as three concentric tanks consisting of two steel liners within a protective shell (see Figure ES-1). The protective shell is constructed of reinforced concrete designed to sustain soil loads and temperature gradients generated by the contained radioactive waste (WHC 1994). The inner wall is lined with a carbon-steel liner called the secondary tank. The primary tank, also constructed of carbon steel, is completely enclosed within the secondary tank. The primary tank is freestanding. It sits on an insulating concrete pad that protects the structural concrete foundation from excessive temperatures during the annealing treatment, or stress relief, of the primary tank. The insulating pad is cast with air distribution and drain grids to provide leak detection, maintain a uniform tank bottom temperature, facilitate heat removal, and eliminate pockets of water condensation. An annular space, which separates the two steel liners, serves as a containment barrier to any primary tank leaks. The tanks are actively vented to the environment through high-efficiency particulate air filters. The primary ventilation system removes vapors from the primary tank and maintains negative pressure in relation to the atmosphere. The annulus ventilation system cools the primary tank, removes moisture from annular space, and helps detect radioactive leaks.

Tank 241-SY-103 has a maximum storage capacity of 4,390 kL (1,160 kgal) and a nominal capacity of 4,370 kL (1,150 kgal) (WHC 1994). It has an inside diameter of 22.9 m (75 ft), and it is 14.3 m (46 ft 9 in.) high at the crown.

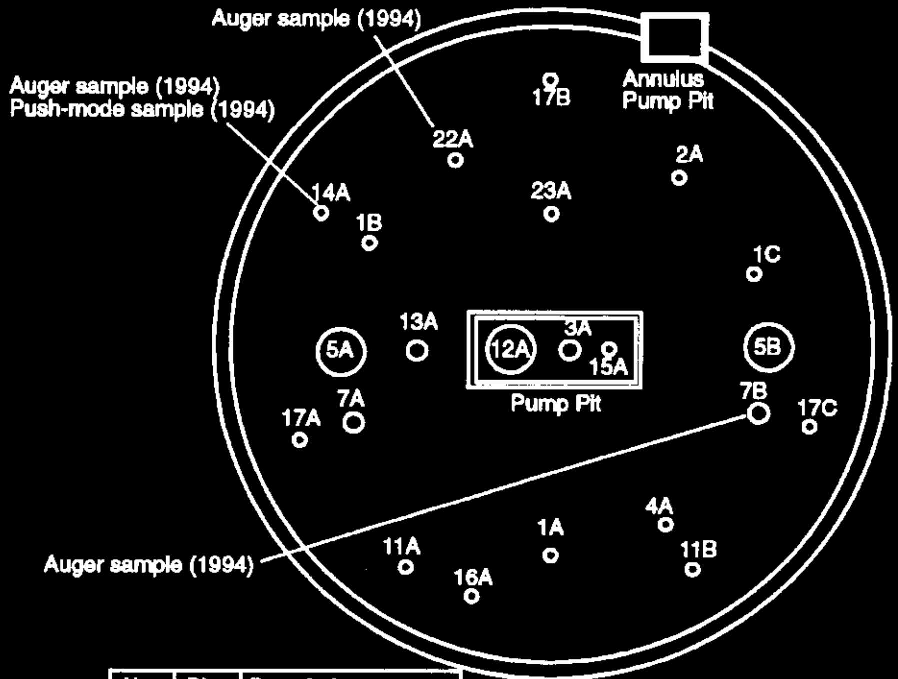
Tank 241-SY-103 has 24 risers that penetrate the primary tank dome and provide access for waste transfers and sampling and tank monitoring and ventilation (additional risers access the annulus) (DOE 1994). Instruments monitor the pressure, temperature, liquid level, sludge level, and other bulk tank characteristics. Waste has been added and removed through risers that enter tank 241-SY-103 through the central pump pit. Riser locations are shown in Figure 2-2. For more riser information, see Anderson (1992).

2.3 PROCESS KNOWLEDGE

Tank 241-SY-103 began operating in 1977 when it received concentrated wastes. Two years later the tank contained more than 3,600 kL (950 kgal) of CCPLX waste. During 1980, the tank was pumped down to a waste heel of about 466 kL (123 kgal), then received DSS. During 1985, the tank received small transfers of uranium ion exchange sludge. The uranium sludge was generated from groundwater pumped from beneath a crib near U-Plant, and it was processed through ion-exchange resins. The tank received saltwell liquid and waste water from the 200 West Area during 1988 and 1989. The waste transfer history of the tank is discussed in Section 2.3.1.

Since 1979, waste level fluctuations within tank 241-SY-103 have been observed at times when waste was not added or removed from the tank (Welty 1988). The fluctuations are attributed to the accumulation and release of gases, mainly hydrogen (gas release events). Tank 241-SY-103 contains waste forms that are similar to the constituents in tank 241-SY-101. Both tanks generate and house accumulated gases. This phenomenon is

Figure 2-2. Riser Configuration for Tank 241-SY-103.



No.	Dia.	Description
1A	4 in.	Spare
1B	4 in.	Sludge Weight
1C	4 in.	Spare
2A	4 in.	ENRAF Gauge
3A	12 in.	Supernate Pump
4A	4 in.	Thermocouple Probe
5A	42 in.	Spare
5B	42 in.	Video Camera
7A	12 in.	Exhaust Port
7B	12 in.	Spare
11A	4 in.	Spare
11B	4 in.	Pressure Transmitter
12A	42 in.	Supernate Addition
13A	12 in.	Observation Port
14A	4 in.	Spare
15A	4 in.	Dropleg Nozzle
16A	4 in.	Spare
17A	4 in.	Manual Tape
17B	4 in.	MIT
17C	4 in.	Sludge Weight
22A	4 in.	Spare
23A	4 in.	Sludge Weight

shown by rising surface levels followed by periodic gas releases and subsequent surface level drops. From January 1989 to July 1993, 12 gas release events were observed in tank 241-SY-103 with an average period between events of 135 days (Fox et al. 1993). During these events, surface level decreases were measured ranging from 2.7 cm (0.7 in.) to 8.7 cm (2.3 in.). Unlike tank 241-SY-101, which has experienced much larger releases historically, the pressure in the headspace of tank 241-SY-103 remained below atmospheric pressure for each event. Since 1990, the period between gas release events in tank 241-SY-103 appears to be increasing with the longest period being 302 days. This may be the result of cooling temperatures in the tank. Prior to 1985, waste level fluctuations in tank 241-SY-103 were random (Harmon 1993). In the latter half of 1985, after uranium ion exchange wastes were pumped into the tank, the magnitude of the surface level fluctuations appeared to increase.

Figure 2-3 shows the fill history of the tank based on information from Agnew et al. (1995), Anderson (1990), Fox et al. (1993), and Harmon (1993). The estimated amount of each major waste type added to the tank during its process history is shown in Table 2-1.

Table 2-1. Summary of Major Waste Transfers[1].

Waste Type	Period received	Estimated Volume
Complexant concentrate[2]	1977 to 1980	466[3] kL (123 kgal)
Double-shell slurry	1980	1,590 kL (420 kgal)
Uranium ion exchange eluate	1985	121 kL (32 kgal)
Tank 241-SX-104 supernate	1981 to 1989	496 kL (131 kgal)

Notes:

[1]Volumes are from Fox et al. (1993).

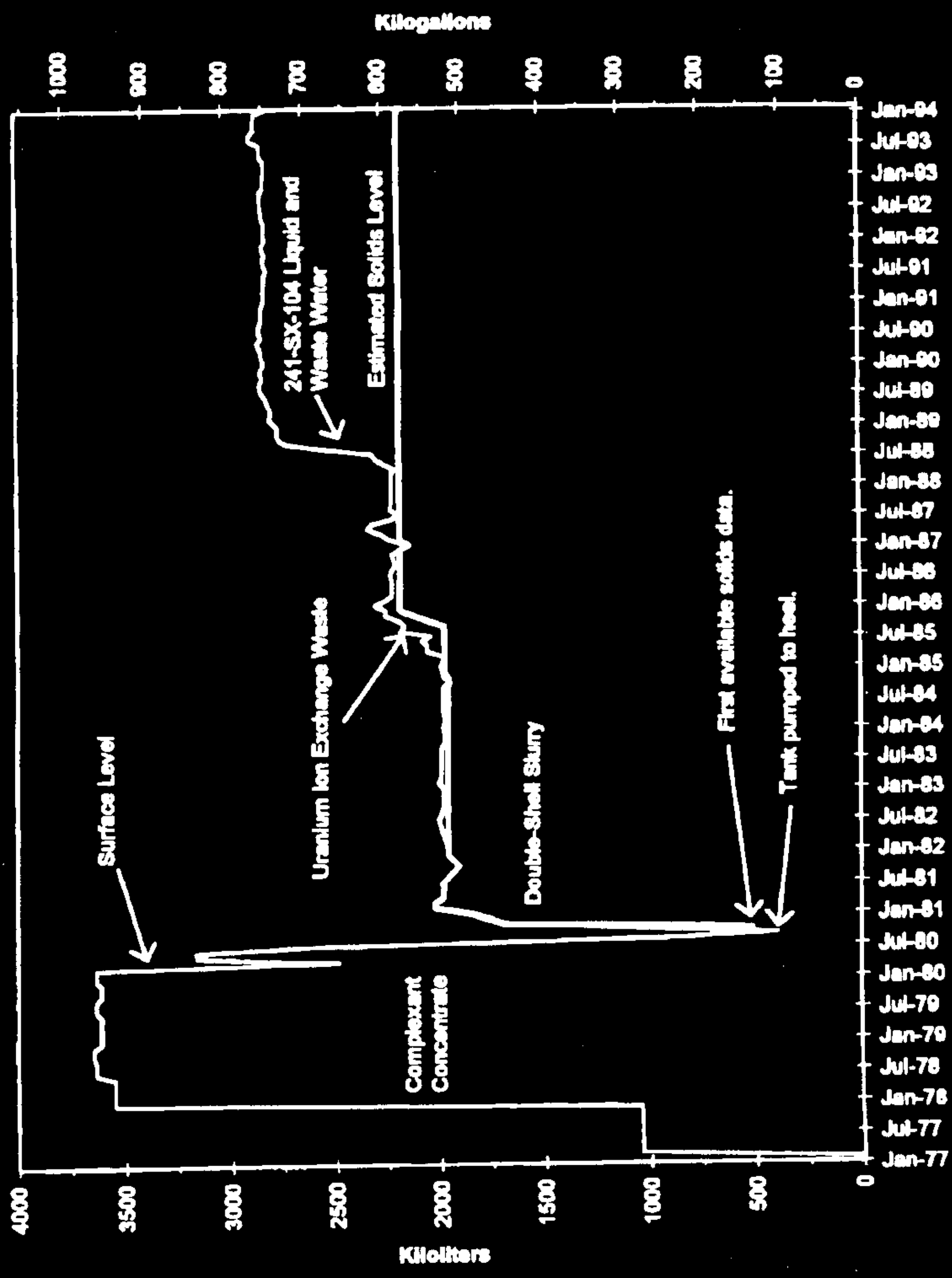
[2]Complexant concentrate (CCPLX) also includes B Plant high strontium waste and evaporator residual liquor.

[3]The estimated CCPLX volume represents the heel remaining in the tank after most CCPLX was removed.

2.3.1 Waste Transfer History

During 1977 to 1979, tank 241-SY-103 received concentrated wastes from B Plant cesium and strontium recovery campaigns (Anderson 1990, Agnew et al. 1995). This waste, CCPLX and residual evaporator liquid, is rich in complexing agents such as sodium salts of ethylenediaminetetraacetate (EDTA) and glycolic acid (Agnew 1995).

Figure 2-3. Tank 241-SY-103 Fill History.



Most of the CCPLX waste was transferred from the tank in 1980 leaving a heel of about 466 kL (123 kgal) (Agnew et al. 1995). During 1980, about 1,590 kL (420 kgal) of DSS was received from the 242-S Evaporator (Fox et al. 1993). Double-shell slurry is the most concentrated product produced by Hanford Site evaporators (Strode et al. 1988). This waste was concentrated beyond the aluminate boundary; it is highly viscous, and has high concentrations of hydroxide, nitrate, carbonate and aluminate (Agnew 1995).

Other than small amounts of water, no other transfers involving this tank occurred until 1985. From June to November of 1985, approximately 121 kL (32 kgal) of uranium sludge from ion exchange processing were placed on top of the DSS. This waste consisted of a solution of sodium nitrate and sodium hydroxide that contained about 690 kg of uranium (Fox et al. 1993).

There have been no transfers from tank 241-SY-103 since January 1981. However, between 1981 and 1989 numerous small additions of waste water were made from catch tanks, sumps, and evaporator flushes as well as saltwell liquid from single-shell tanks. (Agnew et al. 1995 and Fox et al. 1993). The most significant waste addition, after the 1985 uranium sludge transfer, was approximately 496 kL (131 kgal) of liquid waste from the saltwell pumping of tank 241-SX-104 from 1988 to 1989 (Fox et al. 1993). Tank 241-SX-104 was storing DSS feed at the time of the pumping. No waste has been added since 1990 (Koreski 1995).

2.3.2 Historical Estimate of Contents

Tank inventory estimates based on the tank layer model, waste status and transaction record summary, and Hanford defined waste types, have been developed for tank 241-SY-103 (Brevick 1995) by Los Alamos National Laboratory. Table 2-2 shows the historical tank content estimate based on the supernatant mixing model (Brevick 1995).

Waste, added to the tank at various times, has settled resulting in regions that vary from sludge in the lower depths to liquid toward the top. The solids in the lowest region are expected to be CCPLX, a heel from the early process history. DSS is expected on top of CCPLX with uranium ion exchange sludge on top of DSS. Waste water and other liquid waste transfers have contributed to the less dense upper waste region. Similar to the waste in tank 241-SY-101, the bottom layers of waste in tank 241-SY-103 appear to be nonconvective, while the upper region appears to be convective (that is, the waste appears to circulate naturally) (Fox et al. 1993). Sampling has confirmed the existence of a crust layer at the waste surface (Schreiber 1994b).

Based on the process history of tank 241-SY-103, some assumptions can be made about its major waste constituents. The lower regions of waste are expected to contain large amounts of organic complexants from the CCPLX heel left in the tank in 1980. Large concentrations of aluminate are expected from the DSS, the predominant waste type in the tank.

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

Total Inventory Estimate[2]			
Physical Properties			
Total supernatant	4.21E+6 kg (758 kgal)		
Heat load	5.36 kW (1.83E+4 Btu/hr)		
Bulk density[3]	1.47 (g/cm^3)		
Water wt%[3]	45.7		
TOC wt% C (wet)	1.08		
Chemical Constituents	mole/L	ppm (μg/g)	kg
Na^+	9.94	1.56E+5	6.56E+5
Al^{+3}	1.40	2.56E+4	1.08E+5
Fe^{+3} (total Fe)	2.74E-3	1.04E+2	4.40E+2
Cr^{+3}	3.21E-2	1.14E+3	4.79E+3
Bi^{+3}	1.61E-3	2.29E+2	9.64E+2
La^{+3}	1.48E-5	1.40	5.91
Hg^{+2}	9.81E-6	1.34	5.65
Zr [as $ZrO(OH)_2$]	9.84E-4	6.11E+1	2.58E+2
Pb^{+2}	4.85E-5	6.84	2.88E+1
Ni^{+2}	2.39E-3	9.54E+1	4.02E+2
Sr^{+2}	1.57E-5	9.36E-1	3.94
Mn^{+4}	8.08E-3	3.02E+2	1.27E+3
Ca^{+2}	1.92E-2	5.24E+2	2.21E+3
K^+	2.40E-2	6.39E+2	2.69E+3
OH^-	6.06	7.01E+4	2.95E+5
NO_3^-	3.00	1.27E+5	5.34E+5
NO_2^-	2.84	8.90E+4	3.75E+5
CO_3^{-2}	3.69E-1	1.51E+4	6.36E+4
PO_4^{-3}	1.34E-1	8.66E+3	3.65E+4
SO_4^{-2}	2.81E-1	1.84E+4	7.76E+4
Si (as SiO_3^{-2})	4.06E-2	7.77E+2	3.27E+3
F^-	9.67E-2	1.25E+3	5.27E+3
Cl^-	1.70E-1	4.11E+3	1.73E+4
$C_6H_5O_7^{-3}$	3.45E-2	4.45E+3	1.87E+4
$EDTA^{-4}$	2.15E-2	4.22E+3	1.78E+4
$HEDTA^{-3}$	3.84E-2	7.17E+3	3.02E+4

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

Chemical Constituents	mole/L	ppm (μg/g)	kg
glycolate$^-$	1.04E-1	5.31E+3	2.24E+4
acetate$^-$	1.48E-2	5.95E+2	2.51E+3
oxalate^{-2}	5.60E-5	3.36	1.41E+1
DBP	1.64E-2	1.80E+3	7.57E+3
butanol	1.64E-2	8.27E+2	3.48E+3
NH_2	4.69E-2	5.43E+2	2.29E+3
$Fe(CN)_6^{-4}$	0	0	0
Radiological constituents			
Pu	2.52E-2 (μCi/g)	--	1.77 (kg)
U	5.20E-3 (M)	843 (μg/g)	3.55E+3 (kg)
Cs	0.386 (Ci/L)	263 (μCi/g)	1.11E+6 (Ci)
Sr	8.76E-3 (Ci/L)	5.97 (μCi/g)	2.51E+4 (Ci)

Notes:

[1]From Brevick (1995)

[2]Unknowns in tank solids inventory are assigned by the tank layer model.

[3]Volume average for density, mass average water weight percent and TOC weight percent C.

2.4 SURVEILLANCE DATA

2.4.1 Surface-Level Readings

The waste surface level in tank 241-SY-103 is measured with an automated gauge (ENRAF gauge) and a manual tape (currently out of service) (Hanlon 1995). Surface-level measurements are recorded daily. The ENRAF gauge went into service in July 1994 to replace a Food Instrument Corporation gauge (see De Lorenzo et al. 1994). The ENRAF gauge determines the waste surface level by detecting variations in the weight of a displacer (a small disk) suspended in the tank through a riser (Hanlon 1995). The displacer is suspended on the end of wire wound onto a precision measuring drum. The displacer is lowered until a force transducer detects a change in the weight of the displacer, indicating contact with the waste surface has been made. The measurement precision of the gauge as it is used at the Hanford Site has yet to be determined (Harmon 1993). The manual tape uses a conductivity electrode that is lowered until contact is established with the waste surface, indicated by the completion of an electrical circuit.

According to data from the Surveillance Analysis Computer System, the ENRAF gauge measured a surface level of 690 cm (271 in.) on April 6, 1995. Surface levels were measured by the Food Instrument Corporation and ENRAF gauges from 1981 through 1994 (see Figure 2-4). A closer examination of data from 1989 through 1993 shows a distinct saw-toothed pattern of gas accumulation and release (see Figure 2-5). The current surface level is not expected to be equal to the sum of all the major and minor waste additions over the process history of the tank because of the cycles of slurry growth and subsequent gas releases. In addition, the surface level is also affected by evaporation and condensation processes (Fox et al. 1993).

2.4.2 Internal Tank Temperatures

Temperatures in tank 241-SY-103 are measured by thermocouple probes assembled in a tree that enters the tank at riser 4A located 6.1 m (20 ft) from the tank's center (see Figure 2-2). The lowest operational thermocouple (thermocouple 2) is 23 cm (0.75 ft) above the tank bottom; other thermocouples are spaced at 61-cm (24-in.) intervals (Tran 1993). The thermocouples are iron-constantan type J with an average error of ± 2.5 °C (4.5 °F) (Scaief 1991). The maximum in-tank temperature on April 6, 1995 was 34.4 °C (94 °F) measured at thermocouple 3. Waste temperatures recorded by thermocouples 2, 4, and 6 indicate the waste is cooling (Fox et al. 1993). A least squares linear fit of average temperatures from these three thermocouples indicates a cooling rate of 2.7 °C (4.86 °F) per year. The highest temperature ever recorded in the tank was 47.2 °C (117 °F) at thermocouple 2 in May 1991. In-tank temperatures have remained within operating and design specifications (WHC 1994).

Figure 2-6 shows temperatures recorded from thermocouples 2, 6, and 12 from January 1991 to December 1994. The tank waste regions measured by the thermocouples are not well defined. However, examination of data from previous core sampling and temperature histories indicates thermocouple 2 is probably within the nonconvective region, thermocouple 6 may be within the lower part of the convective layer, and thermocouple 12 is probably within the crust layer (Fox et al. 1993). The relationship of the temperature readings from thermocouples 6 and 12 in recent years suggests both are near the temperature of the convective region, which was not the case prior to 1991. The crust layer may have been thicker at that time, providing additional heat flow resistance for heat traveling to the dome air.

A Multifunctional Instrument Tree in riser 17B measures temperatures (with type K thermocouples). The peak temperature measured is approximately 100 °F. The convective layer is approximately 90 °F. This is comparable to those measured in riser 4A (98 °F and 93 °F). Data from the Multifunctional Instrument Tree can help establish the boundary between convective and nonconvective layers. Figure 2-7 shows the axial temperature profile along with the core segment location.

Figure 2-4. Tank 241-SY-103 Surface Levels 1981 to 1994.

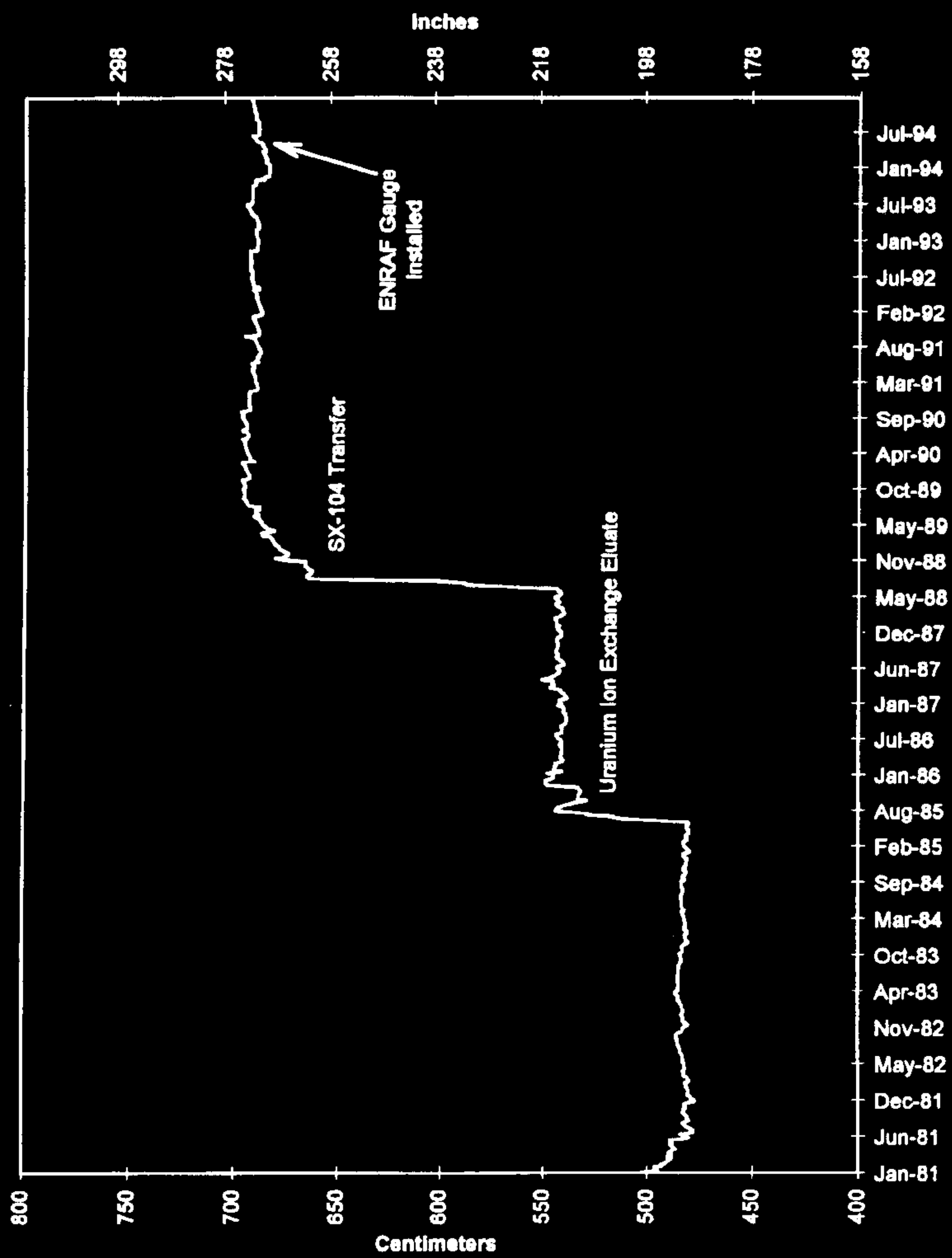


Figure 2-5. Tank 241-SY-103 Surface Levels June 1989 to June 1993.

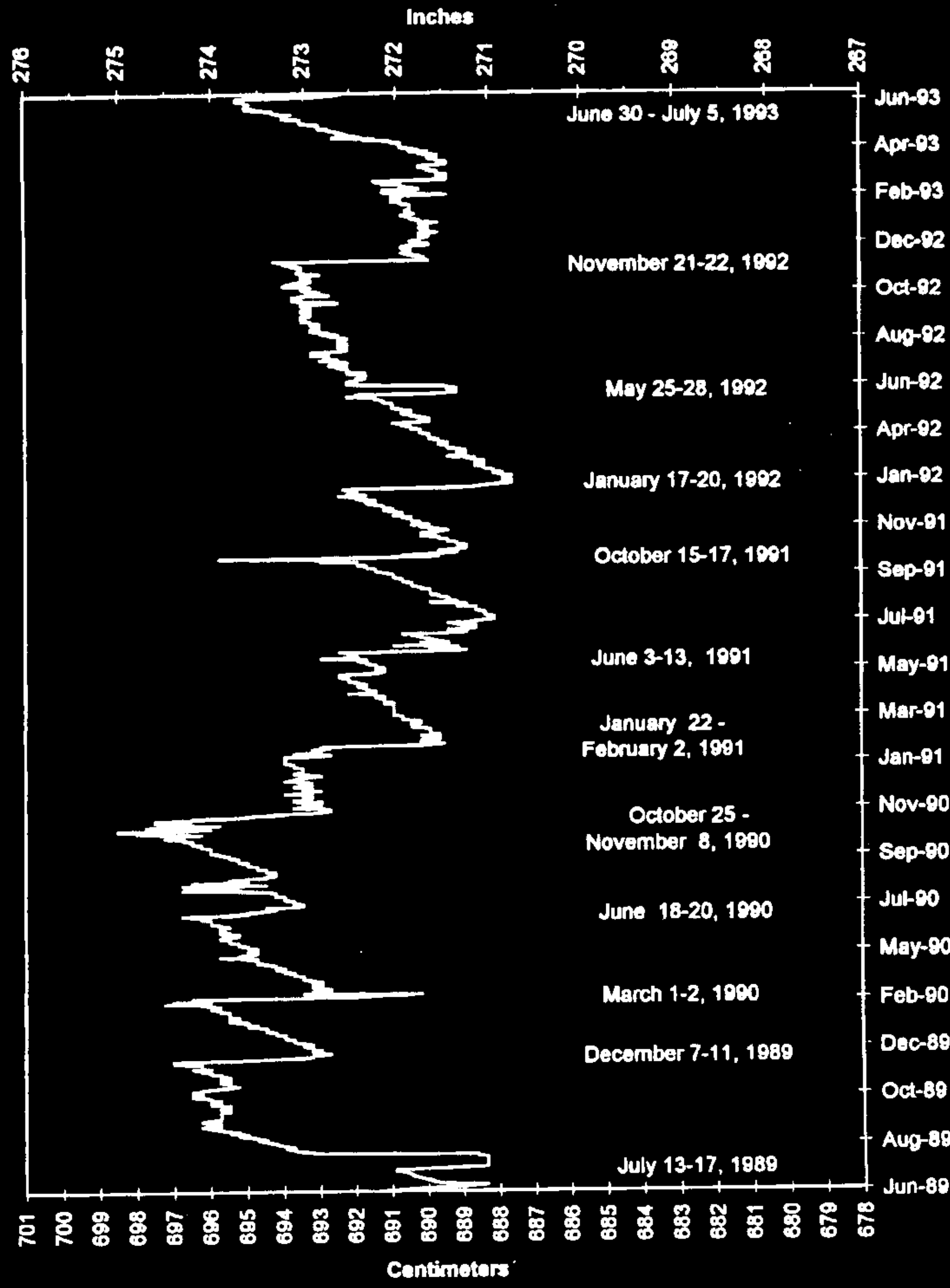


Figure 2-6. Tank 241-SY-103 In-Tank Temperature History.

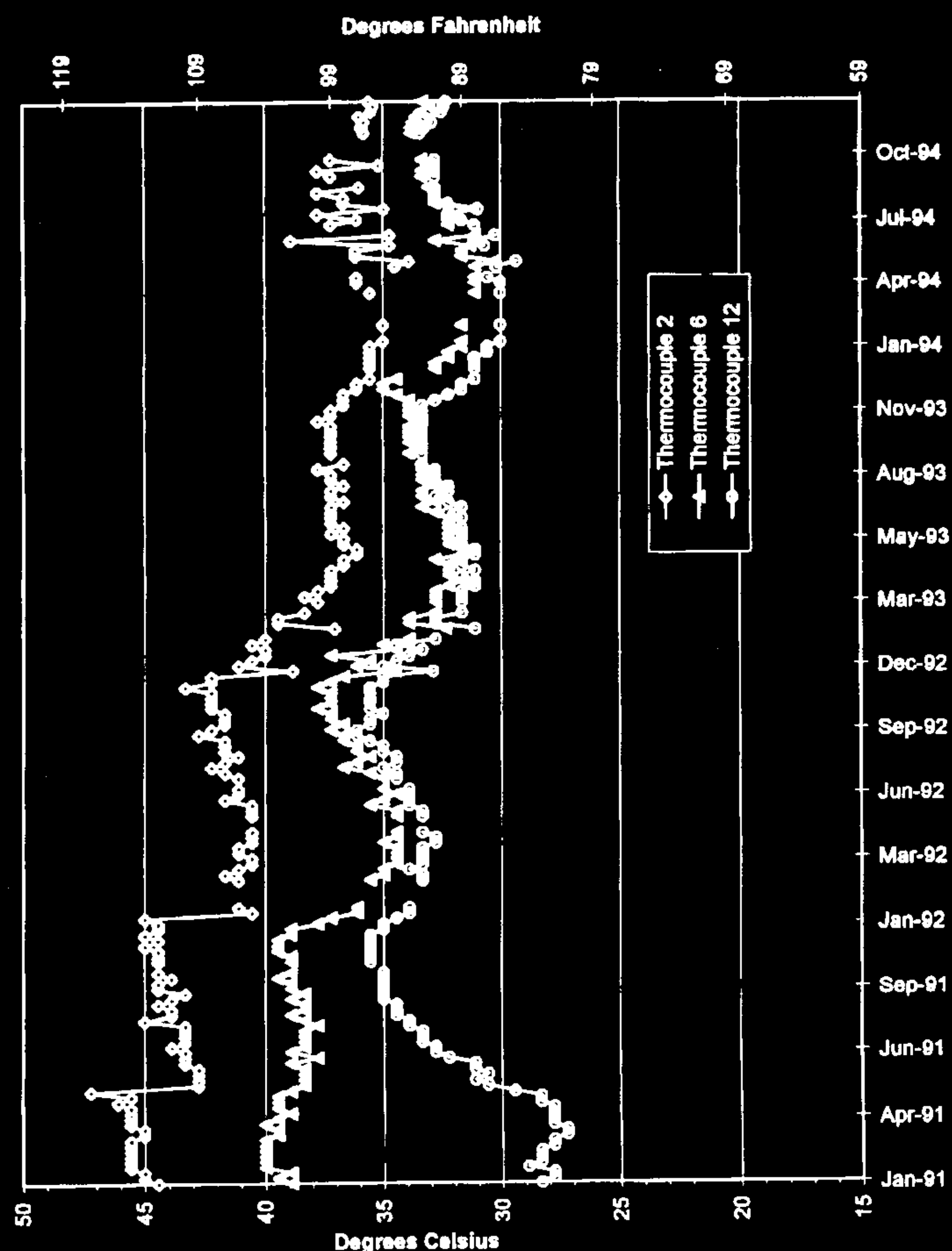
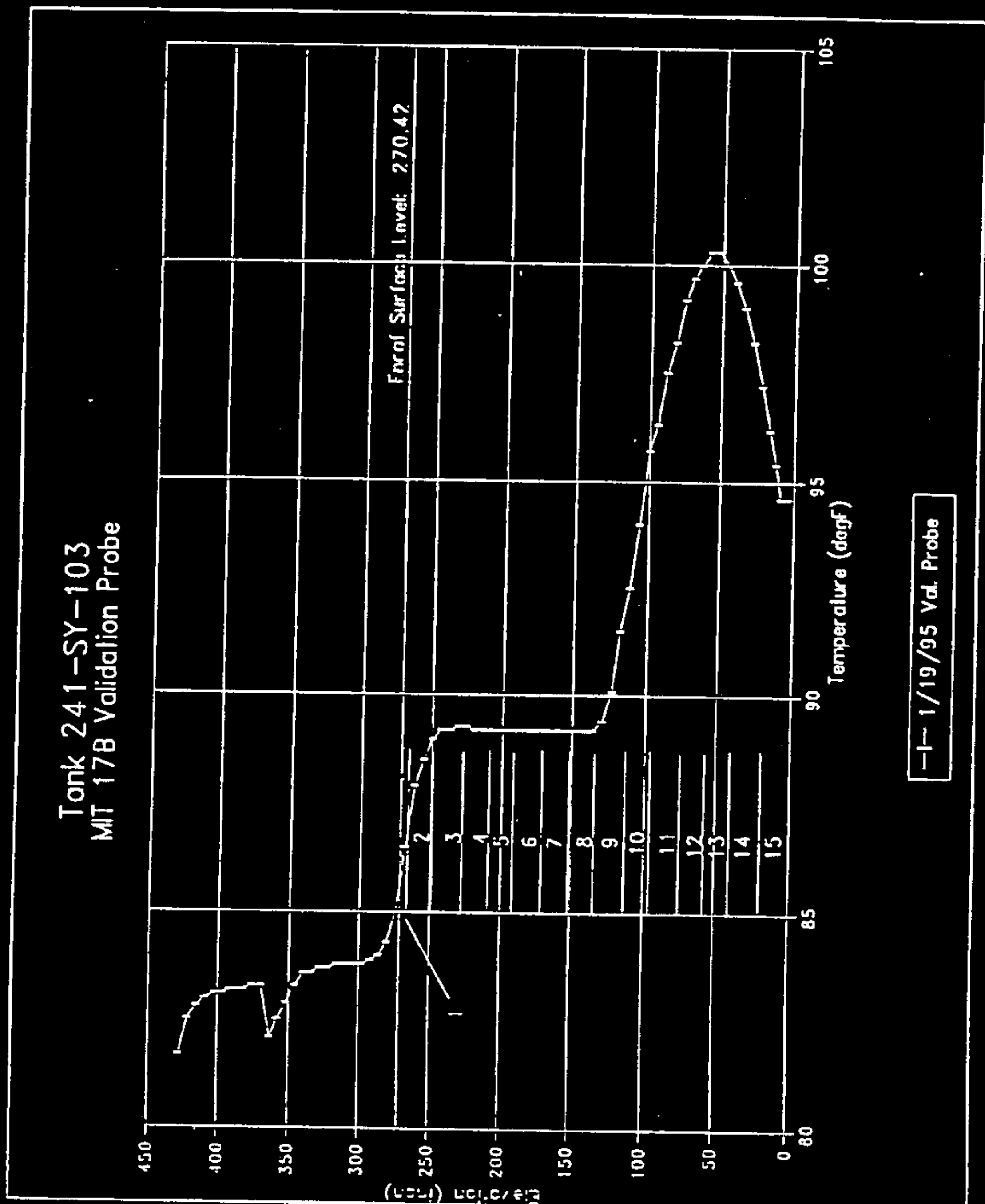


Figure 2-7. Tank 241-SY-103 MIT 17B Validation Probe Results.



2.4.3 Gas Monitoring

Hydrogen gas is measured in the exhaust gas using a SHMS. The SHMS consists of two Whittaker cells. One cell has a range of 0 to 1 percent; the other has a range of 0 to 10 percent. For a description of the SHMS and gas monitoring results, see Wilkins (1995).

Grab samples indicate that the baseline hydrogen concentration is below 100 ppm (0.01%). Gas release events have occurred approximately every two months since December 1994. The highest hydrogen concentration measured during these events was 0.294 volume percent on May 2, 1995.

Nitrous oxide, ammonia, and methane have been measured in addition to hydrogen. Nitrous oxide concentrations ranged from 4 to 39 ppm in grab samples taken in August and September of 1994. Two grab samples taken during the March 2, 1995 gas release had N_2O results of 630 and 900 ppm. Grab samples taken in August 1995 detected methane at 12 and 15 ppm.

Ammonia was measured in the vent header from mid-December to mid-January (1994 to 1995). Concentrations ranged from 40 to 180 ppm. Ammonia is also measured at the SY Tank Farm stack exhaust to detect any ammonia from the three SY tanks. The estimated contribution of ammonia from tank 241-SY-103 at the time of the peak concentration at the SY Tank Farm stack during the May 2, 1995 gas release from 241-SY-103 was 486 ppm.

2.4.4 In-Tank Photographs

The interior of tank 241-SY-103 was most recently photographed in October 1985. About 492 kL (130 kgal) of waste was added to the tank since the photographs were taken; therefore, the photographs no longer reflect current conditions in the tank and are not included in this report.

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3.0 TANK SAMPLING OVERVIEW

This section describes three sampling events associated with tank 241-SY-103. A push-mode core sample was taken in August and September of 1994 for safety screening following the requirements of the Westinghouse Hanford Company *Tank Safety Screening Data Quality Objective* (DQO) (Babad and Redus 1994), the *Flammable Gas Tank Safety Program: Data Requirements for Core Sample Analysis Developed Through the Data Quality Objective Process* (McDuffie and Johnson 1994), and *Tank 241-SY-103 Tank Characterization Plan* (Schreiber 1994b and 1995). In June 1994, auger sampling and analysis of the tank's crust material were completed to ensure that further core sampling could be carried out in a safe manner. In 1986, core samples were taken from tank 241-SY-103 in support of retrieval, transport, and pretreatment characterization activities.

Results for the 1994 push-mode core sampling event may be found in the *45- and 216-Day Safety Screen Results for Tank 241-SY-103, Core 62* reports (Rice 1994 and 1995). The results for the auger sampling event are given in *45-Day Deliverable for Tank 241-SY-103* (Kocher 1994) and *136-Day Deliverable Report - 241-SY-103 Auger Samples, Risers 7A, 14B, and 22A* (Bell 1994). The results for the 1986 sampling event are reported in *Tank 103-SY Dissolution Study - Results of Physical Measurements* (Prignano 1988a), *Tank 103-SY Dissolution Study - Results of Chemical Analyses* (Prignano 1988b), and *Characterization of Waste from Double-Shell Tank 103-SY* (Fow et al. 1986).

3.1 DESCRIPTION OF THE 1994 CORE SAMPLING EVENT

During August and September of 1994, one core sample was obtained from riser 14A of tank 241-SY-103. The sample, which was obtained by the push-mode core sampling method, consisted of 15 segments. A solution of 0.3 molar (M) lithium bromide and purified water was used for the hydrostatic head fluid (HHF). Originally a second core sample was planned, but it has been delayed due to sample pressurization of the last core segment.

Table 3-1 summarizes the sampling information for this event. The second column lists the approximate depth of the top of each segment in relation to the bottom of the tank, using the solids level measurement of 686 cm (270 in.) taken by manual tape in July of 1994 (Schreiber 1994a). It should be noted that the first segment was only to a depth of 10 cm (4 in.). This information is given as a guide and is not meant to be precise. Table 3-1 also provides sample date, the date the sample was received by the laboratory, the date the sample was extruded, and the drill string dose rate as reported on the chain-of-custody documentation.

Table 3-1. Tank 241-SY-103 Core 62 Sampling Information[1].

Segment Number	Approximate Depth (cm)	Sample Date[2]	Date Received by 222-S Laboratory[2]	Extrusion Date[2]	Drill String Dose Rate (R/hr)
1	714	8/19/94	8/22/94	8/24/94	2
2	666	8/19/94	8/22/94	8/24/94	2.2
3	617	8/23/94	8/25/94	8/26/94	2.2
4	569	8/23/94	8/25/94	8/26/94	2
5	521	9/8/94	9/9/94	9/12/94	2.2
6	473	9/13/94	9/15/94	9/16/94	2.5
7	425	9/13/94	9/15/94	9/16/94	2
8	376	9/13/94	9/15/94	9/19/94	2
9	328	9/13/94	9/15/94	9/19/94	1.9
10	280	9/13/94	9/15/94	9/20/94	1.7
11	232	9/16/94	9/19/94	9/21/94	1.9
12	183	9/16/94	9/19/94	9/22/94	1.7
13	135	9/16/94	9/19/94	9/23/94	1.8
14	87	9/19/94	9/21/94	9/23/94	1.8
15	39	9/19/94	9/21/94	9/26/94	1.5

Notes:

[1]From Rice (1994)

[2]Dates are listed in the mm/dd/yy format.

3.1.1 1994 Core Sample Handling

The samples were extruded and subsampled in the 222-S Laboratory hot cell. Table 3-2 lists the segment number, the percent of sample recovered, the liquid volume of the segment, the solid mass of the segment, and a description of the sample. Figure 3-1 describes the test plan flow chart for sample breakdown. Photos of segments 1, 9, and 12 are in Appendix E.

The only problems noted were during the extrusion of segments 3 and 15. When the valve for segment 3 was first opened, no liquid sample appeared. Apparently a solid plug had formed. Once the extrusion began, this solid plug was pushed onto the tray followed rapidly by the drainable liquid. Some liquid was lost out the back of the sample tray, and much of the solid was carried into the drainable liquid jar with the liquid.

Table 3-2. Tank 241-SY-103 Core 62 Subsampling Information[1]. (2 sheets)

Segment Number	Sampler Recovery (percent)	Drainable Liquid (mL)	Solid (g)	Sample Description
1	91	262	22	The liquid was turbid and medium brown in color. The solids resembled dirty ice crystals, much like "snow cone" ice.
2	91	272	9.6	The liquid was turbid and medium brown in color. The solids resembled dirty ice crystals, much like "snow cone" ice.
3	91	~ 262 (±10)	5.8	When the valve was first opened, no liquid sample appeared. When the extrusion began, the solid material was pushed onto the tray followed rapidly by the drainable liquid. Some liquid was lost out the back of the sample tray and much of the solid was carried into the drainable liquid jar with the liquid. The liquid was turbid and medium brown in color. The solids resembled dirty ice crystals, much like "snow cone" ice.
4	100	295	33	The liquid was turbid and medium brown in color. The solids resembled dirty ice crystals, much like "snow cone" ice.
5	95	270	36	The liquid was turbid and medium brown in color. The solids resembled dirty ice crystals, much like "snow cone" ice.
6	92	260	34	The liquid was turbid and medium brown in color. The solids resembled dirty ice crystals, much like "snow cone" ice.
7	88	262	22	The liquid was turbid and medium brown in color. The solids resembled dirty ice crystals, much like "snow cone" ice.
8	98	295	22	The liquid was turbid and medium brown in color. The solids resembled dirty ice crystals, much like "snow cone" ice.
9	92	35	369	The drainable liquid was dark brown and opaque. The solid sample did not retain its shape following extrusion, but spread slowly across the sample tray. The dark brown solids appeared homogeneous, with the consistency of thin, wet mud.

Table 3-2. Tank 241-SY-103 Core 62 Subsampling Information[1]. (2 sheets)

Segment Number	Sampler Recovery (percent)	Drainable Liquid (mL)	Solid (g)	Sample Description
10	85	0	381	This segment contained no drainable liquid. The lower half segment was dark brown and retained the shape of the sampler after extrusion. The upper half was more wet and did not retain its shape, with the upper quarter being similar in appearance to segment 9.
11	95	0	431	This segment contained no drainable liquid. The solid material was slightly different in color from segment 10, having a grey vs. a red cast to the otherwise homogeneous brown color. This change occurred gradually, without a layering effect. The sample retained its shape following extrusion and was slightly pitted at the surface.
12	95	0	382	This segment contained no drainable liquid. The solid material was grey brown in color, soft and damp in texture, much like segment 11. The sample retained its shape following extrusion and was slightly pitted at the surface.
13	95	0	429	This segment contained no drainable liquid. The solid material was grey brown in color, soft and damp in texture, much like segments 11 and 12. The sample retained its shape following extrusion and was slightly pitted at the surface.
14	80	0	352	This segment contained no drainable liquid. About 25 cm (10 in.) of solid were extruded, followed by a 10-cm (4-in.) air gap, then 10 to 13 cm (4 to 5 in.) of solids. The solid material was grey brown in color, soft and damp in texture, and was slightly pitted at the surface.
15	52	125	na	This segment was composed primarily of drainable liquid. When the sampler valve was opened, an estimated 20 mL of liquid sprayed onto the hot cell wall. The amount of solids was difficult to determine due to the runny texture.

Note:

[1]From Rice (1994)

Figure 3-1. Test Plan Flowchart for Core 62 of Tank 241-SY-103. (2 sheets)

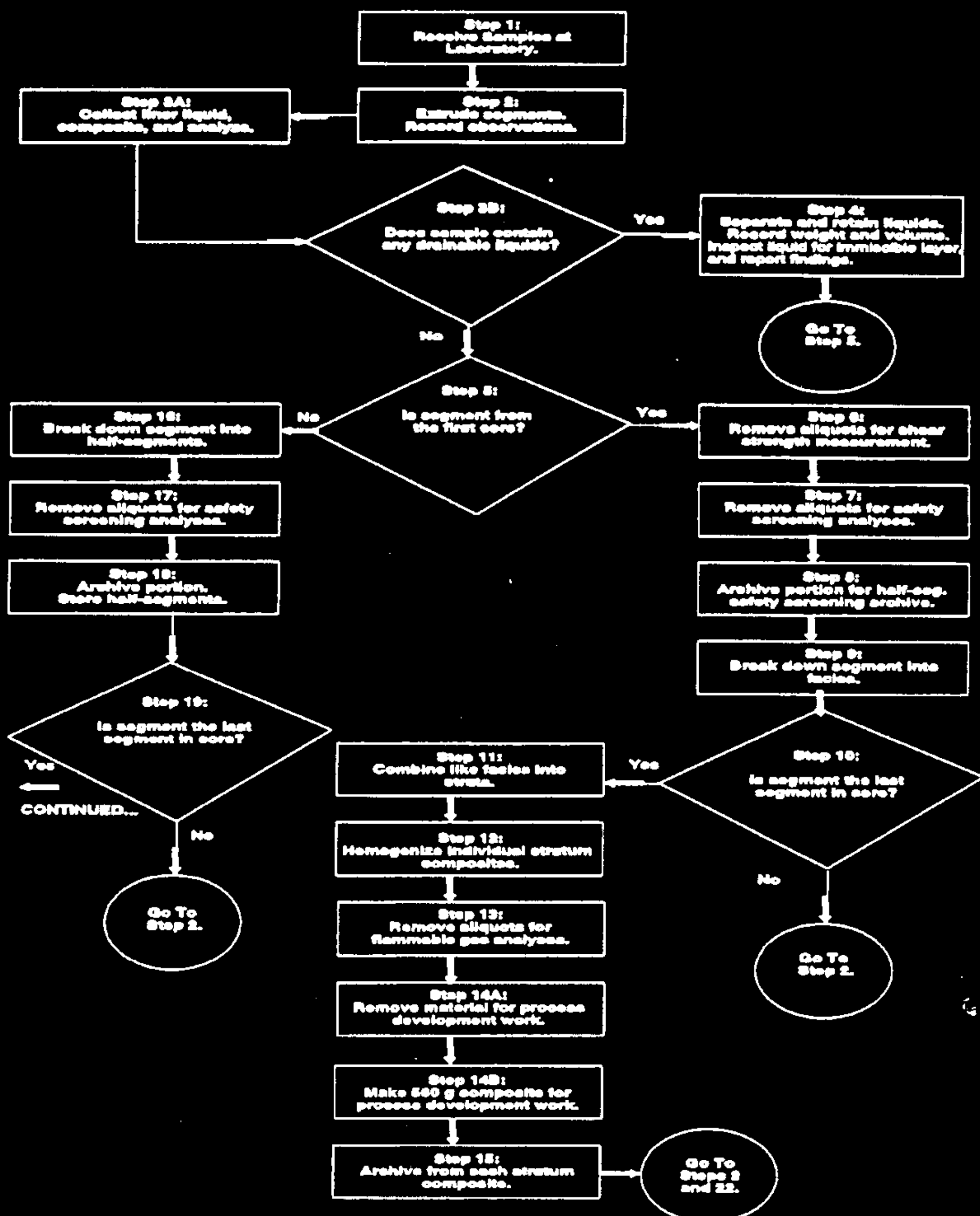
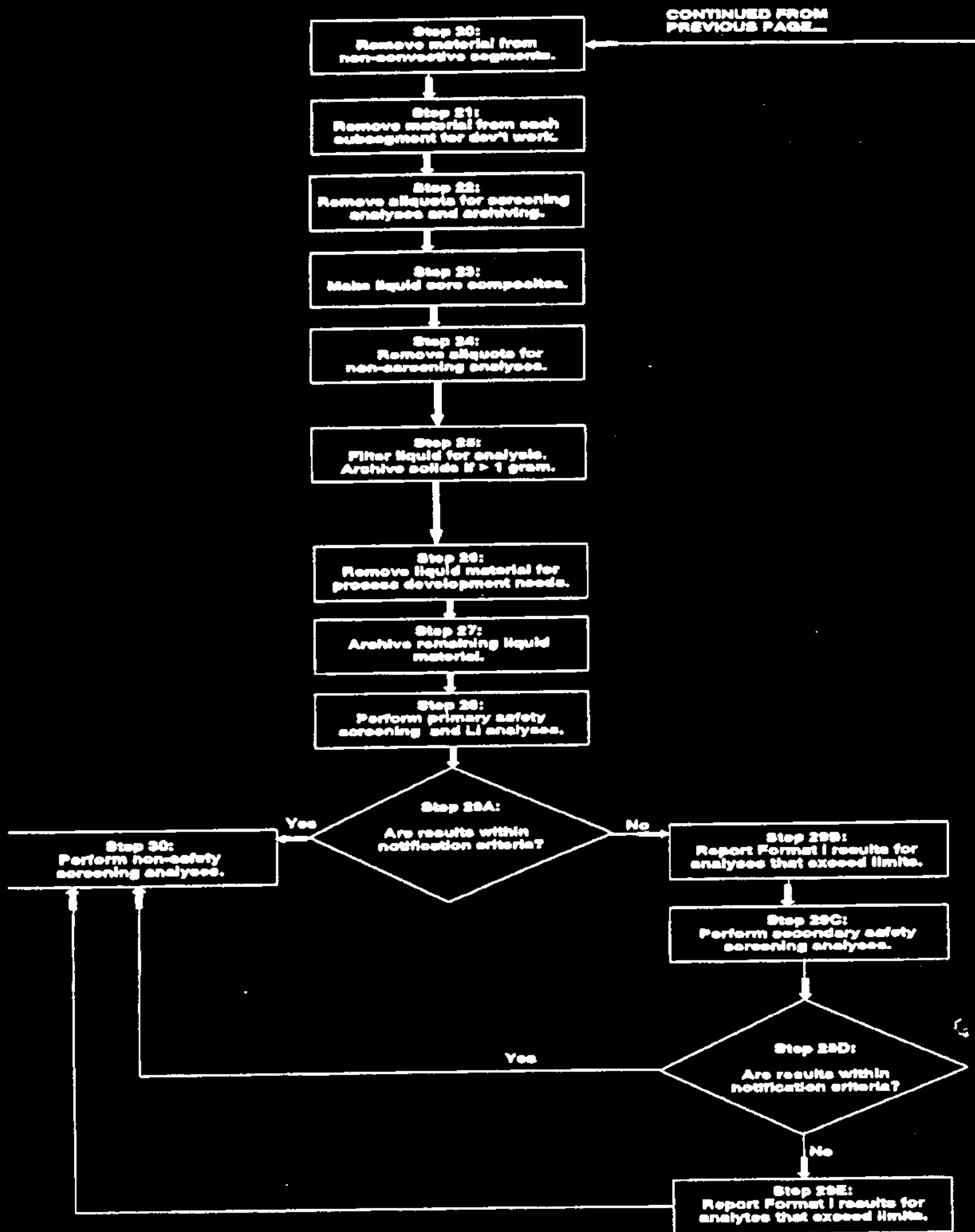


Figure 3-1. Test Plan Flowchart for Core 62 of Tank 241-SY-103. (2 sheets)



When segment 15 of core 62 was extruded in the 222-S Laboratory hot cell, internal pressure in the sampler caused approximately 20 mL of sample material to be sprayed on the wall of the hot cell. This pressurization was not anticipated. No injuries or imminent safety hazards resulted from the release (Rice 1994).

Samples taken in August 1986 did not exhibit pressurization, including the sample from the tank bottom. However, while a sample was being extruded from tank 241-SY-101 in 1991, pressurization did occur. As a result of this last release of pressure, the sampling procedures for the tanks on the Flammable Gas Watch List were modified to include additional requirements listed in the *Safety Basis for Activities in Double-Shell Flammable Gas Watch List Tanks* (VanVleet 1994). The procedure for operation of the on site transfer cask (WHC-SD-TP-SARP-002) is being reevaluated to determine the appropriate changes necessary for shipment of a sample of this nature (Mercado 1992). In addition, the new hot cells in the 222-S Laboratory are being equipped with baffles to minimize sample loss and spreading from a pressurized sampler.

After extrusion, each segment of core 62 was divided into two subsamples. Segments 1 through 9 and 15 were divided into drainable liquids and solids. Segments 10 through 14 did not contain any drainable liquid and were divided into upper and lower segment halves. The drainable liquid subsamples were analyzed by differential scanning calorimetry (DSC) and thermogravimetric analysis (TGA), while the solids from segments 1 through 9 and 15 and the upper and lower segment halves from segments 10 through 14 were analyzed for DSC, TGA, and total alpha activity. Each subsample underwent safety screening analysis following the tank characterization plan (TCP) (Schreiber 1994a). In addition, a sample of the HHF used during sampling was analyzed for lithium and bromide.

After the safety screening subsamples had been removed, the segments were visually evaluated for facies and strata. The drainable liquid was separated into the following subsamples: segments 1, 8, 9 and 15 (individual samples); and segments 2 through 7 (subsamples combined into a drainable liquid composite). The solids in segment 1, which were left behind after the liquid drained away, were identified as stratum 1 because they may contain crust material. Solids from segments 4 through 8 were combined into a stratum B composite (segments 2 and 3 contained insufficient solids to include in the composite). Segment 9 represented the liquid-solid interface, and the solids in it were treated as their own stratum (stratum C). Subsamples in segments 10 through 14 were collected into a composite labeled stratum D. Apparent sampling problems in segment 15 caused it to be analyzed separately.

The subsamples were analyzed for a variety of analytes including ICP, IC, and radiochemical. They are defined in the TCP analyte requirements in Table 1 of Schreiber (1995) as STRATA COMP. and FG LIQ.

3.1.2 1994 Core Sample Analysis

Safety screening analyses were performed on the subsamples of core 62 following the requirements of the *Tank Safety Screening Data Quality Objective* (Babad and Redus 1994), the *Flammable Gas Tank Safety Program: Data Requirements for Core Sample Analysis Developed Through the Data Quality Objective Process* (McDuffie and Johnson 1994), and tank 241-SY-103 TCP (Schreiber 1994a and 1995). The TCP stated that the safety screening analyses were required to be performed on half segments. However, the flammable gas DQO required that analyses be performed on composite samples made from discrete core strata. To meet both requirements, the TCP instructed that sample aliquots for the safety screening analyses be taken without dividing the segment into half segments or disturbing the stratification of the segment. Aliquots were to be removed from both halves of the segment without homogenization, as if the segment had actually been divided into half segments. The aliquots from core 62 were analyzed for energetics by DSC, percent water by TGA, and total alpha activity. The results from the safety screening analyses are reported in the *45-Day Safety Screen Results for Tank 241-SY-103, Core 62* (Rice 1994) and the *216-Day Safety Screen Results for Tank 241-SY-103, Core 62* (Rice 1995), and are included in Appendix A. Results from these reports are tabulated in Section 4.0.

Laboratory control standards and duplicate analysis quality control checks were applied to the TGA, DSC, and total alpha activity analyses. Blank analysis and spikes were also applied to the total alpha activity analysis. Assessment of the quality control data is presented in Section 5.0 of this document.

The TGA and DSC analyses were done on 5- to 20-mg specimens of the waste material under a nitrogen atmosphere; however, DSC samples S95T000085 and S95T000105 were inadvertently run in air. This did not appear to adversely affect the analysis. The total alpha activity specimens must be dissolved before analysis. This is accomplished by fusing a solid aliquot (0.2 to 0.5 grams) of the waste material in potassium hydroxide and dissolving, or digesting, the resultant fluxed material in hydrochloric acid. Total alpha activity is then determined on a liquid aliquot of the dissolved waste material.

All reported analyses were completed using approved laboratory procedures. No deviations or modifications to the procedures, except as noted in the above paragraph, are noted by the laboratory.

The TGA analysis was performed directly on each segment subsample. The average of one of the solid results (segment 8) was below the 17 percent action limit. The subsamples did not contain a significant exotherm by DSC, and are in a segment that is greater than 90 percent liquid. The solid(s) and drainable liquid samples met precision criteria except for the upper half of segment 14. The analysis was not rerun for this sample. Significant difficulty was encountered during the analysis of the "snow cone" ice-like solids from segments 1 through 9. These samples were observed during extrusion as crystalline in appearance. They were often reported as a heavy sticky syrup during analysis. Several samples had to be analyzed again because of reproducibility problems. In most cases, the rerun analyses substantiated the apparent heterogeneous nature of the samples.

During DSC analyses, two sample results were above the safety screen notification limit of 523 J/g, which prompted secondary analyses of TOC and cyanide for these samples (lower halves of segments 13 and 14). DSC analyses met with similar difficulties because of the heterogeneity problem discussed above, including the contamination of the DSC sensor. The laboratory noted that two samples were inadvertently run in air instead of nitrogen, but this did not appear to have a negative effect on the analyses. The duplicates were run in nitrogen.

The majority of the total alpha results for core 62 have very large detection limits. Although the "less than" values reported are high, they are still significantly below the notification limit. Standard results for segments 2 and 4 slightly exceeded the accuracy limit of 10 percent. Because the laboratory internal quality control limits were not exceeded, a rerun was not requested. Reproducibility criteria were exceeded by segments 9, 10, and 14, again because of large dilution factors. The counting statistics in this case were poor, making it difficult to attain the required reproducibility. No reruns were requested.

No analytical problems were noted with the lithium or bromide analyses of the HHF sample. However, the presence of HHF was suspected in segment 15. Bromide analysis of the sample determined that segment 15 suffered significant intrusion of HHF. The data for this segment were not corrected for HHF dilution. Lithium could not be used as a tracer in the HHF because it formed insoluble compounds in the SY-103 matrix. The lithium results reported in Appendix A may be biased low because of this. The bromine levels in all other samples indicate that the HHF contamination was less than 5 percent.

The TOC and cyanide results for segments 13 and 14 were below the notification limit. Reproducibility problems similar to those noted above were encountered because of a lack of sample homogeneity.

3.2 DESCRIPTION OF JUNE 1994 AUGER SAMPLING EVENT

The auger samples were obtained from June 2, 1994 through June 9, 1994, using risers 7B, 14A, and 22A (Bell 1994). The samples were taken to address the "crust burn" issue, which is the possibility of the waste crust in the tank becoming hot enough during intrusive (core) sampling activities to initiate an exothermic reaction, or to ignite the radiolytically-produced hydrogen gas (Schreiber 1994a). An auger sample was considered a satisfactory and safe way to evaluate the waste crust in the tank. A photo of the auger sample from riser 14B is included in Appendix E.

No problems with the sampling event were noted, with the exception of a kinked bounding spring in the auger sampler for riser 22A that caused some difficulty in removing the auger from the sleeve.

Table 3-3 lists the sample date, extrusion date, sample mass, and a description of the sample.

Table 3-3. Description of June 1994 Auger Samples[1].

Sample Location	Sample Date[2]	Extrusion Date[2]	Sample Mass (g)	Sample Description
Riser 7B	6/8/94	6/9/94	10.7	Hard, dry brittle crust on flutes 1-4 and 6, white to light gray color. Different texture than subsequent samples.
Riser 14A	6/6/94	6/7/94	9.05	95 percent of material on flute 2, white to light brown color. Smaller amounts on flutes 1 and 3.
Riser 22A	6/2/94	6/7/94	20.5	4 to 5 mL liquid in liner not recovered. White, crusty material recovered from flutes 1-3; white and dark brown material from flute 4; dark brown material from flutes 5-8.

Notes:

[1]From Bell (1994)

[2]Dates are listed in the mm/dd/yy format.

Table 3-4 lists pertinent information regarding the auger sampling event.

Table 3-4. Tank 241-SY-103 June 1994 Auger Sampling Information[1].

Shipment Number	Sample Number	Cask Number	Cask Seal Number	Drill String Dose Rate (mR/hr)	Segment/Riser
Auger samples					
33783	94-AUG-001	C-1046	2297	160	Riser 22A
43663	94-AUG-002	C-1043	3756	60	Riser 14A
na[2]	94-AUG-003	C-1054	na	na	Riser 7B

Notes:

[1]From Kocher (1994)

[2]Information not available

3.2.1 1994 Auger Sample Handling

After extrusion, the auger samples were subsampled for DSC, TGA, total inorganic carbon (TIC), and TOC. In two augers, (obtained from risers 14A and 7B), one subsample (A) was taken from the auger; the other (B) from the extrusion tray. The third auger, taken from riser 22A, was subsampled from the auger only. These six subsamples were used for the DSC and TGA analyses. Composite samples were obtained for the TIC and TOC analyses for risers 7B and 14A by combining material remaining on the auger and the tray after the DSC and TGA subsamples were obtained. In the case of the auger obtained from riser 22A, two composites were taken. Composite 1 was composed of the white crust material on flutes 1 to 3, and composite 2 was composed of the dark brown material from flutes 4 to 8.

3.2.2 1994 Auger Sample Analysis

TGA was performed directly on the subsamples. All samples met the relative percent difference criteria, with the exception of subsample B from riser 7B. The analysis was not rerun. The DSC analyses showed no exotherms. The data is in Appendix B.

Heterogeneity in the TIC and TOC samples from all three risers caused some quality control criteria to be exceeded. The problem was believed to be due to oversized samples which caused the upper limit of the analysis to be exceeded. A subsequent smaller sample improved the quality control results, but it did not bring them to specification.

3.3 DESCRIPTION OF THE 1986 CORE SAMPLING EVENT

In 1986, tank 241-SY-103 was sampled by the Rockwell Hanford Corporation. Using a core sampling method, one core with 12 segments was obtained (Fow et al. 1986). As shown in Figure 2-3, the tank was expected to contain mostly solids, with little or no supernate. (See Section 2.3 for a description of the expected solids composition.) Core segments 2, 7, and 12 were chosen to characterize the tank waste. The samples were taken in order to evaluate the suitability of the waste to be transported by pipeline and treated in vitrification and grouting facilities.

Segment 2, a brown slurry containing solid particles approximately 0.16 cm (0.06 in.) in diameter, was suspected to contain uranium sludge. It was taken from a depth of 483 to 531 cm (190 to 209 in.) from the tank bottom.

Segment 7, also brown and grainy, with larger particles and less fluid than segment 2, was thought to consist of DSS. This segment was taken at a depth of 241 to 290 cm (95 to 114 in.) from the tank bottom. A large, rock-like particle about 0.64 cm (0.25 in.) in diameter and 0.25 cm (0.10 in.) thick was found in segment 7. Segment 12 had the appearance of dark brown chunky peanut butter mixed with sand without the adhesive properties of peanut butter. This sample was taken from the bottom of the tank and was suspected to contain concentrated complexed waste.

3.3.1 1986 Core Sample Handling

Pacific Northwest National Laboratory (PNNL) personnel combined the two samples from each core segment into one container (three total) prior to characterization, then preparation procedures were performed according to analysis. In general, chemical and radiochemical analyses were preceded by dissolution in acid or by dilution in water. Physical analyses were preceded by dilution or by oven drying.

3.3.2 1986 Core Sample Analysis

Chemical and radiochemical analyses were preceded by dissolution in concentrated nitric acid and heating until the sample was dissolved or by adding water until the water-to-waste ratio was approximately 10:1 (V/V). The acid-digested samples were used for the inductively coupled plasma analysis and for the radiochemical analyses. The 10:1 (V/V) water slurry solutions were used for the ion chromatography, carbonate, and hydroxide analyses.

Physical properties measured for tank 241-SY-103 wastes were density and settling rates. Preparation for the physical tests (see Section 4.3.1) consisted of placing 5 mL of each of the three segment samples in a 10-mL graduated cylinder. This procedure was repeated. Three of the resulting six cylinders were then dried, and the remaining three were placed in a 10 °C (50 °F) water bath. Settling rate data were gathered over the next three days, then the samples were weighed, and the density was calculated.

The results of the chemical and radiochemical analyses of the 1986 samples are tabulated in Appendix C (Fow et al. 1986). Physical properties are discussed in Section 4.3.

3.4 GAS MONITORING

In addition to the online SHMS described in Section 2.4.3, a series of grab samples were taken between August and October. Table 3-5 lists the dates and gas concentrations found (Wilkins 1995).

Table 3-5. 1995 Tank 241-SY-103 Grab Samples.

Date	H_2, ppm	N_2O, ppm	Other, ppm
August 18	19	<10	
August 18	19	<10	
August 25	16	<10	
August 25	38	18	
September 1	63	39	CH_4 = 11 [1]
September 1	3	<10	
September 7	<40	<10	
September 7	38	32	
September 15	27	23	
September 15	15	<10	
September 23	28	12	
September 23	48	23	
October 6	16	<5	
October 6	22	5	
October 19	22	4	
October 19	28	6	

Note:

[1]Methane was normally reported as being less than 10 ppm.

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4.0 ANALYTICAL RESULTS AND WASTE INVENTORY ESTIMATES

4.1 OVERVIEW

The purpose of this section is to summarize the sampling and analytical results from each event as reported in the appendices. This section uses the data from the 1994 core sampling event to arrive at a single estimate of the analyte concentration and total amount of the analyte in the tank (inventory) based on the volumes of solid and liquid layers estimated to be in the tank (Rice 1995).

The convective (mixing) and nonconvective (nonmixing) layer compositions are based on the analyses of the 1994 core sampling event and are reported in Appendix A. Physical measurements were taken on the 1994 core sample as well.

The chemical and radiochemical results from the 1986 sampling event were not used to calculate tank inventories. Supernatant was added to the tank after the 1986 sampling event. The solids sampled may not be representative of what is currently in the tank near the surface of the liquid/solid interface, and the three individual segments are not as useful as the segment composites from the 1994 core for calculating a concentration of the solids.

In deriving the inventory estimates, if all of the values were below the detection limit, the inventory result was identified as not available (na). If at least one value was above the detection limit, that value was used to calculate an inventory amount. The rest of the inventory estimates were based on the average of two results generated from duplicate samples. No attempt was made to derive an estimate of error caused by the low sample size (2). The derivation of the tank inventory estimates is discussed in the next section.

4.2 DATA PRESENTATION

A summary of the data obtained from the analyses of the composite samples obtained from the 1994 core sample from tank 241-SY-103 are shown in Tables 4-1, 4-2, and 4-3. Tables 4-1 and 4-2 are data summaries for the convective and nonconvective layers. Table 4-3 is an estimated inventory based on the sum of Tables 4-1 and 4-2. The first column, "analyte method," is the method used to determine the analyte concentration. For many of the metals, two different methods were used to prepare the samples. The higher of the fusion (F) or acid digest (A) results was used to calculate tank inventories. Composite B and D samples were used to calculate the solids values in the convective and nonconvective layers respectively. The drainable liquid composite sample for segments 2-7 was used to calculate the liquid values in the convective layer. Each segment is 48 cm (19 in.) long.

Table 4-1. Convective Layer Summary. (2 Sheets)

Method/ Analyte	Drainable Liquid Composite		Stratum B Composite		Convective Layer Est. wt (kg)
	Average Concentration (µg/mL)	Est. wt (kg)	Average Concentration (µg/g)	Est. wt (kg)	
IC. Formate	4.24E+3	5.72E+3	2.75E+3	3.96E+2	6.12E+3
IC. Oxalate	<2.55E+3	na	<96.8	na	na
IC. Cl^-	1.16E+4	1.57E+4	4.52E+3	6.51E+2	1.64E+4
IC. F^-	<3.06E+2	na	na	na	na
IC. NO_2^-	1.43E+5	1.93E+5	5.56E+4	8.01E+3	2.01E+5
IC. NO_3^-	1.79E+5	2.42E+5	3.56E+5	5.13E+4	2.93E+5
IC. PO_4^{3-}	3.12E+3	4.21E+3	1.93E+4	2.78E+3	6.99E+3
IC. SO_4^{2-}	<4.08E+3	na	1.36E+3	1.96E+2	1.96E+2
OH^-	2.86E+4	3.86E+4	1.05E+4	1.51E+3	4.01E+4
ICP. Al	4.14E+4	5.59E+4	2.75E+4 (A)	3.96E+3	5.99E+4
ICP. B	8.9E+1	1.2E+2	na	na	1.2E+2
ICP. Ca	1.18E+2	1.59E+2	1.94E+2 (A)	2.8E+1	1.87E+2
ICP. Cr	3.3E+1	4.5E+1	3.1E+1 (A)	4	4.9E+1
ICP. K	3.91E+3	5.28E+3	2.72E+3 (A)	3.92E+2	5.67E+3
ICP. Na	2.12E+5	2.86E+5	2.12E+5 (F)	3.05E+4	3.17E+5
ICP. Ni	4.9E+1	6.6E+1	3.4E+1 (A)	5	7.1+1
ICP. Si	7.9E+1	1.07E+2	na	na	1.07E+2
ICP.Zn	<4.2	na	3.6E+1 (A)	5	5
ICP.Zr	<4.2	na	<1.93 (A)	na	na
ICP.Fe	<2.1E+1	na	4.8E+1 (A)	7	7
ICP.Bi	<4.2E+1	na	na	na	na
ICP.Ba	<2.1E+1	na	na	na	na
U	2.82	4	<2.12E-2	na	4
TOC	9.64E+3	2.82E+4[1]	2.66E+3	6.83E+2[1]	2.89E+4
H_2O (%)	48.43 %	9.59E+5	46.68%	6.72E+4	1.03E+6

Table 4-1. Convective Layer Summary. (2 Sheets)

Analyte	Drainable liquid composite		Stratum B composite		Convective Layer Act. (Ci)
	Average Activity (μCi/mL)	Est. act. (Ci)	Average Activity (μCi/g)	Est. act. (Ci)	
^{241}Am	1.75E-3 (D)	2.36	<2.50E-3 (R) <1.47E-2 (F)	na	2.36
^{137}Cs	4.23E+2 (D)	5.71E+5	1.76E+2 (R) 1.34E+2 (F)	2.53E+4 (R)	5.96E+5
^{60}Co	<1.69E-2 (D)	na	<6.26E-3 (R) <2.27E-2 (F)	na	na
$^{243/244}$Cm	<7.77E-4 (D)	na	<2.50E-3 (R) <1.47E-2 (F)	na	na
^{154}Eu	<8.02E-2 (D)	na	<2.67E-2 (R) <5.98E-2 (F)	na	na
^{155}Eu	<2.58E-1 (D)	na	<1.32E-1 (R) <3.08E-1 (F)	na	na
^{129}I	1.91E-4 (V)	2.58E-1	<1.68E-1 (F)	na	2.58E-1
^{237}Np	<5.93E-4 (D)	na	<2.42E-3 (R) <1.45E-2 (F)	na	na
^{238}Pu	<6.12E-5 (D)	na	<3.13E-4 (R) 3.99E-3 (F)	5.75E-1	5.75E-1
$^{239/240}$Pu	<6.12E-5 (D)	na	<3.13E-4 (R) <2.42E-3 (F)	na	na
^{90}Sr	2.98 (D)	4.02E+3	1.30 (R) 1.12 (F)	1.87E+2 (R)	4.21E+3
^{99}Tc	1.63E-1 (D)	2.20E+2	1.47E-1 (F)	2.12E+1 (F)	2.41E+2
Tritium	2.34E-3 (D)	3.16	<4.73E-4 (W)	na	3.16
Total alpha	<2.52E-2 (D)	na	<4.51E-3 (F)	na	na
Total beta	4.24E+2 (D)	5.72E+5	1.71E+2 (F)	2.46E+4	5.97E+5

Notes:

(A) = acid digest
(D) = diluted with acid
(F) = fusion in Ni crucible
(R) = acidified water digest
(V) = water dilution - no acid added
(W) = water digested - no acid added
IC = ion chromatography
ICP = inductively coupled plasma
na = not available
TOC = total inorganic carbon

[1]As kg of acetate, corrected for formate contribution

Table 4-2. Nonconvective Layer Summary. (2 Sheets)

Method/analyte	Stratum D composite	
	Average concentration ($\mu g/g$)	Estimated weight (kg)
IC. Formate	4.960E+3	1.07E+4
IC. Oxalate	2.08E+4	4.47E+4
IC. Cl^-	7.03E+3	1.51E+4
IC. F^-	1.56E+3	3.35E+3
IC. NO_2^-	8.19E+4	1.76E+5
IC. NO_3^-	9.81E+4	2.11E+5
IC. PO_4^{3-}	1.56E+4	3.35E+4
IC. SO_4^{2-}	7.82E+3	1.68E+4
OH^-	1.84E+4	3.96E+4
ICP. Al (F)	3.96E+4	8.51E+4
ICP. Ca (A)	3.5E+2	7.52E+2
ICP. Cr (F)	1.02E+4	2.19E+4
ICP. K (A)	3.34E+3	7.18E+3
ICP. Na (A)	1.87E+5	4.02E+5
ICP. Ni (A)	1.02E+2	2.19E+2
ICP.Fe (F)	2.70E+3	5.80E+3
ICP.Zn (A)	2.3E+1	4.9E+1
ICP.Zr (A)	5.7E+1	1.23E+2
U	7.76E+2	1.67E+3
TOC	1.06E+4	1.94E+4[1]
TIC	8.80E+3	9.46E+4[2]
H_2O (%)	32.99%	7.09E+5

Table 4-2. Nonconvective Layer Summary. (2 Sheets)

Analyte	Stratum D composite	
	Average activity (µCi/g)	Est. Activity (Ci)
^{241}Am	6.68E-1 (F)	1.44E+3 (F)
^{137}Cs	2.50E+2 (R) 2.32E+2 (F)	5.38E+5 (R)
^{60}Co	2.28E-2 (R) 4.90E-2 (F)	1.05E+2 (F)
$^{243/244}$Cm	<2.37E-3 (F)	na
^{154}Eu	<5.37E-2 (R) 7.54E-1 (F)	1.62E+3 (F)
^{155}Eu	<1.81E-1 (R) 6.55E-1 (F)	1.41E+3 (F)
^{129}I	<5.25E-2 (F) <2.23E-2 (W)	na
^{237}Np	<2.60E-3 (R) <1.20E-2 (F)	na
^{238}Pu	5.07E-4 (R) 1.62E-2 (F)	3.48E+1 (F)
$^{239/240}$Pu	9.41E-4 (R) 6.23E-2 (F)	1.34E+2 (F)
^{90}Sr	2.16 (R) 3.48E+1 (F)	7.48E+4 (F)
^{99}Tc	2.44E-1 (F) 1.35E-1 (R)	5.25E+2 (F)
Tritium	na	na
Total alpha	5.68E-1 (F)	1.22E+3 (F)
Total beta	4.32E+2 (F)	9.29E+5

Notes:

(A) = acid digest
(F) = fusion in a Ni crucible
(R) = water digest acidified for radchem
(W) = water digest - no acid added
na = not available

[1]As kg of acetate, corrected for formate and oxalate contribution

[2]As kg of carbonate

Table 4-3. Tank 241-SY-103 Inventory. (2 Sheets)

Analyte	Convective layer (kg)	Nonconvective Layer (kg)	Total (kg)
Formate	6.12E+3	1.07E+4	1.68E+4
Oxalate	na	4.47E+4	4.47E+4
Cl^-	1.64E+4	1.51E+4	3.15E+4
F^-	na	3.35E+3	3.35E+3
NO_2^-	2.01E+5	1.76E+5	3.77E+5
NO_3^-	2.93E+5	2.11E+5	5.04E+5
PO_4^{3-}	6.99E+3	3.35E+4	4.05E+4
SO_4^{2-}	1.96E+2	1.68E+4	1.70E+4
OH^-	4.01E+4	3.96E+4	7.97E+4
Al	5.99E+4	8.51E+4	1.47E+5
B	1.2E+2	na	1.2E+2
Ca	1.87E+2	7.52E+2	9.39E+2
Cr	4.9E+1	2.19E+4	2.19E+4
K	5.67E+3	7.18E+3	1.28E+4
Na	3.17E+5	4.02E+5	7.19E+5
Ni	7.1E+1	2.19E+2	2.9E+2
Si	1.07E+2	na	1.07E+2
Zn	5	4.9E+1	5.4E+1
Zr	na	1.23E+2	1.23E+2
Fe	7	5.80E+3	5.81E+3
U	4	1.67E+3	1.67E+3
TOC	2.89E+4[1]	9.02E+3[1]	3.79E+4[1]
TIC	na	9.46E+4[2]	9.46+04[2]

Table 4-3. Tank 241-SY-103 Inventory. (2 Sheets)

Analyte	Convective Layer Activity (Ci)	Nonconvective Layer Activity (Ci)	Total Activity
^{241}Am	2.36	1.44E+3	1.44E+3
^{137}Cs	5.96E+5	5.38E+5	1.13E+6
^{60}Co	na	1.05E+2	1.05E+2
^{154}Eu	na	1.62E+3	1.62E+3
^{155}Eu	na	1.41E+3	1.41E+3
^{129}I	2.58E-1	na	2.58E-1
^{238}Pu	5.75E-1	3.48E+1	3.54E+1
$^{239/240}$Pu	na	1.34E+2	1.34E+2
^{90}Sr	4.21E+3	7.48E+4	7.90E+4
^{99}Tc	2.41E+2	5.25E+2	7.66E+2
Tritium	3.16	na	3.16
Total alpha	na	1.17E+3	1.17E+3
Total beta	5.97E+5	9.29E+5	1.53E+6

Notes:

na = not available

[1]As kg of acetate, corrected for formate and oxalate concentration

[2]As kg of carbonate

Table 4-4. Calculated Tank Volumes and Masses.

	Convective Layer		Nonconvective Layer
	Drainable Liquid	Solids	
Density (g/mL)	1.47	1.51	1.57
Volume (kL)	1.35E+3	9.6E+1	1.37E+3
Mass (kg)	1.98E+6	1.44E+5	2.15E+6

The projected inventory of the tank was based on the height of the waste at the time of the inventory (686 cm [270 in.]), which is approximately 2,820 kL (745 kgal) of waste (Schreiber 1995). The historical estimate of the tank contents on January 1994 was 2,870 kL (758 kgal) of waste, of which 2,184 kL (577 kgal) was expected to be solids (Hanlon 1995). The results of the extrusion of core 62 from tank 241-SY-103 indicate that the surveillance-based estimates of the liquid and solid layers in the tank are not very reliable. The liquid-solid interface was found in segment 9, out of 15 segments, indicating that about half of the tank contents are supernatant.

At the time of the 1994 core sampling, the depth of the waste was estimated to be 686 cm (270 in.). To estimate the tank inventory, an estimate of the liquid (convective) layer and solid (nonconvective) layer was made from the extrusion data shown in Table 3-2. Based on the length of each segment (19 in.) and the estimated height of the liquid-solid interface in segment 9, the height of the liquid layer (in segments) can be converted to a volume.

The density of the drainable liquid and the solids from segment 9 were about the same (1.47 g/mL vs. 1.51 g/mL), so the volume of the liquid and solid (obtained from the hot cell extrusion data sheets) was used to estimate the fraction of segment 9 that was attributable to the liquid layer. In any case, the exact point of the liquid/solid interface is difficult to accurately determine because of solids settling and suspension variables. The tank also has cyclic height changes that may affect this interface. The following formula was used to calculate what fraction segment 9 is liquid. The volumes used were obtained from hot cell data sheets.

vol. liquid/(vol. liquid + vol. solid) = 35/(35 + 250) = 0.12 segment.

The first segment was only sampled to a depth of 10 cm (4 in.). The height of the convective layer, including the crust, can be estimated at 7.12 segments plus the 10 cm of the first segment. Each segment is 48 cm (19 in.) long. This calculates to a height of 354 cm (139 in.). A height of 354 cm is approximately 1,450 kL (384 kgal). No data has been collected on the thickness of the crust layer or its composition. The historical estimate for the crust is about 15 kL (4 kgal), which is used in the following formula to help estimate the volume of the nonconvective layer.

Nonconvective vol. = total vol. - (crust vol. + convective vol.).

The nonconvective volume has been estimated to be 1,370 kL (362 kgal) by this method.

The convective layer consisted mainly of liquids with some solids present. Based on the stratum B composite, the solids represent about 7 percent by weight in the convective layer. Because of the small amount of solids present and the closeness in densities of the solids and liquids, the density of the convective layer can be approximated as 1.47 g/mL, which is the drainable liquid composite sample density. The solids would then represent about 1.44E+05 kg and the liquids about 1.98E+06 kg (1,350 kL) (356 kgal) in the convective layer. This solids-corrected convective layer volume is used to calculate inventory from the drainable liquid composite sample analyses. The solids weight is used to calculate inventory contributions from stratum B composite sample analyses. The calculated volumes and masses used in determining the convective and nonconvective inventories are summarized in Table 4-4. No attempt was made to derive an estimate of error in Table 4-3 and 4-4.

Solids in the convective layer were analyzed with a polorizeable light microscope and were identified as tri-sodium phosphate with a large amount of interstitial liquid (Rice 1995). It is possible that cooling the sample from tank temperature (approximately 34 °C [94 °F]) to room temperature caused the solid to precipitate because tri-sodium phosphate is relatively insoluble in water. No further attempts were made to analyze the solids independently from the interstitial liquid.

The nonconvective layer was made up of solids that varied in consistency from a thin wet mud to a damp solid that retained its shape after extrusion.

4.3 PHYSICAL MEASUREMENTS

Physical analyses were performed on samples taken in 1986 and 1994. The physical and rheological properties measured in 1986 included density, settling rate, apparent viscosity, yield stress, and shear strength (Fow et al. 1986). Analyses on the 1994 core sample include density, viscosity, shear strength, volume percent solids, and solids settling rate (Schreiber 1995). The 1986 solids contents of tank 241-SY-103 should be similar to the current solids contents. The sampling plans for the two sampling events make direct comparisons difficult. Three segments were chosen for the 1986 sampling event (segments 2, 7, and 12) in an attempt to characterize the uranium sludge, DSS, and the CCPLX layers in the tank. In the 1994 sampling event, the segments containing solids (segments 10 through 14) were subsampled and combined into a composite before analysis.

4.3.1 Density, Percent Solids and Settling Behavior

The bulk densities for the composite samples from 1994 and the segment densities from 1986 are shown in Table 4-5. Additional data on dilutions of the 1986 samples are in Appendix C. The stratum D sample density does not include any sample from the last segment because of an apparent sampling failure. There is significant variance in segment 12 from the 1986 data because of the difficulty in measuring the segment's volume.

The volume percent centifuged solids decreased with caustic strength at a dilution ratio of 3.0:1 (V/V) from 11% for deionized water to 4% for 2 M NaOH. The decrease in volume percent settled solids at 60 and 80 °C was nearly linear, decreasing from 100% to about 40% between the dilution ratios of 0:1 (no dilution) and 1.0:1 (V/V). At 30 °C, the decrease in

Table 4-5. Densities of Waste Samples from Tank 241-SY-103.

Sample Point	Sample Year	Density (g/mL)
Segment 2	1986	1.52
Segment 7	1986	1.54
Segment 12	1986	1.60[1], 1.78[2], 1.90[3]
Drainable liguid composite (segment 2-7)	1994	1.47
Drainable liquid (segment no. 8)	1994	1.47
Stratum A (segment 1)	1994	1.59
Stratum B (segment 4-8)	1994	1.51
Stratum C (segment 9)	1994	1.51
Stratum D (segment 10-14)	1994	1.57

Notes:

[1]Measured when 1:1 (v/v) dilution was prepared.

[2]Calculated based on 1:1 (v/v) density.

[3]Calculated based on 1:2 (v/v) density.

volume percent settled solids showed a near linear decrease from 100 percent to 40 percent between 0.15:1 and 1.0:1 (V/V). The volume percent settled solids was near 20 percent for all diluents at 30, 60, and 80 °C (Bredt et al. 1995).

Percent solids was not measured in the 1986 samples.

Solids settling behavior was measured at two temperatures (10 °C and 46 °C [50 °F and 115 °F]) for the three segments in 1986, as well as several dilutions. See Appendix C, Tables C-3 through C-6, for the settling rates of the 1986 samples. The solids in the undiluted samples of segment 2 and segment 7 settled very slowly. The settling rate for the undiluted sample of segment 12 was not determined because it had no supernatant. The solids in the dilutions had settled substantially by the end of the first day and had completed settling by the end of the second day. Settling rates were not determined for the 1994 core sample.

4.3.2 Thermodynamic Analyses

TGA and DSC were not performed on the 1986 samples.

The safety screening results of individual segments were reported in the *45-Day Safety Screening Report* and are summarized in Table 4-6 (Rice 1994). The average of one solid

Table 4-6. Safety Screen Results for Core 62, Tank 241-SY-103.

Segment	Location	Average TGA (percent water)	Average DSC J/g (dry)	Average Alpha (μCi/g)
1	Drainable liquid	48.81	173	NR
	Solid	39.18	118 (193)	<2.29E-1
2	Drainable liquid	48.71	206	NR
	Solid	34.30	No Exo	<1.26E-1
3	Drainable liquid	47.62	162	NR
	Solid	19.52	43 (53)	<1.03E-1
4	Drainable liquid	48.52	200	NR
	Solid	35.24	57 (82)	<1.02E-1
5	Drainable liquid	48.34	216	NR
	Solid	19.69	No Exo	<2.57E-1
6	Drainable liquid	49.22	158	NR
	Solid	29.57	193 (276)	<2.50E-1
7	Drainable liquid	49.79	144	NR
	Solid	26.93	147 (224)	<1.95E-1
8	Drainable liquid	48.89	227	NR
	Solid	15.59[1]	No Exo	<1.38E-1
9	Drainable liquid	48.83	286	NR
	Solid	45.34	174 (319)	7.3E-1
10	Upper	43.72	202 (358)	5.6E-1
	Lower	40.42	160 (268)	8.9E-1
11	Upper	45.74	227 (419)	8.1E-1
	Lower	38.34	109 (246)	9.1E-1
12	Upper	41.49	113 (193)	9.8E-1
	Lower	42.45	201 (349)	<7.53E-1
13	Upper	39.81	196 (326)	1.13
	Lower	40.22	377 (630)[2]	9.1E-1
14	Upper	38.80	149 (245)	9.9E-1
	Lower	41.10	273 (464)	1.54
15	Drainable liquid	75.06	181	NR
	Solid	68.75	No Exo	<4.88E-1

Notes:

NR = not requested

[1]Below the notification limit of 17 percent water

[2]Above the notification limit of 523 J/g (dry)

sample had a result below the safety screen notification limit of 17 percent water (segment 8). It did not, however, contain a significant exotherm, and it is in a segment that was greater than 90 percent water. One sample (lower half of segment 13) had a result above the safety screen notification limit of 523 J/g (dry). The lower half of segment 14 also had a result above the safety screen notification limit, but the duplicate did not, and the average was below the limit.

4.3.3 Shear Strength

Shear strength was measured on both sets of core samples. Of the 1986 samples analyzed, segments 2 and 7 did not exhibit detectable shear strengths. Segment 12 had a maximum shear strength value of 16,430 dynes/cm (Fow et al. 1986). Shear strength was measured on two sets of samples from the 1994 core sampling event. The shear strength of the undisturbed samples was approximately 10,000 dyne/cm^2, while the highest yield stress observed for the gently hand-stirred composite was only 63 dyne/cm^2 (Bredt et al. 1995).

4.3.4 Shear Stress Versus Shear Rate for Tank 241-SY-103

The apparent viscosity of the samples taken from the nonconvective layer composite sample obtained in 1994 decreased with both temperature and dilution. The effect of temperature is most pronounced between and 30 and 60 °C, decreasing from 320 to 120 cP for the undiluted sample at 400 s^{-1}. With dilution, the decrease is most pronounced between the undiluted and 0.15:1 (V/V) sample, decreasing from 320 to 110 cP at 400 s^{-1}. The apparent viscosity of the composite and diluted samples decreased with increasing shear rate above a yield point. Foam formation in the samples caused an increase in apparent viscosity with increasing shear rate for the 0.50:1, 1.0:1, and 3.01:1 (V/V) diluted samples. The increase in apparent viscosity resulting from foam formation was seen above 300 s^{-1} for the 0.51 and 1.0:1 (V/V) diluted samples and above 50 s^{-1} for the 3.0:1 (V/V) diluted samples.

The Yield Power Law equation is as follows:

$$\sigma = \alpha + \beta \gamma^{n}$$

where

σ = shear stress in Pa (lb$_f$/ft^2)
γ = shear rate
α = yield stress (not a fit parameter)
β and n are fit parameters

Results from the power law model are shown in Table 4-7 (Bredt et al. 1995).

Table 4-7. Tank 241-SY-103 Core 62 Rheological Data. (2 sheets)

Dilution	Temperature (°C)	Viscosity 100-400 s⁻¹ (cP)	Yield Point (Pa)	Consistency Parameter (Pa sec)	Flow Index Behavior	Comments
0:1	30	560-340	4.3	2.32	0.677	
0:1 Dup	30	370-290	3.7	0.659	0.859	
0:1	60	180-110	6.3	0.289	0.814	
0:1 Dup	60	220-130	4.8	1.05	0.628	
0:1	90	240-120	0.33	5.98	0.327	
0:1 Dup	90	250-120	1.3	4.78	0.373	
0:15:1	30	140-110	1.1	0.241	0.873	
0:15:1 Dup	30	130-110	0.84	0.196	0.896	
0:15:1	60	82-50	1.6	0.322	0.670	
0:15:1 Dup	60	100-60	2.1	0.450	0.635	
0:15:1	90	90-42	4.5	0.274	0.634	
0:15:1 Dup	90	110-52	4.7	0.362	0.631	
0:30:1	30	58-50	0.53	0.0745	0.927	
0:30:1 Dup	30	60-51	0.52	0.0902	0.900	
0:30:1	60	77-43	1.0	0.481	0.584	
0:30:1	90	69-32	4.2	0.110	0.731	
0:30:1 Dup	90	73-34	0.66	0.948	0.435	
0:50:1	30	1.5-4.3				a
0:50:1 Dup	30	9-7	0.085	0.0166	0.848	b
0:50:1	60	15-10	0.32	0.0380	0.752	b
0:50:1 Dup	60	15-10	0.27	0.0348	0.778	b
0:50:1	90	20-12	0.85	0.0240	0.845	b
0:50:1 Dup	90	21-12	0.84	0.0438	0.748	b
1.0:1	30	16-13	0.17	0.0266	0.873	b
1.0:1 Dup	30	17-13	0.16	0.0408	0.802	b
1.0:1	60	11-8	0.24	0.0265	0.777	b
1.0:1 Dup	60	13-9	0.22	0.0358	0.749	b
1.0:1	90	13-9	0.31	0.0438	0.696	b
1.0:1 Dup	90	15-9	0.36	0.0527	0.683	b

Table 4-7. Tank 241-SY-103 Core 62 Rheological Data. (2 sheets)

Dilution	Temperature (°C)	Viscosity 100-400 s^{-1} (cP)	Yield Point (Pa)	Consistency Parameter (Pa sec)	Flow Index Behavior	Comments
1:3	30	4-6				a,c
1:3 Dup	30	4-6				a,c
1:3	60	6-7				a,c
1:3 Dup	60	7-7				a,c
1:3	90	7-6				a,c
1:3 Dup	90	5-6				a,c

Notes:

[a]Foam formation prevents modeling using yield power law.

[b]Model fit fails above 300 s^{-1}, apparent dilatant behavior observed above 300 s^{-1}.

[c]Apparent dilatant behavior observed above 50 s^{-1}.

The rheological parameters for diluted and undiluted 1986 samples are in Appendix C, Table C-7. The data indicate that segment 12 is yield-pseudoplastic, whereas the remaining samples do not exhibit a yield stress. The diluted samples number 2(1:1)[1] and number 12(1:2)[1] at 10 and 46 °C (50 and 115 °F), and number 12(1:1)[1] at 10 °C were found to be dilatant fluids, which means the fluids become more viscous at higher shear rates. The remaining diluted samples became less viscous as the shear rates increased. They are identified as pseudoplastic fluids. Apparent viscosities were calculated based on the 1986 core data for various samples and dilutions using flows of 189 and 284 L/min (50 and 75 gal/min), which yields a shear rate of 70 and 104 sec^{-1} for schedule 40 pipe. The results are summarized in Appendix C, Table C-8.

A ball rheometer was deployed in July and August of 1995 in risers 17C and 22A. The rheological properties of the convective layer were uniform and characterized by a viscosity of approximated 45 cP and a yield strength of less than 2 Pa. The nonconvective layer had a yield strength of less than 210 Pa and an apparent viscosity of 10^4 to 10^5 cP. The rheology of the nonconvective layer varied widely with depth and was very sensitive to shear history, more so in riser 22A than 17C. The ball rheometer was not able to penetrate a heel layer about 120 cm thick on the tank bottom (Shepard et al. 1995).

[1]The values inside the parentheses indicate the size of the sample dilution by volume.

4.4 GAS MONITORING

Waste tank 241-SY-103 is on the Flammable Gas Watch List. Gas release events occur in this tank every two or three months. Hydrogen and ammonia online gas monitors have been installed. Figure 4-1 gives the results from the hydrogen monitor for December, 1994 through September, 1995. Figure 4-2 gives the results from the ammonia monitor located in the SY Farm exhaust stack for August 23, 1995 through September 13, 1995.

In July and August of 1995, a void fraction instrument was operated in risers 17C and 22A. The results indicate that the nonconvective layer contains up to 12 percent void. The average void fraction was 0.05/± 0.019 at riser 17C and 0.084 ± 0.021 at riser 22A. The stored gas volume based on these void fraction measurements is 210 ± 60 M^3 at 1 atmosphere. This is consistent with the volume estimated from the observed response of waste level to atmospheric pressure (Shepard et al. 1995).

Figure 4-1. Tank 241-SY-103 Hydrogen Results.

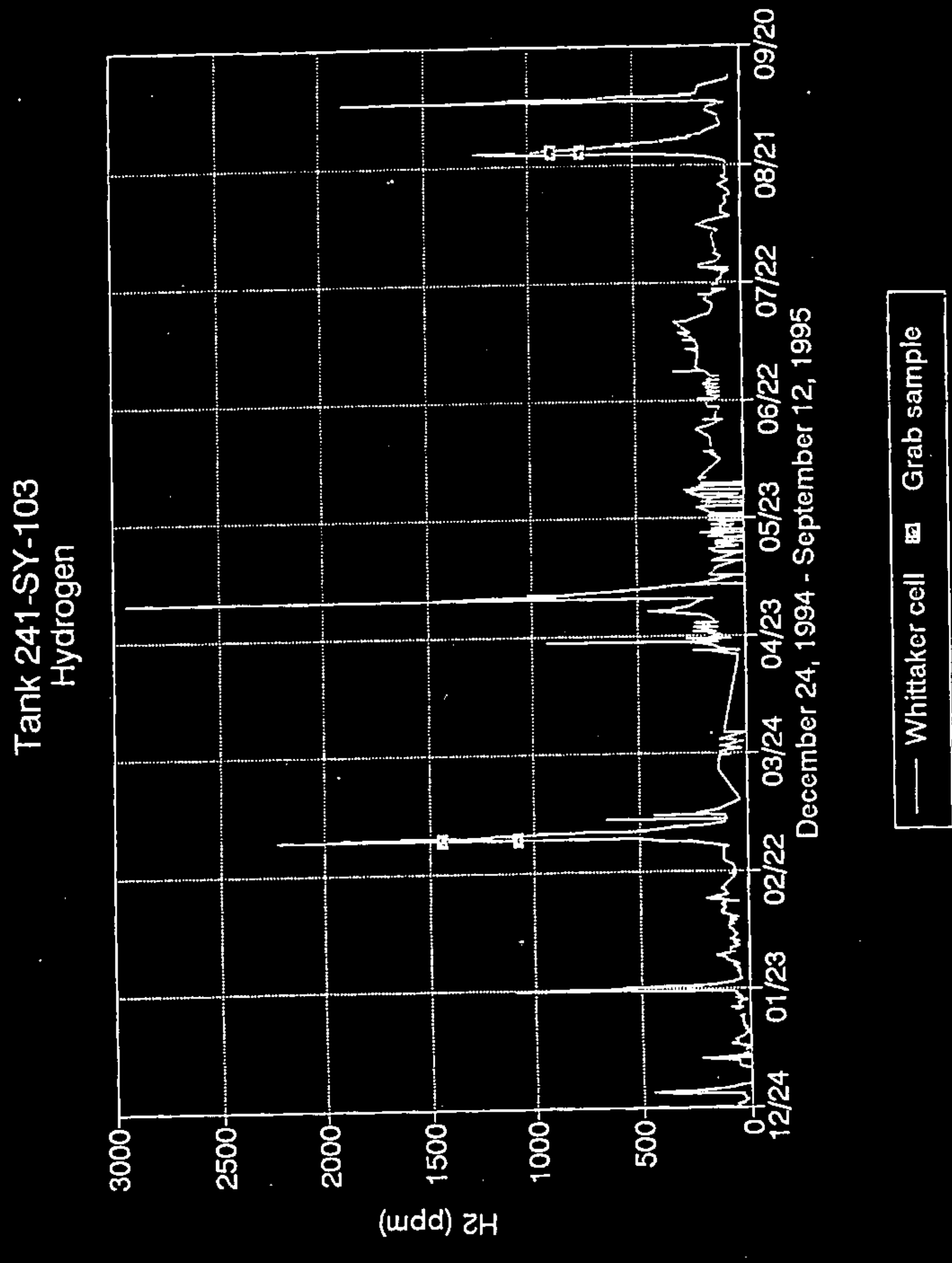
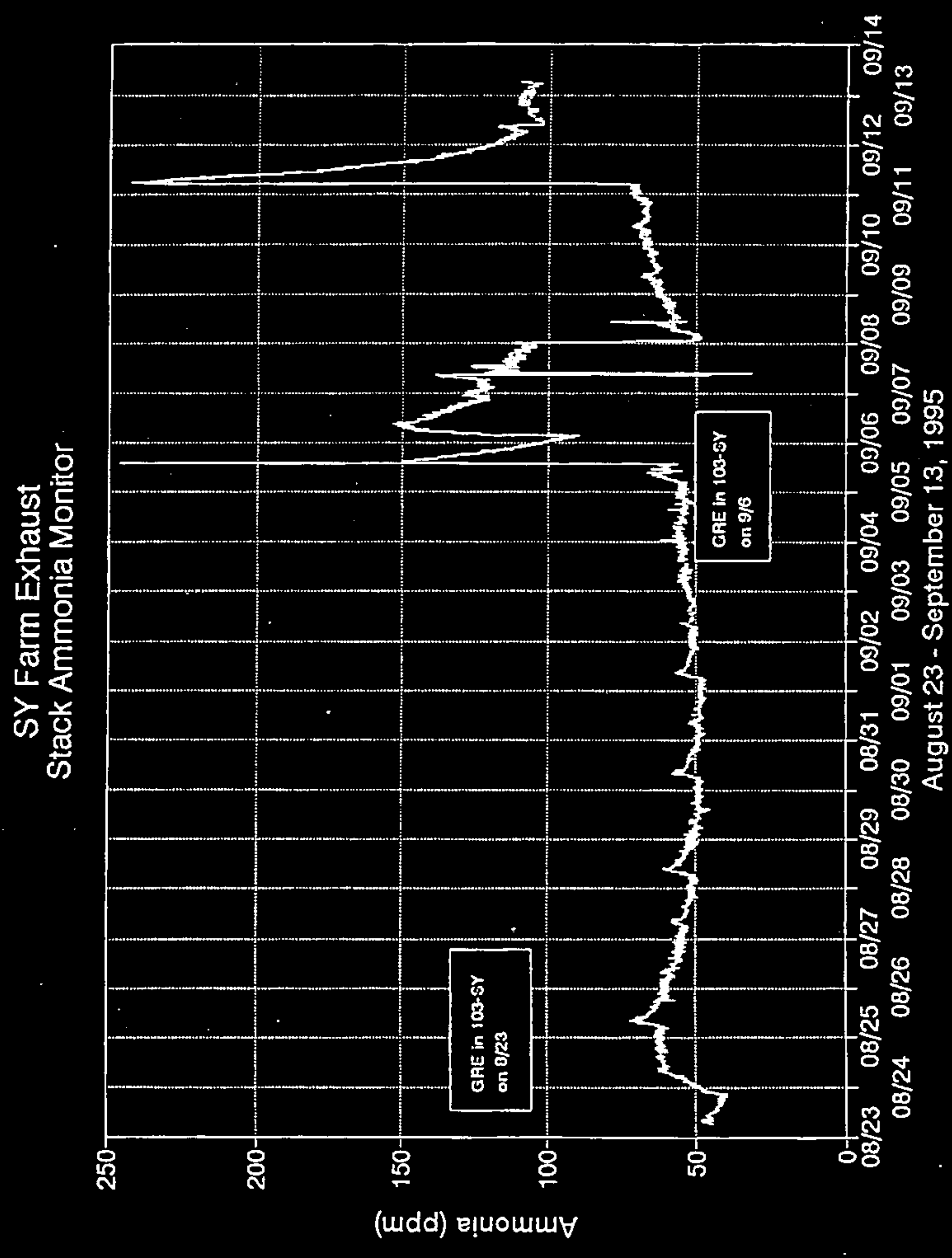


Figure 4-2. SY Farm Exhaust Stack Ammonia Monitor.



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5.0 INTERPRETATION OF CHARACTERIZATION RESULTS

5.1 ASSESSMENT OF SAMPLING AND ANALYTICAL RESULTS

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

5.1.1 Field/Laboratory Observations

During the extrusion of the 1994 core segments, several observations were made that could impact the data interpretation (Rice 1995). During the subsampling of the drainable liquid from segment 1, the sample jar was inadvertently cracked at the base by the manipulator fingers. This caused most of the drainable liquid sample to be lost. The remaining drainable liquid sample had the following analyses performed on it: DSC, TGA, and ICP using an acid digest. Insufficient sample remained to do radiochemical or other water preparation analyses.

During the extrusion of segment 3, no liquid appeared when the valve was opened. A solid plug had apparently formed. As the extrusion began, this plug was pushed onto the tray and was followed rapidly by the drainable liquid. Some of the liquid was lost out the back of the sample tray, and much of the solid was carried into the drainable liquid jar with the liquid. During the extrusion of segment 14, an air gap of 10 to 13 cm (4 to 5 in.) was observed after approximately 25 cm (10 in.) of solids.

When segment 15 was extruded, internal pressure in the sampler caused approximately 20 mL of sample material to be sprayed on the hot cell wall. This pressurization had not been expected and was not observed during the extrusion of the 1986 core segment of the same depth. The remaining sample from segment 15 was inconsistent with the previous segment. The analysis indicated that the liquid was mostly HHF, signifying a sampling failure. Because of the pressurization of the 15th segment, an operational hold was placed on the nonsafety screening analyses of the segment, and the second core has not yet been obtained.

Segment 13 had sufficient liner liquids (34 g) to require analysis. The analyses indicate that it is a mixture of the HHF and some fraction of the core sample material, showing the valve had a small leak. The concentration of bromine in the segment 13 liner liquid (0.2 M) indicates that most of the liner liquid is HHF.

5.1.2 Quality Control Assessment of Analytical Data

No quality control data is available for evaluating samples analyzed at PNNL for the 1986 sampling event. The quality control requirements for the 1994 sampling event are defined in the TCP for tank 241-SY-103; the results are summarized in the format IV report defined in the TCP by the method of analysis (Schreiber 1995, Rice 1995). The 1994 raw data contain different amounts of blank, duplicate, spike, and standards data, depending on the method used to generate the results (see Appendix A and Rice [1995]). The source documents should be examined to evaluate the quality of a given analysis. With few exceptions, the data quality objectives were met overall.

The TCP required blind standard checks for three analyses: TOC, IC, and ICP. The results are in Appendix D, Tables D-1, D-2, and D-3. Problems passing the TOC consistently may mean that the TOC results may not be reliable (2 out of 4 results were unacceptable). The water pollution blind standard results are comparable only to the liquid samples. The solid samples are prepared by a different method.

In general, the quality control data are consistent and show acceptable precision, especially considering the associated problems with sampling and the complex chemical and radiochemical nature of the samples. The alpha count rates were very low in all samples and below detection limits in most, potentially impacting the inventory calculations and data interpretation. In the same samples, the beta-gamma activity was high and was predominately associated with two isotopes; strontium-90 and ^{137}Cs accounted for approximately 98 percent of the beta-gamma activity. Although some data are judged as unreliable, all data are included in the report. The reader can make case-by-case decisions on data use.

Several analyses suffered from poor spike recovery and/or precision. Tritium spike recoveries showed a matrix incompatibility with the analytical method and are of little value. Although several total beta measurements gave marginal precision (approximately 20 percent or higher), most total beta data are useful in meeting the programmatic needs. Low spike recoveries for ^{129}I indicate the data have low reliability and are of little use. Occasional low precision (relative percent difference of 20 percent or more) in ^{90}Sr determinations do not preclude use of the data. One technetium-99 duplicate gave poor precision (relative percent difference of 28 percent), but most duplicates are judged adequate.

Analyses for alpha emitting isotopes were severely hampered by count rates near the detection limit and by high beta activities. These problems not withstanding, most alpha emitting isotope data are acceptable. Neptunium-237 recoveries were not high (approximately 70 to 80 percent); however, the data are within the expected range for the method and sample matrix. The plutonium-238 activity for stratum B is very doubtful. The total beta count rate indicates it is not present, and no plutonium-239 was detected.

5.1.3 Data Consistency Checks

The ability to assess the overall consistency of the data between segment and composite samples is limited because only one core was taken. Checks can be made on some analytes when the same aliquot of sample is analyzed by two comparable analyses, or when two different methods were used to prepare the sample before analysis. The comparisons are limited because sampling effects caused by sample heterogeneity cannot be separated from differences in the methods. Some comparisons are shown below.

5.1.3.1 Comparison Between ICP and IC Phosphate Analyses. Table 5-1 compares the calculated phosphate concentration based on the ICP phosphorus result with phosphate data obtained from the IC for liquid samples. Phosphorus by ICP was not requested on the solid samples. The calculated ICP results, which were analyzed using an acid digest, will typically be greater than IC data because of phosphates that are slightly insoluble in water.

Table 5-1. Average Phosphate Concentration (μg/mL).

	Drainable Liquid Segments 2-7	Drainable Liquid Segment 8
PO_4^{3-} (calculated)	3530	3570
PO_4^{3-} (from IC)	3120	3180
% Relative Percent Difference (100 x (calc - IC) x 2/(calc + IC)	12	12

5.1.3.2 Comparison of ICP Acid Digest and Fusion Methods. Table 5-2 summarizes results for the most abundant elements in each stratum. Although each stratum was mixed at the time the composite sample was created, variation in the aluminum results for the stratum B composite sample could be explained by the heterogeneous behavior of the samples. Most of the stratum C composite sample acid digestion results are significantly lower than the fusion preparation.

The metals in question should be made soluble during acid digest preparation as well as during fusion preparation. Duplicate results for acid and fusion in the stratum C sample agree with the original result. There is no compelling reason why the fusion preparation would be more appropriate for these metals, as demonstrated by the stratum D sample results. Stratum C and stratum D are similar in composition, being primarily or exclusively solid material. The stratum C sample contained more liquid, however, and the sample would tend to stratify in storage. These results could be explained if the sample was not mixed thoroughly each time an aliquot was removed.

Table 5-2. Average Concentration Stratum Samples Selected Elements (μg/g).

	Stratum A	Stratum B	Stratum C	Stratum D
Al (F)	22200	12400	37500	39600
Al (A)	29200	27500	25300	35000
Cr (F)	59	<93	5650	10200
Cr (A)	27	31	252	6550
Fe (F)	30	<274	1460	2700
Fe (A)	<18	48	78	2120
Na (F)	141000	212000	172000	140000
Na (A)	150000	161000	147000	187000

Notes:
(A) = acid digest
(F) = fusion in a Ni crucible

5.1.3.3 Comparison of Acid Digest and Fusion Methods for Radiochemical Analysis. In all cases, the activities found for actinide and lanthanide elements were higher for samples prepared by fusion rather than acid digest. This was expected from past experience and consideration of the chemistries involved.

Strontium-90 values produced by fusion of solid samples from the stratum B composite sample were 14 percent lower than values yielded by acid digest. This is probably due to subsampling errors arising from sample heterogeneity. Stratum D solid samples prepared by fusion yield significantly higher values than those subjected to acid digest. Consideration of strontium chemistry shows this is to be expected.

Cesium-137 values for acid digested samples were slightly higher than for fused samples. This may be due to cesium volatility.

5.1.3.4 Comparison of Total Alpha with the Sum of the Isotopes. The only significant alpha activity was associated with solids in stratum D. The sum of the individual alpha emitting isotopes exceeded the total alpha activity by 32 percent. This does not preclude using the data because the very low alpha activities that led to high counting errors. Total alpha results may also be biased low from absorption by solids on the mount.

Table 5-3. Total Alpha/Specific Isotope Sums (μCi/mL).

Matrix	Total Alpha Activity μCi/mL	Sum of Isotope Alpha Activity μCi/mL	Isotope Sum Total Alpha (100)%
Stratum D solids composite	5.68E-1	7.50E-1	132%

5.1.3.5 Comparison of Total Beta with the Sum of the Isotopes. Significant beta activity is associated with all samples and strata. As shown in Table 5-4, the sum of individual beta emitting isotopes and total beta are in excellent agreement for the drainable liquid and solids in the stratum B composite sample. In the stratum D composite sample, the sum of the individual isotopes is only 66 percent of the total beta activity. A satisfactory explanation is not apparent at this time. One significant difficulty is that the precision of the total beta results for that composite is poor (relative percent difference of 30 percent). In addition, the ^{90}Sr relative percent difference is 15.2 percent for the sample prepared by fusion, which was used for inventory and this calculation. The ^{137}Cs relative percent difference for the sample prepared by acid dilution, which was used for this calculation and the inventory calculation is low, only 0.4 percent. It is of interest, however, that the relative percent difference for the fused sample is 31 percent. Generally, the agreement between acid-diluted samples and fused samples is expected to be much better.

Table 5-4. Total Beta/Specific Isotope Sums (μCi/mL).

Matrix	Total Beta Activity μCi/mL	Sum of Isotope Beta Activity μCi/mL	Isotope Sum Total Beta (100) %
Drainable liquid composite	4.24E+2	4.26E+2	101%
Stratum B solids composite	1.71E+2	1.77E+2	104%
Stratum D solids composite	4.32E+2	2.85E+2	66%

5.1.3.6 Mass and Charge Balance. The objective in performing a mass and charge balance on the 1994 core data is to determine if the measurements are self-consistent. In calculating balances, only the sludge phase was considered for ease of calculation. Only analytes at a concentration of 1,500 μg/g or greater were considered.

With the exception of sodium and potassium, all cations listed in Table 5-5 were assumed to be present in their most common hydroxide or oxide form, and the concentrations of the assumed species were calculated stoichiometrically. There is some uncertainty as to whether a specific species are hydroxides or oxides, but the difference in molecular weight has a minimal effect on the overall mass balance. Smaller concentrations of other forms of the species are probably also present in the waste, but they are not included in order to keep the mass-charge balance calculations simple and consistent.

Because precipitants are neutral species, all positive charge was attributed to sodium and potassium cations. The anionic analytes listed in Table 5-6 were assumed to be present as sodium or potassium salts and were expected to balance the positive charge. The TOC and TIC results were converted to acetate and carbonate respectively for comparison. In the case of the TOC result, the data for formate and oxalate were converted to the appropriate TOC units, then subtracted prior to the TOC result being converted to acetate. The percent water was obtained from the TGA result of the solids composite in stratum D.

Table 5-5. Cation Mass and Charge Data (Stratum D).

Analyte	Concentration (μg/g)	Assumed Species	Concentration of Assumed Species (μg/g)	Charge (μmol/g)
Aluminum	3.96E+4	$Al(OH)_3$	1.14E+5	0
Chromium	1.02E+4	$Cr(OH)_3$	2.02E+4	0
Potassium	3.34E+3	K^+	3.34E+3	85
Iron	2.70E+3	Fe(O)(OH)	1.70E+3	0
Sodium	1.87E+5	Na^+	1.87E+5	8134
		Total	3.27E+3	8219

The ratio of microequivalents of total cations to microequivalents of total anions is 1.08. A perfect charge balance would yield a ratio of 1.00. The charge balance, along with the mass balance result of 0.966 g/g in Table 5-7, demonstrates agreement among the analyses when considering the uncertainty in the assumptions and numerous measurements that were used to arrive at the values. These results indicate that large data inconsistencies or errors are not present, and that major components have been determined and evaluated properly.

Table 5-6. Anion Mass and Charge Data (Stratum D).

Analyte	Concentration (μg/g)	Charge (μmol/g)
TOC (acetate)	9.02E+3[1]	1.53E+2
TIC (carbonate)	4.40E+4[2]	1.467E+3
Formate	4.96E+3	1.1E+2
Oxalate	2.08E+4	4.73E+2
Chloride	7.03E+3	1.98E+2
Fluoride	1.56E+3	8.2E+1
Nitrite	8.19E+4	1.78E+3
Nitrate	9.81E+4	1.582E+3
Phosphate	1.56E+4	4.93E+2
Sulfate	7.82E+3	1.63E+2
Hydroxide	1.84E+4	1.082E+3
Total	3.09E+5	7.583E+3

Notes:

[1]Estimated as acetate, corrected for formate and oxalate

[2]Estimated as carbonate

Table 5-7. Mass Balance Totals.

Totals	Concentrations (grams per gram)
Total from Table 5-5	0.327
Total from Table 5-6	0.309
Water (33%)	0.330
Grand Total	0.966

5.2 COMPARISON OF SAMPLING EVENTS

The use of composite samples in the 1994 sample event makes it difficult to compare results in the solids to the individual segments analyzed from the 1986 sampling event. A comparison of the two solids results are listed in Table 5-8. The chemical and radiochemical results for the 1986 core sampling event are in Appendix C.

Comparing the radiochemistry data for the 1986 event (see Appendix C) and that for stratum D of the 1994 event (see Appendix A) shows that the activities found in 1994 are somewhat lower than those found in 1986. Because of the uncertainties arising from compositing in 1994, no rigorous comparison of the two events is possible.

Table 5-8. 1986 and 1994 Core Comparison.

Analyte	1986 (μg/g)			1994 (μg/g)	
	Segment 2	Segment 7	Segment 12	Stratum C	Stratum D
Al	4.45E+4	4.15E+4	4.77E+4	3.75E+4	3.96E+4
Cr	3.0E+3	5.9E+3	5.8E+3	5.65E+3	1.02E+4
Fe	9.4E+2	1.6E+3	2.0E+3	1.46E+3	2.70E+3
K	3.8E+3	3.4E+3	2.6E+3	3.04E+3	3.34E+3
Na	2.17E+5	2.07E+5	2.97E+5	1.60E+5	1.87E+5
Ni	8.0E+1	1.30E+2	1.20E+2	2.9E+1	1.02E+2
Cl^-	7.3E+3	6.8E+3	5.3E+3	7.4E+3	7.0E+3
NO_2^-	8.35E+4	7.91E+4	7.31E+4	7.99E+4	8.19E+4
NO_3^-	1.0E+5	1.0E+5	2.5E+5	9.64E+4	9.81E+4
PO_4^{3-}	3.1E+3	3.8E+3	4.2E+3	8.44E+3	1.56E+4
SO_4^{2-}	2.4E+3	4.6E+3	3.8E+3	6.38E+3	7.82E+3
OH^-	2.10 M	2.06 M	1.55 M	1.79 M	1.63 M

5.3 TANK WASTE PROFILE

The tank waste profile for tank 241-SY-103, for which approximately half the contents is contained in a nonconvective layer, is difficult to estimate. The ability to evaluate the horizontal distribution of waste components is limited by the number of risers sampled (14A and 17A), while the vertical stratification depends on the number of segments or subsegments analyzed. Because supernatant has been also added to the tank since 1986, estimates using the 1986 data are further complicated.

The 1986 segment samples (2, 7, and 12) probably give a better estimate of the solids stratification, because the segments were chosen to sample the three suspected solids layers (see Section 3.3) The 1994 core solids were composited into two samples, one from the interface (stratum C); the other containing solids from the rest of the segments (stratum D), with the exception of the bottom segment.

The solids compositions have been estimated in Table 2-2 for the CCPLX and DSS based on process knowledge. The uranium ion exchange sludge has not been estimated. The CCPLX layer is expected to be on the bottom, and the DSS layer above it. The main features of the CCPLX waste estimate are the lack of aluminum, the presence of organics, and lower levels of nitrite and hydroxide, when compared to the DSS. Table 5-8 shows there appears to be no significant difference for these analytes among segments 2, 7, and 12. This indicates that substantial mixing has occurred between the solids layers.

Organics were not measured in the 1986 core sample, but they were part of the composite samples in the 1994 core. The safety screen analyses did include DSC, which can give a relative idea of the stratification of organics in the solids layer. The DSC analyses were done on each half segment, and the results are in Appendix A and Rice 1995. Only in the lower half of segments 13 and 14 are there indications of increased organics. Unfortunately, the data for segment 15, which would be expected to have the most organics, had sampling problems associated with it, making the data suspect. The alpha results show no trends.

Uranium was not measured in the 1986 core sample. Table 5-9 lists the average uranium results of the 1994 strata solids. There appears to be no difference between the stratum C sample, expected to contain the uranium resin sludge, and the stratum D sample.

Data indicate that two relatively homogenous phases (convective and nonconvective) are present in the tank. The nonconvective layer does not show signs of stratification, which may be due to the mechanical mixing action experienced during gas releases.

Table 5-9. Average Concentration (μg/g) Solids.

	Stratum A	Stratum B	Stratum C	Stratum D
Uranium	7.05	<.02	626	776

5.4 COMPARISON OF ANALYTICAL AND TRANSFER HISTORY INFORMATION

A comparison of the supernatant mixing model and the analytical composite sample results from the 1994 core are found in Table 5-10 (Brevick 1995). Most of the major constituents compare reasonably well with the computer model, with the exception of hydroxide. Among the lesser constituents, Cr^{3+} and K^+ were found at much higher amounts than the model predicted, and SO_4^{2+} was much lower. The model contains several organic constituents, among them citrate, EDTA, HEDTA, glycolate, and dibutyl phosphate (DBP), which were not analyzed on the 1994 core sample and could not be compared. A TOC analysis compares well with the model's prediction.

Table 5-10. Tank 241-SY-103 Inventory Comparison.

Constituent	Supernatant Mixing Model Composite (kg)	1994 Core Total Inventory	
		(kg)	% Ratio: Predicted (100) / Found
Na^+	6.56E+5	7.19E+5	9.1E+1
Al^{3+}	1.08E+5	1.45E+5	7.4E+1
Cr^{3+}	4.79E+3	2.19E+4	2.2E+1
Ni^{2+}	4.02E+2	2.9E+2	1.37E+2
K^+	2.69E+3	1.28E+4	2.1E+1
OH^-	2.95E+5	8.06E+4	3.66E+2
NO_3^-	5.34E+5	5.04E+5	1.06+2
NO_2^-	3.75E+5	3.77E+5	9.9E+1
PO_4^{3-}	3.65E+4	4.05E+4	9.0E+1
SO_4^{2-}	7.76E+4	1.70E+4	4.56E+2
F^-	5.27E+3	3.35E+3	1.57E+2
Cl^-	1.73E+4	3.15E+4	5.5E+1
TOC	1.08 wt% C	0.89 wt% C	1.21E+2
$C_6H_5O_7^{-3}$	1.87E+4	5.50E+3[1]	3.40G+2
$EDTA^{4-}$	1.78E+4	6.15E+3[1]	2.89E+2
$HEDTA^{3-}$	3.02E+4	1.46E+2[1]	2.07E+4
Oxlate	1.41E+1	4.73E+4[1]	2.98E-2
Acetate	2.51E+3	6.83E+3[1]	3.67E+1
U	3.55E+3	1.67E+3	2.13E+2
Pu	1.77 kg	2.16 kg	8.2E+1
Cs	1.11E+6 Ci	1.13E+6 Ci	9.8E+1
Sr	2.51E+4 Ci	7.90 E+4 Ci	3.2E+1

Note:

[1]Data from Campbell et al. (1995)

5.5 EVALUATION OF PROGRAM REQUIREMENTS

DQOs were available for the 1994 auger and core sampling events. Implementation of the applicable DQOs is summarized in Schreiber (1994a, 1994b and 1995). The criteria identified in the applicable DQOs is discussed in the following sections.

5.5.1 Safety Evaluation

The relevant safety issues for tank 241-SY-103 include its placement on the Flammable Gas Watch List and an unresolved safety question concerning the potential for a large quantity of hydrogen and nitrous oxide to exist as an explosive mixture within the waste (Schreiber 1995). The safety screening factors include waste fuel energy, percent moisture, and criticality.

Before a core sample could be taken, an auger sample was taken in 1994 to evaluate the possibility of the tank waste crust becoming hot enough during core sampling to initiate an exothermic reaction, or to ignite the radiolytically-produced hydrogen gas (Schreiber 1994a). The analyses used to evaluate this possibility were DSC, TGA, TIC, and TOC.

Auger sample results indicated that no exotherms were present, and the TOC was well below the notification limit of 3.00E+4 μgC/g. Several samples had a water content of less than 17 percent, but the lack of exotherms indicates a safety problem does not exist. See Appendix B for auger sample results.

The results of the safety screen analyses for the 1994 core sample are in Appendix A. One of the 30 subsegment samples exceeded the notification limit of 523 J/g (dry). This is to be expected, based on the historical record of the complexant concentrate heel that was left in the tank. The percent water measurements, as determined by TGA, were all above the notification limit of 17 percent, except for the separated solids in segment 8, which had no exotherms associated with them. The segment 8 sample was greater than 90 percent liquid. See Appendix A for a summary of the results.

The potential for criticality is assessed from the total alpha analysis. All results were well below the notification limit of 41 μCi/g. The majority of the alpha results were reported as "less thans." The "less thans" were all significantly below the notification limit.

The flammable gas DQO analyses are intended to help understand the mechanisms for gas generation, retention, and release. The data will be used to develop potential mitigation responses.

The flammability of the gas in the tank headspace is another safety screening consideration. Analysis of the tank headspace has been performed. Because of the similarity of this tank to tank 241-SY-101 and the fluctuations in tank waste height (see Figure 2-5), this tank is expected to produce hydrogen gas. It does not appear that concentrations have approached or built up above the lower flammability limit (Wilkins 1995). Both the DSC and TOC results indicate that some fuel is present near the tank bottom.

Another factor in assessing the tank waste safety is the heat generation and temperature of the wastes. Heat is generated in the tanks primarily from radioactive decay. The primary contributors for tank 241-SY-103 are ^{137}Cs and ^{90}Sr. The estimated heat generated from the isotopes in the tank is 5,880 W (20,100 Btu/hr) as shown in Table 5-11. This is well below the 11,723-W (40,000-Btu/hr) criteria for distinguishing a high-heat tank from a low-heat tank.

Table 5-11. Heat Generation (W).

Matrix	$^{90}Sr/Y$	$^{137}Cs/Ba$	Total W
Drainable liquids	2.69E+1	2.70E+3	2.72E+3
Convective solids (stratum B)	1.25	1.19E+2	1.21E+2
Nonconvective solids (stratum D)	5.00E+2	2.54E+3	3.04E+3
			5.88E+3

5.5.2 Operational Evaluations

The 1986 sampling was performed to characterize the waste for retrieval and processing to create immobile waste forms suitable for disposal. The 1994 core sampling was performed to screen the tank for general safety considerations, flammable gas issues, and for further process development purposes. However, the process development core (core 2) has not yet been sampled. Metal and anion analyses will support operating decisions for this tank. The 1994 analysis results indicate that the total organic content of the tank is near the 10-g/L TOC complexant waste classification limit, and that the actinide levels in the sludge exceed the transuranics limit of 100 nCi/g.

5.5.3 Environmental Evaluation

Tank 241-SY-103 was not characterized to designate waste or to evaluate environmental compliance issues. The tank has been characterized to meet regulatory requirements that the waste is safely stored and managed. No specific organic (volatile or semivolatile) analyses have been performed on the tank; therefore, no assessment can be made of these compounds.

The 1994 analyses indicate that the tank meets the hydroxide specification ($12 < pH > 14$), with the lowest pH measured at 12.85. Chromium, mostly as Cr^{3+}, is present in relatively high concentrations in the sludge. No analysis was made for metals such as lead, mercury, cadmium and silver.

5.5.4 Process Development Evaluation

The metal and anion analyses will be important in evaluating the glass disposal waste formulations and identifying potential components that may affect the treatment and disposal process. Because waste sludges may be blended, washed, and treated before disposal, there are no specific criteria. Solids samples have been taken for physical testing (Bredt et al. 1995) and to evaluate sludge washing (Lumetta and Rapko 1995).

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6.0 CONCLUSIONS AND RECOMMENDATIONS

The solids in tank 241-SY-103 were sampled in 1986; the crust, supernate, and solids were sampled in 1994. Only one core sample was obtained in 1994. This core sample was analyzed to meet the requirements of the safety screening and flammable gas DQOs. DSC analyses for solids from one semi-segment portion of the sludge showed exotherms that exceeded the safety screening criteria of 531 J/g (dry weight). The tank contents are greater than 50 percent supernate, and the moisture levels of the solids layer were all greater than the 17 percent safety screening criteria. The thermal history of the waste does not indicate any excessive temperatures, and the tank temperature is decreasing. Analyses of metals, TOC, and anions support the flammability DQO. Physical measurement results to support flammability studies are in progress, but results were not available for inclusion in this report. The Pu results for the waste are well below the criticality criteria, but actinide activity exceeds the transuranics classification, particularly in the nonconvective layer. Limited samples and data from different risers and waste depths make it difficult to accurately determine the variability of the waste composition in the tank. The headspace has been evaluated for flammable gases. Continuous online monitoring, as well as grab samples, indicate that while the buildup of hydrogen gas does exist, it remains below the lower flammability limit.

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APPENDIX A

1994 CORE SAMPLING DATA

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Table A-1. Safety Screen Results for Core 62, Tank 241-SY-103.

Segment	Location	Average TGA (percent water)	Average DSC joules/gram (dry)	Average alpha (μCi/g)
1	DL	48.81	173	NR
	Solid	39.18	118 (193)	<2.29E-1
2	DL	48.71	206	NR
	Solid	34.30	No Exo	<1.26E-1
3	DL	47.62	162	NR
	Solid	19.52	43 (53)	<1.03E-1
4	DL	48.52	200	NR
	Solid	35.24	57 (82)	<1.02E-1
5	DL	48.34	216	NR
	Solid	19.69	No Exo	<2.57E-1
6	DL	49.22	158	NR
	Solid	29.57	193 (276)	<2.50E-1
7	DL	49.79	144	NR
	Solid	26.93	147 (224)	<1.95E-1
8	DL	48.89	227	NR
	Solid	15.59[1]	No Exo	<1.38E-1
9	DL	48.83	286	NR
	Solid	45.34	174 (319)	0.73
10	Upper	43.72	202 (358)	0.56
	Lower	40.42	160 (268)	0.89
11	Upper	45.74	227 (419)	0.81
	Lower	38.34	109 (246)	0.91
12	Upper	41.49	113 (193)	0.98
	Lower	42.45	201 (349)	<7.53E-1
13	Upper	39.81	196 (326)	1.13
	Lower	40.22	377 (630)[2]	0.91
14	Upper	38.80	149 (245)	0.99
	Lower	41.10	273 (464)	1.54
15	DL	75.06	181	NR
	Solid	68.75	No Exo	<4.88E-1

Notes: DL = drainable liquid
DSC = differential scanning calorimetry
NR = not requested
TGA = thermogravimetric analysis
μCi/g = microcuries per gram

[1]Above the notification limit of 17 percent water

[2]Above the notification limit of 523 joules/gram (dry)

Table A-2. Laboratory Data Results for Tank 241-SY-103, Core 62[1].

Sample#	B	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %
Segment #1													
SEGMENT PORTION			Drainable Liquid										
S94T000008			% Water by TGA using Mettler	%	98.26	n/a	49.45	48.18	4.88E+01	2.6	n/a	1.00E-02	n/a
S94T000008			DSC Exotherm using Mettler	Joules/g	97.7	n/a	1.36E+02	210.6	1.73E+02	43.3	n/a	n/a	n/a
S94T000009		D	Lithium-ICP-Acid Dil.	ug/mL	99.8	1.00E-03	LDL	LDL	n/a	n/a	n/a	11	n/a
S95T000281			Tot. Organic Carbon by Coul.	ug/mL	99.67	<5.000	n/a	n/a	n/a	n/a	n/a	5	n/a
S95T000281			% Water by TGA using Mettler	%	99.32	n/a	47.4	46.04	4.67E+01	2.91	n/a	n/a	n/a
S95T000281			pH Direct	pH	99.46	n/a	n/a	n/a	n/a	n/a	n/a	1.00E-02	n/a
S95T000281			DSC Exotherm using Mettler	Joules/g	103.7	n/a	32.9	31.7	3.23E+01	3.72	n/a	n/a	n/a
S95T000323		B	Aluminium -ICP-Acid Digest-Liq	ug/mL	96.4	1.50E-02	2.42E+04	24100	2.42E+04	0.41	n/a	21	n/a
S95T000323		B	Boron -ICP-Acid Digest-Liquid	ug/mL	94.6	1.00E-03	56.8	52.6	5.47E+01	7.68	n/a	21	n/a
S95T000323		B	Barium -ICP-Acid Digest-Liquid	ug/mL	94.2	0.00E+00	< 21.00	<21	n/a	n/a	n/a	21	n/a
S95T000323		B	Bismuth -ICP-Acid Digest/Liq	ug/mL	92.8	-2.30E-02	< 42.00	<42	n/a	n/a	n/a	42	n/a
S95T000323		B	Calcium -ICP-Acid Digest-Liq	ug/mL	98	1.70E-02	82.7	74.9	7.88E+01	9.9	n/a	42	n/a
S95T000323		B	Chromium -ICP-Acid Digest-Liq	ug/mL	96.8	0.00E+00	1.62E+02	161	1.62E+02	0.62	n/a	4.2	n/a
S95T000323		B	Iron -ICP-Acid Digest-Liquid	ug/mL	95.2	5.00E-03	49.8	50.1	5.00E+01	0.6	n/a	21	n/a
S95T000323		B	Potassium -ICP-Acid Digest-Liq	ug/mL	100.2	7.40E-02	2.32E+03	2310	2.32E+03	0.43	n/a	210	n/a
S95T000323		B	Lithium -ICP-Acid Digest-Liq	ug/mL	94.2	0.00E+00	< 4.200	<4.20	n/a	n/a	n/a	4.2	n/a
S95T000323		B	Sodium -ICP-Acid Digest-Liquid	ug/mL	94.4	-3.00E-03	1.27E+05	126000	1.26E+05	0.79	n/a	42	n/a
S95T000323		B	Nickel -ICP-Acid Digest-Liquid	ug/mL	96.4	-7.00E-03	30.7	27.9	2.93E+01	9.56	n/a	8.4	n/a
S95T000323		B	Phosphorus-ICP-Acid Adjust-Liq	ug/mL	95.2	3.00E-03	8.60E+02	866	8.63E+02	0.7	n/a	84	n/a
S95T000323		B	Silicon -ICP-Acid Digest-Liq	ug/mL	88.2	1.20E-02	67.8	66.9	6.74E+01	1.34	n/a	21	n/a

Table A-2. Laboratory Data Results for Tank 241-SY-103, Core 62[1].

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %
S95T000323		B	Uranium -ICP-Acid Digest-Liq	ug/mL	192.2	-1.40E-02	<2.10e+02	<210	n/a	n/a	n/a	210	n/a
S95T000323		B	Zinc -ICP-Acid Digest-Liquid	ug/mL	94.6	1.00E-03	< 4.200	<4.20	n/a	n/a	n/a	4.2	n/a
S95T000323		B	Zirconium -ICP-Acid Digest-Liq	ug/mL	95.6	0.00E+00	< 4.200	<4.20	n/a	n/a	n/a	4.2	n/a
SEGMENT PORTION				Stratum "A" Solids Composite (Segment 1)									
S94T000004			% Water by TGA using Mettler	%	100.2	n/a	40.92	37.44	3.92E+01	8.88	n/a	1.00E-02	n/a
S94T000004			DSC Exotherm Dry Calculated	Joules/g Dry	n/a	n/a	1.75E+02	211.6	1.93E+02	19	n/a	1.00E-03	n/a
S94T000004			DSC Exotherm using Mettler	Joules/g	102.3	n/a	1.03E+02	132.4	1.18E+02	24.7	n/a	n/a	n/a
S94T000005		F	Uranium by Phosphorescence	ug/g	99.24	1.37	7.83	6.27	7.05E+00	22.1	104	1.31	n/a
S94T000005		F	Alpha of Digested Solid	uCi/g	110.2	<2.290e-1	<2.29e-01	<2.29E-1	n/a	n/a	108.2	5.48E-01	500
S94T000005		F	Am-241 by Extraction	uCi/g	107.1	<2.480e-2	<2.87e-02	<2.81E-2	n/a	n/a	n/a	2.90E-02	23
S94T000005		F	Cm-243/244 by Extraction	uCi/g	n/a	<2.480e-2	<2.87e-02	<2.81E-2	n/a	n/a	n/a	2.90E-02	65.4
S94T000005		F	Beta of Solid Sample	uCi/g	91.36	<1.050	3.08E+02	285	2.97E+02	7.76	89.8	1.88	1.7
S94T000005		F	Cesium-137 by GEA	uCi/g	98.4	3.28E-01	2.39E+02	242	2.41E+02	1.25	n/a	3.28E-01	1.05
S94T000005		F	Iodine-129 Waste Tank Samples	uCi/g	100	<8.030e-2	<5.02e-02	<4.71e-2	n/a	n/a	n/a	5.00E-02	n/a
S94T000005		F	Aluminium -ICP-Fusion	ug/g	98.6	3.20E-01	2.23E+04	22200	2.22E+04	0.45	n/a	226	n/a
S94T000005		F	Calcium -ICP-Fusion	ug/g	101.4	2.97E-01	<4.52e+02	177	n/a	n/a	n/a	452	n/a
S94T000005		F	Chromium -ICP-Fusion	ug/g	102.2	6.00E-03	64.5	54.2	5.94E+01	17.4	n/a	45.2	n/a
S94T000005		F	Iron -ICP-Fusion	ug/g	101.2	3.02E-01	<2.26e+02	30.2	n/a	n/a	n/a	226	n/a
S94T000005		F	Potassium -ICP-Fusion	ug/g	96.6	-1.40E-02	n/a	n/a	n/a	n/a	n/a	1.36E+03	n/a
S94T000005		F	Sodium -ICP-Fusion	ug/g	97.4	3.88	1.41E+05	141000	1.41E+05	0	n/a	452	n/a
S94T000005		F	Nickel -ICP-Fusion	ug/g	101.8	6.66	1.33E+03	1330	1.33E+03	0	n/a	90.5	n/a

Table A-2. Laboratory Data Results for Tank 241-SY-103, Core 62[1].

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %
S94T000005		F	Zinc -ICP-Fusion	ug/g	103.6	1.50E-02	< 45.20	4.28	n/a	n/a	n/a	45.2	n/a
S94T000005		F	Zirconium -ICP-Fusion	ug/g	99.8	1.00E-01	< 45.20	-2.59	n/a	n/a	n/a	45.2	n/a
S94T000005		F	Lithium -ICP-Fusion	ug/g	98	<1.000e-2	LDL	LDL	n/a	n/a	n/a	95.1	n/a
S94T000005		F	Np237 by TTA Extraction	uCi/g	73.28	<9.320e-3	<1.17e-02	<9.29e-3	n/a	n/a	63.7	2.00E-02	490.6
S94T000005		F	Pu-238 by Ion Exchange	uCi/g	n/a	1.00E-02	<4.23e-03	<3.67e-3	n/a	n/a	n/a	4.00E-03	12.5
S94T000005		F	Pu-239/240 by TRU-SPEC Resin	uCi/g	97.89	<9.050e-3	<4.23e-03	<3.67e-3	n/a	n/a	n/a	4.00E-03	13.2
S94T000005		F	Strontium-89/90 High Level	uCi/g	99.11	2.90E-02	1.68	1.94	1.81E+00	14.4	n/a	1.00E-03	1
S94T000005		F	Technetium-99 Liq. Scint.	uCi/g	85.06	<2.480e-2	1.91E-01	0.175	1.83E-01	8.74	85	2.50E-02	4.14
S94T000006			Bulk Density of Sample	g/mL	n/a	n/a	1.59	n/a	n/a	n/a	n/a	5.00E-01	n/a
S94T000265			pH on SST Samples	pH	100.2	n/a	13.01	13.04	1.30E+01	0.23	n/a	1.00E-02	n/a
S94T000265			TOC by Persulfate/Coulometry	ug/g	90.67	32.5	4.92E+03	4620	4.77E+03	6.29	n/a	80	n/a
S94T000265			TIC by Acid/Coulometry	ug/g	97.83	2.200	2.68e+03	2.68e+03	2.68e+03	0.00	n/a	5.000	n/a
S94T000266		A	Aluminium -ICP-Acid Digest	ug/g	97.6	2.60E-02	2.89E+04	29400	2.92E+04	1.72	n/a	17.6	n/a
S94T000266		A	Calcium -ICP-Acid Digest	ug/g	101.2	2.10E-02	1.09E+02	108	1.09E+02	0.92	n/a	35.1	n/a
S94T000266		A	Chromium -ICP-Acid Digest	ug/g	95.8	1.10E-02	27	27.9	2.75E+01	3.28	n/a	3.51	n/a
S94T000266		A	Iron -ICP-Acid Digest	ug/g	96.6	4.40E-02	< 17.60	<17.6	n/a	n/a	n/a	17.6	n/a
S94T000266		A	Potassium -ICP-Acid Digest	ug/g	121	2.15	2.89E+03	2930	2.91E+03	1.37	n/a	105	n/a
S94T000266		A	Sodium -ICP-Acid Digest	ug/g	99.2	1.14E-01	1.50E+05	149000	1.50E+05	0.67	n/a	70.2	n/a
S94T000266		A	Nickel -ICP-Acid Digest	ug/g	94.6	7.00E-03	33.4	35.5	3.45E+01	6.1	n/a	7.02	n/a
S94T000266		A	Zinc -ICP-Acid Digest	ug/g	91.2	6.00E-03	19.4	19.1	1.93E+01	1.56	n/a	3.51	n/a
S94T000266		A	Zirconium -ICP-Acid Digest	ug/g	96.4	7.00E-03	< 3.510	<3.51	n/a	n/a	n/a	3.51	n/a
S94T000267		W	OH- by Pot. Titration	ug/g	99.36	<60300.0	1.40E+04	15900	1.50E+04	12.7	n/a	5.99E+03	n/a

Table A-2. Laboratory Data Results for Tank 241-SY-103, Core 62[1].

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk. Rec %	Det Limit	Count Err %
S94T000267		W	Chromium (VI) by Spec.	ug/g	100.6	<2.290e-1	< 21.90	<21.9	n/a	n/a	107.9	21.9	n/a
S94T000267		W	Tritium By Lachat	uCi/g	92.36	<4.210e-4	<4.15e-04	<4.21E-4	n/a	n/a	88.8	4.21E-04	5.49
S94T000267		W	Bromide by Ion Chromatograph	ug/g	97.38	<1.000	< 95.80	<95.8	n/a	n/a	94.4	95.8	n/a
S94T000267		W	Chloride-IC-Dionex 4000i/4500	ug/g	95.73	1.188	5.79E+03	7050	6.42E+03	19.6	72.7	19.2	n/a
S94T000267		W	Fluoride-IC-Dionex 4000i/4500	ug/g	94.82	<1.000e-1	3.00E+02	366	3.33E+02	19.8	65.8	9.59	n/a
S94T000267		W	Nitrite-IC - Dionex 4000i/4500	ug/g	96.21	<1.000	6.86E+04	84400	7.65E+04	20.7	102.1	95.8	n/a
S94T000267		W	Nitrate by IC-Dionex4000i/4500	ug/g	96.19	<1.000	1.61E+05	105000	1.33E+05	42.1	103.5	95.8	n/a
S94T000267		W	Oxalate by IC - Dionex 4000i	ug/g	94.81	<1.000	< 95.80	<95.8	n/a	n/a	101.4	95.8	n/a
S94T000267		W	Phosphate-IC-Dionex 4000i/4500	ug/g	97.09	<1.000	6.03E+04	31900	4.61E+04	61.6	65.9	95.8	n/a
S94T000267		W	Sulfate by IC-Dionex4000i/4500	ug/g	95.83	<1.000	1.58E+03	1840	1.71E+03	15.2	95.6	95.8	n/a
S94T000267		W	Acetate by IC - Dionex 4000i	ug/g	n/a	<1.000	n/a	n/a	n/a	n/a	n/a	1	n/a
S94T000267		W	Formate by IC - Dionex 4000i	ug/g	n/a	<1.000	2.83E+03	3000	2.92E+03	5.83	108.3	96	n/a
S94T000268		R	Am-241 by Extraction	uCi/g	99.58	<2.670e-3	3.19E-03	0.00298	3.09E-03	6.81	n/a	3.00E-03	13.2
S94T000268		R	Cm-243/244 by Extraction	uCi/g	n/a	<2.670e-3	<2.58e-03	<2.45e-3	n/a	n/a	n/a	3.00E-03	42.9
S94T000268		R	Cobalt-60 by GEA	uCi/g	97.06	<2.990e-3	<1.07e-02	<9.75e-3	n/a	n/a	n/a	3.00E-03	na
S94T000268		R	Cesium-137 by GEA	uCi/g	94.64	<6.900e-3	2.41E+02	210	2.26E+02	13.7	n/a	7.00E-03	0.16
S94T000268		R	Europium-154 by GEA	uCi/g	n/a	<6.390e-3	<5.03e-02	<4.33e-2	n/a	n/a	n/a	6.00E-03	na
S94T000268		R	Europium-155 by GEA	uCi/g	n/a	<7.000e-3	<1.78e-01	<1.67e-1	n/a	n/a	n/a	7.00E-03	na
S94T000268		R	Np237 by TTA Extraction	uCi/g	72.18	<2.220e-3	<2.22e-03	<2.22E-3	n/a	n/a	87.1	5.00E-03	101
S94T000268		R	Pu-238 by Ion Exchange	uCi/g	n/a	<3.510e-4	<3.33e-04	<3.00e-4	n/a	n/a	n/a	3.33E-04	11.4
S94T000268		R	Pu-239/240 by TRU-SPEC Resin	uCi/g	98.59	<3.510e-4	<3.33e-04	<3.00e-4	n/a	n/a	n/a	3.33E-04	10.1
S94T000268		R	Strontium-89/90 High Level	uCi/g	91.89	2.10E-02	1.84	1.68	1.76E+00	9.09	n/a	2.10E-02	4.7

Table A-2. Laboratory Data Results for Tank 241-SY-103, Core 62[1].

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %
SEGMENT # 2-7													
SEGMENT PORTION					Drainable Liquid Composite								
S95T000282			Tot. Organic Carbon by Coul.	ug/mL	99.67	<5.000	9.68E+03	9610	9.64E+03	0.73	n/a	105	n/a
S95T000282			% Water by TGA using Mettler	%	99.32	n/a	48.52	48.34	4.84E+01	0.37	n/a	n/a	n/a
S95T000282			pH Direct	pH	99.32	n/a	13.99	14.02	1.40E+01	0.21	n/a	1.00E-02	n/a
S95T000282			DSC Exotherm using Mettler	Joules/g	103.7	n/a	86.6	83.5	8.51E+01	3.64	n/a	n/a	n/a
S95T000324		B	Aluminium -ICP-Acid Digest-Liq	ug/mL	96.4	1.50E-02	4.05E+04	42200	4.14E+04	4.11	n/a	21	n/a
S95T000324		B	Boron -ICP-Acid Digest-Liquid	ug/mL	94.6	1.00E-03	86.5	90.8	8.87E+01	4.85	n/a	21	n/a
S95T000324		B	Barium -ICP-Acid Digest-Liquid	ug/mL	94.2	0.00E+00	< 21.00	<21.0	n/a	n/a	n/a	21	n/a
S95T000324		B	Bismuth -ICP-Acid Digest/Liq	ug/mL	92.8	-2.30E-02	< 42.00	<42.0	n/a	n/a	n/a	42	n/a
S95T000324		B	Calcium -ICP-Acid Digest-Liq	ug/mL	98	1.70E-02	1.19E+02	117	1.18E+02	1.69	n/a	42	n/a
S95T000324		B	Chromium -ICP-Acid Digest-Liq	ug/mL	96.8	0.00E+00	32.6	33.9	3.33E+01	3.91	n/a	1.00E-02	n/a
S95T000324		B	Iron -ICP-Acid Digest-Liquid	ug/mL	95.2	5.00E-03	< 21.00	<21.0	n/a	n/a	n/a	21	n/a
S95T000324		B	Potassium -ICP-Acid Digest-Liq	ug/mL	100.2	7.40E-02	3.82E+03	4000	3.91E+03	4.6	n/a	210	n/a
S95T000324		B	Lithium -ICP-Acid Digest-Liq	ug/mL	94.2	0.00E+00	< 4.200	<4.20	n/a	n/a	n/a	4.2	n/a
S95T000324		B	Sodium -ICP-Acid Digest-Liquid	ug/mL	94.4	-3.00E-03	2.08E+05	215000	2.12E+05	3.31	n/a	42	n/a
S95T000324		B	Nickel -ICP-Acid Digest-Liquid	ug/mL	96.4	-7.00E-03	50.1	47.6	4.89E+01	5.12	n/a	8.4	n/a
S95T000324		B	Phosphorus-ICP-Acid Adjust-Liq	ug/mL	95.2	3.00E-03	1.12E+03	1170	1.14E+03	4.37	n/a	84	n/a
S95T000324		B	Silicon -ICP-Acid Digest-Liq	ug/mL	88.2	1.20E-02	77.9	81	7.95E+01	3.9	n/a	21	n/a
S95T000324		B	Uranium -ICP-Acid Digest-Liq	ug/mL	192.2	-1.40E-02	<2.10e+02	<210	n/a	n/a	n/a	210	n/a
S95T000324		B	Zinc -ICP-Acid Digest-Liquid	ug/mL	94.6	1.00E-03	< 4.200	<4.20	n/a	n/a	n/a	4.2	n/a
S95T000324		B	Zirconium -ICP-Acid Digest-Liq	ug/mL	95.6	0.00E+00	< 4.200	<4.20	n/a	n/a	n/a	4.2	n/a

Table A-2. Laboratory Data Results for Tank 241-SY-103, Core 62[1].

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %
S95T000328		D	Uranium by Phosphorescence	ug/mL	93.03	1.98E-01	2.4	3.24	2.82E+00	29.8	98.2	3.00E-02	n/a
S95T000328		D	Alpha in Liquid Samples	uCi/mL	91.76	<2.52e-02	<2.52e-2	<2.52e-2	n/a	n/a	93.00	5.74e-02	72.3
S95T000328		D	Beta in Liquid Samples	uCi/mL	103.5	<1.090e-1	4.19E+02	429	4.24E+02	2.36	107.3	1.20E-01	0.4
S95T000328		D	Am-241 by Extraction	uCi/mL	88.27	<1.590e-3	1.67E-03	0.00182	1.75E-03	8.6	n/a	1.00E-03	8.9
S95T000328		D	Cm-243/244 by Extraction	uCi/mL	n/a	<1.590e-3	<7.77e-04	<1.04e-3	n/a	n/a	n/a	1.00E-03	29.8
S95T000328		D	Cobalt-60 by GEA	uCi/mL	104	<5.320e-4	<1.95e-02	<1.69e-2	n/a	n/a	n/a	1.00E-03	na
S95T000328		D	Cesium-137 by GEA	uCi/mL	100	<8.020e-4	4.24E+02	422	4.23E+02	0.47	n/a	1.00E-03	0.15
S95T000328		D	Europium-154 by GEA	uCi/mL	n/a	<1.330e-3	<8.02e-02	<8.28e-2	n/a	n/a	n/a	1.00E-03	na
S95T000328		D	Europium-155 by GEA	uCi/mL	n/a	<1.180e-3	<2.58e-01	<2.58e-1	n/a	n/a	n/a	1.00E-03	na
S95T000328		D	Tritium By Lachat	uCi/mL	100	<6.950e-5	2.42E-03	0.00226	2.34E-03	6.84	73	6.95E-05	2.32
S95T000328		D	Np237 by TTA Extraction	uCi/mL	82.92	<4.120e-4	<8.34e-04	<5.93e-4	n/a	n/a	85.5	1.00E-03	126.8
S95T000328		D	Pu-238 by Ion Exchange	uCi/mL	n/a	<5.900e-5	<6.12e-05	<6.32e-5	n/a	n/a	n/a	6.12E-05	100
S95T000328		D	Pu-239/240 by TRU-SPEC Resin	uCi/mL	93.75	<5.900e-5	<6.12e-05	<6.32e-5	n/a	n/a	n/a	6.12E-05	3.1
S95T000328		D	Strontium-89/90 High Level	uCi/mL	94.55	<9.580e-2	2.91	3.06	2.99E+00	5.03	n/a	9.80E-02	6
S95T000328		D	Technetium-99 Liq. Scint.	uCi/mL	96.68	1.00E-03	1.54E-01	0.171	1.63E-01	10.5	n/a	1.00E-03	0.99
S95T000332		V	OH- by Pot. Titration	ug/mL	99.38	<4167.0	2.93E+04	27900	2.86E+04	4.9	n/a	4.17E+03	n/a
S95T000332		V	Chromium (VI) by Spec.	ug/mL	102.2	<3.900e-2	6.76	5.35	6.06E+00	23.3	105.4	3.939	n/a
S95T000332		V	Iodine-129 Waste Tank Samples	uCi/mL	81.65	<5.910e-4	<4.78e-04	0.000191	n/a	n/a	n/a	4.78E-04	n/a
S95T000332		V	Bromide by Ion Chromatograph	ug/mL	100	<40.80	<4.08e+03	<4.08e3	n/a	n/a	94.3	4.08E+03	n/a
S95T000332		V	Chloride-IC-Dionex 4000i/4500	ug/mL	101.9	<5.100	1.17E+04	11500	1.16E+04	1.72	112	510	n/a
S95T000332		V	Fluoride-IC-Dionex 4000i/4500	ug/mL	96.79	<3.060	<3.06e+02	<3.06e2	n/a	n/a	81.8	306	n/a
S95T000332		V	Nitrite-IC - Dionex 4000i/4500	ug/mL	93.51	<40.80	1.45E+05	141000	1.43E+05	2.8	98.3	4.08E+03	n/a

Table A-2. Laboratory Data Results for Tank 241-SY-103, Core 62[1].

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %
S95T000332		V	Nitrate-IC - Dionex 4000i/4500	ug/mL	102.2	<51.00	1.83E+05	175000	1.79E+05	4.47	108	5.10E+03	n/a
S95T000332		V	Oxalate by IC - Dionex 4000i	ug/mL	91.68	<25.50	<2.55e+03	<2.55e3	n/a	n/a	93.2	2.55E+03	n/a
S95T000332		V	Phosphate-IC-Dionex 4000i/4500	ug/mL	96.32	<30.60	3.23E+03	3020	3.12E+03	6.72	96.7	3.06E+03	n/a
S95T000332		V	Sulfate by IC-Dionex4000i/4500	ug/mL	101.7	<40.80	<4.08e+03	<4.08e3	n/a	n/a	99.9	4.08E+03	n/a
S95T000332		V	Acetate by IC - Dionex 4000i	ug/mL	n/a	<2.000e-1	1.37E+03	1330	1.35E+03	2.96	41.2	220	n/a
S95T000332		V	Formate by Ion Chromatograph	ug/mL	n/a	<2.000e-1	4.28E+03	4210	4.24E+03	1.65	13.9	220	n/a
S95T000740			Bulk Density of Sample	g/mL	n/a	n/a	1.47	n/a	n/a	n/a	n/a	5.00E-01	n/a
SEGMENT # 4-8													
SEGMENT PORTION					Stratum "B" Solids Composite								
S94T000273			% Water by TGA on Perkin Elmer	%	98.28	n/a	46.81	46.55	4.67E+01	0.56	n/a	n/a	n/a
S94T000273			pH on SST Samples	pH	100.2	n/a	12.85	12.92	1.29E+01	0.54	n/a	1.00E-02	n/a
S94T000273			DSC Exotherm using Mettler	Joules/g	100.2	n/a	1.70E+02	167.1	1.69E+02	1.9	n/a	n/a	n/a
S94T000273			TOC by Persulfate/Coulometry	ug/g	90.67	32.5	2.40E+03	2910	2.66E+03	19.2	n/a	80	n/a
S94T000273			TIC by Acid/Coulometry	ug/g	97.83	2.200	2.00e+03	2.05e+03	2.02e+03	2.47	n/a	5.000	n/a
S94T000276		A	Aluminium -ICP-Acid Digest	ug/g	97.6	2.60E-02	2.75E+04	27500	2.75E+04	0	n/a	9.67	n/a
S94T000276		A	Calcium -ICP-Acid Digest	ug/g	101.2	2.10E-02	2.02E+02	187	1.95E+02	7.71	n/a	19.3	n/a
S94T000276		A	Chromium -ICP-Acid Digest	ug/g	95.8	1.10E-02	31.1	31	3.11E+01	0.32	n/a	1.93	n/a
S94T000276		A	Iron -ICP-Acid Digest	ug/g	96.6	4.40E-02	47.1	49.7	4.84E+01	5.37	n/a	9.67	n/a
S94T000276		A	Potassium -ICP-Acid Digest	ug/g	121	2.15	2.68E+03	2750	2.72E+03	2.58	n/a	58	n/a
S94T000276		A	Sodium -ICP-Acid Digest	ug/g	99.2	1.14E-01	1.59E+05	163000	1.61E+05	2.48	n/a	96.7	n/a
S94T000276		A	Nickel -ICP-Acid Digest	ug/g	94.6	7.00E-03	34.3	33.7	3.40E+01	1.76	n/a	3.87	n/a

Table A-2. Laboratory Data Results for Tank 241-SY-103, Core 62[1].

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %
S94T000276		A	Zinc -ICP-Acid Digest	ug/g	91.2	6.00E-03	36.6	36.4	3.65E+01	0.55	n/a	1.93	n/a
S94T000276		A	Zirconium -ICP-Acid Digest	ug/g	96.4	7.00E-03	< 1.930	<1.93	n/a	n/a	n/a	1.93	n/a
S94T000279		W	OH- by Pot. Titration	ug/g	99.36	<60300.0	1.46E+04	6420	1.05E+04	77.8	n/a	6.05E+03	n/a
S94T000279		W	Chromium (VI) by Spec.	ug/g	100.6	<2.290e-1	< 22.10	<22.1	n/a	n/a	108.4	22.1	n/a
S94T000279		W	Tritium By Lachat	uCi/g	93.8	<4.660e-4	<4.73e-04	<4.72E-4	n/a	n/a	87.2	4.66E-04	5.6
S94T000279		W	Bromide by Ion Chromatograph	ug/g	97.38	<1.000	< 96.80	<97.1	n/a	n/a	97.4	96.8	n/a
S94T000279		W	Chloride-IC-Dionex 4000i/4500	ug/g	95.73	1.188	5.88E+03	3170	4.52E+03	59.9	96.8	19.4	n/a
S94T000279		W	Fluoride-IC-Dionex 4000i/4500	ug/g	94.82	<1.000e-1	2.67E+02	<9.713	n/a	n/a	71.7	9.68	n/a
S94T000279		W	Nitrite-IC - Dionex 4000i/4500	ug/g	96.21	<1.000	7.17E+04	39600	5.56E+04	57.7	100	96.8	n/a
S94T000279		W	Nitrate by IC-Dionex4000i/4500	ug/g	96.19	<1.000	2.47E+05	465000	3.56E+05	61.2	101.2	96.8	n/a
S94T000279		W	Oxalate by IC - Dionex 4000i	ug/g	94.81	<1.000	< 96.80	<97.1	n/a	n/a	101.4	96.8	n/a
S94T000279		W	Phosphate-IC-Dionex 4000i/4500	ug/g	97.09	<1.000	2.32E+04	15400	1.93E+04	40.4	97.5	96.8	n/a
S94T000279		W	Sulfate by IC-Dionex4000i/4500	ug/g	95.83	<1.000	1.62E+03	1090	1.36E+03	39.1	94.2	96.8	n/a
S94T000279		W	Acetate by IC - Dionex 4000i	ug/g	n/a	<1.000	n/a	n/a	n/a	n/a	n/a	1	n/a
S94T000279		W	Formate by IC - Dionex 4000i	ug/g	n/a	<1.000	2.70E+03	2800	2.75E+03	3.64	91.7	96.8	n/a
S94T000282		R	Am-241 by Extraction	uCi/g	99.58	<2.670e-3	<2.88e-03	<2.50e-3	n/a	n/a	n/a	3.00E-03	14.2
S94T000282		R	Cm-243/244 by Extraction	uCi/g	n/a	<2.670e-3	<2.88e-03	<2.50e-3	n/a	n/a	n/a	3.00E-03	52.5
S94T000282		R	Cobalt-60 by GEA	uCi/g	107.4	<2.910e-3	<1.01e-02	0.00626	n/a	n/a	n/a	3.00E-03	NA
S94T000282		R	Cesium-137 by GEA	uCi/g	103.1	<6.560e-3	2.21E+02	130	1.76E+02	51.9	n/a	7.00E-03	0.16
S94T000282		R	Europium-154 by GEA	uCi/g	n/a	<7.970e-3	<4.72e-02	<2.67e-2	n/a	n/a	n/a	8.00E-03	NA
S94T000282		R	Europium-155 by GEA	uCi/g	n/a	<6.960e-3	<1.72e-01	<1.32e-1	n/a	n/a	n/a	7.00E-03	NA
S94T000282		R	Np237 by TTA Extraction	uCi/g	80.17	<2.420e-3	<2.42e-03	<2.51e-3	n/a	n/a	72.6	5.00E-03	109.9

Table A-2. Laboratory Data Results for Tank 241-SY-103, Core 62[1].

Sample#	R	A/F	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %
S94T000282		R	Pu-238 by Ion Exchange	uCi/g	n/a	<3.510e-4	<3.13e-04	<4.32e-4	n/a	n/a	n/a	3.13E-04	100
S94T000282		R	Pu-239/240 by TRU-SPEC Resin	uCi/g	98.59	<3.510e-4	<3.13e-04	<4.32e-4	n/a	n/a	n/a	3.13E-04	11.8
S94T000282		R	Strontium-89/90 High Level	uCi/g	93.69	2.00E-03	1.65	0.954	1.30E+00	53.5	n/a	2.00E-03	1.5
S94T000299		F	Uranium by Phosphorescence	ug/g	108.5	<2.120e-2	<2.12e-02	<2.03e-2	n/a	n/a	107.3	2.10E-02	n/a
S94T000299		F	Alpha of Digested Solid	uCi/g	97.6	<3.270e-3	<4.51e-03	<5.50e-3	n/a	n/a	87.8	8.00E-03	500
S94T000299		F	Am-241 by Extraction	uCi/g	102.5	<5.790e-2	<1.52e-02	<1.47e-2	n/a	n/a	n/a	1.50E-02	19.2
S94T000299		F	Cm-243/244 by Extraction	uCi/g	n/a	<5.790e-2	<1.52e-02	<1.47e-2	n/a	n/a	n/a	1.50E-02	113.2
S94T000299		F	Beta of Solid Sample	uCi/g	90.06	3.20E-01	1.79E+02	162	1.71E+02	9.97	87.5	2.38E-01	0.8
S94T000299		F	Cobalt-60 by GEA	uCi/g	105.4	<2.090e-2	<2.35e-02	<2.27e-2	n/a	n/a	n/a	2.10E-02	na
S94T000299		F	Cesium-137 by GEA	uCi/g	96.94	<3.970e-2	1.39E+02	128	1.34E+02	8.24	n/a	4.00E-02	0.49
S94T000299		F	Europium-154 by GEA	uCi/g	n/a	<3.630e-2	<5.98e-02	<6.02e-2	n/a	n/a	n/a	3.60E-02	na
S94T000299		F	Europium-155 by GEA	uCi/g	n/a	<4.580e-2	<3.29e-01	<3.08e-1	n/a	n/a	n/a	4.60E-02	na
S94T000299		F	Iodine-129 Waste Tank Samples	uCi/g	107.9	<1.040e-1	<1.68e-01	<3.09e-1	n/a	n/a	n/a	1.68E-01	na
S94T000299		F	Aluminium -ICP-Fusion	ug/g	98.2	5.80E-01	1.30E+04	11900	1.24E+04	8.84	n/a	287	n/a
S94T000299		F	Calcium -ICP-Fusion	ug/g	102	4.58E-01	<5.73e+02	<548	n/a	n/a	n/a	3	n/a
S94T000299		F	Iron -ICP-Fusion	ug/g	101.2	3.42E-01	<2.87e+02	<274	n/a	n/a	n/a	1.00E-01	n/a
S94T000299		F	Potassium -ICP-Fusion	ug/g	100	6.10E-02	n/a	n/a	n/a	n/a	n/a	5.00E-01	n/a
S94T000299		F	Sodium -ICP-Fusion	ug/g	98	3.87	2.23E+05	201000	2.12E+05	10.4	n/a	1	n/a
S94T000299		F	Nickel -ICP-Fusion	ug/g	100.8	2.09	1.27E+03	539	9.05E+02	80.8	n/a	2	n/a
S94T000299		F	Zinc -ICP-Fusion	ug/g	102.8	-2.20E-02	< 57.30	LDL	n/a	n/a	n/a	57.3	n/a
S94T000299		F	Zirconium -ICP-Fusion	ug/g	99.6	6.70E-02	< 57.30	LDL	n/a	n/a	n/a	57.3	n/a
S94T000299		F	Np237 by TTA Extraction	uCi/g	81.27	<1.870e-2	1.45E-02	<2.40e-2	n/a	n/a	83.2	2.50E-02	102.5

Table A-2. Laboratory Data Results for Tank 241-SY-103, Core 62[1].

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %
S94T000299		F	Pu-238 by Ion Exchange	uCi/g	n/a	<2.900e-3	<2.42e-03	0.00399	n/a	n/a	n/a	2.00E-03	10.9
S94T000299		F	Pu-239/240 by TRU-SPEC Resin	uCi/g	112.7	<2.900e-3	<2.42e-03	<2.78e-3	n/a	n/a	n/a	2.00E-03	8.6
S94T000299		F	Strontium-89/90 High Level	uCi/g	89.29	1.00E-03	1.11	1.14	1.13E+00	2.67	n/a	3.00E-03	2.1
S95T000739			Bulk Density of Sample	g/mL	n/a	n/a	1.51	n/a	n/a	n/a	n/a	5.00E-01	n/a
S95T001394		F	Chromium -ICP-Fusion	ug/g	101.3	8.90E-02	< 95.35	<93.1904	n/a	n/a	n/a	95.3	n/a
S95T001394		F	Technetium-99 Liq. Scint.	uCi/g	104.1	3.60E-02	1.26E-01	0.167	1.47E-01	28	n/a	3.10E-02	5.45
SEGMENT # 2													
Lower Half						L Lower Half of Segment							
S94T000011			% Water by TGA using Mettler	%	99.1	n/a	22.45	33.45	2.80E+01	39.4	n/a	1.00E-02	n/a
S94T000011	1		% Water by TGA using Mettler	%	99.7	n/a	47.01	n/a	n/a	n/a	n/a	1.00E-02	n/a
S94T000011			DSC Exotherm Dry Calculated	Joules/g Dry	n/a	n/a	0.00E+00	0	0.00E+00	n/a	n/a	n/a	n/a
S94T000011			DSC Exotherm using Mettler	Joules/g	95.9	n/a	0.00E+00	no exo	n/a	n/a	n/a	n/a	n/a
S94T000012		F	Alpha of Digested Solid	uCi/g	110.2	<2.290e-1	<1.26e-01	<1.48E-1	n/a	n/a	109.9	3.00E-01	253
S94T000012		F	Lithium -ICP-Fusion	ug/g	98	<1.000e-2	LDL	LDL	n/a	n/a	n/a	52.1	n/a
						Drainable Liquid							
S94T000015			% Water by TGA using Mettler	%	98.26	n/a	48.27	49.22	4.88E+01	1.95	n/a	1.00E-02	n/a
S94T000015			DSC Exotherm using Mettler	Joules/g	97.7	n/a	1.67E+02	245.1	2.06E+02	38.1	n/a	n/a	n/a
S94T000016		D	Lithium-ICP-Acid Dil.	ug/mL	99.8	1.00E-03	LDL	LDL	n/a	n/a	n/a	11	n/a

Table A-2. Laboratory Data Results for Tank 241-SY-103, Core 62[1].

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %
SEGMENT # 3													
SEGMENT PORTION						L Lower Half of Segment							
S94T000020			% Water by TGA using Mettler	%	99.9	n/a	21.22	17.81	1.95E+01	17.5	n/a	1.00E-02	n/a
S94T000020			DSC Exotherm Dry Calculated	Joules/g Dry	n/a	n/a	37.1	69	5.31E+01	60.1	n/a	n/a	n/a
S94T000020			DSC Exotherm using Mettler	Joules/g	94.9	n/a	29.2	56.7	4.30E+01	64	n/a	n/a	n/a
S94T000021		F	Alpha of Digested Solid	uCi/g	102.9	<1.250e-1	<1.03e-01	<1.03e-1	n/a	n/a	114.3	2.54E-01	138.6
S94T000021		F	Lithium -ICP-Fusion	ug/g	99.2	<1.000e-2	LDL	LDL	n/a	n/a	n/a	52.1	n/a
						Drainable Liquid							
S94T000025			% Water by TGA using Mettler	%	99.22	n/a	47.41	47.83	4.76E+01	0.88	n/a	1.00E-02	n/a
S94T000025			DSC Exotherm using Mettler	Joules/g	98.42	n/a	1.90E+02	133.9	1.62E+02	34.9	n/a	n/a	n/a
S94T000026		D	Lithium-ICP-Acid Dil.	ug/mL	100.6	0.00E+00	LDL	LDL	n/a	n/a	n/a	11	n/a
SEGMENT # 4													
Lower Half						L Lower Half of Segment							
S94T000028			% Water by TGA using Mettler	%	99.41	n/a	35.51	23	2.93E+01	42.8	n/a	1.00E-02	n/a
S94T000028	1		% Water by TGA using Mettler	%	99.7	n/a	47.21	n/a	n/a	n/a	n/a	1.00E-02	n/a
S94T000028			DSC Exotherm Dry Calculated	Joules/g Dry	n/a	n/a	70.77	93.5	8.21E+01	27.7	n/a	1.00E-02	n/a
S94T000028			DSC Exotherm using Mettler	Joules/g	94.9	n/a	41.5	72	5.68E+01	53.7	n/a	n/a	n/a
S94T000028			TOC by Persulfate/Coulometry	ug/g	90.67	106	4.53E+03	1870	3.20E+03	83.1	n/a	153	n/a
S94T000029		F	Alpha of Digested Solid	uCi/g	112	<1.250e-1	<2.10e-01	<1.02e-1	n/a	n/a	119	2.52E-01	309.9
S94T000029		F	Lithium -ICP-Fusion	ug/g	99.2	<1.000e-2	LDL	LDL	n/a	n/a	n/a	51.7	n/a
Drainable Liquid						Drainable Liquid							
S94T000032			% Water by TGA using Mettler	%	99.22	n/a	48.51	48.54	4.85E+01	0.06	n/a	1.00E-02	n/a
S94T000032			DSC Exotherm using Mettler	Joules/g	102.6	n/a	1.96E+02	203.8	2.00E+02	4.11	n/a	n/a	n/a

Table A-2. Laboratory Data Results for Tank 241-SY-103, Core 62[1].

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %
S94T000033		D	Lithium-ICP-Acid Dil.	ug/mL	100.6	0.00E+00	LDL	LDL	n/a	n/a	n/a	11	n/a
SEGMENT # 5													
Lower Half					L Lower Half of Segment								
S94T000036			% Water by TGA using Mettler	%	98.8	n/a	20.78	18.6	1.97E+01	11.1	n/a	1.00E-02	n/a
S94T000036			DSC Exotherm Dry Calculated	Joules/g Dry	n/a	n/a	46.8	0	2.34E+01	200	n/a	n/a	n/a
S94T000036			DSC Exotherm using Mettler	Joules/g	95.3	n/a	37.1	noexo	n/a	n/a	n/a	n/a	n/a
S94T000037		F	Alpha of Digested Solid	uCi/g	92.14	<5.610e-1	<2.57e-01	<2.59e-1	n/a	n/a	96.3	6.15E-01	500
S94T000037		F	Lithium -ICP-Fusion	ug/g	102.4	<1.000e-2	LDL	LDL	n/a	n/a	n/a	63.5	n/a
Drainable Liquid					Drainable Liquid								
S94T000040			% Water by TGA using Mettler	%	99	n/a	48.72	47.97	4.83E+01	1.55	n/a	1.00E-02	n/a
S94T000040			DSC Exotherm using Mettler	Joules/g	100.2	n/a	2.52E+02	180.4	2.16E+02	33	n/a	n/a	n/a
S94T000041		D	Lithium-ICP-Acid Dil.	ug/mL	101.2	0.00E+00	LDL	LDL	n/a	n/a	n/a	11	n/a
SEGMENT # 6													
Lower Half					L Lower Half of Segment								
S94T000055			% Water by TGA using Mettler	%	99.2	n/a	31.74	27.41	2.96E+01	14.6	n/a	1.00E-02	n/a
S94T000055			DSC Exotherm Dry Calculated	Joules/g Dry	n/a	n/a	3.25E+02	227.3	2.76E+02	35.3	n/a	1.00E-01	n/a
S94T000055			DSC Exotherm using Mettler	Joules/g	104.4	n/a	2.22E+02	165	1.93E+02	29.4	n/a	n/a	n/a
S94T000064		F	Alpha of Digested Solid	uCi/g	92.14	<5.610e-1	<3.80e-01	<2.50e-1	n/a	n/a	92.9	6.02E-01	500
S94T000064		F	Lithium -ICP-Fusion	ug/g	102.4	<1.000e-2	LDL	LDL	n/a	n/a	n/a	62.1	n/a
					Drainable Liquid								
S94T000105			% Water by TGA using Mettler	%	99	n/a	49.1	49.34	4.92E+01	0.49	n/a	1.00E-02	n/a
S94T000105			DSC Exotherm using Mettler	Joules/g	100.5	n/a	1.70E+02	145.5	1.58E+02	15.5	n/a	n/a	n/a

Table A-2. Laboratory Data Results for Tank 241-SY-103, Core 62[1].

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %
S94T000109		D	Lithium-ICP-Acid Dil.	ug/mL	101.2	0.00E+00	LDL	LDL	n/a	n/a	n/a	6	n/a
SEGMENT # 7													
Lower Half						L Lower Half of Segment							
S94T000056	1		% Water by TGA using Mettler	%	99.7	n/a	15.3	n/a	n/a	n/a	n/a	1.00E-02	n/a
S94T000056			% Water by TGA using Mettler	%	98.2	n/a	48.31	17.18	3.28E+01	95.1	n/a	1.00E-02	n/a
S94T000056			DSC Exotherm Dry Calculated	Joules/g Dry	n/a	n/a	2.51E+02	197.5	2.24E+02	23.8	n/a	1.00E-02	n/a
S94T000056			DSC Exotherm using Mettler	Joules/g	104.7	n/a	1.30E+02	163.6	1.47E+02	23.1	n/a	n/a	n/a
S94T000065		F	Alpha of Digested Solid	uCi/g	94.76	<1.970e-1	<1.97e-01	<1.95e-1	n/a	n/a	96.8	4.70E-01	183.3
S94T000065		F	Lithium -ICP-Fusion	ug/g	103	<1.000e-2	LDL	LDL	n/a	n/a	n/a	60.7	n/a
						Drainable Liquid							
S94T000106			% Water by TGA using Mettler	%	99	n/a	48.89	50.69	4.98E+01	3.62	n/a	1.00E-02	n/a
S94T000106			DSC Exotherm using Mettler	Joules/g	100.5	n/a	1.54E+02	133.2	1.44E+02	14.4	n/a	n/a	n/a
S94T000110		D	Lithium-ICP-Acid Dil.	ug/mL	99.8	1.00E-03	LDL	LDL	n/a	n/a	n/a	11	n/a
SEGMENT # 8													
						L Lower Half of Segment							
S94T000057	1		% Water by TGA using Mettler	%	99.2	n/a	15.27	n/a	n/a	n/a	n/a	1.00E-02	n/a
S94T000057			% Water by TGA using Mettler	%	98.2	n/a	13.67	17.84	1.58E+01	26.5	n/a	1.00E-02	n/a
S94T000057			DSC Exotherm Dry Calculated	Joules/g Dry	n/a	n/a	0.00E+00	0	0.00E+00	n/a	n/a	1.00E-01	n/a
S94T000057			DSC Exotherm using Mettler	Joules/g	104.7	n/a	0.00E+00	no exo	n/a	n/a	n/a	n/a	n/a
S94T000066		F	Alpha of Digested Solid	uCi/g	94.76	<1.970e-1	<1.38e-01	<1.38e-1	n/a	n/a	92.4	3.29E-01	500
S94T000066		F	Lithium -ICP-Fusion	ug/g	100.2	<2.100e-2	LDL	LDL	n/a	n/a	n/a	81.1	n/a

Table A-2. Laboratory Data Results for Tank 241-SY-103, Core 62[1].

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %
Drainable Liquid			Drainable Liquid										
S94T000107			% Water by TGA using Mettler	%	99	n/a	49.03	48.75	4.89E+01	0.57	n/a	1.00E-02	n/a
S94T000107			DSC Exotherm using Mettler	Joules/g	100.2	n/a	2.14E+02	239.2	2.27E+02	11	n/a	n/a	n/a
S94T000111		D	Lithium-ICP-Acid Dil.	ug/mL	99.8	1.00E-03	LDL	LDL	n/a	n/a	n/a	11	n/a
S94T000082			Bulk Density of Sample	g/mL	n/a	n/a	1.47	n/a	n/a	n/a	n/a	5.00E-01	n/a
S95T000283			Tot. Organic Carbon by Coul.	ug/mL	99.67	<5.000	1.01E+04	9980	1.00E+04	1.2	n/a	105	n/a
S95T000283			% Water by TGA using Mettler	%	98.83	n/a	47.65	47.85	4.78E+01	0.42	n/a	n/a	n/a
S95T000283			pH Direct	pH	99.46	n/a	13.9	n/a	n/a	n/a	n/a	1.00E-02	n/a
S95T000283			DSC Exotherm using Mettler	Joules/g	95.96	n/a	29.2	31.4	3.03E+01	7.26	n/a	n/a	n/a
S95T000325		B	Aluminium -ICP-Acid Digest-Liq	ug/mL	99.6	-6.00E-03	3.72E+04	38000	3.76E+04	2.13	n/a	21	n/a
S95T000325		B	Boron -ICP-Acid Digest-Liquid	ug/mL	98.2	5.00E-03	81.1	81.1	8.11E+01	0	n/a	21	n/a
S95T000325		B	Barium -ICP-Acid Digest-Liquid	ug/mL	97.6	0.00E+00	< 21.00	<21.0	n/a	n/a	n/a	21	n/a
S95T000325		B	Bismuth -ICP-Acid Digest/Liq	ug/mL	101.6	1.00E-02	< 42.00	<42.0	n/a	n/a	n/a	42	n/a
S95T000325		B	Calcium -ICP-Acid Digest-Liq	ug/mL	103.8	8.00E-03	1.16E+02	115	1.16E+02	0.87	n/a	42	n/a
S95T000325		B	Chromium -ICP-Acid Digest-Liq	ug/mL	102.4	0.00E+00	37.1	37.9	3.75E+01	2.13	n/a	4.2	n/a
S95T000325		B	Iron -ICP-Acid Digest-Liquid	ug/mL	101.2	1.00E-03	< 21.00	<21.0	n/a	n/a	n/a	21	n/a
S95T000325		B	Potassium -ICP-Acid Digest-Liq	ug/mL	97.6	-9.20E-02	3.50E+03	3640	3.57E+03	3.92	n/a	210	n/a
S95T000325		B	Lithium -ICP-Acid Digest-Liq	ug/mL	98.2	1.00E-03	< 4.200	<4.20	n/a	n/a	n/a	4.2	n/a
S95T000325		B	Sodium -ICP-Acid Digest-Liquid	ug/mL	98.2	6.00E-03	1.95E+05	199000	1.97E+05	2.03	n/a	42	n/a
S95T000325		B	Nickel -ICP-Acid Digest-Liquid	ug/mL	100.6	-6.00E-03	47.4	48.8	4.81E+01	2.91	n/a	8.4	n/a
S95T000325		B	Phosphorus-ICP-Acid Adjust-Liq	ug/mL	100.4	-1.10E-02	1.15E+03	1180	1.16E+03	2.58	n/a	84	n/a
S95T000325		B	Silicon -ICP-Acid Digest-Liq	ug/mL	93.2	1.90E-02	1.17E+02	116	1.17E+02	0.86	n/a	21	n/a

Table A-2. Laboratory Data Results for Tank 241-SY-103, Core 62[1].

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %
S95T000325		B	Uranium -ICP-Acid Digest-Liq	ug/mL	97.4	4.70E-02	<2.10e+02	<210	n/a	n/a	n/a	2.10E+05	n/a
S95T000325		B	Zinc -ICP-Acid Digest-Liquid	ug/mL	103.2	-1.00E-03	< 4.200	<4.20	n/a	n/a	n/a	4.2	n/a
S95T000325		B	Zirconium -ICP-Acid Digest-Liq	ug/mL	99	4.00E-03	< 4.200	<4.20	n/a	n/a	n/a	4.2	n/a
S95T000329		D	Uranium by Phosphorescence	ug/mL	93.03	1.98E-01	4.06	3.8	3.93E+00	6.62	101	3.00E-02	n/a
S95T000329		D	Alpha in Liquid Samples	uCi/mL	93.91	<8.68e-02	< 5.19e-2	<8.11e-2	n/a	n/a	102.0	1.06e-01	500.0
S95T000329		D	Beta in Liquid Samples	uCi/mL	105.3	<1.910e-1	3.65E+02	348	3.57E+02	4.77	110.2	2.41E-01	0.6
S95T000329		D	Am-241 by Extraction	uCi/mL	88.27	<1.590e-3	2.09E-03	0.00191	2.00E-03	9	n/a	1.00E-03	8.9
S95T000329		D	Cm-243/244 by Extraction	uCi/mL	n/a	<1.590e-3	<1.10e-03	<1.14e-3	n/a	n/a	n/a	1.00E-03	29.5
S95T000329		D	Cobalt-60 by GEA	uCi/mL	104	<5.320e-4	2.72E-02	0.0238	2.55E-02	13.3	n/a	1.00E-03	32.01
S95T000329		D	Cesium-137 by GEA	uCi/mL	100	<8.020e-4	3.80E+02	368	3.74E+02	3.21	n/a	1.00E-03	0.16
S95T000329		D	Europium-154 by GEA	uCi/mL	n/a	<1.330e-3	<7.98e-02	<7.32e-2	n/a	n/a	n/a	1.00E-03	n/a
S95T000329		D	Europium-155 by GEA	uCi/mL	n/a	<1.180e-3	<2.44e-01	<2.42e-1	n/a	n/a	n/a	1.00E-03	n/a
S95T000329		D	Tritium By Lachat	uCi/mL	100	<6.950e-5	3.16E-04	0.00332	1.82E-03	165	2.16E+03	6.95E-05	4.67
S95T000329		D	Np237 by TTA Extraction	uCi/mL	82.92	<4.120e-4	<7.89e-04	<4.42e-4	n/a	n/a	81.6	1.00E-03	141.3
S95T000329		D	Pu-238 by Ion Exchange	uCi/mL	n/a	<5.900e-5	<6.41e-05	<6.51e-5	n/a	n/a	n/a	6.41E-05	15.7
S95T000329		D	Pu-239/240 by TRU-SPEC Resin	uCi/mL	93.75	<5.900e-5	6.80E-05	7.28E-05	7.04E-05	6.82	n/a	6.41E-05	8.7
S95T000329		D	Strontium-89/90 High Level	uCi/mL	91.89	<3.690e-2	2.5	2.3	2.40E+00	8.33	n/a	5.20E-02	6
S95T000329		D	Technetium-99 Liq. Scint.	uCi/mL	96.68	1.00E-03	1.44E-01	0.149	1.46E-01	3.41	n/a	1.00E-03	1.05
S95T000333		V	OH- by Pot. Titration	ug/mL	99.38	<4167.0	2.96E+04	28900	2.92E+04	2.39	n/a	4.17E+03	n/a
S95T000333		V	Chromium (VI) by Spec.	ug/mL	102.2	<3.900e-2	< 3.939	12.4	n/a	n/a	n/a	3.939	n/a
S95T000333		V	Iodine-129 Waste Tank Samples	uCi/mL	81.65	<5.910e-4	1.90E-04	0.000193	1.91E-04	1.57	n/a	1.00E-03	34
S95T000333		V	Bromide by Ion Chromatograph	ug/mL	100	<40.80	<4.08e+03	<4.08e3	n/a	n/a	n/a	4.08E+03	n/a

Table A-2. Laboratory Data Results for Tank 241-SY-103, Core 62[1].

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %
S95T000333		V	Chloride-IC-Dionex 4000i/4500	ug/mL	101.9	<5.100	1.17E+04	11000	1.14E+04	6.17	n/a	510	n/a
S95T000333		V	Fluoride-IC-Dionex 4000i/4500	ug/mL	96.79	<3.060	<3.06e+02	<3.06e2	n/a	n/a	n/a	306	n/a
S95T000333		V	Nitrite-IC - Dionex 4000i/4500	ug/mL	93.51	<40.80	1.43E+05	134000	1.38E+05	6.5	n/a	4.08E+03	n/a
S95T000333		V	Nitrate-IC - Dionex 4000i/4500	ug/mL	102.2	<51.00	1.78E+05	167000	1.72E+05	6.38	n/a	5.10E+03	n/a
S95T000333		V	Oxalate by IC - Dionex 4000i	ug/mL	91.68	<25.50	<2.55e+03	<2.55e3	n/a	n/a	n/a	2.55E+03	n/a
S95T000333		V	Phosphate-IC-Dionex 4000i/4500	ug/mL	96.32	<30.60	3.38E+03	2980	3.18E+03	12.6	n/a	3.06E+03	n/a
S95T000333		V	Sulfate by IC-Dionex 4000i/4500	ug/mL	101.7	<40.80	<4.08e+03	<4.08e3	n/a	n/a	n/a	4.08E+03	n/a
S95T000333		V	Acetate by IC - Dionex 4000i	ug/mL	n/a	<2.000e-1	1.32E+03	1340	1.33E+03	1.5	n/a	220	n/a
S95T000333		V	Formate by Ion Chromatograph	ug/mL	n/a	<2.000e-1	4.23E+03	4340	4.28E+03	2.57	n/a	220	n/a
SEGMENT # 9													
					Stratum "C" Composite Solids								
S94T000058			% Water by TGA using Mettler	%	99.2	n/a	46.03	44.64	4.53E+01	3.07	n/a	1.00E-02	n/a
S94T000058			DSC Exotherm Dry Calculated	Joules/g Dry	n/a	n/a	3.22E+02	316.3	3.19E+02	1.63	n/a	1.00E-01	n/a
S94T000058			DSC Exotherm using Mettler	Joules/g	104.7	n/a	1.74E+02	175.1	1.74E+02	0.92	n/a	n/a	n/a
S94T000067		F	Uranium by Phosphorescence	ug/g	98.26	1.81	6.49E+02	602	6.26E+02	7.51	123	1.31	n/a
S94T000067		F	Alpha of Digested Solid	uCi/g	91.61	<2.120e-1	8.71E-01	0.589	7.30E-01	38.6	99.1	4.28E-01	53.3
S94T000067		F	Am-241 by Extraction	uCi/g	100.8	<1.580e-1	6.13E-01	0.484	5.48E-01	23.5	n/a	1.44E-01	6.1
S94T000067		F	Cm-243/244 by Extraction	uCi/g	n/a	<1.580e-1	<1.44e-01	<3.20e-1	n/a	n/a	n/a	1.44E-01	25.3
S94T000067		F	Beta of Solid Sample	uCi/g	91.36	3.07	4.30E+02	406	4.18E+02	5.74	87.8	2.28	1.6
S94T000067		F	Cesium-137 by GEA	uCi/g	98.47	4.49E-01	2.93E+02	296	2.95E+02	1.02	n/a	4.49E-01	0.94
S94T000067		F	Iodine-129 Waste Tank Samples	uCi/g	100	<6.020e-2	<6.22e-02	<8.22e-2	n/a	n/a	n/a	6.20E-02	n/a

Table A-2. Laboratory Data Results for Tank 241-SY-103, Core 62[1].

Sample#	R	A/F	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %
S94T000067		F	Aluminium -ICP-Fusion	ug/g	98.6	2.90E-01	3.89E+04	36100	3.75E+04	7.47	n/a	275	n/a
S94T000067		F	Calcium -ICP-Fusion	ug/g	101.4	2.50E-01	8.08E+02	LDL	n/a	n/a	n/a	549	n/a
S94T000067		F	Chromium -ICP-Fusion	ug/g	102.2	2.90E-02	6.23E+03	5070	5.65E+03	20.5	n/a	54.9	n/a
S94T000067		F	Iron -ICP-Fusion	ug/g	101.2	9.00E-02	1.56E+03	1360	1.46E+03	13.7	n/a	275	n/a
S94T000067		F	Potassium -ICP-Fusion	ug/g	96.6	-1.40E-02	n/a	n/a	n/a	n/a	n/a	5.49E+03	n/a
S94T000067		F	Sodium -ICP-Fusion	ug/g	97.4	4.65	1.77E+05	166000	1.72E+05	6.41	n/a	549	n/a
S94T000067		F	Nickel -ICP-Fusion	ug/g	101.8	10.4	4.96E+03	5870	5.42E+03	16.8	n/a	110	n/a
S94T000067		F	Zinc -ICP-Fusion	ug/g	103.6	2.00E-02	< 54.90	14.1	n/a	n/a	n/a	54.9	n/a
S94T000067		F	Zirconium -ICP-Fusion	ug/g	99.8	1.22E-01	< 54.90	135	n/a	n/a	n/a	54.9	n/a
S94T000067		F	Lithium -ICP-Fusion	ug/g	100.6	2.10E-01	LDL	LDL	n/a	n/a	n/a	60.4	n/a
S94T000067		F	Np237 by TTA Extraction	uCi/g	85.4	<1.180e-2	<1.01e-02	<1.25e-2	n/a	n/a	82.7	2.10E-02	145.4
S94T000067		F	Pu-238 by Ion Exchange	uCi/g	n/a	<3.150e-1	<2.01e-01	<3.51e-1	n/a	n/a	n/a	2.01E-01	100
S94T000067		F	Pu-239/240 by TRU-SPEC Resin	uCi/g	102.1	3.90E-01	3.79E-01	0.419	3.99E-01	10	n/a	2.01E-01	5.3
S94T000067		F	Strontium-89/90 High Level	uCi/g	99.11	7.40E-02	34.9	29.1	3.20E+01	18.1	n/a	1.00E-03	0.2
S94T000067		F	Technetium-99 Liq. Scint.	uCi/g	86.72	1.60E-02	2.28E-01	0.225	2.27E-01	1.32	82	1.50E-02	3.5
S94T000077			Bulk Density of Sample	g/mL	n/a	n/a	1.51	n/a	n/a	n/a	n/a	5.00E-01	n/a
S94T000274			pH on SST Samples	pH	100.2	n/a	13.04	12.98	1.30E+01	0.46	n/a	1.00E-02	n/a
S94T000274			TOC by Persulfate/Coulometry	ug/g	89.33	33.8	1.00E+04	9150	9.58E+03	8.88	n/a	80	n/a
S94T000274			TIC by Acid/Coulometry	ug/g	97.00	4.500	6.45e+03	6.37e+03	6.41e+03	1.25	n/a	5.000	n/a
S94T000277		A	Aluminium -ICP-Acid Digest	ug/g	97.6	2.60E-02	2.64E+04	24200	2.53E+04	8.7	n/a	24.5	n/a
S94T000277		A	Calcium -ICP-Acid Digest	ug/g	101.2	2.10E-02	1.10E+02	107	1.09E+02	2.77	n/a	49	n/a
S94T000277		A	Chromium -ICP-Acid Digest	ug/g	95.8	1.10E-02	2.65E+02	240	2.53E+02	9.9	n/a	4.9	n/a

Table A-2. Laboratory Data Results for Tank 241-SY-103, Core 62[1].

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %
S94T000277		A	Iron -ICP-Acid Digest	ug/g	96.6	4.40E-02	80.9	74.5	7.77E+01	8.24	n/a	24.5	n/a
S94T000277		A	Potassium -ICP-Acid Digest	ug/g	121	2.15	3.18E+03	2900	3.04E+03	9.21	n/a	147	n/a
S94T000277		A	Sodium -ICP-Acid Digest	ug/g	99.2	1.14E-01	1.53E+05	141000	1.47E+05	8.16	n/a	98	n/a
S94T000277		A	Nickel -ICP-Acid Digest	ug/g	94.6	7.00E-03	30.2	27.6	2.89E+01	9	n/a	9.8	n/a
S94T000277		A	Zinc -ICP-Acid Digest	ug/g	91.2	6.00E-03	8.08	7.86	7.97E+00	2.76	n/a	4.9	n/a
S94T000277		A	Zirconium -ICP-Acid Digest	ug/g	96.4	7.00E-03	< 4.900	<4.90	n/a	n/a	n/a	4.9	n/a
S94T000280		W	OH- by Pot. Titration	ug/g	99.36	<60300.0	2.00E+04	20200	2.01E+04	1	n/a	6.11E+03	n/a
S94T000280		W	Chromium (VI) by Spec.	ug/g	101.9	<2.290e-1	61.7	63.7	6.27E+01	3.19	100.6	20.76	n/a
S94T000280		W	Tritium By Lachat	uCi/g	93.8	<4.660e-4	<4.69e-04	<4.74E-4	n/a	n/a	95	5.00E-04	5.4
S94T000280		W	Bromide by Ion Chromatograph	ug/g	97.9	<1.000	< 97.80	<97.8	n/a	n/a	99	97.8	n/a
S94T000280		W	Chloride-IC-Dionex 4000i/4500	ug/g	96.4	<2.000e-1	7.44E+03	7360	7.40E+03	1.08	104.1	19.6	n/a
S94T000280		W	Fluoride-IC-Dionex 4000i/4500	ug/g	94.64	<1.000e-1	3.76E+02	418	3.97E+02	10.6	67.4	9.78	n/a
S94T000280		W	Nitrite-IC - Dionex 4000i/4500	ug/g	96.4	<1.000	7.91E+04	80700	7.99E+04	2	102.8	97.8	n/a
S94T000280		W	Nitrate by IC-Dionex 4000i/4500	ug/g	97.23	<1.000	9.54E+04	97400	9.64E+04	2.07	99.1	97.8	n/a
S94T000280		W	Oxalate by IC - Dionex 4000i	ug/g	95.43	<1.000	2.31E+04	23300	2.32E+04	0.86	100.8	97.8	n/a
S94T000280		W	Phosphate-IC-Dionex 4000i/4500	ug/g	96.7	<1.000	8.37E+03	8520	8.44E+03	1.78	98.6	97.8	n/a
S94T000280		W	Sulfate by IC-Dionex4000i/4500	ug/g	95.99	<1.000	6.38E+03	6380	6.38E+03	0	95	97.8	n/a
S94T000280		W	Acetate by IC - Dionex 4000i	ug/g	n/a	<1.000	3.41E+02	394	3.68E+02	14.4	72.2	98	n/a
S94T000280		W	Formate by IC - Dionex 4000i	ug/g	n/a	<1.000	3.25E+03	3620	3.44E+03	10.8	123.3	98	n/a
S94T000283		R	Am-241 by Extraction	uCi/g	87.55	<2.500e-3	5.18E-03	0.00318	4.18E-03	47.8	n/a	2.00E-03	9.5
S94T000283		R	Cm-243/244 by Extraction	uCi/g	n/a	<2.500e-3	<2.45e-03	<2.28e-3	n/a	n/a	n/a	2.00E-03	36.5
S94T000283		R	Cobalt-60 by GEA	uCi/g	97.06	<2.990e-3	<1.15e-02	<1.23e-2	n/a	n/a	n/a	3.00E-03	na

Table A-2. Laboratory Data Results for Tank 241-SY-103, Core 62[1].

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %
S94T000283		R	Cesium-137 by GEA	uCi/g	94.64	<6.900e-3	2.49E+02	267	2.58E+02	6.98	n/a	7.00E-03	0.16
S94T000283		R	Europium-154 by GEA	uCi/g	n/a	<6.390e-3	<5.05e-02	<5.95e-2	n/a	n/a	n/a	6.00E-03	na
S94T000283		R	Europium-155 by GEA	uCi/g	n/a	<7.000e-3	<1.83e-01	<1.90e-1	n/a	n/a	n/a	7.00E-03	na
S94T000283		R	Np237 by TTA Extraction	uCi/g	80.17	<2.420e-3	<3.50e-03	<2.45e-3	n/a	n/a	73.8	5.00E-03	291.7
S94T000283		R	Pu-238 by Ion Exchange	uCi/g	n/a	<7.940e-4	<6.76e-04	<4.30e-4	n/a	n/a	n/a	1.00E-03	100
S94T000283		R	Pu-239/240 by TRU-SPEC Resin	uCi/g	113.4	<7.940e-4	7.00E-04	0.000472	5.86E-04	38.9	n/a	1.00E-03	9.6
S94T000283		R	Strontium-89/90 High Level	uCi/g	93.69	2.00E-03	1.88	2.43	2.16E+00	25.5	n/a	2.00E-03	1.4
S95T000295		R	Technetium-99 Liq. Scint.	uCi/g	101.2	<1.750e-3	1.68E-01	0.16	1.64E-01	4.88	n/a	2.00E-03	1.65
Drainble Liquid			Drainable Liquid										
S94T000108			% Water by TGA using Mettler	%	99	n/a	48.7	48.95	4.88E+01	0.51	n/a	1.00E-02	n/a
S94T000108			DSC Exotherm using Mettler	Joules/g	100.2	n/a	2.88E+02	285.1	2.86E+02	0.87	n/a	n/a	n/a
S94T000112		D	Lithium-ICP-Acid Dil.	ug/mL	100.6	0.00E+00	LDL	LDL	n/a	n/a	n/a	11	n/a
SEGMENT # 10													
Upper Half			U Upper Half of Segment										
S94T000063			% Water by TGA using Mettler	%	98.5	n/a	44.33	43.1	4.37E+01	2.81	n/a	1.00E-02	n/a
S94T000063			DSC Exotherm Dry Calculated	Joules/g Dry	n/a	n/a	3.64E+02	352.2	3.58E+02	3.27	n/a	1.00E-01	n/a
S94T000063			DSC Exotherm using Mettler	Joules/g	99.47	n/a	2.03E+02	200.4	2.02E+02	1.09	n/a	n/a	n/a
S94T000069		F	Alpha of Digested Solid	uCi/g	91.61	<1.690e-1	3.77E-01	0.75	5.64E-01	66.2	93.4	4.52E-01	84.3
S94T000069		F	Lithium -ICP-Fusion	ug/g	103	<1.000e-2	LDL	LDL	n/a	n/a	n/a	63.8	n/a
Lower Half			L Lower Half of Segment										
S94T000068		F	Alpha of Digested Solid	uCi/g	91.61	<2.120e-1	9.79E-01	0.797	8.88E-01	20.5	97	4.07E-01	53.3
S94T000068		F	Lithium -ICP-Fusion	ug/g	100.6	2.10E-01	LDL	LDL	n/a	n/a	n/a	57.5	n/a

Table A-2. Laboratory Data Results for Tank 241-SY-103, Core 62[1].

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %
S94T000070			% Water by TGA using Mettler	%	98.6	n/a	40.8	40.04	4.04E+01	1.88	n/a	1.00E-02	n/a
S94T000070			DSC Exotherm Dry Calculated	Joules/g Dry	n/a	n/a	2.92E+02	244.3	2.68E+02	17.8	n/a	1.00E-01	n/a
S94T000070			DSC Exotherm using Mettler	Joules/g	96.31	n/a	1.73E+02	146.5	1.60E+02	16.5	n/a	n/a	n/a
SEGMENT # 11													
Upper Half					U Upper Half of Segment								
S94T000072			% Water by TGA using Mettler	%	97.6	n/a	46.45	45.04	4.58E+01	3.08	n/a	1.00E-02	n/a
S94T000072			DSC Exotherm Dry Calculated	Joules/g Dry	n/a	n/a	4.24E+02	412.8	4.19E+02	2.75	n/a	1.00E-01	n/a
S94T000072			DSC Exotherm using Mettler	Joules/g	103.3	n/a	2.27E+02	226.9	2.27E+02	0.13	n/a	n/a	n/a
S94T000119		F	Alpha of Digested Solid	uCi/g	93.5	<2.510e-1	8.24E-01	0.803	8.14E-01	2.58	101.6	5.87E-01	60.4
S94T000119		F	Lithium -ICP-Fusion	ug/g	101.1	2.443	LDL	LDL	n/a	n/a	n/a	64.1	n/a
Lower Half					L Lower Half of Segment								
S94T000071			% Water by TGA using Mettler	%	98.6	n/a	39.17	37.52	3.83E+01	4.3	n/a	1.00E-02	n/a
S94T000071			DSC Exotherm Dry Calculated	Joules/g Dry	n/a	n/a	1.51E+02	342	2.46E+02	77.7	n/a	1.00E-01	n/a
S94T000071			DSC Exotherm using Mettler	Joules/g	104.4	n/a	91.7	213.7	1.53E+02	79.9	n/a	n/a	n/a
S94T000071	1		DSC Exotherm using Mettler	Joules/g	104.4	n/a	21.2	n/a	n/a	n/a	n/a	n/a	n/a
S94T000094		F	Alpha of Digested Solid	uCi/g	91.61	<1.690e-1	8.87E-01	0.926	9.07E-01	4.3	96.2	3.55E-01	43.7
S94T000094		F	Lithium -ICP-Fusion	ug/g	100.6	<1.000e-2	LDL	LDL	n/a	n/a	n/a	95.8	n/a
SEGMENT # 12													
Upper Half					U Upper Half of Segment								
S94T000085			% Water by TGA using Mettler	%	100.1	n/a	40.03	42.95	4.15E+01	7.04	n/a	1.00E-02	n/a
S94T000085			DSC Exotherm Dry Calculated	Joules/g Dry	n/a	n/a	2.07E+02	179.1	1.93E+02	14.5	n/a	n/a	n/a

Table A-2. Laboratory Data Results for Tank 241-SY-103, Core 62[1].

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %
S94T000085			DSC Exotherm using Mettler	Joules/g	101.2	n/a	1.24E+02	102.2	1.13E+02	19.4	n/a	n/a	n/a
S94T000120		F	Alpha of Digested Solid	uCi/g	93.5	<2.510e-1	1	0.968	9.84E-01	3.25	100.3	5.93E-01	50.5
S94T000120		F	Lithium -ICP-Fusion	ug/g	101.1	2.443	LDL	LDL	n/a	n/a	n/a	64.7	n/a
Lower Half					L Lower Half of Segment								
S94T000090			% Water by TGA using Mettler	%	97.6	n/a	43.04	41.86	4.25E+01	2.78	n/a	1.00E-02	n/a
S94T000090			DSC Exotherm Dry Calculated	Joules/g Dry	n/a	n/a	3.58E+02	340.6	3.49E+02	4.98	n/a	1.00E-01	n/a
S94T000090			DSC Exotherm using Mettler	Joules/g	103.3	n/a	2.04E+02	198	2.01E+02	2.94	n/a	n/a	n/a
S94T000095		F	Alpha of Digested Solid	uCi/g	97.19	<3.900e-1	<7.81e-01	<7.53e-1	n/a	n/a	119.9	8.67E-01	143.7
S94T000095		F	Lithium -ICP-Fusion	ug/g	98.4	<1.000e-2	LDL	LDL	n/a	n/a	n/a	54.1	n/a
SEGMENT # 13													
SEGMENT PORTION						Liner Liquid							
S95T000284			Tot. Organic Carbon by Coul.	ug/mL	99.67	<5.000	4.36E+03	4270	4.32E+03	2.09	n/a	105	n/a
S95T000284			% Water by TGA using Mettler	%	98.83	n/a	69.58	69.48	6.95E+01	0.14	n/a	n/a	n/a
S95T000284			pH Direct	pH	99.32	n/a	13.63	N/A	n/a	n/a	n/a	1.00E-02	n/a
S95T000284			DSC Exotherm using Mettler	Joules/g	95.96	n/a	0.00E+00	0	0.00E+00	n/a	n/a	n/a	n/a
S95T000326		B	Aluminium -ICP-Acid Digest-Liq	ug/mL	99.6	-6.00E-03	5.15E+03	4320	4.74E+03	18.5	n/a	21	n/a
S95T000326		B	Boron -ICP-Acid Digest-Liquid	ug/mL	98.2	5.00E-03	63	54.3	5.87E+01	14.7	n/a	21	n/a
S95T000326		B	Barium -ICP-Acid Digest-Liquid	ug/mL	97.6	0.00E+00	< 21.00	<21.0	n/a	n/a	n/a	21	n/a
S95T000326		B	Bismuth -ICP-Acid Digest/Liq	ug/mL	101.6	1.00E-02	< 42.00	<42.0	n/a	n/a	n/a	42	n/a
S95T000326		B	Calcium -ICP-Acid Digest-Liq	ug/mL	103.8	8.00E-03	1.36E+02	109	1.23E+02	22	n/a	42	n/a
S95T000326		B	Chromium -ICP-Acid Digest-Liq	ug/mL	102.4	0.00E+00	35	29.7	3.24E+01	16.1	n/a	4.2	n/a
S95T000326		B	Iron -ICP-Acid Digest-Liquid	ug/mL	101.2	1.00E-03	< 21.00	<21.0	n/a	n/a	n/a	21	n/a

Table A-2. Laboratory Data Results for Tank 241-SY-103, Core 62[1].

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %
S95T000326		B	Potassium -ICP-Acid Digest-Liq	ug/mL	97.6	-9.20E-02	1.56E+03	1260	1.41E+03	21.3	n/a	210	n/a
S95T000326		B	Lithium -ICP-Acid Digest-Liq	ug/mL	98.2	1.00E-03	< 4.200	<4.20	n/a	n/a	n/a	4.2	n/a
S95T000326		B	Sodium -ICP-Acid Digest-Liquid	ug/mL	98.2	6.00E-03	1.10E+05	92700	1.01E+05	17.1	n/a	42	n/a
S95T000326		B	Nickel -ICP-Acid Digest-Liquid	ug/mL	100.6	-6.00E-03	25.6	22.1	2.39E+01	14.7	n/a	8.4	n/a
S95T000326		B	Phosphorus-ICP-Acid Adjust-Liq	ug/mL	100.4	-1.10E-02	1.10E+03	916	1.01E+03	18.3	n/a	84	n/a
S95T000326		B	Silicon -ICP-Acid Digest-Liq	ug/mL	93.2	1.90E-02	83.6	70.3	7.70E+01	17.3	n/a	21	n/a
S95T000326		B	Uranium -ICP-Acid Digest-Liq	ug/mL	97.4	4.70E-02	<2.10e+02	<210	n/a	n/a	n/a	210	n/a
S95T000326		B	Zinc -ICP-Acid Digest-Liquid	ug/mL	103.2	-1.00E-03	< 4.200	<4.20	n/a	n/a	n/a	4.2	n/a
S95T000326		B	Zirconium -ICP-Acid Digest-Liq	ug/mL	99	4.00E-03	< 4.200	<4.20	n/a	n/a	n/a	4.2	n/a
S95T000330		D	Uranium by Phosphorescence	ug/mL	93.03	1.98E-01	5.78	5.4	5.59E+00	6.8	115	3.00E-02	n/a
S95T000330		D	Alpha in Liquid Samples	uCi/mL	93.91	<8.68e-02	< 8.11e-3	<5.19e-3	n/a	n/a	107.7	1.06e-02	500.0
S95T000330		D	Beta in Liquid Samples	uCi/mL	105.3	<1.910e-1	72	68.9	7.05E+01	4.4	109.3	2.40E-02	0.4
S95T000330		D	Am-241 by Extraction	uCi/mL	82.41	<7.430e-4	<1.00e-03	<8.09e-4	n/a	n/a	n/a	1.00E-03	11.3
S95T000330		D	Cm-243/244 by Extraction	uCi/mL	n/a	<7.430e-4	<1.00e-03	<8.09e-4	n/a	n/a	n/a	1.00E-03	52.5
S95T000330		D	Cobalt-60 by GEA	uCi/mL	104	<5.320e-4	<2.58e-03	0.00408	n/a	n/a	n/a	1.00E-03	na
S95T000330		D	Cesium-137 by GEA	uCi/mL	100	<8.020e-4	62.2	63.2	6.27E+01	1.59	n/a	1.00E-03	0.12
S95T000330		D	Europium-154 by GEA	uCi/mL	n/a	<1.330e-3	<1.31e-02	<1.29e-2	n/a	n/a	n/a	1.00E-03	na
S95T000330		D	Europium-155 by GEA	uCi/mL	n/a	<1.180e-3	<3.14e-02	<3.14e-2	n/a	n/a	n/a	1.00E-03	na
S95T000330		D	Tritium By Lachat	uCi/mL	100	<6.950e-5	3.19E-03	0.00285	3.02E-03	11.3	536.4	6.95E-05	2.06
S95T000330		D	Np237 by TTA Extraction	uCi/mL	91.19	<7.890e-4	<7.59e-04	<4.87e-4	n/a	n/a	81.9	1.00E-03	153.2
S95T000330		D	Pu-238 by Ion Exchange	uCi/mL	n/a	<7.670e-5	<7.13e-05	<6.17e-5	n/a	n/a	n/a	7.13E-05	9.1
S95T000330		D	Pu-239/240 by TRU-SPEC Resin	uCi/mL	96.9	<7.670e-5	1.05E-04	8.49E-05	9.50E-05	21.2	n/a	7.13E-05	5.9

Table A-2. Laboratory Data Results for Tank 241-SY-103, Core 62[1].

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %
S95T000330		D	Strontium-89/90 High Level	uCi/mL	91.89	<3.690e-2	1.77E-01	0.203	1.90E-01	13.7	n/a	5.10E-02	29.6
S95T000330		D	Technetium-99 Liq. Scint.	uCi/mL	96.68	1.00E-03	3.09E-02	0.0334	3.21E-02	7.78	n/a	1.00E-03	2.25
S95T000334		V	OH- by Pot. Titration	ug/mL	99.38	<4167.0	1.42E+04	15000	1.46E+04	5.48	n/a	4.17E+03	n/a
S95T000334		V	Chromium (VI) by Spec.	ug/mL	102.2	<3.900e-2	64.7	78.8	7.18E+01	19.7	n/a	3.939	n/a
S95T000334		V	Iodine-129 Waste Tank Samples	uCi/mL	92.51	<5.640e-4	<4.88e-04	<6.44e-4	n/a	n/a	n/a	1.00E-03	n/a
S95T000334		V	Bromide by Ion Chromatograph	ug/mL	103.5	<8.000e-1	1.56E+04	16300	1.60E+04	4.39	n/a	1.68E+03	n/a
S95T000334		V	Chloride-IC-Dionex 4000i/4500	ug/mL	103.2	<1.000e-1	4.14E+03	4200	4.17E+03	1.44	n/a	210	n/a
S95T000334		V	Fluoride-IC-Dionex 4000i/4500	ug/mL	97.86	<6.000e-2	3.22E+02	<1.26e2	n/a	n/a	n/a	126	n/a
S95T000334		V	Nitrite-IC - Dionex 4000i/4500	ug/mL	97.59	<8.000e-1	4.86E+04	49800	4.92E+04	2.44	n/a	1.68E+03	n/a
S95T000334		V	Nitrate-IC - Dionex 4000i/4500	ug/mL	102.2	<1.000	6.47E+04	68800	6.68E+04	6.14	n/a	2.10E+03	n/a
S95T000334		V	Oxalate by IC - Dionex 4000i	ug/mL	92.87	<5.000e-1	<1.05e+03	<1.05e3	n/a	n/a	n/a	1.05E+03	n/a
S95T000334		V	Phosphate-IC-Dionex 4000i/4500	ug/mL	96.12	<6.000e-1	2.56E+03	2860	2.71E+03	11.1	n/a	1.26E+03	n/a
S95T000334		V	Sulfate by IC-Dionex4000i/4500	ug/mL	103.7	<8.000e-1	3.83E+03	4000	3.92E+03	4.34	n/a	1.68E+03	n/a
S95T000334		V	Acetate by IC - Dionex 4000i	ug/mL	n/a	n/a	7.16E+02	757	7.37E+02	5.57	n/a	220	n/a
S95T000334		V	Formate by Ion Chromatograph	ug/mL	n/a	n/a	2.08E+03	2130	2.10E+03	2.38	n/a	220	n/a
Upper Half						U Upper Half of Segment							
S94T000088			% Water by TGA using Mettler	%	97.7	n/a	39.77	39.85	3.98E+01	0.2	n/a	1.00E-02	n/a
S94T000088			DSC Exotherm Dry Calculated	Joules/g Dry	n/a	n/a	2.98E+02	352.6	3.26E+02	16.7	n/a	1.00E-01	n/a
S94T000088			DSC Exotherm using Mettler	Joules/g	104.7	n/a	1.80E+02	212.1	1.96E+02	16.5	n/a	n/a	n/a
S94T000121		F	Alpha of Digested Solid	uCi/g	93.5	<3.710e-1	1.08	1.18	1.13E+00	8.85	98.6	7.57E-01	67.6
S94T000121		F	Lithium -ICP-Fusion	ug/g	99.05	7.642	LDL	LDL	n/a	n/a	n/a	66.2	n/a

Table A-2. Laboratory Data Results for Tank 241-SY-103, Core 62[1].

Sample#	R	A	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %
Lower Half			L Lower Half of Segment										
S94T000091			% Water by TGA using Mettler	%	98.5	n/a	41.2	39.23	4.02E+01	4.9	n/a	1.00E-02	n/a
S94T000091			DSC Exotherm Dry Calculated	Joules/g Dry	n/a	n/a	6.19E+02	641.4	6.30E+02	3.49	n/a	1.00E-01	n/a
S94T000091			DSC Exotherm using Mettler	Joules/g	102	n/a	3.64E+02	389.8	3.77E+02	6.79	n/a	n/a	n/a
S94T000091			Cyanide Dry - Calculated w TGA	ug/g Dry Wt	n/a	n/a	43.03	44.76	4.39E+01	3.94	n/a	2.00E-02	n/a
S94T000091			Cyanide EDTA Addition	ug/g	90.46	<2.000e-3	25.3	27.2	2.63E+01	7.24	n/a	3.00E-01	n/a
S94T000091			TOC by Persulfate/Coulometry	ug/g	93.33	20.9	1.12E+04	10400	1.08E+04	7.41	n/a	400	n/a
S94T000096		F	Alpha of Digested Solid	uCi/g	97.19	<3.900e-1	<7.27e-01	0.913	n/a	n/a	117.8	8.06E-01	143.7
S94T000096		F	Lithium -ICP-Fusion	ug/g	98.4	<1.000e-2	LDL	LDL	n/a	n/a	n/a	96.1	n/a
SEGMENT # 14													
Upper Half			U Upper Half of Segment										
S94T000089			% Water by TGA using Mettler	%	97.7	n/a	40.84	36.77	3.88E+01	10.5	n/a	1.00E-02	n/a
S94T000089			DSC Exotherm Dry Calculated	Joules/g Dry	n/a	n/a	2.55E+02	234.4	2.45E+02	8.3	n/a	1.00E-01	n/a
S94T000089			DSC Exotherm using Mettler	Joules/g	104.7	n/a	1.51E+02	148.2	1.49E+02	1.67	n/a	n/a	n/a
S94T000122		F	Alpha of Digested Solid	uCi/g	93.5	<3.710e-1	9.89E-01	0.993	9.91E-01	0.4	103.8	6.92E-01	54.9
S94T000122		F	Lithium -ICP-Fusion	ug/g	99.05	7.642	LDL	LDL	n/a	n/a	n/a	60.4	n/a
Lower Half			L Lower Half of Segment										
S94T000092			% Water by TGA using Mettler	%	98.5	n/a	40.59	41.61	4.11E+01	2.48	n/a	1.00E-02	n/a
S94T000092			DSC Exotherm Dry Calculated	Joules/g Dry	n/a	n/a	3.97E+02	531.4	4.64E+02	29.1	n/a	1.00E-01	n/a
S94T000092			DSC Exotherm using Mettler	Joules/g	102	n/a	2.36E+02	310.3	2.73E+02	27.4	n/a	n/a	n/a
S94T000092			Cyanide Dry - Calculated w TGA	ug/g Dry Wt	n/a	n/a	1.53E+02	161.5	1.57E+02	5.27	n/a	2.00E-02	n/a
S94T000092			Cyanide EDTA Addition	ug/g	90.46	<1.000e-1	91	94.3	9.27E+01	3.56	82.8	6.64	n/a

Table A-2. Laboratory Data Results for Tank 241-SY-103, Core 62[1].

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %
S94T000092			TOC by Persulfate/Coulometry	ug/g	93.33	20.9	6.48E+03	14100	1.03E+04	74.1	n/a	400	n/a
S94T000097		F	Alpha of Digested Solid	uCi/g	94.76	<3.180e-1	1.43	1.65	1.54E+00	14.3	99.3	5.67E-01	36.1
S94T000097		F	Lithium -ICP-Fusion	ug/g	98.4	<1.000e-2	LDL	LDL	n/a	n/a	n/a	58.6	n/a
SEGMENT # 15													
SEGMENT PORTION						Liner Liquid							
S95T000262			Bulk Density of Sample	g/mL	n/a	n/a	1.16	n/a	n/a	n/a	n/a	5.00E-01	n/a
S95T000285			Tot. Organic Carbon by Coul.	ug/mL	99.67	<5.000	3.81E+03	3960	3.88E+03	3.86	n/a	105	n/a
S95T000285			% Water by TGA using Mettler	%	99.34	n/a	75.35	74.73	7.50E+01	0.83	n/a	n/a	n/a
S95T000285			pH Direct	pH	99.46	n/a	13.5	n/a	n/a	n/a	n/a	1.00E-02	n/a
S95T000285			DSC Exotherm using Mettler	Joules/g	107.2	n/a	0.00E+00	0	0.00E+00	n/a	n/a	n/a	n/a
S95T000327		B	Aluminium -ICP-Acid Digest-Liq	ug/mL	99.6	-6.00E-03	3.08E+03	3060	3.07E+03	0.65	n/a	21	n/a
S95T000327		B	Boron -ICP-Acid Digest-Liquid	ug/mL	98.2	5.00E-03	33.2	34.4	3.38E+01	3.55	n/a	21	n/a
S95T000327		B	Barium -ICP-Acid Digest-Liquid	ug/mL	97.6	0.00E+00	< 21.00	<21.0	n/a	n/a	n/a	21	n/a
S95T000327		B	Bismuth -ICP-Acid Digest/Liq	ug/mL	101.6	1.00E-02	< 42.00	<42.0	n/a	n/a	n/a	42	n/a
S95T000327		B	Calcium -ICP-Acid Digest-Liq	ug/mL	103.8	8.00E-03	75.2	86.4	8.08E+01	13.9	n/a	42	n/a
S95T000327		B	Chromium -ICP-Acid Digest-Liq	ug/mL	102.4	0.00E+00	5.49	5.24	5.37E+00	4.66	n/a	4.2	n/a
S95T000327		B	Iron -ICP-Acid Digest-Liquid	ug/mL	101.2	1.00E-03	< 21.00	<21.0	n/a	n/a	n/a	21	n/a
S95T000327		B	Potassium -ICP-Acid Digest-Liq	ug/mL	97.6	-9.20E-02	1.20E+03	1190	1.20E+03	0	n/a	210	n/a
S95T000327		B	Lithium -ICP-Acid Digest-Liq	ug/mL	98.2	1.00E-03	69.1	68.7	6.89E+01	0.58	n/a	4.2	n/a
S95T000327		B	Sodium -ICP-Acid Digest-Liquid	ug/mL	98.2	6.00E-03	7.34E+04	73000	7.32E+04	0.55	n/a	42	n/a
S95T000327		B	Nickel -ICP-Acid Digest-Liquid	ug/mL	100.6	-6.00E-03	26.6	26.1	2.64E+01	1.9	n/a	8.4	n/a

Table A-2. Laboratory Data Results for Tank 241-SY-103, Core 62[1].

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %
S95T000327		B	Phosphorus-ICP-Acid Adjust-Liq	ug/mL	100.4	-1.10E-02	6.35E+02	640	6.38E+02	0.78	n/a	84	n/a
S95T000327		B	Silicon -ICP-Acid Digest-Liq	ug/mL	93.2	1.90E-02	84.1	88.9	8.65E+01	5.55	n/a	21	n/a
S95T000327		B	Uranium -ICP-Acid Digest-Liq	ug/mL	97.4	4.70E-02	<2.10e+02	<210	n/a	n/a	n/a	210	n/a
S95T000327		B	Zinc -ICP-Acid Digest-Liquid	ug/mL	103.2	-1.00E-03	< 4.200	<4.20	n/a	n/a	n/a	4.2	n/a
S95T000327		B	Zirconium -ICP-Acid Digest-Liq	ug/mL	99	4.00E-03	< 4.200	<4.20	n/a	n/a	n/a	4.2	n/a
S95T000331		D	Uranium by Phosphorescence	ug/mL	93.03	1.98E-01	4.64	5.82	5.23E+00	22.6	116	3.00E-02	n/a
S95T000331		D	Alpha in Liquid Samples	uCi/mL	93.91	<8.68e-02	< 4.61e-3	<6.94e-3	n/a	n/a	98.00	1.06e-02	196.0
S95T000330		D	Alpha in Liquid Samples	uCi/mL	93.91	<8.68e-02	<8.11e-3	<5.19e-3	n/a	n/a	107.7	1.06e-02	500.0
S95T000331		D	Beta in Liquid Samples	uCi/mL	105.3	<1.910e-1	1.10E+02	115	1.13E+02	4.44	109	2.40E-02	0.3
S95T000331		D	Am-241 by Extraction	uCi/mL	82.41	<7.430e-4	<1.12e-03	<1.83e-3	n/a	n/a	n/a	1.00E-03	20
S95T000331		D	Cm-243/244 by Extraction	uCi/mL	n/a	<7.430e-4	<1.12e-03	<1.83e-3	n/a	n/a	n/a	1.00E-03	74.2
S95T000331		D	Cobalt-60 by GEA	uCi/mL	104	<5.320e-4	<4.76e-03	<4.72e-3	n/a	n/a	n/a	1.00E-03	na
S95T000331		D	Cesium-137 by GEA	uCi/mL	100	<8.020e-4	1.04E+02	104	1.04E+02	0	n/a	1.00E-03	0.1
S95T000331		D	Europium-154 by GEA	uCi/mL	n/a	<1.330e-3	<2.32e-02	<2.28e-2	n/a	n/a	n/a	1.00E-03	na
S95T000331		D	Europium-155 by GEA	uCi/mL	n/a	<1.180e-3	<4.08e-02	<4.06e-2	n/a	n/a	n/a	1.00E-03	na
S95T000331		D	Tritium By Lachat	uCi/mL	100	<6.950e-5	6.89E-03	0.00198	4.43E-03	111	20.9	6.95E-05	1.45
S95T000331		D	Np237 by TTA Extraction	uCi/mL	91.19	<7.890e-4	<6.53e-04	0.000879	n/a	n/a	87.6	1.00E-03	217.8
S95T000331		D	Pu-238 by Ion Exchange	uCi/mL	n/a	<7.670e-5	<6.57e-05	<6.10e-5	n/a	n/a	n/a	6.57E-05	100
S95T000331		D	Pu-239/240 by TRU-SPEC Resin	uCi/mL	96.9	<7.670e-5	<6.57e-05	<6.10e-5	n/a	n/a	n/a	6.57E-05	100
S95T000331		D	Strontium-89/90 High Level	uCi/mL	91.89	<3.690e-2	3.25E-01	0.318	3.22E-01	2.18	n/a	5.20E-02	19.5
S95T000331		D	Technetium-99 Liq. Scint.	uCi/mL	96.68	1.00E-03	4.28E-02	0.039	4.09E-02	9.29	n/a	1.00E-03	2.03
S95T000335		V	OH- by Pot. Titration	ug/mL	99.38	<4167.0	1.30E+04	12700	1.28E+04	2.33	n/a	4.17E+03	n/a

Table A-2. Laboratory Data Results for Tank 241-SY-103, Core 62[1].

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %
S95T000335		V	Chromium (VI) by Spec.	ug/mL	102.2	<3.900e-2	8.18	11	9.59E+00	29.4	n/a	3.939	n/a
S95T000335		V	Iodine-129 Waste Tank Samples	uCi/mL	92.51	<5.640e-4	<4.58e-04	<5.82e-4	n/a	n/a	n/a	1.00E-03	n/a
S95T000335		V	Bromide by Ion Chromatograph	ug/mL	103.5	<8.000e-1	1.76E+04	17500	1.76E+04	0.57	n/a	1.69E+03	n/a
S95T000335		V	Chloride-IC-Dionex 4000i/4500	ug/mL	103.2	<1.000e-1	3.86E+03	3880	3.87E+03	0.52	n/a	210	n/a
S95T000335		V	Fluoride-IC-Dionex 4000i/4500	ug/mL	97.86	<6.000e-2	<1.26e+02	<1.26e2	n/a	n/a	n/a	126	n/a
S95T000335		V	Nitrite-IC - Dionex 4000i/4500	ug/mL	97.59	<8.000e-1	4.15E+04	41400	4.14E+04	0.24	n/a	1.68E+03	n/a
S95T000335		V	Nitrate-IC - Dionex 4000i/4500	ug/mL	102.2	<1.000	5.93E+04	59200	5.92E+04	0.17	n/a	2.10E+03	n/a
S95T000335		V	Oxalate by IC - Dionex 4000i	ug/mL	92.87	<5.000e-1	<1.05e+03	<1.05e3	n/a	n/a	n/a	1.05E+03	n/a
S95T000335		V	Phosphate-IC-Dionex 4000i/4500	ug/mL	96.12	<6.000e-1	1.68E+03	1720	1.70E+03	2.35	n/a	1.26E+03	n/a
S95T000335		V	Sulfate by IC-Dionex4000i/4500	ug/mL	103.7	<8.000e-1	2.55E+03	2570	2.56E+03	0.78	n/a	1.68E+03	n/a
S95T000335		V	Acetate by IC - Dionex 4000i	ug/mL	n/a	n/a	7.05E+02	692	6.99E+02	1.86	n/a	220	n/a
S95T000335		V	Formate by Ion Chromatograph	ug/mL	n/a	n/a	2.09E+03	2010	2.05E+03	3.9	n/a	220	n/a
Lower Half			L Lower Half of Segment										
S94T000093			% Water by TGA using Mettler	%	100.1	n/a	68.87	68.64	6.88E+01	0.33	n/a	1.00E-02	n/a
S94T000093			DSC Exotherm Dry Calculated	Joules/g Dry	n/a	n/a	0.00E+00	0	0.00E+00	n/a	n/a	n/a	n/a
S94T000093			DSC Exotherm using Mettler	Joules/g	102.6	n/a	0.00E+00	0	0.00E+00	n/a	n/a	n/a	n/a
S94T000098		F	Alpha of Digested Solid	uCi/g	94.76	<3.180e-1	5.09E-01	<4.88e-1	n/a	n/a	97.1	6.08E-01	89.5
S94T000098		F	Lithium -ICP-Fusion	ug/g	104	<1.000e-2	2.08E+03	1810	1.94E+03	13.9	n/a	120	n/a
S95T000157		W	Bromide by Ion Chromatograph	ug/g	100.3	<1.000	2.44E+04	24000	2.42E+04	1.65	97	1	n/a
			Drainable Liquid										
S94T000104			% Water by TGA using Mettler	%	99	n/a	74.74	75.39	7.51E+01	0.87	n/a	1.00E-02	n/a
S94T000104			DSC Exotherm using Mettler	Joules/g	100.2	n/a	1.56E+02	205.3	1.81E+02	27.4	n/a	n/a	n/a

Table A-2. Laboratory Data Results for Tank 241-SY-103, Core 62[1].

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %
S94T000104			Sulfate by IC-Dionex4000i/4500	ug/mL	n/a	n/a	na	na	n/a	n/a	n/a	9.99E-01	n/a
S94T000104			Phosphate-IC-Dionex 4000i/4500	ug/mL	n/a	n/a	na	na	n/a	n/a	n/a	9.99E-01	n/a
S94T000104			Nitrate-IC - Dionex 4000i/4500	ug/mL	n/a	n/a	na	na	n/a	n/a	n/a	9.99E-01	n/a
S94T000104			Nitrite-IC - Dionex 4000i/4500	ug/mL	n/a	n/a	na	na	n/a	n/a	n/a	9.99E-01	n/a
S94T000104			Fluoride-IC-Dionex 4000i/4500	ug/mL	n/a	n/a	na	na	n/a	n/a	n/a	1.00E-01	n/a
S94T000104			Chloride-IC-Dionex 4000i/4500	ug/mL	n/a	n/a	na	na	n/a	n/a	n/a	2.00E-01	n/a
S94T000104			Bromide by Ion Chromatograph	ug/mL	103	<1.000	1.93E+04	18900	1.91E+04	2.09	98.6	1	n/a
S94T000113		D	Lithium-ICP-Acid Dil.	ug/mL	100.6	0.00E+00	LDL	LDL	n/a	n/a	n/a	11	n/a
S95T000156		A	Lithium -ICP-Acid Digest	ug/g	96.6	0.00E+00	1.92E+02	193	1.93E+02	0.52	n/a	2.19	n/a

SEGMENT # 10-14

SEGMENT PORTION — Stratum "D" Solids Composite

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %
S94T000271			Bulk Density of Sample	g/mL	n/a	n/a	1.57	n/a	n/a	n/a	n/a	5.00E-01	n/a
S94T000275			% Water by TGA on Perkin Elmer	%	98.28	n/a	32.13	33.85	3.30E+01	5.21	n/a	n/a	n/a
S94T000275			pH on SST Samples	pH	100.2	n/a	13.08	13.05	1.31E+01	0.23	n/a	1.00E-02	n/a
S94T000275			DSC Exotherm using Mettler	Joules/g	100.2	n/a	1.56E+02	160.7	1.59E+02	2.78	n/a	n/a	n/a
S94T000275			TOC by Persulfate/Coulometry	ug/g	89.33	33.8	1.03E+04	10800	1.06E+04	4.74	n/a	80	n/a
S94T000275			TIC by Acid/Coulometry	ug/g	97.00	4.500	8.66e+03	8.95e+03	8.80e+03	3.29	n/a	5.000	n/a
S94T000278		A	Aluminium -ICP-Acid Digest	ug/g	97.6	2.60E-02	3.48E+04	35200	3.50E+04	1.14	n/a	43	n/a
S94T000278		A	Calcium -ICP-Acid Digest	ug/g	101.2	2.10E-02	3.55E+02	346	3.51E+02	2.57	n/a	85.9	n/a
S94T000278		A	Chromium -ICP-Acid Digest	ug/g	95.8	1.10E-02	6.50E+03	6600	6.55E+03	1.53	n/a	8.59	n/a
S94T000278		A	Iron -ICP-Acid Digest	ug/g	96.6	4.40E-02	2.11E+03	2120	2.12E+03	0.47	n/a	43	n/a

Table A-2. Laboratory Data Results for Tank 241-SY-103, Core 62[1].

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %
S94T000278		A	Potassium -ICP-Acid Digest	ug/g	121	2.15	3.31E+03	3380	3.34E+03	2.09	n/a	258	n/a
S94T000278		A	Sodium -ICP-Acid Digest	ug/g	99.2	1.14E-01	1.88E+05	186000	1.87E+05	1.07	n/a	172	n/a
S94T000278		A	Nickel -ICP-Acid Digest	ug/g	94.6	7.00E-03	1.02E+02	101	1.02E+02	0.99	n/a	17.2	n/a
S94T000278		A	Zinc -ICP-Acid Digest	ug/g	91.2	6.00E-03	23.7	23.2	2.35E+01	2.13	n/a	8.59	n/a
S94T000278		A	Zirconium -ICP-Acid Digest	ug/g	96.4	7.00E-03	58.2	55	5.66E+01	5.65	n/a	8.59	n/a
S94T000281		W	OH- by Pot. Titration	ug/g	99.36	<60300.0	1.81E+04	18800	1.84E+04	3.79	n/a	5.94E+03	n/a
S94T000281		W	Chromium (VI) by Spec.	ug/g	101.9	<2.290e-1	1.54E+02	148	1.51E+02	3.97	100.6	21.75	n/a
S94T000281		W	Tritium By Lachat	uCi/g	93.8	<4.660e-4	NA	NA	n/a	n/a	n/a	1.00E-04	NA
S94T000281		W	Bromide by Ion Chromatograph	ug/g	97.9	<1.000	< 95.10	<96.1	n/a	n/a	88.8	95.1	n/a
S94T000281		W	Chloride-IC-Dionex 4000i/4500	ug/g	96.4	<2.000e-1	7.08E+03	6980	7.03E+03	1.42	93.5	19	n/a
S94T000281		W	Fluoride-IC-Dionex 4000i/4500	ug/g	94.64	<1.000e-1	1.55E+03	1570	1.56E+03	1.28	84.3	9.51	n/a
S94T000281		W	Nitrite-IC - Dionex 4000i/4500	ug/g	96.4	<1.000	8.06E+04	83200	8.19E+04	3.17	102.1	95.1	n/a
S94T000281		W	Nitrate by IC-Dionex4000i/4500	ug/g	97.23	<1.000	9.72E+04	99000	9.81E+04	1.83	97.6	95.1	n/a
S94T000281		W	Oxalate by IC - Dionex 4000i	ug/g	95.43	<1.000	2.07E+04	20800	2.08E+04	0.48	90.7	95.1	n/a
S94T000281		W	Phosphate-IC-Dionex 4000i/4500	ug/g	96.7	<1.000	1.55E+04	15800	1.56E+04	1.92	88.4	95.1	n/a
S94T000281		W	Sulfate by IC-Dionex4000i/4500	ug/g	95.99	<1.000	7.77E+03	7880	7.82E+03	1.41	88	95.1	n/a
S94T000281		W	Acetate by IC - Dionex 4000i	ug/g	n/a	<1.000	3.16E+03	3100	3.13E+03	1.92	100.6	95	n/a
S94T000281		W	Formate by IC - Dionex 4000i	ug/g	n/a	<1.000	4.83E+03	5090	4.96E+03	5.24	90.1	95	n/a
S94T000284		R	Am-241 by Extraction	uCi/g	87.55	<2.500e-3	7.87E-03	<2.37e-3	n/a	n/a	n/a	3.00E-03	6.6
S94T000284		R	Cm-243/244 by Extraction	uCi/g	n/a	<2.500e-3	<2.51e-03	<2.37e-3	n/a	n/a	n/a	3.00E-03	24.6
S94T000284		R	Cobalt-60 by GEA	uCi/g	97.06	<2.990e-3	<1.14e-02	0.0228	n/a	n/a	n/a	3.00E-03	na
S94T000284		R	Cesium-137 by GEA	uCi/g	94.64	<6.900e-3	2.50E+02	251	2.51E+02	0.4	n/a	7.00E-03	0.15

Table A-2. Laboratory Data Results for Tank 241-SY-103, Core 62[1].

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %
S94T000284		R	Europium-154 by GEA	uCi/g	n/a	<6.390e-3	<5.47e-02	<5.37e-2	n/a	n/a	n/a	6.00E-03	na
S94T000284		R	Europium-155 by GEA	uCi/g	n/a	<7.000e-3	<1.81e-01	<1.83e-1	n/a	n/a	n/a	7.00E-03	na
S94T000284		R	Np237 by TTA Extraction	uCi/g	80.17	<2.420e-3	<2.60e-03	<3.59e-3	n/a	n/a	80.4	5.00E-03	500
S94T000284		R	Pu-238 by Ion Exchange	uCi/g	n/a	<7.940e-4	5.07E-04	<3.95e-4	n/a	n/a	n/a	3.72E-04	7.1
S94T000284		R	Pu-239/240 by TRU-SPEC Resin	uCi/g	113.4	<7.940e-4	9.41E-04	<3.95e-4	n/a	n/a	n/a	3.72E-04	100
S94T000284		R	Strontium-89/90 High Level	uCi/g	91.89	2.10E-02	2.21	2.1	2.16E+00	5.1	n/a	2.10E-02	4.3
S94T000300		F	Uranium by Phosphorescence	ug/g	108.5	<2.120e-2	8.18E+02	735	7.77E+02	10.7	113.1	2.10E-02	n/a
S94T000300		F	Alpha of Digested Solid	uCi/g	97.6	<3.270e-3	6.01E-01	0.535	5.68E-01	11.6	82.6	5.00E-03	4.1
S94T000300		F	Am-241 by Extraction	uCi/g	102.5	<5.790e-2	7.11E-01	0.625	6.68E-01	12.9	n/a	1.02E-01	6.9
S94T000300		F	Cm-243/244 by Extraction	uCi/g	n/a	<5.790e-2	<1.02e-01	<1.13e-1	n/a	n/a	n/a	1.02E-01	22.5
S94T000300		F	Beta of Solid Sample	uCi/g	108.2	9.80E-02	4.96E+02	368	4.32E+02	29.6	98.2	1.62E-01	0.4
S94T000300		F	Cobalt-60 by GEA	uCi/g	105.4	<2.090e-2	5.21E-02	0.0458	4.90E-02	12.9	n/a	2.10E-02	23.21
S94T000300		F	Cesium-137 by GEA	uCi/g	96.94	<3.970e-2	2.68E+02	196	2.32E+02	31	n/a	4.00E-02	0.29
S94T000300		F	Europium-154 by GEA	uCi/g	n/a	<3.630e-2	7.97E-01	0.712	7.54E-01	11.3	n/a	3.60E-02	15.8
S94T000300		F	Europium-155 by GEA	uCi/g	n/a	<4.580e-2	<7.21e-01	0.655	n/a	n/a	n/a	4.60E-02	na
S94T000300		F	Iodine-129 Waste Tank Samples	uCi/g	107.9	<1.040e-1	<1.46e-01	<5.25e-2	n/a	n/a	n/a	1.46E-01	na
S94T000300		F	Calcium -ICP-Fusion	ug/g	102	4.58E-01	<3.95e+02	LDL	n/a	n/a	n/a	395	n/a
S94T000300		F	Potassium -ICP-Fusion	ug/g	100	6.10E-02	NA	n/a	n/a	n/a	n/a	1.18E+03	n/a
S94T000300		F	Sodium -ICP-Fusion	ug/g	98	3.87	1.61E+05	120000	1.40E+05	29.2	n/a	395	n/a
S94T000300		F	Nickel -ICP-Fusion	ug/g	100.8	2.09	6.54E+02	932	7.93E+02	35.1	n/a	79	n/a
S94T000300		F	Zinc -ICP-Fusion	ug/g	102.8	-2.20E-02	< 39.50	LDL	n/a	n/a	n/a	39.5	n/a
S94T000300		F	Zirconium -ICP-Fusion	ug/g	99.6	6.70E-02	< 39.50	LDL	n/a	n/a	n/a	39.5	n/a

Table A-2. Laboratory Data Results for Tank 241-SY-103, Core 62[1].

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %
S94T000300		F	Np237 by TTA Extraction	uCi/g	71.07	9.00E-03	<1.49e-02	<1.20e-2	n/a	n/a	82	1.50E-02	129
S94T000300		F	Pu-238 by Ion Exchange	uCi/g	n/a	<2.900e-3	1.55E-02	0.0169	1.62E-02	8.64	n/a	8.00E-03	4.5
S94T000300		F	Pu-239/240 by TRU-SPEC Resin	uCi/g	112.7	<2.900e-3	6.67E-02	0.0579	6.23E-02	14.1	n/a	8.00E-03	2.6
S94T000300		F	Strontium-89/90 High Level	uCi/g	89.29	1.00E-03	37.5	32.2	3.49E+01	15.2	n/a	9.00E-03	0.7
S95T000291		W	Iodine-129 Waste Tank Samples	uCi/g	114.8	<2.290e-2	<2.34e-02	<2.23e-2	n/a	n/a	n/a	2.30E-02	n/a
S95T000296		R	Technetium-99 Liq. Scint.	uCi/g	101.2	<1.750e-3	1.42E-01	0.127	1.35E-01	11.2	n/a	2.00E-03	1.79
S95T001395		F	Aluminium -ICP-Fusion	ug/g	98.98	5.427	3.97E+04	39400	3.96E+04	0.85	n/a	242	n/a
S95T001395		F	Chromium -ICP-Fusion	ug/g	101.3	8.90E-02	1.07E+04	9700	1.02E+04	10.2	n/a	48.4	n/a
S95T001395		F	Iron -ICP-Fusion	ug/g	100	4.319	2.86E+03	2550	2.70E+03	11.3	n/a	242	n/a
S95T001395		F	Technetium-99 Liq. Scint.	uCi/g	104.1	3.60E-02	2.42E-01	0.246	2.44E-01	1.64	n/a	1.50E-02	3.6

Notes:

LDL = less than detect in limit
R = replicate analysis
A# = aliquot class
A = acid-digest
B = acid digestion of a liquid
D = acid dilution
F = fusion digested sample
n/a = not aplicable
R = water digest-acid added sample for radiochemistry
V = water dilution
W = water digest-no acid

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[1]Rice (1995)

APPENDIX B

1994 AUGER SAMPLING DATA

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Table B-1. 136-Day Deliverable Summary Table for Tank 241-SY-103 Auger Sample - Riser 7B.

Riser 7B, Subsample A: Flutes 1, 2, 3, 4, and 6

Analysis (units)	Lab ID #	Notification Limits	Std Recovery (%)	Prep Blank	Sample	Duplicate	Mean	RPD (%)	Spike Rec. (%)	Det. Limit
DSC (cal/g)	R5398	>586 J/g (dry)	103.0	NA	NO EXO	NO EXO	NA	NA	NA	NA
TGA (% water)	R5398	NA	95.9	NA	8.02	8.56	8.29	6.51	NA	NA

Riser 7B, Subsample B: Flutes 1, 2, 3, 4, and 6

Analysis (units)	Lab ID #	Notification Limits	Std Recovery (%)	Prep Blank	Sample	Duplicate	Mean	RPD (%)	Spike Rec. (%)	Det. Limit
DSC (cal/g)	R5399	>586 J/g (dry)	102.3	NA	NO EXO	NO EXO	NA	NA	NA	NA
TGA (% water)	R5399	NA	98.5	NA	11.96	17.82	14.89	39.3	NA	NA

Riser 7B, Composite: Flutes 1, 2, 3, 4, and 6

Analysis (units)	Lab ID #	Notification Limits	Std Recovery (%)	Prep Blank	Sample	Duplicate	Mean	RPD (%)	Spike Rec. (%)	Det. Limit
TIC (μg/C/g)	R5430	NA	94.6	4.30 μg C	2.25 E+04	3.13 E+04	2.69 E+04	32.7	NA	4.00 E+02
TOC (μg/C/g)	R5430	>3.00 E+04 (μgC/g)	90.0	17.60 μg C	1.00 E+04	7.70 E+03	8.85 E+03	26.0	NA	4.00 E+02

Table B-2. 136-Day Deliverable Summary Table for Tank 241-SY-103 Auger Sample - Riser 14A.

Riser 14A, Subsample A: Flute 2

Analysis (units)	Lab ID #	Notification Limits	Std Recovery (%)	Prep Blank	Sample	Duplicate	Mean	RPD (%)	Spike Rec. (%)	Det. Limit
DSC (cal/g)	R5376	>586 J/g (dry)	100.8	NA	NO EXO	NO EXO	NA	NA	NA	NA
TGA (% water)	R5376	NA	98.1	NA	33.21	33.52	33.36	0.93	NA	NA

Riser 14A, Subsample B: Flute 2

Analysis (units)	Lab ID #	Notification Limits	Std Recovery (%)	Prep Blank	Sample	Duplicate	Mean	RPD (%)	Spike Rec. (%)	Det. Limit
DSC (cal/g)	R5377	>586 J/g (dry)	100.2	NA	NO EXO	NO EXO	NA	NA	NA	NA
TGA (% water)	R5377	NA	98.4	NA	30.85	31.95	31.40	3.50	NA	NA

Riser 14A, Composite: Flute 2

Analysis (units)	Lab ID #	Notification Limits	Std Recovery (%)	Prep Blank	Sample	Duplicate	Mean	RPD (%)	Spike Rec. (%)	Det. Limit
TIC (µg/C/g)	R5429	NA	94.6	4.30 µg C	1.76 E+04	2.00 E+04	1.88 E+04	12.8	NA	4.00 E+02
TOC (µg/C/g)	R5429	>3.00 E+04 (µgC/g)	90.0	17.60 µg C	1.23 E+04	1.07 E+04	1.15 E+04	13.9	NA	4.00 E+02

Table B-3. 136-Day Deliverable Summary Table for Tank 241-SY-103 Auger Sample - Riser 22A.

Riser 22A, Subsample A: Flute 2

Analysis (units)	Lab ID #	Notification Limits	Std Recovery (%)	Prep Blank	Sample	Duplicate	Mean	RPD (%)	Spike Rec. (%)	Det. Limit
DSC (cal/g)	R5372	>586 J/g (dry)	105.1	NA	NO EXO	NO EXO	NA	NA	NA	NA
TGA (% water)	R5372	NA	102.2	NA	11.37	11.98	11.67	5.23	NA	NA

Riser 22A, Subsample B: Flute 3

Analysis (units)	Lab ID #	Notification Limits	Std Recovery (%)	Prep Blank	Sample	Duplicate	Mean	RPD (%)	Spike Rec. (%)	Det. Limit
DSC (cal/g)	R5373	>586 J/g (dry)	105.1	NA	NO EXO	NA	NA	NA	NA	NA
DSC (cal/g)	R5373	>586 J/g (dry)	105.1	NA	NA	NO EXO	NA	NA	NA	NA
TGA (% water)	R5373	NA	98.1	NA	24.04	23.61	23.82	1.80	NA	NA

Riser 22A, Subsample C: Flute 6

Analysis (units)	Lab ID #	Notification Limits	Std Recovery (%)	Prep Blank	Sample	Duplicate	Mean	RPD (%)	Spike Rec. (%)	Det. Limit
DSC (cal/g)	R5374	>586 J/g (dry)	105.1	NA	NO EXO	NO EXO	NA	NA	NA	NA
TGA (% water)	R5374	NA	98.1	NA	26.84	23.93	25.38	1.80	NA	NA

Table B-3. 136-Day Deliverable Summary Table for Tank 241-SY-103 Auger Sample - Riser 22A.

Riser 22A, Subsample D: Flute 7

Analysis (units)	Lab ID #	Notification Limits	Std Recovery (%)	Prep Blank	Sample	Duplicate	Mean	RPD (%)	Spike Rec. (%)	Det. Limit
DSC (cal/g)	R5375	>586 J/g (dry)	100.8	NA	NO EXO	NO EXO	NA	NA	NA	NA
TGA (% water)	R5375	NA	98.1	NA	26.29	24.77	25.53	5.95	NA	NA

Riser 22A, Composite 1: Flute 1-3

Analysis (units)	Lab ID #	Notification Limits	Std Recovery (%)	Prep Blank	Sample	Duplicate	Mean	RPD (%)	Spike Rec. (%)	Det. Limit
TIC (μg/C/g)	R5425	NA	100.0	3.40 μg C	8.19 E+03	7.00 E+03	7.60 E+03	15.7	~183.0	4.00 E+02
TOC (μg/C/g)	R5425	>3.00 E+04 (μgC/g)	95.0	27.1 μg C	1.03 E+04	6.39 E+03	8.34 E+03	~46.9	91.0	4.00 E+02

Riser 22A, Composite 2: Flute 4-8

Analysis (units)	Lab ID #	Notification Limits	Std Recovery (%)	Prep Blank	Sample	Duplicate	Mean	RPD (%)	Spike Rec. (%)	Det. Limit
TIC (μg/C/g)	R5426	NA	100.0	3.40 μg C	1.11 E+04	1.52 E+04	1.32 E+04	~31.2	~230.0	4.00 E+02
TOC (μg/C/g)	R5426	>3.00 E+04 (μgC/g)	95.0	27.1 μg C	9.46 E+03	7.47 E+03	8.47 E+03	~26.0	~60.7	4.00 E+02

Note:

~ TCP Laboratory Acceptance Criteria Exceeded

APPENDIX C

1986 CORE SAMPLING DATA

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Table C-1. Elements and Anion Concentrations of Waste from Double-Shell Tank 241-SY-103.

Species	Concentration, wt%[1]		
	No. 2	No. 7	No. 12
Al	4.45	4.15	4.77
B	0.105	0.012	0.009
Ba	ND	0.0005	0.0004
Ca	0.020	0.027	0.016
Cr	0.30	0.59	0.58
Fe	0.094	0.16	0.20
K	0.38	0.34	0.26
La	0.002	0.005	0.002
Mg	0.001	0.003	0.0009
Mn	0.023	0.047	0.051
Mo	0.013	0.012	0.009
Na	21.7	20.7	29.7
Nd	ND	0.008	ND
Ni	0.008	0.013	0.012
Si	0.016	0.034	0.060
Sr	ND	0.0003	ND
Zn	ND	0.004	0.042
Zr	0.002	0.003	0.002
CO_3^{2-}	1.64	2.70	2.44
F	<0.15	<0.15	<0.11
Cl	0.73	0.68	0.53
NO_2^-	8.35	7.91	7.31
PO_4	0.31	0.38	0.42
NO_3	10	10	25
SO_4	0.24	0.46	0.38
OH^-	2.10N	2.06N	1.55N

Notes:

ND = Not detected

[1]With the exception of HO^-

Table C-2. Radionuclide Concentrations of Waste from Double-Shell Tank 241-SY-103.

Radionuclide	Sample Number, mCi/g of Sample		
	No. 2	No. 7	No. 12
Total beta	6.09E-1 ± 1.22E-2	6.21E-1 ± 1.38E-2	5.09E-1 ± 1.40E-2
$^{239-240}Pu$	3.81E-5 ± 1.91E-6	7.03E-5 ± 1.84E-6	7.38E-5 ± 1.87E-6
$^{241}Am + ^{238}Pu$	3.21E-4 ± 21.9E-5	5.15E-4 ± 2.30E-5	6.35E-4 ± 3.74E-5
^{241}Pu	4.59E-3 ± 1.87E-3	<5.15E-3	<5.37E-3
^{60}Co	8.32E-5 ± 2.60E-5	1.47E-4 ± 3.36E-5	3.64E-4 ± 2.66E-5
^{137}Cs	4.95E-1 ± 8.12E-3	4,78E-1 ± 1.38E-2	3.46E-1 ± 6.07E-3
^{154}Eu	7.75E-4 ± 9.33E-5	1.49E-3 ± 1.56E-4	2.12E-3 ± 1.07E-3
^{155}Eu	6.21E-4 ± 2.23E-4	1.84E-3 ± 2.62E-4	<1/36E-3

Table C-3. Solids Settling Behavior for Sample No. 2.

Time (hr)	Solids Height, mm	
	No. 2 at 10 °C	No. 2 at 46 °C
0.00	54.52	50.60
1.75	53.36	50.60
2.95	53.36	49.50
3.90	52.20	49.50
4.75	52.20	50.60
22.33	52.20	33.55
26.83	52.20	33.00
28.75	52.20	33.00
46.33	52.20	33.00
51.25	51.62	33.00

Table C-4. Solids Settling Behavior for Sample No. 2-1:1

Time (hr)	Solids settling behavior for sample no. 2-1:1	
	No. 2-1:1 at 10 °C	No. 2-1:1 at 46 °C
0.00	61.36	56.84
1.25	59.00	15.08
2.45	53.10	9.28
3.40	11.80	8.12
4.25	9.44	8.12
21.83	7.08	8.12
26.33	7.08	8.12
28.23	7.08	8.12
45.83	7.08	8.12
50.75	7.08	8.12

Table C-5. Solids Settling Behavior for Sample No. 12-1:1.

Time (hr)	Solids Height, mm	
	No. 12-1:1 at 10 °C	No. 12-1:1 at 46 °C
0.00	59.28	57.12
1.08	57.00	50.40
2.28	54.72	36.96
3.23	57.00	30.24
4.08	59.28	28.00
21.67	22.80	20.16
26.17	21.66	19.60
28.08	21.66	20.16
45.67	19.38	19.60
50.58	19.38	19.60

Table C-6. Solids Settling Behavior for Sample No. 12-1:2.

Time (hr)	Solids height, mm	
	No. 12-1:2 at 10 °C	No. 12-1:2 at 46 °C
0.00	63.44	61.36
1.00	57.34	55.46
2.20	42.70	41.30
3.15	34.16	33.04
4.00	31.11	30.09
21.58	20.74	20.06
26.08	20.74	20.06
28.00	19.52	18.88
45.58	18.91	18.29
50.50	18.91	18.29

Table C-7. Rehologial Parameters for Diluted and Undiluted Samples of Waste from Double-Shell Tank 241-SY-103 at 10 °C and 46 °C.

Parameter	No. 2	No. 7	No. 12	No. 2-1:1	No. 7-1:1	No. 12-1:1	No. 12-1:2
46 °C							
τ_y(Pa)	0	0	17.7	0	0	0	0
K (Pa-sec)	0.0400	0.0856	0.9462	0.0010	0.0051	0.0070	0.0033
n	0.92	0.95	0.95	1.18	0.97	0.99	1.03
R^2	0.999	0.999	0.996	0.991	0.998	0.995	0.995
10 °C							
τ_y (Pa)	0	0	NA	0	0	0	0
K (Pa-sec)	0.2747	0.596	NA	0.0053	0.0101	0.0092	0.0041
n	0.96	0.91	NA	1.022	0.98	1.06	1.1
R^2	0.999	0.999	NA	0.998	0.999	0.997	0.998

Note:

NA = Unable to obtain data

Table C-8. Apparent Viscosities (cp) of Waste from Double-Shell Tank 241-SY-103 at Shear Rates Corresponding to 50 and 75 gal/min in a 3-in. Schedule 40 pipe.

Flow Rate	Shear Rate	No. 2		No. 7		No. 12		No. 2-1:1		No. 7-1:1		No. 12-1:1		No. 12-1:2	
		10 °C	46 °C	10 °C	46 °C	10 °C	46 °C	10 °C	46 °C	10 °C	46 °C	10 °C	46 °C	10 °C	46 °C
50 gpm	70 sec^{-1}	234.1	29.0	415.8	70.1	--	1027.0	5.7	2.0	9.3	4.5	11.7	6.7	6.1	3.7
75 gpm	104 sec^{-1}	230.4	28.1	401.2	68.7	--	929.2	5.8	2.2	9.3	4.5	12.0	6.7	6.4	3.8

Note:

NA = Unable to obtain data.

APPENDIX D

1994 BLIND SAMPLE RESULTS

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APPENDIX D

1994 BLIND SAMPLE RESULTS

Blind Sample Results

The tank characterization plan requested blind results for three analyses; total inorganic carbon/total organic carbon, IC, and inductively coupled plasma. Presented below are the results from the water pollution performance evaluation study.

Table D-1. Inductively-Coupled Plasma Blind Results (μg/L).

	Reported	True	Evaluation	Study ID
Al	568	610	Acceptable	WP033
Ca	87.8	89.0	Acceptable	WP033
Cr	527	529	Acceptable	WP033
Fe	1290	1300	Acceptable	WP033
K	13.7	14.0	Acceptable	WP033
Na	95.2	94.2	Acceptable	WP033
Ni	1070	1080	Acceptable	WP033
Zn	722	726	Acceptable	WP033

Table D-2. IC Blind Results (mg/L).

	Reported	True	Evaluation	Study ID
Chloride	168	170	Acceptable	WP033
Fluoride	4.03	4.00	Acceptable	WP033
Sulphate	108	110	Acceptable	WP033
Nitrate	.880	.860	Acceptable	WP033

Table D-3. Total Organic Carbon Blind Results (mg/L).

	Reported	True	Evaluation	Study ID
TOC	17.9	35	Not Accept	WP033
TOC	44.0	44.0	Acceptable	WP032
TOC	79.0	82.0	Acceptable	WP031
TOC	8.25	14.0	Not Accept	WP030

APPENDIX E

1994 AUGER AND CORE 62 EXTRUSION PHOTOGRAPHS

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Photo 1: 1994 Auger Sample, Riser 14A, Tank 241-SY-103.

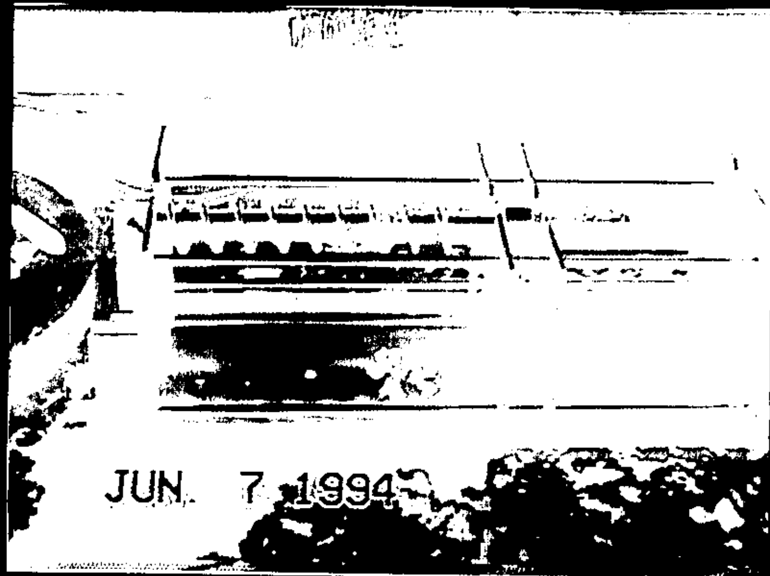

Photo 2: 1994 Core 62, Segment #1, Tank 241-SY-103.

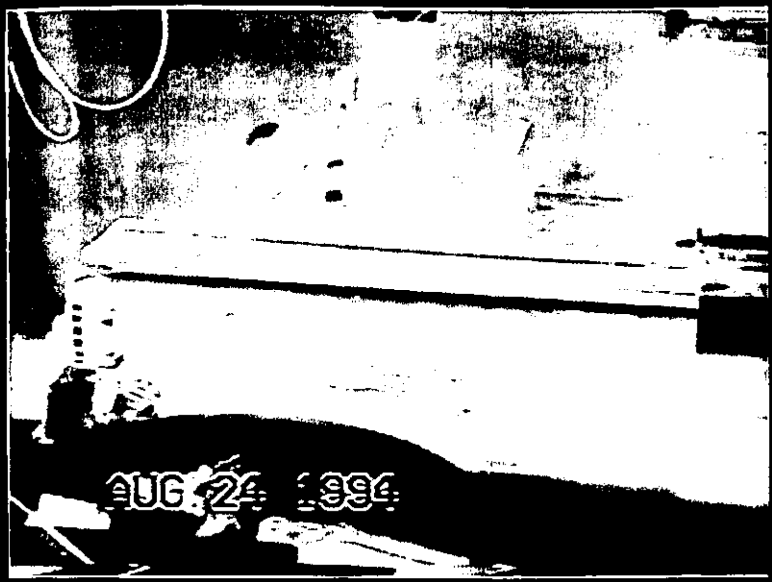

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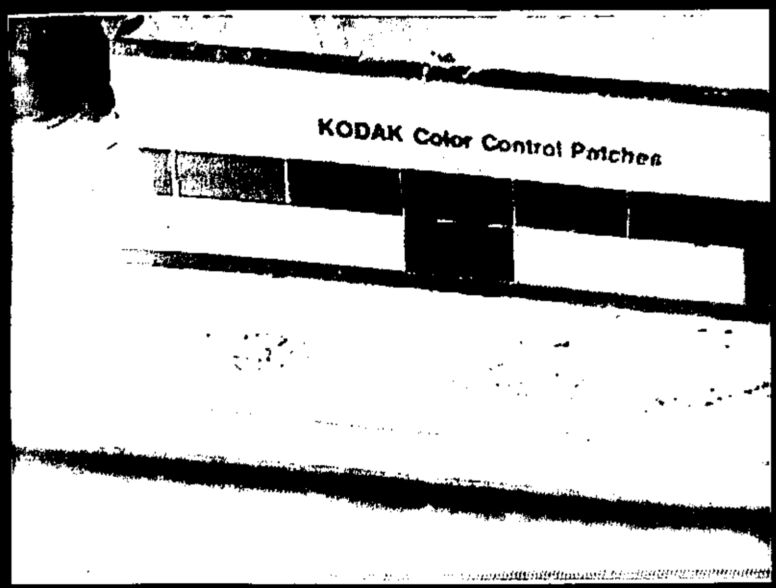
Photo 3: 1994 Core 62, Segment #9, Tank 241-SY-103

Photo 4: 1994 Core 62, Segment #12, Tank 241-SY-103



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D. A. Barnes	R1-80	X			
G. R. Bloom	H5-61	X			
T. M. Brown	R2-12	X			
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W. L. Cowley	H4-65	X			
M. L. Dexter	R1-51	X			
G. L. Dunford	S7-81	X			
D. B. Engelman	R1-49	X			
G. D. Forehand	S7-21	X			
J. S. Garfield	H5-49	X			
* J. D. Guberski	R2-06				X
D. R. Hansen	S3-28	X			
D. L. Herting	T6-09	X			
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J. W. Hunt	R2-12	X			

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K. K. Kawabata	S7-55	X			
T. J. Kelley	S7-21	X			
N. W. Kirch	R2-11	X			
M. J. Kupfer	H5-49	X			
D. L. McGrew	R3-25	X			
J. E. Meacham	S7-15	X			
W. C. Miller	R1-30	X			
C. T. Narquis	T6-16	X			
R. J. Nicklas	R1-43	X			
D. E. Place	H5-27	X			
D. A. Reynolds	R2-11	X			
L. M. Sasaki	R2-12	X			
F. A. Schmittroth	H0-35	X			
N. J. Scott-Proctor	S5-01	X			
L. W. Shelton, Jr.	H5-49	X			
B. C. Simpson	R2-12	X			
G. L. Troyer	T6-50	X			
D. A. Turner	S7-15	X			
D. J. Washenfelder	H5-27	X			
M. S. Waters	S6-30	X			
L. R. Webb	T6-06	X			
K. A. White	S5-13	X			
TFIC (Tank Farm Information Center)	R1-20	X			
Central Files	A3-88	X			
EDMC	H6-08	X			
ERC (Environmental Resource Center)	R1-51	X			
TCRC (10)	R2-12	X			

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