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Analysis of Tank 39H (HTF-39-15-61, 62) Surface and Subsurface Supernatant Samples in Support of Corrosion Control Program

L. N. Oji

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REVIEWS AND APPROVALS

AUTHORS:

L. N. Oji, Advanced Characterization and Processing Date

TECHNICAL REVIEW:

D. T. Herman, Advanced Characterization and Processing Date
Reviewed per E7 2.60

APPROVALS:

F. M. Pennebaker, Manager Date
Advanced Characterization and Processing

A. P. Fellinger, Manager Date
Environmental & Chemical Process Technology Research Programs

C. B. Sherburne, Process Safety & Regulatory Manager Date
Tank Farm/ETP Process Engineering

EXECUTIVE SUMMARY

This report provides the results of analyses on Tanks 39H surface and subsurface supernatant liquid samples in support of the Corrosion Control Program. Analyses included warm acid strike preparation followed by analysis for silicon, aluminum, and sodium and water dilution preparation followed by analysis for anions. Other reported analytical results include analyses results for uranium, Pu-241 and Pu-239.

The measured sodium concentration averaged, respectively, 4.28E+00 ± *9.30E-02* M and 4.32E+00 ± *1.076E-01* M in the Tank 39H surface sample and Tank 39H subsurface sample.

In general, the nitrate, nitrite, free-OH and specific gravity of the Tank 39H surface and subsurface samples were all about the same in magnitude, respectively, averaging 1.98 M, 0.314 M, 1.26 M and 1.24. The measured silicon concentration for the Tank 39H surface and subsurface samples were, respectively, 3.84E+01± *5.51E+00* and 4.14E+01± *1.17E+00* mg/L.

Based on the uranium, Pu-241 and Pu-239 concentrations, the calculated U-235 equivalent is 21.41 wt% for the surface sample and 21.32 wt% for the subsurface sample.

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LIST OF ABBREVIATIONS

AA-Na	Sodium by Atomic Absorption
CCP	Corrosion Control Program
ECP	Enrichment Control Program
HTF	H Tank Farm
IC	Ion Chromatography
ICP-MS	Inductively Coupled Plasma-Mass Spectrometry
ICP-ES	Inductively Coupled Plasma – Emission Spectrometry
SpG	Specific Gravity
SRNL	Savannah River National Laboratory
SRR	Savannah River Remediation
TIC	Total Inorganic Carbon
TTQAP	Task Technical and Quality Assurance Plan

1.0 Introduction

The Corrosion Control Program (CCP) establishes concentration and temperature limits for key constituents and periodic sampling and analysis to confirm that waste supernate is within these limits [i].

In May 2015, Savannah River Remediation (SRR) sampled from two locations within Tanks 39H. As summarized in Table 1, these supernatant samples were delivered to the Savannah River National Laboratory (SRNL) in June 2015 for analyses to support the CCP. The Tank 39H surface sample was identified as HTF-39-15-61 and the Tank 39H variable depth (subsurface) sample as HTF-39-15-62. This Tank 39H variable depth sample was collected at a depth of 95 inches from the tank bottom, while the Tank 39H surface sample was taken from the surface.

The Tank 39H serves as the canyon receipt tank for the 3H-Evaporator systems. The overhead decant from Tank 39H goes into Tank 32H, which is the direct feed tank to the 3H Evaporator. This work is governed by the Technical Task Request and the experimental details are presented in the Task Technical and Quality Assurance Plan[ii, iii]. Requirements for performing reviews of technical reports and the extent of review are established in Manual E7 Procedure 2.60. SRNL documents the extent and type of review using the SRNL Technical Report Design Checklist contained in WSRC-IM-2002-00011, Rev. 2.

2.0 General Supernatant Sample Description

Table 2 contains a description of the sampling locations and the quantity of material received for the "as-received" Tank 39H surface and variable depth subsurface samples. As shown in Figure 1, the two samples were essentially free of any visible settled insoluble solids. The two Tank 39H samples (HTF-39-15-61 and HTF-39-15-62) were relatively clear and transparent, although the Tank 39H subsurface sample (HTF-39-15-62) appeared slightly hazy and cloudy.

In general, the visual appearance of these samples was consistent with supernatant liquid containing <1 wt. % insoluble solids.

3.0 Experimental

Analysis for the CCP was performed on the two Tank 39H surface and subsurface samples. The CCP analysis requirements for the Tank 39H slurry supernatant samples are summarized in Table 1.

The CCP analysis includes ion chromatography (IC) for anions (nitrate and nitrite), acid titration for free hydroxide, and gamma scan for detectable gamma-emitting isotopes. The preparation for the IC and titration analyses was by dilution with de-ionized water. Density of the "as-received" samples was measured by determining the weight of 1.0 mL sample portions in triplicate and the specific gravity (SpG) was calculated from these density measurements relative to density of water. Inductively-coupled plasm-mass spectroscopy (ICP-MS) was performed for uranium isotopic analysis and radiochemical separation and counting methods for Pu-238, Pu-239/240, and Pu-241. The preparation for the Pu and U sample analyses were by dilution with 2M nitric acid.

All analyses were performed and reported in triplicate as shown in appendices A and B and the averages and standard deviations are presented in Table 3.

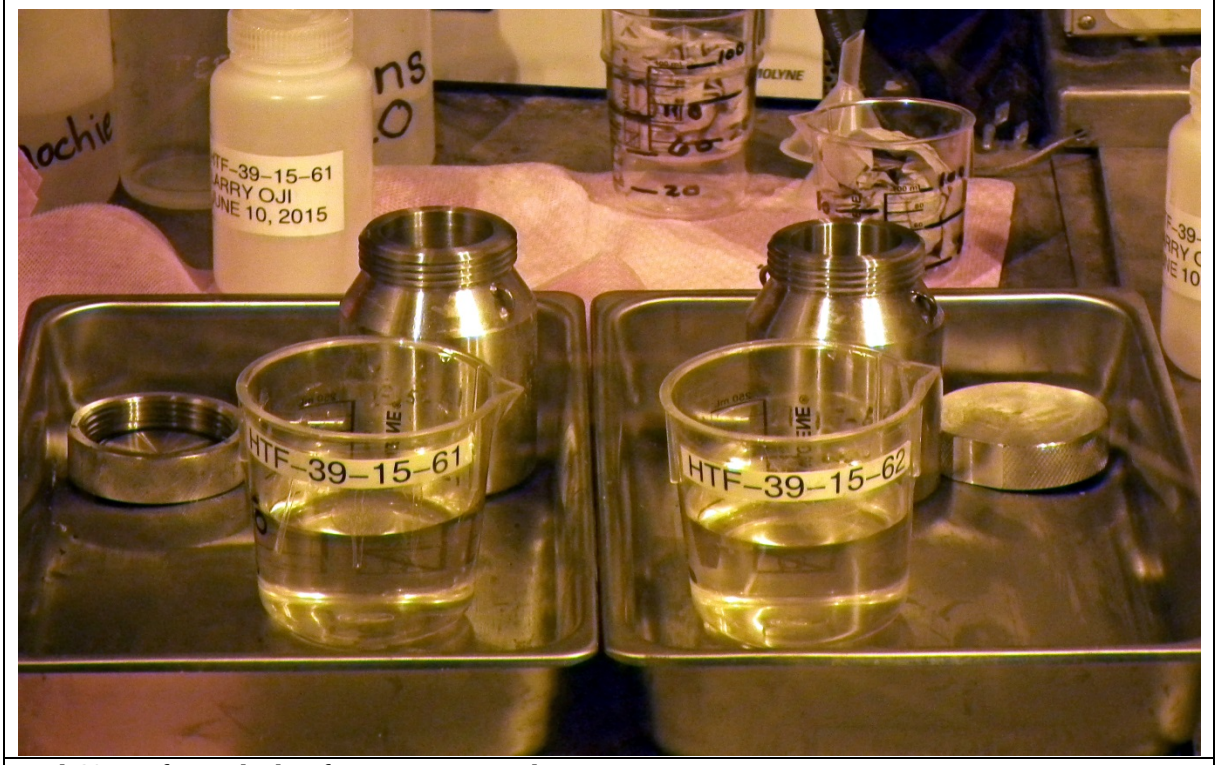
Table 1 Tanks 39H Sample Delivery Dates and Analysis Suite Summary.

Sample	Sample ID	Description	Date at SRNL	Date put in shielded cell
Tank 39H surface	HTF-39-15-61	Tank 39H Surface sample	6/1/2015	6/3/2015
Tank 39H VDS	HTF-39-15-62	Tank 39H sample collected at a depth of 95 inches from the Tank 39H bottom	6/1/2015	6/3/2015

CCP Sample location	Analysis Suite summary
Tank 39H surface sample	CCP
Tank 39H Sub-surface Sample or variable depth sample (VDS)	CCP

Table 2 General Supernate Sample Description (As-received) for Tanks 39H Samples

Tank Sample ID	Sample location	Approx. Volume, mL	Mass, g	Clarity of supernate
HTF-39H-15-61	Tank 39H surface sample	160	205.735	Clear supernate without visible settled solids
HTF-39H-15-62	Tank 39H sub-surface sample	150	192.298	Slightly hazy supernate without visible settled solids.



Tank 39H surface and subsurface supernate samples

Figure 1 From left to right: samples from the Tank 39H supernate surface (61) and 39H supernate subsurface (62).

4.0 Analytical Results

Table 3 contains a summary of the analytical results for both Tank 39H surface and subsurface samples. This summary includes only the average values for the analytes and the standard deviation for each analysis in triplicate. However, analyses for select cations for both Tank 39H samples, which were not requested by the customer, are also reported and were performed to support the cation/anion balance and general information for the Tank 39H.

Results for the analytes that were below the limits of quantification are preceded by "<". The standard deviations were calculated only for values that were all above the detection limits. The three individual determinations of the triplicate preparations and measurements are reported along with the average values and the standard deviations.

To check the results, a cation-anion normality balance was performed. The normal concentrations of cations (mainly Na^+ and K^+) were summed, as were the anions (NO_3^-, NO_2^-, SO_4^{2-}, Cl^-, CO_3^{2-}, PO_4^{3-}, AlO_2^-, $C_2O_4^{2-}$ and free OH^-). The two sums were compared.

Table 3 CCP and ECP Analytical Data for Tanks 39H Supernate Samples.

Analytes	Tank 39H Surface HTF-39-15-61		Tank 39H Sub-Surface HTF-39-15-62		Methods	Units
	Average	**Stdev.**	**Average**	**Stdev.**	-	-
OH^-	**1.28**	*0.08*	**1.23**	*0.19*	Titration	M
NO_2^-	**3.14E-01**	*4.06E-03*	**3.15E-01**	*8.36E-04*	IC	M
NO_3^-	**1.98E+00**	*2.56E-02*	**1.98E+00**	*1.30E-02*	IC	M
F^-	**<6.05E-03**	-	**<6.14E-03**	*<6.14E-03*	IC	M
CHO_2^-	**<2.55E-03**	-	**<2.59E-03**	*<2.59E-03*	IC	M
Cl^-	**<3.24E-03**	-	**<3.29E-03**	*<3.29E-03*	IC	M
PO_4^{3-}	**<1.21E-03**	-	**<1.23E-03**	*<1.23E-03*	IC	M
SO_4^{2-}	**4.83E-02**	*3.12E-04*	**4.68E-02**	*2.35E-03*	IC	M
$C_2O_4^{2-}$	**<1.31E-03**	-	**<1.33E-03**	-	IC	M
Br^-	**<1.44E-03**		**<1.46E-03**	-	IC	M
CO_3^{2-}	***1.83E-01***	*3.27E-03*	**1.84E-01**	*2.57E-03*	TIC	M
Al	**2.81E+03**	*3.75E+02*	**3.19E+03**	*3.72E+01*	ICP-ES	mg/L
B	**1.09E+02**	*1.41E+01*	**1.23E+02**	*1.74E+00*	ICP-ES	mg/L
Ca	**3.87E+00**	*8.13E-01*	**2.87E+00**	*3.80E-01*	ICP-ES	mg/L
Cr	**9.69E+01**	*1.26E+01*	**1.09E+02**	*1.74E+00*	ICP-ES	mg/L
Fe	**1.37E+01**	*1.92E+00*	**1.71E+01**	*5.40E+00*	ICP-ES	mg/L
K	**2.98E+02**	*4.27E+01*	**3.33E+02**	*4.97E+00*	ICP-ES	mg/L
La	**9.34E-01**	*5.18E-02*	**<8.73E-01**		ICP-ES	mg/L
Na	**1.07E+05**	*7.71E+02*	**1.08E+05**	*1.32E+03*	ICP-ES	mg/L
P	**6.10E+01**	*6.96E+00*	**6.68E+01**	*1.84E+00*	ICP-ES	mg/L
S	**2.18E+03**	*8.04E+01*	**2.48E+03**	*2.84E+02*	ICP-ES	mg/L
Si	**3.84E+01**	*5.51E+00*	**4.14E+01**	*1.17E+00*	ICP-ES	mg/L
V	**8.34E-01**	*1.11E-01*	**1.04E+00**	*1.98E-01*	ICP-ES	mg/L
Zn	**1.52E+00**	*1.37E-01*	**1.38E+00**	*7.71E-03*	ICP-ES	mg/L
Hg	**3.25E+01**	*3.92E-01*	**3.30E+01**	*5.21E-01*	CVAA-Hg	mg/L
Na	**4.28E+00**	*9.30E-02*	**4.32E+00**	*1.07E-01*	AA-Na	M
Total cation	**4.28E+00**	*9.30E-02*	**4.32E+00**	*1.07E-01*	Calc.	M
Total anion	**3.98E+00**	*9.30E-02*	**3.94E+00**	*1.95E-01*	Calc.	M
Cs-137	**1.73E+08**	*4.28E+06*	**1.77E+08**	*3.95E+06*	gamma scan	dpm/mL
Ba-137m	**1.64E+08**	*4.05E+06*	**1.68E+08**	*3.74E+06*	gamma scan	dpm/mL
SpG 27 °C	**1.24**	*0.03*	**1.23**	*0.02*	Calc.	-
U-233	**2.65E-03**	*1.71E-04*	**2.75E-03**	*2.16E-04*	ICP-MS	mg/L
U-234	**6.62E-02**	*2.33E-03*	**6.47E-02**	*1.94E-03*	ICP-MS	mg/L
U-235	**2.42E+00**	*7.01E-02*	**2.37E+00**	*5.44E-02*	ICP-MS	mg/L
U-236	**4.42E-01**	*1.73E-03*	**4.33E-01**	*4.14E-03*	ICP-MS	mg/L
U-238	**8.57E+00**	*6.78E-02*	**8.48E+00**	*6.71E-02*	ICP-MS	mg/L
Total U	**1.15E+01**	*5.48E-02*	**1.13E+01**	*9.77E-02*	ICP-MS	mg/L
U-235/U-total	**2.10E-01**	*5.71E-03*	**2.09E-01**	*3.81E-03*	Calc.	-
Pu-238	**1.21E-03**	*8.75E-05*	**1.06E-03**	*1.06E-04*	PuTTA	mg/L
Pu-239*	**1.72E-02**	*1.04E-03*	**1.57E-02**	*1.76E-03*	PuTTA	mg/L
Pu-239/240	**2.38E+03**	*1.44E+02*	**2.17E+03**	*2.32E+02*	PuTTA	dpm/mL
Pu-241	**7.54E-05**	*6.71E-06*	**8.31E-05**	*3.12E-05*	Pu-238/241	mg/L

* The Pu-239 mass concentrations were calculated from the Pu-239/240 results, based on the assumption that all activity was due to Pu-239 (as opposed to Pu-240). Note that the ICP-MS results for Pu-239 were all above the minimum detection limits.

For these comparisons, the primary contributing cations included Na^+ and K^+, while the primary contributing anions included hydroxide, nitrite, nitrate, carbonate, formate, sulfate, phosphate, oxalate, chloride, and aluminate.

For the Tank 39H surface sample the cations summed to 4.28 M, while the anions summed to 3.98 M. Thus, the anions summed to about 93.0 % of the cations. Similarly, for the Tank 39H subsurface sample the calculated cation and anions were 4.32 and 3.94, respectively. The anions summed to about 91.2 % of the cation value for the Tank 39H subsurface sample. The differences between the cation and anion molarity values are within 10% of each other, which is fairly good when one takes into consideration that the nominal uncertainties (1 sigma) for ICP-ES, IC and OH are about 20%. The difference can be attributed to the analytical uncertainties and the fact that most of the anions (phosphates, fluorides, oxalate and chlorides) were below the IC instrument detection limits.

The Pu-239 value reported in mg/L assumes that all of the activity measured as Pu-239/240 is from Pu-239. This assumption results in a high bias to the Pu-239 result and thus the assumption is conservative with respect to the concentration of this fissile isotope. All measurements reported for U-233, U-234, U-235, U-236 and U-238 for all Tank 39H samples are above the ICP-MS detection limit. As a result, the uranium enrichment calculations are based on U-total; where U-total includes the masses of uranium isotopes, U-233-U-238.

Tables 4 through 9 in Appendices A-B contain all the analytical results for the characterization of Tanks 39H samples. These detailed analyses results are grouped by the required programs (CCP and ECP) in separate sections of the tables. Results for Tank 39H surface supernate are summarized in Appendix A, Table 4 through Table 6, while Tables 7 through Table 9, Appendix B, contain the analyses results for Tank 39H subsurface samples. Tables 6 and 9 contain the results for the additional analytes which were measured by the same group of methods but were not required.

5.0 Conclusions

This report provides the results of analyses on Tanks 39H surface and subsurface supernatant liquid samples in support of the Corrosion Control Program. Analyses included direct ICP-ES analysis of the diluted “as-received” sample, warm acid strike preparation followed by ICP-ES analysis for silicon, aluminum, and sodium and water dilution preparations for IC analysis for anions. Other reported analytical results include analyses results for uranium, Pu-241 and Pu-239.

The measured sodium concentration averaged, respectively, 4.28E+00 ± *9.30E-02* M and 4.32E+00 ± *1.076E-01* M in the Tank 39H surface sample and Tank 39H subsurface sample.

In general, the nitrate, nitrite, free-OH and specific gravity of the Tank 39H surface and subsurface samples were all about the same in magnitude, respectively, averaging 1.98 M, 0.314 M, 1.26 M and 1.24. The measured silicon concentration for the Tank 39H surface and subsurface samples were, respectively, 3.84E+01± *5.51E+00* and 4.14E+01± *1.17E+00*mg/L. The U-235 mass divided by the total uranium mass averaged 2.10E-01 (2.10E+01 % uranium enrichment) for all sample measurements in both types of Tank 39H samples. The U-235 concentration in the Tank 39H samples ranged from 2.34 to 2.50 mg/L, while the U-238 concentration ranged from 8.41 to 8.65 mg/L. The total uranium concentrations in the two Tank 39H samples ranged from 11.24 to 11.54 mg/L.

6.0 Quality Assurance

Data are recorded in SRNL Electronic Notebook: L5575-00080 SRNL Electronic Notebook (Production); SRNL, Aiken, SC 29808 (2014) and various AD notebooks contain the analytical/experimental data.

7.0 References

[i] K. B. Martin, "CSTF Corrosion Control Program," WSRC-TR-2002-00327, Rev. 8, July 22, 2014.

[ii] H. Bui, "Tank 51 Enrichment Sample Analysis," X-TTR-H-00058, Rev. 0, June 02, 2015.

[iii] C. J. Martino, "Task Technical and Quality Assurance Plan for Analysis of Tank 38H and Tank 43H Enrichment Control Program and Corrosion Control Samples," SRNL-RP-2013-00522, Rev. 0, August 2013.

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Appendix A. Tank 39H Surface samples (HTF-39-15-61)

Table 4 Tank 39H Surface Sample HTF-39-15-61: CCP Results

Analytes	Analysis-1	Analysis-2	Analysis-3	Average	St. Deviation	Units
NO_3^-	1.95E+00	1.98E+00	2.00E+00	**1.98E+00**	*2.56E-02*	Mole/L
NO_2^-	3.10E-01	3.14E-01	3.18E-01	**3.14E-01**	*4.06E-03*	Mole/L
OH^-	1.30	1.20	1.35	**1.28**	*0.08*	Molar
SO_4^{2-}	4.84E-02	4.79E-02	4.85E-02	**4.83E-02**	*3.12E-04*	Mole/L
CHO_2^-	<2.51E-03	<2.57E-03	<2.58E-03	**<2.55E-03**	-	Mole/L
Cl^-	<3.19E-03	<3.26E-03	<3.27E-03	**<3.24E-03**	-	Mole/L
F^-	<5.95E-03	<6.08E-03	<6.11E-03	**<6.05E-03**	-	Mole/L
PO_4^{3-}	<1.19E-03	<1.22E-03	<1.22E-03	**<1.21E-03**	-	Mole/L
$C_2O_4^{2-}$	<1.29E-03	<1.31E-03	<1.32E-03	**<1.31E-03**	-	Mole/L
Br^-	<1.42E-03	<1.45E-03	<1.45E-03	**<1.44E-03**	-	Mole/L
Inorganic carbon	2.16E+06	2.16E+06	2.24E+06	**2.19E+06**	*4.53E+04*	µgC/L
Organic carbon	2.23E+05	2.23E+05	2.22E+05	**2.22E+05**	*7.18E+02*	µgC/L
Total carbon	2.39E+06	2.39E+06	2.46E+06	**2.41E+06**	*4.05E+04*	µgC/L
CO_3^{2-}	1.83E-01	1.80E-01	1.87E-01	**1.83E-01**	*3.27E-03*	M
Na	4.38E+00	4.26E+00	4.20E+00	**4.28E+00**	*9.30E-02*	M
Cs-137	1.74E+08	1.69E+08	1.78E+08	**1.73E+08**	*4.28E+06*	dpm/mL
Ba-137m	1.64E+08	1.60E+08	1.68E+08	**1.64E+08**	*4.05E+06*	dpm/mL
SpG @ 27 °C	1.20	1.26	1.25	**1.24**	*0.03*	-

SpG = Specific gravity

Table 5 Tank 39H Surface Sample (HTF-39-15-61): Select Elemental Analysis Results

Analytes	Analysis-1	Analysis-2	Analysis-3	Average	St. Deviation	Units
Al	2.90E+03	2.40E+03	3.14E+03	**2.81E+03**	*3.75E+02*	mg/L
B	1.13E+02	9.40E+01	1.21E+02	**1.09E+02**	*1.41E+01*	mg/L
Ca	4.80E+00	3.33E+00	3.46E+00	**3.87E+00**	*8.13E-01*	mg/L
Cr	9.99E+01	8.31E+01	1.08E+02	**9.69E+01**	*1.26E+01*	mg/L
Fe	1.43E+01	1.16E+01	1.53E+01	**1.37E+01**	*1.92E+00*	mg/L
K	2.95E+02	2.57E+02	3.42E+02	**2.98E+02**	*4.27E+01*	mg/L
La	9.28E-01	8.86E-01	9.89E-01	**9.34E-01**	*5.18E-02*	mg/L
Mo	2.69E+01	2.16E+01	2.77E+01	**2.54E+01**	*3.32E+00*	mg/L
Na**	1.01E+05	9.80E+04	9.66E+04	**9.85E+04**	*2.14E+03*	mg/L
P	5.86E+01	5.55E+01	6.88E+01	**6.10E+01**	*6.96E+00*	mg/L
S	2.17E+03	2.10E+03	2.26E+03	**2.18E+03**	*8.04E+01*	mg/L
Si	4.09E+01	3.21E+01	4.22E+01	**3.84E+01**	*5.51E+00*	mg/L
V	8.35E-01	7.23E-01	9.44E-01	**8.34E-01**	*1.11E-01*	mg/L
Zn	1.39E+00	1.49E+00	1.66E+00	**1.52E+00**	*1.37E-01*	mg/L
Hg	3.24E+01	3.22E+01	3.29E+01	**3.25E+01**	*3.92E-01*	mg/L

**Sodium analysis by atomic absorption (AA-Na)

Table 6 Tank 39H Surface Sample HTF-39-15-61: ECP Results

Analytes	Analysis-1	Analysis-2	Analysis-3	Average	St. Deviation	Units
U-233	2.84E-03	2.52E-03	2.59E-03	**2.65E-03**	*1.71E-04*	mg/L
U-234	6.73E-02	6.35E-02	6.77E-02	**6.62E-02**	*2.33E-03*	mg/L
U-235	2.50E+00	2.38E+00	2.38E+00	**2.42E+00**	*7.01E-02*	mg/L
U-236	4.41E-01	4.44E-01	4.42E-01	**4.42E-01**	*1.73E-03*	mg/L
U-238	8.52E+00	8.65E+00	8.55E+00	**8.57E+00**	*6.78E-02*	mg/L
U-Total	1.15E+01	1.15E+01	1.14E+01	**1.15E+01**	*5.48E-02*	mg/L
U-235/U-total	2.17E-01	2.06E-01	2.08E-01	**2.10E-01**	*5.71E-03*	-
U-Enrichment	2.17E+01	2.06E+01	2.08E+01	**2.10E+01**	*5.71E-01*	%
Pu-238	1.31E-03	1.14E-03	1.18E-03	**1.21E-03**	*8.75E-05*	mg/L
Np-237	2.15E-02	2.16E-02	2.05E-02	**2.12E-02**	*5.94E-04*	mg/L
Pu-239	1.83E-02	1.62E-02	1.72E-02	**1.72E-02**	*1.04E-03*	mg/L
Pu-241	8.28E-05	6.97E-05	7.38E-05	**7.54E-05**	*6.71E-06*	mg/L
Pu-239/240	2.52E+03	2.24E+03	2.37E+03	**2.38E+03**	*1.44E+02*	dpm/mL

Appendix B. Tank 39H Sub-Surface samples (HTF-39-15-62)

Table 7 Tank 39H Sub-Surface Sample HTF-39-15-62: CCP Results

Analytes	Analysis-1	Analysis-2	Analysis-3	Average	St. Deviation	Units
NO_3^-	1.98E+00	1.97E+00	2.00E+00	**1.98E+00**	*1.30E-02*	Mole/L
NO_2^-	3.15E-01	3.14E-01	3.15E-01	**3.15E-01**	*8.36E-04*	Mole/L
OH^-	1.33	1.35	1.01	**1.23**	*0.19*	Molar
SO_4^{2-}	4.94E-02	4.60E-02	4.49E-02	**4.68E-02**	*2.35E-03*	Mole/L
CHO_2^-	<2.59E-03	<2.57E-03	<2.62E-03	**<2.59E-03**		Mole/L
Cl^-	<3.29E-03	<3.25E-03	<3.32E-03	**<3.29E-03**		Mole/L
F^-	<6.14E-03	<6.08E-03	<6.21E-03	**<6.14E-03**	-	Mole/L
PO_4^{3-}	<1.23E-03	<1.22E-03	<1.24E-03	**<1.23E-03**	-	Mole/L
$C_2O_4^{2-}$	<1.33E-03	<1.31E-03	<1.34E-03	**<1.33E-03**	-	Mole/L
Br^-	<1.46E-03	<1.44E-03	<1.48E-03	**<1.46E-03**	-	Mole/L
Inorganic carbon	2.19E+06	2.18E+06	2.24E+06	**2.20E+06**	*3.08E+04*	µgC/L
Organic carbon	1.35E+05	1.25E+05	1.37E+05	**1.33E+05**	*6.74E+03*	µgC/L
Total carbon	2.33E+06	2.30E+06	2.38E+06	**2.34E+06**	*3.87E+04*	µgC/L
$CO3^{2-}$	1.83E-01	1.82E-01	1.86E-01	**1.84E-01**	*2.57E-03*	M
Na	4.34E+00	4.42E+00	4.21E+00	**4.32E+00**	*1.07E-01*	M
Cs-137	1.77E+08	1.73E+08	1.81E+08	**1.77E+08**	*3.95E+06*	dpm/mL
Ba-137m	1.67E+08	1.64E+08	1.71E+08	**1.68E+08**	*3.74E+06*	dpm/mL
SpG @ 27 °C	1.26	1.22	1.23	**1.23**	*0.02*	--

Table 8 Tank 39H Sub-Surface Sample (HTF-39-15-62): Select Elemental Analysis Results

Analytes	Analysis-1	Analysis-2	Analysis-3	Average	St. Deviation	Units
Al	3.19E+03	3.19E+03	3.18E+03	**3.19E+03**	*6.39E+00*	mg/L
B	1.24E+02	1.23E+02	1.23E+02	**1.23E+02**	*5.63E-01*	mg/L
Ca	3.25E+00	2.54E+00	2.80E+00	**2.86E+00**	*3.57E-01*	mg/L
Cr	1.09E+02	1.07E+02	1.09E+02	**1.09E+02**	*9.45E-01*	mg/L
Fe	1.40E+01	1.40E+01	2.36E+01	**1.72E+01**	*5.55E+00*	mg/L
K	3.27E+02	3.31E+02	3.42E+02	**3.34E+02**	*7.76E+00*	mg/L
La	<8.69E-01	<8.71E-01	<8.79E-01	**<8.73E-01**	-	mg/L
Mo	2.92E+01	2.91E+01	2.96E+01	**2.93E+01**	*2.64E-01*	mg/L
Na**	1.09E+05	1.07E+05	1.09E+05	**1.08E+05**	*7.15E+02*	mg/L
P	6.44E+01	6.68E+01	6.94E+01	**6.69E+01**	*6.44E+01*	mg/L
S	2.68E+03	2.17E+03	2.60E+03	**2.48E+03**	*2.76E+02*	mg/L
Si	4.06E+01	4.06E+01	4.31E+01	**4.14E+01**	*1.46E+00*	mg/L
V	1.21E+00	8.25E-01	1.09E+00	**1.04E+00**	*1.98E-01*	mg/L
Zn	1.37E+00	1.38E+00	1.39E+00	**1.38E+00**	*7.71E-03*	mg/L
						mg/L
Hg	3.25E+01	3.31E+01	3.35E+01	**3.30E+01**	*5.21E-01*	mg/L

**Sodium analysis by atomic absorption (AA-Na)

Table 9 Tank 39H Sub-Surface Sample HTF-39-15-62: ECP Results

Analytes	Analysis-1	Analysis-2	Analysis-3	Average	St. Deviation	Units
U-233	2.52E-03	2.96E-03	2.78E-03	**2.75E-03**	*2.16E-04*	mg/L
U-234	6.25E-02	6.53E-02	6.62E-02	**6.47E-02**	*1.94E-03*	mg/L
U-235	2.34E+00	2.43E+00	2.34E+00	**2.37E+00**	*5.44E-02*	mg/L
U-236	4.28E-01	4.34E-01	4.36E-01	**4.33E-01**	*4.14E-03*	mg/L
U-238	8.41E+00	8.49E+00	8.54E+00	**8.48E+00**	*6.71E-02*	mg/L
U-Total	1.12E+01	1.14E+01	1.14E+01	**1.13E+01**	*9.77E-02*	mg/L
U-235/U-total	2.08E-01	2.13E-01	2.05E-01	**2.09E-01**	*3.81E-03*	-
U-Enrichment	2.08E+01	2.13E+01	2.05E+01	**2.09E+01**	*3.81E-01*	%
Pu-238	1.04E-03	9.83E-04	1.17E-03	**1.06E-03**	*9.93E-05*	mg/L
Np-237	1.98E-02	2.08E-02	2.16E-02	**2.07E-02**	*9.08E-04*	mg/L
Pu-239	1.49E-02	1.47E-02	1.77E-02	**1.57E-02**	*1.68E-03*	mg/L
Pu-241	1.19E-04	5.98E-05	7.10E-05	**8.31E-05**	*3.12E-05*	mg/L
Pu-239/240	2.05E+03	2.02E+03	2.44E+03	**2.17E+03**	*2.32E+02*	dpm/mL