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222-S LABORATORY

**FINAL ANALYTICAL REPORT FOR ANALYSIS OF
RADTU TANK SAMPLES FROM PRF SOUTH CANYON
SAMPLE DELIVERY GROUP 20142504**

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222-S LABORATORY

FINAL ANALYTICAL REPORT FOR ANALYSIS OF RADTU TANK SAMPLES FROM PRF SOUTH CANYON

1.0 INTRODUCTION

This final report presents the results for the solid samples taken from the PRF South Canyon Airlock on November 24, 2014. The samples were analyzed in accordance with F13-048, *Sampling Authorization Form (SAF)*; ATL-MP-1011, *ATL Quality Assurance Project Plan for 222-S Laboratory (QAPP)*; PFP-LOI-10-0006, *Letter of Instruction for Analysis of RADTU Tank Contents in PRF South Canyon Airlock, 236-Z (LOI)*; SW-846, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods*; DOE/RL-2004-29, *Sampling and Analysis Plan for the Plutonium Finishing Plant, Above-Grade Structures (SAP)*; and the additional guidance given by the customer point of contact.

Because the 222-S Laboratory facility was designed to analyze hazardous and complex tank waste samples, most SW-846 test methods performed at the 222-S Laboratory contain deviations that are listed in an appendix in the analytical procedures. All other known deviations or variances from SW-846 are documented in this narrative. The following attachments are included in this report.

- Attachment 1 Data Summary Report
- Attachment 2 Analysis Date and Holding Time Report
- Attachment 3 Correspondence
- Attachment 4 Receipt Paperwork

2.0 SAMPLE RECEIPT AND APPEARANCE

Two samples were received by the 222-S Laboratory on January 14, 2015, in 500-mL glass bottles. The samples were stored under refrigeration upon receipt at 1° Celsius. The samples were received in good condition with adequate paperwork. Samples were received 51 days after sampling.

The solid samples were described as a RADTU tank waste mixed with diatomaceous earth (Selectsorb).

3.0 ANALYTICAL RESULTS SUMMARY

The Data Summary Report (Attachment 1) presents the final analytical results for those analytes requested on the SAF and LOI.

The “Det Limit” column in Attachment 1 contains the method detection limit (MDL) or minimum detectable activity (MDA).

In Attachment 1, the column labeled “A#” indicates the aliquot class or the method used for sample preparation before analysis. The aliquot classes are defined as follows:

“A” indicates samples were prepared by SW-846 3050B.

“Hg” indicates samples were acid-digested using SW-846 7471A. “W” indicates samples were prepared by a water digest.

“Z” indicates samples were prepared by zirconium fusion digest.

The “Qual Flags” column in Attachment 1 contains data qualifier flags from FEAD CP-15383, *Common Requirements of the Format for Electronic Analytical Data (FEAD)*, which are defined as follows:

“B” for inorganic results is used to indicate that the reported result should be considered an estimate because it was below the quantitation limit. The “B” flag is applied to sample concentrations that are greater than the MDL but less than the quantitation limit.

“B” for radiochemistry is used to indicate that the blank result is $\geq 2X$ the MDA of the blank and is more than the MDA of the associated sample.

“C” indicates the blank result was greater than 20% of the sample result.

“N” indicates the spike and/or spike duplicate sample recovery is outside control limits.

“U” for all results is used to indicate that the reported result was less than the calculated detection limit.

Manual calculations using rounded results from the Data Summary Report (Attachment 1) or result calculation forms may differ slightly from the actual results derived from the raw data.

3.1 INORGANIC ANALYSES

3.1.1 Mercury

Analysis for mercury by cold vapor atomic absorption was performed on acid-digested aliquots. All quality control (QC) requirements were met. The required detection limit (RDL) was met. The 28-day SW-846 holding time for mercury analysis was exceeded, since the sample were received at the laboratory until 51 days after sampling.

3.1.2 Ion Chromatography

The IC analysis for anions was performed on water-digested aliquots of the samples. The required analytes were chloride, fluoride, nitrate, nitrite, oxalate, and sulfate. Fluoride, nitrate, nitrite, and sulfate were detected in the preparation blank above the MDL, below the quantitation limit. Only fluoride level in the blank was greater than 20% of the sample result. These results were flagged with a “C”.

The matrix spike (MS) recovery for sulfate exceeded the control limit in the SAP of 70%-130% at 232%. Since the spike level was less than 20% of the sample result this criterion does not apply. The SW-846 holding time for all anions exceeded due to the delayed delivery of the samples to the laboratory. All other quality control (QC) requirements listed in the SAP and the QAPP were met.

3.1.3 Inductively Coupled Plasma/Atomic Emission Spectroscopy

The inductively coupled plasma/atomic emission spectroscopy (ICP/AES) analysis was performed on acid-digested aliquots of the solid samples. Approximately 20% of the sample remained after the digestion and appeared to be a fine brown solid. All analyses met the holding time.

The preparation blank result for arsenic, calcium, chromium, and magnesium exceeded the MDL but were below the quantitation limit. With the exception of arsenic, the blank results were less than 20% of the lowest sample results. Since sample results for arsenic were below the quantitation limit the usability of the data was not affected. A "C" was only applied to the arsenic results.

The relative percent difference (RPD) between the sample and duplicate results for arsenic and antimony exceeded 30% requirement in the SAP. Since the sample result for arsenic and antimony were below the quantitation limit, this criterion does not apply.

The MS recoveries for barium, calcium, iron, and sodium, exceeded the 70%-130% requirement in the SAP. However since all spike levels were less than 25% of the sample result, this criterion does not apply. The MS recoveries for chromium and nickel exceeded the requirement and have been flagged with an "N". Laboratory believe this may be due to the high level of interfering elements in these samples.

The ICP/AES analysis was unable to meet the RDLs for beryllium and cadmium. These elements were analyzed using the inductively coupled plasma/mass spectrometry (ICP/MS). All other QC requirements listed in the SAP and the QAPP were met.

3.1.4 Inductively Coupled Plasma/Mass Spectroscopy

The ICP/MS analysis was performed on acid-digested aliquots of the solid samples. Approximately 20% of the sample remained after the digestion and appeared to be a fine brown solid. The actinides, ^{233}U , ^{234}U , ^{235}U , ^{238}U , ^{242}Pu and ^{237}Np and the metals, cadmium and beryllium, were analyzed using this method.

Metals by ICP/MS: In order to meet the RDLs for cadmium and beryllium ICP/MS was used. All QC requirements listed in the SAP and the QAPP were met.

Actinides Analysis: The MS recovery for ^{235}U exceeded the 70%-130% requirement in the SAP at 185%. However since the spike level was less than 20% of the sample result, this criterion does not apply. The initial calibration blank was above the MDL but below the quantitation level for ^{237}Np and ^{233}U . All ^{233}U results were below the MDL and the sample result for ^{237}Np were greater than five times the blank result. There no "B" flags were applied and the usability of the

data was not affected. All RDLs were met. All other QC requirements listed in the SAP and the QAPP were met.

For Actinide analysis, direct is the most accurate type of calibration; however, standard material is not commercially available for all isotopes of interest. Concentrations of those isotopes without available standards are estimated based on the instrument's response to another isotope of the same element, which is known as "isotopic substitution" and is an indirect method of calibration. Direct calibration standards were used for ^{233}U , ^{235}U , ^{238}U , ^{237}Np , and ^{242}Pu . Isotopic substitution calibrations were performed for the other isotopes as listed in the Table below.

Table 1. Inductively Coupled Plasma/Mass Spectroscopy Standards and Spikes

Standard Type	Isotopes
Direct calibration standards	^{233}U , ^{235}U , ^{238}U , ^{237}Np , ^{242}Pu
Matrix spike, laboratory control standard, and calibration verification standards	^{233}U , ^{235}U , ^{238}U , ^{237}Np , ^{242}Pu
Isotope substitution	^{234}U (^{235}U),

3.2 RADIOCHEMISTRY ANALYSES

3.2.1 Total Alpha/Total Beta

The total alpha/total beta analysis for the solid samples was performed on acid-digested aliquots. Approximately 20% of the sample remained after the digestion and appeared to be a fine brown solid. All QC requirements listed in the SAP and the QAPP were met. The RDLs were meet. The total alpha was 20% to 35% lower than the sum of the isotopic plutonium and the ^{241}Am . This may reflex the incomplete nature of the acid digestion.

3.2.2 Strontium-89/90

The $^{89/90}\text{Sr}$ analysis was performed on fusion-digested samples. All QC requirements listed in the SAP and the QAPP were met. The required detection limit for $^{89/90}\text{Sr}$ was met.

3.2.3 Americium-241

The ^{241}Am analysis for the solid samples was performed on fusion-digested aliquots. Since preparation blank result was above the quantitation level and above the MDA of the sample, "B" was applied. However, since the blank result was less than 2% of the lowest sample result, the usability of the data was not affected, and reanalysis was not requested. All other QC requirements and RDL listed in the SAP and the QAPP were met.

3.2.4 Plutonium-238 and Plutonium-239/240

The ^{238}Pu and $^{239/240}\text{Pu}$ analysis was performed on the fusion-digest. All QC requirements in the SAP and the QAPP were met. The required RDLs in the SAP were meet.

4.0 PROCEDURES

Table 2 lists the procedures used in preparation and analysis of the samples contained in this report.

Table 2. Analytical Procedures

Analysis	Reference	Preparation Method	Analysis Procedure
Inorganic Analyses			
Hg	SW-846 7471A	Acid digest – LA-325-110, Rev. CB-1; SW-846 7471A	LA-325-110, Rev. CB-1
IC – Anions	SW-846 9056A	Water digest – LA-504-101, Rev. N-1	LA-533-166, Rev. C-0
ICP/AES – Metals	SW-846 6010C	Acid digest – LA-505-163, Rev. I-2; SW-846 3050B	LA-505-174, Rev. B-3
ICP/MS – Actinides & Metals	SW-846 6020A	Acid digest – LA-505-163, Rev. I-2; SW-846 3050B	LA-506-103, Rev. F-0
Radiochemical Analyses			
Total Alpha/Beta	N/A	Separation – LA-508-101, Rev. P-1 Acid digest – LA-505-163, Rev. I-2; SW-846 3050B	LA-508-124, Rev. C-3
^{89/90} Sr	N/A	Separation – LA-220-101, Rev. K-2 Fusion digest – LA-549-141, Rev. N-1	LA-508-124, Rev. C-2
^{238, 239/240} Pu	N/A	Separation – LA-953-104, Rev. J-1 Fusion digest – LA-549-141, Rev. N-1	LA-508-168, Rev. B-1
²⁴¹ Am	N/A	Separation – LA-953-104, Rev. J-0-C Fusion digest – LA-549-141, Rev. N-1	LA-508-168, Rev. B-1

N/A – No reference method for this analysis

5.0 REFERENCES

- ATL-MP-1011, 2014, *ATL Quality Assurance Project Plan for 222-S Laboratory*, Rev. 12-3, Advanced Technologies and Laboratories International, Inc., Richland, Washington.
- FEAD CP-15383, 2007, *Common Requirements of the Format for Electronic Analytical Data (FEAD)*, Rev. 8, CH2M HILL Plateau Remediation Company, Richland, Washington.
- DOE/RL-2004-29, 2005, *Sampling and Analysis Plan for the Plutonium Finishing Plant, Above-Grade Structures*, Rev. 0, U.S. Department of Energy, Richland, Washington.
- F13-048, *Sampling Authorization Form*, PFP South Canyon Airlock Tank Sampling, CH2M Hill Plateau Remediation Company, Richland, Washington.
- PFP-LOI-10-0006, 2014, *Letter of Instruction for Analysis of RADTU Tank Contents in PRF South Canyon Airlock, 236-Z*, (LOI), Rev. 0, CH2M HILL Plateau Remediation Company, Richland, Washington.
- SW-846, 1986, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods*, Third Edition, as amended, U.S. Environmental Protection Agency, Washington, D.C.

FEBRUARY 24, 2015

Attachment 1

DATA SUMMARY REPORT

**PPF South Canyon RADTU Tank 2015-01
 Data Summary, Non-requested and Opportunistic Analyte Results**

Sample Group: 20142504

SDG Number: 20142504

Customer Sample ID: B24V17

Sample Portion: Acid Digest

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Alpha and Beta															
S14M000074		A	12587-46-1	Gross alpha	uCi/g	98.0	<3.83E-05	50.3	46.3	48.3	8.29	115	5.84E-03	0.854	
S14M000074		A	12587-47-2	Gross beta	uCi/g	100	<7.86E-05	9.73	9.04	9.38	7.32	115	0.0150	1.706	
ICP-AES															
S14M000072		A	7440-36-0	Antimony	ug/g	94.0	<6.00E-03	46.6	28.0	37.3	49.9	96.1	11.4	n/a	B
ICP-RCRA Metals															
S14M000074		A	7440-22-4	Silver	ug/g	98.0	<3.00E-03	100	84.3	92.2	17.2	110	6.20	n/a	
S14M000074		A	7429-90-5	Aluminum	ug/g	96.7	<0.0140	319	305	312	4.58	105	28.9	n/a	
S14M000074		A	7440-38-2	Arsenic	ug/g	98.4	6.46E-03	19.7	14.5	17.1	30.8	100	10.3	n/a	CB
S14M000074		A	7440-39-3	Barium	ug/g	100	<1.00E-03	4.30E+03	4.74E+03	4.52E+03	9.74	403	2.07	n/a	
S14M000074		A	7440-70-2	Calcium	ug/g	106	0.103	5.32E+04	4.71E+04	5.02E+04	12.1	619	184	n/a	
S14M000074		A	7440-48-4	Cobalt	ug/g	101	<1.00E-03	2.79	2.77	2.78	0.470	104	2.07	n/a	B
S14M000074		A	7440-47-3	Chromium	ug/g	99.3	3.08E-03	446	471	458	5.65	276	2.07	n/a	N
S14M000074		A	7440-50-8	Copper	ug/g	99.1	<2.00E-03	24.1	23.3	23.7	3.26	104	4.13	n/a	B
S14M000074		A	7439-89-6	Iron	ug/g	100	<0.0200	8.09E+03	8.43E+03	8.26E+03	4.05	723	41.3	n/a	
S14M000074		A	7440-09-7	Potassium	ug/g	97.8	<0.0220	79.2	74.5	76.9	6.07	98.4	45.5	n/a	B
S14M000074		A	7439-95-4	Magnesium	ug/g	100	0.0108	206	199	202	3.54	113	18.6	n/a	
S14M000074		A	7439-96-5	Manganese	ug/g	100	<1.00E-03	75.6	79.8	77.7	5.39	117	2.07	n/a	
S14M000074		A	7440-23-5	Sodium	ug/g	103	<0.0920	2.32E+05	2.36E+05	2.34E+05	1.57	-408	190	n/a	
S14M000074		A	7440-02-0	Nickel	ug/g	99.7	<1.00E-03	389	432	411	10.3	288	2.07	n/a	N
S14M000074		A	7439-92-1	Lead	ug/g	104	<0.0100	2.38E+03	2.41E+03	2.40E+03	1.51	130	20.7	n/a	
S14M000074		A	7782-49-2	Selenium	ug/g	101	<4.00E-03	<8.27	<8.24	n/a	n/a	103	8.27	n/a	U
S14M000074		A	7440-24-6	Strontium	ug/g	101	<1.00E-03	311	282	297	9.70	103	2.07	n/a	
S14M000074		A	7440-28-0	Thallium	ug/g	95.4	<4.00E-03	<8.27	<8.24	n/a	n/a	92.3	8.27	n/a	U
S14M000074		A	7440-62-2	Vanadium	ug/g	97.7	<1.00E-03	<2.07	<2.06	n/a	n/a	100	2.07	n/a	U
S14M000074		A	7440-66-6	Zinc	ug/g	98.6	<0.0160	49.4	52.6	51.0	6.26	104	33.1	n/a	B
ICP/MS															

NA = Not Analyzed, ND = Not Detected

B - Inorganic Estimated

C - Inorganic Blank Contamination

N - Spike Outside Range

U - < Det Limit

**PPF South Canyon RADTU Tank 2015-01
 Data Summary, Non-requested and Opportunistic Analyte Results**

Sample Group: 20142504

SDG Number: 20142504

Customer Sample ID: B24V17

Sample Portion: Acid Digest

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
ICP/MS															
S14M000074		A	13968-55-3	Uranium-233	ug/g	95.3	<5.00E-05	<1.03E-02	<5.00E-05	n/a	n/a	97.0	0.0103	n/a	U
S14M000074		A	13966-29-5	Uranium-234	ug/g	n/a	<5.40E-06	0.0580	0.0546	0.0563	6.01	n/a	1.12E-03	n/a	
S14M000074		A	15117-96-1	Uranium-235	ug/g	100	<5.40E-06	0.221	0.207	0.214	6.17	185	1.12E-03	n/a	
S14M000074		A	13994-20-2	Neptunium-237	ug/g	81.3	<1.12E-05	0.274	0.246	0.260	10.6	80.2	2.32E-03	n/a	
S14M000074		A	U-238	Uranium-238	ug/g	99.8	<4.18E-05	0.984	0.894	0.939	9.67	104	8.64E-03	n/a	
S14M000074		A	13982-10-0	Plutonium-242	ug/g	110	<1.30E-04	1.06	0.945	1.00	11.4	106	0.0269	n/a	
S14M000074		A	7440-41-7	Beryllium	ug/g	115	<2.00E-04	<0.0413	<0.0412	n/a	n/a	119	0.0413	n/a	U
S14M000074		A	7440-43-9	Cadmium	ug/g	120	<3.00E-04	17.8	17.0	17.4	4.85	124	0.0620	n/a	

Sample Portion: Fusion Digest

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Am241,Cm243 by TRU-Spec Resin															
S14M000071		Z	14596-10-2	Americium-241	uCi/g	103	0.364	28.3	28.2	28.2	0.496	n/a	0.0176	0.74	B
Pu238,239 by TRU-SPEC Resin															
S14M000071		Z	PU-239/240	Plutonium-239/240	uCi/g	103	<0.0223	29.8	29.0	29.4	2.65	n/a	0.0544	1.15	
S14M000071		Z	13981-16-3	Plutonium-238	uCi/g	n/a	<0.0298	5.02	4.64	4.83	7.83	n/a	0.0450	2.82	
Sr-89/90 by GPC															
S14M000071		Z	SR-89/90	Strontium-89/90	uCi/g	103	<4.23E-03	9.22E-03	9.74E-03	9.48E-03	5.49	102	7.07E-04	8.7	

Sample Portion: Hg Acid Digest

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Mercury by CVAA															
S14M000075		HG	7439-97-6	Mercury	ug/g	100	<1.10E-05	12.0	11.8	11.9	0.911	108	0.0441	n/a	

Sample Portion: Water Digest

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Anions and Small Organic Acids															

NA = Not Analyzed, ND = Not Detectec

B - Inorganic Estimated

C - Inorganic Blank Contamination

N - Spike Outside Range

U - < Det Limit

PFP South Canyon RADTU Tank 2015-01
 Data Summary, Non-requested and Opportunistic Analyte Results

Sample Group: 20142504
 SDG Number: 20142504
 Customer Sample ID: B24V17
 Sample Portion: Water Digest

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Anions and Small Organic Acids															
S14M000073		W	16984-48-8	Fluoride	ug/mL	102	0.0200	284	308	296	8.37	83.7	50.5	n/a	CB
S14M000073		W	16887-00-6	Chloride	ug/mL	98.7	<0.0160	1.02E+03	1.06E+03	1.04E+03	4.54	86.1	162	n/a	
S14M000073		W	14797-65-0	Nitrite	ug/mL	99.4	0.111	6.37E+03	7.11E+03	6.74E+03	11.1	88.6	707	n/a	
S14M000073		W	14808-79-8	Sulfate	ug/mL	94.6	0.0950	1.51E+05	1.68E+05	1.60E+05	10.8	232	465	n/a	
S14M000073		W	338-70-5	Oxalate	ug/mL	102	<0.0260	7.89E+03	7.79E+03	7.84E+03	1.26	104	263	n/a	
S14M000073		W	14797-55-8	Nitrate	ug/mL	101	0.118	2.20E+04	2.33E+04	2.27E+04	5.62	105	636	n/a	

NA = Not Analyzed, ND = Not Detected

B - Inorganic Estimated

C - Inorganic Blank Contamination

N - Spike Outside Range

U - < Det Limit

PFP South Canyon RADTU Tank 2015-01
 Data Summary, Non-requested and Opportunistic Analyte Results

Sample Group: 20142504

SDG Number: 20142504

Customer Sample ID: B24V18

Sample Portion: Acid Digest

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Alpha and Beta															
S14M000080		A	12587-46-1	Gross alpha	uCi/g	98.0	<3.83E-05	39.4	n/a	n/a	n/a	n/a	5.68E-03	0.953	
S14M000080		A	12587-47-2	Gross beta	uCi/g	100	<7.86E-05	7.57	n/a	n/a	n/a	n/a	0.0146	1.908	
ICP-AES															
S14M000078		A	7440-36-0	Antimony	ug/g	94.0	<6.00E-03	<12.5	n/a	n/a	n/a	n/a	12.5	n/a	U
ICP-RCRA Metals															
S14M000080		A	7440-22-4	Silver	ug/g	98.0	<3.00E-03	84.6	n/a	n/a	n/a	n/a	6.04	n/a	
S14M000080		A	7429-90-5	Aluminum	ug/g	96.7	<0.0140	315	n/a	n/a	n/a	n/a	28.2	n/a	
S14M000080		A	7440-38-2	Arsenic	ug/g	98.4	6.46E-03	13.7	n/a	n/a	n/a	n/a	10.1	n/a	CB
S14M000080		A	7440-39-3	Barium	ug/g	100	<1.00E-03	3.40E+03	n/a	n/a	n/a	n/a	2.01	n/a	
S14M000080		A	7440-70-2	Calcium	ug/g	106	0.103	3.42E+04	n/a	n/a	n/a	n/a	179	n/a	
S14M000080		A	7440-48-4	Cobalt	ug/g	101	<1.00E-03	2.86	n/a	n/a	n/a	n/a	2.01	n/a	B
S14M000080		A	7440-47-3	Chromium	ug/g	99.3	3.08E-03	372	n/a	n/a	n/a	n/a	2.01	n/a	N
S14M000080		A	7440-50-8	Copper	ug/g	99.1	<2.00E-03	22.4	n/a	n/a	n/a	n/a	4.02	n/a	B
S14M000080		A	7439-89-6	Iron	ug/g	100	<0.0200	8.63E+03	n/a	n/a	n/a	n/a	40.2	n/a	
S14M000080		A	7440-09-7	Potassium	ug/g	97.8	<0.0220	61.1	n/a	n/a	n/a	n/a	44.3	n/a	B
S14M000080		A	7439-95-4	Magnesium	ug/g	100	0.0108	203	n/a	n/a	n/a	n/a	18.1	n/a	
S14M000080		A	7439-96-5	Manganese	ug/g	100	<1.00E-03	67.4	n/a	n/a	n/a	n/a	2.01	n/a	
S14M000080		A	7440-23-5	Sodium	ug/g	103	<0.0920	2.62E+05	n/a	n/a	n/a	n/a	185	n/a	
S14M000080		A	7440-02-0	Nickel	ug/g	99.7	<1.00E-03	273	n/a	n/a	n/a	n/a	2.01	n/a	N
S14M000080		A	7439-92-1	Lead	ug/g	104	<0.0100	2.45E+03	n/a	n/a	n/a	n/a	20.1	n/a	
S14M000080		A	7782-49-2	Selenium	ug/g	101	<4.00E-03	<8.05	n/a	n/a	n/a	n/a	8.05	n/a	U
S14M000080		A	7440-24-6	Strontium	ug/g	101	<1.00E-03	242	n/a	n/a	n/a	n/a	2.01	n/a	
S14M000080		A	7440-28-0	Thallium	ug/g	95.4	<4.00E-03	<8.05	n/a	n/a	n/a	n/a	8.05	n/a	U
S14M000080		A	7440-62-2	Vanadium	ug/g	97.7	<1.00E-03	<2.01	n/a	n/a	n/a	n/a	2.01	n/a	U
S14M000080		A	7440-66-6	Zinc	ug/g	98.6	<0.0160	54.5	n/a	n/a	n/a	n/a	32.2	n/a	B
ICP/MS															

NA = Not Analyzed, ND = Not Detected

B - Inorganic Estimated

C - Inorganic Blank Contamination

N - Spike Outside Range

U - < Det Limit

**PPF South Canyon RADTU Tank 2015-01
 Data Summary, Non-requested and Opportunistic Analyte Results**

Sample Group: 20142504

SDG Number: 20142504

Customer Sample ID: B24V18

Sample Portion: Acid Digest

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
ICP/MS															
S14M000080		A	13968-55-3	Uranium-233	ug/g	95.3	<5.00E-05	<0.0101	n/a	n/a	n/a	n/a	0.0101	n/a	U
S14M000080		A	13966-29-5	Uranium-234	ug/g	n/a	<5.40E-06	0.0465	n/a	n/a	n/a	n/a	1.09E-03	n/a	
S14M000080		A	15117-96-1	Uranium-235	ug/g	100	<5.40E-06	0.181	n/a	n/a	n/a	n/a	1.09E-03	n/a	
S14M000080		A	13994-20-2	Neptunium-237	ug/g	81.3	<1.12E-05	0.218	n/a	n/a	n/a	n/a	2.25E-03	n/a	
S14M000080		A	U-238	Uranium-238	ug/g	99.8	<4.18E-05	0.623	n/a	n/a	n/a	n/a	8.41E-03	n/a	
S14M000080		A	13982-10-0	Plutonium-242	ug/g	110	<1.30E-04	0.832	n/a	n/a	n/a	n/a	0.0262	n/a	
S14M000080		A	7440-41-7	Beryllium	ug/g	115	<2.00E-04	<0.0402	n/a	n/a	n/a	n/a	0.0402	n/a	U
S14M000080		A	7440-43-9	Cadmium	ug/g	120	<3.00E-04	16.6	n/a	n/a	n/a	n/a	0.0604	n/a	

Sample Portion: Fusion Digest

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Am241,Cm243 by TRU-Spec Resin															
S14M000077		Z	14596-10-2	Americium-241	uCi/g	103	0.364	18.5	n/a	n/a	n/a	n/a	8.57E-03	0.68	B
Pu238,239 by TRU-SPEC Resin															
S14M000077		Z	PU-239/240	Plutonium-239/240	uCi/g	103	<0.0223	36.7	n/a	n/a	n/a	n/a	0.0178	0.72	
S14M000077		Z	13981-16-3	Plutonium-238	uCi/g	n/a	<0.0298	6.00	n/a	n/a	n/a	n/a	0.0340	1.80	
Sr-89/90 by GPC															
S14M000077		Z	SR-89/90	Strontium-89/90	uCi/g	103	<4.23E-03	3.44E-03	n/a	n/a	n/a	n/a	7.50E-04	20.423	

Sample Portion: Hg Acid Digest

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Mercury by CVAA															
S14M000081		HG	7439-97-6	Mercury	ug/g	100	<1.10E-05	0.500	n/a	n/a	n/a	n/a	2.51E-03	n/a	

Sample Portion: Water Digest

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Anions and Small Organic Acids															

NA = Not Analyzed, ND = Not Detected

B - Inorganic Estimated

C - Inorganic Blank Contamination

N - Spike Outside Range

U - < Det Limit

PFP South Canyon RADTU Tank 2015-01
 Data Summary, Non-requested and Opportunistic Analyte Results

Sample Group: 20142504

SDG Number: 20142504

Customer Sample ID: B24V18

Sample Portion: Water Digest

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
Anions and Small Organic Acids															
S14M000079		W	16984-48-8	Fluoride	ug/mL	102	0.0200	378	n/a	n/a	n/a	n/a	50.9	n/a	C
S14M000079		W	16887-00-6	Chloride	ug/mL	98.7	<0.0160	1.12E+03	n/a	n/a	n/a	n/a	163	n/a	
S14M000079		W	14797-65-0	Nitrite	ug/mL	99.4	0.111	6.96E+03	n/a	n/a	n/a	n/a	713	n/a	
S14M000079		W	14808-79-8	Sulfate	ug/mL	94.6	0.0950	2.07E+05	n/a	n/a	n/a	n/a	468	n/a	
S14M000079		W	338-70-5	Oxalate	ug/mL	102	<0.0260	7.88E+03	n/a	n/a	n/a	n/a	265	n/a	
S14M000079		W	14797-55-8	Nitrate	ug/mL	101	0.118	2.29E+04	n/a	n/a	n/a	n/a	641	n/a	

B - Inorganic Estimated

C - Inorganic Blank Contamination

N - Spike Outside Range

U - < Det Limit

NA = Not Analyzed, ND = Not Detected

FEBRUARY 24, 2015

Attachment 2

ANAYLSIS DATE AND HOLDING TIME REPORT

FEBRUARY 24, 2015

Analysis Date and Holding Time Report

Sample	Customer Sample Id	Method	Prep Method	Sample Date Time	Received Date	Preparation Date	Analysis Date	Missed Holding Time
S14M000074	B24V17	GPC-Gross Alpha/Beta	Acid Digest, SW-846 3050B	11/24/2014 13:40	01/14/2015 14:30	02/06/2015 08:45	02/17/2015 13:30	No
S14M000080	B24V18	GPC Gross Alpha/Beta	Acid Digest, SW-846 3050B	11/24/2014 13:40	01/14/2015 14:30	02/06/2015 08:45	02/17/2015 13:30	No
S14M000071	B24V17	AEA-Am-241	Fusion Digest, Separation	11/24/2014 13:40	01/14/2015 14:30	02/03/2015 13:34	02/10/2015 14:46	No
S14M000077	B24V18	AEA-Am-241	Fusion Digest, Separation	11/24/2014 13:40	01/14/2015 14:30	02/03/2015 13:34	02/10/2015 14:46	No
S14M000075	B24V17	CVAA-Mercury, SW-846 7471A	Acid Digest, SW-846 7471A	11/24/2014 13:40	01/14/2015 14:30	02/05/2015 09:00	02/06/2015 13:36	Yes
S14M000081	B24V18	CVAA-Mercury, SW-846 7471A	Acid Digest, SW-846 7471A	11/24/2014 13:40	01/14/2015 14:30	02/05/2015 09:00	02/06/2015 13:42	Yes
S14M000073	B24V17	IC-Anions, SW-846 9056A	Water Digest	11/24/2014 13:40	01/14/2015 14:30	02/03/2015 09:56	02/05/2015 14:43"	[gu"
S14M000079	B24V18	IC-Anions, SW-846 9056A	Water Digest	11/24/2014 13:40	01/14/2015 14:30	02/03/2015 10:28	02/05/2015 16:55"	[gu"
S14M000074	B24V17	ICP/AES-Metals, SW-846 6010C	Acid Digest, SW-846 3050B	11/24/2014 13:40	01/14/2015 14:30	02/06/2015 08:45	02/11/2015 12:39	No
S14M000080	B24V18	ICP/AES-Metals, SW-846 6010C	Acid Digest, SW-846 3050B	11/24/2014 13:40	01/14/2015 14:30	02/06/2015 08:45	02/11/2015 12:51	No
S14M000072	B24V17	ICP/AES-Metals, SW-846 6010C	Acid Digest, SW-846 3050B	11/24/2014 13:40	01/14/2015 14:30	01/29/2015 09:30	02/11/2015 11:33	No
S14M000078	B24V18	ICP/AES-Metals, SW-846 6010C	Acid Digest, SW-846 3050B	11/24/2014 13:40	01/14/2015 14:30	01/29/2015 09:30	02/11/2015 11:44	No
S14M000074	B24V17	ICP/MS-Actinides	Acid Digest, SW-846 3050B	11/24/2014 13:40	01/14/2015 14:30	02/06/2015 08:45	02/17/2015 15:05	No
S14M000074	B24V17	ICP/MS-Actinides	Acid Digest, SW-846 3050B	11/24/2014 13:40	01/14/2015 14:30	02/06/2015 08:45	02/17/2015 10:43	No
S14M000074	B24V17	ICP/MS-Actinides	Acid Digest, SW-846 3050B	11/24/2014 13:40	01/14/2015 14:30	02/06/2015 08:45	02/17/2015 12:30	No
S14M000080	B24V18	ICP/MS-Actinides	Acid Digest, SW-846 3050B	11/24/2014 13:40	01/14/2015 14:30	02/06/2015 08:45	02/17/2015 15:13	No
S14M000080	B24V18	ICP/MS-Actinides	Acid Digest, SW-846 3050B	11/24/2014 13:40	01/14/2015 14:30	02/06/2015 08:45	02/17/2015 10:50	No
S14M000080	B24V18	ICP/MS-Actinides	Acid Digest, SW-846 3050B	11/24/2014 13:40	01/14/2015 14:30	02/06/2015 08:45	02/17/2015 12:48	No
S14M000074	B24V17	ICP/MS-Metals, SW846-6020A	Acid Digest, SW-846 3050B	11/24/2014 13:40	01/14/2015 14:30	02/06/2015 08:45	02/18/2015 15:04	No
S14M000080	B24V18	ICP/MS-Metals, SW846-6020A	Acid Digest, SW-846 3050B	11/24/2014 13:40	01/14/2015 14:30	02/06/2015 08:45	02/18/2015 15:12	No
S14M000071	B24V17	AEA-Isotopic Plutonium	Fusion Digest, Separation	11/24/2014 13:40	01/14/2015 14:30	02/03/2015 13:34	02/18/2015 10:48	No
S14M000077	B24V18	AEA-Isotopic Plutonium	Fusion Digest, Separation	11/24/2014 13:40	01/14/2015 14:30	02/03/2015 13:34	02/18/2015 10:48	No
S14M000071	B24V17	GPC-Sr-89/90	Fusion Digest, Separation	11/24/2014 13:40	01/14/2015 14:30	02/03/2015 13:34	02/05/2015 13:40	No
S14M000077	B24V18	GPC-Sr-89/90	Fusion Digest, Separation	11/24/2014 13:40	01/14/2015 14:30	02/03/2015 13:34	02/05/2015 13:40	No

FEBRUARY 24, 2015

Attachment 3

CORRESPONDENCE

FEBRUARY 24, 2015

Ritenour, Gerald P

From: Ritenour, Gerald P
Sent: Tuesday, February 24, 2015 8:55 AM
To: Widney, Richard J (Jeff)
Subject: RADU Tank Uranium

Jeff,
The results for the ICPMS isotopic uranium indicates a high level of enrichment. I see nothing wrong with the data. The enrichment levels of the various standard are normal. I plan on reporting this data unless you feel differently.

Thanks, JR

Customer

Sample ID	SAMPLE_R	Method	A	ANALYTE	Unit	RESULT	DUPLICATE	RPD	SPK_REC	Det Limit
B24V17	S14M000074	ICP/MS	A	Uranium-235	ug/g	0.221	0.207	6.17	185	1.12E-03
B24V17	S14M000074	ICP/MS	A	Uranium-238	ug/g	0.984	0.894	9.67	104	8.64E-03
B24V18	S14M000080	ICP/MS	A	Uranium-235	ug/g	0.181	n/a	n/a	n/a	1.09E-03
B24V18	S14M000080	ICP/MS	A	Uranium-238	ug/g	0.623	n/a	n/a	n/a	8.41E-03

Gerald Ritenour
ATL Analytical Operations
Advanced Technologies and Laboratories International, Inc.
Contractor to the Office of River Protection
U.S. Department of Energy
(509) 372-2742 office
(509) 438-8837 cell
gerald_p_ritenour@rl.gov

FEBRUARY 24, 2015

Ritenour, Gerald P

From: Widney, Richard J (Jeff)
Sent: Monday, February 09, 2015 7:36 AM
To: Ritenour, Gerald P
Cc: Widney, Richard J (Jeff)
Subject: RE: PFP South Canyon

I am good. Please proceed.

Jeff Widney
Waste Operations and NDA Director
PFP Closure Project
Office (509) 372-3090
Cell (509) 551-2364

From: Ritenour, Gerald P
Sent: Friday, February 06, 2015 2:46 PM
To: Widney, Richard J (Jeff)
Subject: PFP South Canyon

Jeff,
We missed the IC anions holding time by 6 hours on a water digest, due to a ventilation upset. Are you willing to accept this data as is or do we need to perform another digest/reanalysis? The exceedance in the HT by six hours will not affect the data quality from a technical basis.
Thanks, JR

Gerald Ritenour
ATL Analytical Operations
Advanced Technologies and Laboratories International, Inc.
Contractor to the Office of River Protection
U.S. Department of Energy
(509) 372-2742 office
(509) 438-8837 cell
gerald_p_ritenour@rl.gov

FEBRUARY 24, 2015

Attachment 4

RECEIPT PAPERWORK

FEBRUARY 24, 2015

222-S	SAMPLE RECEIPT AND CHAIN OF CUSTODY VERIFICATION CHECKLIST	ATS-LO-090-101 Rev <u>D G. 0</u>
--------------	---	----------------------------------

Date Samples Received: 1-14-15 Total Number of Samples: 7 Group #: 20142504
 Sample Custodian: RT Steele IH Technician: _____

Sample Custodian to Complete:

Action	Yes	No	N/A	Comments
RSR provided?	✓			
Verify GKI is complete			✓	<input checked="" type="checkbox"/> In Project File
Received from an alpha facility?	✓			<input type="checkbox"/> Contact PC for approval to release
Check that outer custody seal is intact, if present			✓	
Record cooler temperature in centigrade, as appropriate	34			<input checked="" type="checkbox"/> Check if <u>no cooler</u> and/or no ice (<u>Blue Ice</u>)
Samples are intact and in good condition	✓			If No, provide comments below
RSA/COC provided and complete containing the following information?				
• Client name and client sample number	✓			
• Date and time of sampling	✓			
• Sampling location or origin	✓			
• Container type, size, and number	✓			
• Preservatives (if used) noted on the COC/RSA and sample bottles			✓	
• Analysis request is clear	✓			
• Signature of persons relinquishing and receiving samples	✓			
• Date and/or time of sample custody exchange	✓			
Verify that sample numbers on containers match the COC and/or RSA	✓			
Samples stored <u>properly</u> (e.g., refrigeration)	✓			

Notify the PC immediately if any problems are noted. Any "No" checked boxes require PC resolution. For WRPS samples, the initials block below is completed by the responsible WRPS PC.

Samples acceptable for release? NO * PC/SC Initials PKJ Date 1-14-15
 If No, comment on communication and resolution:

* wait for P.C. Instructions

Number of IH Samples Received:

Aldehyde Screen: _____	Amines: _____	Ammonia: <u>NA</u>	Aromatic HC: _____	Asbestos: _____
Beryllium: _____	Be-Bulk: _____	Be-Filter: _____	Be-Wipe: _____	1,3-Butadiene: _____
Formaldehyde: _____	Furans: _____	Mercury: _____	Methanol: _____	Nitrosamines: _____
Nitrous Oxide: _____	Pyridines: _____	SVOA: _____	VOA: _____	Other-IH: _____

FEBRUARY 24, 2015

COLLECTOR
K. Patterson

SAMPLING LOCATION
236-Z South Canyon Airlock RADTU Tank solid

ICE CHEST NO.

SHIPPED TO
222-S Lab Operations

COMPANY CONTACT
TODAK, D

TELEPHONE NO.
376-6427

PROJECT DESIGNATION
PFP South Canyon Airlock Tank Sampling - Other Solid

FIELD LOGBOOK NO.
HNF N 507-31

ACTUAL SAMPLE DEPTH
N/A

OFFSITE PROPERTY NO.

PROJECT COORDINATOR
TODAK, D

SAF NO.
F13-048

COA
303088

BILL OF LADING/AIR BILL NO.

PRICE CODE 9N

AIR QUALITY

METHOD OF SHIPMENT
GOVERNMENT VEHICLE

DATA TURNAROUND
45 Days / 45 Days

ORIGINAL

MATRIX*
A=Air
DL=Drum Liquids
DS=Drum Solids
L=Liquid
O=Oil
S=Soil
SE=Sediment
T=Tissue
V=Vegetation
W=Water
WI=Wipe
X=Other

POSSIBLE SAMPLE HAZARDS/ REMARKS
*Contains Radioactive Material at concentrations that are not be regulated for transportation per 49 CFR/IATA Dangerous Goods Regulations but are not releasable per DOE Order 458.1.

SPECIAL HANDLING AND/OR STORAGE

PRESERVATION Cool <=6C

HOLDING TIME 28 Days

TYPE OF CONTAINER G/P

NO. OF CONTAINER(S) 1

VOLUME 30g

SAMPLE ANALYSIS SEE ITEM (1) IN SPECIAL INSTRUCTIONS

Grp: 20142504
Sample: S14m000070

SAMPLE NO.	MATRIX*
B2YV17	OTHER SOLID

SAMPLE DATE	SAMPLE TIME
11/24/14	1340

TRVL-14-196

CHAIN OF POSSESSION

SIGN/ PRINT NAMES

SPECIAL INSTRUCTIONS

RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
K. Patterson	11/24/14 1435	Don Sorenson	11-24-14 1435
Don Sorenson	11-24-14 1430	1924	
Don Sorenson	1-14-15 1330	Tom Watson	1/14/15 1330
Tom Watson	1/14/15 1344	Doug Kelly	1-14-15 1344
Doug Kelly	1-14-15 1430	Altkuk Altkuk	1-14-15 1430

** 222-S will attempt to report preliminary data within in 30 days of sample receipt.
** GKI will be provided to 222S prior to sample submittal.
** NDA results will be sent to the laboratory prior to sample shipment.
TRVL-14-196
(1) 6020_METALS_ICPMS: COMMON; 6020_METALS_ICPMS: COMMON (Add-on); 6010_METALS_ICP: COMMON; 6010_METALS_ICP: COMMON (Add-on); 7471_MERCURY_CV: COMMON (SOLIDS); Actinides ICPMS: COMMON; 9056_ANIONS_IC: COMMON; 9056_ANIONS_IC: COMMON (Add-on) {Oxalate}; 9045_pH (Non-Aqueous): COMMON; ALPHA_GPC: COMMON; BETA_GPC: COMMON; AMCMISO_EIE_PRECIP_AEA: COMMON; PUIISO_IE_PRECIP_AEA: COMMON {Plutonium-238, Plutonium-239/240};

LABORATORY SECTION	RECEIVED BY	TITLE	DATE/TIME
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD	DISPOSED BY	DATE/TIME

FEBRUARY 24 2015

COLLECTOR <i>K Patterson</i>	COMPANY CONTACT TODAK, D	TELEPHONE NO. 376-6427	PROJECT COORDINATOR TODAK, D	PRICE CODE 9N	DATA TURNAROUND 45 Days / 45 Days
SAMPLING LOCATION 236-Z South Canyon Airlock RADTU Tank solid DUP	PROJECT DESIGNATION PFP South Canyon Airlock Tank Sampling - Other Solid		SAF NO. F13-048	AIR QUALITY <input type="checkbox"/>	
ICE CHEST NO.	FIELD LOGBOOK NO. <i>HNF-N 507-31</i>	ACTUAL SAMPLE DEPTH <i>N/A</i>	COA 303088	METHOD OF SHIPMENT GOVERNMENT VEHICLE	ORIGINAL
SHIPPED TO 222-S Lab Operations	OFFSITE PROPERTY NO.		BILL OF LADING/AIR BILL NO.		

MATRIX* A=Air DL=Drum Liquids DS=Drum Solids L=Liquid O=Oil S=Soil SE=Sediment T=Tissue V=Vegetation W=Water WI=Wipe X=Other	POSSIBLE SAMPLE HAZARDS/ REMARKS *Contains Radioactive Material at concentrations that are not be regulated for transportation per 49 CFR/IATA Dangerous Goods Regulations but are not releasable per DOE Order 458.1.	PRESERVATION Cool <=6C
		HOLDING TIME 28 Days
		TYPE OF CONTAINER G/P
		NO. OF CONTAINER(S) 1
		VOLUME 30g
		SAMPLE ANALYSIS SEE ITEM (1) IN SPECIAL INSTRUCTIONS
SPECIAL HANDLING AND/OR STORAGE		

Grp: 20142504
Sample: 314M000074

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME
B2YV18	OTHER SOLID	11/24/14	1340

TRVL-14-196

CHAIN OF POSSESSION	SIGN/ PRINT NAMES	SPECIAL INSTRUCTIONS
RELINQUISHED BY/REMOVED FROM <i>K Patterson</i>	RECEIVED BY/STORED IN <i>Don Sorrison</i>	** 222-S will attempt to report preliminary data within in 30 days of sample receipt. ** GKI will be provided to 222S prior to sample submittal. ** NDA results will be sent to the laboratory prior to sample shipment. TRVL-14-196 (1) 6020_METALS_ICPMS: COMMON; 6020_METALS_ICPMS: COMMON (Add-on); 6010_METALS_ICP: COMMON; 6010_METALS_ICP: COMMON (Add-on); 7471_MERCURY_CV: COMMON (SOLIDS); Actinides ICPMS: COMMON; 9056_ANIONS_IC: COMMON; 9056_ANIONS_IC: COMMON (Add-on) {Oxalate}; 9045_pH (Non-Aqueous): COMMON; ALPHA_GPC: COMMON; BETA_GPC: COMMON; AMCMISO_EIE_PRECIP_AEA: COMMON; PUIISO_IE_PRECIP_AEA: COMMON {Plutonium-238, Plutonium-239/240};
RELINQUISHED BY/REMOVED FROM <i>Don Sorrison</i>	RECEIVED BY/STORED IN <i>IP2A</i>	
RELINQUISHED BY/REMOVED FROM <i>Don Sorrison</i>	RECEIVED BY/STORED IN <i>Temp water by water</i>	
RELINQUISHED BY/REMOVED FROM <i>Temp water by water</i>	RECEIVED BY/STORED IN <i>Don Kelly</i>	
RELINQUISHED BY/REMOVED FROM <i>Don Kelly</i>	RECEIVED BY/STORED IN <i>RTHub</i>	
RELINQUISHED BY/REMOVED FROM	RECEIVED BY/STORED IN	

LABORATORY SECTION	RECEIVED BY	TITLE	DATE/TIME
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD	DISPOSED BY	DATE/TIME