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**FINAL ANALYTICAL REPORT FOR SUMP PIT HA-23S  
SLUDGE SAMPLE**

**SAMPLE DELIVERY GROUP 222S20121031**

**Document No.: 20121031 Rev. 0**

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## 222-S LABORATORY

### FINAL ANALYTICAL REPORT FOR SUMP PIT HA-23S SLUDGE SAMPLE

#### 1.0 INTRODUCTION

This final report presents the results for the sludge sample taken from sump pit HA-23S in Room 235B of Building 234-5Z on July 2, 2012. The sample was analyzed in accordance with F12-031, Sampling Authorization Form, *HA-23S Sump Pit Sludge* (SAF); ATL-MP-1011, *ATL Quality Assurance Project Plan for 222-S Laboratory* (QAPP); PFP-LOI-12-0002, *Letter Of Instruction For Analysis Of HA-23S Sump Pit Sludge* (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 Time Report
- Attachment 3 Sample Breakdown Diagram
- Attachment 4 Receipt Paperwork

#### 2.0 SAMPLE RECEIPT AND APPEARANCE

One sample was received by the 222-S Laboratory on July 12, 2012, in a full 60-mL glass bottle. The sample was not stored under refrigeration when receipted and the receipt temperature was not measured. The sample was stored under refrigeration after receipt by the laboratory.

#### 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 the 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 that were prepared by SW-846 3050B.

“E” indicates samples that were prepared by strong nitric acid digest.

Samples without a letter identifier in the “A#” column were analyzed directly with no separate preparation or with sample preparation performed as a part of the procedure steps.

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.

“C” for inorganic result is used to indicate the blank result was greater than 20% of the sample result.

“D” for organic results to indicate that the analysis was performed on a dilution.

“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 an acid-digested aliquot. All quality control (QC) requirements in the LOI and QAPP were met. The required detection limit (RDL) and SW-846 holding time were met.

#### **3.1.2 Inductively Coupled Plasma/Atomic Emission Spectroscopy**

The ICP/AES metals analysis was performed on SW-846 3050B acid digest and a separate acid digest after the sample was prepared in a muffle furnace. Due to QC issues, only calcium and vanadium were reported from the later digest. The sample results from the two digest were similar for calcium and vanadium, but the interference check standard recoveries for SW-846 digest failed the 80% to 120% requirement. Calcium was detected in the blank from the muffle furnace digest but was less than 20% of the sample result, and therefore did not affect the usability of the data. Silver, arsenic, cadmium, antimony, selenium, and thallium were report from the ICP/MS analysis of the SW-846 digestion.

For the SW-846 digestion batch, all LCS and MS recoveries met the requirement in the QAPP. The RPD for sodium exceeded the 30% requirement in the LOI, however, since the result for sodium was below the quantitation limit this criterion does not apply. The preparation blank contained aluminum and chromium at levels below the 20% requirement in the FEAD document and therefore, no flag was applied.

### 3.1.3 Inductively Coupled Plasma/Mass Spectroscopy

The ICP/MS metal analysis was performed on SW-846 acid-digest aliquot. The LCS and RPD all met the requirements in the SAP and the QAPP. The standard used for the MS did not contain thallium. All other MS recoveries met the requirement. The preparation blank contained thallium at the same level as the sample. The sample result has been flagged with a "C". Since the sample and blank results for thallium were below the quantitation limit, reanalysis was not required.

Direct calibration, where a standard containing the isotope and element of interest is used to calibrate the response of the isotope, is the most accurate type of calibration; however, standard reference material is not available for all of the isotopes of interest. Concentrations of those isotopes without available standards are estimated by using isotopic substitution. Results estimated in this manner are designated "semi-quantitative." The 222-S Laboratory currently does not have standards available for calibration, calibration checks, or matrix spikes for  $^{234}\text{U}$ . The results for this isotope is considered semi-quantitative.

The ICP/MS isotopic uranium analysis was performed on both digests discussed above. Only the result from the muffle furnace digest has been reported. There were not notable QC issue with this batch and all requirements in the LOI and QAPP were meet. The LSC and MS were prepared post digest.

## 3.2 RADIOCHEMISTRY ANALYSES

### 3.2.1 Total Alpha/Total Beta

The total alpha/total beta analysis was performed on an acid-digested aliquot. The spikes were prepared after the digestion. The LCS recoveries, MS recoveries, and RPDs met the criteria in the LOI and QAPP. No alpha activity was detected in the method blank. A low level of beta activity was detected in this blank. Since the activity was less than 5% of the sample result reanalysis was not required and the result was reported without a qualifier. The reported minimum detectable activities (MDA) for gross alpha and beta met the required detection limits.

### 3.2.2 Gamma Energy Analysis

The GEA was performed on an acid-digested aliquot. The only requested isotope for GEA was  $^{137}\text{Cs}$ . All QC requirements in the LOI and QAPP were met. Due to the matrix, the MDA slightly exceeded the RDL, and  $^{137}\text{Cs}$  was not detected in the sample.

### 3.2.3 Strontium-90

The  $^{90}\text{Sr}$  was performed on an acid-digested aliquot. All QC requirements in the LOI and QAPP were met. The LCS spike and carrier were prepared after the digestion. Due to the matrix, the MDA exceeded the RDL and  $^{90}\text{Sr}$  was not detected in the sample.

### 3.2.4 Americium-241

The  $^{241}\text{Am}$  analysis was performed on an acid-digested aliquot. The LCS spike and tracers were added after the digestion. The LCS recoveries, tracer recoveries, and RPDs met the criteria in the

LOI and QAPP. Am-241 activity was detected in the preparation blank. Since the activity was less than 1% of the sample result reanalysis was not required and the result was reported. The RDL requirement was met.

### 3.2.5 Plutonium-238 and Plutonium-239/240

The <sup>238</sup>Pu and <sup>239/240</sup>Pu analysis was performed on an acid-digested aliquot. The LCS spike and tracers were added after the digestion. The LCS recoveries, tracer recoveries, and RPDs met the criteria in the LOI and QAPP. Pu-239/240 activity was detected in the preparation blank at slightly above the MDA. Since the activity was less than 1% of the sample result reanalysis was not required and the result was reported. The reported <sup>242</sup>Pu activity is mostly likely carrier over from the <sup>239/240</sup>Pu peak. The RDL requirement was met.

### 3.2.6 Plutonium-241

The <sup>241</sup>Pu analysis was performed on an acid-digested aliquot. The LCS spike and tracers were added after the digestion. The LCS recoveries, tracer recoveries, and RPDs met the criteria in the LOI and QAPP. Pu-241 activity was detected in the preparation blank at slightly above the MDA. Since blank result was less than the quantification level, reanalysis was not required. There was no RDL for <sup>241</sup>Pu.

## 3.3 POLYCHLORINATED BIPHENYLS

Polychlorinated biphenyls were analyzed on a dilution of a direct aliquot of sample. The LCS, sample duplicate RPD, and blank met the QC requirements in the LOI and QAPP. The MS and MS duplicate were diluted to a level below the quantitation limit and a recovery could not be reported. The sample surrogate recoveries for DCP and TCX at 151% and 170% were well above the administrative limits of 70% to 130%. The laboratory does not have statistically derived recovery limits for a dilution preparation. It is the laboratory's opinion that the sample result for Aroclor 1248 could be biased slightly high.

## 4.0 PROCEDURES

Table 1 lists the procedures used in preparation and analysis of the samples contained in this report.

**Table 1. Analytical Procedures**

Analysis	Preparation Method	Analysis Procedure
<b>Inorganic Analyses</b>		
Mercury	LA-325-110, Rev. B-0 (SW-846 7471B)	LA-325-110, Rev. B-0 (SW-846 7471B)
ICP/AES	LA-505-163, Rev. H-0 (SW-846 3050B) LA-544-101, Rev. H-0	LA-505-174, Rev. A-0 (SW-846 6010C)
ICP/MS: Actinides and Metals	LA-505-163, Rev. H-0 (SW-846 3050B)	LA-506-102, Rev. G-0 LA-506-103, Rev. B-0 (SW-846 6020A)
<b>Radiochemical Analyses</b>		

**Table 1. Analytical Procedures**

Analysis	Preparation Method	Analysis Procedure
GEA	LA-544-101, Rev. H-0 LA-548-121, Rev. J-0	LA-508-167, Rev. A-0
<sup>90</sup> Sr – Separation/Beta counting	LA-220-101, Rev. J-0 LA-544-101, Rev. H-0	LA-508-124, Rev. C-0
<sup>241</sup> Am – Separation/AEA	LA-544-101, Rev. H-0 LA-953-104, Rev. J-0-A	LA-508-168, Rev. A-0
<sup>239/240</sup> Pu, <sup>238</sup> Pu – Separation/AEA	LA-953-104, Rev. J-0-A LA-544-101, Rev. H-0	LA-508-168, Rev. A-0
<sup>241</sup> Pu – Separation/LSC	LA-953-104, Rev. J-0-A LA-544-101, Rev. H-0	LA-508-121, Rev. G-0
Total Alpha/Total Beta	LA-544-101, Rev. H-0 LA-508-101, Rev. O-0	LA-508-124, Rev. C-0
Organic Analyses		
PCB	LA-523-149, Rev. C-0 SW-846 3580A	LA-523-140, Rev. H-0 (SW-846 8280A)

## 5.0 REFERENCES

- ATL-MP-1011, 2011, *ATL Quality Assurance Project Plan for 222-S Laboratory*, Rev. 11-A, Advanced Technologies and Laboratories International, Inc., Richland, Washington.
- 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.
- F12-031, July 12, 2012, Sampling Authorization Form, *Ha-23S Sump Pit Sludge*.Rev.1, CH2MHill Plateau Remediation Company, Richland, Washington.
- PPF-LOI-12-0002, June 20, 2012, *Letter Of Instruction of HA-23S Sump Pit Sludge (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.

Attachment 1

DATA SUMMARY REPORT

**Data Summary Report**

**Sample Group: 20121031**

**Customer Group or SDG Number: 222S20121031**

**Customer Sample ID: B2LWF8**

**Sample Portion: Grab Sample Total**

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
S12M000187			7439-97-6	Mercury	ug/g	104	<1.10E-05	0.297	0.291	0.294	1.81	108	1.48E-03	n/a	
S12M000188	E		7440-70-2	Calcium	ug/g	93.7	0.0856	1.97E+03	2.01E+03	1.99E+03	1.66	101	78.5	n/a	
S12M000188	E		7440-62-2	Vanadium	ug/g	91.4	<1.00E-03	<0.981	<0.963	n/a	n/a	95.4	0.981	n/a	U
S12M000188	E		13968-55-3	Uranium-233	ug/g	104	<3.92	<3.92	<3.85	n/a	n/a	99.7	3.92	n/a	U
S12M000188	E		13966-29-5	Uranium-234	ug/g	n/a	<0.0981	<0.0981	<0.0963	n/a	n/a	n/a	0.0981	n/a	U
S12M000188	E		15117-96-1	Uranium-235	ug/g	102	<0.196	0.786	0.561	0.674	33.4	123	0.196	n/a	N
S12M000188	E		13982-70-2	Uranium-236	ug/g	n/a	<0.0785	<0.0785	<0.0771	n/a	n/a	n/a	0.0785	n/a	U
S12M000188	E		U-238	Uranium-238	ug/g	99.8	<9.81	<9.81	<9.63	n/a	n/a	102	9.81	n/a	U
S12M000189	E		12587-46-1	Gross alpha	uCi/g	102	<5.61E-03	17.4	17.0	17.2	1.77	97.2	5.61E-03	1.501	
S12M000189	E		12587-47-2	Gross beta	uCi/g	113	0.0399	2.23	2.39	2.31	6.85	125	0.0168	3.441	
S12M000189	E		14596-10-2	Americium-241	uCi/g	101	0.0232	6.57	6.63	6.60	0.909	n/a	6.50E-03	0.95	
S12M000189	E		10045-97-3	Cesium-137	uCi/g	100	<5.11E-03	<2.80E-03	<5.25E-03	n/a	n/a	n/a	2.80E-03	n/a	U
S12M000189	E		PU-239/240	Plutonium-239/240	uCi/g	103	0.0160	10.6	11.0	10.8	3.70	n/a	9.97E-03	0.78	
S12M000189	E		13981-16-3	Plutonium-238	uCi/g	n/a	<0.0103	0.969	1.06	1.01	8.97	n/a	5.98E-03	2.73	
S12M000189	E		13982-10-0	Plutonium-242	uCi/g	n/a	<5.03E-03	0.0520	0.0249	0.0384	70.5	n/a	4.64E-03	11.31	
S12M000189	E		14119-32-5	Plutonium-241	uCi/g	96.3	1.49	26.3	26.7	26.5	1.51	n/a	0.798	1.62	
S12M000189	E		SR-89/90	Strontium-89/90	uCi/g	100	<1.06E-03	<1.02E-03	4.52E-04	n/a	n/a	n/a	1.02E-03	n/a	
S12M000190			12674-11-2	Aroclor 1016	ug/kg	n/a	<5.42E+03	<4.88E+06	<3.71E+06	n/a	n/a	n/a	4.88E+06	n/a	DU
S12M000190			11104-28-2	Aroclor 1221	ug/kg	n/a	<896	<8.07E+05	<6.14E+05	n/a	n/a	n/a	8.07E+05	n/a	DU
S12M000190			11141-16-5	Aroclor 1232	ug/kg	n/a	<1.52E+03	<1.37E+06	<1.04E+06	n/a	n/a	n/a	1.37E+06	n/a	DU
S12M000190			53469-21-9	Aroclor 1242	ug/kg	n/a	<3.62E+03	<3.26E+06	<2.48E+06	n/a	n/a	n/a	3.26E+06	n/a	DU
S12M000190			12672-29-6	Aroclor 1248	ug/kg	n/a	<2.05E+03	2.75E+07	2.98E+07	2.86E+07	7.96	n/a	1.85E+06	n/a	D
S12M000190			11097-69-1	Aroclor 1254	ug/kg	92.2	<1.31E+03	<1.18E+06	<8.99E+05	n/a	n/a	n/a	1.18E+06	n/a	DU
S12M000190			11096-82-5	Aroclor 1260	ug/kg	n/a	<2.12E+03	<1.91E+06	<1.45E+06	n/a	n/a	n/a	1.91E+06	n/a	DU
S12M000249	A		7429-90-5	Aluminum	ug/g	88.0	0.0217	48.8	48.8	48.8	0.0374	94.5	2.39	n/a	
S12M000249	A		7440-39-3	Barium	ug/g	96.3	<2.00E-03	0.859	n/a	n/a	n/a	102	0.398	n/a	
S12M000249	A		7440-41-7	Beryllium	ug/g	95.0	<2.00E-03	<0.398	<0.388	n/a	n/a	103	0.398	n/a	U
S12M000249	A		7440-48-4	Cobalt	ug/g	97.1	<2.00E-03	<0.398	<0.388	n/a	n/a	103	0.398	n/a	U
S12M000249	A		7440-47-3	Chromium	ug/g	96.4	2.09E-03	6.65	6.82	6.73	2.52	103	0.398	n/a	

NA = Not Analyzed, ND = Not Detected

D - Dilution

U - < Det Limit

C - Inorganic Blank Contamination

B - Inorganic Estimated

N - Spike Outside Range

**Data Summary Report**

**Sample Group: 20121031**

**Customer Group or SDG Number: 222S20121031**

**Customer Sample ID: B2LWF8**

**Sample Portion: Grab Sample Total**

Sample#	R	A#	CAS #	Analyte	Unit	STD %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Cnt Err %	Qual Flags
S12M000249		A	7440-50-8	Copper	ug/g	98.0	<4.00E-03	7.62	7.89	7.76	3.49	107	0.796	n/a	
S12M000249		A	7440-09-7	Potassium	ug/g	88.5	<0.0400	11.0	10.8	10.9	1.53	96.6	7.96	n/a	
S12M000249		A	7439-95-4	Magnesium	ug/g	87.6	<4.00E-03	91.0	94.1	92.6	3.37	94.8	0.796	n/a	
S12M000249		A	7440-23-5	Sodium	ug/g	95.9	<0.0800	34.9	19.0	27.0	59.0	106	15.9	n/a	
S12M000249		A	7440-02-0	Nickel	ug/g	94.4	<2.00E-03	10.6	10.8	10.7	1.82	100	0.398	n/a	
S12M000249		A	7439-92-1	Lead	ug/g	92.9	<0.0120	9.15	9.41	9.28	2.85	99.6	2.39	n/a	
S12M000249		A	7440-24-6	Strontium	ug/g	94.8	<4.00E-03	2.21	2.13	2.17	3.88	99.4	0.796	n/a	
S12M000249		A	7440-66-6	Zinc	ug/g	90.9	<8.00E-03	64.5	66.2	65.4	2.68	98.5	1.59	n/a	
S12M000249		A	7440-22-4	Silver	ug/g	89.0	<8.00E-03	<1.59	<1.55	n/a	n/a	96.5	1.59	n/a	U
S12M000249		A	7440-38-2	Arsenic	ug/g	84.7	<0.0420	<8.35	<8.16	n/a	n/a	99.2	8.35	n/a	U
S12M000249		A	7440-43-9	Cadmium	ug/g	90.3	<3.00E-03	<0.597	<0.583	n/a	n/a	100	0.597	n/a	U
S12M000249		A	7440-36-0	Antimony	ug/g	89.3	<6.00E-03	1.86	1.59	1.73	15.5	93.4	1.19	n/a	B
S12M000249		A	7782-49-2	Selenium	ug/g	87.5	<0.0610	<12.1	<11.8	n/a	n/a	96.5	12.1	n/a	U
S12M000249		A	7440-28-0	Thallium	ug/g	102	0.0208	5.48	5.34	5.41	2.54	n/a	0.796	n/a	CB

NA = Not Analyzed, ND = Not Detected

D - Dilution  
 N - Spike Outside Range

U - < Det Limit

C - Inorganic Blank Contamination

B - Inorganic Estimated

Attachment 2

ANALYSIS DATE AND TIME REPORT

## ANALYSIS DATE AND TIME REPORT

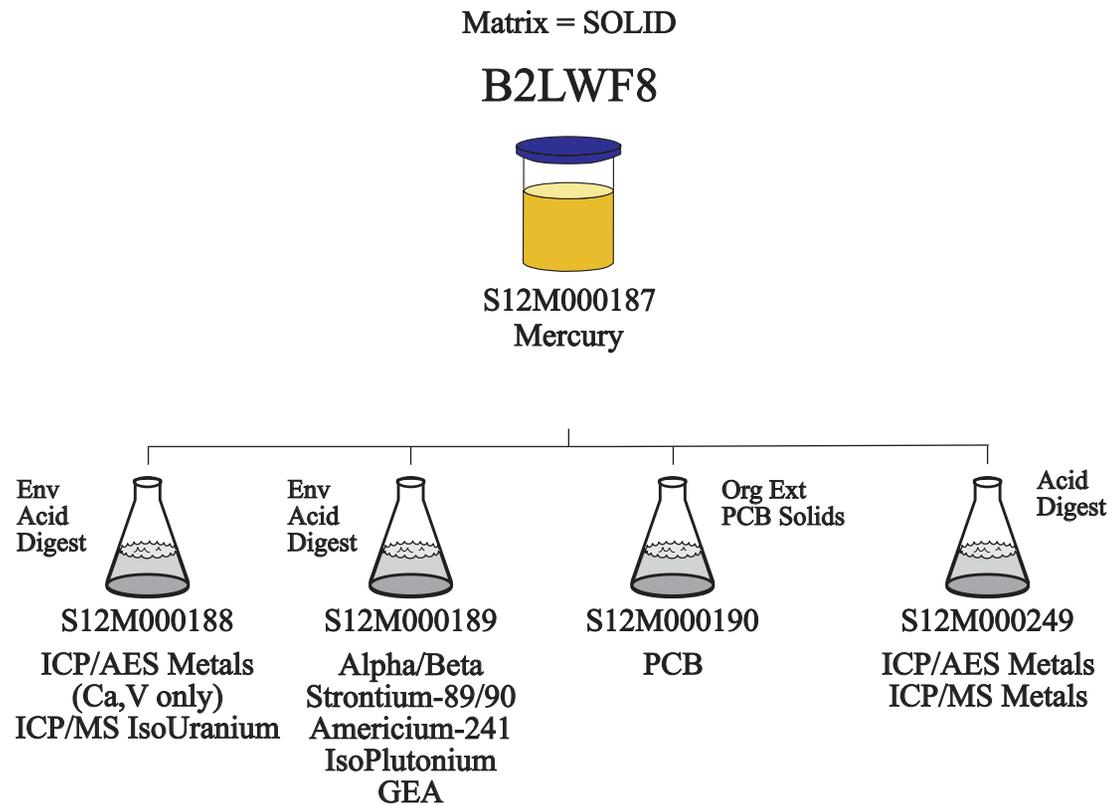
Sample	Customer Sample Id	Method	Prep Method	Sample Date Time	Received Date	Preparation Date	Analysis Date
S12M000187	B2LWF8	SW-846 7471B	SW-846 7174B	07/02/2012 10:05	07/12/2012 14:03	07/27/2012 13:05	07/27/2012 10:30
S12M000188	B2LWF8	SW-846 6010C (Ca, V only)	Acid Digest	07/02/2012 10:05	07/12/2012 14:03	07/24/2012 15:37	08/02/2012 13:47
S12M000189	B2LWF8	Gross Alpha Beta	Acid Digest	07/02/2012 10:05	07/12/2012 14:03	07/24/2012 09:14	07/24/2012 15:28
S12M000189	B2LWF8	241 Americium	Acid Digest	07/02/2012 10:05	07/12/2012 14:03	07/24/2012 09:14	07/30/2012 09:37
S12M000189	B2LWF8	GEA	Acid Digest	07/02/2012 10:05	07/12/2012 14:03	07/24/2012 09:14	07/24/2012 19:22
S12M000189	B2LWF8	Plutonium-238,239/240	Acid Digest	07/02/2012 10:05	07/12/2012 14:03	07/24/2012 09:14	07/26/2012 10:56
S12M000189	B2LWF8	Plutonium-241	Acid Digest	07/02/2012 10:05	07/12/2012 14:03	07/24/2012 09:14	07/27/2012 09:50
S12M000189	B2LWF8	Strontium-90	Acid Digest	07/02/2012 10:05	07/12/2012 14:03	07/24/2012 09:14	07/25/2012 11:25
S12M000190	B2LWF8	SW-846 8082A (PCB)	SW-846 3580A	07/02/2012 10:05	07/12/2012 14:03	07/26/2012 09:45	07/30/2012 18:55
S12M000249	B2LWF8	SW-846 6010C (metals)	SW-846-3050B	07/02/2012 10:05	07/12/2012 14:03	08/15/2012 13:39	08/20/2012 10:39
S12M000249	B2LWF8	ICP/MS Isotopic Uranium	SW-846-3050B	07/02/2012 10:05	07/12/2012 14:03	08/15/2012 13:39	08/16/2012 12:32
S12M000249	B2LWF8	SW-846 6020A (metals)	SW-846-3050B	07/02/2012 10:05	07/12/2012 14:03	08/15/2012 13:39	08/16/2012 12:14

Attachment 3

SAMPLE BREAKDOWN DIAGRAM

Project: PFP HA-23S Sump  
Group No.: 20121031

Customer SDG = 222S20121031



Attachment 4

RECEIPT PAPERWORK

<b>ATL</b>	<b>SAMPLE RECEIPT AND CHAIN OF CUSTODY VERIFICATION CHECKLIST</b>	LO-090-101 Rev <u>F.F.o</u>
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Date Samples Received: 7.12.12 Group #: 20121031  
 Number of Samples: 1  
 Sample Custodian: rt stule

**Sample Custodian to Complete:**

Action	Yes	No	N/A	Comments
RSA/COC provided?	✓			
RSR provided?	✓			
Verify GKI is complete		✓		<input checked="" type="checkbox"/> In Project File
Received from an alpha facility?	✓			<input type="checkbox"/> Contact PM for approval to release
Check that outer custody seal is intact, if present	✓			
Record cooler temperature in centigrade, as appropriate			✓	<input type="checkbox"/> Check if no cooler and/or no ice
Samples are intact and in good condition	✓			If No, provide comments below
Verify that COC or RSA is accurate 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) are noted on the COC/RSA and sample bottle			✓	
• 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 <u>COC</u> and/or RSA	✓			
Samples stored properly (e.g., refrigeration)	✓			<u>2 A Fridge awaiting BRkdn.</u>

Notify the PM immediately if any problems are noted.

Samples acceptable for release? yes Initials RKI Date 7.12.12

If No, comment on communication and resolution:

Other Comments:

**ATTACHMENT B: Chain of Custody/Sample Analysis Request (May be separated from main document)**

CHPRC		C.O.C. Number 12-003				Page 1 of 1				
Collector Larry Monroe			Contact/Requestor Jeff Widney			Telephone 372-3090		MSIN T5-49	FAX 372-3676	
SAF Number F12-031			Sample Origin 234-52 HA 235-Sump			Purchase Order/Change Code N/A				
Project Title PFP Closure			Logbook No 12-003			Ice Chest No N/A		Temp. N/A		
Shipped To (Lab) 2225 Lab			Method of Shipment TRUCK			Bill of Lading/Air Bill No. N/A				
Protocol N/A			Data Turnaround ASAP			Offsite Property No. N/A				
Sample No.	Lab ID	*	Date	Time	No./Type Container	Sample Analysis				Preservative
B2LWF8 +2003	MKP 7-12-12	-	7-2-12	1005	60 ml glass	SEE SAF # F12-031				N/A
LAB ID	S12000187									
GROUP	20121031									
Possible Sample Hazards/Remarks (List all known wastes) Fyreguel 220 #014029					SPECIAL INSTRUCTIONS N/A					Hold Time
MSDS <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No										
Relinquished By	Print	Sign	Date/Time	Received By	Print	Sign	Date/Time	Matrix *		
copy Adair	Adair		7-2-12/1340	TANIA BATES	Jennifer Bates		7-2-12/1350	SL		
Relinquished By	Print	Sign	Date/Time	Received By	Print	Sign	Date/Time	S = Soil		
Kouison	legu		7-10-12/140	Rabin Scott	Ad: Scott		7-10-12	DS = Drum Solids		
Relinquished By	Print	Sign	Date/Time	Received By	Print	Sign	Date/Time	DL = Drum Liquids		
Rabin Scott	Ad: Scott		7-12-12	RHedels	RHedels		7-12-12 1403	T = Tissue		
Relinquished By	Print	Sign	Date/Time	Received By	Print	Sign	Date/Time	WI = Wipe		
								L = Liquid		
								V = Vegetation		
								X = Other		
FINAL SAMPLE DISPOSITION		Disposal Method (e.g., Return to customer, per lab procedure, used in process)					Disposed By		Date/Time	

Sample # - 12-003

Sampler Name - Larry Monroe

Material type - semi solid

Date 7-2-12

Time 1005

TARE - 110g

Gross - 150g

HA-235  
sludge sample

7 diam  
7.5 height

INTEROFFICE MEMORANDUM

**CH2MHILL**  
Plateau Remediation Company

3B200-KTB-12-081

**Date:** July 5, 2012  
**To:** J. C. Michel, T5-50  
**From:** K. T. Brasel, PFP NDA   
**Subject:** NDA Results for HA-23S Oil Sludge Sample

This letter reports the TRU activity for a 40 gram oil sludge sample from the HA-23S Sump in Room 235B of Building 234-5Z within the PFP complex. The sample, packaged in a 60-mil glass vial inside an ice cream carton inside a steel paint can, was brought into Room 192A and measured with a high-purity germanium detector (8508) on July 3, 2012. The can was rotated during measurement and a background was collected at the beginning and subtracted from the spectrum. The plutonium isotopic fractions used in the calculations are from a previous measurement, letter 3B200-KTB-12-070. See attachments for results.

These measurements were performed in accordance with HNF-22051, *Total Measurement Uncertainty Calculation Reference for ISOCS Gamma-Ray Spectroscopy NDA Measurements*, and ZA-503-303, *In-Situ Object Counting System (ISOCS) Gamma Spectroscopy Routine Operations*.

Please contact my office if you have any questions concerning these measurements.

cc:

T. Adair, T5-70  
K. Brasel, T5-73  
M. Danna, T4-32  
L. Estrada, T5-73  
T. Welsh, G3-41  
R.J. Widney, T5-49  
J. Winkel, T5-54  
 M. Withers, T5-73  
K. Murphy, T4-35  
E. Seiber, T5-49  
Letterbook

**ISOCS Item Report**

Item ID:	HA-23S Oil Sample from sump
Date Assayed:	7/3/12
Item Mass, kg:	0.04
Isotopic Source:	Measured MGA

Isotope	Mass Fraction (% of tot-Pu)	Activity (uCi)	Total Uncrtny (uCi)	Upper Limit (uCi)	Isotope Mass (g)	Total Uncrtny (g)	Upper Limit (g)	Codes
Pu-238	0.018%	1.42E+01	2.10E+00	1.84E+01	8.31E-07	1.22E-07	1.08E-06	I
Pu-239	88.887%	2.60E+02	2.81E+01	3.16E+02	4.18E-03	4.53E-04	5.09E-03	M
Pu-240	10.814%	1.16E+02	1.70E+01	1.50E+02	5.09E-04	7.50E-05	6.59E-04	I
Pu-242	0.109%	2.04E-02	3.00E-03	2.64E-02	5.15E-06	7.58E-07	6.67E-06	I
Np-237								
Am-241	1.513%	2.44E+02	3.63E+01	3.17E+02	7.12E-05	1.06E-05	9.24E-05	I
Other TRU								
U-235								
U-238								
Pu-241	0.172%	8.36E+02	1.23E+02	1.08E+03	8.09E-06	1.19E-06	1.05E-05	I
Other								
Other								
Other								

Total Pu, g**	4.707E-03
Total Uncertainty, g***	6.933E-04
Upper Limit, g Pu****	6.093E-03

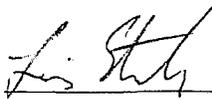
Total TRU Activity, uCi	6.34E+02
Total Uncertainty, uCi***	7.89E+01
Upper Limit, uCi****	7.92E+02

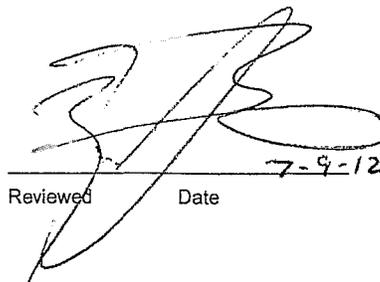
TRU Specific Activity, nCi/g	1.58E+04
Total Uncertainty, nCi/g***	1.97E+03
Upper Limit, nCi/g****	1.98E+04

Total Activity (TRU + non-TRU), uCi	1.47E+03
Total Uncertainty, uCi***	1.85E+02
Upper Limit, uCi****	1.84E+03

\* Codes: M = Activity directly measured by ISOCS.  
 I = Activity inferred from ISOCS measured Pu-239 and mass fraction using identified isotopic source.  
 C = Mass fraction calculated from measured ISOCS value and total plutonium.

\*\* Based on Pu-239 and mass fraction of Pu-239.  
 \*\*\* Uncertainties stated at 1 standard deviation.  
 \*\*\*\* The upper limit is the result plus 2 times the uncertainty. The Upper Limit, g Pu is also the PFP Criticality Value.

  
 Calculated Date 7-9-12

  
 Reviewed Date 7-9-12

RADIOLOGICAL CONTROL SMEAR SAMPLE ANALYSIS RECORD										Log No: S-(RSR# OR Task# -MDDYY) S-Z-1202750		Page 1 of 1		
Counter Information:														
Alpha:		CSEB3-0069 / SAC-4 / 5-3-2013		NA		0.39 / 2.571		0 / 50		0.00		200W / 234-SZ / Room 236		
Instrument ID No./Model/Cal Expiration		Detector ID No.		E <sub>c</sub> / CF		N <sub>b</sub> (counts)/T <sub>b</sub> (min)		R <sub>b</sub> (cpm)		Counter Location (i.e. Area/Facility/Room)				
Beta:		NA		NA		0.00 / N/A		0 / 0		N/A		NA		
Instrument ID No./Model/Cal Expiration		Detector ID No.		E <sub>c</sub> / CF		N <sub>b</sub> (counts)/T <sub>b</sub> (min)		R <sub>b</sub> (cpm)		Counter Location (i.e. Area/Facility/Room)				
No.	Smear Location, Serial No., Sample Purpose	Smear Media* (W, F, O, T)	Sample Date/Time		DL (cpm)	T <sub>g</sub> (min)	MDA (dpm/smear)	N <sub>g</sub> (counts)	R <sub>n</sub> (cpm)	Sample Activity (dpm/smear)	σ (dpm/smear)	RCT Signature & HID No.	Survey No.	
			Area Smeared in cm <sup>2</sup> (e.g., 100)											
1	SAMPLE CAN #12-003, #1-2	T	07/12/12	08:32	α	0.000	1	6.97	1	1.0	3	2.6	<i>Chris Newman</i> H0036884	Z-1202750
			100		β	N/A	NA	N/A	NA	N/A	N/A	N/A		07/12/12
2	VIKING CONTAINER #4 TYPE A, #1-5	T	07/12/12	08:40	α	0.000	1	6.97	0	0.0	0	0.0	<i>Chris Newman</i> H0036884	Z-1202750
			100		β	N/A	NA	N/A	NA	N/A	N/A	N/A		07/12/12
3		T	07/12/12		α	0.000	1	6.97						Z-1202750
			100		β	N/A	NA	N/A	NA	N/A	N/A	N/A		07/12/12
4		T	07/12/12		α	0.000	1	6.97						Z-1202750
			100		β	N/A	NA	N/A	NA	N/A	N/A	N/A		07/12/12
5		T	07/12/12		α	0.000	1	6.97						Z-1202750
			100		β	N/A	NA	N/A	NA	N/A	N/A	N/A		07/12/12
6		T	07/12/12		α	0.000	1	6.97						Z-1202750
			100		β	N/A	NA	N/A	NA	N/A	N/A	N/A		07/12/12
7		T	07/12/12		α	0.000	1	6.97						Z-1202750
			100		β	N/A	NA	N/A	NA	N/A	N/A	N/A		07/12/12
8		T	07/12/12		α	0.000	1	6.97						Z-1202750
			100		β	N/A	NA	N/A	NA	N/A	N/A	N/A		07/12/12
9		T	07/12/12		α	0.000	1	6.97						Z-1202750
			100		β	N/A	NA	N/A	NA	N/A	N/A	N/A		07/12/12
10		T	07/12/12		α	0.000	1	6.97						Z-1202750
			100		β	N/A	NA	N/A	NA	N/A	N/A	N/A		07/12/12

\* W = Whatman F = Filter T = Tech Smear O = Other: N/A

NOTE: Sample Activity, MDA, and Sample Standard Deviation are in units of dpm/100 cm<sup>2</sup> when the smear area is less than or equal to 100 cm<sup>2</sup>. In general, dpm/smear equals dpm/area smeared.

Definition:

E <sub>c</sub> = Instrument Counting efficiency (cpm/dpm)	N <sub>g</sub> = Gross Counts measured during sample counting time (T <sub>g</sub> )
CF = Instrument correction factor (1/E <sub>c</sub> )	MDA = Minimum Detectable Activity
T <sub>b</sub> = background counting interval	σ = Counting Error
N <sub>b</sub> = Number of background counts recorded during background counting interval (T <sub>b</sub> )	R <sub>n</sub> = Sample Count Rate $\left( \frac{N_g}{T_g} - R_b \right)$
R <sub>b</sub> = Background counting rate (N <sub>b</sub> /T <sub>b</sub> )	
DL = Decision Level	
T <sub>g</sub> = Sample Counting Time	

See PRC-PRO-RP-40035 for explanation of formulae used.

Log Reviewed By(Print/Sign): Rick Swallow *RLW* Date: 7-12-12

<b>RADIOACTIVE SHIPMENT RECORD</b>			3. Page 1 of 1		4. Ship Prepaid		5. Via Site Carrier			
<b>1. SHIP FROM U.S. DEPT. OF ENERGY C/O</b> Company <u>CH2MHILL PRC</u> Address <u>PEP</u> City, State, Zip <u>200 West Area</u> Contact <u>Scott Weiss</u> Phone <u>373-0280</u> Cell <u>720-891-0420</u>			<b>2. SHIP TO</b> <input checked="" type="checkbox"/> U.S. DEPT. OF ENERGY C/O Company <u>ATLII</u> Address <u>222-S</u> City, State, Zip <u>200 West Area</u> Attention <u>Ruth Bushaw</u> Phone <u>373-4314</u>			6. SHIPMENT AUTHORIZATION MM013 NUMBER <b>7. EMERGENCY CONTACT INFO</b> Telephone <u>1-509-373-3800</u> ERG #s <u>163</u> Charge Code				
<b>8. HM UNID</b> Proper Shipping Name: <input checked="" type="checkbox"/> UN2915 Radioactive Material, Type A package			PRI HAZ SUB HAZ 7							
9. No. Pkg.	Model Package	COC/Spec	Serial No.	Seal No.	Isotopes	C.S.I.	T.I.	Bq/Package	Gr. Wt. Kg.	
1	Viking	DOT 7A TYPE A	S/N 12	N/A	Pu238Pu239Pu240Pu241Am241	N/A	0.2	5.44E-5 TBq	9 Kg	
<b>10. Identify for Normal Form Only</b> Physical Form <u>Liquid</u> Chemical Form <u>Mixture</u>			<b>11.</b> <input type="checkbox"/> Highway Route Controlled Quantity <input checked="" type="checkbox"/> Exclusive Use Shipment with instructions <input type="checkbox"/> Placards Applied <input checked="" type="checkbox"/> Fissile Excepted, Grams <u>4.20E-03</u> <input checked="" type="checkbox"/> UN ID Marking <u>UN2915</u>			<b>12. LABELS APPLIED</b> <u>Radioactive Yellow - II</u> <b>13. ADDITIONAL INFO / LABELS / MARKINGS</b>				
<b>8. HM UNID</b> Proper Shipping Name:			PRI HAZ SUB HAZ							
9. No. Pkg.	Model Package	COC/Spec	Serial No.	Seal No.	Isotopes	C.S.I.	T.I.	Bq/Package	Gr. Wt. Kg.	
<b>10. Identify for Normal Form Only</b> Physical Form Chemical Form			<b>11.</b> <input type="checkbox"/> Highway Route Controlled Quantity <input type="checkbox"/> Exclusive Use Shipment with instructions <input type="checkbox"/> Placards Applied <input type="checkbox"/> Fissile Excepted, Grams <input type="checkbox"/> UN ID Marking			<b>12. LABELS APPLIED</b> <b>13. ADDITIONAL INFO / LABELS / MARKINGS</b>				
<b>8. HM UNID</b> Proper Shipping Name:			PRI HAZ SUB HAZ							
9. No. Pkg.	Model Package	COC/Spec	Serial No.	Seal No.	Isotopes	C.S.I.	T.I.	Bq/Package	Gr. Wt. Kg.	
<b>10. Identify for Normal Form Only</b> Physical Form Chemical Form			<b>11.</b> <input type="checkbox"/> Highway Route Controlled Quantity <input type="checkbox"/> Exclusive Use Shipment with instructions <input type="checkbox"/> Placards Applied <input type="checkbox"/> Fissile Excepted, Grams <input type="checkbox"/> UN ID Marking			<b>12. LABELS APPLIED</b> <b>13. ADDITIONAL INFO / LABELS / MARKINGS</b>				
<b>8. HM UNID</b> Proper Shipping Name:			PRI HAZ SUB HAZ							
9. No. Pkg.	Model Package	COC/Spec	Serial No.	Seal No.	Isotopes	C.S.I.	T.I.	Bq/Package	Gr. Wt. Kg.	
<b>10. Identify for Normal Form Only</b> Physical Form Chemical Form			<b>11.</b> <input type="checkbox"/> Highway Route Controlled Quantity <input type="checkbox"/> Exclusive Use Shipment with instructions <input type="checkbox"/> Placards Applied <input type="checkbox"/> Fissile Excepted, Grams <input type="checkbox"/> UN ID Marking			<b>12. LABELS APPLIED</b> <b>13. ADDITIONAL INFO / LABELS / MARKINGS</b>				
<b>8. HM UNID</b> Proper Shipping Name:			PRI HAZ SUB HAZ							
<b>14. Shipment DE-Ci:</b> 6.1E-04					Shipment Totals		C.S.I.	T.I.	Bq/Package	Gr. Wt. Kg.
							N/A	0.2	5.44E-5 TBq	9
15. Surface Dose Rate of Package <input type="checkbox"/> <0.005 or _____ mSv/hr <input checked="" type="checkbox"/> <0.5 or <u>0.13</u> mrem/hr (N+β γ)		Dose Rate @ 1 Meter from Surface of Package <input type="checkbox"/> <0.005 or _____ mSv/hr <input checked="" type="checkbox"/> <0.5 or <u>0.12</u> mrem/hr (N+β γ)		Smears of Outer Container <input type="checkbox"/> <4.0 Bq (220 dpm) β γ /cm <sup>2</sup> <input type="checkbox"/> <0.4 Bq (22 dpm) α /cm <sup>2</sup> <input checked="" type="checkbox"/> <Tbl. 2-2 HNF-5173 Limits		TRUCK LOAD OR EXCLUSIVE USE Surface <input checked="" type="checkbox"/> <2 mSv/hr (200 mrem/hr) @ 2 meters <input checked="" type="checkbox"/> <0.1 mSv/hr (10 mrem/hr) @ Cab or sleeper <input checked="" type="checkbox"/> <0.02 mSv/hr (2 mrem/hr) (Using N+β γ)				
Additional Data and Instructions (inc. Readings on Internal Packaging)				Bldg <u>234-52</u> Survey No. <u>2-1202750</u> Date <u>7-12-12</u>						
<b>16. TRANSPORTER</b> Vehicle Number <u>HO-638-7162</u> DRIVER SIGNATURE <u>[Signature]</u> PRINT NAME <u>Gerald Hughes</u>			<b>17. RECEIVER</b> RECEIVER SIGNATURE <u>[Signature]</u> PRINT NAME <u>RT Steele</u> DATE <u>7.12.12</u>							
18. This is to certify that the above-named materials are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation according to the applicable regulations of the Department of Transportation.										
Certifier's Signature <u>[Signature]</u> Print Name <u>Scott Weiss</u>			On behalf of DOE-RL Date <u>7/12/12</u>			Organization <u>CSG</u>				
<b>19. AUTHORIZATION FOR SHIPMENT</b>										
<b>AIR TRANSPORT CERTIFICATION</b> <input type="checkbox"/> N/A		<b>CARGO AIRCRAFT</b> <input type="checkbox"/> Cargo Aircraft Only Labels Applied		<b>PASSENGER AIRCRAFT</b> <input type="checkbox"/> Ltd Qty <input type="checkbox"/> Research/Medical Diagnosis <input type="checkbox"/> <3 T.I. <input type="checkbox"/> Human Medical Research		Pkg. Dimensions (cm)				
<b>20. OFFSITE AUTHORIZATION</b>										
Survey No.			Date Shipped		Routing		ETA			
Approved for Shipment Offsite						Date				

**Exclusive Use Instructions**

From: U.S. Department of Energy, Richland Operations  
P.O. Box 550, 2355 Stevens Drive  
Richland, WA 99352

**Instructions to the Carrier for Maintenance of Exclusive Shipment Controls**

You are advised per these instructions to transport the items defined on the attached shipping documents under "EXCLUSIVE USE" provisions.

"EXCLUSIVE USE" (also referred to as "SOLE USE" or "FULL LOAD" as used in IAEA Regulations) means any shipment: (1) From a single consignor having the exclusive use of a transport vehicle (2) For which all initial, intermediate and final loading and unloading is carried out by or under the directions for the consignor, consignee, or his designated agent.

**SPECIAL REMARKS CONCERNING EXCLUSIVE USE INSTRUCTIONS:**

- DO NOT TRANSFER SHIPMENT FROM ORIGINATING CARRIER VEHICLE \*
- DO NOT LOAD OTHER PACKAGES ON ORIGINATING CARRIER VEHICLE
- DELIVER SHIPMENT DIRECTLY TO CONSIGNEE

\*If transfer from originating carrier vehicle is necessary, then maintenance of exclusive use provisions are required for each subsequent carrier vehicle.

\*The contents of this shipment are being shipped in conjunction with shipments SC050 and KC090 and will be on the same transport vehicle.

Signature below denotes acknowledgement and understanding of the above stated requirements.

Drivers' Signature:  Date: 7-12-12

**GENERATOR KNOWLEDGE INFORMATION**

1. Chain of Custody Number 12-003 CACN/COA na Customer Identification Number na

2. List generator knowledge or description of process that produced sample. Or list description of sample source:  
 Sludge from a sump associated with Glove box HA-23S in 234-5Z.

MSDS Available?  No  Yes Hanford MSDS No. #014029

3. List all waste codes and constituents associated with the waste or media that was sampled, regardless of CERCLA status.

a) Does the sample contain any of the following listed waste codes?

**By checking "unknown" the customer understands that no knowledge is available following a careful search.**

List Federal Waste Code(s):

List Constituent(s):

P Codes: \_\_\_\_\_  Yes  No  Unknown  
 U Codes: \_\_\_\_\_  Yes  No  Unknown  
 K Codes: \_\_\_\_\_  Yes  No  Unknown  
 F Codes: \_\_\_\_\_  Yes  No  Unknown

b) List applicable characteristic waste codes, flash point, pH, constituents, and concentrations as appropriate.

D001:  FP <100°F  FP ≥100 <140°F  DOT Oxidizer  Yes  No  Unknown  
 D002:  pH ≤2  pH ≥12.5  Solid Corrosive (WSC2)  Yes  No  Unknown  
 D003:  Cyanide  Sulfide  Water Reactive  Other \_\_\_\_\_  Yes  No  Unknown  
 D004-D043 (Identify applicable waste codes and concentrations): \_\_\_\_\_ (i.e., peroxide former, explosive, air reactive)  Yes  No  Unknown

c) If characteristic, list any known underlying hazardous constituents (UHCs) reasonably expected to be present, and their concentrations that may be present above the LDR treatment standard (40 CFR 268.48):

NA

d) List any known Land Disposal Restrictions (LDR) subcategories, if applicable (40 CFR 268.40):

UNK

e) List any applicable Washington State dangerous waste codes: (not required if federally regulated)

(\*State mixture rule for ignitability)

WT01:  Yes  No  Unknown WP01:  Yes  No  Unknown  
 WT02:  Yes  No  Unknown WP02:  Yes  No  Unknown  
 W001:  Yes  No  Unknown WP03:  Yes  No  Unknown  
 List constituents and concentrations: \_\_\_\_\_ F003:\*  Yes  No  Unknown

4. Is this material TSCA regulated for PCBs?  Yes  No  Unknown  Analysis Requested

List concentration if applicable: \_\_\_\_\_

If yes, what is the source of the PCBs? (see TSCA PCB Hanford Site User Guide, DOE/RL-2001-50)

PCB Liquid Waste  PCB Bulk Product Waste  PCB Transformer ≥500 ppm  Unknown  
 PCB Remediation Waste  PCB R&D Waste  PCB contaminated electrical equipment (capacitor/ballast) <500 ppm  
 PCB Spill Material  PCB Item  Other PCB Waste (list) \_\_\_\_\_

5. Is this material TRU?  Yes  No  Unknown

**6. ACCURACY OF INFORMATION**

Based on my inquiry of those individuals immediately responsible for obtaining this information, that to the best of my knowledge, the information entered in this document is true, accurate, and complete.

Print & Sign R. Midy / R. Midy Date 7/2/12