# ENGINEERING CHANGE NOTICE

Page 1 of 2

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| 2. ECN Category (mark one) | 3. Originator's Name, Organization, MSIN, and Telephone No. | 4. USQ Required? | 5. Date |
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14a. Justification (mark one)

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14b. Justification Details

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# ENGINEERING CHANGE NOTICE

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

| | | | | | |
|---|---|---|---|---|---|
| SDD/DD | [] | Seismic/Stress Analysis | [] | Tank Calibration Manual | [] |
| Functional Design Criteria | [] | Stress/Design Report | [] | Health Physics Procedure | [] |
| Operating Specification | [] | Interface Control Drawing | [] | Spares Multiple Unit Listing | [] |
| Criticality Specification | [] | Calibration Procedure | [] | Test Procedures/Specification | [] |
| Conceptual Design Report | [] | Installation Procedure | [] | Component Index | [] |
| Equipment Spec. | [] | Maintenance Procedure | [] | ASME Coded Item | [] |
| Const. Spec. | [] | Engineering Procedure | [] | Human Factor Consideration | [] |
| Procurement Spec. | [] | Operating Instruction | [] | Computer Software | [] |
| Vendor Information | [] | Operating Procedure | [] | Electric Circuit Schedule | [] |
| OM Manual | [] | Operational Safety Requirement | [] | ICRS Procedure | [] |
| FSAR/SAR | [] | IEFD Drawing | [] | Process Control Manual/Plan | [] |
| Safety Equipment List | [] | Cell Arrangement Drawing | [] | Process Flow Chart | [] |
| Radiation Work Permit | [] | Essential Material Specification | [] | Purchase Requisition | [] |
| Environmental Impact Statement | [] | Fac. Proc. Samp. Schedule | [] | Tickler File | [] |
| Environmental Report | [] | Inspection Plan | [] | | [] |
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20. Other Affected Documents: (NOTE: Documents listed below will not be revised by this ECN.) Signatures below indicate that the signing organization has been notified of other affected documents listed below.

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21. Approvals

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| Cog. Eng. L.M. Sasaki *L M Sasaki* | 4/30/97 | PE | |
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| Other R.J. Cash *R J Cash* | 4/30/97 | Other | |
| | | | |
| N.W. Kirch *NW Kirch* | 4/30/97 | DEPARTMENT OF ENERGY<br>Signature or a Control Number that tracks the Approval Signature | |
| | | ADDITIONAL | |

# Tank Characterization Report for Single-Shell Tank 241-T-107

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

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Abstract: This document summarizes the information on the historical uses, present status, and the sampling and analysis results of waste stored in Tank 241-T-107. This report supports the requirements of the Tri-Party Agreement Milestone M-44-05.



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# Tank Characterization Report for Single-Shell Tank 241-T-107

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## LIST OF TERMS

| | |
|---|---|
| 1C | first-cycle decontamination waste |
| 1C1 | first-cycle decontamination waste generated from 1944 to 1949 |
| AA | atomic absorption |
| ANOVA | analysis of variance |
| APC | alpha proportional counting |
| BPC | beta proportional counting |
| Btu/hr | British thermal units per hour |
| CF | concentration factor |
| Ci | curie |
| Ci/g | curies per gram |
| Ci/L | curies per liter |
| cm | centimeter |
| $cm^2$ | square centimeter |
| cP | centipoise |
| CVAA | cold vapor atomic absorption |
| CW | cladding waste |
| DOE | U.S. Department of Energy |
| DQO | data quality objective |
| DSC | differential scanning calorimetry |
| $dynes/cm^2$ | dynes per square centimeter |
| Ecology | Washington State Department of Ecology |
| FIC | Food Instrument Corporation |
| ft | feet |
| g | gram |
| g C/L | grams of carbon per liter |
| g/gal | grams per gallon |
| GC | gas chromatography |
| GEA | gamma energy analysis |
| g/L | grams per liter |
| g/mL | grams per milliliter |
| g-mol | gram-mole |
| HDW | Hanford Defined Waste |
| IC | ion chromatography |
| ICP | inductively coupled plasma spectroscopy |
| in. | inch |
| IX | ion exchange waste |
| kg | kilogram |
| kgal | kilogallon |
| kL | kiloliter |
| LEL | lower explosive limit |
| LF | laser fluorimetry |
| LFL | lower flammability limit |

## LIST OF TERMS (Continued)

| | |
|---|---|
| LL | lower limit |
| m | meter |
| *M* | moles per liter |
| mg | milligram |
| mg/L | milligrams per liter |
| $mg/m^3$ | milligrams per cubic meter |
| mL | milliliters |
| mL/in. | milliliters per inch |
| mm | millimeter |
| mrad/hr | millirad per hour |
| MS | mass spectrometry |
| n/a | not applicable |
| NA | not analyzed |
| N/D | not determined |
| n/r | not reported |
| NR | not required |
| Pa | Pascals |
| Pa/sec | Pascals per second |
| PF | partitioning factor |
| PHMC | Project Hanford Management Contractor |
| ppmv | parts per million by volume |
| PUREX | plutonium-uranium extraction plant |
| QC | quality control |
| rad/hr | rads per hour |
| REML | restricted maximum likelihood estimation |
| RPD | relative percent difference |
| RSD | relative standard deviation |
| SMM | supernatant mixing model |
| SORWT | Sort of Radioactive Waste Types (model) |
| SVOA | semivolatile organic analysis |
| TBP | tributyl phosphate |
| TC | total carbon |
| TCR | tank characterization report |
| TGA | thermogravimetric analysis |
| TIC | total inorganic carbon |
| TLM | tank layer model |
| TOC | total organic carbon |
| TWRS | Tank Waste Remediation System |
| UL | upper limit |
| UR | uranium recovery waste |
| vol% | volume percent |
| W | watt |

## LIST OF TERMS (Continued)

| | |
|---|---|
| WSTRS | Waste Status and Transaction Record Summary |
| wt% | weight percent |
| °C | degrees Celsius |
| °F | degrees Fahrenheit |
| % | percent |
| $\mu$Ci/g | microcuries per gram |
| $\mu$Ci/gal | microcuries per gallon |
| $\mu$Ci/mL | microcuries per milliliter |
| $\mu$m | micrometer |
| $\mu$Ci/L | microcuries per liter |
| $\mu$eq/g | microequivalents per gram |
| $\mu$g | microgram |
| $\mu$g/g | micrograms per gram |
| $\mu$g/mL | micrograms per milliliter |

# 1.0 INTRODUCTION

One major function of the Tank Waste Remediation System (TWRS) is to characterize wastes in support of waste management and disposal activities at the Hanford Site. Analytical data from sampling and analysis and other available information about a tank are compiled and maintained in a tank characterization report (TCR). This report and its appendixes serve as the TCR for single-shell tank 241-T-107.

The objectives of this report are as follows: 1) to use characterization data in response to technical issues associated with tank 241-T-107 waste, and 2) to provide a standard characterization of this waste in terms of a best-basis inventory estimate. Section 2.0 summarizes the response to technical issues, Section 3.0 shows the best-basis inventory estimate, and Section 4.0 provides recommendations about safety status and additional sampling needs. The appendixes contain supporting data and information. This report also supports the requirements of the *Hanford Federal Facility Agreement and Consent Order* (Ecology et al. 1996), Milestone M-44-05.

## 1.1 SCOPE

The characterization information in this report originated from sample analyses and known historical sources. Although only the results of recent sample events will be used to fulfill the requirements of the data quality objectives (DQOs), other information can be used to support (or question) conclusions derived from these results. Historical information (see Appendix A) includes surveillance information, records pertaining to waste transfers and tank operations, and expected tank contents derived from a process knowledge model.

Appendix B summarizes the recent sampling events listed in Table 1-1, sample data obtained before 1989, and the sampling results. The 1992 and 1993 core sampling effort was directed by the *Tank Waste Remediation System Tank Waste Characterization Plan* (Bell 1993). The results of the 1992 and 1993 sampling event were originally reported in *WHC 222-S and PNL-325 Single-Shell Tank Waste Characterization, 241-T-107 Cores 50, 51, and 52 - Data Package and Validation Summaries* (Svancara and Pool 1993) and *Statistical Characterization Report for Single-Shell Tank 241-T-107* (Jensen et al. 1994).

Before the 1992 and 1993 core sampling, a vapor sampling event was performed to address flammability issues. The results of the 1992 vapor sampling event were reported in Pingel (1992). The 1995 vapor sampling event satisfied the data requirements for this tank specified in the *Tank 241-T-107 Tank Characterization Plan* (Carpenter 1995). The results of the January 18, 1995, vapor sampling event were reported in *Tank 241-T-107 Headspace Gas and Vapor Characterization Results for Samples Collected in January 1995* (Huckaby and Bratzel 1995).

Appendix C reports on the statistical analysis and numerical manipulation of data used in issue resolution. Appendix D contains the evaluation to establish the best basis for the inventory estimate and the statistical analysis performed for this evaluation. Appendix E is a bibliography that resulted from an in-depth literature search of all known information sources applicable to tank 241-T-107 and its respective waste types. Most Appendix E reports can be found in the Tank Characterization Resource Center.

Table 1-1. Summary of Recent Sampling.

| Sample/Date[1] | Phase | Location | Segmentation | % Recovery |
|---|---|---|---|---|
| Vapor sample (11/2/92) | Gas | Tank headspace | n/a | n/a |
| Core 50 (11/10/92) | Solid/ Liquid | Riser 2 | 1[2] | 36 |
| | | | 1R | 34 |
| | | | 2 | 94 |
| | | | 3 | 96 |
| | | | 4 | 67 |
| Core 51 (2/18/93) | Solid/ Liquid | Riser 5 | 1 | 0 |
| | | | 2 | 64 |
| | | | 3U, 3L | 100 |
| | | | 4U, 4L | 100 |
| Core 52 (3/10/93) | Solid/ Liquid | Riser 3 | 1 | 43 |
| | | | 2 | 56 |
| | | | 3U, 3L | 95 |
| | | | 4 | 60 |
| Vapor sample (1/18/95) | Gas | Tank headspace, riser 5, 5.5 m (18 ft) below top of riser | n/a | n/a |

Notes:

n/a = not applicable
1R = first segment was resampled
U = upper half segment
L = lower half segment

[1]Dates are in the mm/dd/yy format.
[2]Segment was not used because it sat in the riser for more than 48 hours.

## 1.2 TANK BACKGROUND

Tank 241-T-107 is located in the 200 West Area T Tank Farm on the Hanford Site. It is the first tank in a three-tank cascade series. Tank 241-T-107 went into service in 1945 and received first cycle decontamination waste from B and T Plants. Supernate was transferred from the tank in 1951 in preparation to receive tributyl phosphate (TBP) from U Plant. Tributyl phosphate is also referred to as uranium recovery (UR) waste. During 1952 and 1953, TBP waste was transferred into tank 241-T-107.

In 1953 and 1954, the tank sent waste to tank 241-TX-118 and received unconcentrated ferrocyanide-scavenged TBP waste and flush water. Supernatant transfers out of the tank occurred in 1966. In 1967, tank 241-T-107 received plutonium-uranium extraction (PUREX) cladding waste from tank 241-C-102. In 1967, waste was transferred to tank 241-TY-103. During 1973, supernatant and flush water were transferred into tank 241-T-107, and supernatant was transferred out. Some waste was transferred to tank 241-T-101 in 1976. The tank was removed from service and declared inactive in 1976 when liquids were pumped from the tank in support of stabilization efforts (Agnew et al. 1996b). In 1983, additional salt well liquids were pumped to tank 241-AN-103. Interim stabilization was completed in May 1996.

Table 1-2 is a summary description of tank 241-T-107. The tank has an operating capacity of 2,010 kL (530 kgal) and presently contains an estimated 655 kL (173 kgal) of noncomplexed waste (Hanlon 1996). The tank was removed from the Ferrocyanide Watch List on September 4, 1996 (Kinzer 1996) and is not on other Watch Lists (Public Law 101-510).

Table 1-2. Description of Tank 241-T-107.

| | |
|---|---|
| **TANK DESCRIPTION** | |
| Type | Single-shell |
| Constructed | 1943 to 1944 |
| In service | 1945 |
| Diameter | 22.9 m (75.0 ft) |
| Operating depth | 5.2 m (17 ft) |
| Capacity | 2,010 kL (530 kgal) |
| Bottom shape | Dish |
| Ventilation | Passive |
| **TANK STATUS** | |
| Waste classification | Noncomplexed |
| Total waste volume | 655 kL (173 kgal) |
| Supernatant volume | 0 kL (0 kgal) |
| Saltcake volume | 0 kL (0 kgal) |
| Sludge volume | 655 kL (173 kgal) |
| Drainable interstitial liquid volume | 83 kL (22 kgal) |
| Waste surface level (November 17, 1996) | 172.5 cm (67.92 in.) |
| Temperature (September 1975 to November 1996) | 11 °C (52 °F) to 33 °C (91 °F) |
| Integrity | Assumed leaker (1984) |
| Watch List | Ferrocyanide[1] (1991 to 1996) |
| **SAMPLING DATES** | |
| Vapor samples | October 22, 1992 and January 18, 1995 |
| Core samples | November 1992 to March 1993 |
| **SERVICE STATUS** | |
| Declared inactive | 1976 |
| Interim stabilization | 1996 |

Note:

[1]Removed from Ferrocyanide Watch List on September 4, 1996.

# 2.0 RESPONSE TO TECHNICAL ISSUES

The technical issues that have been identified for tank 241-T-107 (Brown et al. 1996) are as follows:

Safety screening:

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

Hazardous vapor safety screening:

- Does the vapor headspace exceed 25 percent of the lower flammability limit (LFL)? If so, what are the principal fuel components?
- Are compounds of technological significance present in the tank at a level that the industrial hygiene group shall be alerted to their presence so that adequate breathing zone monitoring can be accomplished and future activities in and around the tank can be performed in a safe manner?

Although the 1992 to 1993 core sampling event predated DQOs, results from the event have been used to address the first issue outlined in the safety screening DQO (Dukelow et al. 1995). Vapor screening was addressed according to the vapor DQO (Osborne et al. 1994) through the 1995 vapor sampling. Appendix B shows the analytical results from the core and vapor sampling events.

Tank 241-T-107 was on the Ferrocyanide Watch List and the 1992 and 1993 core samples were analyzed to support the resolution of the ferrocyanide safety issue. The ferrocyanide safety issue has been resolved; tank 241-T-107 was removed from the Ferrocyanide Watch List on September 4, 1996 (Kinzer 1996).

## 2.1 SAFETY SCREENING

The data needed to screen the waste in tank 241-T-107 for potential safety problems is documented in the *Tank Safety Screening Data Quality Objective* (Dukelow et al. 1995). These potential safety problems are exothermic conditions in the waste, flammable gases in the waste and/or tank headspace, and criticality conditions in the waste. Each condition is addressed separately below as applicable to the safety screening DQO. Because the 1992 and 1993 core sampling and analysis predate the DQO, however, sufficient data exist for comparisons to the requirements of the safety screening DQO.

### 2.1.1 Exothermic Conditions (Energetics)

The first requirement outlined in the safety screening DQO (Dukelow et al. 1995) is to ensure that exothermic constituents (organic or ferrocyanide) do not exist in tank 241-T-107 in sufficient quantities to pose a safety hazard. Because of this requirement, energetics in tank 241-T-107 waste were evaluated. The safety screening DQO required the waste sample profile be tested for energetics at the half segment, or every 24 cm (9.5 in.), to determine whether the energetics exceed the safety threshold limit. This requirement was met for three segments only. A majority of other segments were not broken down into halves because of low solids recovery.

The threshold limit for energetics is 480 joules per gram on a dry weight basis. Results obtained using differential scanning calorimetry (DSC) indicate that no exotherms were apparent for any analyses attributed to the tank waste (Svancara and Pool 1993). One exotherm was attributed to a plastic artifact that was mixed with the waste in the last segment of core 50. Further analyses of the plastic artifact with different carrier gases show the artifact to be anomalous and not representative tank waste (Svancara and Pool 1993). Because exotherms were not found in the waste, 95 percent confidence intervals were not calculated.

Historically, tank 241-T-107 waste is expected to have some exothermic properties because of the presence of ferrocyanide in the waste. However, recent studies (Babad et al. 1993 and Lilga et al. 1993, 1994, 1995, and 1996) and analytical data from other ferrocyanide tanks (for example, tanks 241-BY-104, 241-BY-106, 241-BY-108, and 241-C-108) have shown that a large degree of ferrocyanide decomposition probably occurs because of the combined effects of radiation, temperature, and pH in the harsh environments of the high-level radioactive waste tanks.

### 2.1.2 Flammable Gas

Vapor phase measurements, taken in the tank headspace on January 18, 1995, indicated the flammability of the headspace gases was below the safety screening threshold of 25 percent of the LFL (measurements of the lower explosive limit [LEL] are actually made; LEL is equivalent to LFL). Appendix B provides data from these vapor phase measurements and from vapor sampling on October 22, 1992.

### 2.1.3 Criticality

The safety screening DQO threshold limit is 1 g $^{239}$Pu per liter of waste. Assuming that all alpha is from $^{239}$Pu and using the overall bulk density of 1.51 g/mL, 1 g/L of $^{239}$Pu is equivalent to 41 $\mu$Ci/g of alpha activity. Total alpha activity was analyzed in accordance with documents requiring analyses of composites instead of half segment or segment level analyses. The total alpha activities measured in the liquid and solid core composite samples were well below the 41 μCi/g limit. The single largest result was 0.475 μCi/g. The safety screening DQO requires the upper limit of the one-sided 95 percent confidence interval be calculated for each sample. However, because of the low results, no calculations were made for individual samples. A 95 percent confidence interval was calculated on the tank mean, yielding an upper limit of 0.930 μCi/g. Therefore, criticality is not an issue for tank 241-T-107.

## 2.2 FERROCYANIDE ISSUES

The ferrocyanide safety issue has been resolved for tank 241-T-107; the tank was removed from the Ferrocyanide Watch List on September 4, 1996 (Kinzer 1996). A comparison is made in Section 2.5 between the 1992 and 1993 analytical results and the requirements of the ferrocyanide DQO (Meacham et al. 1995). This comparison is for information only because the requirements are no longer applicable.

## 2.3 VAPOR SCREENING

The 1995 vapor samples were taken to satisfy the requirements of the *Data Quality Objectives for Generic In-Tank Health and Safety Issue Resolution* (Osborne et al. 1994). The analyses required to meet the vapor DQO requirements were documented in Carpenter (1995). The vapor DQO addresses two problems: 1) potential flammable levels of gases and vapors generated or released in waste storage tank headspaces and, 2) the potential for worker hazards associated with the toxicity of constituents in any fugitive vapor emissions from these tanks. These problems are addressed below.

### 2.3.1 Flammable Gas

This is the same requirement as the safety screening flammability requirement except that the limit in Osborne et al. (1994) is 20 percent of the LFL instead of 25 percent. See Section 2.1.2 for a treatment of the flammability issue. All results from the January 18, 1995, vapor sampling were well below the DQO threshold, and it was determined that no organic or inorganic vapor posed a flammability hazard (Huckaby and Bratzel 1995).

### 2.3.2 Toxicity

To address the vapor DQO, Carpenter (1995) required the analysis of ammonia, carbon dioxide, carbon monoxide, hydrogen, methane, nitric oxide, nitrous oxide, nitrogen dioxide, tritium, and water vapor from samples of the tank headspace. Carpenter (1995) specified a threshold limit for each of these compounds except carbon dioxide, nitrous oxide, tritium, and water vapor. Aside from water and carbon dioxide, the most abundant waste constituents in the tank 241-T-107 headspace were ammonia (125 ppmv) and nitrous oxide

(41.5 ppmv). However, the concentrations of these species were below any limits listed in Carpenter (1995). Note that the concentrations of both ammonia and nitrous oxide exceeded the 25 ppmv limit of the current vapor DQO (Osborne and Buckley 1995).

In addition to the inorganic vapors, an analysis of organics was required from SUMMA[1] canisters and triple sorbent traps. The total organic vapor concentrations were found to be relatively low. The sum of quantitatively measured and estimated triple sorbent trap organic analyte concentrations was 1.4 mg/m$^3$ (Huckaby and Bratzel 1995).

## 2.4 OTHER TECHNICAL ISSUES

A factor in assessing tank safety is the heat generation and temperature of the waste. Heat is generated in the tanks from radioactive decay. An estimate of the tank heat load based on radionuclide data from the 1992 and 1993 sample event is 779 W (2,660 Btu/hr), as shown in Table 2-1. Only the radionuclides present in detectable quantities were used in the calculation. This estimate agrees well with the heat load estimate based on tank headspace temperatures (708 W [2,416 Btu/hr]) (Kummerer 1995). The heat load estimate based on the tank process history was 37.4 W (128 Btu/hr) (Agnew et al. 1996a). All these estimates are quite low and are well below the 11,700 W (40,000 Btu/hr) limit that separates high- and low-heat load tanks (Smith 1986).

Table 2-1. Tank 241-T-107 Projected Heat Load.

| Radionuclide | Curies | Watts |
|---|---|---|
| $^{241}$Am | 13.8 | 0.453 |
| $^{137}$Cs | 12,200 | 57.6 |
| $^{239/240}$Pu | 148 | 4.51 |
| $^{90}$Sr | 106,800 | 716 |
| $^{99}$Tc | 50.0 | 0.0251 |
| Total watts | | 779 |

[1]SUMMA is a trademark of Moletrics, Inc., Cleveland, Ohio.

## 2.5 SUMMARY

This section summarizes the analytical results for the issues that apply to the tank 241-T-107 waste. Table 2-2 summarizes the results for the safety screening and vapor screening. Some uncertainty exists for total alpha analyses because only core composite data were available for evaluation. All safety screening primary analytes were well below threshold limits. As discussed previously, all the requirements of the vapor DQO (Osborne et al. 1994) were met. All analytical results were well below the ferrocyanide DQO thresholds.

Table 2-2. Summary of Safety Screening, Vapor Screening, and Ferrocyanide Evaluation Results.

| Issue | Sub-Issue | Result |
|---|---|---|
| Safety screening | Energetics | No exotherms observed in tank waste samples. |
| | Flammable gas | All vapor measurements below 25 percent of LFL. |
| | Criticality | All analyses well below 41 $\mu$Ci/g total alpha activity (composites). |
| Vapor screening | Flammability | All vapor measurements below 20 percent of LFL. |
| | Toxicity | All analytes were within the toxicity threshold limits of Osborne et al. (1994)[1]. |
| Ferrocyanide[2] | Energetics | No exotherms observed. |
| | Moisture | 46.0 percent (Thermogravimetric Analysis [TGA] on segments) - well above limit. |
| | Nickel | 292[3] $\mu$g/g (composites); far below 8,000 $\mu$g/g limit. |
| | Cyanide | 68.8 $\mu$g/g (composites); far below 39,000 $\mu$g/g limit. |

Notes:

[1]If the vapor results were evaluated against the current vapor DQO (Osborne and Buckley 1995), the ammonia and nitrous oxide concentrations would exceed toxicity limits.

[2]Tank 241-T-107 has been removed from the Ferrocyanide Watch List, and comparison to the ferrocyanide DQO is included for general information only.

[3]Acid digest results for nickel were used because of concerns that fusion results were contaminated from the nickel crucible using during the fusion procedure.

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# 3.0 BEST-BASIS INVENTORY ESTIMATE

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

Chemical inventory information generally is derived using two approaches: 1) component inventories are estimated using the results of sample analyses, and 2) component inventories are predicted using a model based on process knowledge and historical information. The most recent model was developed by Los Alamos National Laboratory (Agnew et al. 1996a). Information derived from these two approaches is often inconsistent. An effort is underway to provide waste inventory estimates that will serve as standard characterization source terms for various waste management activities (Hodgson and LeClair 1996). As part of this effort, an evaluation of available chemical information for tank 241-T-107 was performed that included the following:

- Data from chemical analyses of three core samples collected from November 1992 through March 1993 (Svancara and Pool 1993).

- The solids composite inventory estimate generated from the Los Alamos National Laboratory model, *Hanford Tank Chemical and Radionuclide Inventories: HDW Model Rev. 3* (Agnew et al. 1996a), also referred to as the historical tank inventory estimate.

Results from this evaluation, which are detailed in Appendix D, support using sampling data as the basis for the best estimate inventory for tank 241-T-107 for the following reasons:

1. The inventory estimate generated by the Los Alamos National Laboratory model is based on a single defined waste stream and does not take into account any possible solids contributions from the TBP waste, the PUREX cladding waste, or the ion exchange waste received by the tank.

2. Comparisons demonstrate that neither the first cycle decontamination cycle $BiPO_4$ (1C) flowsheet nor the Hanford Defined Waste (HDW) model compare well with the analytical results. The historical tank inventory estimate needs to be reevaluated.

At present, the sample-based inventories derived from analytical data are the best-basis inventories. Tables 3-1 and 3-2 summarize the best-basis inventories for tank 241-T-107. A tank volume of 655 kL (173 kgal) and a density of 1.51 g/mL were used to calculate these inventories.

Table 3-1. Best-Basis Inventory Estimates for Nonradioactive Components in Tank 241-T-107. (2 sheets)

| Analyte | Total Inventory (kg) | Best-Basis[1] (S, M, or E) | Comment |
|---|---|---|---|
| Al | 16,200 | S | |
| Bi | 11,100 | S | |
| Ca | 1,480 | S | |
| Cl | 541 | S | |
| TIC as $CO_3$ | 4,180 | S | |
| Cr | 343 | S | |
| F | 11,400 | S | Based on water soluble portion only. |
| Fe | 27,000 | S | |
| K | 231 | S | |
| Mn | 201 | S | |
| Na | 1.217E+05 | S | |
| Ni | 289 | S | |
| $NO_2$ | 11,700 | S | |
| $NO_3$ | 74,600 | S | |
| Pb | 636 | S | |
| P as $PO_4$ | 1.128E+05 | S | |
| Si | 6,000 | S | |
| S as $SO_4$ | 9,860 | S | |
| Sr | 852 | S | |

Table 3-1. Best-Basis Inventory Estimates for Nonradioactive Components in Tank 241-T-107. (2 sheets)

| Analyte | Total Inventory (kg) | Best-Basis[1] (S, M, or E) | Comment |
|---|---|---|---|
| TOC | 1,680 | S | |
| $U_{TOTAL}$ | 22,400 | S | |
| Zr | 112 | S | |

Notes:

TIC = total inorganic carbon
TOC = total organic carbon

[1]Best-basis estimate based on S = Sampling, M = HDW model, and E = Engineering assessment.

Table 3-2. Best-Basis Inventory Estimates for Radioactive Components in Tank 241-T-107.

| Analyte | Total Inventory (Ci) | Best-Basis[1] (S, M, or E) | Comment |
|---|---|---|---|
| $^{90}Sr$ | 1.068E+05 | S | |
| $^{90}Y$ | 1.068E+05 | S | Based on $^{90}Sr$ |
| $^{99}Tc$ | 50 | S | |
| $^{137}Cs$ | 12,200 | S | |
| $^{137}Ba$ | 11,500 | S | Based on $^{137}Cs$ |
| $^{239/240}Pu$ | 148 | S | |
| $^{241}Am$ | 13.8 | S | |

Note:

[1]Best-basis estimate based on S = sampling, M = HDW model, and E = engineering assessment.

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# 4.0 RECOMMENDATIONS

The January 18, 1995, vapor sampling event provided sufficient information to address the requirements of the vapor DQO (Osborne et al. 1994). No further vapor sampling efforts are necessary. The results satisfied the governing vapor DQO (Rev. 0). However, comparison to the current vapor DQO (Rev. 2) reveals that two analytes exceeded toxicity limits.

As discussed in Section 2.0, the 1992 and 1993 core sampling predated the existence of DQOs. Analytical results from this event were evaluated against the requirements of the safety screening DQO. All results were well within the safety notification limits. Although the ferrocyanide DQO was no longer applicable, an evaluation was also made between the DQO and the results; again, all requirements were satisfied. Although the sampling and analysis activities performed for tank 241-T-107 did not strictly meet the requirements for all applicable DQO documents (that is, some analyses were performed on core composites or whole segments instead of half segments), sufficient information is available to determine that notification limits would not be exceeded. Furthermore, a characterization best-basis inventory was developed for the tank contents.

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

Table 4-1. Acceptance of Tank 241-T-107 Sampling and Analysis.

| Issue | Sampling and Analysis Performed | Program[1] Acceptance |
|---|---|---|
| Safety screening DQO | Yes | Yes |
| Vapor DQO | Yes | Yes |

Note:

[1]PHMC TWRS

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

Table 4-2. Acceptance of Evaluation of Characterization Data and Information for Tank 241-T-107.

| Issue | Evaluation Performed | Program[1] Acceptance |
|---|---|---|
| Waste safety categorization (tank is safe) | Yes | Yes |
| Tank headspace vapors do not pose a safety concern | Yes | Yes |

Note:

[1]PHMC TWRS

One final comment regarding the safety screening DQO needs to be made. The one-sided confidence intervals that were used to determine whether $^{239}Pu$ is below the DQO threshold were not calculated on each individual sample data because the data were not analyzed at the segment level, and the analytical results were well below the limits. Also it was not possible to check for contamination or dilution of the samples by the hydrostatic head fluid because water without a tracer was used for the head fluid (Valenzuela and Jensen 1994).

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# APPENDIX A

# HISTORICAL TANK INFORMATION

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# APPENDIX A

# HISTORICAL TANK INFORMATION

Appendix A describes tank 241-T-107 based on historical information. For this report, historical information includes any information about the fill history, waste types, surveillance, or modeling data about the tank. This information is necessary to provide a balanced assessment of the sampling and analytical results.

This appendix contains the following information:

- **Section A1**: Current tank status including the waste levels and the stabilization and isolation status.
- **Section A2**: Information about tank design.
- **Section A3**: Process knowledge of the tank, that is, the waste transfer history and the estimated contents of the tank based on modeling data.
- **Section A4**: Surveillance data for tank 241-T-107 including surface-level readings, temperatures, and a description of the waste surface based on photographs.
- **Section A5**: References for Appendix A.

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

## A1.0 CURRENT TANK STATUS

As of October 31, 1996, tank 241-T-107 contained an estimated 655 kL (173 kgal) of noncomplexed waste. The waste volumes were estimated using photographs and surface-level measurements. Table A1-1 shows the volumes of waste phases found in the tank. In 1976, tank 241-T-107 was removed from service. It was declared an assumed leaker in 1984. The tank was interim stabilized in 1996; intrusion prevention has not been completed. The tank is passively ventilated, and all monitoring systems were in compliance with documented standards as of October 31, 1996. Tank 241-T-107 was removed from the Ferrocyanide Watch List on September 4, 1996 (Hanlon 1996).

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

| Waste Type | kL (kgal) |
|---|---|
| Total waste | 655 (173) |
| Supernatant | 0 |
| Sludge | 655 (173) |
| Saltcake | 0 |
| Drainable interstitial liquid | 83 (22) |
| Drainable liquid remaining | 83 (22) |
| Pumpable liquid remaining | 45 (12) |

Note:

[1]Hanlon (1996)

## A2.0 TANK DESIGN AND BACKGROUND

Tank 241-T-107 was constructed during 1943 and 1944. It is one of twelve 2,010 kL (530 kgal) tanks in T Farm. The tanks were designed for nonboiling waste with a maximum fluid temperature of 104 °C (220 °F). A typical T Farm tank contains 9 to 11 risers ranging from 10 cm (4 in.) to 30 cm (12 in.) in diameter that provide surface-level access to the underground tank. Generally, there is one riser through the center of the tank dome and four or five each on opposite sides of the dome.

Tank 241-T-107 entered service in 1945 and is first in a three-tank cascading series. These tanks are connected by a 7.6-cm (3-in.) cascade line. The bottom center elevation of tank 241-T-107 is 193.5 m (635 ft) above sea level. The tank cascades to tank 241-T-108 at 193.0 m (633 ft), then to tank 241-T-109, which has a bottom center elevation at 192.3 m (631 ft). The cascade overflow height is approximately 4.78 m (188 in.) from the tank bottom and 60 cm (2 ft) below the top of the steel liner.

The single-shell tanks are constructed of 30-cm (1-ft)-thick reinforced concrete with a 6.4 mm (0.25 in.) mild carbon steel liner (ASTM A283 Grade C) on the bottom and sides and a 38-cm (1.25-ft)-thick-domed concrete top. The tanks have a dished bottom with a 1.2-m (4-ft) radius knuckle and a 5.2-m (17-ft) operating depth. The tanks are set on a reinforced concrete foundation.

A three-ply cotton fabric waterproofing was applied over the foundation and the steel tank. Four coats of primer paint were sprayed on all exposed interior tank surfaces. Tank ceiling domes were covered with three applications of magnesium zincfluorosilicate wash. Lead flashing was used to protect the joint where the steel liner meets the concrete dome. Asbestos gaskets were used to seal the access holes in the tank dome. The tanks were waterproofed on the sides and top with tar and a cement-like mixture. Each tank was covered with approximately 2.1 m (7 ft) of overburden.

Tank 241-T-107 has four process inlet nozzles and one cascade overflow inlet located approximately 4.8 m (188 in.) from the tank bottom (as measured at the tank wall). Figure A2-1 shows their locations.

Figure A2-2 shows a tank cross section, the approximate waste level, and a schematic of the tank equipment. Tank 241-T-107 has nine risers. Risers 2, 3, 5, 6, 7, and 8 are tentatively available for sampling (Lipnicki 1996). Risers 2, 3, 6, and 7 are all 30 cm (12 in.) in diameter. Risers 5 and 8 are 10 cm (4 in.) in diameter. Table A2-1 lists tank 241-T-107 risers showing their sizes and general use.

Figure A2-1. Riser Configuration for Tank 241-T-107.

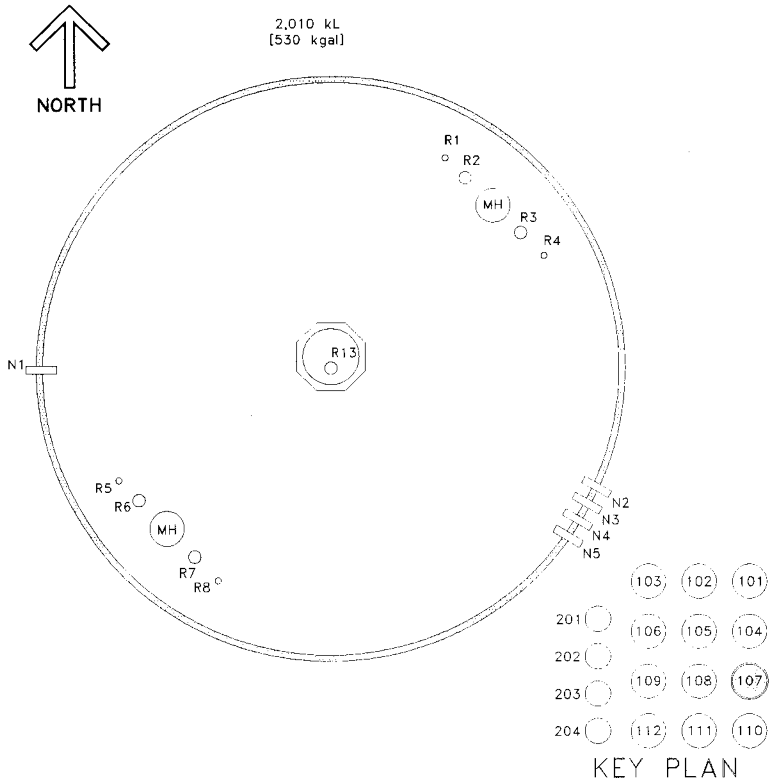


Figure A2-2. Tank 241-T-107 Cross Section and Schematic.

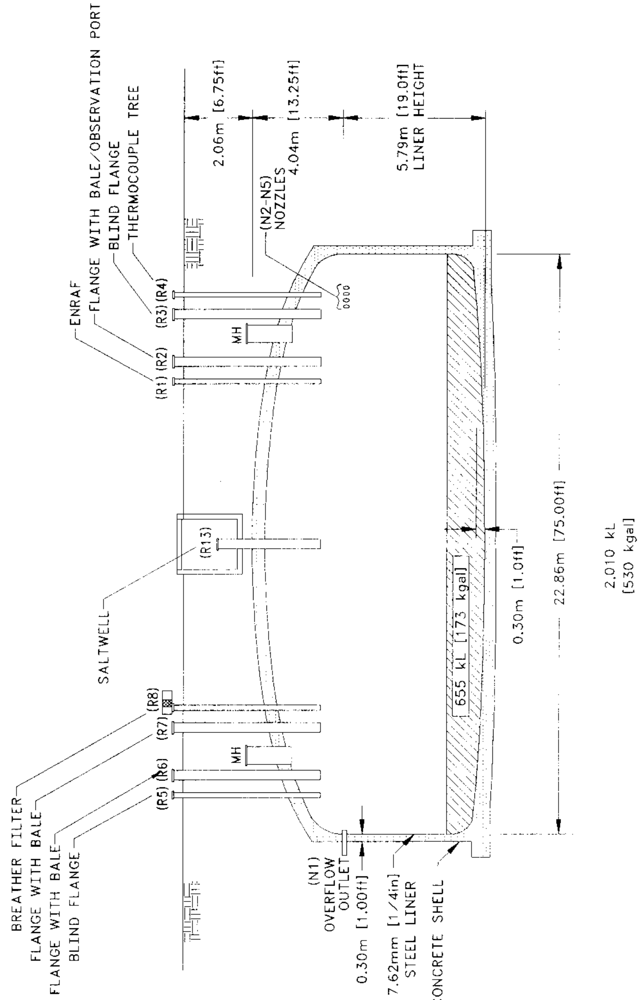


Table A2-1. Tank 241-T-107 Risers.[1,2,3]

| Number | Diameter | | Description and Comments |
|---|---|---|---|
| | cm | in. | |
| R1 | 10 | 4 | ENRAF[2] gauge (installed June 1994) (previously contained an FIC gauge); (benchmarked December 11, 1986) |
| R2[4] | 30 | 12 | Flange with bale/observation port, spare |
| R3[4] | 30 | 12 | Blind flange |
| R4 | 10 | 4 | Thermocouple tree |
| R5[4] | 10 | 4 | Blind flange; temperature vapor probe (September 22, 1994) |
| R6[4] | 30 | 12 | Flange with bale, spare |
| R7[4] | 30 | 12 | Flange with bale, spare |
| R8[4] | 10 | 4 | Breather filter |
| R13 | 30 | 12 | Salt well riser; (benchmarked December 11, 1986) |
| N1 | 7.6 | 3 | Cascade outlet nozzle |
| N2 | 7.6 | 3 | Process inlet nozzle |
| N3 | 7.6 | 3 | Process inlet nozzle |
| N4 | 7.6 | 3 | Process inlet nozzle |
| N5 | 7.6 | 3 | Process inlet nozzle |

Notes:

FIC = Food Instrument Corporation

[1]Alstad (1993)
[2]Tran (1993)
[3]Vitro Engineering Corporation (1988)
[4]These risers are available for sampling according to Lipnicki (1996).

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

# A3.0 PROCESS KNOWLEDGE

The sections below: 1) provide information about the transfer history of tank 241-T-107; 2) describe the process wastes that made up the transfers; and 3) give an estimate of the current tank contents based on transfer history.

## A3.1 WASTE TRANSFER HISTORY

Table A3-1 summarizes the waste transfer history of tank 241-T-107 (Agnew et al. 1996b). First-cycle decontamination (1C1) waste was added to tank 241-T-107 in the first quarter of 1945. This type of waste originated from the bismuth phosphate process performed at B and T Plants. The waste consists of by-product materials co-precipitated from a plutonium containing solution. The 1C1 waste stream also contained coating waste from the removal of the aluminum fuel element coating. First cycle decontamination waste was added continuously through the first quarter of 1946. Tank 241-T-107 was full in September 1945 and began to overflow into tank 241-T-108. The cascade was completely full by March 1946.

The tank remained undisturbed until 1951, then over half the supernatant waste was removed and sent to tank 241-TX-118. Tank 241-T-107 was reserved to receive TBP waste which came from the TBP uranium extraction process generated at U Plant. Tributyl phosphate waste (also called UR waste) was added to the tank from the end of 1952 until the first quarter of 1953. During this time, some waste cascaded to tank 241-T-108. In 1953, supernatant again was removed and sent to tank 241-TX-118 to feed the 200 West evaporator, leaving tank 241-T-107 slightly less than half-full with 908 kL (240 kgal) remaining in the tank.

From the last quarter of 1953 to the first quarter of 1954, tank 241-T-107 received flush water and unconcentrated, ferrocyanide-scavenged, TBP waste from tank 241-T-101. Between 1954 and late 1966, no addition or removal of waste was recorded, and the total waste volume remained constant. Supernatant tank waste was moved to tank 241-TX-118 from the second to fourth quarters of 1966, leaving 787 kL (208 kgal) of waste.

In 1967, tank 241-T-107 received cladding waste (CW) supernatant from tank 241-C-102. Cladding waste was produced at the PUREX plant from the processing of cold uranium. Approximately 1,040 kL (275 kgal) of CW waste, which included mostly liquids and a small amount of solids, were removed from tank 241-T-107 and transferred to tank 241-TY-103 in 1969.

In the beginning of 1973, tank 241-T-107 received flush water and supernatant waste from tank 241-BX-104. This was ion exchange waste (IX) from the cesium recovery process at B Plant. This waste, however, was immediately distributed to tanks 241-T-108 and 241-T-105 in the first and second quarters of 1973.

Supernatant was moved to tank 241-T-101 in 1976. Also in 1976, tank 241-T-107 was removed from service and designated inactive. In the third quarter of 1977, the solids level was adjusted to 568 kL (150 kgal), and the total volume was measured at 674 kL (178 kgal). In 1979, the integrity of the tank was questioned because of an anomalous activity noted in the dry wells or because of a noticeable drop in waste volume. Several level adjustments have occurred since. In February 1980, a new solids level of 632 kL (167 kgal) and a total volume of 674 kL (178 kgal) were recorded (Agnew et al. 1996b). A small amount of liquid was pumped to tank 241-AN-103 in the fourth quarter of 1983. Interim stabilization of tank 241-T-107 was completed in May 1996, and on May 31, 1996, a new solids level of 655 kL (173 kgal) was recorded (Hanlon 1996). Table A3-1 shows the major transfers of waste for tank 241-T-107.

Table A3-1. Tank 241-T-107 Major Transfers.[1, 2]

| Transfer Source | Transfer Destination | Waste Type | Time Period | Estimated Waste Volume | |
|---|---|---|---|---|---|
| | | | | kL | kgal |
| B and T plants | --- | 1C1 | 1945-1946 | 6,019 | 1,590 |
| --- | 241-T-108 | 1C1 | 1945-1946 | -4,005 | -1,058 |
| --- | 241-TX-118 | SU | 1951 | -1,079 | -285 |
| U plant | --- | TBP | 1952-1953 | 4,804 | 1,269 |
| --- | 241-T-108 | SU | 1952-1953 | -3,725 | -984 |
| --- | 241-TX-118 | SU | 1953 | -1,120 | -296 |
| 241-T-101 | --- | SU (TBP) | 1953-1954 | 1,037 | 274 |
| Misc. sources | --- | WTR | 1954 | 106 | 28 |
| --- | 241-TX-118 | SU | 1966 | -1,207 | -319 |
| 241-C-102 | --- | SU (CW) | 1967 | 1,124 | 297 |
| --- | 241-TY-103 | SU | 1969 | -1,041 | -275 |
| Misc. sources | --- | WTR | 1973 | 49 | 13 |
| 241-BX-104 | --- | SU (IX) | 1973 | 4,762 | 1,258 |
| --- | 241-T-108 | SU | 1973 | -2,449 | -647 |
| --- | 241-T-105 | SU | 1973 | -1,711 | -452 |
| --- | 241-T-101 | SU | 1976 | -833 | -220 |
| --- | 241-AN-103 | SWLQW | 1983 | -19 | -5 |

Notes:

SU = supernatant
SWLQW = salt well liquid
WTR = flush water

[1]Agnew et al. (1996b)
[2]Because only major transfers are listed, the sum of these transfers will not equal the current tank waste volume.

## A3.2 HISTORICAL ESTIMATION OF TANK CONTENTS

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

- *Waste Status and Transaction Record Summary for the Northwest Quadrant of the Hanford 200 West Area* (WSTRS) (Agnew et al. 1996b). The WSTRS is a tank-by-tank quarterly summary spreadsheet of waste transactions.

- *Hanford Tank Chemical and Radionuclide Inventories: HDW Model Rev. 3* (Agnew et al. 1996a). This document contains the HDW list, the Supernatant Mixing Model (SMM), and the Tank Layer Model (TLM).

- Historical Tank Content Estimate for the (Northeast, Northwest, Southeast, or Southwest) Quadrant of the Hanford 200 (East or West) Area (Brevick et al. 1996, 1997a, 1997b, 1997c). This set of four documents compiles and summarizes much of the process history, design, and technical information regarding the underground waste storage tanks in the 200 Areas.

- Tank Layer Model. The TLM defines the sludge and saltcake layers in each tank using waste composition and waste transfer information.

- Supernatant Mixing Model. This is a subroutine within the HDW model that calculates the volume and composition of certain supernatant blends and concentrates.

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

Various analytes are in the waste including sodium, nitrates, nitrites, sulfates, and hydroxides that are common to several waste streams. Over the years, the types and amounts of chemical compounds used in processes have varied to improve product recovery, and waste management practices (that is, evaporation and fission product recovery) have further confounded the waste matrix. Therefore, present concentrations may not parallel historical records.

Based on Agnew et al. (1996a), tank 241-T-107 contains two layers of 1C1 waste (total waste amount of 646 kL [171 kgal]). The bottom layer is predicted to be composed of 496 kL (131 kgal) of 1C1 waste, and the top layer contains 150 kL (40 kgal) of unknown waste which is assigned to 1C1.

Figure A3-1 is a graph of the estimated waste type and volume for the tank layers. Table A3-2 shows the historical tank inventory estimate for tank 241-T-107. The total by Agnew et al. (1996a) differs slightly from the current estimate of 655 kL (173 kgal) because the waste volume estimate has been adjusted since.

Tank 241-T-107 was categorized as a ferrocyanide tank because it received waste from tank 241-T-101, a settling tank for the in-plant ferrocyanide scavenging process. The ferrocyanide scavenging method was performed on U Plant waste effluent, bismuth phosphate first cycle decontamination waste, and selected other wastes through an in-farm or in-plant scavenging process. In this process, sodium ferrocyanide and nickel were added to precipitate $^{137}Cs$ and other soluble radionuclides from the waste. Scavenging of $^{60}Co$ with $Na_2S$ was also commonly done. It was possible tank 241-T-107 had greater than 1000 g-mol of ferrocyanide. Analytes that differentiate ferrocyanide waste from other wastes are elevated levels of nickel, calcium, and $^{137}Cs$. However, the aging of the waste, exposure to radiation, and high pH within the tank are believed to have degraded the ferrocyanide (Lilga et al. 1996).

Figure A3-1. Tank 241-T-107 Tank Layer Model.

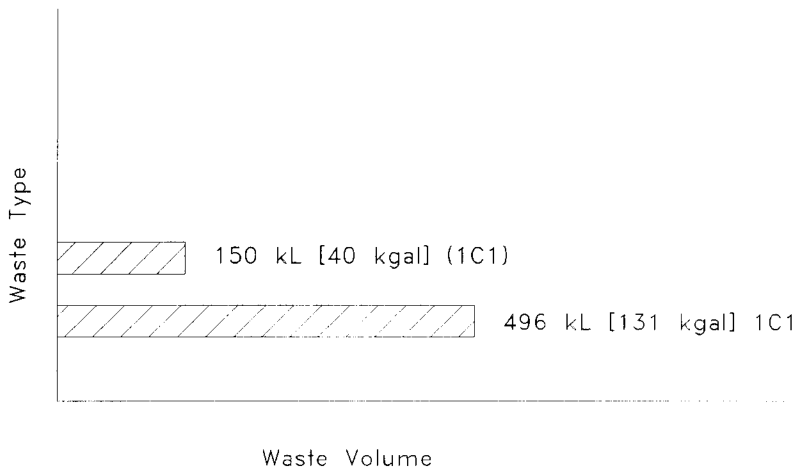


Table A3-2. Tank 241-T-107 Historical Tank Inventory Estimate.[1,2] (2 sheets)

| Total Inventory Estimate | | | |
|---|---|---|---|
| **Physical Properties** | | | |
| Total solid waste | 8.70E+05 kg (180 kgal) | | |
| Heat load | 0.0374 kW (128 Btu/hr) | | |
| Bulk density | 1.28 (g/mL) | | |
| Void fraction | -- | | |
| Water wt% | 72.0 | | |
| Total organic carbon wt% carbon (wet) | 0 | | |
| **Chemical Constituents** | ***M*** | **$\mu g/g$** | **kg** |
| $Na^+$ | 4.63 | 83,400 | 72,600 |
| $Al^{3+}$ | 0.452 | 9,540 | 8,300 |
| $Fe^{3+}$ (total Fe) | 0.307 | 13,400 | 11,700 |
| $Cr^{3+}$ | 0.00358 | 146 | 127 |
| $Bi^{3+}$ | 0.0731 | 12,000 | 10,400 |
| $La^{3+}$ | 0 | 0 | 0 |
| $Hg^{2+}$ | 1.00E-04 | 15.8 | 13.7 |
| Zr (as $ZrO(OH)_2$) | 0.00978 | 699 | 608 |
| $Pb^{2+}$ | 0 | 0 | 0 |
| $Ni^{2+}$ | 0.00110 | 50.7 | 44.1 |
| $Sr^{2+}$ | 0 | 0 | 0 |
| $Mn^{4+}$ | 0 | 0 | 0 |
| $Ca^{2+}$ | 0.0717 | 2,250 | 1,960 |
| $K^+$ | 0.00307 | 93.9 | 81.7 |
| $OH^-$ | 2.49 | 33,200 | 28,800 |
| $NO_3^-$ | 0.355 | 17,300 | 15,000 |
| $NO_2^-$ | 0.170 | 6,130 | 5,330 |
| $CO_3^{2-}$ | 0.0717 | 3,370 | 2,930 |
| $PO_4^{3-}$ | 1.27 | 94,200 | 81,900 |
| $SO_4^{2-}$ | 0.0424 | 3,190 | 2,780 |
| Si (as $SiO_3^{2-}$) | 0.0600 | 1,320 | 1,150 |

Table A3-2. Tank 241-T-107 Historical Tank Inventory Estimate.[1, 2] (2 sheets)

| Total Inventory Estimate | | | |
|---|---|---|---|
| Chemical Constituents (Continued) | *M* | μg/g | kg |
| $F^-$ | 0.157 | 2,340 | 2,030 |
| $Cl^-$ | 0.0141 | 391 | 340 |
| citrate | 0 | 0 | 0 |
| $EDTA^{4-}$ | 0 | 0 | 0 |
| $HEDTA^{3-}$ | 0 | 0 | 0 |
| glycolate | 0 | 0 | 0 |
| acetate | 0 | 0 | 0 |
| oxalate | 0 | 0 | 0 |
| DBP | 0 | 0 | 0 |
| butanol | 0 | 0 | 0 |
| $NH_3$ | 1.70E-04 | 2.27 | 1.97 |
| $Fe(CN)_6^{4-}$ | 0 | 0 | 0 |
| Radiological Constituents | Ci/L | μCi/g | Ci |
| Pu | --- | 0.00570 | 0.0826 (kg) |
| U | 5.43E-04 (*M*) | 101 (μg/g) | 88.0 (kg) |
| Cs | 0.0116 | 9.07 | 7,890 |
| Sr | 1.02E-04 | 0.0803 | 69.8 |

Notes:

[1]Agnew et al. (1996a)

[2]These inventory predictions have not been validated and should be used with caution.

## A4.0 SURVEILLANCE DATA

Tank 241-T-107 surveillance consists of surface-level measurements (liquid and solid), temperature monitoring inside the tank (waste and headspace), and leak detection well (dry well) monitoring for radioactivity outside the tank. Surveillance data provide the basis for determining tank integrity.

Liquid-level measurements may indicate whether the tank has a major leak. Solid surface-level measurements may indicate physical changes in and consistencies of the solid layers of a tank. Drywells located around the tank perimeter may show increased radioactivity caused by leaks. Tank 241-T-107 has no liquid observation well, but it does have three identified dry wells.

## A4.1 SURFACE-LEVEL READINGS

Tank 241-T-107 is categorized as an assumed leaker. An automatic FIC gauge set in intrusion mode was used to monitor the surface level through riser 1 until June 1994. At that time, the FIC gauge was replaced with an ENRAF™ gauge. Manual readings are required daily if the ENRAF™ gauge fails or if the computer automated surveillance system readings are zero. The leak detection criteria for tank 241-T-107 are an increase of 5.1 cm (2.0 in.) or a decrease of 2.5 cm (1.0 in.) in intrusion mode from the baseline value. On September 30, 1995, there was an administrative solids level adjustment to 655 kL (173 kgal) with no supernatant. In March 1996, tank 241-T-107 met stabilization criteria; official declaration was made in May 1996. On May 31, 1996, a new solids level of 655 kL (173 kgal) was recorded (Hanlon 1996). On November 17, 1996, the automatic ENRAF™ reading was 172.6 cm (67.97 in.), and the manual ENRAF™ reading was 172.5 cm (67.92 in.). Figure A4-1 is a level history graph of the volume measurements.

## A4.2 INTERNAL TANK TEMPERATURES

There are two thermocouple trees in tank 241-T-107, located in riser 4 (J type) and riser 5 (resistance temperature detector type). The data from the thermocouple tree in riser 5 closely matches the data from the thermocouple tree in riser 4. The thermocouple tree in riser 5 has 8 thermocouples. The thermocouple tree in riser 4 has 12 thermocouples to monitor the waste temperature. Thermocouple 1 is 36.6 cm (1.2 ft) from the tank bottom. Thermocouples 2 though 9 are spaced at 61-cm (2-ft) intervals above thermocouple 1. Thermocouples 9 though 11 are at 1.22-m (4-ft) intervals. The position of the 12th thermocouple probe is unknown; therefore, data from this thermocouple were not used (Brevick et al. 1995).

The temperature range from September 1975 to November 1996 was 11 °C (52 °F) to 33 °C (91 °F), and the average temperature was 18 °C (64 °F). On November 17, 1996, the average tank temperature was 19 °C (66°F), the minimum was 18 °C (65 °F) from thermocouple 7 in riser 5, and the maximum was 19 °C (67 °F) from thermocouple 11 in riser 4. For plots of the thermocouple readings, refer to Brevick et al. (1995). Figure A4-2 shows a graph of the weekly high temperature.

Figure A4-1. Tank 241-T-107 Level History.

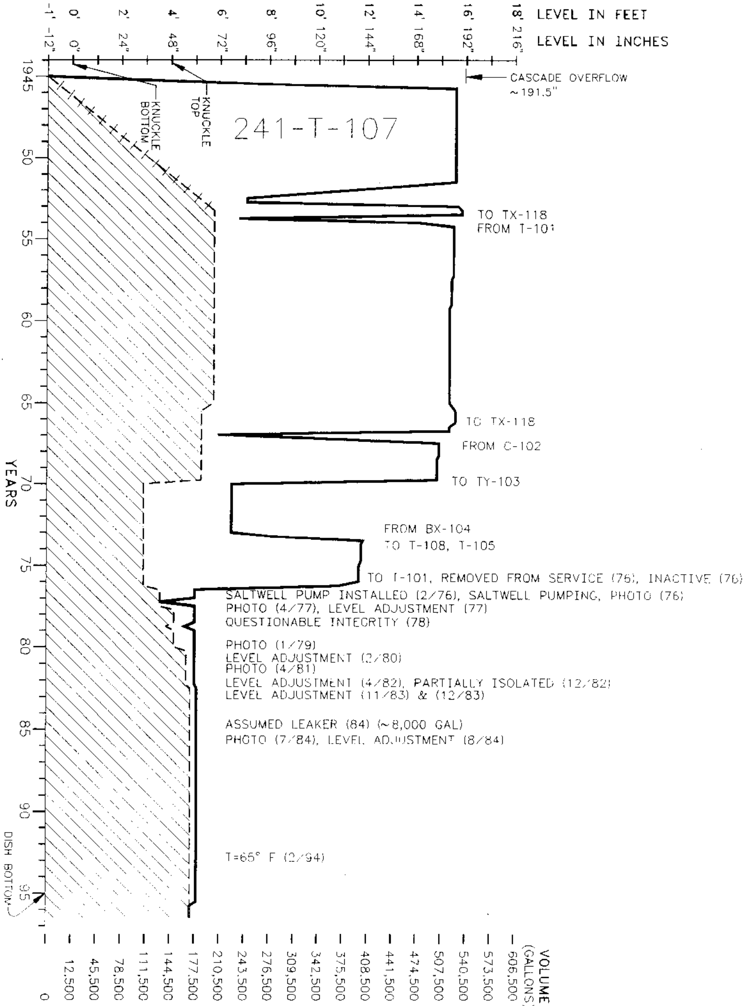
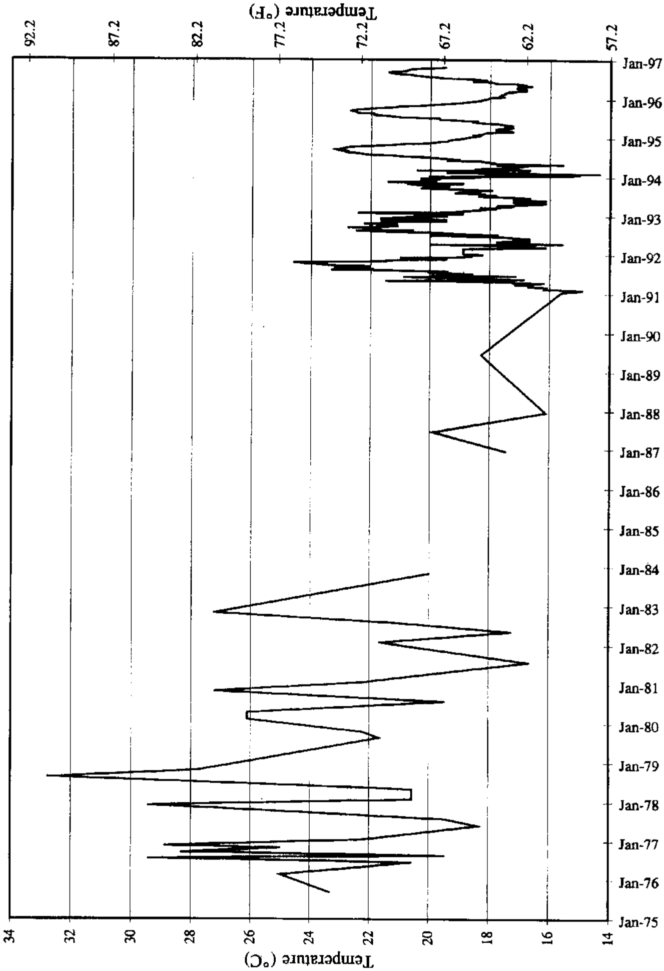


Figure A4-2. Tank 241-T-107 High Temperature Plot.



## A4.3 TANK 241-T-107 PHOTOGRAPHS

For a photographic montage from July 12, 1984, refer to Brevick et al. (1995). Details within the tank are difficult to see because of the hazy quality of the photographs. The surface appears to be covered with a liquid except for a few places where solid mounds break through the liquid surface. An FIC probe, temperature probe, salt well screen, manhole, and some inlet nozzles have been identified and labeled. Because of salt well pumping and interim stabilization, the photographs do not represent current tank contents. In-tank videos were taken in September 1995 and May 1996 in support of interim stabilization following salt well pumping. The video shows an uneven surface, varying as much as 4 in. (Hanlon 1996). No supernate is visible on the surface.

## A5.0 APPENDIX A REFERENCES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# APPENDIX B

# SAMPLING OF TANK 241-T-107

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# APPENDIX B

# SAMPLING OF TANK 241-T-107

Appendix B provides sampling and analysis information for each known sampling event for tank 241-T-107 and an assessment of the 1992 and 1993 core sampling results.

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

Future sampling of tank 241-T-107 will be appended to the above list.

## B1.0 TANK SAMPLING OVERVIEW

Appendix B describes all known sampling events for tank 241-T-107, and provides the analytical results for each event. The sampling events listed include the 1992 and 1993 core sampling event, the 1992 and 1995 vapor sampling events, and the 1965, 1975, 1985, and 1989 historical supernatant sampling events.

Characterization of the solid portion of the tank waste is based on the 1992 and 1993 core sampling event. Core 50 was taken according to Winters et al. (1991); however, the core was characterized as directed in Bell (1993). Cores 51 and 52 were taken and analyzed as directed in Bell (1993). Because the sampling event predated DQOs, no DQO was applicable. An effort has been made to evaluate these results against the safety screening and ferrocyanide DQO requirements. The data package originally published the analytical results (Svancara and Pool 1993).

The tank headspace gases have been sampled twice. Before the November 1992 core sampling of tank 241-T-107, vapor samples were taken on October 1, 1992, for flammability issues. No DQOs were applicable because the event occurred before their existence. The results were reported in *Results from the Vapor Sampling of Waste Tank T-107* (Pingel 1992).

To support the safety screening DQO (Dukelow et al. 1995) and the vapor DQO (Osborne et al. 1994), additional vapor phase measurements were made on January 18, 1995. The vapor phase screening was taken for flammability and toxicity issues. The results were reported in *Tank 241-T-107 Headspace Gas and Vapor Characterization Results for Samples Collected in January 1995* (Huckaby and Bratzel 1995).

Safety screening analyses include the following: total alpha to determine criticality, DSC to ascertain the fuel energy value, TGA to obtain the total moisture content, and bulk density. In addition, combustible gas meter readings in the tank headspace were performed to measure flammability. Table B1-1 summarizes sampling and analytical requirements from the safety screening, vapor, and ferrocyanide DQOs.

Table B1-1. Integrated Data Quality Objective Requirements for Tank 241-T-107.

| Sampling Event | Applicable DQOs | Sampling Requirements | Analytical Requirements |
|---|---|---|---|
| 1992 and 1993 core sampling | Safety screening[1] | Core samples from a minimum of two risers separated radially to the maximum extent possible. | ▸ Energetics<br>▸ Moisture content<br>▸ Total alpha<br>▸ Bulk density |
| | Ferrocyanide[1, 2] | A minimum of two cores. Efforts should be made to obtain good sample recovery and quarter segment analyses for primary analytes. | ▸ Energetics<br>▸ Moisture content<br>▸ Metals<br>▸ Anions<br>▸ Radionuclides |
| 1992 and 1995 vapor phase measurements | Vapor[3, 4] | Measurement in a minimum of one location within tank headspace. | ▸ Vapor flammability<br>▸ Gases ($NH_3$, $H_2$, $CH_4$, $H_2O$, $CO_2$, CO, NO, $NO_2$, $N_2O$, tritium, and organics) |

Notes:

[1]DQO did not exist at the time of sampling.

[2]Removed from Ferrocyanide Watch List and no longer applicable.

[3]Osborne et al. (1994)

[4]DQO did not exist at the time of the 1992 vapor sampling.

Sampling data for tank 241-T-107 have been obtained for four historical liquid samples: September 1965, September 1975, March 1985, and August 1989. No information was available regarding sample handling or analysis for the samples; therefore, only analytical results and references are reported. The reason for the samplings were given as evaporator feed and mixing studies.

# B2.0 SAMPLING EVENTS

## B2.1 NOVEMBER 1992 - MARCH 1993 CORE SAMPLING EVENT

This section describes the core sampling and analysis event for tank 241-T-107 which occurred from November 1992 to March 1993.

### B2.1.1 Description of Sampling Event

Tank 241-T-107 was push-mode core sampled through three risers during a period from November 5, 1992 to March 15, 1993. Approximately four segments were expected from each core sample (three full segments and one partial segment). Initially, two core samples were scheduled for tank 241-T-107, but because of poor sample recovery, a third core was taken (Silvers and Noonan 1993). Core 50 was obtained from riser 2, core 51 from riser 5, and core 52 from riser 3. The first core (core 50) was sampled on November 10, 1993; the second core sample (core 51) was completed on February 18, 1993; and the third core (core 52) on March 10, 1993. A chain-of-custody record was kept during the sampling event for each segment sampled and is available in the full data package (Svancara and Pool 1993).

The sampler is constructed of a stainless steel column 48-cm (19-in.) long, with a 2.2-cm (7/8-in.) inside diameter and a volume of 187 mL (0.05 gal). It is important to note that water, not normal paraffin hydrocarbons, was used as the hydrostatic head fluid for the tank 241-T-107 sampling event, potentially biasing the sample results. Water is a key component of the tank waste and, if the hydrostatic head fluid had leaked into the sample, the water content would appear much higher than it actually was. Lithium bromide, currently used as a tracer in the hydrostatic head fluid, was not used for the tank 241-T-107 sampling event. The 222-S Laboratory did not note any contamination of the sample by the hydrostatic head fluid; however, this type of contamination could be difficult to detect solely on a visual basis. Refer to the *Tank Characterization Reference Guide* (De Lorenzo et al. 1994) for more information on sampling.

### B2.1.2 Sample Handling

The samples from tank 241-T-107 were transported in shipping casks to the 222-S Laboratory for analysis between November 10, 1992 and March 15, 1993. Further physical and radiochemical characterization was performed at the 325 Analytical Chemistry Laboratory. The 325 Analytical Chemistry Laboratory is operated by the Pacific Northwest National Laboratory and is located in the 300 Area of the Hanford Site.

Each segment remained in the cask until it was extruded from the sampler in the hot cell. The work performed on the samples was done remotely behind 60 cm (2 ft) of lead glass. Each sampler was placed in a horizontal position on the sample extruder, and the sample was removed using a piston positioned at the top of the sampler. The piston pushed the sample, bottom end first, onto a metal tray where solids and liquids were collected. A total of three core samples, averaging approximately three and a quarter segments per core, were taken from tank 241-T-107. If enough sample existed, each segment was divided into subsegments: upper (U) and lower (L). The drainable liquid from each core was collected and consolidated into a core drainable liquid composite sample, and the mass of the segment and the approximate length are recorded. From this information, the gross bulk densities were estimated. The sample volume was determined by measuring the length of the extruded sample and multiplying it by 9.85 mL/in. (The sampler had a volume of 187 mL for a sample length of 19 in.).

After the samples were extruded, they were photographed with the jar number and a color chart so that the description of each segment was consistent. The visual characteristics of the extruded samples and their mass and length were recorded in a log book. Special attention was placed on the sample volume, liquid/solid ratio, color, consistency, texture, and homogeneity of each segment. These notes helped provide qualitative descriptions for the cores. The written descriptions aided hot cell technicians in capturing the physical characteristics that a photograph cannot show, such as consistency and texture.

Because of the relatively low recovery, only three segments were divided into half-segments; the remaining segments were analyzed on a whole-segment basis. The material was homogenized and subsampled for laboratory analyses and archiving. Subsamples of each half-segment were recombined and subsampled for composite analyses and for shipment to Pacific Northwest National Laboratory for analysis. No solids composite was made for core 50 because of insufficient sample. Drainable liquid composites were made for all three cores. Table B2-1 summarizes the logbook and gives the subsampling scheme and sample descriptions.

Table B2-1. Tank 241-T-107 Subsampling Scheme and Sample Description.[1] (2 sheets)

| Core | Seg | Percent Sampler Recovery | Sample Obtained: Percent Solid | Sample Obtained: Percent Liquid | Comments |
|---|---|---|---|---|---|
| 50 | 1 | 36 | 72 | 28 | 22.87 g of very light to medium brown solids. Dark stripe down one side of the extruded solids. 8.75 g of opaque brown drainable liquid. Segment was resampled since it sat in the riser over 48 hours. |
| | 1R | 34 | 70 | 30 | 25.58 g of light brown solids homogeneous mixture. 10.89 g of opaque brown drainable liquid. |
| | 2 | 94 | 100 | 0 | 194.45 g of solids. Sampler was under pressure. Solids were inhomogeneous and ranged from a light brown section, similar to Segment 1 except darker in color, to medium brown solids, to a dark brown section. No drainable liquids. |
| | 3 | 96 | 5 | 95 | Sample was recovered by holding the sampler vertical and tapping with a hammer. 8.52 g of dark brown solids were recovered. The solids were thick and homogeneous. 165 g of opaque brown drainable liquid; density of 0.97 g/mL. |
| | 4 | 67 | 1 | 99 | 1.17 g piece of solids was recovered. 120.42 g of opaque brown drainable liquid; density of 0.97 g/mL. |
| 51 | 1 | 0 | 0 | 0 | Sampler was completely empty. |
| | 2 | 64 | 40 | 60 | 64.48 g of dark brown solids. 87.30 g of opaque drainable liquid; density of 1.26 g/mL. |
| | 3 | 100 | 100 | 0 | 215.66 g of dark brown solids. Solids appeared to be homogeneous. No drainable liquids. |
| | 4 | 100 | 100 | 0 | 206.15 g of dark brown solids. Top 1 in. and bottom 6 in. appeared to have more fluids. No drainable liquids. |

Table B2-1. Tank 241-T-107 Subsampling Scheme and Sample Description.[1] (2 sheets)

| Core | Seg | Percent Sampler Recovery | Sample Obtained | | Comments |
|---|---|---|---|---|---|
| | | | Percent Solid | Percent Liquid | |
| 52 | 1 | 43 | 100 | 0 | 28.46 g of medium to dark gray solids. One side appeared to be dark gray, rest was light gray. No drainable liquids. |
| 52 | 2 | 56 | 100 | 0 | 111.23 g of brown solids. Solids appeared wet. |
| | 3 | 95 | 100 | 0 | 201.41 g of solids. Color ranged from light brown at bottom to dark brown at top. Solids were lumpy. No drainable liquids. |
| | 4 | 60 | 3 | 97 | 4.25 g of light brown solids. 117.34 g of brown turbid drainable liquid; density of 1.12 g/mL. |

Notes:

Seg = segment

[1]Svancara and Pool (1993)

The general characteristics of tank 241-T-107 waste materials are as follows:

- Drainable liquids were brown in color and contained a large amount of suspended solids.
- Core samples ranged from light to dark brown with some medium to dark gray solids in the upper segments.
- The consistency of the solids ranged from a homogeneous slurry to a lumpy sludge. In all cases, the waste held its shape fairly well.
- Poor recovery from the first riser prompted the sampling of a third riser.

The next step in the sample preparation process was the distribution of aliquots for the various analytical procedures. The unhomogenized (direct) samples were obtained by pushing a small open metal tube into the segment. These were used for particle size analysis and volatile organic analysis. Subsequent homogenization of the segments was performed. This was done in an apparatus called a stomacher, a machine with paddles. A bag containing the sample was placed in the stomacher, and the samples were homogenized by a process similar to kneading bread. A majority of the analyses were performed on the homogenized samples. By mixing equal portions of each homogenized segment together, it is believed that a representative composite for each core was obtained. When homogenization was completed and aliquots were removed for analysis, the remaining sample was archived and stored at the 222-S Laboratory. Segments, composite samples, and subsamples were often divided into different aliquots to satisfy sample analysis requirements.

### B2.1.3 Sample Analysis

The analyses performed on the core samples were those required under Module B2 of Bell (1993). Quality control tests included performing the analyses in duplicate and the use of standards, spikes, and blanks. To verify analyte recoveries resulting from separation techniques, laboratory control samples, carriers, spikes, tracers, and surrogates were analyzed concurrently with the samples.

Sample preparation procedures were conducted to optimize the recovery of each analyte of interest from the tank waste. Water digestion, acid digestion, and potassium hydroxide fusion were used to extract metals and several radioisotopes from solid samples. In some cases, digestions were performed on liquid samples to improve analytical matrices. Table B2-2 describes many separations that were specific to a particular analysis.

In some cases, no sample preparation was necessary or desired. Direct analyses were performed on the sample matrix with little or no sample preparation. Several direct analyses were performed relating to the physical or energetic properties of the waste: density, TGA, DSC, and gravimetric weight percent water.

Water digestion (leach) analyses were performed after the sample matrix was digested in distilled/deionized water; then the water was analyzed for soluble analytes. The soluble anions were determined by ion chromatography (IC). The primary anions analyzed in this manner were fluoride, chloride, nitrate, nitrite, phosphate, and sulfate. In addition, TOC, total inorganic carbon (TIC), free cyanide, pH, and ammonia were also analyzed from water digestion samples by various analytical methods. Note that IC assays used a 1:100 sample:water dilution, where pH measurements used a 1:1 sample:water ratio. Selected radionuclides were measured on some water digestion samples to determine the type and number of soluble radionuclides. Inductively coupled plasma (ICP) was performed on some water digestion samples to determine the amount of soluble metal cations. Nitrite and

Table B2-2. Solid Samples Preparation Summary.

| Direct | Fusion Dissolution | Water Leach | Acid Digestion |
|---|---|---|---|
| **Segment or Subsegment** | | | |
| - Persulfate oxidation (TC/TOC/TIC)<br>- TGA<br>- DSC<br>- Spectrometry ($CN^-$)<br>- Gravimetry<br>- Bulk density | - ICP<br>- GEA<br>- BPC ($^{90}Sr$)<br>- LF<br>- APC (total alpha Pu)<br>- Alpha spectrometry<br>- Mass spectrometry | - pH | - ICP |
| **Composite** | | | |
| - Persulfate oxidation (TC/TOC/TIC)<br>- SVOA<br>- Spectrometry ($CN^-$)<br>- Gravimetry<br>- CVAA (Hg)<br>- Bulk density<br>- Rheology<br>- Physical properties | - ICP<br>- GEA<br>- AA<br>- APC<br>- BPC (Total beta, $^{90}Sr$)<br>- Alpha spectrometry<br>- Mass spectrometry<br>- Liq. scin. ($^{99}Tc$)<br>- LF | - IC<br>- ICP<br>- GEA<br>- Distillation ($NH_3$)<br>- Spectrophotometry ($Cr^{6+}$, $NO_2^-$)<br>- Spectrometry ($CN^-$)<br>- Furnace oxidation (TOC/TIC)<br>- APC<br>- BPC (Total beta)<br>- Liq. scin. ($^{14}C$, $^{3}H$)<br>- pH<br>- Wt% residual solids<br>- Residual solids | - ICP<br>- AA |

Notes:

| | | |
|---|---|---|
| AA | = | atomic absorption |
| APC | = | alpha proportional counting |
| BPC | = | beta proportional counting |
| CVAA | = | cold vapor atomic absorption |
| GEA | = | gamma energy analysis |
| LF | = | laser fluorimetry |
| Liq. scin. | = | liquid scintillation |
| SVOA | = | semivolatile organic analysis |
| TC | = | total carbon |

chromium (VI) from water digestions were analyzed by spectrophotometry. A total alpha and total beta count were performed on the water digestion samples as well. Gamma energy analysis was also performed on water digestion samples to detect water soluble radionuclides. In many cases, these analytes were below the detection limits for the water digestion samples, suggesting that many analytes are not water soluble.

For acid digestion preparation, the sample was dissolved in a mixture of hydrochloric and nitric acids. This preparation brings most insoluble metals into solution with a minimum amount of dilution and was considered best for the detection of trace elements and some major metals. Some elements occur in the tank in relatively large quantities and were referred to as major metals. These properties are the reason that acid digestion is generally used as the sample preparation for homogenization tests. The analyses performed on this preparation were ICP and AA. (The AA analysis used nitric acid only.) Analyzing an acid digestion solution using ICP analysis detected elemental compositions within the waste, especially trace and major metals.

Experience with Hanford tank waste matrices has shown that acid digestion does not always provide complete solubilization and that a more rigorous dissolution preparation (that is, fusion) may be necessary to get adequate quantitation. Analyses that were performed on fusion-prepared samples included ICP, AA, and LF for metals; and GEA, APC, alpha spectrometry, BPC, liquid scintillation, and mass spectrometry for radionuclides. Fusion dissolution analyses were performed on the sample matrix after fusion with potassium hydroxide in a nickel crucible, then dissolution in acid. This preparation dissolves the entire sample, whereas other sample preparation procedures may not completely dissolve the sample matrix. One significant disadvantage of fusion preparation is that large amounts of potassium hydroxide are required to bring a sample into solution, which means a large dilution is involved. Because of this high dilution factor, trace elements are less likely to be correctly quantified, if they are detected at all. Another limitation of the preparation method is if the sample contains substantial quantities of potassium or nickel, these analytes will not be quantifiable, because the procedure uses potassium hydroxide and a nickel crucible. (This limitation can be overcome using alternate preparation methods, if potassium or nickel are analytes critical to interpretation of the data.) Elements that occur in abundance (major metals) or are highly insoluble are likely to be detected better by the fusion results than by any other sample preparation.

Generally, fusion dissolution is the preferred method of analyzing radionuclide content, with the exception of $^{14}C$, $^{129}I$, and $^{3}H$ (tritium). However, the sample preparation specified in the test instructions for $^{14}C$ (water digestion) is probably not the best for the high-level waste matrices. Difficulty with dissolving the sample with a water leach and volatility associated with a fusion preparation will potentially bias the $^{14}C$ results low for both sample preparation types, if they are associated with the water insoluble solid materials. Similar difficulties are encountered for other radionuclides. However, none of these analytes are expected to be significant contributors to the radionuclide content of the waste.

The major analytes detected during the fusion ICP analysis for tank 241-T-107 were aluminum, bismuth, iron, sodium, phosphorus, silicon, and sulfur. In the case of these elements, the fusion result was the preferred method of analysis, because it was believed to provide more complete dissolution of the waste and a more complete quantitation of analytes. Comparing these results with IC results can provide insight to the solubility characteristics of the waste. Some of the primary radionuclides that were measured using fusion preparation are $^{241}$Am, $^{239/240}$Pu, $^{90}$Sr, $^{137}$Cs, and $^{99}$Tc. A total alpha and total beta count were performed on the fusion dissolution samples as well.

All reported analyses were performed in accordance with approved laboratory procedures. Tables B2-3 and B2-4 list the procedure numbers and applicable analyses.

Table B2-3. Analytical Methods For Organic and Physical Analyses.

| Analysis | Method | Procedure Number |
|---|---|---|
| SVOA | Gas chromatography/mass spectrometry (GC/MS) | PNL-ALO-345 |
| TGA | TGA | LA-560-112 |
| Percent water | Gravimetry | LA-564-101 |
| DSC | DSC | LA-514-113 |
| Density | Bulk density | LA-560-101 |
| Specific gravity | Specific gravity | LA-510-112 |
| Rheology | Rheology | PNL-ALO-501 |
| Particle size | Particle size | T044-A-01712F |

Table B2-4. Analytical Methods for Chemical and Radionuclide Analyses.

| Analyte | Method | Procedure Number |
|---|---|---|
| Cs | AA spectroscopy | LA-505-121 |
| Hg | CVAA | LA-325-104 |
| Total metals | ICP | LA-505-151 |
| $F^-$, $Cl^-$, $NO_3^-$, $NO_2^-$,$PO_4^{3-}$, $SO_4^{2-}$ | IC | LA-533-105 |
| $CN^-$ | Distillation/spectrometric analysis | LA-695-102 |
| $NO_2^-$ | Spectrophotometry | LA-645-001 |
| $Cr^{6+}$ | Spectrophotometry | LA-265-101 |
| $NH_3$ | Distillation/Kjeldahl | LA-634-102 |
| $H^+$ | pH | LA-212-102<br>LA-212-103 |
| U | LF | LA-925-106 |
| Total alpha<br>Total beta | Proportional counting | LA-508-104<br>LA-508-101<br>LA-508-114 |
| $^{238}Pu$, $^{238,240}Pu$, $^{241}Am$ | Alpha spectrometry | LA-503-156<br>LA-508-051 |
| $^{90}Sr$ | BPC | LA-220-101 |
| $^{99}Tc$<br>$^{14}C$<br>$^{3}H$ | Liquid scintillation | LA-438-101<br>LA-348-104<br>LA-218-114 |
| $^{154}Eu$, $^{155}Eu$, $^{241}Am$, $^{137}Cs$, $^{60}Co$ | GEA | LA-548-121<br>LA-508-052<br>LA-504-101 |
| $^{129}I$ | Low energy gamma analysis | LA-378-103 |
| Pu isotopic | Fusion mass spectrometry | PNL-ALO-423<br>PNL-MA-597 |
| U isotopic | Mass spectrometry | PNL-MA-597<br>PNL-ALO-445 |
| TOC | TOC | LA-344-105<br>PNL-ALO-381 |
| $CO_3/C$ | TIC | LA-622-102<br>PNL-ALO-381 |

### B2.1.4 Analytical Results

This section summarizes the sampling and analytical results associated with the 1992 and 1993 sampling and analysis of tank 241-T-107. Table B2-5 describes the chemical, physical, and thermodynamic results. All results are documented in the validated data package (Svancara and Pool 1993).

Table B2-5. Analytical Presentation Tables.

| Analysis | Table Number |
|---|---|
| Physical properties summary | B2-6 |
| Particle size data | B2-7 |
| Metals by graphite atomic absorption | B2-8 |
| Metals by CVAA spectroscopy | B2-9 |
| Metals by ICP spectroscopy | B2-10 through B2-40 |
| Hexavalent chromium by spectrophotometry | B2-41 |
| Uranium by LF | B2-42 |
| Anions by IC | B2-43 through B2-48 |
| Ammonia by distillation | B2-49 |
| Nitrite by spectrophotometry | B2-50 |
| Cyanide by distillation/spectrometry | B2-51 |
| SVOA | B2-52 |
| Analyses for TC/TIC/TOC | B2-53 through B2-55 |
| Radionuclides by APC | B2-56 |
| Radionuclides by BPC | B2-57 and B2-58 |
| Radionuclides by alpha spectrometry | B2-59 through B2-61 |
| Radionuclides by mass spectrometry | B2-62 through B2-70 |
| Radionuclides by GEA | B2-71 through B2-82 |
| Radionuclides by liquid scintillation | B2-83 through B2-85 |
| Analyses for physical properties | B2-86 through B2-93 |
| Analyses for rheological properties | B2-94 through B2-96 |
| 1992 vapor sampling results | B2-97 |
| 1995 vapor sampling results | B2-98 |
| Historical sampling results | B2-99 through B2-102 |

A complete validation was performed on the data. Many quality control (QC) and quality assurance parameters were investigated during the validation including standard recoveries, spike recoveries, duplicate analyses, and blanks. For complete data validation information, refer to Svancara and Pool (1993). For more information about the QC investigation and a summary of the data validation findings, refer to Section B3.2.

The following subsections discuss the methods used in analyzing the core samples. Because of the large size of the data set, all discussion of the analytical procedures is provided first, followed by the data tables. For most analytes (except for some physical and rheological measurements), the data tables consist of six columns. Column 1 shows the sample number. Column 2 delineates the core and/or segment from which the samples were derived. An entry of "50:3" means core 50, segment 3. Column 3 lists the sample portion from which the aliquots were taken. For ICP analytes, no distinction was made between the duplicate analyses for some segments which were performed for homogenization tests. The final three columns display the primary and duplicate analytical values and a mean for each sample/duplicate pair.

**B2.1.4.1 Inorganic Analyses**. The characterization plan (Bell 1993) required that anions and metals be analyzed. Metals were determined following three different sample treatments: 1) water extraction, 2) acid digestion, and 3) potassium hydroxide fusion. The anions were prepared by water extraction. Drainable liquid composite samples were analyzed directly.

**Atomic Absorption Spectroscopy**. Atomic absorption analyses for cesium were performed according to procedure LA-505-121 on cores 51 and 52 composites after fusion, and on the core 51 composite after an acid digestion. Table B2-8 shows the results.

**Cold Vapor Atomic Absorption Spectroscopy**. Mercury was analyzed on the solids composites by CVAA spectroscopy according to procedure LA-325-104. Table B2-9 shows the results.

**Inductively Coupled Plasma Spectroscopy**. The following analytes were evaluated by ICP according to procedure LA-505-151: aluminum, antimony, arsenic, barium, beryllium, bismuth, boron, cadmium, calcium, cerium, chromium, cobalt, copper, iron, lanthanum, lead, magnesium, manganese, nickel, potassium, phosphorus, selenium, silicon, silver, sodium, strontium, sulfur, zinc, and zirconium. Aluminum, bismuth, iron, phosphorus, and sodium were the most abundant metals in tank 241-T-107. The core composites were analyzed after acid, fusion, and water digestions. The two fusion digest samples of core 52 originated from the same core composite aliquot before fusion preparation. Segment analyses were performed after acid and fusion digestions. Tables B2-10 through B2-40 show the results.

**Chromium (VI) by Spectrophotometric Analysis.** Analyses for chromium (VI) were performed by spectrophotometry on composite samples which had been water leached. The analyses were performed according to procedure LA-265-101. Table B2-41 shows the results of this analysis.

**Laser Fluorimetry.** Total uranium concentrations were measured in the fusion composite samples using LF. The analyses were performed according to procedure LA-925-106. Table B2-42 shows the results of this analysis.

**Ion Chromatography.** The following anions were determined by IC according to procedure LA-533-105: chloride, fluoride, nitrate, nitrite, phosphate, and sulfate. All IC analyses were performed on core composites. The solids analyses were performed after water digestions. The two water digest samples for the solids composite of core 52 originated from the same core composite aliquot after water digestion. Tables B2-43 through B2-48 show the analytical results.

**Ammonia by Distillation.** Ammonia analysis was performed by procedure LA-634-102 on the water-leached solids composites. Table B2-49 shows the results.

**Nitrite by Spectrophotometric Analysis.** Nitrite was determined according to procedure LA-645-001. This analysis was performed on water digested core composites and the drainable liquids. Table B2-50 shows the results.

**Distillation/Spectrometric Analysis.** Cyanide was determined according to procedure LA-695-102. Analyses were performed directly on the segments and composites. In addition, water digestions of the core composites were made. Table B2-51 shows the results.

### B2.1.4.2 Organic Analyses

**Semivolatile Organic Compounds.** Semivolatile organic compounds were determined according to procedure PNL-ALO-345. Table B2-52A shows the detected results, and Table B2-52B shows the analytes with all nondetected values.

### B2.1.4.3 Carbon

**Total Carbon.** Total carbon was analyzed by persulfate oxidation directly on the segments and solids composites. Table B2-53 shows the results.

**Total Organic Carbon.** Total organic carbon was determined by persulfate oxidation using procedures LA-344-105 and PNL-ALO-381. Analyses were performed directly on the segments and core composites. Total organic carbon was measured by furnace oxidation on water leaches of the core composites. Table B2-54 shows TOC results.

**Total Inorganic Carbon.** Total inorganic carbon was determined by coulometry measurements of the $CO_2$ evolved following sample acidification, as established in procedures LA-344-102 and PNL-ALO-381. Analyses were performed directly on the segments and core composites. Core composite TIC concentrations were also measured by furnace oxidation after a water leach. Table B2-55 shows the TIC results.

### B2.1.4.4 Radiochemical Analyses

**Alpha Proportional Counting.** Alpha proportional counting was used to determine total alpha activity according to procedures LA-508-101 and LA-508-104. Analyses were performed on fused and water digested core composites. Table B2-56 shows the sample results.

**Beta Proportional Counting.** Beta proportional counting was used to determine total beta activity and $^{90}Sr$ activity according to procedures LA-508-114, LA-508-101, and LA-220-101, respectively. Analyses were performed both on core composite samples which had been fused and composites which had been water leached. Tables B2-57 and B2-58 show the results.

**Alpha Energy Spectrometry.** The following were evaluated on the core composites by alpha energy spectrometry according to procedures LA-503-156 and LA-508-051: $^{241}Am$, $^{238}Pu$, and $^{239/240}Pu$. Tables B2-59 through B2-61 show the sample results.

**Mass Spectrometry.** Thermal ionization mass spectrometry was used to determine the presence of all isotopes of Pu according to procedures PNL-ALO-423 and PNL-MA-597 and all isotopes of U according to procedures PNL-MA-597 and PNL-ALO-445. Uranium and plutonium values were consistent with typical fuel burn up. Because of the low $^{238}Pu$ concentration and the high uranium concentration in the samples, the uranium contamination in the purified Pu fraction interfered with the mass spectrometric determination of $^{238}Pu$. Therefore, $^{238}Pu$ was determined by alpha energy spectrometry. Because of the small quantity of Pu in the samples and the low isotopic abundance of $^{241}Pu$ and $^{242}Pu$, values reported for these isotopes are best estimates only. Tables B2-62 through B2-70 show the mass spectrometry results.

**Gamma Energy Analysis.** The activities of the following radionuclides were determined by GEA according to procedures LA-548-121 and LA-508-052: $^{241}Am$, $^{144}Ce/Pr$, $^{134}Cs$, $^{137}Cs$, $^{60}Co$, $^{154}Eu$, $^{155}Eu$, $^{40}K$, $^{103}Ru$, $^{106}Ru/Rh$, and $^{228}Th$. The activity of $^{129}I$ was determined on the liquids by low energy gamma analysis according to procedure LA-378-103. Composites samples were prepared for analysis using both fusion and water digestion. Segment samples were analyzed only after fusion. Tables B2-71 through B2-82 show the GEA results.

**Liquid Scintillation.** Tritium, $^{14}C$, and $^{99}Tc$ were analyzed by liquid scintillation according to procedures LA-218-114, LA-348-104, and LA-438-101, respectively. Solids composites were measured after water digestion except for $^{99}Tc$, which was measured after fusion. Tables B2-83 through B2-85 show the sample results.

**B2.1.4.5 Physical Analyses.** At the time of the sampling and analysis of tank 241-T-107, no DQO existed to define the scope of the analyses. However, several analytes relating specifically to physical properties were determined to be of interest to the waste characterization program; they are summarized here. The physical characteristics of tank waste are required to develop and provide a basis for validation of equipment testing using design criteria and simulated waste.

**Density/Specific Gravity.** Upon extrusion, a rough density calculation was made for each segment from both cores by dividing the mass recovered for that segment by its volume. Table B2-87 shows the results. In addition, more precise analytical density determinations were performed for all segments according to procedure LA-560-102. Table B2-86 shows these values. Specific gravity measurements were made on the liquid composites according to procedure LA-510-112. Table B2-88 shows the results.

**pH.** Sample pH was measured on solid segment samples and core composite samples, drainable liquid core composite samples, and on the field and hot cell blanks according to procedures LA-212-103 for solids and LA-212-102 for liquids. If any pH was greater than 12.5, a hydroxide analysis was to be completed. All sample pH measurements were less than 12. Table B2-89 shows the results.

**Physical Measurements.** Physical testing was performed on unhomogenized material from one segment of core 50. The testing included density (centrifuged supernate and solids densities) and settling behavior (volume percent centrifuged solids, volume percent settled solids, weight percent centrifuged solids, weight percent solids, weight percent dissolved solids, and weight percent undissolved solids). Table B2-6 shows the results.

Table B2-6 data indicate the as-received sample did not settle, but a substantial amount of liquid was associated with the sample, as was observed by the volume percent and weight percent centrifuged solids. This conclusion is supported by the weight percent solids data. A two-fold decrease in the volume percent of settled and centrifuged solids, between each dilution and linear decrease in the slurry density as a function of dilutions, is expected for insoluble solids. The decrease in the centrifuged supernate density as a function of dilution also indicates insoluble solids. These conclusions do not exclude the possibility that some components of the solids are soluble, but these soluble components are not the major components of solids. The weight percent dissolved solids indicate that a significant amount of salts are dissolved in the centrifuged supernate of the as-received sample, but no analysis was performed on the dilutions to determine the amount of solids dissolved during each dilution.

The 1:1 dilution for core 50, segment 2, reached a final volume percent settled solids behavior of 65 to 75 percent. Settling was observed throughout the two-day period, but the majority of the settling was observed in the first 10 hours. The 3:1 dilution reached a final volume percent settled solids of approximately 32 percent. Significant settling for both dilutions was observed over the 48 hours, but the settling velocity of these dilutions decreased sharply over the first eight hours, then remained constant. After the drop in percent settled solids, the remainder of the suspended solids, approximately 25 percent, took up most of the remaining time settling in a long, gradual decline, before coming to equilibrium.

Table B2-6. Physical Properties Summary (Core 50, Segment 2).

| Property | As Received | 1:1 | 3:1 |
|---|---|---|---|
| Settled solids (vol%) | 100 | 68 | 32 |
| Centrifuged solids (vol%) | 74 | 36 | 16 |
| Centrifuged solids (wt%) | 79 | 44 | 19 |
| Total solids (wt%) | 47 | NA | NA |
| Dissolved solids (wt%) | 22 | NA | NA |
| Undissolved solids (wt%) | 25 | NA | NA |
| **Density (g/mL)** | **As Received** | **1:1** | **3:1** |
| Sample | 1.44[1] | 1.22 | 1.10 |
| Centrifuged supernate | 1.20 | 1.07 | 1.03 |
| Centrifuged solids | 1.53 | 1.44 | 1.32 |

Notes:

NA = Not analyzed

[1]Density results were obtained from the 325 Laboratory.

The weight percent water was determined on all segments for both cores and the core composite samples. Two methods were used: gravimetry and thermogravimetry. The gravimetric determination of the weight percent water is measured by the loss of mass in the sample after being held in a drying oven at 102 °C (216 °F) for 24 hours. Table B2-90 shows the results. In addition, the weight percent residual solids and the mass of the residual solids were measured on the core composites after water digestion. Tables B2-91 and B2-92 show the results. Table B2-93 shows the total dissolved solids as measured on the solids composites.

**Rheological Properties**. The shear strength of the waste from tank 241-T-107 was measured on unhomogenized samples. Because only one visually discernible stratum was observed in tank 241-T-107, shear strength measurements were only performed on core 50, segment 2. The shear strength measurements were made at ambient temperature using a shear vane connected to a viscometer and rotated at 0.3 rpm.

Shear strength ($\tau_s$) is a semiquantitative measurement of the force required to move the sample. The shear strength of the sample was measured at four different locations. The average shear strength was 7,200 dynes/cm$^2$ (see Table B2-94); the standard deviation for these four measurements was 3,700 dynes/cm$^2$. This large variance between measurements is attributed largely to the heterogeneity of the sample. The heterogeneity of this sample is evident in the moisture content. There is an observable relationship to the moisture content; core 50, segment 2, has 29.8 percent water for an unhomogenized sample (43 percent for homogenized sample). The percent water does not compare with adjoining segments which have a significantly higher amount of water present. The torque on the sample was recorded as a function of time and the shear strength was calculated using the following equation.

$$\tau_s = \frac{[\%\tau/100] * S_\tau * 4.9E{+}05}{\dfrac{\pi * H_v * D_v^2}{2} + \dfrac{\pi * D_v^3}{6}}$$

where:

| | | |
|---|---|---|
| $\%\tau/100$ | = | the ratio of the total torque to the maximum torque of the viscometer head, measured as a percentage of the full scale on the plot of the shear stress versus time diagram (dimensionless) |
| $S_\tau$ | = | signal (reading) proportional to the torque |
| 4.9E+05 | = | maximum torque of the viscometer head (dynes•cm) |
| $H_v$ | = | shear vane height (1.582 cm) |
| $D_v$ | = | shear vane diameter (0.800 cm) |

Although relatively low, the shear strength of the material substantially exceeded the baseline value for the measurement system (200 dynes/cm$^2$).

**Shear Stress and Viscosity**. Shear stress measurements, as functions of shear rate, were performed on the 1:1 and 3:1 (water:sample) dilution of the sample at ambient hot cell temperatures. Because of drying of the sample on the plate at elevated temperatures, the shear stress of the samples as a function of shear rate could not be measured on the as-received samples at 95 °C.

A rheogram for a material with a yield has two sections. The first section is a straight line beginning at the origin and climbing up the ordinate. This portion of the rheogram records the material as it acts like a solid or gel. When sufficient force is applied to the material to make the gel yield, the rheogram breaks sharply to the right, recording the material's behavior as a fluid. The point on the rheogram at which the sample's behavior transfers from a solid or gel to a fluid is the yield point or yield stress. The minimum shear stress must be exceeded to initiate fluid behavior in the material. The samples are elastic under low shear conditions (less than 50 $s^{-1}$) and plastic under high shear conditions (greater than 300 $s^{-1}$). The general behavior exhibited by the waste is best described by a yield psuedoplastic model; however, the systems were not modeled, and empirical model parameters were not determined because the system was at the limits of detection.

The 1:1 dilution samples have significant yield points at approximately 0.75 Pa; therefore, the 1:1 dilution samples exhibit yield psuedoplastic behavior. The 3:1 dilutions exhibit essentially Newtonian behavior. Table B2-95 shows the yield point, consistency factor, and flow behavior index data for the 1:1 dilution samples.

The viscosity of this sample (core 50, segment 2) ranges from 20 to 9 centipoise (cP) over a shear rate range of approximately 100 to 400 $s^{-1}$. The viscosity of the sample decreases with increasing shear rate. At 90 °C, the viscosity of the sample was slightly lower (12 to 7 cP over a shear rate range of 100 to 400 $s^{-1}$) than at ambient temperature. At shear rates greater than 100 $s^{-1}$, the viscosity of the 3:1 dilution was less than or equal to 5 cP. At 95 °C, the viscosity of the 3:1 dilution is lower than was observed at ambient temperature (less than or equal to 3 cP at shear rates greater than 100 $s^{-1}$); thus, it appears that the viscosity of the samples decreases with increasing temperature.

**Particle Size Analysis.** To evaluate which potential waste retrieval method will be done for each tank, a particle size analysis was performed according to procedure T044-A-01712F. Particle size analysis was performed once on tank 241-T-107 because, at the time of extrusion and sample breakdown, the hot cell chemist visually observed one stratum only.

An important consideration involving the analysis of particle size is the dispersant (the liquid used to disperse and suspend the particles from the solid sample) used. The primary concern with the dispersant is dissolving the particles present. Any particles in the tank that are soluble in the dispersant will dissolve or decrease in size during the analysis. Depending on the dispersant, the particle size analysis may not represent the true particle size distribution in the tank. In the case of tank 241-241-T-107, water was used as the dispersing medium. If a "true" particle size distribution is required, the mother liquor (drainable liquid) of the tank should be used, if possible, because the tank particulates are already in equilibrium with the tank mother liquor.

To perform particle size analysis, a small aliquot of waste is placed in a dispersant (water) to separate and suspend particles. The waste/water matrix is placed in the particle size analyzer, and a beam of laser light is passed through the dispersant. The diameter of solid particles can be determined by the amount of light that passes through the matrix. There are two distinct ways the analyzer determines particle size: number distribution range and volume distribution range.

Tank 241-T-107 had only one particle size analysis, performed on core 50, segment 2. The analysis was performed on the unhomogenized sample. The particle sizes for core 50, segment 2, are as follows: number distribution range = 0.5 to 8 $\mu$m with a mean of 1.09 $\mu$m, and a majority of the volume distribution range = 0.10 to 150 $\mu$m with a mean of 39.05 $\mu$m. Some particles may have been greater than 150 $\mu$m, but this number was the upper limit on the analyzer. Refer to Figures 5-8 and 5-9 in Valenzuela and Jensen (1994) for a graphical representation. Table B2-7 summarizes the particle size results.

Table B2-7. Particle Size Data for Tank 241-T-107.

| Core 50, Segment 2 | Distribution Range | Mean | Median |
|---|---|---|---|
| Number distribution | 0.5 to 8.0 $\mu$m | 1.09 $\mu$m | 0.85 $\mu$m |
| Volume distribution | 0.10 to 150 $\mu$m | 39.05 $\mu$m | 32.97 $\mu$m |

**B2.1.4.6 Thermodynamic Analyses**. The following subsections discuss the thermodynamic analyses performed on the tank 241-T-107 waste. These analyses include DSC and TGA.

**Differential Scanning Calorimetry.** In a DSC analysis, heat absorbed or emitted by a substance is measured while the temperature of the sample is heated at a constant rate. Nitrogen is passed over the sample material to remove any gases being released. The onset temperature for an endothermic or exothermic event is determined graphically.

The DSC analyses for tank 241-T-107 were performed using either procedure LA-514-113 on a Mettler[3] DSC 20 instrument or procedure LA-514-114 on a Perkin-Elmer[4] DSC 7 instrument. The DSC traces for segment 4 show an exotherm beginning around 300 °C. This exothermic region was attributed to a plastic artifact that was commingled with the waste in the last segment of core 50. Further analysis of the plastic artifact with different carrier gases showed the artifact was anomalous and did not represent tank waste (Svancara and Pool 1993). No exothermic reactions were noted that were attributed to the waste; therefore, DSC results are not shown in the analytical tables, and 95 percent confidence intervals on the mean for each sample were not calculated.

[3]Mettler is a registered trademark of Mettler Electronics, Anaheim, CA.

[4]Perkin Elmer is a registered trademark of Perkins Research amd Manufacturing Company, Inc., Canoga Park, CA.

**Thermogravimetric Analysis.** Thermogravimetric analysis measures the mass of a sample while its temperature is increased at a constant rate. Air is passed over the sample during heating to remove any released gases. Any decrease in the weight of a sample during TGA represents a loss of gaseous matter from the sample, through evaporation or through a reaction that forms gas phase products. The moisture content is estimated by assuming that all TGA sample weight loss up to a certain temperature (typically 150 to 200 °C) is caused by water evaporation. The temperature limit for moisture loss is chosen by the operator at an inflection point on the TGA plot. Other volatile matter fractions can be differentiated by inflection points as well.

Tank 241-T-107 samples were analyzed by TGA using procedure LA-560-112 on a Mettler® TG 50 instrument. Table B2-96 shows TGA results. Gravimetric analyses were performed on tank subsamples to assess the accuracy of the TGA results. Because some TGA results were interpreted conservatively, the gravimetric results provide a better estimate of sample moisture content.

The TGA was performed on nonhomogenized facies, homogenized segments or subsegments, and drainable liquid composites. The values produced may vary substantially as a result of the small sample size and sample heterogeneity. In core 50, segment 4, an anomalous percent water was noted which was attributed to the plastic material that was burned with air cover gas: therefore, the TGA was not measuring the water content of this sample. When the cover gas was changed to nitrogen, no loss in weight was noted.

Gravimetrically measuring the amount of solids provides more representative measurements of the water/solids content within a sample. The gravimetric method uses a larger sample aliquot than the TGA (about 1 g versus 10 to 35 mg), reducing variations caused by sample heterogeneity. The samples are heated in an oven at 102 °C (216 °F) until the weight measurements do not change, indicating all free water has been removed. All solids composites and homogenized segments or subsegments (except core 50, segments 3 and 4, and core 52, segment 4) were analyzed in duplicate by this method according to procedure LA-564-101. See Section B3.3.1 for a comparison of the TGA and gravimetric data.

**B2.1.4.7 Data Tables.** The data tables in this section were footnoted when standard recoveries, spike recoveries, or duplicate analyses were outside the QC criteria specified in Bell (1993). The QC criteria specified for sample analysis for ICP is as follows: 75 to 125 percent recovery for spikes, 80 to 120 percent recovery for standards, and ±20 percent relative percent differences (RPDs) for duplicates; for the remaining analytes, 80 to 120 percent recovery for both spikes and standards and ±20 percent for RPDs. Sample and duplicate pairs, in which these QC parameters were outside of these limits, are footnoted in the sample mean column of the data summary tables as follows:

- "a" indicates the standard recovery was below the QC limit.
- "b" indicates the standard recovery was above the QC limit.

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

A complete data validation was performed on the data set as described in Svancara and Pool (1993). Any data qualified as unusable have been appropriately footnoted in the data tables as follows:

- "r" indicates the data was qualified as unusable.

See Section B3.2 for a discussion of the data validation results.

Table B2-8. Tank 241-T-107 Analytical Results: Cesium (AA).

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion** | | | µg/g | µg/g | µg/g |
| 436-6793 | Core 51 composite | Whole | <700 | <700 | <700 |
| 500-6793 | Core 52 composite | Whole | <700 | <700 | <700 |
| **Solids: acid digest** | | | µg/g | µg/g | µg/g |
| 439-8794 | Core 51 composite | Whole | <140 | <140 | <140 |

Table B2-9. Tank 241-T-107 Analytical Results: Mercury (CVAA).

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids** | | | µg/g | µg/g | µg/g |
| 427-5798 | Core 51 composite | Whole | <0.125 | <0.125 | <0.125 |
| 495-5798 | Core 52 composite | Whole | 0.153 | 0.134 | 0.1435 |

Table B2-10. Tank 241-T-107 Analytical Results: Aluminum (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: acid digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 356 | 50: 2 | Whole | 87,100 | 86,900 | 87,000[QC:b] |
| 356 | | Whole | 1.320E+05 | 79,000 | 1.055E+05[QC:b,e] |
| 357 | | Whole | 92,900 | 68,100 | 80,500[QC:b,e] |
| 357 | | Whole | 95,800 | 1.220E+05 | 1.089E+05[QC:b,e] |
| 418 | 51: 3 | Lower half | 915 | --- | 915[QC:b] |
| 418 | | Lower half | 254 | 83.9 | 168.95[QC:b,c,e,r] |
| 419 | | Lower half | 206 | 235 | 220.5[QC:b,r] |
| 419 | | Lower half | 438 | 385 | 411.5[QC:b] |
| 490 | 52: 3 | Lower half | 16,000 | 16,400 | 16,200 |
| 490 | | Lower half | 15,800 | 15,300 | 15,550[QC:b] |
| 491 | | Lower half | 18,500 | 18,700 | 18,600 |
| 491 | | Lower half | 15,900 | 15,300 | 15,600[QC:b] |
| 549 | Core 51 composite | Whole | 4,030 | 4,250 | 4,140 |
| 503 | Core 52 composite | Whole | 23,900 | 25,300 | 24,600[QC:b,d] |
| **Solids: fusion** | | | **µg/g** | **µg/g** | **µg/g** |
| 387 | 50: 1R | Subsegment | 9,900 | 9,720 | 9,810 |
| 309 | 50: 2 | Whole | 90,900 | 94,900 | 92,900[QC:d] |
| 322 | 50: 3 | Whole | 18,500 | 23,000 | 20,750[QC:e] |
| 406 | 51: 2 | Whole | 11,300 | 12,700 | 12,000 |
| 255 | 51: 3 | Lower half | 586 | 790 | 688[QC:e] |
| 254 | | Upper half | 1,340 | 1,150 | 1,245 |
| 257 | 51: 4 | Lower half | 9,270 | 9,160 | 9,215 |
| 256 | | Upper half | 2,220 | 2,320 | 2,270 |
| 455 | 52: 1 | Whole | 2.120E+05 | 2.150E+05 | 2.135E+05[QC:d] |
| 481 | 52: 2 | Whole | 46,300 | 39,800 | 43,050 |
| 483 | 52: 3 | Lower half | 15,200 | 15,600 | 15,400 |
| 482 | | Upper half | 7,810 | 8,530 | 8,170 |

Table B2-10. Tank 241-T-107 Analytical Results: Aluminum (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion (Cont'd)** | | | **µg/g** | **µg/g** | **µg/g** |
| 436 | Core 51 composite | Whole | 7,260 | 4,200 | 5,730[QC:e] |
| 495 | Core 52 composite | Whole | 26,700 | 27,800 | 27,250 |
| 500 | | Whole | 26,400 | 27,500 | 26,950 |
| **Solids: water digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 534 | Core 51 composite | Whole | 344 | 627 | 485.5[QC:e] |
| 495 | Core 52 composite | Whole | 849 | 784 | 816 |
| **Liquids** | | | **µg/mL** | **µg/mL** | **µg/mL** |
| 393 | Core 50 composite | Drainable liquid | 4.45 | 4.06 | 4.255[QC:b] |
| 442 | Core 51 composite | Drainable liquid | 11.1 | 11.8 | 11.45[QC:b] |
| 494 | Core 52 composite | Drainable liquid | 47.2 | 48.4 | 47.8[QC:b] |

Table B2-11. Tank 241-T-107 Analytical Results: Antimony (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: acid digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 356 | 50: 2 | Whole | 134 | 87.4 | 110.7[QC:c,e] |
| 356 | | Whole | 84.3 | 60.2 | 72.25[QC:b,e] |
| 357 | | Whole | 123 | 113 | 118 |
| 357 | | Whole | 80.4 | 68.4 | 74.4[QC:b,d] |
| 418 | 51: 3 | Lower half | 273 | --- | 273 |
| 418 | | Lower half | 153 | 138 | 145.5[QC:a,r] |
| 419 | | Lower half | 228 | 220 | 224[QC:c] |
| 419 | | Lower half | 158 | 151 | 154.5[QC:a,r] |
| 490 | 52: 3 | Lower half | <20.8 | <20.8 | <20.8[QC:a] |
| 490 | | Lower half | 29.5 | <20.7 | <25.1[QC:a,c,e] |
| 491 | | Lower half | 20.7 | <20.9 | <20.8[QC:a] |
| 491 | | Lower half | 24.3 | <20.8 | <22.55[QC:a,c] |
| 549 | Core 51 composite | Whole | <209 | <208 | <208.5 |
| 503 | Core 52 composite | Whole | 37.4 | 53.6 | 45.5[QC:d,e] |
| **Solids: fusion** | | | **µg/g** | **µg/g** | **µg/g** |
| 387 | 50: 1R | Subsegment | <75.2 | <75.1 | <75.15 |
| 309 | 50: 2 | Whole | 78.3 | 190 | 134.15[QC:e] |
| 322 | 50: 3 | Whole | 128 | 118 | 123 |
| 406 | 51: 2 | Whole | 108 | 77.4 | 92.7[QC:e] |
| 255 | 51: 3 | Lower half | 230 | 160 | 195[QC:e] |
| 254 | | Upper half | 115 | 110 | 112.5 |
| 257 | 51: 4 | Lower half | <73.4 | 94.2 | <83.8 |
| 256 | | Upper half | 181 | 183 | 182 |
| 455 | 52: 1 | Whole | <1,030 | <1,030 | <1,030 |
| 481 | 52: 2 | Whole | 82.8 | <75.7 | <79.25 |
| 483 | 52: 3 | Lower half | 142 | <75 | <108.5[QC:e] |
| 482 | | Upper half | 113 | 127 | 120 |

Table B2-11. Tank 241-T-107 Analytical Results: Antimony (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: acid digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 356 | 50: 2 | Whole | 134 | 87.4 | 110.7[QC:c,e] |
| **Solids: fusion (Cont'd)** | | | **µg/g** | **µg/g** | **µg/g** |
| 436 | Core 51 composite | Whole | 139 | 104 | 121.5[QC:d,e] |
| 495 | Core 52 composite | Whole | <1,040 | <1,040 | <1,040 |
| 500 | | Whole | <75.4 | <75.8 | <75.6 |
| **Solids: water digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 534 | Core 51 composite | Whole | <22.1 | <22.1 | <22.1 |
| 495 | Core 52 composite | Whole | <213 | <213 | <213 |
| **Liquids** | | | **µg/mL** | **µg/mL** | **µg/mL** |
| 393 | Core 50 composite | Drainable liquid | 1.57 | 2.27 | 1.92[QC:e] |
| 442 | Core 51 composite | Drainable liquid | 2.52 | 2.52 | 2.52 |
| 494 | Core 52 composite | Drainable liquid | <3.8 | <3.8 | <3.8[QC:b] |

Table B2-12. Tank 241-T-107 Analytical Results: Arsenic (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: acid digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 356 | 50: 2 | Whole | 6.27 | 6.66 | 6.465 |
| 356 | | Whole | <2.92 | <3.00 | <2.96 |
| 357 | | Whole | <2.96 | <2.88 | <2.92 |
| 357 | | Whole | 6.86 | <3.9 | <5.38[QC:e] |
| 418 | 51: 3 | Lower half | <2.3 | --- | <2.3 |
| 418 | | Lower half | 4.53 | 4.02 | 4.275 |
| 419 | | Lower half | 4.71 | 4.65 | 4.68 |
| 419 | | Lower half | <2.99 | <2.95 | <2.97 |
| 490 | 52: 3 | Lower half | <3 | <2.95 | <2.975 |
| 490 | | Lower half | <2.98 | 4.5 | <3.74[QC:e] |
| 491 | | Lower half | <2.95 | <2.99 | <2.97 |
| 491 | | Lower half | <2.96 | <2.96 | <2.96 |
| 549 | Core 51 composite | Whole | <29.9 | <29.8 | <29.85 |
| 503 | Core 52 composite | Whole | 4.63 | 3.95 | 4.29 |
| **Solids: fusion** | | | **µg/g** | **µg/g** | **µg/g** |
| 387 | 50: 1R | Subsegment | <19.3 | <19.3 | <19.3 |
| 309 | 50: 2 | Whole | 22.3 | <19.4 | <20.85 |
| 322 | 50: 3 | Whole | <19.3 | <19.3 | <19.3 |
| 406 | 51: 2 | Whole | <19.4 | <19.4 | <19.4 |
| 255 | 51: 3 | Lower half | <19 | <19.5 | <19.25 |
| 254 | | Upper half | <18.3 | <18 | <18.15 |
| 257 | 51: 4 | Lower half | <18.8 | <18.7 | <18.75 |
| 256 | | Upper half | <18.8 | <19 | <18.9 |
| 455 | 52: 1 | Whole | <148 | <147 | <147.5 |
| 481 | 52: 2 | Whole | 23.5 | <19.4 | <21.45 |
| 483 | 52: 3 | Lower half | <19.4 | <19.2 | <19.3 |
| 482 | | Upper half | <19.3 | <19.2 | <19.25 |

Table B2-12. Tank 241-T-107 Analytical Results: Arsenic (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion (Cont'd)** | | | **µg/g** | **µg/g** | **µg/g** |
| 436 | Core 51 composite | Whole | < 19.4 | <19.3 | <19.35 |
| 495 | Core 52 composite | Whole | <148 | <148 | <148 |
| 500 | | Whole | <19.3 | <19.5 | <19.4 |
| **Solids: water digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 534 | Core 51 composite | Whole | <3.16 | <3.16 | <3.16 |
| 495 | Core 52 composite | Whole | <30.4 | <30.4 | <30.4 |
| **Liquids** | | | **µg/mL** | **µg/mL** | **µg/mL** |
| 393 | Core 50 composite | Drainable liquid | <0.39 | <0.39 | <0.39 |
| 442 | Core 51 composite | Drainable liquid | <0.39 | <0.39 | <0.39 |
| 494 | Core 52 composite | Drainable liquid | <0.975 | <0.975 | <0.975 |

Table B2-13. Tank 241-T-107 Analytical Results: Beryllium (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: acid digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 356 | 50: 2 | Whole | <0.299 | <0.299 | <0.299 |
| 356 | | Whole | <0.292 | <0.3 | <0.296[QC:c] |
| 357 | | Whole | <0.299 | <0.3 | <0.2995 |
| 357 | | Whole | <0.296 | <0.288 | <0.292 |
| 418 | 51: 3 | Lower half | <0.23 | --- | <0.23 |
| 418 | | Lower half | <0.299 | <0.297 | <0.298 |
| 419 | | Lower half | <0.299 | <0.296 | <0.2975 |
| 419 | | Lower half | <0.299 | <0.295 | <0.297 |
| 490 | 52: 3 | Lower half | <0.3 | <0.295 | <0.2975 |
| 490 | | Lower half | <0.298 | <0.296 | <0.297 |
| 491 | | Lower half | 0.314 | 0.346 | 0.33 |
| 491 | | Lower half | <0.295 | <0.299 | <0.297 |
| 549 | Core 51 composite | Whole | <2.99 | <2.98 | <2.985 |
| 503 | Core 52 composite | Whole | <0.299 | <0.297 | <0.298 |
| **Solids: fusion** | | | **µg/g** | **µg/g** | **µg/g** |
| 387 | 50: 1R | Subsegment | <1.49 | <1.48 | <1.485 |
| 309 | 50: 2 | Whole | <1.5 | <1.49 | <1.495 |
| 322 | 50: 3 | Whole | <1.49 | <1.49 | <1.49 |
| 406 | 51: 2 | Whole | <1.49 | <1.49 | <1.49 |
| 255 | 51: 3 | Lower half | <1.46 | <1.5 | <1.48 |
| 254 | | Upper half | <1.41 | <1.39 | <1.4 |
| 257 | 51: 4 | Lower half | <1.45 | <1.44 | <1.445 |
| 256 | | Upper half | <1.44 | <1.46 | <1.45 |
| 455 | 52: 1 | Whole | <14.8 | <14.7 | <14.75 |
| 481 | 52: 2 | Whole | <1.49 | <1.49 | <1.49 |
| 483 | 52: 3 | Lower half | <1.49 | <1.48 | <1.485 |
| 482 | | Upper half | <1.49 | <1.48 | <1.485 |

Table B2-13. Tank 241-T-107 Analytical Results: Beryllium (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion (Cont'd)** | | | **µg/g** | **µg/g** | **µg/g** |
| 436 | Core 51 composite | Whole | <1.49 | <1.49 | <1.49 |
| 495 | Core 52 composite | Whole | <14.8 | <14.8 | <14.8 |
| 500 | | Whole | <1.49 | <1.5 | <1.495 |
| **Solids: water digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 534 | Core 51 composite | Whole | <0.316 | <0.316 | <0.316 |
| 494 | Core 52 composite | Whole | <3.04 | <3.04 | <3.04 |
| **Liquids** | | | **µg/mL** | **µg/mL** | **µg/mL** |
| 393 | Core 50 composite | Drainable liquid | <0.03 | <0.03 | <0.03 |
| 442 | Core 51 composite | Drainable liquid | <0.03 | <0.03 | <0.03 |
| 494 | Core 52 composite | Drainable liquid | <0.075 | <0.075 | <0.075 |

Table B2-14. Tank 241-T-107 Analytical Results: Bismuth (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: acid digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 356 | 50: 2 | Whole | 3,110 | 2,530 | 2,820[QC:a,e] |
| 356 | | Whole | 4,030 | 2,800 | 3,415[QC:a,d,e] |
| 357 | | Whole | 2,950 | 3,100 | 3,025[QC:a,c] |
| 357 | | Whole | 3,870 | 3,610 | 3,740[QC:a,d] |
| 418 | 51: 3 | Lower half | 1,920 | --- | 1,920[QC:a] |
| 418 | | Lower half | 1,050 | 1,110 | 1,080[QC:a,d] |
| 419 | | Lower half | 1,160 | 1,050 | 1,105[QC:a] |
| 419 | | Lower half | 1,530 | 1,390 | 1,460[QC:a,c] |
| 490 | 52: 3 | Lower half | 23,700 | 24,900 | 24,300[QC:a] |
| 490 | | Lower half | 24,600 | 24,200 | 24,400[QC:a] |
| 491 | | Lower half | 24,700 | 23,900 | 24,300[QC:a] |
| 491 | | Lower half | 27,800 | 28,000 | 27,900[QC:a] |
| 549 | Core 51 composite | Whole | 7,790 | 8,130 | 7,960[QC:a] |
| 503 | Core 52 composite | Whole | 13,100 | 14,400 | 13,750[QC:a] |
| **Solids: fusion** | | | **µg/g** | **µg/g** | **µg/g** |
| 387 | 50: 1R | Subsegment | 20,500 | 18,300 | 19,400[QC:c] |
| 309 | 50: 2 | Whole | 2,710 | 2,520 | 2,615[QC:c] |
| 322 | 50: 3 | Whole | 10,600 | 11,400 | 11,000[QC:c] |
| 406 | 51: 2 | Whole | 986 | 987 | 986.5 |
| 255 | 51: 3 | Lower half | 1,090 | 1,040 | 1,065 |
| 254 | | Upper half | 1,000 | 866 | 933[QC:c] |
| 257 | 51: 4 | Lower half | 19,600 | 17,500 | 18,550 |
| 256 | | Upper half | 3,510 | 3,730 | 3,620 |
| 455 | 52: 1 | Whole | <310 | 376 | <343 |
| 481 | 52: 2 | Whole | 11,500 | 10,700 | 11,100 |
| 483 | 52: 3 | Lower half | 22,100 | 22,600 | 22,350[QC:c] |
| 482 | | Upper half | 9,580 | 10,900 | 10,240[QC:c] |

Table B2-14. Tank 241-T-107 Analytical Results: Bismuth (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion (Cont'd)** | | | **µg/g** | **µg/g** | **µg/g** |
| 436 | Core 51 composite | Whole | 8,200 | 8,490 | 8,345[QC:c] |
| 495 | Core 52 composite | Whole | 12,900 | 12,300 | 12,600 |
| 500 | | Whole | 14,000 | 17,300 | 15,650[QC:c,e] |
| **Solids: water digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 534 | Core 51 composite | Whole | 108 | 81.5 | 94.75[QC:c,e] |
| 495 | Core 52 composite | Whole | 375 | 409 | 392 |
| **Liquids** | | | **µg/mL** | **µg/mL** | **µg/mL** |
| 393 | Core 50 composite | Drainable liquid | <0.92 | <0.92 | <0.92[QC:a] |
| 442 | Core 51 composite | Drainable liquid | <0.92 | <0.92 | <0.92[QC:a,c] |
| 494 | Core 52 composite | Drainable liquid | 16.9 | 17 | 16.95[QC:a] |

Table B2-15. Tank 241-T-107 Analytical Results: Boron (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: acid digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 356 | 50: 2 | Whole | 6.7 | 5.91 | 6.305[QC:b,c] |
| 356 | | Whole | <0.998 | 6.57 | <3.784[QC:b,e] |
| 357 | | Whole | 6.46 | 11.9 | 9.18[QC:b,c,e] |
| 357 | | Whole | <0.998 | 1.55 | <1.274[QC:b,e] |
| 418 | 51: 3 | Lower half | 43.6 | --- | 43.6[QC:b] |
| 418 | | Lower half | <1.74 | <0.99 | <1.365[QC:b,e] |
| 419 | | Lower half | 17.8 | 14.1 | 15.95[QC:b,e] |
| 419 | | Lower half | <0.997 | <0.988 | <0.9925[QC:b] |
| 490 | 52: 3 | Lower half | 18.3 | 15.1 | 16.7[QC:b] |
| 490 | | Lower half | 25.2 | 19.8 | 22.5[QC:b,e] |
| 491 | | Lower half | 19 | 15.8 | 17.4[QC:b] |
| 491 | | Lower half | 23.6 | 14.3 | 18.95[QC:b,e] |
| 549 | Core 51 composite | Whole | 33.8 | 13.5 | 23.65[QC:b,e] |
| 503 | Core 52 composite | Whole | 3.59 | <0.99 | <2.29[QC:b,e] |
| **Solids: fusion** | | | **µg/g** | **µg/g** | **µg/g** |
| 387 | 50: 1R | Subsegment | 6.98 | 6.92 | 6.95 |
| 309 | 50: 2 | Whole | <5 | <4.97 | <4.985 |
| 322 | 50: 3 | Whole | <4.95 | <4.95 | <4.95 |
| 406 | 51: 2 | Whole | <4.98 | <4.98 | <4.98 |
| 255 | 51: 3 | Lower half | <4.87 | <5 | <4.935 |
| 254 | | Upper half | <4.7 | <4.62 | <4.66 |
| 257 | 51: 4 | Lower half | 8.64 | <4.8 | <6.72[QC:e] |
| 256 | | Upper half | <4.81 | <4.86 | <4.835 |
| 455 | 52: 1 | Whole | <49.2 | <49.1 | <49.15[QC:d] |
| 481 | 52: 2 | Whole | <4.98 | <4.98 | <4.98 |
| 483 | 52: 3 | Lower half | 8.02 | 11.8 | 9.91[QC:e] |
| 482 | | Upper half | <4.96 | <4.92 | <4.94 |

Table B2-15. Tank 241-T-107 Analytical Results: Boron (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion (Cont'd)** | | | **µg/g** | **µg/g** | **µg/g** |
| 436 | Core 51 composite | Whole | <4.98 | <4.95 | <4.965 |
| 495 | Core 52 composite | Whole | <49.3 | <49.4 | <49.35[QC:d] |
| 500 | | Whole | <4.96 | <4.99 | <4.975 |
| **Solids: water digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 534 | Core 51 composite | Whole | 607 | 666 | 636.5 |
| 495 | Core 52 composite | Whole | 16.1 | 14.8 | 15.5 |
| **Liquids** | | | **µg/mL** | **µg/mL** | **µg/mL** |
| 393 | Core 50 composite | Drainable liquid | 9.33 | 9.03 | 9.18[QC:b,d] |
| 442 | Core 51 composite | Drainable liquid | 24.2 | 25 | 24.6[QC:b,d] |
| 494 | Core 52 composite | Drainable liquid | 28.3 | 32 | 30.15[QC:b,d,r] |

Table B2-16. Tank 241-T-107 Analytical Results: Cadmium (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: acid digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 356 | 50: 2 | Whole | 5.6 | 4.65 | 5.125 |
| 356 | | Whole | 7.52 | 5.21 | 6.365[QC:c,e] |
| 357 | | Whole | 5.5 | 5.43 | 5.465 |
| 357 | | Whole | 6.94 | 6.84 | 6.89 |
| 418 | 51: 3 | Lower half | 12.3 | --- | 12.3 |
| 418 | | Lower half | 5.77 | 5.72 | 5.745 |
| 419 | | Lower half | 5.91 | 5.66 | 5.785 |
| 419 | | Lower half | 7.47 | 6.62 | 7.045 |
| 490 | 52: 3 | Lower half | 1.41 | 1.3 | 1.355 |
| 490 | | Lower half | 3.99 | 3.1 | 3.545[QC:a] |
| 491 | | Lower half | 1.55 | 1.05 | 1.3[QC:e] |
| 491 | | Lower half | 3.94 | 4.07 | 4.005[QC:a] |
| 549 | Core 51 composite | Whole | 7.93 | 6.5 | 7.215[QC:a] |
| 503 | Core 52 composite | Whole | 4.17 | 7.01 | 5.59[QC:e] |
| **Solids: fusion** | | | **µg/g** | **µg/g** | **µg/g** |
| 387 | 50: 1R | Subsegment | 4.68 | 6.83 | 5.755[QC:e] |
| 309 | 50: 2 | Whole | 6.58 | 6.41 | 6.495 |
| 322 | 50: 3 | Whole | 6.65 | 6.49 | 6.57 |
| 406 | 51: 2 | Whole | 40.6 | 16.7 | 28.65[QC:e] |
| 255 | 51: 3 | Lower half | 7.52 | 6.53 | 7.025 |
| 254 | | Upper half | 7.84 | 7.6 | 7.72 |
| 257 | 51: 4 | Lower half | 5.57 | 7.51 | 6.54[QC:e] |
| 256 | | Upper half | 8.27 | 10.4 | 9.335[QC:e] |
| 455 | 52: 1 | Whole | <29.5 | <29.5 | <29.5 |
| 481 | 52: 2 | Whole | 4.59 | 5.19 | 4.89 |
| 483 | 52: 3 | Lower half | 5.92 | 6.08 | 6 |
| 482 | | Upper half | 6.22 | 4.78 | 5.5[QC:e] |

Table B2-16. Tank 241-T-107 Analytical Results: Cadmium (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion (Cont'd)** | | | **µg/g** | **µg/g** | **µg/g** |
| 50: 1R | Subsegment | 4.68 | 6.83 | 5.755[QC:e] | 6.15 |
| 495 | Core 52 composite | Whole | <29.6 | <29.6 | <29.6 |
| 500 | | Whole | 5.66 | 9.81 | 7.735[QC:e] |
| **Solids: water digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 534 | Core 51 composite | Whole | <0.632 | <0.632 | <0.632 |
| 495 | Core 52 composite | Whole | <6.07 | <6.07 | <6.07 |
| **Liquids** | | | **µg/mL** | **µg/mL** | **µg/mL** |
| 393 | Core 50 composite | Drainable liquid | <0.07 | <0.07 | <0.07 |
| 442 | Core 51 composite | Drainable liquid | <0.07 | <0.07 | <0.07 |
| 494 | Core 52 composite | Drainable liquid | <0.175 | <0.175 | <0.175 |

Table B2-17. Tank 241-T-107 Analytical Results: Calcium (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: acid digest** | | | µg/g | µg/g | µg/g |
| 356 | 50: 2 | Whole | 658 | 516 | 587[QC:b,e] |
| 356 | | Whole | 1,520 | 1,470 | 1,495[QC:b,c] |
| 357 | | Whole | 620 | 643 | 631.5[QC:b,d] |
| 357 | | Whole | 4,690 | 942 | 2,816[QC:b,c,e] |
| 418 | 51: 3 | Lower half | 671 | 723 | 697[QC:d] |
| 418 | | Lower half | 1,090 | --- | 1,090[QC:b] |
| 419 | | Lower half | 735 | 672 | 703.5 |
| 419 | | Lower half | 906 | 843 | 874.5[QC:b,c] |
| 490 | 52: 3 | Lower half | 449 | 449 | 449[QC:b] |
| 490 | | Lower half | 375 | 405 | 390[QC:b,d] |
| 491 | | Lower half | 420 | 409 | 414.5[QC:b] |
| 491 | | Lower half | 883 | 603 | 743[QC:b,c,e] |
| 549 | Core 51 composite | Whole | 808 | 897 | 852.5[QC:b] |
| 503 | Core 52 composite | Whole | 542 | 643 | 592.5[QC:b] |
| **Solids: fusion** | | | µg/g | µg/g | µg/g |
| 387 | 50: 1R | Subsegment | 1,060 | 1,040 | 1,050 |
| 309 | 50: 2 | Whole | 895 | 749 | 822 |
| 322 | 50: 3 | Whole | 1,100 | 910 | 1,005 |
| 406 | 51: 2 | Whole | 2,160 | 2,030 | 2,095 |
| 255 | 51: 3 | Lower half | 956 | 1,020 | 988 |
| 254 | | Upper half | 963 | 959 | 961 |
| 257 | 51: 4 | Lower half | 2,060 | 2,810 | 2,435[QC:e] |
| 256 | | Upper half | 1,400 | 1,460 | 1,430 |
| 455 | 52: 1 | Whole | 13,500 | 8,300 | 10,900[QC:e] |
| 481 | 52: 2 | Whole | 671 | 871 | 771 |
| 483 | 52: 3 | Lower half | 437 | 407 | 422 |
| 482 | | Upper half | 583 | 1,020 | 801.5[QC:e] |

Table B2-17. Tank 241-T-107 Analytical Results: Calcium (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion (Cont'd)** | | | **µg/g** | **µg/g** | **µg/g** |
| 436 | Core 51 composite | Whole | 765 | 794 | 779.5 |
| 495 | Core 52 composite | Whole | 6,780 | 611 | 3,695.5[QC:e] |
| 500 | | Whole | 702 | 781 | 741.5 |
| **Solids: water digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 534 | Core 51 composite | Whole | 151 | 800 | 475.5[QC:e] |
| 495 | Core 52 composite | Whole | 71.1 | 59.9 | 65.5 |
| **Liquids** | | | **µg/mL** | **µg/mL** | **µg/mL** |
| 393 | Core 50 composite | Drainable liquid | 4.87 | 3.7 | 4.285[QC:e] |
| 442 | Core 51 composite | Drainable liquid | 7 | 2.95 | 4.975[QC:e] |
| 494 | Core 52 composite | Drainable liquid | 3.48 | 4.4 | 3.94[QC:b,r] |

Table B2-18. Tank 241-T-107 Analytical Results: Cerium (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: acid digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 356 | 50: 2 | Whole | 27.4 | 20.6 | 24[QC:e] |
| 356 | | Whole | <6.61 | <6.8 | <6.705[QC:c] |
| 357 | | Whole | 36.8 | 24.1 | 30.45[QC:e] |
| 357 | | Whole | 80.4 | 297 | 188.7[QC:c,e] |
| 418 | 51: 3 | Lower half | <5.3 | --- | <5.3[QC:c,r] |
| 418 | | Lower half | <12.8 | <12.7 | <12.75 |
| 419 | | Lower half | <12.8 | <12.6 | <12.7 |
| 419 | | Lower half | <6.77 | <6.69 | <6.73[QC:c,r] |
| 490 | 52: 3 | Lower half | 266 | 282 | 274 |
| 490 | | Lower half | 327 | 314 | 320.5 |
| 491 | | Lower half | 295 | 295 | 295 |
| 491 | | Lower half | 328 | 318 | 323 |
| 549 | Core 51 composite | Whole | <67.8 | <67.5 | <67.65[QC:a] |
| 503 | Core 52 composite | Whole | 180 | 185 | 182.5 |
| **Solids: fusion** | | | **µg/g** | **µg/g** | **µg/g** |
| 387 | 50: 1R | Subsegment | 133 | 113 | 123 |
| 309 | 50: 2 | Whole | <64 | <63.6 | <63.8 |
| 322 | 50: 3 | Whole | <63.4 | 78.7 | <71.05 |
| 406 | 51: 2 | Whole | <63.7 | <63.7 | <63.7 |
| 255 | 51: 3 | Lower half | <62.4 | <64 | <63.2 |
| 254 | | Upper half | <60.2 | <59.1 | <59.65 |
| 257 | 51: 4 | Lower half | 212 | 226 | 219 |
| 256 | | Upper half | 67.9 | <62.3 | <65.1 |
| 455 | 52: 1 | Whole | <335 | <334 | <334.5 |
| 481 | 52: 2 | Whole | 202 | 158 | 180[QC:e] |
| 483 | 52: 3 | Lower half | 376 | 308 | 342 |
| 482 | | Upper half | 207 | 235 | 221 |

Table B2-18. Tank 241-T-107 Analytical Results: Cerium (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion (Cont'd)** | | | **μg/g** | **μg/g** | **μg/g** |
| 436 | Core 51 composite | Whole | 87.6 | 104 | 95.8 |
| 495 | Core 52 composite | Whole | <335 | <336 | <335.5 |
| 500 | | Whole | 132 | 137 | 134.5 |
| **Solids: water digest** | | | **μg/g** | **μg/g** | **μg/g** |
| 534 | Core 51 composite | Whole | <7.16 | <7.16 | <7.16 |
| 495 | Core 52 composite | Whole | <68.8 | <68.9 | <68.9 |
| **Liquids** | | | **μg/mL** | **μg/mL** | **μg/mL** |
| 393 | Core 50 composite | Drainable liquid | <1.28 | <1.28 | <1.28 |
| 442 | Core 51 composite | Drainable liquid | <1.28 | <1.28 | <1.28 |
| 494 | Core 52 composite | Drainable liquid | <3.2 | <3.2 | <3.2 |

Table B2-19. Tank 241-T-107 Analytical Results: Chromium (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: acid digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 356 | 50: 2 | Whole | 279 | 229 | 254 |
| 356 | | Whole | 329 | 233 | 281[QC:d,e] |
| 357 | | Whole | 278 | 286 | 282[QC:c] |
| 357 | | Whole | 314 | 289 | 301.5[QC:d] |
| 418 | 51: 3 | Lower half | 494 | --- | 494 |
| 418 | | Lower half | 336 | 354 | 345[QC:d] |
| 419 | | Lower half | 355 | 334 | 344.5 |
| 419 | | Lower half | 415 | 387 | 401[QC:c] |
| 490 | 52: 3 | Lower half | 532 | 563 | 547.5[QC:d] |
| 490 | | Lower half | 593 | 572 | 582.5[QC:c] |
| 491 | | Lower half | 593 | 561 | 577[QC:c] |
| 491 | | Lower half | 623 | 608 | 615.5[QC:c] |
| 549 | Core 51 composite | Whole | 383 | 381 | 382 |
| 503 | Core 52 composite | Whole | 309 | 342 | 325.5 |
| **Solids: fusion** | | | **µg/g** | **µg/g** | **µg/g** |
| 387 | 50: 1R | Subsegment | 339 | 327 | 333 |
| 309 | 50: 2 | Whole | 264 | 252 | 258 |
| 322 | 50: 3 | Whole | 205 | 233 | 219 |
| 406 | 51: 2 | Whole | 370 | 341 | 355.5 |
| 255 | 51: 3 | Lower half | 392 | 395 | 393.5 |
| 254 | | Upper half | 321 | 280 | 300.5 |
| 257 | 51: 4 | Lower half | 355 | 342 | 348.5 |
| 256 | | Upper half | 480 | 504 | 492 |
| 455 | 52: 1 | Whole | 123 | 161 | 142[QC:e] |
| 481 | 52: 2 | Whole | 256 | 242 | 249 |
| 483 | 52: 3 | Lower half | 545 | 516 | 530.5 |
| 482 | | Upper half | 275 | 296 | 285.5 |

Table B2-19. Tank 241-T-107 Analytical Results: Chromium (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion (Cont'd)** | | | **µg/g** | **µg/g** | **µg/g** |
| 436 | Core 51 composite | Whole | 351 | 359 | 355 |
| 495 | Core 52 composite | Whole | 280 | 348 | 314[QC:e] |
| 500 | | Whole | 341 | 389 | 365 |
| **Solids: water digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 534 | Core 51 composite | Whole | 230 | 216 | 223 |
| 495 | Core 52 composite | Whole | 213 | 184 | 198 |
| **Liquids** | | | **µg/mL** | **µg/mL** | **µg/mL** |
| 393 | Core 50 composite | Drainable liquid | 45.6 | 45 | 45.3 |
| 442 | Core 51 composite | Drainable liquid | 271 | 275 | 273[QC:d] |
| 494 | Core 52 composite | Drainable liquid | 186 | 190 | 188 |

Table B2-20. Tank 241-T-107 Analytical Results: Iron (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: acid digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 356 | 50: 2 | Whole | 21,600 | 20,100 | 20,850 |
| 356 | | Whole | 31,800 | 21,000 | 26,400[QC:e] |
| 357 | | Whole | 26,500 | 23,800 | 25,150 |
| 357 | | Whole | 31,500 | 29,300 | 30,400 |
| 418 | 51: 3 | Lower half | 69,100 | --- | 69,100 |
| 418 | | Lower half | 31,500 | 32,900 | 32,200 |
| 419 | | Lower half | 36,400 | 32,700 | 34,550 |
| 419 | | Lower half | 42,500 | 40,000 | 41,250 |
| 490 | 52: 3 | Lower half | 18,800 | 19,600 | 19,200 |
| 490 | | Lower half | 19,900 | 19,500 | 19,700 |
| 491 | | Lower half | 19,900 | 19,400 | 19,650 |
| 491 | | Lower half | 22,300 | 22,300 | 22,300 |
| 549 | Core 51 composite | Whole | 33,400 | 32,900 | 33,150[QC:d] |
| 503 | Core 52 composite | Whole | 20,100 | 39,500 | 29,800[QC:e] |
| **Solids: fusion** | | | **µg/g** | **µg/g** | **µg/g** |
| 387 | 50: 1R | Subsegment | 19,400 | 18,600 | 19,000 |
| 309 | 50: 2 | Whole | 20,300 | 20,400 | 20,350 |
| 322 | 50: 3 | Whole | 22,500 | 25,100 | 23,800 |
| 406 | 51: 2 | Whole | 34,600 | 38,700 | 36,650 |
| 255 | 51: 3 | Lower half | 34,200 | 34,300 | 34,250 |
| 254 | | Upper half | 31,200 | 25,800 | 28,500 |
| 257 | 51: 4 | Lower half | 20,000 | 19,300 | 19,650 |
| 256 | | Upper half | 34,000 | 36,100 | 35,050 |
| 455 | 52: 1 | Whole | 47,700 | 33,400 | 40,550[QC:d] |
| 481 | 52: 2 | Whole | 20,600 | 21,500 | 21,050 |
| 483 | 52: 3 | Lower half | 19,000 | 19,000 | 19,000 |
| 482 | | Upper half | 24,500 | 22,300 | 23,400 |

Table B2-20. Tank 241-T-107 Analytical Results: Iron (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion (Cont'd)** | | | **µg/g** | **µg/g** | **µg/g** |
| 436 | Core 51 composite | Whole | 26,300 | 26,600 | 26,450 |
| 495 | Core 52 composite | Whole | 24,100 | 25,000 | 24,550 |
| 500 | | Whole | 21,000 | 42,800 | 31,900[QC:e] |
| **Solids: water digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 534 | Core 51 composite | Whole | 315 | 229 | 272[QC:e] |
| 495 | Core 52 composite | Whole | 429 | 449 | 439 |
| **Liquids** | | | **µg/mL** | **µg/mL** | **µg/mL** |
| 393 | Core 50 composite | Drainable liquid | 5.82 | 5.67 | 5.745 |
| 442 | Core 51 composite | Drainable liquid | 47.5 | 48.5 | 48 |
| 494 | Core 52 composite | Drainable liquid | 18.9 | 19.2 | 19.05 |

Table B2-21. Tank 241-T-107 Analytical Results: Lanthanum (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: acid digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 356 | 50: 2 | Whole | <2 | <1.99 | <1.995[QC:r] |
| 356 | | Whole | <1.65 | <1.7 | <1.675[QC:c] |
| 357 | | Whole | <2 | <2 | <2[QC:c,r] |
| 357 | | Whole | 12.3 | 33.2 | 22.75[QC:e] |
| 418 | 51: 3 | Lower half | <1.3 | --- | <1.3 |
| 418 | | Lower half | <1.99 | <1.98 | <1.985[QC:c,r] |
| 419 | | Lower half | <1.99 | <1.98 | <1.985[QC:r] |
| 419 | | Lower half | <1.69 | <1.67 | <1.68[QC:c] |
| 490 | 52: 3 | Lower half | <1.7 | <1.67 | <1.685 |
| 490 | | Lower half | <1.69 | <1.68 | <1.685[QC:c] |
| 491 | | Lower half | <1.67 | <1.69 | <1.68 |
| 491 | | Lower half | <1.68 | <1.68 | <1.68[QC:c] |
| 549 | Core 51 composite | Whole | <16.9 | <16.9 | <16.9 |
| 503 | Core 52 composite | Whole | <2 | <1.98 | <1.99[QC:c,r] |
| **Solids: fusion** | | | **µg/g** | **µg/g** | **µg/g** |
| 387 | 50: 1R | Subsegment | <9.9 | <9.88 | <9.89 |
| 309 | 50: 2 | Whole | <10 | <9.94 | <9.97 |
| 322 | 50: 3 | Whole | <9.9 | <9.9 | <9.9 |
| 406 | 51: 2 | Whole | <9.96 | <9.96 | <9.96 |
| 255 | 51: 3 | Lower half | <9.75 | <10 | <9.875 |
| 254 | | Upper half | <9.4 | <9.24 | <9.32 |
| 257 | 51: 4 | Lower half | <9.65 | <9.6 | <9.625 |
| 256 | | Upper half | <9.62 | <9.73 | <9.675 |
| 455 | 52: 1 | Whole | <83.7 | <83.5 | <83.6 |
| 481 | 52: 2 | Whole | <9.96 | <9.96 | <9.96 |

Table B2-21. Tank 241-T-107 Analytical Results: Lanthanum (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion (Cont'd)** | | | **µg/g** | **µg/g** | **µg/g** |
| 483 | 52: 3 | Lower half | <9.94 | <9.86 | <9.9 |
| 482 | | Upper half | <9.92 | <9.84 | <9.88 |
| 436 | Core 51 composite | Whole | <9.96 | <9.9 | <9.93 |
| 495 | Core 52 composite | Whole | <83.8 | <84 | <83.9 |
| 500 | | Whole | <9.92 | <9.98 | <9.95 |
| **Solids: water digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 534 | Core 51 composite | Whole | <1.79 | <1.79 | <1.79 |
| 495 | Core 52 composite | Whole | <17.2 | <17.2 | <17.2 |
| **Liquids** | | | **µg/mL** | **µg/mL** | **µg/mL** |
| 393 | Core 50 composite | Drainable liquid | <0.2 | <0.2 | <0.2 |
| 442 | Core 51 composite | Drainable liquid | <0.2 | <0.2 | <0.2 |
| 494 | Core 52 composite | Drainable liquid | <0.500 | <0.500 | <0.500 |

Table B2-22. Tank 241-T-107 Analytical Results: Lead (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: acid digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 356 | 50: 2 | Whole | 589 | 477 | 533[QC:e] |
| 356 | | Whole | 763 | 534 | 648.5[QC:d,e] |
| 357 | | Whole | 733 | 665 | 699[QC:d] |
| 357 | | Whole | 695 | 632 | 663.5[QC:e] |
| 418 | 51: 3 | Lower half | 1,660 | --- | 1,660 |
| 418 | | Lower half | 1,030 | 1,080 | 1,055[QC:d] |
| 419 | | Lower half | 1,100 | 1,000 | 1,050 |
| 419 | | Lower half | 1,340 | 1,230 | 1,285[QC:e] |
| 490 | 52: 3 | Lower half | 139 | 137 | 138 |
| 490 | | Lower half | 144 | 146 | 145 |
| 491 | | Lower half | 144 | 143 | 143.5 |
| 491 | | Lower half | 166 | 162 | 164 |
| 549 | Core 51 composite | Whole | 1,170 | 1,040 | 1,105 |
| 503 | Core 52 composite | Whole | 357 | 618 | 487.5[QC:e] |
| **Solids: fusion** | | | **µg/g** | **µg/g** | **µg/g** |
| 387 | 50: 1R | Subsegment | 239 | 244 | 241.5 |
| 309 | 50: 2 | Whole | 535 | 525 | 530 |
| 322 | 50: 3 | Whole | 448 | 544 | 496 |
| 406 | 51: 2 | Whole | 1,340 | 1,320 | 1,330 |
| 255 | 51: 3 | Lower half | 895 | 1,080 | 987.5 |
| 254 | | Upper half | 1,550 | 1,450 | 1,500 |
| 257 | 51: 4 | Lower half | 278 | 249 | 263.5 |
| 256 | | Upper half | 965 | 1,040 | 1,002.5 |
| 455 | 52: 1 | Whole | 1,180 | 2,500 | 1,840[QC:e] |
| 481 | 52: 2 | Whole | 444 | 395 | 419.5 |
| 483 | 52: 3 | Lower half | 144 | 119 | 131.5 |
| 482 | | Upper half | 491 | 412 | 451.5 |

Table B2-22. Tank 241-T-107 Analytical Results: Lead (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion (Cont'd)** | | | **μg/g** | **μg/g** | **μg/g** |
| 436 | Core 51 composite | Whole | 763 | 690 | 726.5 |
| 495 | Core 52 composite | Whole | 482 | 611 | 546.5[QC:e] |
| 500 | | Whole | 346 | 796 | 571[QC:e] |
| **Solids: water digest** | | | **μg/g** | **μg/g** | **μg/g** |
| 534 | Core 51 composite | Whole | 20.3 | 20.1 | 20.2 |
| 495 | Core 52 composite | Whole | <62.8 | <62.8 | <62.8 |
| **Liquids** | | | **μg/mL** | **μg/mL** | **μg/mL** |
| 393 | Core 50 composite | Drainable liquid | <0.78 | <0.78 | <0.78 |
| 442 | Core 51 composite | Drainable liquid | <0.78 | <0.78 | <0.78 |
| 494 | Core 52 composite | Drainable liquid | <1.95 | <1.95 | <1.95 |

Table B2-23. Tank 241-T-107 Analytical Results: Lithium (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: acid digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 356 | 50: 2 | Whole | 5.59 | 4.45 | 5.02[QC:e] |
| 356 | | Whole | 7.47 | 5.09 | 6.28[QC:c,e] |
| 357 | | Whole | 5.65 | 5.53 | 5.59 |
| 357 | | Whole | 7.09 | 6.46 | 6.775 |
| 418 | 51: 3 | Lower half | 13 | --- | 13 |
| 418 | | Lower half | 7.28 | 7.9 | 7.59 |
| 419 | | Lower half | 8.19 | 7.39 | 7.79 |
| 419 | | Lower half | 9.79 | 9.1 | 9.445 |
| 490 | 52: 3 | Lower half | 1.22 | 1.33 | 1.275 |
| 490 | | Lower half | 1.39 | 1.48 | 1.435 |
| 491 | | Lower half | 1.34 | 1.5 | 1.42 |
| 491 | | Lower half | 1.58 | 1.57 | 1.575 |
| 549 | Core 51 composite | Whole | 7.59 | 6.32 | 6.955[QC:a] |
| 503 | Core 52 composite | Whole | 3.97 | 4.05 | 4.01 |
| **Solids: fusion** | | | **µg/g** | **µg/g** | **µg/g** |
| 387 | 50: 1R | Subsegment | <2.97 | <2.96 | <2.965 |
| 309 | 50: 2 | Whole | 4.4 | 4.34 | 4.37 |
| 322 | 50: 3 | Whole | 3.31 | 4.69 | 4[QC:e] |
| 406 | 51: 2 | Whole | 8.79 | 8.75 | 8.77 |
| 255 | 51: 3 | Lower half | 8.64 | 7.03 | 7.835[QC:e] |
| 254 | | Upper half | 7.74 | 6.86 | 7.3 |
| 257 | 51: 4 | Lower half | <2.9 | 2.89 | <2.895 |
| 256 | | Upper half | 8.95 | 8.5 | 8.725 |
| 455 | 52: 1 | Whole | <19.7 | <19.6 | <19.65 |
| 481 | 52: 2 | Whole | 6.21 | 5.8 | 6.005 |
| 483 | 52: 3 | Lower half | 5.55 | 4.57 | 5.06 |
| 482 | | Upper half | 7.88 | 8.64 | 8.26 |

Table B2-23. Tank 241-T-107 Analytical Results: Lithium (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion (Cont'd)** | | | **µg/g** | **µg/g** | **µg/g** |
| 436 | Core 51 composite | Whole | 4.87 | 5.07 | 4.97 |
| 495 | Core 52 composite | Whole | <19.7 | <19.8 | <19.75 |
| 500 | | Whole | 3.14 | 4.98 | 4.06[QC:e] |
| **Solids: water digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 534 | Core 51 composite | Whole | 0.904 | 0.793 | 0.8485 |
| 495 | Core 52 composite | Whole | <4.05 | <4.05 | <4.05 |
| **Liquids** | | | **µg/mL** | **µg/mL** | **µg/mL** |
| 393 | Core 50 composite | Drainable liquid | <0.06 | <0.06 | <0.06 |
| 442 | Core 51 composite | Drainable liquid | <0.06 | <0.06 | <0.06 |
| 494 | Core 52 composite | Drainable liquid | <0.150 | <0.150 | <0.150 |

Table B2-24. Tank 241-T-107 Analytical Results: Magnesium (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: acid digest** | | | µg/g | µg/g | µg/g |
| 356 | 50: 2 | Whole | 282 | 194 | 238[QC:c] |
| 356 | | Whole | 228 | 169 | 198.5[QC:b,c] |
| 357 | | Whole | 211 | 215 | 213[QC:b,d] |
| 357 | | Whole | 327 | 246 | 286.5[QC:d,c] |
| 418 | 51: 3 | Lower half | 323 | --- | 323 |
| 418 | | Lower half | 210 | 223 | 216.5[QC:d] |
| 419 | | Lower half | 224 | 211 | 217.5 |
| 419 | | Lower half | 273 | 255 | 264[QC:c] |
| 490 | 52: 3 | Lower half | 149 | 150 | 149.5 |
| 490 | | Lower half | 153 | 148 | 150.5 |
| 491 | | Lower half | 163 | 159 | 161 |
| 491 | | Lower half | 163 | 172 | 167.5[QC:c] |
| 549 | Core 51 composite | Whole | 265 | 259 | 262 |
| 503 | Core 52 composite | Whole | 157 | 173 | 165 |
| **Solids: fusion** | | | µg/g | µg/g | µg/g |
| 387 | 50: 1R | Subsegment | 180 | 174 | 177 |
| 309 | 50: 2 | Whole | 252 | 250 | 251 |
| 322 | 50: 3 | Whole | 211 | 234 | 222.5 |
| 406 | 51: 2 | Whole | 547 | 533 | 540 |
| 255 | 51: 3 | Lower half | 258 | 251 | 254.5 |
| 254 | | Upper half | 286 | 242 | 264 |
| 257 | 51: 4 | Lower half | 214 | 227 | 220.5 |
| 256 | | Upper half | 337 | 352 | 344.5 |
| 455 | 52: 1 | Whole | 407 | 443 | 425 |
| 481 | 52: 2 | Whole | 193 | 166 | 179.5 |
| 483 | 52: 3 | Lower half | 156 | 161 | 158.5 |
| 482 | | Upper half | 202 | 192 | 197 |

Table B2-24. Tank 241-T-107 Analytical Results: Magnesium (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion (Cont'd)** | | | **μg/g** | **μg/g** | **μg/g** |
| 436 | Core 51 composite | Whole | 223 | 240 | 231.5 |
| 495 | Core 52 composite | Whole | 302 | 189 | 245.5[QC:e] |
| 500 | | Whole | 190 | 252 | 221[QC:e] |
| **Solids: water digest** | | | **μg/g** | **μg/g** | **μg/g** |
| 534 | Core 51 composite | Whole | 7.3 | 12.2 | 9.75[QC:e] |
| 495 | Core 52 composite | Whole | 10.0 | 9.83 | 9.92 |
| **Liquids** | | | **μg/mL** | **μg/mL** | **μg/mL** |
| 393 | Core 50 composite | Drainable liquid | 1.32 | 1.16 | 1.24 |
| 442 | Core 51 composite | Drainable liquid | 0.511 | 0.31 | 0.4105[QC:e] |
| 494 | Core 52 composite | Drainable liquid | 0.390 | 0.396 | 0.393[QC:b] |

Table B2-25. Tank 241-T-107 Analytical Results: Manganese (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: acid digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 356 | 50: 2 | Whole | 235 | 197 | 216 |
| 356 | | Whole | 316 | 225 | 270.5[QC:d,e] |
| 357 | | Whole | 263 | 249 | 256[QC:e] |
| 357 | | Whole | 325 | 319 | 322[QC:d] |
| 418 | 51: 3 | Lower half | 434 | --- | 434 |
| 418 | | Lower half | 233 | 249 | 241[QC:d] |
| 419 | | Lower half | 252 | 232 | 242 |
| 419 | | Lower half | 323 | 300 | 311.5[QC:e] |
| 490 | 52: 3 | Lower half | 59.3 | 57.1 | 58.2 |
| 490 | | Lower half | 56.4 | 60.1 | 58.25 |
| 491 | | Lower half | 59.2 | 57 | 58.1 |
| 491 | | Lower half | 68.3 | 65.5 | 66.9 |
| 549 | Core 51 composite | Whole | 236 | 226 | 231[QC:a] |
| 503 | Core 52 composite | Whole | 126 | 298 | 212[QC:e] |
| **Solids: fusion** | | | **µg/g** | **µg/g** | **µg/g** |
| 387 | 50: 1R | Subsegment | 95.5 | 95.2 | 95.35 |
| 309 | 50: 2 | Whole | 242 | 229 | 235.5 |
| 322 | 50: 3 | Whole | 139 | 159 | 149 |
| 406 | 51: 2 | Whole | 824 | 933 | 878.5 |
| 255 | 51: 3 | Lower half | 278 | 285 | 281.5 |
| 254 | | Upper half | 292 | 267 | 279.5 |
| 257 | 51: 4 | Lower half | 98.9 | 99.6 | 99.25 |
| 256 | | Upper half | 250 | 268 | 259 |
| 455 | 52: 1 | Whole | 1,850 | 3,280 | 2,565[QC:e] |
| 481 | 52: 2 | Whole | 226 | 206 | 216 |
| 483 | 52: 3 | Lower half | 99.4 | 85.7 | 92.55 |
| 482 | | Upper half | 175 | 158 | 166.5 |

Table B2-25. Tank 241-T-107 Analytical Results: Manganese (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion (Cont'd)** | | | **µg/g** | **µg/g** | **µg/g** |
| 436 | Core 51 composite | Whole | 196 | 183 | 189.5 |
| 495 | Core 52 composite | Whole | 197 | 177 | 187 |
| 500 | | Whole | 161 | 313 | 237[QC:e] |
| **Solids: water digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 534 | Core 51 composite | Whole | 1.78 | 2.37 | 2.075[QC:e] |
| 495 | Core 52 composite | Whole | <3.04 | 3.04 | <3.04 |
| **Liquids** | | | **µg/mL** | **µg/mL** | **µg/mL** |
| 393 | Core 50 composite | Drainable liquid | <0.03 | 0.0345 | <0.03225 |
| 442 | Core 51 composite | Drainable liquid | 0.0756 | 0.0811 | 0.07835 |
| 494 | Core 52 composite | Drainable liquid | <0.0750 | <0.0750 | <0.0750 |

Table B2-26. Tank 241-T-107 Analytical Results: Molybdenum (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: acid digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 356 | 50: 2 | Whole | 12 | 9.85 | 10.925 |
| 356 | | Whole | 15.1 | 10.7 | 12.9[QC:c,e] |
| 357 | | Whole | 13.5 | 13 | 13.25 |
| 357 | | Whole | 10.5 | 10.8 | 10.65 |
| 418 | 51: 3 | Lower half | 12.9 | --- | 12.9 |
| 418 | | Lower half | 7.07 | 7.63 | 7.35 |
| 419 | | Lower half | 7.63 | 6.77 | 7.2 |
| 419 | | Lower half | 9.93 | 10.1 | 10.015 |
| 490 | 52: 3 | Lower half | 3.61 | 3.81 | 3.71 |
| 490 | | Lower half | 3.73 | 3.56 | 3.645 |
| 491 | | Lower half | 4.05 | 3.87 | 3.96 |
| 491 | | Lower half | 3.53 | 3.24 | 3.385 |
| 549 | Core 51 composite | Whole | <5.98 | <5.95 | <5.965 |
| 503 | Core 52 composite | Whole | 5.57 | 7.26 | 6.415[QC:e] |
| **Solids: fusion** | | | **µg/g** | **µg/g** | **µg/g** |
| 387 | 50: 1R | Subsegment | 4.8 | <4.45 | <4.625 |
| 309 | 50: 2 | Whole | 12.9 | 12.8 | 12.85 |
| 322 | 50: 3 | Whole | <4.46 | 4.49 | <4.475 |
| 406 | 51: 2 | Whole | 20.6 | 18.2 | 19.4 |
| 255 | 51: 3 | Lower half | 9.53 | 11.7 | 10.615[QC:e] |
| 254 | | Upper half | 12.2 | 12.5 | 12.35 |
| 257 | 51: 4 | Lower half | 5.27 | 7.3 | 6.285[QC:e] |
| 256 | | Upper half | 7.13 | 6.93 | 7.03 |
| 455 | 52: 1 | Whole | <29.5 | <29.5 | <29.5 |
| 481 | 52: 2 | Whole | 13.7 | 13.1 | 13.4 |
| 483 | 52: 3 | Lower half | 9.77 | 8.21 | 8.99 |
| 482 | | Upper half | 9.82 | 5.74 | 7.78[QC:e] |

Table B2-26. Tank 241-T-107 Analytical Results: Molybdenum (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion (Cont'd)** | | | **μg/g** | **μg/g** | **μg/g** |
| 436 | Core 51 composite | Whole | 10.5 | 10.6 | 10.55 |
| 495 | Core 52 composite | Whole | <29.6 | <29.6 | <29.6 |
| 500 | | Whole | 7.96 | 6.63 | 7.295 |
| **Solids: water digest** | | | **μg/g** | **μg/g** | **μg/g** |
| 534 | Core 51 composite | Whole | 8.72 | 8.67 | 8.695 |
| 495 | Core 52 composite | Whole | 6.96 | 7.17 | 7.06 |
| **Liquids** | | | **μg/mL** | **μg/mL** | **μg/mL** |
| 393 | Core 50 composite | Drainable liquid | 2.23 | 2.14 | 2.185 |
| 442 | Core 51 composite | Drainable liquid | 22.2 | 22.6 | 22.4 |
| 494 | Core 52 composite | Drainable liquid | 2.09 | 2.16 | 2.125 |

Table B2-27. Tank 241-T-107 Analytical Results: Neodymium (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: acid digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 356 | 50: 2 | Whole | 91.7 | 68 | 79.85[QC:e] |
| 356 | | Whole | 71.7 | 52.5 | 62.1[QC:e] |
| 357 | | Whole | 68.4 | 64.9 | 66.65 |
| 357 | | Whole | 116 | 76.3 | 96.15[QC:e] |
| 418 | 51: 3 | Lower half | 185 | --- | 185 |
| 418 | | Lower half | 122 | 136 | 129 |
| 419 | | Lower half | 136 | 118 | 127 |
| 419 | | Lower half | 156 | 142 | 149[QC:e] |
| 490 | 52: 3 | Lower half | 8.91 | <8.1 | <8.505 |
| 490 | | Lower half | 13.9 | <8.07 | <10.985[QC:e] |
| 491 | | Lower half | 14 | 16 | 15 |
| 491 | | Lower half | <8.1 | 9.39 | <8.745 |
| 549 | Core 51 composite | Whole | 106 | 112 | 109 |
| 503 | Core 52 composite | Whole | 35.5 | 38.2 | 36.85 |
| **Solids: fusion** | | | **µg/g** | **µg/g** | **µg/g** |
| 387 | 50: 1R | Subsegment | <38.6 | <38.5 | <38.55 |
| 309 | 50: 2 | Whole | 40.2 | 73.5 | 56.85[QC:e] |
| 322 | 50: 3 | Whole | 76.9 | 84.3 | 80.6 |
| 406 | 51: 2 | Whole | 107 | 79.1 | 93.05[QC:e] |
| 255 | 51: 3 | Lower half | 198 | 140 | 169[QC:e] |
| 254 | | Upper half | 117 | 120 | 118.5 |
| 257 | 51: 4 | Lower half | <37.6 | 71.2 | <54.4[QC:e] |
| 256 | | Upper half | 147 | 136 | 141.5 |
| 455 | 52: 1 | Whole | <404 | <403 | <403.5 |
| 481 | 52: 2 | Whole | 76.8 | <38.8 | <57.8[QC:e] |
| 483 | 52: 3 | Lower half | 70.7 | 49.4 | 60.05[QC:e] |
| 482 | | Upper half | 59.7 | 96.3 | 78[QC:e] |

Table B2-27. Tank 241-T-107 Analytical Results: Neodymium (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion (Cont'd)** | | | **µg/g** | **µg/g** | **µg/g** |
| 436 | Core 51 composite | Whole | 81.1 | 83.3 | 82.2 |
| 495 | Core 52 composite | Whole | <404 | <405 | <404.5 |
| 500 | | Whole | 55.3 | <38.9 | <47.1[QC:e] |
| **Solids: water digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 534 | Core 51 composite | Whole | <8.63 | <8.63 | <8.63 |
| 495 | Core 52 composite | Whole | <83.0 | <83.1 | <83.1 |
| **Liquids** | | | **µg/mL** | **µg/mL** | **µg/mL** |
| 393 | Core 50 composite | Drainable liquid | 0.949 | 1.12 | 1.0345 |
| 442 | Core 51 composite | Drainable liquid | 0.795 | 1.04 | 0.9175[QC:e] |
| 494 | Core 52 composite | Drainable liquid | <1.95 | <1.95 | <1.95 |

Table B2-28. Tank 241-T-107 Analytical Results: Nickel (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: acid digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 356 | 50: 2 | Whole | 137 | 115 | 126 |
| 356 | | Whole | 177 | 126 | 151.5[QC:e] |
| 357 | | Whole | 177 | 172 | 174.5 |
| 357 | | Whole | 137 | 142 | 139.5 |
| 418 | 51: 3 | Lower half | 299 | --- | 299 |
| 418 | | Lower half | 178 | 192 | 185 |
| 419 | | Lower half | 193 | 178 | 185.5 |
| 419 | | Lower half | 244 | 226 | 235[QC:e] |
| 490 | 52: 3 | Lower half | 35.2 | 34.4 | 34.8 |
| 490 | | Lower half | 33.6 | 33.9 | 33.75 |
| 491 | | Lower half | 35.1 | 34.5 | 34.8 |
| 491 | | Lower half | 38.3 | 37.6 | 37.95 |
| 549 | Core 51 composite | Whole | 308 | 301 | 304.5[QC:a] |
| 503 | Core 52 composite | Whole | 274 | 285 | 279.5 |
| **Solids: fusion** | | | **µg/g** | **µg/g** | **µg/g** |
| 387 | 50: 1R | Subsegment | 9,780 | 8,070 | 8,925[QC:r] |
| 309 | 50: 2 | Whole | 4,470 | 3,470 | 3,970[QC:e,r] |
| 322 | 50: 3 | Whole | 4,480 | 4,670 | 4,575[QC:r] |
| 406 | 51: 2 | Whole | 11,900 | 12,300 | 12,100[QC:r] |
| 255 | 51: 3 | Lower half | 1,070 | 637 | 853.5[QC:e,r] |
| 254 | | Upper half | 1,700 | 968 | 1,334[QC:e,r] |
| 257 | 51: 4 | Lower half | 10,200 | 8,490 | 9,345[QC:r] |
| 256 | | Upper half | 983 | 738 | 860.5[QC:e,r] |
| 481 | 52: 2 | Whole | 2,610 | 3,220 | 2,915[QC:e,r] |
| 483 | 52: 3 | Lower half | 8,130 | 10,700 | 9,415[QC:e,r] |
| 482 | | Upper half | 3,440 | 1,060 | 2,250[QC:e,r] |
| 436 | Core 51 composite | Whole | 2,850 | 1,370 | 2,110[QC:e,r] |
| **Solids: fusion** | | | **µg/g** | **µg/g** | **µg/g** |
| 500 | Core 52 composite | Whole | 3,800 | 2,530 | 3,165[QC:e,r] |

Table B2-28. Tank 241-T-107 Analytical Results: Nickel (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: water digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 534 | Core 51 composite | Whole | 5.18 | 3.79 | 4.485[QC:e] |
| 495 | Core 52 composite | Whole | <13.2 | <13.2 | <13.2 |
| **Liquids** | | | **µg/mL** | **µg/mL** | **µg/mL** |
| 393 | Core 50 composite | Drainable liquid | 1.79 | 1.75 | 1.77 |
| 442 | Core 51 composite | Drainable liquid | 15.9 | 16.2 | 16.05 |
| 494 | Core 52 composite | Drainable liquid | 2.75 | 2.82 | 2.785 |

Note:

[1]The fusion results for nickel are not valid because of contamination from the nickel crucible during the fusion.

Table B2-29. Tank 241-T-107 Analytical Results: Phosphorus (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: acid digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 356 | 50: 2 | Whole | 4,440 | 14,200 | 9,320[QC:e] |
| 356 | | Whole | 8,170 | 4,050 | 6,110[QC:c,e] |
| 357 | | Whole | 4,850 | 4,470 | 4,660 |
| 357 | | Whole | 4,120 | 5,790 | 4,955[QC:d,e] |
| 418 | 51: 3 | Lower half | 6,330 | --- | 6,330 |
| 418 | | Lower half | 13,400 | 9,040 | 11,220[QC:e] |
| 419 | | Lower half | 7,460 | 9,840 | 8,650[QC:e] |
| 419 | | Lower half | 4,750 | 11,500 | 8,125[QC:e] |
| 490 | 52: 3 | Lower half | 24,800 | 28,000 | 26,400 |
| 490 | | Lower half | 28,000 | 24,200 | 26,100 |
| 491 | | Lower half | 26,000 | 27,000 | 26,500 |
| 491 | | Lower half | 27,600 | 27,400 | 27,500 |
| 549 | Core 51 composite | Whole | 33,900 | 25,400 | 29,650[QC:c,e] |
| 503 | Core 52 composite | Whole | 33,400 | 27,300 | 30,350 |
| **Solids: fusion** | | | **µg/g** | **µg/g** | **µg/g** |
| 387 | 50: 1R | Subsegment | 28,700 | 32,400 | 30,550 |
| 309 | 50: 2 | Whole | 4,340 | 3,340 | 3,840[QC:e] |
| 322 | 50: 3 | Whole | 44,500 | 40,800 | 42,650 |
| 406 | 51: 2 | Whole | 5,350 | 5,310 | 5,330 |
| 255 | 51: 3 | Lower half | 7,880 | 7,350 | 7,615 |
| 254 | | Upper half | 21,300 | 28,900 | 25,100[QC:e] |
| 257 | 51: 4 | Lower half | 31,000 | 33,900 | 32,450 |
| 256 | | Upper half | 12,700 | 6,730 | 9,715[QC:e] |
| 455 | 52: 1 | Whole | <226 | <226 | <226 |
| 481 | 52: 2 | Whole | 22,200 | 29,100 | 25,650[QC:e] |
| 483 | 52: 3 | Lower half | 25,500 | 26,400 | 25,950 |
| 482 | | Upper half | 38,700 | 35,000 | 36,850 |

Table B2-29. Tank 241-T-107 Analytical Results: Phosphorus (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion (Cont'd)** | | | **μg/g** | **μg/g** | **μg/g** |
| 436 | Core 51 composite | Whole | 31,500 | 34,300 | 32,900 |
| 495 | Core 52 composite | Whole | 34,500 | 34,500 | 34,500[QC:d] |
| 500 | | Whole | 33,600 | 28,900 | 31,250 |
| **Solids: water digest** | | | **μg/g** | **μg/g** | **μg/g** |
| 534 | Core 51 composite | Whole | 27,300 | 33,300 | 30,300[QC:d] |
| 495 | Core 52 composite | Whole | 18,400 | 15,900 | 17,100[QC:d] |
| **Liquids** | | | **μg/mL** | **μg/mL** | **μg/mL** |
| 393 | Core 50 composite | Drainable liquid | 785 | 795 | 790 |
| 442 | Core 51 composite | Drainable liquid | 2,020 | 2,030 | 2,025 |
| 494 | Core 52 composite | Drainable liquid | 2,630 | 2,550 | 2,590 |

Table B2-30. Tank 241-T-107 Analytical Results: Potassium (ICP).

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: acid digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 356 | 50: 2 | Whole | 235 | 195 | 215[QC:b] |
| 356 | | Whole | 281 | 177 | 229[QC:e] |
| 357 | | Whole | 251 | 227 | 239 |
| 357 | | Whole | 252 | 242 | 247[QC:b,c] |
| 418 | 51: 3 | Lower half | 435 | --- | 435 |
| 418 | | Lower half | 295 | 311 | 303[QC:d] |
| 419 | | Lower half | 316 | 291 | 303.5 |
| 419 | | Lower half | 353 | 337 | 345[QC:c] |
| 490 | 52: 3 | Lower half | 218 | 239 | 228.5 |
| 490 | | Lower half | 227 | 211 | 219[QC:c] |
| 491 | | Lower half | 225 | 209 | 217 |
| 491 | | Lower half | 210 | 217 | 213.5[QC:d] |
| 549 | Core 51 composite | Whole | 267 | 220 | 243.5[QC:a] |
| 503 | Core 52 composite | Whole | 233 | 217 | 225[QC:b,c] |
| **Solids: water digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 534 | Core 51 composite | Whole | 641 | 260 | 450.5[QC:e] |
| 495 | Core 52 composite | Whole | 226 | 135 | 180 |
| **Liquids** | | | **µg/mL** | **µg/mL** | **µg/mL** |
| 393 | Core 50 composite | Drainable liquid | 46.8 | 46.6 | 46.7 |
| 442 | Core 51 composite | Drainable liquid | 360 | 374 | 367[QC:d] |
| 494 | Core 52 composite | Drainable liquid | 137 | 139 | 138[QC:d] |

Table B2-31. Tank 241-T-107 Analytical Results: Samarium (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: acid digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 356 | 50: 2 | Whole | 144 | 119 | 131.5 |
| 356 | | Whole | 376 | 203 | 289.5[QC:a,c,e] |
| 357 | | Whole | 125 | 150 | 137.5 |
| 357 | | Whole | 33.7 | 334 | 183.85[QC:a,d,e] |
| 418 | 51: 3 | Lower half | 1,120 | --- | 1,120 |
| 418 | | Lower half | 373 | 394 | 383.5[QC:d] |
| 419 | | Lower half | 418 | 362 | 390 |
| 419 | | Lower half | 923 | 886 | 904.5[QC:c] |
| 490 | 52: 3 | Lower half | 28.5 | 27.5 | 28[QC:c] |
| 490 | | Lower half | 13.7 | 21.3 | 17.5[QC:e] |
| 491 | | Lower half | 34.4 | 29.6 | 32 |
| 491 | | Lower half | 36.4 | 37.9 | 37.15 |
| 549 | Core 51 composite | Whole | 480 | 448 | 464[QC:a] |
| 503 | Core 52 composite | Whole | 115 | 96.3 | 105.65[QC:a,d,f] |
| **Solids: fusion** | | | **µg/g** | **µg/g** | **µg/g** |
| 387 | 50: 1R | Subsegment | 69.5 | 69.9 | 69.7 |
| 309 | 50: 2 | Whole | 195 | 194 | 194.5 |
| 322 | 50: 3 | Whole | 202 | 136 | 169[QC:e] |
| 406 | 51: 2 | Whole | 135 | 97.4 | 116.2[QC:e] |
| 255 | 51: 3 | Lower half | 305 | <52 | <178.5[QC:e] |
| 254 | | Upper half | 239 | 103 | 171[QC:e] |
| 257 | 51: 4 | Lower half | <50.2 | 62.4 | <56.3 |
| 256 | | Upper half | 194 | 235 | 214.5 |
| 455 | 52: 1 | Whole | <463 | <462 | <462.5[QC:e] |
| 481 | 52: 2 | Whole | 110 | 97.1 | 103.55 |
| 483 | 52: 3 | Lower half | <51.7 | <51.3 | <51.5 |
| 482 | | Upper half | 106 | 102 | 104 |

Table B2-31. Tank 241-T-107 Analytical Results: Samarium (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion (Cont'd)** | | | **µg/g** | **µg/g** | **µg/g** |
| 436 | Core 51 composite | Whole | 148 | 208 | 178[QC:e] |
| 495 | Core 52 composite | Whole | <464 | <464 | <464 |
| 500 | | Whole | 79.5 | 63.4 | 71.45[QC:e] |
| **Solids: water digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 534 | Core 51 composite | Whole | <9.89 | <9.89 | <9.89 |
| 495 | Core 52 composite | Whole | <95.1 | <95.2 | 95.2 |
| **Liquids** | | | **µg/mL** | **µg/mL** | **µg/mL** |
| 393 | Core 50 composite | Drainable liquid | 2.07 | <1.04 | <1.555[QC:e] |
| 442 | Core 51 composite | Drainable liquid | 3.4 | 3.92 | 3.66 |
| 494 | Core 52 composite | Drainable liquid | <2.6 | <2.6 | <2.6 |

Table B2-32. Tank 241-T-107 Analytical Results: Selenium (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: acid digest** | | | µg/g | µg/g | µg/g |
| 356 | 50: 2 | Whole | 99.1 | 67.8 | 83.45[QC:e] |
| 356 | | Whole | <14.1 | <14 | <14.05[QC:a,r] |
| 357 | | Whole | 97.1 | 85.3 | 91.2 |
| 357 | | Whole | <14.1 | <14.1 | <14.1[QC:a,c,r] |
| 418 | 51: 3 | Lower half | 150 | --- | 150 |
| 418 | | Lower half | <14.1 | <14 | <14.05[QC:a,c,r] |
| 419 | | Lower half | 122 | 114 | 118[QC:c] |
| 419 | | Lower half | <14.1 | <13.9 | <14[QC:a,r] |
| 490 | 52: 3 | Lower half | 138 | 134 | 136 |
| 490 | | Lower half | <8.63 | <8.6 | <8.615[QC:c,r] |
| 491 | | Lower half | 157 | 150 | 153.5[QC:c] |
| 491 | | Lower half | <8.6 | <8.6 | <8.6[QC:c,r] |
| 549 | Core 51 composite | Whole | 104 | <86.3 | <95.15[QC:a] |
| 503 | Core 52 composite | Whole | <14.1 | <14 | <14.05[QC:a,c,r] |
| **Solids: fusion** | | | µg/g | µg/g | µg/g |
| 387 | 50: 1R | Subsegment | <69.8 | <69.7 | <69.75 |
| 309 | 50: 2 | Whole | <70.5 | <70.1 | <70.3[QC:r] |
| 322 | 50: 3 | Whole | <69.8 | <69.8 | <69.8[QC:c,r] |
| 406 | 51: 2 | Whole | <70.2 | <70.2 | <70.2 |
| 255 | 51: 3 | Lower half | <68.7 | <70.5 | <69.6 |
| 254 | | Upper half | <66.3 | <65.2 | <65.75 |
| 257 | 51: 4 | Lower half | <68.1 | <67.7 | <67.9 |
| 256 | | Upper half | <67.8 | <68.6 | <68.2 |
| 455 | 52: 1 | Whole | <428 | <427 | <427.5 |
| 481 | 52: 2 | Whole | <70.2 | <70.2 | <70.2 |
| 483 | 52: 3 | Lower half | <70.1 | <69.5 | <69.8 |
| 482 | | Upper half | <69.9 | <69.4 | <69.65 |

Table B2-32. Tank 241-T-107 Analytical Results: Selenium (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| Solids: fusion (Cont'd) | | | µg/g | µg/g | µg/g |
| 436 | Core 51 composite | Whole | <70.2 | <69.8 | <70[QC:c] |
| 495 | Core 52 composite | Whole | <429 | <430 | <429.5 |
| 500 | | Whole | <69.9 | <70.4 | <70.15[QC:c] |
| Solids: water digest | | | µg/g | µg/g | µg/g |
| 534 | Core 51 composite | Whole | 58.6 | 52.1 | 55.35[QC:a] |
| 495 | Core 52 composite | Whole | <88.1 | 89.4 | <88.8 |
| Liquids | | | µg/mL | µg/mL | µg/mL |
| 393 | Core 50 composite | Drainable liquid | <1.41 | <1.41 | <1.41[QC:a,c,r] |
| 442 | Core 51 composite | Drainable liquid | <1.41 | <1.41 | <1.41[QC:a,c,r] |
| 494 | Core 52 composite | Drainable liquid | <3.52 | <3.52 | <3.52[QC:a,c,r] |

Table B2-33. Tank 241-T-107 Analytical Results: Silicon (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: acid digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 356 | 50: 2 | Whole | 1,600 | 1,200 | 1,400[QC:b,e,r] |
| 356 | | Whole | 1,810 | 1,320 | 1,565[QC:b,d,e] |
| 357 | | Whole | 1,550 | 1,690 | 1,620[QC:b,c,r] |
| 357 | | Whole | 2,140 | 1,950 | 2,045[QC:b,d] |
| 418 | 51: 3 | Lower half | 794 | --- | 794[QC:b,r] |
| 418 | | Lower half | <3.39 | <3.37 | <3.38[QC:a,c,r] |
| 419 | | Lower half | 1,100 | 544 | 822[QC:b,c,e,r] |
| 419 | | Lower half | <3.39 | <3.36 | <3.375[QC:a,r] |
| 490 | 52: 3 | Lower half | 836 | 676 | 756[QC:b,c,e,r] |
| 490 | | Lower half | 2,050 | 2,350 | 2,200[QC:b,c,r] |
| 491 | | Lower half | 901 | 784 | 842.5[QC:b,c,r] |
| 491 | | Lower half | 1,660 | 1,430 | 1,545[QC:b,d,r] |
| 549 | Core 51 composite | Whole | 63.7 | 156 | 109.85[QC:b,e] |
| 503 | Core 52 composite | Whole | 1,820 | 1,460 | 1,640[QC:b,c,e,r] |
| **Solids: fusion** | | | **µg/g** | **µg/g** | **µg/g** |
| 387 | 50: 1R | Subsegment | 9,970 | 9,720 | 9,845 |
| 309 | 50: 2 | Whole | 2,230 | 1,880 | 2,055 |
| 322 | 50: 3 | Whole | 4,670 | 5,250 | 4,960 |
| 406 | 51: 2 | Whole | 5,740 | 4,440 | 5,090[QC:e] |
| 255 | 51: 3 | Lower half | 925 | 1,140 | 1,032.5[QC:e] |
| 254 | | Upper half | 1,100 | 863 | 981.5[QC:e] |
| 257 | 51: 4 | Lower half | 10,100 | 9,870 | 9,985 |
| 256 | | Upper half | 2,680 | 2,780 | 2,730 |
| 455 | 52: 1 | Whole | 4,600 | 4,720 | 4,660[QC:d,r] |
| 481 | 52: 2 | Whole | 5,890 | 5,190 | 5,540 |
| 483 | 52: 3 | Lower half | 11,400 | 11,100 | 11,250 |
| 482 | | Upper half | 4,680 | 5,090 | 4,885 |

Table B2-33. Tank 241-T-107 Analytical Results: Silicon (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion (Cont'd)** | | | **μg/g** | **μg/g** | **μg/g** |
| 436 | Core 51 composite | Whole | 4,980 | 4,750 | 4,865 |
| 495 | Core 52 composite | Whole | 7,260 | 7,370 | 7,315[QC:d,r] |
| 500 | | Whole | 7,110 | 7,390 | 7,250 |
| **Solids: water digest** | | | **μg/g** | **μg/g** | **μg/g** |
| 534 | Core 51 composite | Whole | 3,710 | 4,180 | 3,945 |
| 495 | Core 52 composite | Whole | <16.2 | <16.2 | <16.2 |
| **Liquids** | | | **μg/mL** | **μg/mL** | **μg/mL** |
| 393 | Core 50 composite | Drainable liquid | 60.8 | 56.2 | 58.5[QC:b,d,r] |
| 442 | Core 51 composite | Drainable liquid | 65.8 | 66.8 | 66.3[QC:b,d,r] |
| 494 | Core 52 composite | Drainable liquid | 78.2 | 96.1 | 87.15[QC:b,d,r] |

Table B2-34. Tank 241-T-107 Analytical Results: Silver (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: acid digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 356 | 50: 2 | Whole | 2.99 | 2.44 | 2.715[QC:a,r] |
| 356 | | Whole | 5.69 | 8.22 | 6.955[QC:e] |
| 357 | | Whole | 32.7 | 64.1 | 48.4[QC:e] |
| 357 | | Whole | 2.21 | 1.7 | 1.955[QC:a,c,e,r] |
| 418 | 51: 3 | Lower half | 16.1 | --- | 16.1[QC:a,r] |
| 418 | | Lower half | <0.897 | <0.891 | <0.894[QC:a,c,r] |
| 419 | | Lower half | 19.3 | 16.2 | 17.75[QC:a,c,r] |
| 419 | | Lower half | <0.897 | <0.889 | <0.893[QC:a,r] |
| 490 | 52: 3 | Lower half | <0.496 | <0.494 | <0.495[QC:c] |
| 490 | | Lower half | <0.5 | <0.492 | <0.496[QC:a,c,r] |
| 491 | | Lower half | <0.494 | <0.494 | <0.494 |
| 491 | | Lower half | <0.492 | <0.498 | <0.495[QC:a,c,r] |
| 549 | Core 51 composite | Whole | 6.79 | 7.94 | 7.365[QC:a] |
| 503 | Core 52 composite | Whole | <0.898 | <0.891 | <0.8945[QC:c] |
| **Solids: fusion** | | | **µg/g** | **µg/g** | **µg/g** |
| 387 | 50: 1R | Subsegment | <4.46 | <4.45 | <4.455 |
| 309 | 50: 2 | Whole | <4.5 | <4.47 | <4.485 |
| 322 | 50: 3 | Whole | <4.46 | <4.46 | <4.46 |
| 406 | 51: 2 | Whole | 4.57 | <4.48 | <4.525 |
| 255 | 51: 3 | Lower half | <4.39 | <4.5 | <4.445 |
| 254 | | Upper half | <4.23 | <4.16 | <4.195 |
| 257 | 51: 4 | Lower half | <4.34 | <4.32 | <4.33 |
| 256 | | Upper half | 6.21 | <4.38 | <5.295[QC:e] |
| 455 | 52: 1 | Whole | <24.6 | <24.6 | <24.6 |
| 481 | 52: 2 | Whole | <4.48 | <4.48 | <4.48 |

Table B2-34. Tank 241-T-107 Analytical Results: Silver (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion (Cont'd)** | | | **µg/g** | **µg/g** | **µg/g** |
| 483 | 52: 3 | Lower half | 5.31 | 5.09 | 5.2 |
| 482 | | Upper half | 4.72 | 5.45 | 5.085 |
| 436 | Core 51 composite | Whole | <4.48 | <4.46 | <4.47 |
| 495 | Core 52 composite | Whole | <24.7 | <24.7 | <24.7 |
| 500 | | Whole | <4.46 | <4.49 | <4.475 |
| **Solids: water digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 534 | Core 51 composite | Whole | <0.526 | <0.526 | <0.526 |
| 495 | Core 52 composite | Whole | <5.06 | <5.09 | <5.07 |
| **Liquids** | | | **µg/mL** | **µg/mL** | **µg/mL** |
| 393 | Core 50 composite | Drainable liquid | <0.09 | <0.09 | <0.09[QC:a] |
| 442 | Core 51 composite | Drainable liquid | 0.254 | 0.262 | 0.258[QC:a,c] |
| 494 | Core 52 composite | Drainable liquid | <0.225 | <0.225 | <0.225 |

Table B2-35. Tank 241-T-107 Analytical Results: Sodium (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: acid digest** | | | µg/g | µg/g | µg/g |
| 356 | 50: 2 | Whole | 61,800 | 76,400 | 69,100[QC:b,e] |
| 356 | | Whole | 89,300 | 63,200 | 76,250[QC:b,e] |
| 357 | | Whole | 82,600 | 76,800 | 79,700[QC:b] |
| 357 | | Whole | 59,700 | 60,700 | 60,200[QC:b,d] |
| 418 | 51: 3 | Lower half | 1.130E+05 | --- | 1.130E+05[QC:b] |
| 418 | | Lower half | 92,300 | 84,800 | 88,550[QC:b] |
| 419 | | Lower half | 75,600 | 88,700 | 82,150[QC:b] |
| 419 | | Lower half | 95,700 | 98,900 | 97,300[QC:b] |
| 490 | 52: 3 | Lower half | 1.040E+05 | 1.090E+05 | 1.065E+05[QC:b] |
| 490 | | Lower half | 1.160E+05 | 1.080E+05 | 1.120E+05[QC:b] |
| 491 | | Lower half | 1.080E+05 | 1.080E+05 | 1.080E+05[QC:b] |
| 491 | | Lower half | 1.250E+05 | 1.250E+05 | 1.250E+05[QC:b] |
| 549 | Core 51 composite | Whole | 1.420E+05 | 1.310E+05 | 1.365E+05[QC:b,d] |
| 503 | Core 52 composite | Whole | 1.310E+05 | 1.170E+05 | 1.240E+05[QC:b] |
| **Solids: fusion** | | | µg/g | µg/g | µg/g |
| 387 | 50: 1R | Subsegment | 1.250E+05 | 1.300E+05 | 1.275E+05 |
| 309 | 50: 2 | Whole | 58,300 | 52,100 | 55,200[QC:r] |
| 322 | 50: 3 | Whole | 1.240E+05 | 1.210E+05 | 1.225E+05[QC:c,r] |
| 406 | 51: 2 | Whole | 72,000 | 70,200 | 71,100 |
| 255 | 51: 3 | Lower half | 78,900 | 76,900 | 77,900 |
| 254 | | Upper half | 1.020E+05 | 1.140E+05 | 1.080E+05 |
| 257 | 51: 4 | Lower half | 1.200E+05 | 1.240E+05 | 1.220E+05 |
| 256 | | Upper half | 88,000 | 76,900 | 82,450 |
| 455 | 52: 1 | Whole | 26,500 | 28,000 | 27,250[QC:d] |
| 481 | 52: 2 | Whole | 98,500 | 1.120E+05 | 1.052E+05 |
| 483 | 52: 3 | Lower half | 1.080E+05 | 1.060E+05 | 1.070E+05 |
| 482 | | Upper half | 1.350E+05 | 1.270E+05 | 1.310E+05 |

Table B2-35. Tank 241-T-107 Analytical Results: Sodium (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion (Cont'd)** | | | **µg/g** | **µg/g** | **µg/g** |
| 436 | Core 51 composite | Whole | 1.190E+05 | 1.270E+05 | 1.230E+05 |
| 495 | Core 52 composite | Whole | 1.300E+05 | 1.400E+05 | 1.350E+05 |
| 500 | | Whole | 1.150E+05 | 1.080E+05 | 1.115E+05[QC:c] |
| **Solids: water digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 534 | Core 51 composite | Whole | 1.280E+05 | 1.400E+05 | 1.340E+05 |
| 495 | Core 52 composite | Whole | 87,100 | 76,500 | 81,800[QC:d] |
| **Liquids** | | | **µg/mL** | **µg/mL** | **µg/mL** |
| 393 | Core 50 composite | Drainable liquid | 14,600 | 14,600 | 14,600[QC:b] |
| 442 | Core 51 composite | Drainable liquid | 96,300 | 94,700 | 95,500[QC:b] |
| 494 | Core 52 composite | Drainable liquid | 52,300 | 51,500 | 51,900[QC:b] |

Table B2-36. Tank 241-T-107 Analytical Results: Strontium (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: acid digest** | | | µg/g | µg/g | µg/g |
| 356 | 50: 2 | Whole | 995 | 788 | 891.5[QC:e] |
| 356 | | Whole | 1,210 | 832 | 1,021[QC:d,e] |
| 357 | | Whole | 938 | 988 | 963 |
| 357 | | Whole | 1,200 | 1,140 | 1,170[QC:d] |
| 418 | 51: 3 | Lower half | 2,030 | --- | 2,030 |
| 418 | | Lower half | 1,280 | 1,380 | 1,330[QC:d] |
| 419 | | Lower half | 1,420 | 1,290 | 1,355 |
| 419 | | Lower half | 1,710 | 1,600 | 1,655[QC:e] |
| 490 | 52: 3 | Lower half | 357 | 276 | 316.5 |
| 490 | | Lower half | 390 | 329 | 359.5[QC:d] |
| 491 | | Lower half | 290 | 360 | 325[QC:d,e] |
| 491 | | Lower half | 335 | 319 | 327[QC:d] |
| 549 | Core 51 composite | Whole | 1,250 | 1,230 | 1,240 |
| 503 | Core 52 composite | Whole | 704 | 665 | 684.5[QC:e] |
| **Solids: fusion** | | | µg/g | µg/g | µg/g |
| 387 | 50: 1R | Subsegment | 429 | 414 | 421.5 |
| 309 | 50: 2 | Whole | 853 | 841 | 847 |
| 322 | 50: 3 | Whole | 1,020 | 1,140 | 1,080 |
| 406 | 51: 2 | Whole | 1,060 | 1,020 | 1,040 |
| 255 | 51: 3 | Lower half | 1,350 | 1,350 | 1,350 |
| 254 | | Upper half | 1,170 | 1,030 | 1,100 |
| 257 | 51: 4 | Lower half | 421 | 409 | 415 |
| 256 | | Upper half | 1,560 | 1,650 | 1,605 |
| 455 | 52: 1 | Whole | 46.7 | 50.6 | 48.65 |
| 481 | 52: 2 | Whole | 681 | 616 | 648.5 |
| 483 | 52: 3 | Lower half | 372 | 291 | 331.5[QC:e] |
| 482 | | Upper half | 960 | 930 | 945 |

Table B2-36. Tank 241-T-107 Analytical Results: Strontium (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion (Cont'd)** | | | **µg/g** | **µg/g** | **µg/g** |
| 436 | Core 51 composite | Whole | 934 | 974 | 954 |
| 495 | Core 52 composite | Whole | 652 | 814 | 733[QC:e] |
| 500 | | Whole | 751 | 854 | 802.5 |
| **Solids: water digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 534 | Core 51 composite | Whole | 6.44 | 4.54 | 5.49[QC:e] |
| 495 | Core 52 composite | Whole | 5.06 | 6.08 | 5.57 |
| **Liquids** | | | **µg/mL** | **µg/mL** | **µg/mL** |
| 393 | Core 50 composite | Drainable liquid | 0.14 | 0.139 | 0.1395 |
| 442 | Core 51 composite | Drainable liquid | 0.175 | 0.169 | 0.172 |
| 494 | Core 52 composite | Drainable liquid | 1.80 | 1.82 | 1.81 |

Table B2-37. Tank 241-T-107 Analytical Results: Sulfur (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: acid digest** | | | µg/g | µg/g | µg/g |
| 356 | 50: 2 | Whole | 3,110 | 2,580 | 2,845 |
| 356 | | Whole | 4,320 | 3,420 | 3,870[QC:c,e] |
| 357 | | Whole | 3,010 | 3,130 | 3,070[QC:c] |
| 357 | | Whole | 4,490 | 4,860 | 4,675[QC:c] |
| 418 | 51: 3 | Lower half | 5,920 | --- | 5,920 |
| 418 | | Lower half | 4,030 | 4,260 | 4,145[QC:d] |
| 419 | | Lower half | 4,390 | 4,060 | 4,225 |
| 419 | | Lower half | 4,920 | 4,510 | 4,715[QC:c] |
| 490 | 52: 3 | Lower half | 3,430 | 3,510 | 3,470 |
| 490 | | Lower half | 3,690 | 3,520 | 3,605[QC:c] |
| 491 | | Lower half | 3,840 | 3,840 | 3,840 |
| 491 | | Lower half | 3,680 | 3,470 | 3,575[QC:c] |
| 549 | Core 51 composite | Whole | 3,600 | 3,520 | 3,560[QC:c] |
| 503 | Core 52 composite | Whole | 2,490 | 2,570 | 2,530[QC:d] |
| **Solids: fusion** | | | µg/g | µg/g | µg/g |
| 387 | 50: 1R | Subsegment | 2,960 | 2,880 | 2,920 |
| 309 | 50: 2 | Whole | 2,950 | 2,710 | 2,830 |
| 322 | 50: 3 | Whole | 1,290 | 1,470 | 1,380 |
| 406 | 51: 2 | Whole | 4,350 | 4,230 | 4,290 |
| 255 | 51: 3 | Lower half | 4,260 | 4,270 | 4,265 |
| 254 | | Upper half | 3,640 | 3,250 | 3,445 |
| 257 | 51: 4 | Lower half | 3,110 | 3,060 | 3,085 |
| 256 | | Upper half | 4,260 | 4,470 | 4,365 |
| 455 | 52: 1 | Whole | 1,080 | 1,150 | 1,115 |
| 481 | 52: 2 | Whole | 2,640 | 2,510 | 2,575 |
| 483 | 52: 3 | Lower half | 3,610 | 3,530 | 3,570 |
| 482 | | Upper half | 2,470 | 2,630 | 2,550 |

Table B2-37. Tank 241-T-107 Analytical Results: Sulfur (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion (Cont'd)** | | | **µg/g** | **µg/g** | **µg/g** |
| 436 | Core 51 composite | Whole | 3,490 | 3,640 | 3,565 |
| 495 | Core 52 composite | Whole | 2,470 | 2,440 | 2,455 |
| 500 | | Whole | 2,910 | 3,060 | 2,985 |
| **Solids: water digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 534 | Core 51 composite | Whole | 4,100 | 3,840 | 3,970 |
| 495 | Core 52 composite | Whole | 3,360 | 2,860 | 3,110 |
| **Liquids** | | | **µg/mL** | **µg/mL** | **µg/mL** |
| 393 | Core 50 composite | Drainable liquid | 831 | 818 | 824.5[QC:c,r] |
| 442 | Core 51 composite | Drainable liquid | 6,030 | 5,990 | 6,010 |
| 494 | Core 52 composite | Drainable liquid | 3,350 | 3,320 | 3,335 |

Table B2-38. Tank 241-T-107 Analytical Results: Thallium (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: acid digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 356 | 50: 2 | Whole | 44.8 | 39.3 | 42.05[QC:a] |
| 356 | | Whole | 152 | 113 | 132.5[QC:a,c,e] |
| 357 | | Whole | 327 | 584 | 455.5[QC:a,c,e] |
| 357 | | Whole | <25 | 67.3 | <46.15[QC:a,d,e] |
| 418 | 51: 3 | Lower half | 403 | --- | 403[QC:a] |
| 418 | | Lower half | 205 | 232 | 218.5[QC:d] |
| 419 | | Lower half | 219 | 201 | 210 |
| 419 | | Lower half | 360 | 337 | 348.5[QC:a,c] |
| 490 | 52: 3 | Lower half | 27.9 | 26.3 | 27.1[QC:a] |
| 490 | | Lower half | <16.3 | <16.2 | <16.25 |
| 491 | | Lower half | 26.9 | <16.2 | <21.55[QC:c,e] |
| 491 | | Lower half | <16.1 | 21.5 | <18.8[QC:a,d,e] |
| 549 | Core 51 composite | Whole | <164 | <163 | <163.5[QC:a] |
| 503 | Core 52 composite | Whole | 72 | 35.4 | 53.7[QC:a,d,e,r] |
| **Solids: fusion** | | | **µg/g** | **µg/g** | **µg/g** |
| 387 | 50: 1R | Subsegment | <124 | <124 | <124 |
| 309 | 50: 2 | Whole | <125 | <124 | <124.5[QC:r] |
| 322 | 50: 3 | Whole | 203 | <124 | <163.5[QC:e,r] |
| 406 | 51: 2 | Whole | <125 | <125 | <125 |
| 255 | 51: 3 | Lower half | <122 | <125 | <123.5 |
| 254 | | Upper half | <167 | <116 | <141.5[QC:e] |
| 257 | 51: 4 | Lower half | <121 | <120 | <120.5 |
| 256 | | Upper half | <120 | <122 | <121 |
| 455 | 52: 1 | Whole | <807 | <806 | <806.5 |
| 481 | 52: 2 | Whole | <125 | <125 | <125 |
| 483 | 52: 3 | Lower half | <124 | <123 | <123.5 |
| 482 | | Upper half | <124 | <123 | <123.5 |

Table B2-38. Tank 241-T-107 Analytical Results: Thallium (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion (Cont'd)** | | | **µg/g** | **µg/g** | **µg/g** |
| 436 | Core 51 composite | Whole | <125 | 144 | <134.5 |
| 495 | Core 52 composite | Whole | <809 | <810 | <809.5 |
| 500 | | Whole | <124 | <125 | <124.5 |
| **Solids: water digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 534 | Core 51 composite | Whole | <17.3 | <17.3 | <17.3 |
| 495 | Core 52 composite | Whole | <166 | <166 | <166 |
| **Liquids** | | | **µg/mL** | **µg/mL** | **µg/mL** |
| 393 | Core 50 composite | Drainable liquid | <2.5 | <2.5 | <2.5 |
| 442 | Core 51 composite | Drainable liquid | <2.5 | 3.21 | <2.855[QC:d] |
| 494 | Core 52 composite | Drainable liquid | <6.25 | <6.25 | <6.25 |

Table B2-39. Tank 241-T-107 Analytical Results: Titanium (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: acid digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 356 | 50: 2 | Whole | <0.699 | <0.697 | <0.698 |
| 356 | | Whole | <0.292 | 5.68 | ≤2.986[QC:e,e] |
| 357 | | Whole | 8.49 | 19.7 | 14.095[QC:e] |
| 357 | | Whole | <0.699 | <0.699 | <0.699 |
| 418 | 51: 3 | Lower half | <0.23 | --- | <0.23 |
| 418 | | Lower half | <0.698 | <0.693 | ≤0.6955[QC:e] |
| 419 | | Lower half | <0.698 | <0.692 | <0.695 |
| 419 | | Lower half | <0.299 | <0.295 | <0.297[QC:e] |
| 490 | 52: 3 | Lower half | 2.47 | 2.44 | 2.455 |
| 490 | | Lower half | 2.61 | 2.04 | 2.325[QC:e] |
| 491 | | Lower half | 2.32 | 2.66 | 2.49 |
| 491 | | Lower half | 2.67 | 2.28 | 2.475 |
| 549 | Core 51 composite | Whole | <2.99 | <2.98 | <2.985 |
| 503 | Core 52 composite | Whole | 4.11 | 146 | 75.055[QC:e,r] |
| **Solids: fusion** | | | **µg/g** | **µg/g** | **µg/g** |
| 387 | 50: 1R | Subsegment | <3.47 | <3.46 | <3.465 |
| 309 | 50: 2 | Whole | 39.8 | 33.7 | 36.75 |
| 322 | 50: 3 | Whole | <3.47 | 31.4 | ≤17.435[QC:e] |
| 406 | 51: 2 | Whole | 97.5 | 76.1 | 86.8[QC:e] |
| 255 | 51: 3 | Lower half | <3.41 | <3.5 | <3.455 |
| 254 | | Upper half | <23 | 22 | <22.5 |
| 257 | 51: 4 | Lower half | <3.38 | 4.51 | <3.945[QC:e] |
| 256 | | Upper half | <3.37 | <3.4 | <3.385 |
| 455 | 52: 1 | Whole | 148 | 275 | 211.5[QC:e] |
| 481 | 52: 2 | Whole | 22.4 | 7.89 | 15.145[QC:e] |
| 483 | 52: 3 | Lower half | 8.96 | 13.9 | 11.43[QC:e] |
| 482 | | Upper half | 4.89 | 4.3 | 4.595 |

Table B2-39. Tank 241-T-107 Analytical Results: Titanium (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion (Cont'd)** | | | **µg/g** | **µg/g** | **µg/g** |
| 436 | Core 51 composite | Whole | <3.49 | 16.3 | <9.895[QC:e] |
| 495 | Core 52 composite | Whole | 19.2 | <14.8 | <17 |
| 500 | | Whole | 5.22 | 7.28 | 6.25[QC:e] |
| **Solids: water digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 534 | Core 51 composite | Whole | 1.25 | 2.98 | 2.115[QC:e] |
| 495 | Core 52 composite | Whole | <3.04 | <3.04 | <3.04 |
| **Liquids** | | | **µg/mL** | **µg/mL** | **µg/mL** |
| 393 | Core 50 composite | Drainable liquid | <0.07 | <0.07 | <0.07 |
| 442 | Core 51 composite | Drainable liquid | <0.07 | <0.07 | <0.07 |
| 494 | Core 52 composite | Drainable liquid | <0.175 | <0.175 | <0.175 |

Table B2-40. Tank 241-T-107 Analytical Results: Zirconium (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: acid digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 356 | 50: 2 | Whole | 16.0 | 18.3 | 17.15[QC:c] |
| 356 | | Whole | <1.2 | <1.2 | <1.2[QC:r] |
| 357 | | Whole | 49.6 | 64.8 | 57.2[QC:c,e] |
| 357 | | Whole | <1.2 | <1.2 | <1.2[QC:c,r] |
| 418 | 51: 3 | Lower half | 50.9 | --- | 50.9 |
| 418 | | Lower half | 13.5 | 13.9 | 13.7 |
| 419 | | Lower half | 15.5 | 13.3 | 14.4 |
| 419 | | Lower half | 42.1 | 39.2 | 40.65 |
| 490 | 52: 3 | Lower half | 49.1 | 56.5 | 52.8 |
| 490 | | Lower half | 29.3 | 40.2 | 34.75[QC:c,e,r] |
| 491 | | Lower half | 24.1 | 19.9 | 22[QC:c,r] |
| 491 | | Lower half | 50.4 | 55.6 | 53.0 |
| 549 | Core 51 composite | Whole | 117 | 121 | 119 |
| 503 | Core 52 composite | Whole | 22.5 | 25.7 | 24.1[QC:c,r] |
| **Solids: fusion** | | | **µg/g** | **µg/g** | **µg/g** |
| 387 | 50: 1R | Subsegment | 12.4 | 30.2 | 21.3[QC:e] |
| 309 | 50: 2 | Whole | <6 | <5.96 | <5.98 |
| 322 | 50: 3 | Whole | <5.94 | <5.94 | <5.94 |
| 406 | 51: 2 | Whole | <5.98 | 48.2 | <27.09[QC:e] |
| 255 | 51: 3 | Lower half | 11 | <6 | <8.5[QC:e] |
| 254 | | Upper half | 19.4 | 11.9 | 15.65[QC:e] |
| 257 | 51: 4 | Lower half | 17.9 | 35.9 | 26.9[QC:e] |
| 256 | | Upper half | 45.8 | 45.6 | 45.7 |
| 455 | 52: 1 | Whole | 97.2 | 178 | 137.6[QC:e] |
| 481 | 52: 2 | Whole | 9.29 | 13.6 | 11.445[QC:e] |
| 483 | 52: 3 | Lower half | 111 | 252 | 181.5[QC:e] |
| 482 | | Upper half | 168 | 90 | 129[QC:e] |

Table B2-40. Tank 241-T-107 Analytical Results: Zirconium (ICP). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion (Cont'd)** | | | **µg/g** | **µg/g** | **µg/g** |
| 436 | Core 51 composite | Whole | 85.6 | 66.3 | 75.95 |
| 495 | Core 52 composite | Whole | 214 | 166 | 190 |
| 500 | | Whole | 127 | 93.8 | 110.4[QC:e] |
| **Solids: water digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 534 | Core 51 composite | Whole | 2.1 | 3.9 | 3[QC:e] |
| 495 | Core 52 composite | Whole | 12.2 | 7.09 | 9.65[QC:e] |
| **Liquids** | | | **µg/mL** | **µg/mL** | **µg/mL** |
| 393 | Core 50 composite | Drainable liquid | 0.134 | 0.134 | 0.134 |
| 442 | Core 51 composite | Drainable liquid | 0.656 | 0.641 | 0.6485 |
| 494 | Core 52 composite | Drainable liquid | 1.76 | 1.63 | 1.695 |

Table B2-41. Tank 241-T-107 Analytical Results: Hexavalent Chromium (Spectrophotometry).

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: water digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 534-7769 | Core 51 composite | Whole | <18.5 | <18.4 | <18.45 |
| 528-7769 | Core 52 composite | Whole | <19.2 | <19.5 | <19.35 |

Table B2-42A. Tank 241-T-107 Analytical Results: Total Uranium (LF).

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion** | | | **µg/g** | **µg/g** | **µg/g** |
| 257-5740 | 51: 4 | Lower half | 7,160 | 6,940 | 7,050[QC:c] |
| 294-5740 | | Lower half | 9,020 | 9,020 | 9,020 |
| 294-5740 | | Lower half | 7,980 | 7,680 | 7,830[QC:d] |
| 436-5740 | Core 51 composite | Whole | 11,400 | 29,200 | 20,300[QC:e] |
| 436-6740 | | Whole | 32,900 | 31,600 | 32,250[QC:a] |
| 500-5740 | Core 52 composite | Whole | 16,400 | 18,300 | 17,300 |
| 500-6740 | | Whole | 18,200 | 19,000 | 18,600[QC:d] |
| 500-6740 | | Whole | 18,700 | 22,900 | 20,800[QC:d] |
| **Liquids** | | | **µg/mL** | **µg/mL** | **µg/mL** |
| 393-5740 | Core 50 composite | Drainable liquid | 94.4 | 96.1 | 95.25 |
| 442-5740 | Core 51 composite | Drainable liquid | 610 | 566 | 588 |
| 494-5740 | Core 52 composite | Drainable liquid | 39.7 | 41.5 | 40.6 |

Table B2-42B. Tank 241-T-107 Analytical Results: Uranium-238.[1]

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion** | | | **µCi/g** | **µCi/g** | **µCi/g** |
| 294-5740 | 51:4 | Lower half | 0.00303 | 0.00303 | 0.00303 |
| 436-6740 | Core 51 composite | Whole | 0.01 | 0.01 | 0.01 |
| 500-6740 | Core 52 composite | Whole | 0.00612 | 0.00638 | 0.00625 |
| 500-6740 | | Whole | 0.00628 | 0.00769 | 0.006985 |
| **Liquids** | | | **µCi/mL** | **µCi/mL** | **µCi/mL** |
| 393-5781 | Core 50 composite | Drainable liquid | 3.17E-05 | 3.23E-05 | 3.20E-05 |
| 442-5781 | Core 51 composite | Drainable liquid | 2.05E-04 | 1.90E-04 | 1.98E-04 |
| 494-5781 | Core 52 composite | Drainable liquid | 1.33E-05 | 1.39E-05 | 1.36E-05 |

Note:

[1]Uranium-238 values were calculated from the total uranium (LF) results by assuming the isotopic abundance was equivalent to that found in nature. Uranium concentrations were multiplied by the specific activity of 3.36E-07 Ci/g to obtain $^{238}U$ results (Svancara and Pool 1993).

Table B2-43. Tank 241-T-107 Analytical Results: Chloride (IC).

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: water digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 534-7771 | Core 51 composite | Whole | 732 | 632 | 682 |
| 528-7771 | Core 52 composite | Whole | 389 | 409 | 399 |
| 528-7771 | | Whole | 428 | 420 | 424 |
| **Liquids** | | | **µg/mL** | **µg/mL** | **µg/mL** |
| 393-5771 | Core 50 composite | Drainable liquid | 199 | 193 | 196 |
| 442-5771 | Core 51 composite | Drainable liquid | 1,340 | 1,340 | 1,340 |
| 494-5771 | Core 52 composite | Drainable liquid | 851 | 869 | 860 |

Table B2-44. Tank 241-T-107 Analytical Results: Fluoride (IC).

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: water digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 534-7771 | Core 51 composite | Whole | 8,530 | 9,920 | 9,225 |
| 528-7771 | Core 52 composite | Whole | 14,000 | 13,200 | 13,600[QC:c] |
| 528-7771 | | Whole | 14,300 | 13,200 | 13,750[QC:c] |
| **Liquids** | | | **µg/mL** | **µg/mL** | **µg/mL** |
| 393-5771 | Core 50 composite | Drainable liquid | 170 | 177 | 173.5 |
| 442-5771 | Core 51 composite | Drainable liquid | 824 | 826 | 825 |
| 494-5771 | Core 52 composite | Drainable liquid | 668 | 678 | 673 |

Table B2-45. Tank 241-T-107 Analytical Results: Nitrate (IC).

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: water digest** | | | **μg/g** | **μg/g** | **μg/g** |
| 534-7771 | Core 51 composite | Whole | 96,400 | 89,200 | 92,800 |
| 528-7771 | Core 52 composite | Whole | 54,800 | 57,700 | 56,250 |
| 528-7771 | | Whole | 58,200 | 61,200 | 59,700[QC:d] |
| **Liquids** | | | **μg/mL** | **μg/mL** | **μg/mL** |
| 393-5771 | Core 50 composite | Drainable liquid | 21,200 | 21,200 | 21,200 |
| 442-5771 | Core 51 composite | Drainable liquid | 1.340E+05 | 1.350E+05 | 1.345E+05 |
| 494-5771 | Core 52 composite | Drainable liquid | 1.000E+05 | 1.000E+05 | 1.000E+05 |

Table B2-46. Tank 241-T-107 Analytical Results: Nitrite (IC).

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: water digest** | | | **μg/g** | **μg/g** | **μg/g** |
| 534-7771 | Core 51 composite | Whole | 15,700 | 14,900 | 15,300 |
| 528-7771 | Core 52 composite | Whole | 7,980 | 8,290 | 8,135 |
| 528-7771 | | Whole | 8,420 | 8,730 | 8,575 |
| **Liquids** | | | **μg/mL** | **μg/mL** | **μg/mL** |
| 393-5771 | Core 50 composite | Drainable liquid | 2,590 | 2,570 | 2,580 |
| 442-5771 | Core 51 composite | Drainable liquid | 27,500 | 27,800 | 27,650 |
| 494-5771 | Core 52 composite | Drainable liquid | 7,990 | 8,120 | 8,055 |

Table B2-47. Tank 241-T-107 Analytical Results: Phosphate (IC).

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: water digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 534-7771 | Core 51 composite | Whole | 87,000 | 1.020E+05 | 94,500 |
| 528-7771 | Core 52 composite | Whole | 1.400E+05 | 1.250E+05 | 1.325E+05[QC:c] |
| 528-7771 | | Whole | 1.410E+05 | 1.280E+05 | 1.345E+05[QC:c] |
| **Liquids** | | | **µg/mL** | **µg/mL** | **µg/mL** |
| 393-5771 | Core 50 composite | Drainable liquid | 2,300 | 2,500 | 2,400 |
| 442-5771 | Core 51 composite | Drainable liquid | 6,290 | 6,190 | 6,240 |
| 494-5771 | Core 52 composite | Drainable liquid | 7,650 | 7,610 | 7,630 |

Table B2-48. Tank 241-T-107 Analytical Results: Sulfate (IC).

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: water digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 534-7771 | Core 51 composite | Whole | 13,000 | 12,300 | 12,650 |
| 528-7771 | Core 52 composite | Whole | 6,980 | 7,260 | 7,120 |
| 528-7771 | | Whole | 7,330 | 7,620 | 7,475 |
| **Liquids** | | | **µg/mL** | **µg/mL** | **µg/mL** |
| 393-5771 | Core 50 composite | Drainable liquid | 4,640 | 4,650 | 4,645 |
| 442-5771 | Core 51 composite | Drainable liquid | 16,800 | 16,800 | 16,800 |
| 494-5771 | Core 52 composite | Drainable liquid | 9,580 | 9,580 | 9,580 |

Table B2-49. Tank 241-T-107 Analytical Results: Ammonia (Distillation).

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: water digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 534-7728 | Core 51 composite | Whole | <820 | <816 | <818 |
| 528-7728 | Core 52 composite | Whole | <4,200 | <4,260 | <4,230 |
| **Liquids** | | | **µg/mL** | **µg/mL** | **µg/mL** |
| 393-5728 | Core 50 composite | Drainable liquid | 41.6 | 43 | 42.3 |
| 442-5728 | Core 51 composite | Drainable liquid | 83.1 | 80.3 | 81.7 |
| 494-5728 | Core 52 composite | Drainable liquid | 217 | 225 | 221 |

Table B2-50. Tank 241-T-107 Analytical Results: Nitrite (Spectrophotometry).

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: water digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 534-7779 | Core 51 composite | Whole | 15,000 | 13,500 | 14,250 |
| 528-7779 | Core 52 composite | Whole | 7,710 | 8,240 | 7,975 |
| **Liquids** | | | **µg/mL** | **µg/mL** | **µg/mL** |
| 393-5779 | Core 50 composite | Drainable liquid | 2,830 | 2,630 | 2,730 |
| 442-5779 | Core 51 composite | Drainable liquid | 13,100 | 12,000 | 12,550 |
| 494-5779 | Core 52 composite | Drainable liquid | 7,570 | 7,270 | 7,420 |

Table B2-51. Tank 241-T-107 Analytical Results: Cyanide (Spectrometry).

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids** | | | **µg/g** | **µg/g** | **µg/g** |
| 310-5777 | 50: 1R | Subsegment | 44.3 | 52.6 | 48.45 |
| 311-5777 | 50: 2 | Whole | 65.6 | 62.5 | 64.05 |
| 122-5777 | 50: 3 | Whole | 39.2 | 46.2 | 42.7 |
| 409-5777 | 51: 2 | Whole | 95.7 | 94.8 | 95.25 |
| 233-5777 | 51: 3 | Lower half | 103 | 102 | 102.5 |
| 232-5777 | | Upper half | 110 | 109 | 109.5 |
| 235-5777 | 51: 4 | Lower half | 57.4 | 57.2 | 57.3 |
| 234-5777 | | Upper half | 94.2 | 88.8 | 91.5 |
| 455-5777 | 52: 1 | Whole | 31.5 | 30.5 | 31 |
| 476-5777 | 52: 2 | Whole | 63.4 | 60 | 61.7 |
| 478-5777 | 52: 3 | Lower half | 41.4 | 45.7 | 43.55 |
| 477-5777 | | Upper half | 50.5 | 53.7 | 52.1 |
| 427-5777 | Core 51 composite | Whole | 94.9 | 96.7 | 95.8 |
| 495-5777 | Core 52 composite | Whole | 51.4 | 61.3 | 56.35 |
| **Solids: water digest** | | | **µg/g** | **µg/g** | **µg/g** |
| 534-7778 | Core 51 composite | Whole | 92.9 | 90.6 | 91.75 |
| 528-7778 | Core 52 composite | Whole | 44.9 | 46.9 | 45.9 |
| **Liquids** | | | **µg/mL** | **µg/mL** | **µg/mL** |
| 393-5778 | Core 50 composite | Drainable liquid | 13.5 | 13.4 | 13.45 |
| 442-5778 | Core 51 composite | Drainable liquid | 152 | 152 | 152 |
| 494-5778 | Core 52 composite | Drainable liquid | 40 | 39.6 | 39.8 |

Table B2-52A. Tank 241-T-107 Analytical Results: Semivolatile Organic Analysis Detected Results. (2 sheets)

| Tentatively Identified Compound[1] | Result[2] | Duplicate[2] | Mean |
|---|---|---|---|
| **Liquids: Core 50 drainable liquid (93-07218-E1)** | **μg/mL** | **μg/mL** | **μg/mL** |
| dodecane | 6 | 12 | 9 |
| tetradecane | 15 | 32 | 24 |
| tributylphosphate | n/d | 3 | 3 |
| tridecane | 20 | 41 | 31 |
| **Solids: Core 52 composite (93-07230-E1)** | **μg/g** | **μg/g** | **μg/g** |
| decamethylcyclopentasiloxane | 36 | n/d | 36 |
| 2,2-dimethyldecane | 73 | 110 | 92 |
| 2,2-dimethylheptane | 99 | 140 | 120 |
| 3,3-dimethylhexane[3] | 96 | n/d | 96 |
| 3,3-dimethylhexane[4] | 8 | n/d | 8 |
| 3,3-dimethylpentane | n/d | 44 | 44 |
| dodecamethylcyclohexasiloxane | 110 | 120 | 120 |
| 3-ethyl-5-methylheptane | 10 | n/d | 10 |
| 6-ethyl-2-methyloctane | 11[5] | 140[6] | 76 |
| hexyl pentyl ether | n/d | 12 | 12 |
| 3-methyl-5-propylnonane | n/d | 16 | 16 |
| 7-methyltridecane | n/d | 19 | 19 |
| pentadecane | 19 | 37 | 28 |
| tridecane | 22 | 42 | 32 |
| 2,2,4-trimethyldecane | n/d | 17 | 17 |
| 2,2,8-trimethyldecane | 16 | n/d | 16 |
| 2,5,6-trimethyldecane | 55 | 80 | 68 |
| 2,2,4-trimethylheptane[7] | n/d | 280 | 280 |
| 2,2,4-trimethylheptane[8] | n/d | 140 | 140 |
| 2,2,6-trimethyloctane | 120 | n/d | 120 |
| 2,2,6-trimethyloctane | 31 | n/d | 31 |

Table B2-52A. Tank 241-T-107 Analytical Results: Semivolatile Organic Analysis Detected Results. (2 sheets)

| Tentatively Identified Compound[1] | Result[2] | Duplicate[2] | Mean |
|---|---|---|---|
| **Solids: Core 52 composite (93-07230-E1) (Cont'd)** | **μg/g** | **μg/g** | **μg/g** |
| 2,3,7-trimethyloctane[9] | 53 | 77 | 65 |
| 2,3,7-trimethyloctane[10] | 16 | 23 | 20 |
| 2,4,6-trimethyloctane | 200 | n/d | 200 |

Notes:

n/d = not detected. No estimate of detection limit was available.

[1]C compound identification is based on best match of tentatively identified compound's mass spectrum to spectral library mass spectra. The tentatively identified compounds may or may not actually be present in the original tank waste.

[2]Tentatively identified compound concentrations are estimated using the response factor of the internal standard with the retention time nearest that of the tentatively identified compound.

[3]Identified at retention time of 12.0 minutes

[4]Identified at retention time of 12.7 minutes

[5]Identified at retention time of 12.4 minutes; this retention time more closely matches that of 3-methyl-5-propylnonane (12.4 minutes) in the duplicate

[6]Identified at retention time of 12.0 minutes; this retention time more closely matches that of 3,3-dimethylhexane (12.0 minutes) in the sample

[7]Identified at retention time of 9.8 minutes

[8]Identified at retention time of 10.3 minutes

[9]Identified at retention time of 10.8 minutes

[10]Identified at retention time of 11.5 minutes

Table B2-52B. Tank 241-T-107 Analytical Results: Semivolatile Organic Analysis Nondetected Results.[1] (5 sheets)

| Analyte | µg/mL |
|---|---|
| **Liquid Core composite** | |
| 1,2,4-Trichlorobenzene | <5.00 |
| 1,2-Dichlorobenzene | <5.00 |
| 1,3-Dichlorobenzene | <5.00 |
| 1,4-Dichlorobenzene | <5.00 |
| 2,4,5-Trichlorophenol | <25.0 |
| 2,4,6-Trichlorophenol | <5.00 |
| 2,4-Dichlorophenol | <5.00 |
| 2,4-Dimethylphenol | <5.00 |
| 2,4-Dinitrophenol | <25.0 |
| 2,4-Dinitrotoluene | <5.00 |
| 2,6-Dinitrotoluene | <5.00 |
| 2-Chloronaphthalene | <5.00 |
| 2-Chlorophenol | <5.00 |
| 2-Methylnaphthalene | <5.00 |
| 2-Methylphenol | <5.00 |
| 2-Nitroaniline | <25.0 |
| 2-Nitrophenol | <5.00 |
| 3,3-Dichlorobenzidine | <10.0 |
| 3-Nitroaniline | <25.0 |
| 4,6-Dinitro-o-cresol | <25.0 |
| 4-Bromophenylphenyl ether | <5.00 |
| 4-Chloro-3-methylphenol | <5.00 |
| 4-Chloroaniline | <5.00 |
| 4-Chlorophenylphenyl ether | <5.00 |
| 4-Methylphenol | <5.00 |
| 4-Nitroaniline | <25.0 |
| 4-Nitrophenol | <25.0 |
| Acenaphthene | <5.00 |
| Acenaphthylene | <5.00 |

Table B2-52B. Tank 241-T-107 Analytical Results: Semivolatile Organic Analysis Nondetected Results.[1] (5 sheets)

| Analyte | μg/mL |
|---|---|
| **Liquid Core composite (Cont'd)** | |
| Anthracene | <5.00 |
| Benzo(a)anthracene | <5.00 |
| Benzo(a)pyrene | <5.00 |
| Benzo(b)fluoranthene | <5.00 |
| Benzo(ghi)perylene | <5.00 |
| Benzo(k)fluoranthene | <5.00 |
| Benzoic acid | <25.0 |
| Benzyl alcohol | <5.00 |
| Bis(2-Chloroethoxy)methane | <5.00 |
| Bis(2-chloroethyl) ether | <5.00 |
| Bis(2-Chloroisopropyl) ether | <5.00 |
| Bis(2-ethylhexyl)phthalate | <5.00 |
| Butylbenzylphthalate | <5.00 |
| Chrysene | <5.00 |
| Di-n-butylphthalate | <5.00 |
| Di-n-octylphthalate | <5.00 |
| Dibenz[a,h]anthracene | <5.00 |
| Dibenzofuran | <5.00 |
| Diethylphthalate | <5.00 |
| Dimethyl phthalate | <5.00 |
| Fluoranthene | <5.00 |
| Fluorene | <5.00 |
| Hexachlorobenzene | <5.00 |
| Hexachlorobutadiene | <5.00 |
| Hexachlorocyclopentadiene | <5.00 |
| Hexachloroethane | <5.00 |
| Indeno(1,2,3-cd)pyrene | <5.00 |
| Isophorone | <5.00 |
| Nitrobenzene | <5.00 |

Table B2-52B. Tank 241-T-107 Analytical Results: Semivolatile Organic Analysis Nondetected Results.[1] (5 sheets)

| Analyte | μg/mL |
|---|---|
| **Liquid Core Composite (Cont'd)** | |
| Pentachlorophenol | <25.0 |
| Phenanthrene | <5.00 |
| Phenol | <5.00 |
| Pyrene | <5.00 |
| **Analyte** | **μg/g** |
| **Solid Core Composite** | |
| 1,2,4-Trichlorobenzene | <18.5 |
| 1,2-Dichlorobenzene | <18.5 |
| 1,3-Dichlorobenzene | <18.5 |
| 1,4-Dichlorobenzene | <18.5 |
| 2,4,5-Trichlorophenol | <90.5 |
| 2,4,6-Trichlorophenol | <18.5 |
| 2,4-Dichlorophenol | <18.5 |
| 2,4-Dimethylphenol | <18.5 |
| 2,4-Dinitrophenol | <90.5 |
| 2,4-Dinitrotoluene | <18.5 |
| 2,6-Dinitrotoluene | <18.5 |
| 2-Chloronaphthalene | <18.5 |
| 2-Chlorophenol | <18.5 |
| 2-Methylnaphthalene | <18.5 |
| 2-Methylphenol | <18.5 |
| 2-Nitroaniline | <90.5 |
| 2-Nitrophenol | <18.5 |
| 3,3-Dichlorobenzidine | <36.0 |
| 3-Nitroaniline | <90.5 |
| 4,6-Dinitro-o-cresol | <90.5 |
| 4-Bromophenylphenyl ether | <18.5 |
| 4-Chloro-3-methylphenol | <18.5 |
| 4-Chloroaniline | <18.5 |

Table B2-52B. Tank 241-T-107 Analytical Results: Semivolatile Organic Analysis Nondetected Results.[1] (5 sheets)

| Analyte | µg/g |
|---|---|
| **Solid Core Composite (Cont'd)** | |
| 4-Chlorophenylphenyl ether | <18.5 |
| 4-Methylphenol | <18.5 |
| 4-Nitroaniline | <90.5 |
| 4-Nitrophenol | <90.5 |
| Acenaphthene | <18.5 |
| Acenaphthylene | <18.5 |
| Anthracene | <18.5 |
| Benzo(a)anthracene | <18.5 |
| Benzo(a)pyrene | <18.5 |
| Benzo(b)fluoranthene | <18.5 |
| Benzo(ghi)perylene | <18.5 |
| Benzo(k)fluoranthene | <18.5 |
| Benzoic acid | <90.5 |
| Benzyl alcohol | <18.5 |
| Bis(2-Chloroethoxy)methane | <18.5 |
| Bis(2-chloroethyl) ether | <18.5 |
| Bis(2-Chloroisopropyl) ether | <18.5 |
| Bis(2-ethylhexyl)phthalate | <18.5 |
| Butylbenzylphthalate | <18.5 |
| Chrysene | <18.5 |
| Di-n-butylphthalate | <18.5 |
| Di-n-octylphthalate | <18.5 |
| Dibenz[a,h]anthracene | <18.5 |
| Dibenzofuran | <18.5 |
| Diethylphthalate | <18.5 |
| Dimethyl phthalate | <18.5 |
| Fluoranthene | <18.5 |
| Fluorene | <18.5 |
| Hexachlorobenzene | <18.5 |

Table B2-52B. Tank 241-T-107 Analytical Results: Semivolatile Organic Analysis Nondetected Results.[1] (5 sheets)

| Analyte | µg/g |
|---|---|
| **Solid Core Composite (Cont'd)** | |
| Hexachlorobutadiene | <18.5 |
| Hexachlorocyclopentadiene | <18.5 |
| Hexachloroethane | <18.5 |
| Indeno(1,2,3-cd)pyrene | <18.5 |
| Isophorone | <18.5 |
| Nitrobenzene | <18.5 |
| Pentachlorophenol | <90.5 |
| Phenanthrene | <18.5 |
| Phenol | <18.5 |
| Pyrene | <18.5 |

Note:

[1]The detection limit listed for each analyte is the contract required quantitation limit not the method detection limit.

Table B2-53. Tank 241-T-107 Analytical Results: Total Carbon (Persulfate Oxidation).

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Triplicate | Mean |
|---|---|---|---|---|---|---|
| Solids | | | μg/g | μg/g | μg/g | μg/g |
| 93-07215-J1 | 50: 1R | Subsegment | 2,270 | 2,250 | --- | 2,260 |
| 93-07216-J1 | 50: 2 | Whole | 3,540 | 3,840 | --- | 3,690 |
| 93-07219-J1 | 51: 2 | Whole | 4,750 | 5,470 | --- | 5,110 |
| 93-07221-J1 | 51: 3 | Lower half | 3,510 | 3,550 | --- | 3,530 |
| 93-07220-J1 | | Upper half | 4,690 | 4,140 | --- | 4,415 |
| 93-07223-J1 | 51: 4 | Lower half | 1,720 | 2,140 | --- | 1,930[QC:e] |
| 93-07222-J1 | | Upper half | 3,150 | 2,950 | --- | 3,050 |
| 93-07226-J1 | 52: 1 | Whole | 7,070 | 4,350 | 3,810 | 5,710[QC:e] |
| 93-07227-J1 | 52: 2 | Whole | 4,290 | 3,560 | --- | 3,925 |
| 93-07229-J1 | 52: 3 | Lower half | 1,680 | 1,830 | --- | 1,755 |
| 93-07228-J1 | | Upper half | 2,350 | 1,720 | --- | 2,035[QC:e] |
| 93-07225-J1 | Core 51 composite | Whole | 2,690 | 2,270 | --- | 2,480 |
| 93-07230-J1 | Core 52 composite | Whole | 1,520 | 1,760 | --- | 1,640 |

Table B2-54A. Tank 241-T-107 Analytical Results: Total Organic Carbon (Persulfate Oxidation).

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Triplicate | Mean |
|---|---|---|---|---|---|---|
| Solids | | | µg/g | µg/g | µg/g | µg/g |
| 93-07215-J1 | 50: 1R | Subsegment | 510 | 500 | --- | 505 |
| 93-07216-J1 | 50: 2 | Whole | 600 | 710 | --- | 655 |
| 93-07219-J1 | 51: 2 | Whole | 960 | 1,230 | --- | 1,095[QC:e] |
| 93-07221-J1 | 51: 3 | Lower half | 810 | 1,000 | --- | 905 |
| 93-07220-J1 | | Upper half | 1,330 | 1,200 | --- | 1,265 |
| 93-07223-J1 | 51: 4 | Lower half | 260 | 280 | --- | 270 |
| 93-07222-J1 | | Upper half | 290 | 240 | --- | 265 |
| 93-07226-J1 | 52: 1 | Whole | 3,630 | 2,000 | 1,900 | 2,815[QC:e] |
| 93-07227-J1 | 52: 2 | Whole | 1,030 | 910 | --- | 970 |
| 93-07229-J1 | 52: 3 | Lower half | 220 | 310 | --- | 265[QC:e] |
| 93-07228-J1 | | Upper half | 720 | 650 | --- | 685 |
| 93-07225-J1 | Core 51 composite | Whole | 390 | 410 | --- | 400 |
| 93-07230-J1 | Core 52 composite | Whole | 370 | 270 | --- | 320[QC:e] |

Table B2-54B. Tank 241-T-107 Analytical Results: Total Organic Carbon (Furnace Oxidation).

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| Solids: water digest | | | µg/g | µg/g | µg/g |
| 534-7726 | Core 51 composite | Whole | 1,520 | 1,350 | 1,435 |
| 528-7726 | Core 52 composite | Whole | 2,000 | 1,920 | 1,960 |
| Liquids | | | µg/mL | µg/mL | µg/mL |
| 393-5726 | Core 50 composite | Drainable liquid | 1,100 | 1,200 | 1,150 |
| 442-5726 | Core 51 composite | Drainable liquid | 1,050 | 1,080 | 1,065 |
| 494-5726 | Core 52 composite | Drainable liquid | 340 | 369 | 354.5 |

Table B2-55A. Tank 241-T-107 Analytical Results: Total Inorganic Carbon (Persulfate Oxidation).

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Triplicate | Mean |
|---|---|---|---|---|---|---|
| Solids | | | µg/g | µg/g | | µg/g |
| 93-07215-J1 | 50: 1R | Subsegment | 1,760 | 1,750 | --- | 1,760 |
| 93-07216-J1 | 50: 2 | Whole | 2,940 | 3,130 | --- | 3,040 |
| 93-07219-J1 | 51: 2 | Whole | 3,800 | 4,240 | --- | 4,020 |
| 93-07221-J1 | 51: 3 | Lower half | 2,700 | 2,550 | --- | 2,630 |
| 93-07220-J1 | | Upper half | 3,360 | 2,940 | --- | 3,150 |
| 93-07223-J1 | 51: 4 | Lower half | 1,470 | 1,860 | --- | 1,670[QC:e] |
| 93-07222-J1 | | Upper half | 2,860 | 2,700 | --- | 2,780 |
| 93-07226-J1 | 52: 1 | Whole | 3,440 | 2,350 | 1,920 | 2,570[QC:e] |
| 93-07227-J1 | 52: 2 | Whole | 3,260 | 2,650 | --- | 2,960[QC:e] |
| 93-07229-J1 | 52: 3 | Lower half | 1,460 | 1,520 | --- | 1,490 |
| 93-07228-J1 | | Upper half | 1,630 | 1,070 | --- | 1,350[QC:e] |
| 93-07225-J1 | Core 51 composite | Whole | 2,300 | 1,860 | --- | 2,080[QC:e] |
| 93-07230-J1 | Core 52 composite | Whole | 1,150 | 1,490 | --- | 1,320[QC:e] |

Table B2-55B. Tank 241-T-107 Analytical Results: Total Inorganic Carbon (Furnace Oxidation).

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| Solids: water digest | | | µg/g | µg/g | µg/g |
| 534-7727 | Core 51 composite | Whole | 5,640 | 5,710 | 5,675 |
| 528-7727 | Core 52 composite | Whole | 2,990 | 2,560 | 2,775 |
| Liquids | | | µg/mL | µg/mL | µg/mL |
| 393-5727 | Core 50 composite | Drainable liquid | 516 | 508 | 512 |
| 442-5727 | Core 51 composite | Drainable liquid | 4,580 | 4,510 | 4,545 |
| 494-5727 | Core 52 composite | Drainable liquid | 346 | 332 | 339 |

Table B2-56A. Tank 241-T-107 Analytical Results: Total Alpha (Alpha Proportional Counting).

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion** | | | **µCi/g** | **µCi/g** | **µCi/g** |
| 436-6725 | Core 51 composite | Whole | 0.475 | 0.471 | 0.473 |
| 500-6725 | Core 52 composite | Whole | 0.379 | 0.411 | 0.395 |
| **Solids: water digest** | | | **µCi/g** | **µCi/g** | **µCi/g** |
| 430-7725 | Core 51 composite | Whole | 5.440E-04 | 4.960E-04 | 5.200E-04 |
| 528-7725 | Core 52 composite | Whole | 0.0055 | 0.00426 | 0.00488[QC:e] |
| 528-7725 | | Whole | 0.0116 | 0.00839 | 0.009995[QC:e,e] |
| **Liquids** | | | **µCi/mL** | **µCi/mL** | **µCi/mL** |
| 393-5725 | Core 50 composite | Drainable liquid | 9.740E-04 | 8.540E-04 | 9.140E-04 |
| 442-5725 | Core 51 composite | Drainable liquid | 0.0171 | 0.0161 | 0.0166 |
| 494-5725 | Core 52 composite | Drainable liquid | 5.420E-04 | 4.800E-04 | 5.110E-04 |

Table B2-56B. Tank 241-T-107 Analytical Results: Total Alpha Pu (Alpha Proportional Counting).

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion** | | | **µCi/g** | **µCi/g** | **µCi/g** |
| 93-7224-H-1 | 51: 4 | Lower half | 0.208 | 0.264 | 0.236[QC:e] |
| 93-7230-H-1 | Core 52 composite | Whole | 0.190 | 0.183 | 0.187 |

Table B2-57. Tank 241-T-107 Analytical Results: Total Beta (Beta Proportional Counting).

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion** | | | µCi/g | µCi/g | µCi/g |
| 436-6725 | Core 51 composite | Whole | 392 | 415 | 403.5 |
| 500-6725 | Core 52 composite | Whole | 240 | 274 | 257 |
| **Solids: water digest** | | | µCi/g | µCi/g | µCi/g |
| 430-7725 | Core 51 composite | Whole | 16.1 | 16.9 | 16.5 |
| 528-7725 | Core 52 composite | Whole | 11 | 9.68 | 10.34 |
| **Liquids** | | | µCi/mL | µCi/mL | µCi/mL |
| 393-5725 | Core 50 composite | Drainable liquid | 2.54 | 2.45 | 2.495 |
| 442-5725 | Core 51 composite | Drainable liquid | 25.7 | 24.7 | 25.2 |
| 494-5725 | Core 52 composite | Drainable liquid | 7.5 | 7.61 | 7.555 |

Table B2-58. Tank 241-T-107 Analytical Results: Strontium-90 (Beta Proportional Counting). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion** | | | µCi/g | µCi/g | µCi/g |
| 387-6786 | 50: 1R | Subsegment | 33.7 | 29.6 | 31.65 |
| 309-6786 | 50: 2 | Whole | 155 | 150 | 152.5 |
| 322-6786 | 50: 3 | Whole | 126 | 125 | 125.5 |
| 406-6786 | 51: 2 | Whole | 188 | 192 | 190 |
| 255-6786 | 51: 3 | Lower half | 244 | 240 | 242 |
| 254-6786 | | Upper half | 212 | 190 | 201 |
| 257-6786 | 51: 4 | Lower half | 26.9 | 28 | 27.45 |
| 256-6786 | | Upper half | 221 | 232 | 226.5 |
| 455-6786 | 52: 1 | Whole | 179 | 151 | 165[QC:c] |
| 481-6786 | 52: 2 | Whole | 92.2 | 83.7 | 87.95 |
| 483-6786 | 52: 3 | Lower half | 21.4 | 16.2 | 18.8[QC:e] |
| 483-6786 | | Lower half | 19.6 | 15.1 | 17.35[QC:e] |
| 482-6786 | | Upper half | 92.5 | 99.2 | 95.85 |
| 436-6786 | Core 51 composite | Whole | 132 | 131 | 131.5 |
| 500-6786 | Core 52 composite | Whole | 92 | 78.9 | 85.45 |

Table B2-58. Tank 241-T-107 Analytical Results: Strontium-90 (Beta Proportional Counting). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Liquids** | | | **μCi/mL** | **μCi/mL** | **μCi/mL** |
| 393-5786 | Core 50 composite | Drainable liquid | 0.0105 | 0.0111 | 0.0108 |
| 442-5786 | Core 51 composite | Drainable liquid | 0.118 | 0.127 | 0.123 |
| 494-5786 | Core 52 composite | Drainable liquid | 0.0455 | 0.0443 | 0.0449 |

Table B2-59. Tank 241-T-107 Analytical Results: Americium-241 (Alpha Spectrometry).

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion** | | | **μCi/g** | **μCi/g** | **μCi/g** |
| 436-6781 | Core 51 composite | Whole | 0.0115 | 0.0111 | 0.0113[QC:c] |
| 500-6781 | Core 52 composite | Whole | 0.0161 | 0.0175 | 0.0168 |
| 500-6781 | | Whole | 0.0146 | 0.0189 | 0.01675[QC:c,e] |
| **Liquids** | | | **μCi/mL** | **μCi/mL** | **μCi/mL** |
| 393-5781 | Core 50 composite | Drainable liquid | <4.030E-05 | <2.670E-05 | <3.350E-05[QC:c] |
| 442-5781 | Core 51 composite | Drainable liquid | 2.040E-04 | <5.08E-05 | 1.27E-04[QC:c] |
| 494-5781 | Core 52 composite | Drainable liquid | 6.790E-05 | 7.220E-05 | 7.005E-05[QC:c] |

Table B2-60. Tank 241-T-107 Analytical Results: Plutonium-238 (Alpha Spectrometry).

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion** | | | **µCi/g** | **µCi/g** | **µCi/g** |
| 294-6781 | 51: 4 | Lower half | <0.017 | <0.0134 | <0.0152[QC:c,e] |
| 436-6781 | Core 51 composite | Whole | --- | <0.00718 | <0.00718[QC:c] |
| 436-6781 | | Whole | <0.0113 | <0.0127 | <0.0120[QC:c] |
| 436-6781 | | Whole | <0.00613 | 0.0166 | <0.011365[QC:c,e] |
| 500-6781 | Core 52 composite | Whole | <0.0161 | <0.0165 | <0.0163[QC:c] |
| 500-6781 | | Whole | <0.00635 | <0.00587 | <0.00611[QC:c] |
| **Liquids** | | | **µCi/mL** | **µCi/mL** | **µCi/mL** |
| 393-5781 | Core 50 composite | Drainable liquid | <9.010E-05 | <9.010E-05 | <9.010E-05 |
| 442-5781 | Core 51 composite | Drainable liquid | 0.00244 | 0.00256 | 0.0025[QC:c] |
| 494-5781 | Core 52 composite | Drainable liquid | <1.710E-04 | <1.140E-04 | <1.425E-04[QC:c] |

Table B2-61. Tank 241-T-107 Analytical Results: Plutonium-239/40 (Alpha Spectrometry).

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion** | | | **µCi/g** | **µCi/g** | **µCi/g** |
| 294-6781 | 51: 4 | Lower half | 0.188 | 0.157 | 0.1725[QC:c] |
| 436-6781 | Core 51 composite | Whole | --- | 0.124 | 0.124[QC:c] |
| 436-6781 | | Whole | 0.131 | 0.108 | 0.1195[QC:b,c] |
| 436-6781 | | Whole | 0.129 | 0.0925 | 0.11075[QC:c,e] |
| 500-6781 | Core 52 composite | Whole | 0.153 | 0.184 | 0.1685[QC:c] |
| 500-6781 | | Whole | 0.176 | 0.220 | 0.198[QC:c,e] |
| **Liquids** | | | **µCi/mL** | **µCi/mL** | **µCi/mL** |
| 393-5781 | Core 50 composite | Drainable liquid | <6.570E-05 | <6.600E-05 | <6.585E-05 |
| 442-5781 | Core 51 composite | Drainable liquid | 0.0111 | 0.0117 | 0.0114[QC:c] |
| 494-5781 | Core 52 composite | Drainable liquid | <6.700E-05 | <6.280E-05 | <6.490E-05[QC:c] |

Table B2-62. Tank 241-T-107 Analytical Results: Plutonium-238 to Pu Ratio (Mass Spectrometry).

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion** | | | **%** | **%** | **%** |
| 93-7224-H-2 | 51: 4 | Lower half | 0.003 | 0.005 | 0.004[QC:e] |
| 93-7230-H-1 | Core 52 composite | Whole | 0.006 | 0.008 | 0.007[QC:e] |

Table B2-63. Tank 241-T-107 Analytical Results: Plutonium-239 to Pu Ratio (Mass Spectrometry).

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion** | | | **%** | **%** | **%** |
| 93-7224-H-2 | 51: 4 | Lower half | 98.101 | 98.115 | 98.108 |
| 93-7230-H-1 | Core 52 composite | Whole | 98.133 | 98.011 | 98.072 |

Table B2-64. Tank 241-T-107 Analytical Results: Plutonium-240 to Pu Ratio (Mass Spectrometry).

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion** | | | **%** | **%** | **%** |
| 93-7224-H-2 | 51: 4 | Lower half | 1.871 | 1.85 | 1.8605 |
| 93-7230-H-1 | Core 52 composite | Whole | 1.833 | 1.94 | 1.8865 |

Table B2-65. Tank 241-T-107 Analytical Results: Plutonium-241 to Pu Ratio (Mass Spectrometry).

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion** | | | **%** | **%** | **%** |
| 93-7224-H-2 | 51: 4 | Lower half | 0.02 | 0.02 | 0.02 |
| 93-7230-H-1 | Core 52 composite | Whole | 0.02 | 0.03 | 0.025[QC:e] |

Table B2-66. Tank 241-T-107 Analytical Results: Plutonium-242 to Pu Ratio (Mass Spectrometry).

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion** | | | **%** | **%** | **%** |
| 93-7224-H-2 | 51: 4 | Lower half | 0.01 | 0.01 | 0.01 |
| 93-7230-H-1 | Core 52 composite | Whole | 0.01 | 0.02 | 0.015[QC:e] |

Table B2-67. Tank 241-T-107 Analytical Results: Uranium-234 to U Ratio (Mass Spectrometry).

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion** | | | **%** | **%** | **%** |
| 93-7224-H-2 | 51: 4 | Lower half | 0.005 | 0.005 | 0.005 |
| 93-7230-H-1 | Core 52 composite | Whole | 0.005 | 0.005 | 0.005 |

Table B2-68. Tank 241-T-107 Analytical Results: Uranium-235 to U Ratio (Mass Spectrometry).

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion** | | | **%** | **%** | **%** |
| 93-7224-H-2 | 51: 4 | Lower half | 0.688 | 0.695 | 0.6915 |
| 93-7230-H-1 | Core 52 composite | Whole | 0.687 | 0.686 | 0.6865 |

Table B2-69. Tank 241-T-107 Analytical Results: Uranium-236 to U Ratio (Mass Spectrometry).

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion** | | | % | % | % |
| 93-7224-H-2 | 51: 4 | Lower half | 0.004 | 0.004 | 0.004 |
| 93-7230-H-1 | Core 52 composite | Whole | 0.005 | 0.004 | 0.0045[QC:e] |

Table B2-70. Tank 241-T-107 Analytical Results: Uranium-238 to U Ratio (Mass Spectrometry).

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion** | | | % | % | % |
| 93-7224-H-2 | 51: 4 | Lower half | 99.303 | 99.296 | 99.2995 |
| 93-7230-H-1 | Core 52 composite | Whole | 99.303 | 99.304 | 99.3035 |

Table B2-71. Tank 241-T-107 Analytical Results: Americium-241 (GEA).

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion** | | | **μCi/g** | **μCi/g** | **μCi/g** |
| 387-6730 | 50: 1R | Subsegment | <0.0669 | <0.0657 | <0.0663 |
| 309-6730 | 50: 2 | Whole | <0.151 | <0.154 | <0.1525 |
| 322-6730 | 50: 3 | Whole | <0.0842 | <0.0881 | <0.08615 |
| 406-6730 | 51: 2 | Whole | <0.213 | <0.216 | <0.2145 |
| 255-6730 | 51: 3 | Lower half | <0.148 | <0.151 | <0.1495 |
| 254-6730 | | Upper half | <0.136 | <0.126 | <0.131 |
| 257-6730 | 51: 4 | Lower half | <0.0858 | <0.0834 | <0.0846 |
| 256-6730 | | Upper half | <0.139 | <0.148 | <0.1435 |
| 455-6730 | 52: 1 | Whole | 0.253 | <0.0949 | <0.17395[QC:e] |
| 481-6730 | 52: 2 | Whole | <0.0528 | <0.0498 | <0.0513 |
| 483-6730 | 52: 3 | Lower half | <0.0361 | <0.0358 | <0.03595 |
| 482-6730 | | Upper half | <0.0521 | <0.0506 | <0.05135 |
| 436-6782 | Core 51 composite | Whole | <0.0593 | <0.0614 | <0.06035 |
| 500-6730 | Core 52 composite | Whole | <0.0813 | <0.0873 | <0.0843 |
| **Solids: water digest** | | | **μCi/g** | **μCi/g** | **μCi/g** |
| 534-7730 | Core 51 composite | Whole | <0.0281 | <0.0267 | <0.0274 |
| 534-9730 | | Whole | <0.349 | <0.385 | <0.367 |
| 528-7730 | Core 52 composite | Whole | <0.0222 | <0.0228 | <0.0225 |
| 528-9730 | | Whole | <0.192 | <0.192 | <0.192 |
| **Liquids** | | | **μCi/mL** | **μCi/mL** | **μCi/mL** |
| 393-5782 | Core 50 composite | Drainable liquid | <0.00733 | <0.00733 | <0.00733 |
| 442-5782 | Core 51 composite | Drainable liquid | <0.0323 | <0.033 | <0.03265 |
| 494-5782 | Core 52 composite | Drainable liquid | <0.00568 | <0.0059 | <0.00579 |

Table B2-72. Tank 241-T-107 Analytical Results: Cerium/Praeseodymium-144 (GEA).

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion** | | | **µCi/g** | **µCi/g** | **µCi/g** |
| 387-6730 | 50: 1R | Subsegment | <0.0882 | <0.0875 | <0.08785 |
| 309-6730 | 50: 2 | Whole | <0.202 | <0.198 | <0.2 |
| 322-6730 | 50: 3 | Whole | <0.11 | <0.118 | <0.114 |
| 406-6730 | 51: 2 | Whole | <0.51 | <0.513 | <0.5115 |
| 255-6730 | 51: 3 | Lower half | <0.317 | <0.31 | <0.3135 |
| 254-6730 | | Upper half | <0.292 | <0.271 | <0.2815 |
| 257-6730 | 51: 4 | Lower half | <0.198 | <0.197 | <0.1975 |
| 256-6730 | | Upper half | <0.297 | <0.316 | <0.3065 |
| 455-6730 | 52: 1 | Whole | <0.147 | <0.133 | <0.14 |
| 481-6730 | 52: 2 | Whole | <0.319 | <0.313 | <0.316 |
| 483-6730 | 52: 3 | Lower half | <0.284 | <0.282 | <0.283 |
| 482-6730 | | Upper half | <0.305 | <0.314 | <0.3095 |
| 436-6782 | Core 51 composite | Whole | <0.36 | <0.359 | <0.3595 |
| 500-6730 | Core 52 composite | Whole | <0.116 | <0.12 | <0.118 |
| **Solids: water digest** | | | **µCi/g** | **µCi/g** | **µCi/g** |
| 534-7730 | Core 51 composite | Whole | <0.0409 | <0.0395 | <0.0402 |
| 534-9730 | | Whole | <0.271 | <0.305 | <0.288 |
| 528-7730 | Core 52 composite | Whole | <0.0579 | <0.0579 | <0.0579 |
| 528-9730 | | Whole | <0.15 | <0.158 | <0.154 |
| **Liquids** | | | **µCi/mL** | **µCi/mL** | **µCi/mL** |
| 393-5782 | Core 50 composite | Drainable liquid | <0.00999 | <0.0101 | <0.010045 |
| 442-5782 | Core 51 composite | Drainable liquid | <0.0478 | <0.0488 | <0.0483 |
| 494-5782 | Core 52 composite | Drainable liquid | <0.00834 | <0.00861 | <0.008475 |

Table B2-73. Tank 241-T-107 Analytical Results: Cesium-134 (GEA).

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion** | | | **µCi/g** | **µCi/g** | **µCi/g** |
| 387-6730 | 50: 1R | Subsegment | <0.0061 | <0.00563 | <0.005865 |
| 309-6730 | 50: 2 | Whole | <0.0133 | <0.0143 | <0.0138 |
| 322-6730 | 50: 3 | Whole | <0.00688 | <0.00673 | <0.006805 |
| 406-6730 | 51: 2 | Whole | <0.0139 | <0.0151 | <0.0145 |
| 255-6730 | 51: 3 | Lower half | <0.0114 | <0.0102 | <0.0108 |
| 254-6730 | | Upper half | <0.00879 | <0.00919 | <0.00899 |
| 257-6730 | 51: 4 | Lower half | <0.00849 | <0.00906 | <0.008775 |
| 256-6730 | | Upper half | <0.0105 | <0.01 | <0.01025 |
| 455-6730 | 52: 1 | Whole | <0.009 | <0.00814 | <0.00857 |
| 481-6730 | 52: 2 | Whole | <0.0246 | <0.0225 | <0.02355 |
| 483-6730 | 52: 3 | Lower half | <0.0219 | <0.0254 | <0.02365 |
| 482-6730 | | Upper half | <0.0209 | <0.024 | <0.02245 |
| 436-6782 | Core 51 composite | Whole | <0.0217 | <0.0221 | <0.0219 |
| 500-6730 | Core 52 composite | Whole | <0.0055 | <0.00584 | <0.00567 |
| **Solids: water digest** | | | **µCi/g** | **µCi/g** | **µCi/g** |
| 534-7730 | Core 51 composite | Whole | <0.00127 | <0.00129 | <0.00128 |
| 534-9730 | | Whole | <0.0121 | <0.0139 | <0.013 |
| 528-7730 | Core 52 composite | Whole | <0.00204 | <0.00164 | <0.00184[QC:e] |
| 528-9730 | | Whole | <0.00766 | <0.0075 | <0.00758 |
| **Liquids** | | | **µCi/mL** | **µCi/mL** | **µCi/mL** |
| 393-5782 | Core 50 composite | Drainable liquid | <4.660E-04 | <5.140E-04 | <4.900E-04 |
| 442-5782 | Core 51 composite | Drainable liquid | <0.0014 | <0.00135 | <0.001375 |
| 494-5782 | Core 52 composite | Drainable liquid | <2.660E-04 | <2.720E-04 | <2.690E-04 |

Table B2-74. Tank 241-T-107 Analytical Results: Cesium-137 (GEA).

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion** | | | **µCi/g** | **µCi/g** | **µCi/g** |
| 387-6730 | 50: 1R | Subsegment | 7.08 | 6.97 | 7.025 |
| 309-6730 | 50: 2 | Whole | 12.1 | 11.5 | 11.8 |
| 322-6730 | 50: 3 | Whole | 5.65 | 6.43 | 6.04 |
| 406-6730 | 51: 2 | Whole | 97.7 | 102 | 99.85 |
| 406-6730 | | Whole | 96.2 | 96.7 | 96.45 |
| 255-6730 | 51: 3 | Lower half | 17.1 | 17 | 17.05 |
| 254-6730 | | Upper half | 16.2 | 14.4 | 15.3 |
| 257-6730 | 51: 4 | Lower half | 13.7 | 13.5 | 13.6 |
| 256-6730 | | Upper half | 16.7 | 19 | 17.85 |
| 455-6730 | 52: 1 | Whole | 10.8 | 10.9 | 10.85 |
| 481-6730 | 52: 2 | Whole | 10.9 | 9.66 | 10.28 |
| 483-6730 | 52: 3 | Lower half | 10.6 | 10.7 | 10.65 |
| 482-6730 | | Upper half | 7.39 | 8.26 | 7.825 |
| 436-6782 | Core 51 composite | Whole | 13.5 | 14.2 | 13.85 |
| 500-6730 | Core 52 composite | Whole | 10.3 | 11 | 10.65 |
| **Solids: water digest** | | | **µCi/g** | **µCi/g** | **µCi/g** |
| 534-7730 | Core 51 composite | Whole | 12.4 | 11.6 | 12 |
| 534-9730 | | Whole | 17.1 | 17.7 | 17.4 |
| 528-7730 | Core 52 composite | Whole | 6.39 | 6.59 | 6.49 |
| 528-9730 | | Whole | 5.67 | 7.43 | 6.55[QC:e] |
| **Liquids** | | | **µCi/mL** | **µCi/mL** | **µCi/mL** |
| 393-5782 | Core 50 composite | Drainable liquid | 1.7 | 1.73 | 1.715 |
| 442-5782 | Core 51 composite | Drainable liquid | 18 | 18.7 | 18.35 |
| 494-5782 | Core 52 composite | Drainable liquid | 5.06 | 5.4 | 5.23 |

Table B2-75. Tank 241-T-107 Analytical Results: Cobalt-60 (GEA).

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion** | | | **μCi/g** | **μCi/g** | **μCi/g** |
| 387-6730 | 50: 1R | Subsegment | <0.00624 | <0.00687 | <0.006555 |
| 309-6730 | 50: 2 | Whole | <0.0114 | <0.0127 | <0.01205 |
| 322-6730 | 50: 3 | Whole | <0.00515 | <0.00594 | <0.005545 |
| 406-6730 | 51: 2 | Whole | <0.0071 | <0.0105 | <0.0088[QC:e] |
| 255-6730 | 51: 3 | Lower half | 0.0376 | <0.008 | <0.0228[QC:e] |
| 254-6730 | | Upper half | <0.00893 | <0.00878 | <0.008855 |
| 257-6730 | 51: 4 | Lower half | <0.00892 | <0.00772 | <0.00832 |
| 256-6730 | | Upper half | <0.00889 | 0.0264 | <0.017645[QC:e] |
| 455-6730 | 52: 1 | Whole | <0.00639 | <0.00639 | <0.00639 |
| 481-6730 | 52: 2 | Whole | <0.0251 | <0.0207 | <0.0229 |
| 483-6730 | 52: 3 | Lower half | <0.022 | <0.0254 | <0.0237 |
| 482-6730 | | Upper half | <0.0213 | <0.019 | <0.02015 |
| 436-6782 | Core 51 composite | Whole | <0.0239 | <0.0225 | <0.0232 |
| 500-6730 | Core 52 composite | Whole | <0.00496 | <0.00658 | <0.00577[QC:e] |
| **Solids: water digest** | | | **μCi/g** | **μCi/g** | **μCi/g** |
| 534-7730 | Core 51 composite | Whole | <0.0012 | <0.00145 | <0.001325 |
| 534-9730 | | Whole | 0.0284 | 0.0296 | 0.029 |
| 528-7730 | Core 52 composite | Whole | <0.00199 | <0.00208 | <0.002035 |
| 528-9730 | | Whole | 0.007 | 0.009 | 0.008[QC:e] |
| **Liquids** | | | **μCi/mL** | **μCi/mL** | **μCi/mL** |
| 393-5782 | Core 50 composite | Drainable liquid | <4.060E-04 | <5.280E-04 | <4.670E-04[QC:e] |
| 442-5782 | Core 51 composite | Drainable liquid | <0.00135 | <0.0011 | <0.001225 |
| 494-5782 | Core 52 composite | Drainable liquid | <1.240E-04 | <1.240E-04 | <1.240E-04 |

Table B2-76. Tank 241-T-107 Analytical Results: Europium-154 (GEA).

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion** | | | **µCi/g** | **µCi/g** | **µCi/g** |
| 387-6730 | 50: 1R | Subsegment | 0.108 | 0.089 | 0.0985 |
| 309-6730 | 50: 2 | Whole | <0.0296 | <0.0314 | <0.0305 |
| 322-6730 | 50: 3 | Whole | <0.0169 | <0.0178 | <0.01735 |
| 406-6730 | 51: 2 | Whole | 0.31 | 0.317 | 0.3135 |
| 255-6730 | 51: 3 | Lower half | 0.0437 | <0.0259 | <0.0348[QC:e] |
| 254-6730 | | Upper half | <0.0207 | <0.0211 | <0.0209 |
| 257-6730 | 51: 4 | Lower half | <0.0212 | <0.0211 | <0.02115 |
| 256-6730 | | Upper half | <0.0185 | <0.0252 | <0.02185[QC:e] |
| 455-6730 | 52: 1 | Whole | 1.21 | 0.944 | 1.077[QC:e] |
| 481-6730 | 52: 2 | Whole | <0.0648 | <0.0737 | <0.06925 |
| 483-6730 | 52: 3 | Lower half | <0.0676 | <0.0642 | <0.0659 |
| 482-6730 | | Upper half | <0.0774 | <0.0767 | <0.07705 |
| 436-6782 | Core 51 composite | Whole | <0.0598 | <0.0644 | <0.0621 |
| 500-6730 | Core 52 composite | Whole | <0.0181 | 0.0688 | <0.04345[QC:e] |
| **Solids: water digest** | | | **µCi/g** | **µCi/g** | **µCi/g** |
| 534-7730 | Core 51 composite | Whole | <0.00391 | <0.0034 | <0.003655 |
| 534-9730 | | Whole | 0.12 | 0.149 | 0.1345[QC:e] |
| 528-7730 | Core 52 composite | Whole | <0.00436 | <0.00582 | <0.00509[QC:e] |
| 528-9730 | | Whole | 0.125 | 0.138 | 0.1315 |
| **Liquids** | | | **µCi/mL** | **µCi/mL** | **µCi/mL** |
| 393-5782 | Core 50 composite | Drainable liquid | <0.00131 | <0.00144 | <0.001375 |
| 442-5782 | Core 51 composite | Drainable liquid | <0.00423 | <0.00399 | <0.00411 |
| 494-5782 | Core 52 composite | Drainable liquid | <5.500E-04 | <5.290E-04 | <5.395E-04 |

Table B2-77. Tank 241-T-107 Analytical Results: Europium-155 (GEA).

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion** | | | **μCi/g** | **μCi/g** | **μCi/g** |
| 387-6730 | 50: 1R | Subsegment | 0.0892 | 0.0826 | 0.0859 |
| 309-6730 | 50: 2 | Whole | <0.0689 | <0.0701 | <0.0695 |
| 322-6730 | 50: 3 | Whole | <0.0389 | <0.0411 | <0.04 |
| 406-6730 | 51: 2 | Whole | <0.14 | <0.141 | <0.1405 |
| 255-6730 | 51: 3 | Lower half | <0.0935 | <0.0949 | <0.0942 |
| 254-6730 | | Upper half | <0.086 | <0.0809 | <0.08345 |
| 257-6730 | 51: 4 | Lower half | <0.0535 | <0.0532 | <0.05335 |
| 256-6730 | | Upper half | <0.0879 | <0.0949 | <0.0914 |
| 455-6730 | 52: 1 | Whole | 1.07 | 0.769 | 0.9195[QC:e] |
| 481-6730 | 52: 2 | Whole | <0.0827 | <0.0807 | <0.0817 |
| 483-6730 | 52: 3 | Lower half | <0.0686 | <0.0666 | <0.0676 |
| 482-6730 | | Upper half | <0.0789 | <0.0811 | <0.08 |
| 436-6782 | Core 51 composite | Whole | <0.0886 | <0.0921 | <0.09035 |
| 500-6730 | Core 52 composite | Whole | <0.0387 | <0.0407 | <0.0397 |
| **Solids: water digest** | | | **μCi/g** | **μCi/g** | **μCi/g** |
| 534-7730 | Core 51 composite | Whole | <0.0125 | <0.0123 | <0.0124 |
| 534-9730 | | Whole | <0.159 | <0.206 | <0.1825[QC:e] |
| 528-7730 | Core 52 composite | Whole | <0.0149 | <0.0151 | <0.015 |
| 528-9730 | | Whole | 0.107 | 0.139 | 0.123[QC:e] |
| **Liquids** | | | **μCi/mL** | **μCi/mL** | **μCi/mL** |
| 393-5782 | Core 50 composite | Drainable liquid | <0.00307 | <0.00314 | <0.003105 |
| 442-5782 | Core 51 composite | Drainable liquid | <0.0147 | <0.015 | <0.01485 |
| 494-5782 | Core 52 composite | Drainable liquid | <0.00257 | <0.00265 | <0.00261 |

Table B2-78. Tank 241-T-107 Analytical Results: Potassium-40 (GEA).

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion** | | | **µCi/g** | **µCi/g** | **µCi/g** |
| 387-6730 | 50: 1R | Subsegment | <0.154 | <0.154 | <0.154 |
| 309-6730 | 50: 2 | Whole | <0.314 | <0.312 | <0.313 |
| 322-6730 | 50: 3 | Whole | <0.155 | <0.155 | <0.155 |
| 406-6730 | 51: 2 | Whole | <0.286 | <0.293 | <0.2895 |
| 255-6730 | 51: 3 | Lower half | <0.282 | <0.293 | <0.2875 |
| 254-6730 | | Upper half | <0.276 | <0.272 | <0.274 |
| 257-6730 | 51: 4 | Lower half | <0.287 | <0.278 | <0.2825 |
| 256-6730 | | Upper half | <0.282 | <0.283 | <0.2825 |
| 455-6730 | 52: 1 | Whole | 0.17 | <0.155 | <0.1625 |
| 481-6730 | 52: 2 | Whole | <0.717 | <0.732 | <0.7245 |
| 483-6730 | 52: 3 | Lower half | <0.72 | <0.72 | <0.72 |
| 482-6730 | | Upper half | <0.724 | <0.708 | <0.716 |
| 436-6782 | Core 51 composite | Whole | <0.722 | <0.723 | <0.7225 |
| 500-6730 | Core 52 composite | Whole | 0.291 | 0.184 | 0.2375[QC:e] |
| **Solids: water digest** | | | **µCi/g** | **µCi/g** | **µCi/g** |
| 534-7730 | Core 51 composite | Whole | <0.0324 | <0.0327 | <0.03255 |
| 534-9730 | | Whole | 0.0371 | <0.0338 | <0.03545 |
| 528-7730 | Core 52 composite | Whole | <0.0649 | <0.0653 | <0.0651 |
| 528-9730 | | Whole | 0.0383 | 0.0375 | 0.0379 |
| **Liquids** | | | **µCi/mL** | **µCi/mL** | **µCi/mL** |
| 393-5782 | Core 50 composite | Drainable liquid | <0.013 | <0.0129 | <0.01295 |
| 442-5782 | Core 51 composite | Drainable liquid | <0.0304 | <0.0304 | <0.0304 |
| 494-5782 | Core 52 composite | Drainable liquid | 0.00373 | <0.00335 | <0.00354 |

Table B2-79. Tank 241-T-107 Analytical Results: Ruthenium-103 (GEA).

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion** | | | µCi/g | µCi/g | µCi/g |
| 387-6730 | 50: 1R | Subsegment | <0.0112 | <0.0113 | <0.01125 |
| 309-6730 | 50: 2 | Whole | <0.0216 | <0.0206 | <0.0211 |
| 322-6730 | 50: 3 | Whole | <0.0104 | <0.0112 | <0.0108 |
| 406-6730 | 51: 2 | Whole | <0.0613 | <0.0628 | <0.06205 |
| 255-6730 | 51: 3 | Lower half | <0.0264 | <0.0271 | <0.02675 |
| 254-6730 | | Upper half | <0.0249 | <0.0236 | <0.02425 |
| 257-6730 | 51: 4 | Lower half | <0.0233 | <0.0226 | <0.02295 |
| 256-6730 | | Upper half | <0.0271 | <0.0274 | <0.02725 |
| 455-6730 | 52: 1 | Whole | <0.0146 | <0.0142 | <0.0144 |
| 481-6730 | 52: 2 | Whole | <0.0383 | <0.034 | <0.03615 |
| 483-6730 | 52: 3 | Lower half | <0.0363 | <0.0356 | <0.03595 |
| 482-6730 | | Upper half | <0.0337 | <0.0341 | <0.0339 |
| 436-6782 | Core 51 composite | Whole | <0.04 | <0.04 | <0.04 |
| 500-6730 | Core 52 composite | Whole | <0.0129 | <0.0137 | <0.0133 |
| **Solids: water digest** | | | µCi/g | µCi/g | µCi/g |
| 534-7730 | Core 51 composite | Whole | <0.00619 | <0.00593 | <0.00606 |
| 534-9730 | | Whole | <0.0256 | <0.0278 | <0.0267 |
| 528-7730 | Core 52 composite | Whole | <0.00711 | <0.00721 | <0.00716 |
| 528-9730 | | Whole | <0.0142 | <0.0155 | <0.01485 |
| **Liquids** | | | µCi/mL | µCi/mL | µCi/mL |
| 393-5782 | Core 50 composite | Drainable liquid | <0.0015 | <0.00152 | <0.00151 |
| 442-5782 | Core 51 composite | Drainable liquid | <0.00717 | <0.00734 | <0.007255 |
| 494-5782 | Core 52 composite | Drainable liquid | <0.00127 | <0.0013 | <0.001285 |

Table B2-80. Tank 241-T-107 Analytical Results: Ruthenium/Rhodium-106 (GEA).

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion** | | | **µCi/g** | **µCi/g** | **µCi/g** |
| 387-6730 | 50: 1R | Subsegment | <0.163 | <0.153 | <0.158 |
| 309-6730 | 50: 2 | Whole | <0.326 | <0.311 | <0.3185 |
| 322-6730 | 50: 3 | Whole | <0.16 | <0.166 | <0.163 |
| 406-6730 | 51: 2 | Whole | <0.618 | <0.653 | <0.6355 |
| 255-6730 | 51: 3 | Lower half | <0.297 | <0.288 | <0.2925 |
| 254-6730 | | Upper half | <0.288 | <0.268 | <0.278 |
| 257-6730 | 51: 4 | Lower half | <0.257 | <0.253 | <0.255 |
| 256-6730 | | Upper half | <0.285 | <0.303 | <0.294 |
| 455-6730 | 52: 1 | Whole | --- | <0.21 | <0.105[QC:e] |
| 481-6730 | 52: 2 | Whole | <0.503 | <0.503 | <0.503 |
| 483-6730 | 52: 3 | Lower half | <0.474 | <0.479 | <0.4765 |
| 482-6730 | | Upper half | <0.439 | <0.428 | <0.4335 |
| 436-6782 | Core 51 composite | Whole | <0.495 | <0.56 | <0.5275 |
| 500-6730 | Core 52 composite | Whole | <0.175 | <0.193 | <0.184 |
| **Solids: water digest** | | | **µCi/g** | **µCi/g** | **µCi/g** |
| 534-7730 | Core 51 composite | Whole | <0.0791 | <0.0757 | <0.0774 |
| 534-9730 | | Whole | <0.161 | <0.181 | <0.171 |
| 528-7730 | Core 52 composite | Whole | <0.0752 | <0.0749 | <0.07505 |
| 528-9730 | | Whole | <0.0957 | <0.0986 | <0.09715 |
| **Liquids** | | | **µCi/mL** | **µCi/mL** | **µCi/mL** |
| 393-5782 | Core 50 composite | Drainable liquid | <0.0208 | <0.0207 | <0.02075 |
| 442-5782 | Core 51 composite | Drainable liquid | <0.0932 | <0.0951 | <0.09415 |
| 494-5782 | Core 52 composite | Drainable liquid | <0.0163 | <0.0168 | <0.01655 |

Table B2-81. Tank 241-T-107 Analytical Results: Thorium-228 (GEA).

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: fusion** | | | **µCi/g** | **µCi/g** | **µCi/g** |
| 387-6730 | 50: 1R | Subsegment | <0.0167 | <0.0167 | <0.0167 |
| 309-6730 | 50: 2 | Whole | <0.0349 | <0.0333 | <0.0341 |
| 322-6730 | 50: 3 | Whole | <0.0179 | <0.0193 | <0.0186 |
| 406-6730 | 51: 2 | Whole | <0.088 | <0.0892 | <0.0886 |
| 255-6730 | 51: 3 | Lower half | <0.043 | <0.045 | <0.044 |
| 254-6730 | | Upper half | <0.0421 | <0.0385 | <0.0403 |
| 257-6730 | 51: 4 | Lower half | <0.0346 | <0.0332 | <0.0339 |
| 256-6730 | | Upper half | <0.0423 | <0.0442 | <0.04325 |
| 455-6730 | 52: 1 | Whole | <0.0235 | <0.0227 | <0.0231 |
| 481-6730 | 52: 2 | Whole | <0.0478 | <0.0462 | <0.047 |
| 483-6730 | 52: 3 | Lower half | <0.0458 | <0.0455 | <0.04565 |
| 482-6730 | | Upper half | <0.0457 | <0.0439 | <0.0448 |
| 436-6782 | Core 51 composite | Whole | 0.0513 | <0.0505 | <0.0509 |
| 500-6730 | Core 52 composite | Whole | <0.0205 | <0.0214 | <0.02095 |
| **Solids: water digest** | | | **µCi/g** | **µCi/g** | **µCi/g** |
| 534-7730 | Core 51 composite | Whole | <0.00873 | <0.00844 | <0.008585 |
| 534-9730 | | Whole | <0.0518 | <0.0579 | <0.05485 |
| 528-7730 | Core 52 composite | Whole | <0.0103 | <0.0107 | <0.0105 |
| 528-9730 | | Whole | <0.0295 | <0.031 | <0.03025 |
| **Liquids** | | | **µCi/mL** | **µCi/mL** | **µCi/mL** |
| 393-5782 | Core 50 composite | Drainable liquid | <0.00208 | <0.0021 | <0.00209 |
| 442-5782 | Core 51 composite | Drainable liquid | <0.0102 | <0.0103 | <0.01025 |
| 494-5782 | Core 52 composite | Drainable liquid | <0.00178 | <0.00184 | <0.00181 |

Table B2-82. Tank 241-T-107 Analytical Results: Iodine-129 (Low Energy GEA).

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Liquids** | | | **µCi/mL** | **µCi/mL** | **µCi/mL** |
| 393-5785 | Core 50 composite | Drainable liquid | <7.480E-05 | <8.260E-05 | <7.870E-05[QC:a] |
| 442-5785 | Core 51 composite | Drainable liquid | <3.850E-05 | <3.720E-05 | <3.785E-05[QC:c] |
| 494-5785 | Core 52 composite | Drainable liquid | <3.790E-05 | <3.840E-05 | <3.815E-05[QC:c] |

Table B2-83. Tank 241-T-107 Analytical Results: Carbon-14 (Liquid Scintillation).

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: water digest** | | | **µCi/g** | **µCi/g** | **µCi/g** |
| 430-7788 | Core 51 composite | Whole | 2.550E-04 | <2.220E-04 | <2.385E-04 |
| 506-7788 | Core 52 composite | Whole | 1.150E-04 | 1.730E-04 | 1.440E-04[QC:e] |
| **Liquids** | | | **µCi/mL** | **µCi/mL** | **µCi/mL** |
| 393-5788 | Core 50 composite | Drainable liquid | 1.990E-05 | 1.600E-05 | 1.795E-05[QC:e] |
| 442-5788 | Core 51 composite | Drainable liquid | 3.800E-04 | 6.560E-04 | 5.18E-04 |
| 494-5788 | Core 52 composite | Drainable liquid | 6.220E-05 | 8.550E-05 | 7.385E-05[QC:e] |

Table B2-84. Tank 241-T-107 Analytical Results: Tritium (Liquid Scintillation).

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| Solids: water digest | | | µCi/g | µCi/g | µCi/g |
| 430-7787 | Core 51 composite | Whole | 0.00156 | 0.00117 | 0.001365[QC:d,e] |
| 430-7787 | | Whole | <6.150E-04 | 8.850E-04 | <7.500E-04[QC:e] |
| 506-7787 | Core 52 composite | Whole | 0.00104 | 0.00118 | 0.00111 |
| Liquids | | | µCi/mL | µCi/mL | µCi/mL |
| 393-5787 | Core 50 composite | Drainable liquid | 5.050E-04 | 2.650E-04 | 3.850E-04[QC:e] |
| 393-5787 | | Drainable liquid | 2.480E-04 | 3.430E-04 | 2.955E-04[QC:a,e] |
| 442-5787 | Core 51 composite | Drainable liquid | 0.00214 | 0.00231 | 0.002225[QC:e] |
| 442-5787 | | Drainable liquid | 0.00993 | 0.00396 | 0.006945[QC:e] |
| 494-5787 | Core 52 composite | Drainable liquid | 4.890E-04 | 4.520E-04 | 4.705E-04 |

Table B2-85. Tank 241-T-107 Analytical Results: Technetium-99 (Liquid Scintillation).

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| Solids: fusion | | | µCi/g | µCi/g | µCi/g |
| 436-6784 | Core 51 composite | Whole | 0.046 | 0.0505 | 0.04825[QC:c] |
| 500-6784 | Core 52 composite | Whole | 0.0512 | 0.0543 | 0.05275[QC:c] |
| Liquids | | | µCi/mL | µCi/mL | µCi/mL |
| 393-5784 | Core 50 composite | Drainable liquid | 0.00793 | 0.00816 | 0.008045[QC:c] |
| 442-5784 | Core 51 composite | Drainable liquid | 0.0858 | --- | 0.0858[QC:a,c] |
| 494-5784 | Core 52 composite | Drainable liquid | 0.0171 | 0.0162 | 0.01665[QC:a,c] |

Table B2-86. Tank 241-T-107 Analytical Results: Bulk Density.

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids** | | | **g/mL** | **g/mL** | **g/mL** |
| 535-1755 | 50: 2 | Whole | 1.71 | --- | 1.71 |
| 93-07217 | | Whole | 1.44 | --- | 1.44 |
| 93-07217 | | 1:3 dilution | 1.10 | --- | 1.1 |
| 93-07217 | | 1:1 dilution | 1.22 | --- | 1.22 |
| 283-1755 | 51: 3 | Lower half | 1.70 | --- | 1.7 |
| 282-1755 | | Upper half | 1.49 | --- | 1.49 |
| 285-1755 | 51: 4 | Lower half | 1.53 | --- | 1.53 |
| 284-1755 | | Upper half | 1.48 | --- | 1.48 |
| 517-1755 | 52: 2 | Whole | 1.55 | --- | 1.55 |
| 519-1755 | 52: 3 | Lower half | 1.52 | --- | 1.52 |
| 518-1755 | | Upper half | 1.50 | --- | 1.50 |
| 420-1755 | Core 51 composite | Whole | 1.46 | --- | 1.46 |
| 546-1755 | Core 52 composite | Whole | 1.19 | --- | 1.19 |

Table B2-87. Tank 241-T-107 Analytical Results: Density.[1]

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| Solids | | | g/mL | g/mL | g/mL |
| n/a | 50: 1R | Subsegment | 1.71 | --- | 1.71 |
| n/a | | Subsegment | 1.76 | --- | 1.76 |
| n/a | 50: 2 | Whole | 1.1 | --- | 1.1 |
| n/a | 50: 3 | Whole | 0.95 | --- | 0.95 |
| n/a | 51: 2 | Whole | 1.57 | --- | 1.57 |
| n/a | 51: 3 | Whole | 1.15 | --- | 1.15 |
| n/a | 51: 4 | Whole | 1.1 | --- | 1.1 |
| n/a | 52: 1 | Whole | 1.42 | --- | 1.42 |
| n/a | 52: 2 | Whole | 1.06 | --- | 1.06 |
| n/a | 52: 3 | Whole | 1.13 | --- | 1.13 |
| n/a | 52: 4 | Whole | 0.61 | --- | 0.61 |
| Liquids | | | g/mL | g/mL | g/mL |
| n/a | 50: 3 | Drainable liquid | 0.96 | --- | 0.96 |
| n/a | 50: 4 | Drainable liquid | 0.97 | --- | 0.97 |
| n/a | 51: 2 | Drainable liquid | 1.26 | --- | 1.26 |
| n/a | 52: 4 | Drainable liquid | 1.12 | --- | 1.12 |

Note: n/a = not applicable
[1]Estimations from hot cell, not analytical data.

Table B2-88. Tank 241-T-107 Analytical Results: Specific Gravity.

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| Liquids | | | unitless | unitless | unitless |
| 393-5706 | Core 50 composite | Drainable liquid | 1.02 | 1.02 | 1.02 |
| 442-5706 | Core 51 composite | Drainable liquid | 1.21 | --- | 1.21 |
| 442-5806 | | Drainable liquid | 1.19 | --- | 1.19 |
| 494-5706 | Core 52 composite | Drainable liquid | 1.1 | 1.11 | 1.105 |

Table B2-89. Tank 241-T-107 Analytical Results: pH Measurement.

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: water digest** | | | **Unitless** | **Unitless** | **Unitless** |
| 312-5715 | 50: 1R | Subsegment | 10.3 | --- | 10.3 |
| 313-5715 | 50: 2 | Whole | 11.2 | --- | 11.2 |
| 122-5715 | 50: 3 | Whole | 11.4 | --- | 11.4 |
| 411-5715 | 51: 2 | Whole | 10.6 | 10.5 | 10.55 |
| 211-5715 | 51: 3 | Lower half | 11.4 | 11.3 | 11.35 |
| 210-5715 | | Upper half | 11.4 | 11.4 | 11.4 |
| 213-5715 | 51: 4 | Lower half | 11.6 | 11.6 | 11.6 |
| 212-5715 | | Upper half | 11.2 | 11.2 | 11.2 |
| 455-5715 | 52: 1 | Whole | 10.5 | 10.5 | 10.5 |
| 468-5715 | 52: 2 | Whole | 11.4 | 11.4 | 11.4 |
| 470-5715 | 52: 3 | Lower half | 10.9 | 10.8 | 10.85 |
| 469-5715 | | Upper half | 11.8 | 11.8 | 11.8 |
| 427-5715 | Core 51 composite | Whole | 11.6 | 11.6 | 11.6 |
| 495-5715 | Core 52 composite | Whole | 11.4 | 11.4 | 11.4 |
| **Liquids** | | | **Unitless** | **Unitless** | **Unitless** |
| 393-5713 | Core 50 composite | Drainable liquid | 9.63 | 9.62 | 9.625 |
| 442-5713 | Core 51 composite | Drainable liquid | 10.7 | 10.7 | 10.7 |
| 494-5713 | Core 52 composite | Drainable liquid | 10.3 | 10.3 | 10.3 |

Table B2-90. Tank 241-T-107 Analytical Results: Weight Percent Solids (Gravimetry).

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids** | | | % | % | % |
| 314-5710 | 50: 1R | Subsegment | 82.5 | 81.5 | 82 |
| 315-5710 | 50: 2 | Whole | 58.3 | 58.6 | 58.45 |
| 415-5710 | 51: 2 | Whole | 40.3 | 39.2 | 39.75 |
| 269-5710 | 51: 3 | Lower half | 46.7 | 47.5 | 47.1 |
| 268-5710 | | Upper half | 44 | 45.7 | 44.85 |
| 271-5710 | 51: 4 | Lower half | 50.1 | 50.8 | 50.45 |
| 93-7224-K1 | | Lower half | 49.5 | 49.8 | 49.65 |
| 270-5710 | | Upper half | 44.5 | 45.6 | 45.05 |
| 471-5710 | 52: 1 | Whole | 83.4 | 83.3 | 83.35 |
| 457-5710 | 52: 2 | Whole | 51.1 | 51.9 | 51.5 |
| 459-5710 | 52: 3 | Lower half | 46.6 | 46.5 | 46.55 |
| 458-5710 | | Upper half | 48.5 | 48.7 | 48.6 |
| 421-5710 | Core 51 composite | Whole | 48.6 | 47.6 | 48.1 |
| 510-5710 | Core 52 composite | Whole | 52.2 | 52.3 | 52.25 |
| 93-7224-K1 | | Whole | 56.3 | 58.5 | 57.4 |

Table B2-91. Tank 241-T-107 Analytical Results: Weight Percent Residual Solids.

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: water digest** | | | % | % | % |
| 534-9210 | Core 51 composite | Whole | 27.7 | 24.2 | 25.95 |
| 528-9710 | Core 52 composite | Whole | 30.8 | 32.2 | 31.5 |

Table B2-92. Tank 241-T-107 Analytical Results: Residual Solids.

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids: water digest** | | | **g** | **g** | **g** |
| 534-9210 | Core 51 composite | Whole | 0.1429 | 0.1254 | 0.13415 |
| 528-9710 | Core 52 composite | Whole | 0.1529 | 0.1577 | 0.1553 |

Table B2-93. Tank 241-T-107 Analytical Results: Total Dissolved Solids.

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids** | | | **%** | **%** | **%** |
| 534-7705 | Core 51 composite | Whole | 0.378 | 0.396 | 0.387 |
| 528-7705 | Core 52 composite | Whole | 0.412 | 0.392 | 0.402 |
| **Liquids** | | | **%** | **%** | **%** |
| 393-5705 | Core 50 composite | Drainable liquid | 4.1 | 4.67 | 4.385 |
| 442-5705 | Core 51 composite | Drainable liquid | 24 | 25.4 | 24.7 |
| 494-5705 | Core 52 composite | Drainable liquid | 13.2 | 13.7 | 13.45 |

Table B2-94. Tank 241-T-107 Analytical Results: Shear Strength.

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| **Solids** | | | **dynes/cm$^2$** | **dynes/cm$^2$** | **dynes/cm$^2$** |
| 93-072167 | 50: 2 | Whole | 7,200 | N/A | 7,200 |

Table B2-95. Tank 241-T-107 Analytical Results: Rheological Parameters.

| Sample Number | Sample Location | Sample Portion | Yield Point | Consistency Factor | Flow Behavior Index |
|---|---|---|---|---|---|
| Solids | | | Pa | Pa/sec | Unitless |
| 93-07217 (25 °C) | 50: 2 | 1:1 dilution | 0.70 | 0.024 | 0.78 |
| 93-07217 (25 °C) | | 1:1 dilution | 0.60 | 0.027 | 0.76 |
| 93-07217 (90 °C) | | 1:1 dilution | 0.89 | 0.025 | 0.74 |
| 93-07217 (90 °C) | | 1:1 dilution | 0.66 | 0.019 | 0.73 |

Table B2-96. Tank 241-T-107 Analytical Results: Percent Water (TGA). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| Solids | | | % | % | % |
| 306-5712 | 50: 1R | Subsegment | 27 | 25.4 | 26.2 |
| 384-5712 | | Subsegment | 5.87 | 5.65 | 5.76 |
| 121-5712 | 50: 2 | Whole | 29.6 | 29.9 | 29.75 |
| 307-5712 | | Whole | 45.8 | 40.3 | 43.05 |
| 122-5712 | 50: 3 | Whole | 44.4 | 42.1 | 43.25 |
| 123-5712 | 50: 4 | Whole | 57.2 | 59 | 58.1 |
| 402-5712 | 51: 2 | Whole | 60.1 | 58.5 | 59.3 |
| 157-5712 | 51: 3 | Lower half | 54.3 | 54.2 | 54.25 |
| 156-5712 | | Upper half | 59.4 | 59.9 | 59.65 |
| 159-5712 | 51: 4 | Lower half | 52.8 | 53.4 | 53.1 |
| 158-5712 | | Upper half | 54.8 | 54.6 | 54.7 |
| 455-5712 | 52: 1 | Whole | 15.2 | 15.3 | 15.25 |
| 485-5712 | 52: 2 | Whole | 55.6 | 55.4 | 55.5 |
| 487-5712 | 52: 3 | Lower half | 54.8 | 49.7 | 52.25 |
| 486-5712 | | Upper half | 54.6 | 54.6 | 54.6 |
| 456-5712 | 52: 4 | Whole | 59.3 | 57.7 | 58.5 |

Table B2-96. Tank 241-T-107 Analytical Results: Percent Water (TGA). (2 sheets)

| Sample Number | Sample Location | Sample Portion | Result | Duplicate | Mean |
|---|---|---|---|---|---|
| Liquids | | | % | % | % |
| 393-5712 | Core 50 composite | Drainable liquid | 96.5 | 93.7 | 95.1 |
| 442-5712 | Core 51 composite | Drainable liquid | 73.4 | 74 | 73.7 |
| 494-5712 | Core 52 composite | Drainable liquid | 83.2 | 82.6 | 82.9 |

## B2.2 OCTOBER 1992 VAPOR SAMPLES

### B2.2.1 Description of Sampling Event

Before the November 1992 core sampling of tank 241-T-107, a vapor measurement was taken on October 22, 1992. Testing for flammable gas levels, which was driven by tank farm operations, was a necessary step before beginning core sampling procedures. The vapor samples were taken to measure tank headspace flammability and concentrations of ammonia, organics, NO, $NO_2$, $N_2O$, $O_2$, $H_4N_2$, $CN^-$, and HCN. The vapor measurements were taken at three levels in the tank headspace; short (sample line length of 17 ft 6 in.), medium (line length of 24 ft 3 in. - approximately half the distance), and long (31 ft 8 in. - 1 ft above waste level). All results were obtained in the field (that is, no gas samples were sent to the laboratory for analysis). The results were reported in *Waste Tank T-107 Vapor Sampling Results* (Pingel 1992).

### B2.2.2 Sample Handling

Pingel (1992) gives few details of sample handling except for temperature and barometric pressure. Refer to the field log book for details (WHC-N-499, Vol. 1).

### B2.2.3 Sample Analysis

Descriptions of the sampling and analysis for the vapor samples are reported in Pingel (1992). A portable combustible gas meter was used for the flammability measurement. An organic vapor monitor was used to sample total organics in the gas sample stream. Calorimetric sorbent tubes were used for detecting the remaining gases.

### B2.2.4 Analytical Results

Table B2-97 summarizes the 1992 results of the vapor sampling event. All gases tested with the calorimetric sorbent tubes were below the detection limits except ammonia. Except for the total organics vapor results, there was no variance between the results from differing levels within the tank headspace. Table B2-97 shows the highest results of the organic vapor measurements. This summary is taken from Pingel (1992).

Table B2-97. Summary Results of Vapor Samples Collected from the Headspace of Tank 241-T-107 on October 22, 1992.

| Category | Analyte | Vapor Concentration |
|---|---|---|
| Inorganic | $O_2$ | 20.9 % |
| | $NH_3$ | 203 ppmv |
| | $NO_2$ | ≤ 0.5 ppmv |
| | NO | ≤ 0.5 ppmv |
| | HCN | <2 ppmv |
| | $CN^-$ | <2 ppmv |
| | $H_4N_2$ | <0.2 ppmv |
| Organic | Total organic vapors | 42 ppmv |
| Flammability | Headspace gas flammability | 0% of LEL |

## B2.3 JANUARY 1995 VAPOR SAMPLES

### B2.3.1 Description of Sampling Event

To support the safety screening DQO (Dukelow et al. 1995) and the vapor DQO (Osborne et al. 1994), additional vapor phase measurements were made on January 18, 1995. The vapor phase screening was taken for flammability and toxicity issues. The results were reported in *Tank 241-T-107 Headspace Gas and Vapor Characterization Results for Samples Collected in January 1995* (Huckaby and Bratzel 1995). The vapor phase measurements were taken 5.5 m (18 ft) below riser 6 in the headspace of the tank, and the gas samples were sent to the laboratory for analysis.

### B2.3.2 Sample Handling

Sampling devices, including three sorbent trains (for inorganic analyses) and four SUMMA™ canisters (for organic analyses), were supplied to the Westinghouse Hanford Company sampling staff, and the samples were collected. Sampling media were prepared and analyzed by Pacific Northwest National Laboratory and Oak Ridge National Laboratory. Detailed descriptions of the sampling and analysis of these vapor samples are reported in *Vapor Space Characterization of Waste Tank 241-T-107: Results from Samples Collected on 1/18/95* (Pool et al. 1995).

### B2.3.3 Sample Analysis

Designated holding times of less than 60 days before analysis were met. Sample analysis is covered in depth in Huckaby and Bratzel (1995).

### B2.3.4 Analytical Results

It was determined that no headspace constituents exceeded the flammability or industrial hygiene notification limits specified in the *Tank 241-T-107 Tank Characterization Plan* (Carpenter 1995; Huckaby and Bratzel 1995). Table B2-98 summarizes the results. For the complete list of tentatively and positively identified organic compounds, see Huckaby and Bratzel (1995).

Table B2-98. Summary Results of Vapor Samples Collected from the Headspace of Tank 241-T-107 on January 18, 1995.[1] (2 sheets)

| Category | Analyte | Vapor Concentration | Units |
|---|---|---|---|
| Inorganic | Hydrogen | <94 | ppmv |
| | $NH_3$ | 125 | ppmv |
| | CO | <12 | ppmv |
| | $CO_2$ | 75 | ppmv |
| | NO | <0.05 | ppmv |
| | $NO_2$ | <0.03 | ppmv |
| | $N_2O$ | 41.5 | ppmv |
| | $H_2O$ | 12.1 | mg/L |
| | $H_2O$ | 82 % | % relative humidity |

Table B2-98. Summary Results of Vapor Samples Collected from the Headspace of Tank 241-T-107 on January 18, 1995.[1] (2 sheets)

| Category | Analyte | Vapor Concentration | Units |
|---|---|---|---|
| Organic[2] | Methane | <61 | ppmv |
| | Tributyl phosphate | unknown[3] | ppmv |
| | n-Dodecane | 0.0021 | ppmv |
| | n-Tridecane | 0.0056 | ppmv |
| | Total estimated organic vapor | 1.4[4] | $mg/m^3$ |
| Flammability | Overall headspace gas flammability | No overall result was given in Huckaby and Bratzel (1995). Document states all results were below vapor DQO limit (20 percent of LFL[5]). | |

Notes:

[1]Huckaby and Bratzel (1995)

[2]Summary of key constituents only; complete list can be found in Huckaby and Bratzel (1995).

[3]The absence may be due to sampling methods.

[4]This value is the summation of quantitated and estimated organic vapor concentrations in samples analyzed at Oak Ridge National Laboratory.

[5]This limit has since been increased to 25 percent of the LFL (Osborne and Buckley 1995).

## B2.4 HISTORICAL SAMPLE RESULTS

Historical sampling data for tank 241-T-107 is available from three samplings of the tank liquid. The dates of sampling are September 22, 1965; March 5, 1985; and August 1, 1989. No information was available about sample handling or analysis for the samples. The reasons for the samplings were given as evaporator feed and mixing studies. The samples were reported as being a clear and having an amber color with few solids.

Table B2-99 shows the results of the 1965 sample (Godfrey 1965). Because the tank has been pumped of liquids, the sample probably does not represent the current tank contents.

Table B2-99. September 1965 Supernatant Sample.[1]

| Analysis of Tank 241-T-107 Sample | | |
|---|---|---|
| September 24, 1965 | | |
| COMPONENT | LAB VALUE | LAB UNIT |
| Physical Data | | |
| Sample description | Clear, amber, no solids. 300 mrad/hr. | |
| Specific gravity | 1.204 | Unitless |
| Chemical Analysis | | |
| $AlO_2$ | 0.20 | g/L |
| NaOH | 0.164 | N |
| $NO_3$ | 203.5 | g/L |
| $CO_3$ | 13.5 | g/L |
| Cl | 10.5 | g/L |
| Na | 98 | g/L |
| Radiological Analysis | | |
| $^{137}Cs$ | 7,700 | $\mu$Ci/L |

Note:

N = normal

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

Table B2-100 shows the results of the 1975 sample. Because the sample was liquid and the tank has been pumped of liquids, the sample probably does not represent current tank contents. In addition to the sample analysis, cooling curve measurements were performed on the sample (Wheeler 1975).

Table B2-101 shows the results of the 1985 sample. Because the sample was liquid and the tank has been pumped of liquids, the sample probably does not represent current tank contents. The sample was analyzed for specific constituents, and the results were reported in *Tank 107-T Waste Mixing Study* (Bratzel 1985).

Table B2-100. September 1975 Supernatant Sample.[1]

| Supernatant Sample Number: T-8248 | | |
|---|---|---|
| Sample Received: September 25, 1975 | | |
| COMPONENT | LAB VALUE | LAB UNIT |
| **Physical Analysis** | | |
| Sample Description | Dark yellow, <1 percent solids, 1 rad/hr | |
| pH | 12.3 | --- |
| Specific gravity | 1.129 | --- |
| DTA | no exotherm | --- |
| Water | 85.08 | % |
| **Chemical Analysis** | | |
| OH | 0.0807 | *M* |
| Al | 0.00532 | *M* |
| Na | 2.44 | *M* |
| $NO_2$ | 0.651 | *M* |
| $NO_3$ | 0.800 | *M* |
| $PO_4$ | 0.0251 | *M* |
| Cl | 0.0128 | *M* |
| F | 0.0135 | *M* |
| $CO_3$ | 0.394 | *M* |
| **Radiological Analysis** | | |
| Pu | <3.78E-06 | g/gal |
| $^{106}$RuRh | 3.21E+05 | $\mu$Ci/gal |
| $^{134}$Cs | 869 | $\mu$Ci/gal |
| $^{137}$Cs | 1.48E+05 | $\mu$Ci/gal |
| $^{89,90}$Sr | 8,840 | $\mu$Ci/gal |
| **Cooling Curve Data** | | |
| 35 °C for 35 minutes | | No solids |
| 30 °C for 35 minutes | | No solids |
| 25 °C for 35 minutes | | No solids |
| 20 °C for 35 minutes | | No solids |
| 15 °C for 35 minutes | | No solids |
| 10 °C for 35 minutes | | No solids |
| 5 °C for 35 minutes | | No solids |

Note:

DTA = differential thermal analysis

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

Table B2-101. March 1985 Supernatant Sample.[1]

| Tank 241-T-107 Mixing Study | | |
|---|---|---|
| Supernatant Sample Number: R-3872 | | |
| COMPONENT | LAB VALUE | LAB UNIT |
| **Chemical Analysis** | | |
| La | <1.53E-04 | *M* |
| Ta | <2.96E-04 | *M* |
| Bi | <5.32E-04 | *M* |
| Mo | <7.97E-04 | *M* |
| Ba | <3.68E-05 | *M* |
| Zr | <5.09E-04 | *M* |
| Zn | <7.72E-05 | *M* |
| Sr | <1.15E-05 | *M* |
| $NO_2$ | 0.546 | *M* |
| $SO_4$ | 0.178 | *M* |
| $CO_3$ | 0.358 | *M* |
| F | <0.00379 | *M* |
| TOC | 0.924 | g C/L |
| U | 0.057 | g/L |
| **Radiological Analysis** | | |
| $^{239/40}Pu$ | 9.84 | μCi/L |
| $^{241}Am$ | <0.317 | μCi/L |
| $^{89}Sr$ | 294 | μCi/L |
| $^{137}Cs$ | 25,000 | μCi/L |

Note:

g C/L = grams of carbon per liter

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

Table B2-102 shows the results of the 1989 sample. Because the sample was liquid and the tank has since been pumped of liquids, the sample probably does not represent current tank contents. The sample was analyzed for specific constituents, and the results showed high concentrations of sodium and nitrate. The radionuclides tested for were cesium, strontium, plutonium, and americium (Bratzel 1989).

Table B2-102. August 1989 Supernatant Sample.

| Analysis of Tank Farm Sample: August 1, 1989 | | |
|---|---|---|
| Interim Results | | |
| COMPONENT | LAB VALUE | LAB UNIT |
| **Physical Data** | | |
| pH | 11.0 | --- |
| Specific gravity | 1.20 | --- |
| **Chemical Analysis** | | |
| Al | 0.00102 | *M* |
| F | 8.24E-0 | *M* |
| Na | 2.35 | *M* |
| $NO_2$ | 0.583 | *M* |
| $NO_3$ | 2.19 | *M* |
| OH | 0.0249 | *M* |
| $CO_3$ | 0.374 | *M* |
| $SO_4$ | 0.170 | *M* |
| $PO_4$ | 0.0616 | *M* |
| F | 0.0491 | *M* |
| Cl | 0.0354 | *M* |
| TOC | 0.864 | *M* |
| P | 0.0450 | *M* |
| K | 0.00638 | *M* |
| Cr | 0.00408 | *M* |
| B | 0.00127 | *M* |
| **Radiological Analysis** | | |
| $^{239/40}Pu$ | 12.0 | $\mu$Ci/L |
| $^{241}Am$ | 0.0199 | $\mu$Ci/L |
| Total alpha | 62.0 | $\mu$Ci/L |
| Total beta | 28,800 | $\mu$Ci/L |
| $^{89}Sr$ | 331 | $\mu$Ci/L |
| $^{137}Cs$ | 22,300 | $\mu$Ci/L |

## B3.0 ASSESSMENT OF CHARACTERIZATION RESULTS

This section discusses the overall quality and consistency of the current sampling results for tank 241-T-107 and shows the results of the calculation of tank mean concentrations.

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

### B3.1 FIELD OBSERVATIONS

Three core samples (cores 50, 51, and 52) were taken from tank 241-T-107. Each core was expected to consist of four segments. The top segment was expected to be one-quarter full. Several segments experienced poor recoveries and others had good overall recoveries but few solids. For example, segments 3 and 4 of core 50 had overall recoveries of 96 and 67 percent, respectively. Segment 3 was 95 percent liquid, and segment 4 was 99 percent liquid. In fact, there were insufficient solids from core 50 to make a solids composite. Because the overall tank means are based on the core composite data, no waste from core 50 figured in the mean calculations for the solids.

Except for segment 1 (which was empty), core 51 had the best recoveries. The poor segment recoveries also impacted the segment analyses, because insufficient sample was available for a full suite of analyses for some segments. Only three segments could be split into upper and lower halves for analysis because of the poor solids recoveries. The impact of the poor recoveries on data quality is unknown. There are concerns that the full waste depth profile was not recovered, and the data may not fully represent tank waste.

It is not known whether the high liquid compositions of some segments were caused by intrusions into the samples from the hydrostatic head fluid. Water was used as a hydrostatic head fluid. However, because no tracer was added, contamination of the segments by the head fluid could not be tracked. Based on visual observation, the 222-S Laboratory indicated no contamination was apparent.

Problems were also encountered during sampling and extrusion. Core 50, segment 1, remained in the riser for more than 48 hours. Because each sampling event has limits for time elapsed between sampling and delivery of the sample to the laboratory, this requirement was violated, and core 50, segment 1, was resampled (designated 1R). During extrusion, the sampler for core 50, segment 2, was under pressure. When it was opened, a small amount of sample was ejected; however, a sufficient amount of sample remained (194.6 g) to perform all analyses. The segments for tank 241-T-107 were broken down according to Bell (1993).

## B3.2 QUALITY CONTROL ASSESSMENT

A QC assessment was performed on the data from the last two sampling events. Section B3.2.1 discuss the QC results from the 1992 and 1993 core sampling event, and Section B3.2.2 discusses the QC results from the 1995 vapor sampling event.

### B3.2.1 Quality Control Assessment for the 1992 and 1993 Core Sampling Event

The usual QC assessment for solid and liquid samples includes an evaluation of the appropriate standard recoveries, spike recoveries, duplicate analyses, and blanks that are performed in conjunction with the chemical analyses. All the pertinent quality control tests were conducted on the 1992 and 1993 core samples, enabling a full assessment of data accuracy and precision. Bell (1993) established specific criteria for all analytes. Sample and duplicate pairs, with one or more QC results outside the specified criteria, were identified by footnotes in the data summary tables. Major analytes, which met all QC criteria, included cyanide, nitrite, sulfate, TOC, and weight percent water. The following assessment focuses primarily on major analytes and analytes of concern.

The standard and spike recovery results provide an estimate of analysis accuracy. If a standard or spike recovery is above or below the given criterion, the analytical results may be biased high or low, respectively. Many analytes had minor deviations from the standard recovery criteria, but these were characteristic of variations in the rate of sample introduction caused by the high salt content of the samples. One of the spike recoveries was outside the target level for total alpha activity. This may have been caused by high dissolved solids content on the sample mount and subsequent self-shielding. Spike recoveries outside the limits for sodium and other major ICP analytes such as aluminum, bismuth, iron, and phosphorus were probably caused by the high dilutions required. These high dilutions in turn can cause poor or meaningless spike recoveries and RPDs for ICP elements that had very high concentrations or were close to the detection limit. Low recoveries for many analytes were caused by matrix effects. The high spike recoveries for boron and silicon were caused by hydrofluoric acid in the standard matrix reacting with the glassware.

Precision is estimated by the RPD, which is defined as the absolute value of the difference between the primary and duplicate samples, divided by their mean, times 100. Three total alpha activity samples had high RPDs probably caused by low sample activity and self-adsorption. The RPDs were exceeded for many analytes with concentrations near the detection limit, because this adversely impacts the result reproducibility results. Some high RPDs may be attributable to sample homogeneity problems.

Contamination generally was not a problem. Silicon was noted above the detection limit in some blanks, but this was caused by contamination from the glassware. Sodium was detected at very low concentrations in the blanks, but this was attributed to sample carryover and was inconsequential when compared to the analyte concentration.

A complete validation was performed on the data. This validation included a detailed examination of the data package to recreate the analytical process and verify that proper and acceptable analytical techniques had been applied. Additionally, the data package was checked for correct submission of required deliverables and summary forms and for proper calculation of parameters (Svancara and Pool 1993).

Only 75 analytical results, all ICP data, were rejected. In 42 cases, matrix spike failure was the reason for rejection. As previously discussed, spike recoveries can be poor for analytes near the detection limit because of the high dilutions required. Most analytes with matrix spike recovery problems fell into this category. Boron and silicon experienced matrix spike recovery problems for the same reason.

All 13 nickel fusion results were rejected because of contamination from the nickel crucibles used during the fusion. Other reasons for rejecting data included laboratory control sample failure, calibration verification problems, and duplicate analysis failure. The rejected data are noted with an "r" in the analytical tables in the "Mean" column. Twenty-nine rejected results were below the detection limits.

In summary, the majority of QC results for the core samples were within boundaries specified by Bell (1993). The discrepancies mentioned here and footnoted in the data summary tables should not impact the validity or the use of data for the purpose of evaluating the requirement of the safety screening DQO.

### B3.2.2 Quality Control Assessment for the 1995 Vapor Sampling Event

The only QC information provided in Huckaby and Bratzel (1995) were relative standard deviations (RSDs) for each analyte. Although the Tank Characterization Plan (Carpenter 1995) specified certain QC criteria, it appears from Huckaby and Bratzel (1995) that the QC stipulations in Burnum (1995) were followed. Burnum (1995) specified that the RSDs should be less than 25 percent. The RSD is a measure of variability defined as the standard deviation divided by the mean, times 100.

Positive identification of organic analytes involves matching the gas chromatography (GC) retention times and mass spectrometry (MS) data from a sample with that obtained from analysis of known compounds. The concentration of an analyte in the sample is said to be quantitatively measured if the response of the GC/MS has been established at several known concentrations of that analyte (the GC/MS has been calibrated for that analyte), and the MS response to the analyte in the sample is between the lowest and highest responses to the known concentrations (the analyte is within the calibration range). In this QC summary, only those gases defined as inorganic or those organic gases defined as quantitatively measured or positively identified will be assessed (Huckaby and Bratzel 1995).

Five inorganic gases were detected, and all met the QC criteria. Six organic gases were defined as quantitatively measured, and four met the criteria. The remaining two had RSDs of 33 percent and 37 percent. Nineteen organic analytes, which did not exceed their holding times, were positively identified, but the results cannot be considered quantitative and may not be accurate to within the ≤ 25 percent criteria established by Burnum (1995). Nine of these 19 gases exceeded the QC criteria (Huckaby and Bratzel 1995).

## B3.3 DATA CONSISTENCY CHECKS

Comparing different analytical methods can help to assess data consistency and quality. Several comparisons were possible with the data set provided by the core samples. These included a comparison of phosphorus and sulfur as analyzed by ICP with phosphate and sulfate as analyzed by IC, a comparison of total alpha activity and total beta activity with the sum of the individual alpha and beta emitters, respectively, and a comparison of the moisture content results from the TGA and gravimetric determinations. In addition, mass and charge balances were calculated to help assess the overall data consistency.

### B3.3.1 Comparison of Results from Different Analytical Methods

The data consistency checks below compare results from two analytical methods. Close agreement between the methods strengthens the credibility of both results, but poor agreement brings the reliability of the data into question. All analytical mean results were taken from Table B3-6. In cases where more than one digestion method was conducted for a given analyte, the method that yielded the highest analytical result was used for comparison.

The IC phosphate mean result was 114,000 $\mu$g/g. The analytical phosphorus mean result, as determined by the ICP fusion digest results, was 32,900 $\mu$g/g. This is equivalent to 101,000 $\mu$g/g of phosphate and yields a ratio of 1.14. The IC results indicate more phosphorus in the tank than the ICP results do. Furthermore, the mean water digest ICP result for phosphorus is 23,700 $\mu$g/g, equivalent to 72,600 $\mu$g/g of phosphate. Comparison with the fusion result indicates that 72 percent of the phosphorous is water soluble; therefore, inconsistencies exist between the ICP and IC results for phosphorus/phosphate. The IC results may be biased high, or the ICP results may be low.

The analytical sulfur mean result, as determined by the ICP fusion digest results, was 3,140 $\mu$g/g, equivalent to 9,420 $\mu$g/g of sulfate. The IC sulfate mean result was 9,970 $\mu$g/g, yielding a ratio between the two methods of 0.94. This comparison indicates that nearly all sulfate in the tank is water soluble. A second check for solubility is to compare the ICP fusion and water digest means for sulfur. The water digest sulfur mean was 3,540 $\mu$g/g, yielding a ratio of 1.08 with the fusion mean. This comparison supported the belief that all sulfur is present in a water soluble form.

The total alpha and total beta activities can be compared to the sums of the activities of the individual alpha and beta emitters. The fusion digested results from the composite samples were used in all cases.

The sum of activities of individual alpha emitters was 0.172 $\mu$Ci/g, determined by adding the $^{241}$Am and $^{239/240}$Pu mean activities (the two major alpha emitters) and the $^{238}$U activity calculated from laser fluorimetry data. The gross alpha activity was 0.434 $\mu$Ci/g, yielding a ratio between the two methods of 0.40. There is a large discrepancy between the two methods. Total alpha results were difficult to obtain because of interference from the high solids on the sample mounts resulting from the fusion preparation. Therefore, small sample sizes were used to minimize the amount of solids on the mount. Normally, plutonium and americium account for >95 percent of the total alpha results. However, as the comparison reveals, this is not true for composite fusion digestion samples. The results appear to show a higher total alpha concentration than the sum of the representative isotopes. The higher total alpha concentration may be caused by the following.

1. High counting error

2. Interference from $^{137}$Cs and $^{90}$Sr/$^{90}$Y present in the samples

   (The total beta was over 700 times greater than total alpha for these samples.) A small amount of the $\beta$-emissions may have been confounding the detector. (The activity of the samples is so low that the offset used to discriminate between alpha and beta plateaus was not sufficient to provide accurate readings.) The issue of interference between alpha and beta emitters has been resolved since.

3. Another alpha emitting isotope may be present which is not identified or quantified.

   Isotopic determination of the samples was obtained by thermal ionization mass spectroscopy.

The total beta activity was 330 $\mu$Ci/g. The activity of $^{90}$Sr was 108 $\mu$Ci/g, and the activity of $^{137}$Cs was 12.3 $\mu$Ci/g. To compare these individual measurements with the total beta measurement, the $^{90}$Sr was multiplied by 2 to account for the activity of $^{90}$Y, which exists in secular equilibrium with $^{90}$Sr and would have been counted in the total beta measurement but not counted in the $^{90}$Sr measurement. Total beta activity results from the 222-S Laboratory are based on the efficiency of the detector for $^{60}$Co. To allow the $^{90}$Sr and $^{137}$Cs results to be compared with the total beta result, the $^{90}$Sr and $^{137}$Cs are multiplied by factors of 1.42 and 1.51, respectively, to account for the detector efficiency. This gives a measurement of 325 $\mu$Ci/g for the sum of the beta emitters. The ratio of the sum of beta emitters to the total beta measurement is 0.98, indicating good agreement between the two methods. Table B3-1 summarizes the results of the total beta comparison.

Table B3-1. Total Beta Comparison.

| Analyte | Concentration ($\mu$Ci/g) |
|---|---|
| $^{90}Sr$ | 108 |
| $^{137}Cs$ | 12.3 |
| Sum of beta emitters[1] | 325 |
| Gross beta result | 330 |

Note:

[1]The sum of beta emitters was calculated using the equation: 1.42 x 2 x $^{90}Sr$ +1.51 x $^{137}Cs$. The coefficients 1.42 and 1.51 account for the detector efficiencies for the gross beta, which is calibrated to $^{60}Co$. A factor of 2 accounts for the activity of $^{90}Y$ which exists in secular equilibrium with $^{90}Sr$.

Table B3-2 shows the weight percent water results obtained from the TGA and gravimetric methods. The ratio between the samples and duplicates was within 15 percent of 1.0 for all samples except for the core 50, segment 1R, homogenized sample.

Table B3-2. Comparison of Percent Water Results From Thermogravimetric and Gravimetric Analyses. (2 sheets)

| Sample | Thermogravimetric Analysis | Gravimetric | Ratio |
|---|---|---|---|
| Core 50, segment 1R, nonhomogenized | 5.76 | NR | n/a |
| Core 50, segment 1R, homogenized | 26.2 | 18.0 | 1.46 |
| Core 50, segment 2, nonhomogenized | 29.8 | NR | n/a |
| Core 50, segment 2, homogenized | 43.0 | 41.5 | 1.04 |
| Core 50, segment 3, nonhomogenized | 43.3 | IS | n/a |
| Core 50, segment 4, nonhomogenized | 58.1 w/air<br>0 w/nitrogen | IS | n/a |
| Core 51, segment 2, homogenized | 59.3 | 60.2 | 0.99 |
| Core 51, segment 3U, homogenized | 59.6 | 55.1 | 1.08 |
| Core 51, segment 3L, homogenized | 54.2 | 52.9 | 1.02 |
| Core 51, segment 4U, homogenized | 54.7 | 55.0 | 0.99 |
| Core 51, segment 4L, homogenized | 53.1 | 49.5 | 1.07 |
| Core 52, segment 1, homogenized | 15.2 | 16.7 | 0.91 |
| Core 52, segment 2, homogenized | 55.5 | 48.5 | 1.14 |

Table B3-2. Comparison of Percent Water Results From Thermogravimetric and Gravimetric Analyses. (2 sheets)

| Sample | Thermogravimetric Analysis | Gravimetric | Ratio |
|---|---|---|---|
| Core 52, segment 3U, homogenized | 54.6 | 51.4 | 1.06 |
| Core 52, segment 3L, homogenized | 52.2 | 53.5 | 0.98 |
| Core 52, segment 4, homogenized | 53.5 | IS | n/a |
| Core 50, drainable liquid composite | 95.1 | 95.6 | 0.99 |
| Core 51, drainable liquid composite | 73.7 | 75.3 | 0.98 |
| Core 52, drainable liquid composite | 82.9 | 86.5 | 0.96 |
| Core 51, core solids composite | NR | 51.9 | n/a |
| Core 52, core solids composite | NR | 47.8 | n/a |

Notes:
NR = analysis not required
IS = insufficient sample for analysis

### B3.3.2 Mass and Charge Balances

The principle objective in performing mass and charge balances is to determine whether the measurements are consistent. Mass and charge balances were only calculated on the solids portion of the waste. In calculating balances, only analytes listed in Table B3-6 with a detected mean of 1,000 $\mu$g/g or greater were considered. For the metals, the ICP fusion data were used in all cases. The furnace oxidation results were used for TIC and TOC. Only the core composite means were used.

Table B3-3 lists the cation data. Aluminum was assumed to exist as gibbsite [$Al(OH)_3$] because several samples displayed an endothermic reaction during the DSC analysis at 300 °C (572 °F). All phosphorus was assumed to exist as phosphate. Because the ICP phosphorus/IC phosphate comparison revealed that the IC phosphate mean may be biased high, the phosphate values used in the mass and charge balances were calculated from the ICP phosphorus fusion mean, yielding a total of 101,000 $\mu$g/g of phosphate. Based on the comparison between the ICP fusion and water digest phosphorus data, it was estimated that approximately 72 percent (or 72,600 $\mu$g/g) of the phosphate was water soluble. The remaining amount of phosphate, 28,400 $\mu$g/g, was assumed to be insoluble and exist as the compounds $Ca_3(PO_4)_2$, $FePO_4$, and $BiPO_4$. Based on the silicon data from the core 51 composite, it was determined that silicon exists as the soluble silicate ion. All other cations, except sodium, were assumed to be in their most common hydroxide or oxide form, and the concentrations of the assumed species were calculated stoichiometrically. Because precipitates are neutral species, all positive charge was attributed to the sodium cation. All TOC was assumed to exist as acetate, and all TIC was assumed to be carbonate. Table B3-4 lists the anions that were assumed to be present as sodium salts and were expected to balance the positive charge exhibited by the cation. The concentrations of the cationic species in Table B3-3, the anionic species in Table B3-4, and the percent water were ultimately used to calculate the mass balance.

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

Mass balance = % Water + 0.0001 x {Total Analyte Concentration}

= % Water + 0.0001 x {$Al(OH)_3$ + $BiPO_4$ + $Ca_3(PO_4)_2$ + $FePO_4$ + $FeO(OH)$ + $Na^+$ + $F^-$ + $NO_3^-$ + $NO_2^-$ + $PO_4^{3-}$ + $SiO_3^{2-}$ + $SO_4^{2-}$ + $CO_3^{2-}$ + $CH_3COO^-$}

The total analyte concentrations calculated from the above equation is 469,000 $\mu$g/g. The estimated tank weight percent water, based on the gravimetric data, was calculated to be 48.5 weight percent (or 485,000 $\mu$g/g). Gravimetric results were used in the mass balance because gravimetry gave more representative weight percent water results than the TGA. Adding 485,000 $\mu$g/g to the total analyte concentration would produce a mass balance of 95.4 percent, as displayed in Table B3-5. For comparison, a mass balance of 92.9 percent was obtained using TGA data.

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

Total cations ($\mu$eq/g) = $[Na^+]/23.0 = 5{,}350$ $\mu$eq/g

Total anions ($\mu$eq/g) = $[F^-]/19.0 + [NO_3^-]/62.0 + [NO_2^-]/46.0 + [PO_4^{3-}]/31.7 + [SiO_3^{2-}]/38.0 + [SO_4^{2-}]/48.0 + [CO_3^{2-}]/30.0 + [CH_3COO^-]/59.0 = 5{,}790$ $\mu$eq/g

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

The above calculations yielded reasonable mass and charge balances (close to 100 percent for mass balance and 1.00 for charge balance), indicating the results are generally consistent. These balances may have been adversely affected by the large variances seen in the results for some analytes. Refer to Section B3.4 for a list of the variances on the mean for each analyte.

Table B3-3. Cation Mass and Charge Data.

| Analyte | Concentration ($\mu g/g$) | Assumed Species | Concentration of Assumed Species ($\mu g/g$) | Charge ($\mu eq/g$) |
|---|---|---|---|---|
| Aluminum | 16,400 | $Al(OH)_3$ | 47,400 | 0 |
| Bismuth | 11,200 | $BiPO_4$ | 16,300 | 0 |
| Calcium | 1,500 | $Ca_3(PO_4)_2$ | 3,870 | 0 |
| Iron | 27,300[1] | $FePO_4$ | 28,200 | 0 |
| | | FeO(OH) | 26,800 | 0 |
| Phosphorus (Phosphorus) | 9,200 (44,200)[2] | $BiPO_4$, $Ca_3(PO_4)_2$, $FePO_4$ | ---[3] | 0 |
| Sodium | 123,000 | $Na^+$ | 123,000 | 5,350 |
| Total | | | 246,000 | 5,350 |

Notes:

[1]The extra insoluble phosphorus, which was not attributed to $BiPO_4$ and $Ca_3(PO_4)_2$, was assumed to exist as $FePO_4$. The remaining amount of iron was assumed to exist as FeO(OH).

[2]The overall ICP fusion mean for phosphorus was 32,900 $\mu g/g$. Based on a comparison of the fusion and water leach ICP phosphorus data, it was determined that approximately 28 percent of the phosphorus, or 9,200 $\mu g/g$, were found in an insoluble form. The insoluble portion has been assumed to exist as $BiPO_4$, $Ca_3(PO_4)_2$, and $FePO_4$.

[3]No value was entered into column four for phosphorus because its mass has already been accounted for in the other compounds.

Table B3-4. Anion Mass and Charge Data.

| Analyte | Concentration ($\mu g/g$) | Assumed Species | Concentration of Assumed Species ($\mu g/g$) | Charge ($\mu eq/g$) |
|---|---|---|---|---|
| Fluoride | 11,500 | $F^-$ | 11,500 | 605 |
| Nitrate | 75,400 | $NO_3^-$ | 75,400 | 1,220 |
| Nitrite | 11,800 | $NO_2^-$ | 11,800 | 257 |
| Phosphate[1] | 72,600[2] | $PO_4^{3-}$ | 72,600 | 2,290 |
| Silicon | 6,070 | $SiO_3^{2-}$ | 16,500 | 434 |
| Sulfate | 9,970 | $SO_4^{2-}$ | 9,970 | 208 |
| TIC | 4,230 | $CO_3^{2-}$ | 21,200 | 707 |
| TOC | 1,700 | $CH_3COO^-$ | 4,180 | 71 |
| Total | | | 223,000 | 5,790 |

Notes:

[1]The phosphorus/phosphate comparison in Section B3.3.1 showed a discrepancy between the phosphate values from IC and ICP. The phosphate values derived from the ICP phosphorus data have been used in the mass and charge balances. From the comparison of the ICP fusion and water leach phosphorus data, it was found that approximately 72 percent of the phosphorus was water soluble. Therefore, 72 percent of the total phosphorus value (the ICP fusion phosphorus mean) has been assumed to exist as soluble phosphate, and the concentrations of these fractions have been calculated accordingly.

[2]Represents total phosphate, and is derived from the ICP fusion phosphorus data as described in footnote 1. This value includes soluble and insoluble phosphate.

Table B3-5. Mass Balance Totals.

| Totals | Concentrations ($\mu g/g$) |
|---|---|
| Total from Table B3-3 | 246,000 |
| Total from Table B3-4 | 223,000 |
| Weight percent water | 485,000 |
| Grand total | 954,000 |

### B3.3.3 Review of the Analyte Profile

The following conclusions were drawn from review of the available composite and segment analyses.

**B.3.3.3.1 Core 50**. Interpretation of the results suggested several distinct types of materials. Because of a limited amount of sample and poor sample recovery, no core composite was prepared for core 50, and another core was pulled to compensate for it. The analyses on individual segments revealed high concentrations of aluminum, bismuth, and phosphorus. These results are expected, and the analytes observed generally resemble the composition of CW, TBP, and 1C wastes. The DSC traces for segment 4 show an exotherm beginning around 300 °C. This exothermic region was attributed to a plastic artifact that was mixed with the waste in the last segment of the core. Further analysis of the plastic artifact with different carrier gases showed the artifact to be anomalous and not tank waste. After examining the trends of the segments, all analytes showed a slight drop in concentration toward the middle of core (vertically), except for segment 2, where the core was high in aluminum. This result is in agreement with the high aluminum concentration found in the CW added to the tank late in its service life. The last segment of the core was not recovered; therefore, a conclusion cannot be reached whether the indicator analytes of the 1C waste were present, as found in the other two cores. The change in analyte concentration, as a function of depth of the core observed in the fusion results, is confirmed with the separate acid analysis results from the homogenization tests.

**B.3.3.3.2 Core 51**. Core 51 contained sufficient sample to prepare a core composite. The trends from the composite indicate high bulk concentrations of bismuth, phosphorus, and aluminum. This behavior is expected from the 1C/CW and CW effluent streams. The solubility of aluminum is lower than expected because of the anticipated presence of $Al(OH)_3$. The other major constituents that are found in tank 241-T-107 do not behave as expected. Several trace analytes such as boron, lead, lithium, molybdenum, titanium, and thallium produce erratic results with respect to the three different preparation methods. The process history for the waste streams do not indicate the presence of a large amount of these analytes; therefore, the concentrations should be low and variable.

The concentrations of bismuth and phosphorus increase toward the tank bottom. Segment 4L contains the highest concentration of both bismuth and phosphate. These high concentrations are expected at the tank bottom, because the first waste type added to tank 241-T-107 was 1C waste from the early bismuth phosphate process. Although the aluminum concentration at the tank bottom is not the highest observed, the concentration generally increased toward the bottom. This can also be attributed to the 1C waste stream which contained 24 percent aluminum cladding waste. The high concentrations in segment 2 can be attributed to the CW produced from the dissolution of aluminum cladding added late in tank's service life.

The results from anion analysis reveal high overall concentrations of fluoride, nitrate, nitrite, phosphate, and sulfate. The results indicate low concentrations of chloride in the waste. This is not surprising because chloride is not found in any of the waste streams added to tank 241-T-107. The presence of the anions indicates notable quantities of water soluble compounds.

In the assay results related to the safety concerns for TOC and cyanide/ferrocyanide, TOC values for core 51 are low and fall below the established safety criteria of 3 weight percent carbon on a dry weight percent basis. Comparing the results obtained from both laboratories, the 222-S Laboratory results are approximately 3 times higher than those from 325 Analytical Laboratory. Even so, by taking the higher result as a basis, the dry weight organics percent is 0.3 percent, well below the safety criterion. Total cyanide results (from water leach of the sample) for core 51 are higher than for core 52 but well below the safety limits of 3.9 weight percent cyanide.

Analyses for radionuclides were performed on the core composite and segments. The results indicate all radionuclides analyzed by GEA, except $^{137}$Cs, are below the detection limit. Cesium-137, prepared by water digestion, produced an average of 9.2 $\mu$Ci/g of activity, and the fusion digestion produced an average of 12.0 $\mu$Ci/g. In examining the GEA results of the segments, only $^{137}$Cs produced any significant amount of activity; the remaining analytes were below the detection limit of the instrument. Strontium concentrations range between 250 and 400 $\mu$Ci/g. Comparisons of the results between water and fusion digestion results indicate mostly soluble cesium and insoluble strontium compounds.

**B3.3.3.3 Core 52**. The overall high concentrations of aluminum, bismuth, phosphorus, sodium, and silicon agree well with historical records. Aluminum, bismuth, and phosphorus are found in abundance in the waste matrix, and the concentrations strongly indicate 1C and CW wastes. Concentrations for core composite analysis are generally higher for core 52 than for core 51. Aluminum concentrations for core 52 are higher than for core 51 for all three preparation types. A majority of the duplicates for core 52 were not similar and produced high RPDs. The addition of different waste types was observed by the changing concentration throughout the tank depth. By inspecting the concentrations of the analytes by depth, the upper portion of the waste was found to have high concentrations of aluminum attributed to the TBP/CW waste added to the tank late in its service life. The aluminum concentration drops slightly toward the middle of the core, only to increase toward the bottom. The first type of waste added, 1C waste with 24 percent aluminum cladding, could have been responsible for this increase in concentration. Bismuth concentration slowly increased further down into the waste; this was attributed to the 1C waste. Phosphorus concentrations varied as a function of depth for cores 50 and 51 which fits well historically. Core 52, however, does not have the same variations in the tank. This could be caused by the location of the sampling riser with respect to the inlet of the tank.

Examining anion concentrations provides considerable information. High concentrations of fluoride are noted; however, this observation is not surprising because of the presence of ammonium fluoride used in cladding waste and $SiF_6^{-2}$ from 1C waste. Low chloride concentrations are also to be expected because of the lack of this anion in all Hanford waste streams. Nitrate and nitrite were reported in all types of waste and are therefore not considered significant indicator ions (although substantial changes between segments or cores can be suggestive). Cyanide concentrations are low for core 52 (average 45.9 $\mu$g/g). Examination of the segment analysis results for cyanide reveals segment 2 as containing the highest concentration of cyanide, 0.047 weight percent dry. This concentration of cyanide is extremely low, and is far below the safety limit of 3.9 weight percent.

The first segment of the core had very little water (15.2 percent). The percent of water suggests a formation of a crust. The high concentrations of aluminum seen in the first segments, as well as the DSC scans showing an endothermic region around 100 °C and 300 °C, further suggests the formation of a crust or regional anomaly on top of the waste under riser 3. The total organic carbon analyses indicate low (small) amounts of residual organics in the waste, producing a dry weight percent of 0.38. These two observations affirm the lack of an observable exotherm representative of the tank waste.

The only radionuclides routinely over the detection limit throughout the tank were $^{137}$Cs and $^{90}$Sr. Cesium-137 concentrations appear to be consistent throughout the tank except for the significant drop in concentration between core 51, segment 2 and segment 3U. Tank 241-T-107 has slightly lower $^{137}$Cs concentrations toward the tank bottom. Comparing the water digestion results with the fusion results indicates most $^{137}$Cs is in water soluble forms. Strontium-90 is found primarily in the solids, and its concentration was lower in core 52 than in the other cores. Americium-241 can only be detected in low quantities in segment 1.

### B3.3.4 Homogenization Test Description

To comply with Bell (1993), the ability of the process and analytical laboratories to homogenize segments was evaluated. Two homogenization tests were done on samples taken from cores 50, 51, and 52. In the first test, analytical difficulties with the samples were encountered, and the data were not statistically analyzed. In the second test, data from core 51 was incomplete. Consequently, only data from core 50, segment 2, and core 52, segment 3L, were included in the statistical analysis. In the homogenization tests, samples from cores were homogenized and divided into two parts; one subsample was obtained from each part. Two aliquots were taken from each subsample and prepared for chemical analysis. After acid digestion, an ICP analysis was conducted on the samples. For the full discussion including the homogenization test data, refer to Valenzuela and Jensen (1994). It was determined that the process and analytical laboratories were able to homogenize core segments adequately in this experiment.

## B3.4 MEAN CONCENTRATIONS AND CONFIDENCE INTERVALS

The statistics in this section were calculated using analytical data from the most recent sampling event of tank 241-T-107. Analysis of variance (ANOVA) techniques were used to estimate the mean and to calculate confidence limits on the mean for all analytes above the detection limit. The estimates of the mean and confidence intervals on the mean were computed based on core composite samples, core segment samples, and drainable liquid samples.

### B3.4.1 Mean Concentration Estimates

This section shows three types of analyte concentration estimates: Table B3-6 is based on core composite data, Table B3-7 is based on core segment data, and Table B3-8 is based on results from a chemical analysis of the drainable liquid. The concentration estimates are based on results from ANOVA models fit to the data. These models were fit to the data for all analytes without "less than" values.

The results below are ANOVA estimates based on the core composite data from cores 51 and 52 of tank 241-T-107. In the laboratory, a single core composite sample was formed from the homogenized segment samples of each core. When more than one set of data for the core composite existed, the core means were obtained, then overall means were calculated. Because of incomplete core recovery, the statistical results based on the composite samples are biased. The magnitude of the bias is unknown.

Table B3-6 lists the mean concentrations and the lower limit (LL) and upper limit (UL) to 95 percent confidence intervals on the mean. For some analytes, the LL (95 percent) was negative. Because concentrations are greater than or equal to zero, negative 95 percent LL values were set equal to zero. The ANOVA model used to calculate the summary statistics given in Table B3-6 is outlined in Section B3.4.4.

Table B3-6. Core Composite Statistics (Units are $\mu$g/g Except Radionuclides are $\mu$Ci/g). (3 sheets)

| Analyte | $\bar{y}$ | $\hat{\sigma}^2(\bar{y})$ | df | 95% LL | 95% UL |
|---|---|---|---|---|---|
| ICP.a.Ag | 7.37 | n/a | 1 | n/a | n/a |
| ICP.a.Al | 14,400 | 4.19E+08 | 1 | 0.00 | 2.74E+05 |
| ICP.a.Bi | 10,900 | 3.35E+07 | 1 | 0.00 | 84,400 |
| ICP.a.Ca | 723 | 67,600 | 1 | 0.00 | 4,030 |
| ICP.a.Cd | 6.40 | 2.64 | 1 | 0.00 | 27.0 |
| ICP.a.Cr | 354 | 3,190 | 1 | 0.00 | 1,070 |
| ICP.a.Fe | 31,500 | 1.12E+07 | 1 | 0.00 | 74,000 |
| ICP.a.K | 234 | 342 | 1 | 0.00 | 469 |
| ICP.a.Li | 5.48 | 8.67 | 1 | 0.00 | 42.9 |
| ICP.a.Mg | 214 | 9,410 | 1 | 0.00 | 1,450 |
| ICP.a.Mn | 222 | 361 | 1 | 0.00 | 463 |
| ICP.a.Na | 1.30E+05 | 1.56E+08 | 1 | 0.00 | 2.89E+05 |
| ICP.a.Nd | 72.9 | 5,210 | 1 | 0.00 | 990 |
| ICP.a.Ni | 292 | 625 | 1 | 0.00 | 610 |
| ICP.a.P | 30,000 | 4.90E+05 | 1 | 21,100 | 38,900 |
| ICP.a.Pb | 796 | 3.81E+05 | 1 | 0.00 | 8,640 |
| ICP.a.S | 3,050 | 1.06E+06 | 1 | 0.00 | 16,100 |
| ICP.a.Si | 875 | 2.34E+06 | 1 | 0.00 | 20,300 |
| ICP.a.Sm | 285 | 1.28E+05 | 1 | 0.00 | 4,840 |
| ICP.a.Sr | 962 | 3.09E+05 | 1 | 0.00 | 8,020 |
| ICP.a.Zr | 71.6 | 9,010 | 1 | 0.00 | 1,280 |
| ICP.w.Al | 651 | 1.10E+05 | 1 | 0.00 | 4,860 |
| ICP.w.B | 326 | 3.86E+05 | 1 | 0.00 | 8,220 |
| ICP.w.Bi | 243 | 88,400 | 1 | 0.00 | 4,020 |
| ICP.w.Ca | 271 | 1.68E+05 | 1 | 0.00 | 5,480 |
| ICP.w.Cr | 211 | 600 | 1 | 0.00 | 522 |
| ICP.w.Fe | 356 | 27,900 | 1 | 0.00 | 2,480 |
| ICP.w.K | 316 | 72,900 | 1 | 0.00 | 3,750 |
| ICP.w.Mg | 9.83 | 0.0272 | 1 | 7.74 | 11.9 |
| ICP.w.Mo | 7.88 | 2.66 | 1 | 0.00 | 28.6 |

Table B3-6. Core Composite Statistics (Units are $\mu$g/g Except Radionuclides are $\mu$Ci/g). (3 sheets)

| Analyte | $\bar{y}$ | $\hat{\sigma}^2(\bar{y})$ | df | 95% LL | 95% UL |
|---|---|---|---|---|---|
| ICP.w.Na | 1.08E+05 | 2.72E+09 | 1 | 0.00 | 7.71E+05 |
| ICP.w.P | 23,700 | 4.32E+07 | 1 | 0.00 | 1.07E+05 |
| ICP.w.S | 3,540 | 7.40E+05 | 1 | 0.00 | 14,500 |
| ICP.w.Sr | 5.53 | 0.00640 | 1 | 4.51 | 6.55 |
| ICP.w.Zr | 6.07 | 56.4 | 1 | 0.00 | 102 |
| ICP.f.Al | 16,400 | 1.14E+08 | 1 | 0.00 | 1.52E+05 |
| ICP.f.Bi | 11,200 | 8.35E+06 | 1 | 0.00 | 47,900 |
| ICP.f.Ca | 1,500 | 1.02E+06 | 1 | 0.00 | 14,300 |
| ICP.f.Cr | 347 | 213 | 1 | 161 | 533 |
| ICP.f.Fe | 27,300 | 9.86E+06 | 1 | 0.00 | 67,300 |
| ICP.f.Mg | 232 | 303 | 1 | 11.6 | 453 |
| ICP.f.Mn | 201 | 502 | 1 | 0.00 | 485 |
| ICP.f.Na | 1.23E+05 | 2.20E+07 | 1 | 63,600 | 1.83E+05 |
| ICP.f.P | 32,900 | 8.50E+05 | 1 | 21,200 | 44,600 |
| ICP.f.Pb | 643 | 6,590 | 1 | 0.00 | 1,670 |
| ICP.f.S | 3,140 | 1.78E+05 | 1 | 0.00 | 8,510 |
| ICP.f.Si | 6,070 | 1.46E+06 | 1 | 0.00 | 21,400 |
| ICP.f.Sr | 861 | 8,650 | 1 | 0.00 | 2,040 |
| ICP.f.Zr | 113.0 | 1,370 | 1 | 0.00 | 583 |
| Total dissolved solids (wt%) | 0.395 | 5.63E-05 | 1 | 0.299 | 0.490 |
| RS (wt%) | 28.7 | 30.8 | 1 | 0.00 | 99.2 |
| CN | 68.8 | 2,100 | 1 | 0.00 | 651 |
| IC.F | 11,500 | 4.95E+06 | 1 | 0.00 | 39,700 |
| IC.Cl | 547 | 18,300 | 1 | 0.00 | 2,270 |
| IC.$NO_2^-$ | 11,800 | 1.21E+07 | 1 | 0.00 | 55,900 |
| IC.$NO_3^-$ | 75,400 | 3.03E+08 | 1 | 0.00 | 2.97E+05 |
| IC.$PO_4^{3-}$ | 1.14E+05 | 3.80E+08 | 1 | 0.00 | 3.62E+05 |
| IC.$SO_4^{2-}$ | 9,970 | 7.16E+06 | 1 | 0.00 | 44,000 |
| Spec.w.$NO_2^-$ | 11,100 | 3.94E+07 | 1 | 0.00 | 90,800 |
| Furnace ox.TIC | 4,230 | 8.41E+06 | 1 | 0.00 | 41,100 |

Table B3-6. Core Composite Statistics (Units are $\mu$g/g Except Radionuclides are $\mu$Ci/g). (3 sheets)

| Analyte | $\bar{y}$ | $\hat{\sigma}^2(\bar{y})$ | df | 95% LL | 95% UL |
|---|---|---|---|---|---|
| Persulfate ox. TIC | 1,700 | 1.44E+05 | 1 | 0.00 | 6,530 |
| Furnace ox.TOC | 1,700 | 6,890 | 1 | 0.00 | 5,030 |
| Persulfate ox. TOC | 360 | 1,600 | 1 | 0.00 | 868 |
| Total alpha (fusion) | 0.434 | 0.00152 | 1 | 0.00 | 0.930 |
| Total alpha (water) | 0.00398 | 1.19E-05 | 1 | 0.00 | 0.0479 |
| Am-241 (fusion) | 0.0140 | 7.49E-06 | 1 | 0.00 | 0.0488 |
| Pu-239/40 (fusion) | 0.150 | 0.0011 | 1 | 0.00 | 0.572 |
| Total beta (fusion) | 330 | 5,370 | 1 | 0.00 | 1,260 |
| Total beta (water) | 13.4 | 9.49 | 1 | 0.00 | 52.6 |
| Sr-90 (fusion) | 108 | 530 | 1 | 0.00 | 401 |
| Tc-99 (fusion) | 0.0505 | 5.06E-06 | 1 | 0.0219 | 0.0791 |
| GEA.Cs-137 (fusion) | 12.3 | 2.56 | 1 | 0.00 | 32.6 |
| RS.GEA.Cs-137 (water) | 10.6 | 16.7 | 1 | 0.00 | 62.6 |
| U (LF) | 22,600 | 1.35E+07 | 1 | 0.00 | 69,300 |
| U-238[1] | 0.00831 | 2.86E-06 | 1 | 0.00 | 0.0298 |
| % Solids | 51.5 | 11.3 | 1 | 8.77 | 94.2 |
| pH | 11.5 | 0.0400 | 1 | 8.96 | 14.0 |
| CN.dir | 76.1 | 1,560 | 1 | 0.00 | 577 |

Notes: n/a = not applicable
df = degrees of freedom
ox. = oxidation
RS = residual solids from water digestion.

[1]Calculated from the uranium (fusion) laser fluorimetry data.

Inventory estimates can be calculated for each analyte using an average density of 1.51 g/mL and a waste volume of 655 kL (173 kgal). The kg estimates are the concentration estimates given in Table B3-6 multiplied by 1.51*655/1000. The Ci estimates are the concentration estimates in Table B3-6 multiplied by 1.51*655.

### B3.4.2 Segment-Level Means

Segment data were analyzed for all three tank 241-T-107 core samples. The degrees of freedom used in calculating the confidence intervals is the number of core samples minus one. The confidence intervals computed for the segment level means are based on two degrees of freedom. The confidence intervals in the previous section were based on one degree of freedom.

Table B3-7 contains the summary statistics, by analyte, for ICP KOH/Ni fusion dissolution, radiochemistry, and other analyses. These values are based on a chemical analysis of segments from each core. The ANOVA model used to determine the summary statistics in Table B3-7 is described in Section B3.4.5.

Inventory estimates can be calculated for each analyte using an average density of 1.51 g/mL and a waste volume of 655 kL (173 kgal). The kg estimates are the concentration estimates in Table B3-7 multiplied by 1.51*655/1000. The Ci estimates are the concentration estimates in Table B3-7 multiplied by 1.51*655.

Table B3-7. Segment Data Concentration Estimate Statistics (Units $\mu$g/g Except Radionuclides $\mu$Ci/g). (2 sheets)

| Analyte | $\bar{y}$ | $\hat{\sigma}^2(\bar{y})$ | df | 95% LL | 95% UL |
|---|---|---|---|---|---|
| ICP.f.Al | 38,800 | 4.34E+08 | 2 | 0.00 | 1.28E+05 |
| ICP.f.Bi | 9,010 | 5.71E+06 | 2 | 0.00 | 19,300 |
| ICP.f.Ca | 1,920 | 7.16E+05 | 2 | 0.00 | 5,560 |
| ICP.f.Cd | 9.87 | 6.79 | 2 | 0.00 | 21.1 |
| ICP.f.Cr | 317 | 1,150 | 2 | 171 | 463 |
| ICP.f.Fe | 26,000 | 7.86E+06 | 2 | 13,900 | 38,000 |
| ICP.f.Mg | 261 | 1,250 | 2 | 109 | 412 |
| ICP.f.Mn | 427 | 42,700 | 2 | 0.00 | 1,320 |
| ICP.f.Na | 95,500 | 9.06E+07 | 2 | 54,600 | 1.36E+05 |
| ICP.f.Ni | 5,190 | 1.59E+06 | 2 | 0.00 | 10,600 |
| ICP.f.P | 21,300 | 1.80E+07 | 2 | 3,040 | 39,600 |
| ICP.f.Pb | 717 | 29,600 | 2 | 0.00 | 1,460 |
| ICP.f.S | 2,910 | 2.55E+05 | 2 | 736 | 5,080 |
| ICP.f.Si | 5,390 | 1.05E+06 | 2 | 982 | 9,800 |
| ICP.f.Sr | 793 | 34,700 | 2 | 0.00 | 1,590 |
| ICP.f.Ti | 46.8 | 592 | 2 | 0.00 | 151 |

Table B3-7. Segment Data Concentration Estimate Statistics
(Units $\mu$g/g Except Radionuclides $\mu$Ci/g). (2 sheets)

| Analyte | $\bar{y}$ | $\hat{\sigma}^2(\bar{y})$ | df | 95% LL | 95% UL |
|---|---|---|---|---|---|
| ICP.f.Zr | 55.2 | 1,090 | 2 | 0.00 | 197 |
| Persulfate ox. TIC | 2,460 | 56,800 | 2 | 1,440 | 3,490 |
| Persulfate ox. TOC | 868 | 41,300 | 2 | 0.00 | 1,740 |
| Sr-90 | 119 | 959 | 2 | 0.00 | 252 |
| GEA.Cs-137 | 20.5 | 140.0 | 2 | 0.00 | 71.5 |
| TGA.$H_20$ | 46.0 | 30.7 | 2 | 22.2 | 69.8 |
| % Solids | 58.0 | 47.0 | 2 | 27.9 | 87.5 |
| pH | 11.1 | 0.0194 | 2 | 10.5 | 11.7 |
| CN | 63.3 | 202 | 2 | 2.24 | 124 |

Table B3-8 contains the summary statistics, by analyte, for ICP, IC, radiochemistry, and several special analyses of acidified drainable liquid samples. These values are based on a chemical analysis of a drainable liquid sample from each of three cores.

### B3.4.3 Drainable Liquid Means

Drainable liquid sample data was available from each of three core samples taken from tank 241-T-107. The ANOVA model used to describe the data is identical to the model used for the core composite data. The confidence intervals computed from the drainable liquid data were based on two degrees of freedom. Because of incomplete core segment recovery, the results in Table B3-8 may be biased. The magnitude of the bias is unknown.

Table B3-8. Drainable Liquid Composite Data Concentration Estimate Statistics
(Units $\mu$g/mL Except Radionuclides $\mu$Ci/mL). (2 sheets)

| Analyte | $\bar{y}$ | $\hat{\sigma}^2(\bar{y})$ | df | 95% LL | 95% UL |
|---|---|---|---|---|---|
| ICP.Al | 21.2 | 182 | 2 | 0.00 | 79.2 |
| ICP.B | 21.3 | 39.4 | 2 | 0.00 | 48.3 |
| ICP.Ca | 4.40 | 0.0926 | 2 | 3.09 | 5.71 |
| ICP.Cr | 169 | 4,410 | 2 | 0.00 | 455 |
| ICP.Fe | 24.3 | 156 | 2 | 0.00 | 77.9 |
| ICP.K | 184 | 9,080 | 2 | 0.00 | 594 |

Table B3-8. Drainable Liquid Composite Data Concentration Estimate Statistics (Units $\mu$g/mL Except Radionuclides $\mu$Ci/mL). (2 sheets)

| Analyte | $\bar{y}$ | $\hat{\sigma}^2(\bar{y})$ | df | 95% LL | 95% UL |
|---|---|---|---|---|---|
| ICP.Mg | 0.681 | 0.0781 | 2 | 0.00 | 1.88 |
| ICP.Mo | 8.90 | 45.5 | 2 | 0.00 | 37.9 |
| ICP.Na | 54,000 | 5.47E+08 | 2 | 0.00 | 1.55E+05 |
| ICP.Ni | 6.87 | 21.2 | 2 | 0.00 | 26.7 |
| ICP.P | 1,800 | 2.82E+05 | 2 | 0.00 | 4,090 |
| ICP.S | 3,390 | 2.24E+06 | 2 | 0.00 | 9,830 |
| ICP.Si | 70.7 | 73.1 | 2 | 33.9 | 107 |
| ICP.Sr | 0.707 | 0.304 | 2 | 0.00 | 3.08 |
| ICP.Zr | 0.826 | 0.211 | 2 | 0.00 | 2.80 |
| CN | 68.4 | 1,800 | 2 | 0.00 | 251 |
| IC.F | 557 | 38,700 | 2 | 0.00 | 1,400 |
| IC.Cl | 799 | 1.10E+05 | 2 | 0.00 | 2,230 |
| IC.$NO_2^-$ | 12,800 | 5.79E+07 | 2 | 0.00 | 45,500 |
| IC.$PO_4^{3-}$ | 5,420 | 2.45E+06 | 2 | 0.00 | 12,200 |
| IC.$SO_4^{2-}$ | 10,300 | 1.25E+07 | 2 | 0.00 | 25,500 |
| IC.$NO_3^-$ | 85,200 | 1.12E+09 | 2 | 0.00 | 2.30E+05 |
| Spec.w.$NO_2^-$ | 7,570 | 8.04E+06 | 2 | 0.00 | 19,800 |
| $NH_3$ | 115 | 2,940 | 2 | 0.00 | 348 |
| TIC | 1,800 | 1.89E+06 | 2 | 0.00 | 7,710 |
| TOC | 857 | 63,600 | 2 | 0.00 | 1,940 |
| Total alpha | 0.00601 | 2.81E-05 | 2 | 0.00 | 0.0288 |
| U (LF) | 241 | 30,300 | 2 | 0.00 | 990 |
| U-238[1] | 8.10E-05 | 3.42E-09 | 2 | 0.00 | 3.33E-04 |
| Am-241 | 1.15E-04 | 1.99E-09 | 1 | 0.00 | 6.82E-04 |
| Total beta | 11.8 | 47.4 | 2 | 0.00 | 41.4 |
| Sr-90 | 0.0594 | 0.00109 | 2 | 0.00 | 0.202 |
| Tc-99 | 0.0368 | 6.06E-04 | 2 | 0.00 | 0.143 |
| C-14 | 2.03E-04 | 2.50E-08 | 2 | 0.00 | 8.84E-04 |
| H-3 | 0.00180 | 2.01E-06 | 2 | 0.00 | 0.00803 |
| GEA.Cs-137 | 8.43 | 25.6 | 2 | 0.00 | 30.2 |

Note:

[1]Calculated from the uranium (fusion) laser fluorimetry data.

Inventory estimates can be calculated for each analyte using the drainable interstitial liquid volume of 83 kL (22 kgal). The kg estimates are the concentration estimates in Table B3-8 multiplied by 83/1000. The Ci estimates are the concentration estimates in Table B3-8 multiplied by 83.

### B3.4.4 ANOVA Models for Core Composite and Drainable Liquid Data

The statistical model that describes the structure of the core composite data and drainable liquid data is

$$y_{ij} = \mu + C_i + A_{ij}, \; i = 1,\ldots a, \; j = 1,\ldots n_i,$$

where

$y_{ij}$ = laboratory results from the $j^{th}$ duplicate of the $i^{th}$ core composite sample from the tank

$\mu$ = the grand mean

$C_i$ = the effect of the $i^{th}$ core (spatial effect)

$A_{ij}$ = the analytical error associated with the $j^{th}$ duplicate from the $i^{th}$ core

a = the number of cores

$n_i$ = the number of analytical results from the $i^{th}$ core.

This is an unbalanced one-way random effects analysis of variance model. The $C_i$ variable is assumed to be a random effect. It is assumed that $C_i$ and $A_{ij}$ are each distributed normally with mean zero and variances of $\sigma^{2©}$ and $\sigma^2(A)$, respectively. Estimates of $\sigma^{2©}$ and $\sigma^2(A)$ were obtained using Restricted Maximum Likelihood Estimation (REML). This method, as applied to variance component estimation, is described by Harville (1977). The REML estimates were obtained using the statistics program S-PLUS[5] (Statistical Sciences 1993).

[5]S-PLUS is a registered trademark of Statistical Sciences, Seattle, Washington.

An estimate of the true unknown mean concentration $\mu$ is the mean of the core means; that is, each core is weighted equally.

$$\hat{\mu} = \bar{y} = \frac{1}{a}\sum_{i=1}^{a}\bar{y}_{i+}, \text{ where } \bar{y}_{i+} = \sum_{j=1}^{n_i}\frac{y_{ij}}{n_i}.$$

The variance of $\bar{y}$ (Snedecor and Cochran 1980) is

$$\sigma^2(\bar{y}) = \frac{\sigma^2(C)}{a} + \frac{\sigma^2(A)}{a^2}\sum_{i=1}^{a}\frac{1}{n_i}.$$

The estimated variance of $\bar{y}$ is obtained by substituting the REML estimators of the two variance components into the above equation. The degrees of freedom associated with the estimate of variance is the number of cores with data minus one.

The 95 percent confidence interval (LL and UL) on the mean concentration $\mu$ are

$$95\%\ LL = \bar{y} - t_{0.025}\sqrt{\hat{\sigma}^2(\bar{y})}, \text{ and } 95\%\ UL = \bar{y} + t_{0.025}\sqrt{\hat{\sigma}^2(\bar{y})},$$

where $t_{0.025}$ is the 0.025 quantile from a Student's t-distribution with a-1 degree of freedom. In this case, the number of composite samples (a) equals 2, so that the estimates are based on one degree of freedom and $t_{0.025}$ = 12.706.

### B3.4.5 ANOVA Model for Core Segment Data

The statistical model that describes the structure of the core segment data is

$$y_{ijk} = \mu + C_i + S_{ij} + A_{ijk},$$
$$i = 1,\ldots a,\ j = 1,\ldots b_i,\ k = 1,\ldots n_{ij},$$

where

| | | |
|---|---|---|
| $y_{ijk}$ | = | laboratory results from the $k^{th}$ duplicate of the $j^{th}$ segment of the $i^{th}$ core from the tank |
| $\mu$ | = | the grand mean |
| $C_i$ | = | the effect of the $i^{th}$ core (spatial effect) |

$S_{ij}$ = the effect of the j[th] segment sample from the i[th] core (spatial effect)

$A_{ijk}$ = the analytical error associated with the k[th] duplicate in the j[th] composite from the i[th] core

a = the number of cores

$b_i$ = the number of segments (half segments) in the i[th] core

$n_{ij}$ = the number of analytical results from the j[th] segments (half segments) in the i[th] core.

The number of segments (half segments) in cores 50, 51, and 52 were 3, 5, and 4 (that is, $b_1 = 3$, $b_2 = 5$ and $b_3 = 4$).

The variables $C_i$ and $S_{ij}$ are treated as random effects. It is assumed that $C_i$, $S_{ij}$, and $A_{ijk}$ are each distributed normally with mean zero and variances of $\sigma^2(C)$, $\sigma^2(S)$, and $\sigma^2(A)$, respectively. Estimates of $\sigma^2(C)$, $\sigma^2(S)$, and $\sigma^2(A)$ were obtained using REML methods. The REML estimation method, as applied to variance component, is described by Harville (1977). The REML estimates were obtained using the statistics program S-PLUS® (Statistical Sciences 1993).

The mean concentration of each analyte of interest in the tank was calculated using the following equation:

$$\bar{y} = \frac{1}{a}\sum_{i=1}^{a}\bar{y}_{i++} = \frac{1}{a}\sum_{i=1}^{a}\frac{\sum_{j=1}^{b_i}\sum_{k=1}^{n_{ij}} y_{ijk}}{n_{i+}} = \frac{1}{a}\sum_{i=1}^{a}\frac{\sum_{j=1}^{b_i}\sum_{k=1}^{n_{ij}}(\mu + C_i + S_{ij} + A_{ijk})}{n_{i+}},$$

where

$$\bar{y}_{i++} = \frac{\sum_{j=1}^{b_i}\sum_{k=1}^{n_{ij}} y_{ijk}}{n_{i+}} \quad \text{and} \quad n_{i+} = \sum_{j=1}^{b_i} n_{ij}.$$

This mean equally weights the results from each core regardless of the unbalance that may exist for a particular analyte.

The variance of $\bar{y}$ is

$$V(\bar{y}) = C_1\sigma^2(C) + C_2\sigma^2(S) + C_3\sigma^2(A)$$

where

$$C_1 = \frac{1}{a}, \quad C_2 = \frac{1}{a^2}\sum_{i=1}^{a}\left(\frac{1}{n_{i+}}\right)^2\left(\sum_{j=1}^{b_i} n_{ij}^2\right), \quad C_3 = \frac{1}{a^2}\sum_{i=1}^{a}\left(\frac{1}{n_{i+}}\right).$$

Using $\hat{\sigma}^2(C)$, $\hat{\sigma}^2(S)$, and $\hat{\sigma}^2(A)$ (REML variance component estimates), an estimated variance of $\bar{y}$ is

$$\hat{\sigma}^2(\bar{y}) = C_1\hat{\sigma}^2(C) + C_2\hat{\sigma}^2(S) + C_3\hat{\sigma}^2(A).$$

The approximate degrees of freedom used for $\hat{\sigma}^2(\bar{y})$ is the number of cores with data minus one.

The lower and upper 95 percent limits (95 percent LL and 95 percent UL, respectively) on the mean concentration are

$$95\%\ LL = \bar{y} - t_{0.025}\sqrt{\hat{\sigma}^2(\bar{y})} \quad \text{and} \quad 95\%\ UL = \bar{y} + t_{0.025}\sqrt{\hat{\sigma}^2(\bar{y})}$$

where $t_{0.025}$ is the 0.025 quantile from a Student's t-distribution with approximate degrees of freedom equal to the number of cores with data minus one. In this case, the degrees of freedom is two and $t_{0.025} = 4.303$.

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# APPENDIX C

# STATISTICAL ANALYSIS FOR ISSUE RESOLUTION

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# APPENDIX C

## STATISTICAL ANALYSIS FOR ISSUE RESOLUTION

In Appendix C, the data investigations required for the applicable DQOs for tank 241-T-107 would normally be reported. These include statistical and other numerical manipulations required in the DQOs. Because the 1992 and 1993 core sampling of tank 241-T-107 predated DQOs, none were applicable to the sampling event. Although an effort has been made to apply the current safety screening DQO requirements to the 1992 and 1993 data set, no computations were made as required by the DQO. Specifically, no confidence intervals were calculated for the total alpha data for each sample/duplicate pair. These calculations were not done because all total alpha results were quite low, and total alpha was only measured on the core composites instead of each half segment as required by the DQO. A 95 percent confidence interval was calculated on the overall tank mean, yielding a UL of 0.930 $\mu$Ci/g. No confidence intervals were necessary for the DSC results because no exotherms were found in any waste samples (the lone exotherm was attributed to a plastic scrap which had been commingled with the sample).

The vapor DQO (Osborne et al. 1994) was applicable to the 1995 vapor sampling event. However, the DQO does not require statistical calculations for issue resolution.

## C1.0 APPENDIX C REFERENCES

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# APPENDIX D

## EVALUATION TO ESTABLISH BEST-BASIS INVENTORY FOR SINGLE-SHELL TANK 241-T-107

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# APPENDIX D

## EVALUATION TO ESTABLISH BEST-BASIS INVENTORY FOR SINGLE-SHELL TANK 241-T-107

An effort is underway to provide waste inventory estimates that will serve as standard characterization source terms for various waste management activities (Hodgson and LeClair 1996). As part of this effort, an evaluation of available waste related information for tank 241-T-107 was performed, and a best-basis inventory was established. This work follows the methodology that was established by the standard inventory task.

## D1.0 IDENTIFY/COMPILE INVENTORY SOURCES

Appendix B provides the characterization results from the most recent sampling event. Section B3.4 provides mean concentrations calculated from the analytical results. Three push-mode core samples were obtained from three risers in November 1992 to March 1993. Samples from each core and core composites from two cores were analyzed.

Component inventories can be calculated by multiplying the concentration of an analyte by the current tank volume and by the density of the waste. The HDW model document (Agnew et al. 1996a) provides tank content estimates, derived from the Los Alamos National Laboratory model, in terms of component concentrations and inventories. Appendix D lists the data sources used in this evaluation.

## D2.0 COMPARE COMPONENT INVENTORY VALUES

The sample-based inventory, derived from analytical mean concentration data for the most recent sampling event (see Appendix B), and model-based inventory, generated by the HDW model (Agnew et al. 1996a), are compared in Tables D2-1 and D2-2. Table D2-1 compares nonradioactive components on a kilogram basis, and Table D2-2 compares the radioactive components on a curie basis.

The sample-based inventory listed in Tables D2-1 and D2-2 was calculated by multiplying each mean analyte concentration value by the current tank volume, 655 kL (173 kgal) (Hanlon 1996), and by the mean density of the waste, 1.51 g/mL (see Appendix B). At the time the tank was sampled, the waste volume was reported as 681 kL (180 kgal) with 647 kL (171 kgal) of sludge and 34 kL (9 kgal) of supernatant. The HDW model-based inventory was derived using this volume and 1.28 g/mL as the mean density.

Table D2-1. Sampling-Based and Hanford Defined Waste-Based Inventory Estimates for Nonradioactive Components in Tank 241-T-107.

| Analyte | Sampling[1] Inventory Estimate (kg) | HDW[2] Inventory Estimate (kg) | Analyte | Sampling[1] Inventory Estimate (kg) | HDW[2] Inventory Estimate (kg) |
|---|---|---|---|---|---|
| Al | 16,200 | 8,300 | Ni | 289 | 44.1 |
| Bi | 11,100 | 10,400 | $NO_2$ | 11,700 | 5,330 |
| Ca | 1,480 | 1,960 | $NO_3$ | 74,600 | 15,000 |
| Cd | 6.3 | nr | OH | nr | 28,800 |
| Cl | 541 | 340 | P as $PO_4$ | 1.128E+05 | 81,900 |
| Cr | 343 | 127 | Si as $SiO_3$ | 6,000 | 1,150 |
| F[3] | 11,400 | 2,030 | S as $SO_4$ | 9,860 | 2,780 |
| Fe | 27,000 | 11,700 | Sr | 852 | nr |
| FeCN/CN | 68.8 | nr | TIC | 4,180 | 2,930 |
| Hg | nr | 13.7 | TOC | 1,680 | 0 |
| K | 231 | 81.7 | $U_{TOTAL}$ | 22,400 | 88 |
| Mg | 229 | nr | Zr | 112 | 608 |
| Mn | 199 | nr | $H_2O$ (wt%) | 4.55E+05 (46) | 5.963E+05 |
| Na | 1.217E+05 | 72,600 | Density (g/mL) | 1.51 | 1.28 |
| $NH_3$ | nr | 1.97 | | | |

Notes:

nr = not reported

[1]Appendix B
[2]Agnew et al. (1996a)
[3]Fluoride based on water soluble portion only.

Table D2-2. Sampling and Hanford Defined Waste Predicted Inventory Estimates for Radioactive Components in Tank 241-T-107.

| Analyte | Sampling[1] Inventory Estimate (Ci) | HDW[2] Inventory Estimate (Ci) | Analyte | Sampling[1] Inventory Estimate (Ci) | HDW[2] Inventory Estimate (Ci) |
|---|---|---|---|---|---|
| $^{90}Sr$ | 1.068E+05 | 69.8 | $^{241}Am$ | 13.8 | nr |
| $^{99}Tc$ | 50 | nr | Total $\alpha$ | 429 | nr |
| $^{137}Cs$ | 12,200 | 7,890 | Total $\beta$ | 3.264E+05 | nr |

Notes:

nr = not reported

[1]Appendix B
[2]Agnew et al. (1996a)

## D3.0 REVIEW AND EVALUATION OF COMPONENT INVENTORIES

The following evaluation of tank contents is performed to identify potential errors and/or missing information that would influence the sampling-based and HDW model component inventories. Computations for the HDW model are based on the assumption that most solid waste in tank 241-T-107 is a single waste type, 1C waste; the remaining unknown waste has also been designated as 1C. The implication is that all tank waste is a single type. Both the waste transfer history and the sampling results indicate that other waste types have contributed to the solids in tank 241-T-107. Appendix A includes a complete summary of the waste transfer history of tank 241-T-107. An abbreviated summary follows and highlights the waste types added to the tank that may have an effect on the solid waste inventory.

Tank 241-T-107 is the first tank in a cascade that includes tanks 241-T-108 and 241-T-109. The tank was filled in 1945 and 1946 with 1C waste and was undisturbed until 1951 when over half the supernatant was removed. The tank then received TBP waste, also known as uranium recovery (UR) waste, until mid-1953. The supernatant was removed again and replaced with unconcentrated, ferrocyanide-scavenged TBP waste. Between 1954 and late 1966, no waste transfers into or out of tank 241-T-107 were recorded, and the waste volume remained constant.

Tank 241-T-107 received cladding waste in 1967. Both aluminum and Zircaloy CW are expected in the tank. In 1969, approximately half the waste content, mostly liquids with a small amount of solids, was removed from tank 241-T-107. In 1973, the tank received ion exchange (IX) waste, which was immediately distributed to other tanks. In 1976, tank 241-T-107 was removed from service and designated inactive.

## D3.1 CONTRIBUTING WASTE TYPES

The waste types expected to have accumulated in tank 241-T-107, as reported by various sources, are listed in Table D3-1. The waste transfer history (see Appendix A) reveals that several waste types were added to tank 241-T-107. The HDW model (Agnew et al. 1996a) assumes these other waste types do not contribute to the tank inventory significantly at this time. Agnew et al. (1996a) predicts the presence of 496 kL (131 kgal) of 1C1 waste, and an additional 150 kL (40 kgal). The calculations that follow indicate constituents of other waste types are present.

Table D3-1. Expected Solids for Tank 241-T-107.

| Reference | Waste Type |
|---|---|
| HDW Model (Agnew et al. 1996a) | 1C1 |
| SORWT (Hill et al. 1995) | 1C, CW, UR |
| WSTRS (Agnew et al. 1996b) (see Appendix A) | 1C1, CW, UR, IX |

Notes:

1C = First cycle decontamination $BiPO_4$ waste
1C1 = First cycle decontamination $BiPO_4$ waste, specifically before 1950
CW = Cladding waste produced at PUREX from dissolution of aluminum and/or Zircaloy fuel cladding
IX = Ion exchange waste from the cesium recovery process at B Plant
SORWT = Sort of Radioactive Waste Types (model)
UR = Uranium recovery waste from uranium recovery operations; also called TBP waste

## D3.2 EVALUATION OF TECHNICAL INFORMATION

Table D3-2 compares technical flowsheet information for the 1C (Kupfer 1996) and TBP (Hill et al. 1995) waste streams and the corresponding HDW model waste streams (Agnew et al. 1996a). According to the HDW model, cladding wastes were sent to the same tanks as first decontamination cycle waste until 1954. The model assumes a mixture of the two waste types, with cladding waste making up approximately 24 percent of the waste stream. The HDW also divides the pre-1950 1C waste from the waste transferred to the tanks after 1950, designating them as 1C1 and 1C2, respectively. The tank was filled in 1946 and was undisturbed until 1951; therefore, only the 1C1 waste type is predicted to be in the tank. According to the transfer history, the tank did not receive additional 1C waste after 1951.

Table D3-2. Technical Flowsheet and Hanford Defined Waste Streams.

| Analyte | Flowsheet[1] 1C/CW (*M*) | Flowsheet[2] TBP (*M*) | HDW[3] 1C/CW (*M*) | HDW[3] TBP (*M*) |
|---|---|---|---|---|
| Al | 0.0826 | nr | 0.233 | nr |
| Bi | 0.0115 | nr | 0.014 | nr |
| Cr | 0.00306 | nr | 0.0052 | 0.0032 |
| F | 0.17 | nr | 0.228 | nr |
| Fe | 0.0315 | 0.03 | 0.046 | 0.046 |
| Na | 2.17 | 8.87 | 2.24 | 4.50678 |
| Si | 0.0312 | nr | 0.038 | 0.1416 |
| U | 0.000963 | 0.0061 | 0.000767 | 0.0078 |
| Zr | 0.000296 | nr | 0.004 | nr |
| $NO_2$ | 0.0577 | nr | 0.174 | nr |
| $NO_3$ | 1.44 | 7.35 | 0.588 | 3.40208 |
| $PO_4$ | 0.258 | 0.3 | 0.326 | 0.13 |
| $SO_4$ | 0.0631 | 0.31 | 0.0616 | 0.1416 |

Notes:

nr = not reported

[1]Appendix C of Kupfer (1996)
[2]Hill et al. (1995)
[3]Appendix B of Agnew et al. (1996)

The waste transfer history indicates that several types of waste were added to tank 241-T-107 over time. Analytical results support this history. The analytical core segment results reveal the tank is horizontally homogeneous and vertically heterogeneous (Jensen et al. 1994).

The history indicates that in addition to the 1C/CW waste noted by Agnew et al. (1996a), tank 241-T-107 received TBP and aluminum and/or Zircaloy CW. The history also indicates IX waste was added to the tank. This waste was mostly liquid and probably mixed with the existing supernatant; it does not appear to have had an effect on the solids. Much of the supernatant was transferred from the tank shortly after the IX waste was added.

## D3.3 ASSUMPTIONS FOR RECONCILING WASTE INVENTORIES

Inventories of certain components in tank 241-T-107 were estimated using an engineering assessment that is based on a set of simplified assumptions. The inventories were compared with tank 241-T-107 sample-based inventories and HDW model inventories.

The assumptions and observations for the engineering assessment were based on best technical judgment pertaining to parameters that can significantly influence tank inventories. These parameters include the following:

1. contributing waste types and correct relative proportions of the waste types

2. model flowsheet conditions, fuel processed, and waste volumes

3. partitioning of components

4. physical parameters such as density, percent solids, and void fraction.

The assumptions can be modified to provide a basis for identifying potential errors that could influence the sampling-based and model-based inventories. The following simplified assumptions and observations were used for the assessment.

1. Analytical data from tanks 241-T-104 and 241-BX-112, which contain only 1C waste, and tank 241-TY-105, which contains only TBP waste, helped provide the analytical basis for estimating the inventory in tank 241-T-107.

2. The waste in tank 241-T-107 consists of 1C waste from the $BiPO_4$ process and the associated CW waste, uranium recovery waste from the TBP process, and aluminum and/or Zircaloy cladding waste. Ion exchange waste made no significant contributions to the solids in the tank.

3. Components listed in the technical flowsheets (see Table D3-1) were used for the evaluation. Cerium is not expected in significant amounts and was not reported in the sampling data. This evaluation makes no estimate about the effect of the cladding waste which was added late in the tank transfer history.

4. Tank inventory comparisons are made on a same volume basis, using the tank volume listed in Hanlon (1996). The engineering evaluation, the sampling-based inventories, and the HDW model-based inventories use equivalent volumes of 655 kL (173 kgal) solids.

5. The waste in the tank is treated as two distinct layers. The bottom layer is composed of 496 kL (131 kgal) of 1C waste; the upper layer 159 kL (42 kgal) of TBP waste. The constituents of these wastes are assumed to be evenly distributed throughout their respective layers.

6. All Bi, Si, and Zr are assumed to precipitate as water insoluble components in the 1C waste. The Fe and U are assumed to precipitate in 1C and TBP wastes. Bi, Si, and Zr are not expected in TBP waste.

7. The Al, Cr, Na, F, $NO_2$, and $PO_4$ are assumed to partition between the liquid and solid phases. Al, Cr, F, and $NO_2$ are not assigned to TBP waste.

8. The $NO_3$ and $SO_4$ are assumed to remain dissolved in the interstitial liquid in 1C and TBP waste.

9. No radiolysis of $NO_3$ to $NO_2$ and no additions of $NO_2$ to the waste for corrosion purposes are factored into this assessment.

## D3.4 CONCENTRATION FACTOR AND PARTITIONING FACTORS FOR TANK 241-T-107

One method for estimating a component inventory for a particular waste type in a tank is to derive a concentration factor (CF) for that component. This approach was used to estimate inventories in tank 241-T-107. Concentration factors are a method of reconciling process-based information and sample-based information for particular waste types. The CF is derived by dividing the concentration of a component found in the tank samples by the concentration of that component in the neutralized process waste stream (that is, the flowsheet concentrations in Table D3-1). The CF values for components of a defined waste are determined best when the tank contains only one waste type and when abundant representative analytical data are available. Multiple waste types are assumed for this tank.

The relative concentrations of components expected to precipitate essentially 100 percent to the waste solids should be approximately proportional to the respective flowsheet concentrations for those components, that is, these components should exhibit nearly the same CF values.

It was noted in the assumptions that this evaluation assumes Bi precipitated nearly 100 percent from the neutralized 1C waste, and no Bi is expected in the TBP waste. The following procedure is used to calculate the CF for Bi in tank 241-T-107. From Table D2-1, the analytical-based inventory for Bi is 11,100 kg. The solids waste volume in the tank is treated as 496 kL of 1C waste. This is a Bi concentration in the solids of 0.107*M*. The flowsheet concentration for Bi is 0.0115 *M* (Table D3-1).

The $CF_{Bi(1C)}$ is:

$$CF_{Bi(1C)} = \frac{0.107 \text{ mole Bi/L}}{0.0115 \text{ mole Bi/L}} = 9.31$$

Tank 241-T-104 has a $CF_{Bi}$ of 10, and tank 241-BX-112 has a $CF_{Bi}$ of 9.5. The $CF_{Bi(1C)}$ value for tank 241-T-107 appears to be reasonable. This value is used for the components assumed to fully precipitate in 1C waste. The CF value of Al is greater than that of Bi, so Al is treated as fully precipitated in the 1C waste, modifying the assumptions. The CF value of Bi is used to calculate the inventory of Al in the tank.

Once the CF values for fully precipitated components for a waste type are determined, the sample analysis can be used to establish how other components partition between solids and liquids. Concentration factors for components not expected to precipitate 100 percent in 1C waste can be ratioed to $CF_{Bi}$ to obtain the partitioning factor (PF) for each component.

$$PF_{PO4(1C)} = \frac{CF_{PO4(1C)}}{CF_{Bi(1C)}} = 0.755$$

This indicates that 75.5 percent of all $PO_4$ added to the tank from the 1C waste stream precipitated and 24.5 percent remained in solution. The PF values of other components expected to partition in the 1C waste are as follows:

| | | | |
|---|---|---|---|
| $PF_{Cr(1C)}$ | 0.467 | $PF_{F(1C)}$ | 0.764 |
| $PF_{NO2(1C)}$ | 0.954 | $PF_{Na(1C)}$ | 0.400 |

The CF value of Fe is used for the basis in the TBP waste. From Table D2-1, the analytical-based inventory for Fe is 27,000 kg. Assuming the iron is evenly distributed in both layers of waste, there are 6,550 kg of Fe in the TBP waste. The TBP waste solids volume in the tank is treated as 159 kL. The Fe concentration in the TBP solids is 0.738*M*. The flowsheet concentration for Fe is 0.03*M* (see Table D3-1). The $CF_{Fe(TBP)}$ is as follows:

$$CF_{Fe(TBP)} = \frac{0.738 \text{ mole Fe/L}}{0.03 \text{ mole Fe/L}} = 24.6$$

The PF values for components expected to partition in the TBP waste are as follows:

| | | | |
|---|---|---|---|
| $PF_{PO4(TBP)}$ | 1.012 | $PF_{Na(TBP)}$ | 0.103 |

The PF values for tank 421-T-107 are different than those expected for 1C waste, but this tank contains a mixture of waste types. The $NO_2$ would appear to almost completely precipitate and is treated as fully precipitated for this assessment. The Al was already shown to have a CF larger than that of Bi and is treated as fully precipitated. Phosphate appears to partition in the 1C waste but to precipitate fully in the TBP waste. Sodium appears to precipitate more in the 1C waste than in the TBP waste.

## D3.5 CALCULATION OF ASSESSMENT-BASED INVENTORIES IN TANK 241-T-107

Assessment-based inventories are calculated in this section. These are determined by combining the assumptions with the product of the PF values calculated in the previous section, the flowsheet values in Table D3-2, the waste porosity values, and the component molecular weight. Sample calculations are shown. The components expected to partition between the solid and liquid phases are not shown.

**Components assumed to precipitate (Al, Bi, Si, Zr, Fe, U, $NO_2$)**

$Al_{(Total)}$: 0.0826 mole Al/L x 496 kL x 1000 L/kL x 27 g Al/mole x kg/ 1000 g x 9.31($CF_{1C}$) = 10,300 kg Al

Similarly,

$Bi_{(Total)}$: 11,100 kg Bi
$Si_{(Total)}$: 11,000 kg Si
$Zr_{(Total)}$: 125 kg Zr
$NO_{2(Total)}$: 12,300 kg $NO_2$

The amounts of Fe and U are the sum of the amounts precipitated from 1C and TBP:

$Fe_{(Total)}$: 14,700 kg Fe
$U_{(Total)}$: 6,740 kg U

**Components assumed to remain dissolved in the aqueous phase ($NO_3$, $SO_4$)**

$NO_{3(1C)}$: 1.44 mole $NO_3$/L x 496 kL x 1000 L/kL x 62 g $NO_3$ / mole x kg / 1000 g x $0.6948_{porosity}$ = 30,800 kg $NO_3$

$NO_{3(TBP)}$: 7.35 mole $NO_3$/L x 159 kL x 1000 L/kL x 62 g $NO_3$ / mole x kg / 1000 g x $0.91417_{porosity}$ = 66,200 kg $NO_3$

$NO_{3(Total)}$: 97,000 kg $NO_3$

$SO_{4(Total)}$: 7,620 kg $SO_4$

## D3.6 COMPARISON OF SELECTED INVENTORY ESTIMATES

The estimated component inventories from this evaluation are compared with sampling and HDW model-based inventories for selected components in Table D3-3. Components that partition are not included in the table. Observations regarding these inventories are also noted.

Table D3-3. Comparison of Selected Inventory Estimates for Tank 241-T-107 Waste.

| Analyte | Assessment Inventory Estimate (kg) | Sampling[1] Inventory Estimate (kg) | HDW[2] Inventory Estimate (kg) |
|---|---|---|---|
| Al | 10,300 | 16,200 | 9,910 |
| Bi | 11,100 | 11,100 | 12,400 |
| Fe | 14,700 | 27,000 | 14,000 |
| $NO_2$ | 12,300 | 11,700 | 6,370 |
| $NO_3$ | 97,000 | 74,600 | 17,900 |
| Si | 11,000 | 6,000 | 1,370 |
| $SO_4$ | 7,620 | 9,860 | 3,320 |
| U | 6,740 | 22,400 | 105 |
| Zr | 125 | 112 | 726 |

Notes:

[1]Table D2-1

[2]Agnew et al. (1996a); adjusted to a tank volume of 655 kL and density of 1.51 g/mL.

Comparison of the assessment inventory and the sampling inventory shows that 3 of the 9 constituents are very close (within 20 percent). All constituents except U are within a factor of two when the assessment inventory is compared to the sampling inventories. This is not unexpected because the evaluation was based on the sampling results and used assumptions that the 1C and TBP flowsheets each apply to only some constituents. The most notable difference between the sampling inventory and the assessment inventory is the U. The U in the sample inventory is unexpectedly high for 1C waste, but was only 30% of that value in the assessment.

The HDW inventory, adjusted to correct the waste volume and density to the sample value, was also compared to the sampling inventory. Only 1 of 9 constituents are within 20 percent, and 3 additional constituents are within a factor of two. The sample inventory is 250 times greater than the HDW inventory.

The comparisons in Table D3-2 demonstrate that adding a second waste type helps to rectify some problems caused by using only the 1C flowsheet or the HDW model to determine the inventory in tank 241-T-107. Modifying the assumptions could increase the accuracy of the assessment inventories. The HDW model assigned 159 kL of the waste as 1C, but its origin is unknown. The assessment treated this amount as TBP waste. It would be helpful to adjust the division of the total waste volume into 1C and TBP waste types. Better results may be expected if the contributions to the solids inventory of the cladding waste could be quantified.

Brief discussions about individual constituents follow.

**Aluminum**. The assessment and sample-based inventories are within 35 percent. The HDW inventory is slightly lower (approximately 61 percent of the sample-based inventory). This constituent was not assumed to fully precipitate in the 1C waste, although the CF indicated that it had. The higher sample value was probably influenced by Al cladding waste added to the tank late in its transfer history. This is confirmed by examining the segment level data.

**Bismuth**. The sampling-based inventory was used as a basis to determine the CF used for this tank. All three inventory values compare well; the HDW estimated inventory was smallest. The assessment assumed Bi to precipitate 100 percent. Bismuth was used to determine the CF for this tank. An assumption was made that Bi is evenly distributed in the 1C waste only. In reality, if the 1C waste was laid down as a sludge layer before the TBP waste was added, it would be expected that the highest concentration of Bi was at the tank bottom. Core segment data indicate that in two of three cores analyzed, this is true (that is, the Bi increases with depth, and the highest concentrations of Bi are in the lowest segments). In the third core, the highest value of Bi was in the top segment of the core; the lowest segment of the core was not retrieved.

**Chromium**. The assessment PF value for Cr is 0.467 indicating almost one half the Cr had precipitated. The HDW inventory is approximately 44 percent of the sample-based inventory. This constituent is expected to partition in the 1C waste.

**Fluoride**. The assessment PF value for F is 0.764. The HDW inventory is approximately 21 percent of the sample-based inventory. This constituent is expected to partition in the 1C waste.

**Iron**. The assessment and sample-based inventories are within 54 percent. The HDW inventory is slightly lower (approximately 52 percent of the sample-based inventory). This constituent is expected to fully precipitate in the 1C and the TBP wastes.

**Nitrite**. The assessment and sample-based inventories are within 5 percent. The HDW inventory is significantly lower (approximately 54 percent of the sample-based inventory). This constituent is expected to remain in solution.

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

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

Chemical and radiological inventory information are generally derived using three approaches: 1) component inventories are estimated using the results of sample analyses; 2) component inventories are predicted using the HDW model, process knowledge, and historical information; or 3) a tank-specific process estimate is made based on process flowsheets, reactor fuel data, essential material usage, and other operating data.

For tank 241-T-107, the sample-based inventory derived from analytical data are the best-basis inventory. Tables D4-1 and D4-2 summarize the best-basis inventory for tank 241-T-107.

Table D4-1. Best Basis Inventory Estimates for Nonradioactive Components in Tank 241-T-107. (2 sheets)

| Analyte | Total Inventory (kg) | Best-Basis[1] (S, M, or E) | Comment |
|---|---|---|---|
| Al | 16,200 | S | |
| Bi | 11,100 | S | |
| Ca | 1,480 | S | |
| Cl | 541 | S | |
| TIC as $CO_3$ | 4,180 | S | |
| Cr | 343 | S | |
| F | 11,400 | S | Based on water soluble portion only. |
| Fe | 27,000 | S | |
| K | 231 | S | |
| Mn | 201 | S | |
| Na | 1.217E+05 | S | |
| Ni | 289 | S | |
| $NO_2$ | 11,700 | S | |
| $NO_3$ | 74,600 | S | |

Table D4-1. Best Basis Inventory Estimates for Nonradioactive Components in Tank 241-T-107. (2 sheets)

| Analyte | Total Inventory (kg) | Best-Basis[1] (S, M, or E) | Comment |
|---|---|---|---|
| Pb | 636 | S | |
| P as $PO_4$ | 1.128E+05 | S | |
| Si | 6,000 | S | |
| S as $SO_4$ | 9,860 | S | |
| Sr | 852 | S | |
| TOC | 1,680 | S | |
| $U_{TOTAL}$ | 22,400 | S | |
| Zr | 112 | S | |

Note:
[1]Best-basis estimate is based on S = sampling, M = HDW model, and E = Engineering assessment.

Table D4-2. Best Basis Inventory Estimates for Radioactive Components in Tank 241-T-107.

| Analyte | Total Inventory (Ci) | Best-Basis[1] (S, M, or E) | Comment |
|---|---|---|---|
| $^{90}Sr$ | 1.068E+05 | S | |
| $^{90}Y$ | 1.068E+05 | S | Based on $^{90}Sr$ |
| $^{99}Tc$ | 50 | S | |
| $^{137}Cs$ | 12,200 | S | |
| $^{137}Ba$ | 11,500 | S | Based on $^{137}Cs$ |
| $^{239/240}Pu$ | 148 | S | |
| $^{241}Am$ | 13.8 | S | |

Note:
[1]Best-basis estimate is based on S = sampling, M = HDW model, and E = Engineering assessment.

## D5.0 APPENDIX D REFERENCES

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

Jensen, L., R. D. Cromar, and S. R. Wilmarth, 1994, *Statistical Characterization Report for Single-Shell Tank 241-T-107*, WHC-SD-WM-TI-645, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

Kupfer, M. J., 1996, *Interim Report: Best-Basis Inventories of Chemicals and Radionuclides in Hanford Site Tank Waste*, WHC-SD-WM-TI-740, Rev. D-Draft, Westinghouse Hanford Company, Richland, Washington.

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# APPENDIX E

# BIBLIOGRAPHY FOR TANK 241-T-107

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# APPENDIX E

# BIBLIOGRAPHY FOR TANK 241-T-107

Appendix E is a bibliography that supports the characterization of tank 241-T-107. This bibliography represents an in-depth literature search of all known information sources that provide sampling, analysis, surveillance, and modeling information, as well as processing occurrences associated with tank 241-T-107 and its respective waste types.

The references in this bibliography are separated into three broad categories. These categories and their subgroups are listed below.

## I. NON-ANALYTICAL DATA

- Ia. Models/Waste Type Inventories/Campaign Information
- Ib. Fill History/Waste Transfer Records
- Ic. Surveillance/Tank Configuration
- Id. Sample Planning/Tank Prioritization
- Ie. Data Quality Objectives/Customers of Characterization Data

## II. ANALYTICAL DATA

- IIa. Sampling of Tank Waste and Waste Types
- IIb. Sampling of 1C Waste Stream

## III. COMBINED ANALYTICAL/NON-ANALYTICAL DATA

- IIIa. Inventories Using Campaign and Analytical Information
- IIIb. Compendium of Existing Physical and Chemical Documented Data Sources
- IIIc. Other Nondocumented or Electronic Sources

## IV. OTHER RESOURCES

This bibliography is broken down into appropriate sections of material with an annotation at the end of each reference describing the information source. Where possible, a reference is provided for information sources. A majority of information listed below can be found in the Lockheed Martin Hanford Corporation Tank Characterization Resource Center.

# I. NON-ANALYTICAL DATA

## Ia. Models/Waste Type Inventories/Campaign Information

Anderson, J. D., 1990, *A History of the 200 Area Tank Farms*, WHC-MR-0132, Westinghouse Hanford Company, Richland, Washington.

- Contains single-shell tank fill history and primary campaign/waste type information up to 1981.

Babad, H., R. J. Cash, J. E. Meacham, and B. C. Simpson, 1993, *The Role of Aging in Resolving the Ferrocyanide Safety Issue*, WHC-EP-0599, Westinghouse Hanford Company, Richland, Washington.

- Contains evaluation of the effect of aging on ferrocyanide tank waste.

Borsheim, G. L., and B. C. Simpson, 1991, *An Assessment of the Inventories of the Ferrocyanide Watchlist Tanks*, WHC-SD-WM-ER-133, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

- Contains brief description of ferrocyanide scavenging program and estimations of $Fe(CN)_6^{-4}$, Cs-137, and Sr-90 for various ferrocyanide containing tanks.

Jungfleisch, F. M., and B. C. Simpson, 1993, *Preliminary Estimation of the Waste Inventories in Hanford Tanks Through 1980*, WHC-SD-WM-TI-057, Rev. 0A, Westinghouse Hanford Company, Richland, Washington.

- A model based on process knowledge and radioactive decay estimations using ORIGEN for different compositions of process waste streams assembled for total, solution, and solids compositions per tank. Assumptions about waste, waste types, and solubility parameters and constraints are also given.

Lilga, M. A., M. R. Lumetta, W. F. Reimath, R. A. Romine, and G. F. Schiefelbein, 1992, *Ferrocyanide Safety Project, Subtask 3.4, Aging Studies FY 1992, Annual Report,* PNL-8387, Pacific Northwest Laboratory, Richland Washington.

- Contains results of work conducted by the Pacific Northwest Laboratory in Fiscal Year 1992 on aging and solubility of ferrocyanide sludge in basic solution.

Lilga, M. A., M. R. Lumetta, and G. F. Schiefelbein, 1993, *Ferrocyanide Safety Project, Task 3 Ferrocyanide Aging Studies FY 1993 Annual Report*, PNL-8888, Pacific Northwest Laboratory, Richland, Washington.

- Contains results of work conducted by the Pacific Northwest Laboratory in Fiscal Year 1993 on aging and solubility of ferrocyanide sludge in basic solution.

Lilga, M. A., E. V. Aldersen, D. J. Kowalski, M. R. Lumetta, and G. F. Schiefelbein, 1994, *Ferrocyanide Safety Project, Task 3 Ferrocyanide Aging Studies FY 1994 Annual Report*, PNL-10126, Pacific Northwest Laboratory, Richland, Washington.

- Contains Fiscal Year 1994 report on ongoing ferrocyanide aging studies.

Lilga, M. A., E. V. Aldersen, R. T. Hallen, M. O. Hogan, T. L. Hubler, G. L. Jones, D. J. Kowalski, M. R. Lumetta, G. F. Schiefelbein, and M. R. Telander, 1995, *Ferrocyanide Safety Project: Ferrocyanide Aging Studies - FY 1995 Annual Report*, PNL-10713, Pacific Northwest Laboratory, Richland, Washington.

- Contains Fiscal Year 1995 report on ongoing ferrocyanide aging studies.

Lilga, M. A., R. T. Hallen, E. V. Aldersen, M. O. Hogan, T. L. Hubler, G. L. Jones, D. J. Kowalski, M. R. Lumetta, W. F. Riemath, R. A. Romine, G. F. Schiefelbein, and M. R. Telander, 1996, *Ferrocyanide Safety Project: Ferrocyanide Aging Studies - Final Report*, PNNL-11211, Pacific Northwest National Laboratory, Richland, Washington.

- Contains final report on ongoing ferrocyanide aging studies.

Schneider, K. J., 1951, *Flowsheets and Flow Diagrams of Precipitation Separations Process*, HW-23043, General Electric Company, Richland, Washington.

- Contains compositions of process stream waste before transfer to 200 Area waste tanks.

**Nitrate**. The assessment and sample-based inventories are within 30 percent. The HDW inventory is significantly lower (approximately 24 percent of the sample-based inventory). This constituent is expected to remain in solution.

**Phosphate**. The PF values for $PO_4$ are 0.755 and 1.012 in 1C and TBP waste, respectively. In both cases, $PO_4$ appears to precipitate more than is expected. The HDW and sample-based inventories are within about 15 percent. This constituent is expected to partition in the waste.

**Silicon**. Neither the assessment nor the HDW inventories were similar to the sample-based inventory. The assessment inventory is almost twice the sampling inventory, and the HDW inventory is less than 23 percent of the sampling inventory. This constituent is expected to fully precipitate in the 1C waste.

**Sodium**. The assessment PF values for Na are 0.400 and 0.103 for 1C and TBP waste, respectively. This indicates the Na precipitates differently in 1C and TBP wastes. The HDW inventory is approximately 71 percent of the sample-based inventory. This constituent is expected to partition in the waste.

**Sulfate**. The assessment and sample-based inventories are within 30 percent. The HDW inventory is significantly lower (approximately 34 percent of the sample-based inventory). This constituent is expected to remain in solution.

**Uranium**. The assessment and sample-based inventories are widely separated. The assessment inventory is about 30 percent of the sample-based inventory. The HDW inventory is significantly lower (less than 1 percent of the sample-based inventory). This constituent is expected to fully precipitate in the 1C and TBP wastes.

**Zirconium**. The assessment and sample-based inventories are within 12 percent. The HDW inventory is significantly higher (approximately 650 percent of the sample-based inventory). This constituent is expected to fully precipitate in the 1C waste. The lack of zirconium in the sample may indicate the tank did not receive significant amounts of Zircaloy cladding waste.

## D3.7 CONCLUSIONS

Based on the relationship of these three comparisons, it is obvious that the HDW model has incorrectly assigned all waste in tank 241-T-107 to 1C. The data strongly suggest that other waste types have left significant amounts of solids in the tank. With sampling data available, the sample-based inventory must be assumed to be a better estimate of the tank contents than the HDW model.

Sloat, R. J., 1954, *TBP Plant Nickel Ferrocyanide Scavenging Flowsheet*, HW-30399, General Electric Company, Richland, Washington.

- Contains compositions of process stream waste before transfer to 200 Area waste tanks.

**Ib. Fill History/Waste Transfer Records**

Agnew, S. F., R. A. Corbin, T. B. Duran, K. A. Jurgensen, T. P. Ortiz, and B. L. Young, 1996, *Waste Status and Transaction Record Summary for the Northwest Quadrant of the Hanford 200 East Area*, WHC-SD-WM-TI-669, Rev. 1, Westinghouse Hanford Company, Richland, Washington.

- Contains spreadsheets showing all available data on tank additions and transfers.

Anderson, J. D., 1990, *A History of the 200 Area Tank Farms*, WHC-MR-0132, Westinghouse Hanford Company, Richland, Washington.

- Contains single-shell tank fill history and primary campaign and waste type information up to 1981.

**Ic. Surveillance/Tank Configuration**

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

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

Hanlon, B. M., 1996, *Tank Farm Surveillance and Waste Status Summary Report for Month Ending October 31, 1996*, HNF-EP-0182-103, Lockheed Martin Hanford Corporation, Richland, Washington.

- Most recent release of a series of summaries including fill volumes, Watch List tanks, occurrences, integrity information, equipment readings, equipment status, tank location, and other miscellaneous tank information. The series includes monthly summaries from December 1947 to the present, however Hanlon has only authored the monthly summaries from November 1989 to the present.

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

- Contains strategy to define an inventory estimate for tank wastes.

Leach, C. E. and S. M. Stahl, 1997, *Hanford Site Tank Farm Facilities Interim Safety Basis Volume I and II,* WHC-SD-WM-ISB-001, Rev. 0M, Duke Engineering and Services Hanford, Richland, Washington.

- Provides a ready reference to the tank farms safety envelope.

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

- Gives an assessment of riser locations for each tank; however, not all tanks are included or completed. Also includes an estimate of which risers are available for sampling.

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

- Compiles information on thermocouple trees installed in Hanford Site underground waste tanks.

Welty, R. K., 1988, *Waste Storage Tank Status and Leak Detection Criteria, Volumes I and II,* WHC-SD-TI-553, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

- Describes the nature, scope, and frequency of surveillance employed for waste storage tanks, states action criteria for response to data deviation, and reviews tank data between June 15, 1973 and June 15, 1988.

WHC, 1987, *Quarterly Trend Analysis of Surveillance Data,* (internal memorandum 65950-87-587 to R. J. Baumhardt, June 29), Westinghouse Hanford Company, Richland, Washington.

- Third quarter trend analysis of waste tank surveillance data to identify trends or anomalies.

## Id. Sample Planning/Tank Prioritization

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

- Details a plan providing a partially integrated approach to the characterization of the Hanford Site tank wastes. The scope of this plan is defined by the characterizing activities for safely storing, maintaining, treating, and disposing of tank waste onsite or packaging it for offsite.

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

- Summarizes the technical basis for characterizing tank waste and assigns a priority number to each tank.

Carpenter B. C., 1995, *Tank 241-T-107 Tank Characterization Plan*, WHC-SD-WM-TP-295, Rev. 0A Westinghouse Hanford Company, Richland, Washington.

- Contains detailed sampling and analysis procedure information for vapor sampling of tank 241-T-107.

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

- Contains Tri-party agreement for the Hanford site.

Hill, J. G., 1991, *Modified Test Plan for Core Sample Analysis of FeCN SSTs C-112, C-109, and T-107*, (internal memorandum 9158449 to J. H. Kessner, November 11), Westinghouse Hanford Company, Richland, Washington.

- Contains modified and revised analytical plan stated in Winters et al. (1991). Sampling of tank 241-T-107 was initiated according to this memo, but sampling was completed and analyses were performed per Bell (1993).

Homi, C. S., 1995, *Tank 241-T-107 Vapor Sampling and Analysis Plan*, WHC-SD-WM-TP-335, Rev. 0G, Westinghouse Hanford Company, Richland, Washington.

- Contains a discussion of tank vapor sampling and the sampling and analysis that will be needed for tank 241-T-107.

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

- Contains Tri-Party Agreement requirement-driven TWRS Characterization Program information and a list of tanks addressed in Fiscal Year 1997.

Keller, K. K., 1994, *Quality Assurance Project Plan for Tank Vapor Characterization*, WHC-SD-WM-QAPP-013, Rev. 2, Westinghouse Hanford Company, Richland, Washington

- Contains specific quality assurance requirements.

Rich, H. S., 1993, *Sampling and Analysis of SST and DST Waste Tanks in Support of TWRS Fiscal Year 1993, Statement of Work*, WHC-SOW-93-0002, Rev. 1, Westinghouse Hanford Company, Richland, Washington.

- Document formally transmits a request to the laboratories to analyze core samples in accordance with Bell (1993) and includes various letters of instruction.

Smith, H. E., 1992, *Technical Project Plan - Response to WHC-SOW-91-0006 for the 222-S Analytical Laboratory*, WHC-SD-CP-TP-070, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

- Documentation for laboratory work in support of Winters et al. (1991).

Winters, W. I., 1992, *Technical Project Plan for 222-S Laboratory in Support of Tank Waste Remediation System Tank Waste Characterization Plan (WHC-SD-WM-PLN-047, Rev. 0) and Statement of Work (WHC-SOW-93-0002)*, WHC-SD-WM-TPP-047, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

- Provides the 222-S Laboratory response to the statement of work. It describes how the laboratory plans to analyze the samples and lists exceptions.

Winters, W. I., J. G. Hill, B. C. Simpson, J. W. Buck, P. J. Chamberlain, and V. L. Hunter, 1991, *Waste Characterization Plan for the Hanford Site Single-Shell Tanks*, WHC-EP-0210, Rev. 3, Westinghouse Hanford Company, Richland, Washington.

- This revision added *Appendix I Test Plan for Sampling and Analysis of Ten Single-Shell Tanks* and revised Appendix D (the quality assurance project plan).

**Ie. Data Quality Objectives and Customers of Characterization Data**

Cowan, S. P., 1996, *Approval to Remove 14 Ferrocyanide Tanks from the Watch List,* (internal memorandum to J. Kinzer, U.S. Department of Energy, Richland Operations Office, August 21), U.S. Department of Energy, Washington D.C.

- Contains justifications for removing tanks from Ferrocyanide Watch List.

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

- Contains objectives to sample all tanks for safety concerns (ferrocyanide, organic, flammable gas, and criticality) as well as decision thresholds for energetics, criticality, and flammability.

Kinzer, J., 1996, *Authorization to Remove the Remaining 14 Ferrocyanide Tanks 241-BY-103, 241-BY-104, 241-BY-105, 241-BY-106, 241-BY-107, 241-BY-108, 241-BY-110, 241-BY-110, 241-BY-112, 241-T-107, 241-TX-118, 241-TY-101, 241-TY-103 and 241-TY-104 from the Watch List,* (letter 9602303 to A. L. Trego, Westinghouse Hanford Company, September 4), U.S. Department of Energy, Richland Operations Office, Richland, Washington.

- Contains authorization for removing tanks from Ferrocyanide Watch List.

Meacham, J. E., R. J. Cash, B. A. Pulsipher, and G. Chen, 1995, *Data Requirements for the Ferrocyanide Safety Issue Developed Through the Data Quality Objective Process*, WHC-SD-WM-DQO-007, Rev. 2, Westinghouse Hanford Company, Richland, Washington.

- Contains ferrocyanide program data needs, list of tanks to be evaluated, decision thresholds, and decision logic flow diagram.

Osborne, J. W., J. L. Huckaby, T. P. Rudolph, E. R. Hewitt, D. D. Mahlum, J. Y. Young, and C. M. Anderson, 1994, *Data Quality Objectives for Generic In-Tank Health and Safety Issue Resolution*, WHC-SD-WM-DQO-002, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

- Contains program data needs, list of tanks to be evaluated, decision thresholds, and decision logic flow diagram.

Postma, A. K., G. S. Barney, G. L. Borsheim, R. J., Cash, M. D. Crippen, D. R. Dickinson, J. M. Grigsby, D. W. Jeppson, C. S. Simmons, and B. C. Simpson, 1994, *Ferrocyanide Safety Program: Safety Criteria for Ferrocyanide Watchlist Tanks*, WHC-EP-0691, Westinghouse Hanford Company, Richland, Washington.

- Document which was developed before the safety screening and ferrocyanide DQOs specifying safety criteria.

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

### IIa. Sampling of Tank 241-T-107

Bratzel, D. R., 1985, *Tank 107-T Waste Mixing Study*, (internal letter 65453-85-043 to L. A. Gale, March 5), Rockwell Hanford Company, Richland, Washington.

- Provides sampling and mixing waste study results from the March 5 sampling of supernate.

Bratzel, D. R., 1989, *Interim Results of T-101 and T-107 Analysis and T-101/Neutralized Plutonium Finishing Plant Acid Waste*, (internal memorandum 12712-PCL89-144 to A. J. DiLiberto, August 1), Westinghouse Hanford Company, Richland, Washington.

- Provides sampling and mixing waste study results from the sampling of several tanks.

Caprio, G. S., 1995, *Vapor and Gas Sampling of Single-Shell Tank 241-T-107 Using the Vapor Sampling System*, WHC-SD-WM-RPT-130, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

- Provides results from the January 1995 sampling of the tank headspace (a complete revision was later written by Huckaby and Bratzel).

Colton, N. G., 1996, *Status Report: Pretreatment Chemistry Evaluation - Wash and Leach Factors for the Single-Shell Tank Waste Inventory*, PNNL-11290, Pacific Northwest National Laboratory, Richland, Washington.

- Contains sludge wash data for all single-shell tanks evaluated since 1986 including tank 241-T-107.

Godfrey, W. L., 1965, *242-T Evaporator Feed*, (internal memorandum to S. J. Beard, September 24), General Electric, Richland, Washington.

- Contains results of analysis of prospective feed for 242-T evaporator including a sample from tank 241-T-107.

Huckaby and Bratzel, D. R., 1995, *Tank 241-T-107 Headspace Gas and Vapor Characterization Results for Samples Collected in January 1995*, WHC-SD-WM-ER-447, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

- Contains specific headspace gas and vapor characterization results for all vapor sampling events to date. In addition, changes have been made to the original vapor reports to qualify the data based on quality assurance issues associated with the performing laboratories.

Klem, M. J., 1990, *Total Organic Carbon Concentration of Single-Shell Waste*, (internal memorandum 82316-90-032 to R. E. Raymond, April 27), Westinghouse Hanford Company, Richland, Washington.

- Summarizes and gives references for the TOC values for 47 single-shell tanks based on available laboratory analysis of solid and/or liquid waste samples.

Jensen, L., R. D. Cromar, and S. R. Wilmarth, 1994, *Statistical Characterization Report for Single-Shell Tank 241-T-107*, WHC-SD-WM-TI-645, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

- Contains the results of the statistical analysis of data from three core samples from the 1992 and 1993 core sampling.

Lumetta, G. L., M. J. Wagner, S. V. Hoops, and R. T. Steele, 1996, *Washing and Caustic Leaching of Hanford Tank C-106 Sludge*, PNNL-11381, Pacific Northwest National Laboratory, Richland, Washington.

- Contains data on the samples taken for privatization in 1996. In support of providing privatization vendors with washed tank 241-C-106 sludge for high-level waste vitrification studies, a pretreatment screening study was performed on about 15 g of material.

Pingel, L. A., 1992, *Waste Tank T-107 Vapor Sampling Results*, (internal memorandum 12240-SAS93-003 to G. L. Dukelow, November 2), Westinghouse Hanford Company, Richland, Washington.

- Contains results of the October 22, 1992 vapor sampling.

Pool, K. H., R. B. Lucke, B. D McVeety, G. S Klinger, T. W. Clauss, M. W. Ligotke, K. B. Olsen, O.P. Bredt, J. S. Fruchter, and S. C. Goheen, 1995, *Vapor Space Characterization of Waste Tank 241-T-107: Results from Samples Collected on 1/18/95*, PNL-10595, Pacific Northwest National Laboratory, Richland, Washington.

- Contains specific headspace gas and vapor characterization results for the January 18, 1995 vapor sampling event.

Sasaki, L. M., and B. D. Valenzuela, 1994, *Ferrocyanide Safety Program: Data Interpretation Report for Tank 241-T-107 Core Samples*, WHC-EP-0796, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

- Contains sample analyses from 1992 and 1993 tank 241-T-107 core sampling event and evaluates the waste in accordance with the ferrocyanide safety program.

Svancara, G. B. and K. N. Pool, 1993, *WHC 222-S and PNL-325 Single-Shell Tank Waste Characterization, 241-T-107 Cores 50, 51, and 52 - Data Package and Validation Summaries*, WHC-SD-WM-DP-042, Rev. 1A, Westinghouse Hanford Company, Richland, Washington.

- Contains sample analyses and data validation from 1992 and 1993 tank 241-T-107 core sampling event.

Valenzuela, B. D., and L. Jensen, 1994, *Tank Characterization Report for Single-Shell Tank 241-T-107*, WHC-SD-WM-ER-382, Rev. 0A, Westinghouse Hanford Company, Richland, Washington.

- Expands the evaluation of data for the sample analyses from 1992 and 1993 tank 241-T-107 core sampling event.

Wheeler, R. E., 1975, *Analysis of Tank Farm Samples, Sample: T-8248, Tank 107-T, Received: September 25, 1975*, (internal memorandum to R. L. Walser, November 26), Atlantic Richfield Hanford Company, Richland, Washington.

- Contains sample analysis results for a liquid sample from tank 241-T-107.

## IIb. Sampling of 1C Waste Stream

This section provides sampling data for other tanks containing 1C waste. The tank 241-T-104 data are particularly significant because some basic assumptions for the best-basis inventory for tank 241-T-107 are based on this data.

Conner, J. M., 1996, *Final Report for Tank 241-BX-112, Auger Samples 95-AUG-047 and 95-AUG-048*, WHC-SD-WM-DP-157, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

- Provides analytical results from the 1995 auger sampling event.

Duchsherer, M. J., 1993, *Single-Shell Tank Waste Characterization 241-T-104, Core 45 and 46 Narrative*, WHC-SD-WM-DP-032, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

- Provides analytical results from the 1992 core sampling event.

Schreiber, R. D., 1995, *45-Day Safety Screening Results and Final Report for Tank 241-BX-110, Auger Samples 95-AUG-045 and 95-AUG-046*, WHC-SD-WM-DP-155, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

- Provides analytical results from the 1995 auger sampling event.

## III. COMBINED ANALYTICAL/NON-ANALYTICAL DATA

### IIIa. Inventories from Campaign and Analytical Information

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

- Contains waste type summaries, primary chemical compound/analyte and radionuclide estimates for sludge, supernatant, and solids, as well as supernatant mixing model, tank layer model, and individual tank inventory estimates.

Agnew, S. F., 1995, *Letter Report: Strategy for Analytical Data Comparisons to HDW Model*, (Letter CST-4:95-sfa272 to Susan Eberlein, September 28), Los Alamos National Laboratory, Los Alamos, New Mexico.

- Contains proposed tank groups based on tank layer model and a statistical method for comparing analytical information to HDW predictions.

Allen, G. K., 1976, *Estimated Inventory of Chemicals Added to Underground Waste Tanks, 1944 - 1975*, ARH-CD-601B, Atlantic Richfield Hanford Company Operations, Richland, Washington.

- Contains major components for waste types, and some assumptions.

Allen, G. K., 1975, *Hanford Liquid Waste Inventory As Of Sept. 30, 1974*, ARH-CD-229, Atlantic Richfield Hanford Company Operations, Richland, Washington.

- Contains major components for waste types, and some assumptions.

Geier, R. G., 1976, *Estimated Hanford Liquid Wastes Chemical Inventory as of June 30, 1976*, ARH-CD-768, Atlantic Richfield Hanford Company, Richland, Washington.

- Estimates contents of a number of single-shell tanks in support of the waste solidification program.

Grigsby, J. M., 1992, *Ferrocyanide Waste Tank Hazard Assessment - Interim Report*, WHC-SD-WM-RPT-032, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

- Contains inventory estimates from physical and campaign data for a few constituents in ferrocyanide containing tanks and a few laboratory analyses.

Jensen, L., R. D. Cromar, and S. R. Wilmarth, 1994, *Statistical Characterization Report for Single-Shell Tank 241-T-107*, WHC-SD-WM-TI-645, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

- Documents the statistical analyses performed on core sample data from the 1993 sampling of tank 241-T-107

Schmittroth, F. A., 1995, *Inventories for Low-Level Tank Waste*, WHC-SD-WM-RPT-164, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

- Contains a global inventory based on process knowledge and radioactive decay estimations using ORIGEN2. Pu and U waste contributions are taken at one percent of the amount used in processes. Also compares information on Tc-99 from ORIGEN2 and analytical data.

**IIIb. Compendium of data from other sources physical and chemical**

Agnew, S. F., and J. G. Watkin, 1994, *Estimation of Limiting Solubilities for Ionic Species in Hanford Waste Tank Supernates*, LA-UR-94-3590, Los Alamos National Laboratory, Los Alamos, New Mexico.

- Document gives solubility ranges used for key chemical and radionuclide components based on supernatant sample analyses.

Brevick, C. H., L. A. Gaddis, and E. D. Johnson, 1995, *Historical Tank Content Estimate for the Northwest Quadrant of the Hanford 200 Areas*, WHC-SD-WM-ER-351, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

- Contains summary information from the supporting document for Tank Farms T, TX, and TY as well as in-tank photographic collages and the solid (including the interstitial liquid) composite inventory estimates.

Brevick, C. H., L. A. Gaddis, and W. W. Pickett, 1995, *Supporting Document for the Northwest Quadrant Historical Tank Content Estimate for T-Tank Farm*, WHC-SD-WM-ER-320, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

- Contains summary tank farm information and tank write-ups on historical data and solid inventory estimates as well as appendixes for the data. The appendixes contain the following information: temperature graphs, surface level graphs, cascade/drywell charts, riser configuration drawings and tables, in-tank photos, and tank layer model bar charts and spreadsheets.

Brevick, C. H., L. A. Gaddis, and E. D. Johnson, *Tank Waste Source Term Inventory Validation, Volume I & II*, WHC-SD-WM-ER-400, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

- Contains sampling information in spreadsheet or graphical form for 23 chemicals and 11 radionuclides for all tanks.

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

- Summarizes issues surrounding characterization of nuclear wastes stored in Hanford Site waste tanks.

Hanlon, B. M., 1996, *Tank Farm Surveillance and Waste Status Summary Report for Month Ending October 31, 1996*, HNF-EP-0182-103, Lockheed Martin Hanford Corporation, Richland, Washington.

- Contains a summary of fill volumes, Watch List tanks, occurrences, integrity information, equipment readings, equipment status, tank location, and other miscellaneous tank information. Grouped here are all the monthly summaries from December 1947 to the present; however, Hanlon has only authored the monthly summaries from November 1989 to the present.

Hartley, S. A., G. Chen, T. A. Ferryman, A. M. Liebetrau, K. M. Remund, and S. A. Allen, 1996, *A Comparison of Historical Tank Contents Estimates (HTCE) Model, Rev. 3, and Sample-Based Estimates*, PNNL-11429, Pacific Northwest National Laboratory, Richland, Washington.

- Contains statistical comparisons of historical model inventories to sample-based inventories.

Husa, E. I., R. E. Raymond, R. K. Welty, S. M. Griffith, B. M. Hanlon, R. R. Rios, and N. J. Vermeulen, 1993, *Hanford Site Waste Storage Tank Information Notebook*, WHC-EP-0625, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

- Contains in-tank photographs and summaries on the tank description, leak detection system, and tank status.

Husa, E. I., 1995, *Hanford Waste Tank Preliminary Dryness Evaluation*, WHC-SD-WM-TI-703, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

- Assesses relative dryness among tanks.

Jungfleisch, F. M., 1980, *Hanford High-Level Defense Waste Characterization - A Status Report*, RHO-CD-1019, Rockwell Hanford Operations, Richland, Washington.

- Provides status information to plan outlined by G. W. Grimes, October 1977, containing a summary of sampling, characterization, and analysis data for the tanks sampled.

Remund, K. M., and B. C. Simpson, 1996, *Hanford Waste Tank Grouping Study*, PNL-11433, Pacific Northwest National Laboratory, Richland, Washington.

- Contains multivariable statistical study categorizing tanks into groups based on analytical data.

Shelton, L. W., 1996, *Chemical and Radionuclide Inventory for Single- and Double-Shell Tanks*, (internal memorandum 74A20-96-30 to D. J. Washenfelder, February 28), Westinghouse Hanford Company, Richland, Washington.

- Contains a tank inventory estimate based on analytical information.

Shelton, L. W., 1995, *Chemical and Radionuclide Inventory for Single- and Double-Shell Tanks*, (internal memorandum 75520-95-007 to R. M. Orme, August 8), Westinghouse Hanford Company, Richland, Washington.

- Contains a tank inventory estimate based on analytical information.

Shelton, L. W., 1995, *Radionuclide Inventories for Single- and Double-Shell Tanks*, (internal memorandum 71320-95-002 to F. M. Cooney, February 14), Westinghouse Hanford Company, Richland, Washington.

- Contains a tank inventory estimate based on analytical information.

## IIIc. Other - Nondocumented or Electronic Sources

Pacific Northwest National Laboratory, 1997, TWINS: Tank Waste Information Network System. In: SYBASE version 4. Available: Hanford Local Area Network (HLAN), Lockheed Martin Services, Richland, Washington; or TCP/IP access, Pacific Northwest National Laboratory, Richland, Washington.

- Provides access to Surveillance Analysis Computer System, Tank Monitor and Control System, Tank Characterization Database, and Kaiser electronic data.

Pacific Northwest National Laboratory, 1997, TCD: Tank Characterization Database. In: SYBASE version 4.0. Available: Tank Waste Information Network System (TWINS), Pacific Northwest National Laboratory, Richland, Washington

- Contains qualified raw sampling data taken in the past few years from 222-S Laboratory. A small amount of information from the 325 Laboratory data is included at this time.

## IV. OTHER RESOURCES

Fluor Daniel Northwest, 1997, Fluor Daniel Northwest Tank Characterization Library. In hard copy. Available: Fluor Daniel Northwest, 200E, Trailer MO-971 Room 26, Sheryl Consort: custodian, Fluor Daniel Northwest, Richland, Washington.

- A resource of 200 Area tank, process campaign, reactor, and other historical records, unclassified and declassified.

WHC, 1995, 222-S Laboratory RIDS: Records Inventory and Disposition Schedule. In: Hardcopy. Available: In 222-S Laboratory RIDS index, Westinghouse Hanford Company archives, Westinghouse Hanford Company, Richland, Washington.

- A RIDS report of the information archived for 1992 and 1993 from the 222-S Laboratory, last printed May 17, 1995. Laboratory notebooks may have been archived that contain pertinent information.

LMHC, 1997, L.S.I.S.: Large Scale Information System, ERS DB - Engineering Release Station Database. In: Database. Available: Hanford Local Area Network (HLAN), Lockheed Martin Hanford Corporation, Richland, Washington.

- Database with any released document information. Most expedient to search by title and keyword for tank in question.

Lockheed Martin Services, 1997, RMIS: Record Management Information System, Records Database. In: Database. Available: HLAN, Lockheed Martin Services, Richland, Washington.

- Records is a database of all released documents since November 1995, which will be back loaded with previous year's data. It can be queried to find documents for any subject either in the keyword or description field.

Lockheed Martin Services, 1997, RMIS: Record Management Information System, Tank Farm Information Center Database. In: Database. Available: HLAN, Lockheed Martin Services, Richland, Washington.

- TFIC is a database of tank related reports, memorandums, and letters that have been optically scanned. The database can be queried to find indexed information for a tank [in the tank or description field] or information referenced to any subject either in the keyword or description field.

LMHC, 1997, TCRC: Tank Characterization Resource Center. In: hard copy. Available: 2750E Room A-243, Ann Young: custodian, Lockheed Martin Hanford Corporation, Richland, Washington.

- A resource of TWRS characterization data including the following: hard copy file folders of sampling data for each tank, an index of multiple tank documents folders, physical/chemical data compendiums, and studies or reports on 200 Area Tanks or Tank Waste generated by various contractors.

WHC, 1996, 209-E Waste Tanks Document Index. In: Hard copy. Available: Fluor Daniel Northwest Library, Fluor Daniel Northwest, Richland, Washington.

- An index of general and tank-specific information for 200 Area tanks.

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