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Revision 0

Characterization Report for the 241-U-361 Settling Tank in the 200-UW-1 Operable Unit

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Project Hanford Management Contractor for the
U.S. Department of Energy under Contract DE-AC06-96RL13200

FLUOR

P.O. Box 1000
Richland, Washington

Approved for Public Release;
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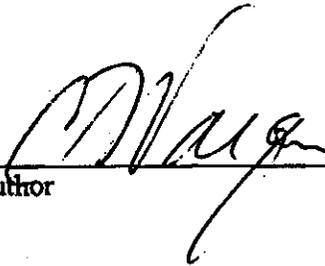
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**CHARACTERIZATION REPORT FOR THE 241-U-361 SETTLING TANK
IN THE 200-UW-1 OPERABLE UNIT**

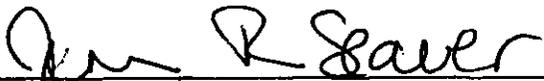
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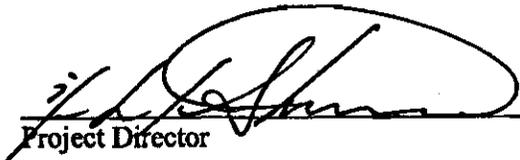
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Project Director

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EXECUTIVE SUMMARY

Tank 241-U-361 is a 36,000-gallon (136,274-liter) capacity underground reinforced-concrete tank situated to the southwest of U-Plant within the 200-UW-1 Operable Unit. This tank received low-level uranium recovery processing waste from the 221-U Building and decontamination waste from 224-U, from 1951 through 1967. The purpose of the tank was to settle solids within the liquid waste streams prior to being discharged into the soil column at cribs 216-U-1 and 216-U-2. Identification of the proper method of disposition of the tank contents, and the tank itself, is necessary as part of the overall U-Plant area closure design.

The U.S. Department of Energy prepared a focused feasibility study (DOE/RL-2003-23, *Focused Feasibility Study for the 200-UW-1 Operable Unit*) (FFS) and the associated proposed plan (DOE/RL-2003-24 Reissued, *Proposed Plan for the 200-UW-1 Operable Unit*), which defined the preferred remedial actions for the waste sites in the 200-UW-1 Operable Unit. The FFS and proposed plan recommended placement of an engineered barrier over the 241-U-361 Settling Tank, after the sludge contents have been removed.

The tank currently contains approximately 27,400 gallons (104,000 liters) of waste sludge with an additional 1,000 gallon (3,790 liters) supernate layer on top of the sludge. The sampling approach was determined and described through the data quality objectives process and defined in an approved sampling and analysis plan (SAP). The sampling design prescribed two supernate samples and a single full continuous core sample, all gathered through a single tank riser. The tank contents were sampled using push-core truck and 19-inch core segment samplers.

The tank was sampled during August and September of 2007. Two supernate samples were recovered, but as the sludge core was advanced, only four of the seven core segments were able to be recovered. Repeated attempts to recover deeper samples were unsuccessful and the rig was repositioned at an alternative riser. The lower three core segments were able to be recovered at the new riser to complete the full depth sampling of the sludge. The seven core segments were extruded and composited into two independent sludge samples, each representing the full depth of the sludge layer as prescribed in the SAP. The sludge is made up of 19 discernable layers, randomly alternating between bright yellow, tan, dark brown, and black in color. The texture of the sludge ranged from sludge slurry at the supernate interface to dry sludge at the bottom.

The samples were analyzed for the contaminants of concern (COCs) identified in the data quality objective process, including metals, radionuclides, anions, as well as volatile and semivolatile organics and polychlorinated biphenyl (PCBs). The sludge was also inspected for the presence of asbestos.

The supernate consists primarily of water with approximately 3.6% nitrate. The supernate contained trace levels of some volatile and semivolatile organic contaminants, as well as low but measurable amounts of PCBs, but only 1-butanol exists at a concentration greater than 1 mg/L. The supernate also contains approximately 1 mg/L mercury, which would exceed *Resource Conservation and Recovery Act* (RCRA) toxicity characteristic levels in the event that the supernate is generated as a separate waste stream.

The sludge layer consists of 71% water, with over 12% uranium, 2.4% nitrate, and about 1% of a 1:4 tributyl phosphate in kerosene process reagent. Due to the high uranium content as well as measurable plutonium-239/240, the total alpha concentration measured in the sludge composite samples exceeds 50 nCi/gram. Cesium-137 and strontium-90 exist at 0.2 $\mu\text{Ci/g}$ and 0.7 $\mu\text{Ci/g}$, respectively. Organic compounds present at concentrations greater than 1mg/kg, in addition to the tributyl phosphate (TBP) and kerosene, include acetone, trichloroethylene, tetrachloroethylene, 1-butanol (a degradation

product of TBP), and Aroclor-1254. Amosite asbestos fibers were also confirmed in the sludge composite samples.

Nine specific questions were documented in the 241-U-361 DQO Final Report. Preliminary answers to the questions were developed using the laboratory results. With no additional treatment, the supernate would be designated as failing the toxicity characteristic [Washington Administrative Code (WAC) 173-303-070 through -100]. No toxicity characteristic leaching procedure (TCLP) testing was performed on the sludge, but calculations using total contaminant contents show that the sludge also has the potential to exceed the toxicity characteristic. Conclusive determination of the toxicity characteristic must be performed on waste streams generated following removal of tank material from the tank (point of generation). If 241-U-361 disposition generates a waste that exhibits the toxicity characteristic, the waste would likely require treatment beyond that necessary to remove the characteristic prior to disposal if the RCRA Universal Treatment Standards are applicable through Land Disposal Restrictions requirements.

Other waste designation actions outside the scope of this document include listed waste determination and performing a Washington State toxicity book designation. For determining whether the 241-U-361 waste is designated for listed waste, a diligent historical record search must be performed to determine whether constituents came from a listed waste source. Secondly, for Washington State toxicity, if the 241-U-361 waste is not designated for listed waste or characteristic waste, a book designation for Washington State toxicity must be performed. Both of these actions are beyond the scope of this characterization report.

The sludge is less than Class C per 40 CFR 60.55. However, the radionuclide content does not meet either radionuclide-specific, or sum-of-the-fractions radionuclide acceptance criteria for Environmental Restoration Disposal Facility (ERDF). In addition total uranium and technetium-99 total curie inventory exceed ERDF "trigger" levels. Therefore the sludge would require a case-specific review to determine ERDF acceptability. The sludge contains asbestos and would require management in accordance with 40 CFR 61.140 through 40 CFR 61.157. The sludge PCB content is below the 500 ppm ERDF criterion and the 50 ppm threshold for 40 CFR 761 regulation. The 241-U-361 supernate represents free liquid that would be restricted from ERDF disposal without treatment. Based on the laboratory data, the sludge would not fail any other general ERDF waste acceptance criteria.

In general, the data quality was found to be adequate for use in evaluating disposition alternatives. However, two data quality issues deserve note. The logistics of the field sampling resulted in most of the sludge samples exceeding holding times. In addition, high levels of uranium and kerosene resulted in elevated detection limits for a number of COCs, sometimes in excess of regulatory decision levels. Although these two issues might represent potentially significant impact to some COC evaluations, they do not preclude the use of the data set to answer the decision statements from the DQO.

The remainder of the project quality-control data, including field blanks, laboratory blanks, spikes, replicates, tracers, internal standards and surrogates, all adequately met performance criteria presented in the approved project sampling and analysis plan.

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TERMS

COC	contaminants of concern
COPC	contaminant of potential concern
CFR	Code of Federal Regulations
DQO	data quality objectives
ERDF	Environmental Restoration Disposal Facility
ETF	200 Area Effluent Treatment Facility
FFS	<i>Focused Feasibility Study for the 200-UW-1 Operable Unit (DOE/RL-2003-23)</i>
GC/MS	gas chromatograph/mass spectrometer
ICP	inductively coupled plasma
LDR	land disposal restriction
LEL	lower explosive limit
OU	Operable Unit
PAH	polycyclic aromatic hydrocarbons
PCB	polychlorinated biphenyl
PLM	polarized light microscopy
ppb	parts per billion
ppm	parts per million
QA	quality assurance
QC	quality control
RCRA	<i>Resource Conservation and Recovery Act of 1976</i>
RPD	relative percent difference
SAP	sampling and analysis plan
SEM	scanning electron microscopy
TBP	tributyl phosphate
TCLP	toxicity characteristic leaching procedure
TIC	tentatively-identified compounds
UTS	Universal Treatment Standards
WAC	Washington Administrative Code

METRIC CONVERSION CHART

Into metric units

Out of metric units

If you know	Multiply by	To get	If you know	Multiply by	To get
Length			Length		
inches	25.40	millimeters	millimeters	0.03937	inches
inches	2.54	centimeters	centimeters	0.393701	inches
feet	0.3048	meters	meters	3.28084	feet
yards	0.9144	meters	meters	1.0936	yards
miles (statute)	1.60934	kilometers	kilometers	0.62137	miles (statute)
Area			Area		
square inches	6.4516	square centimeters	square centimeters	0.155	square inches
square feet	0.09290304	square meters	square meters	10.7639	square feet
square yards	0.8361274	square meters	square meters	1.19599	square yards
square miles	2.59	square kilometers	square kilometers	0.386102	square miles
acres	0.404687	hectares	hectares	2.47104	acres
Mass (weight)			Mass (weight)		
ounces (avoir)	28.34952	grams	grams	0.035274	ounces (avoir)
pounds	0.45359237	kilograms	kilograms	2.204623	pounds (avoir)
tons (short)	0.9071847	tons (metric)	tons (metric)	1.1023	tons (short)
Volume			Volume		
ounces (U.S., liquid)	29.57353	milliliters	milliliters	0.033814	ounces (U.S., liquid)
quarts (U.S., liquid)	0.9463529	liters	liters	1.0567	quarts (U.S., liquid)
gallons (U.S., liquid)	3.7854	liters	liters	0.26417	gallons (U.S., liquid)
cubic feet	0.02831685	cubic meters	cubic meters	35.3147	cubic feet
cubic yards	0.7645549	cubic meters	cubic meters	1.308	cubic yards
Temperature			Temperature		
Fahrenheit	subtract 32 then multiply by 5/9ths	Celsius	Celsius	multiply by 9/5ths, then add 32	Fahrenheit
Energy			Energy		
kilowatt hour	3,412	British thermal unit	British thermal unit	0.000293	kilowatt hour
kilowatt	0.94782	British thermal unit per second	British thermal unit per second	1.055	kilowatt
Force/Pressure			Force/Pressure		
pounds (force) per square inch	6.894757	kilopascals	kilopascals	0.14504	pounds per square inch

06/2001

Source: *Engineering Unit Conversions*, M. R. Lindeburg, PE., Third Ed., 1993, Professional Publications, Inc., Belmont, California.

CHARACTERIZATION REPORT FOR THE 241-U-361 SETTLING TANK IN THE 200-UW-1 OPERABLE UNIT

1.0 INTRODUCTION AND PROJECT DESCRIPTION

1.1 Project Scope

The scope of the 241-U-361 Settling Tank Characterization includes sampling of the 241-U-361 Settling Tank to aid in decision making associated with disposition of the tank contents. The 241-U-361 tank exists to the southwest of the 221-U canyon building in the 200-UW-1 Operable Unit (OU) in the 200 West Area of the Hanford Site (Figures 1-1 and 1-2). According to the 241-U-361 Data Quality Objectives Final Report (D&D-28702, Revision 1, *Data Quality Objectives Summary Report for the 241-U-361 Settling Tank*), two options currently exist for tank contents disposition: removal of contents or in-situ stabilization and disposal. The 241-U-361 Tank (Figure 1-3) contents must be dispositioned before the proposed engineered barrier is installed over the tank and the 216-U-1 and 216-U-2 Cribs. Removal or stabilization of the tank contents is an early step in remediation for this waste site. After additional characterization of the 216-U-1 and 216-U-2 cribs, an engineered surface barrier is planned to be designed and placed over the tank and adjacent cribs, and will serve as the final remedial action for the tank and cribs (see Figure 1-2).

Overall activities for the 241-U-361 Settling Tank Evaluation project include the following.

- Tank interior inspection. Inspection of the tank interior (to aid in determining integrity); and inspection of tank contents to verify process knowledge (e.g., depth of sludge, presence of supernate).
- Health and safety sampling. Data collection for tank headspace vapors and radiological dose rates to ensure that health and safety requirements are met before the tank contents are sampled.
- Waste characterization sampling. Data collection for waste materials (i.e., sludge and liquid) to ensure compliance with the receiving facilities' waste acceptance criteria, or to ensure compliance with the regulatory requirements for in-situ stabilization and disposal.
- Engineering evaluation. Development of an engineering evaluation to determine based on the results of the waste characterization sampling results, the preferred method for disposition of the tank contents. This evaluation will be conducted independently of the data quality objective (DQO) process; however, it is mentioned here to provide an overall understanding of the project scope.

The first two activities have been performed and are documented in the Phase I Final Report (D&D-32500, *241-U-361 Settling Tank Phase I Final Report (Video and Dose Readings)*). The third activity has also been accomplished and is the subject of this report. The engineering evaluation is the final step remains for completion of the 241-U-361 Settling Tank Evaluation Project.

Figure 1-1. Hanford Site and Washington State.

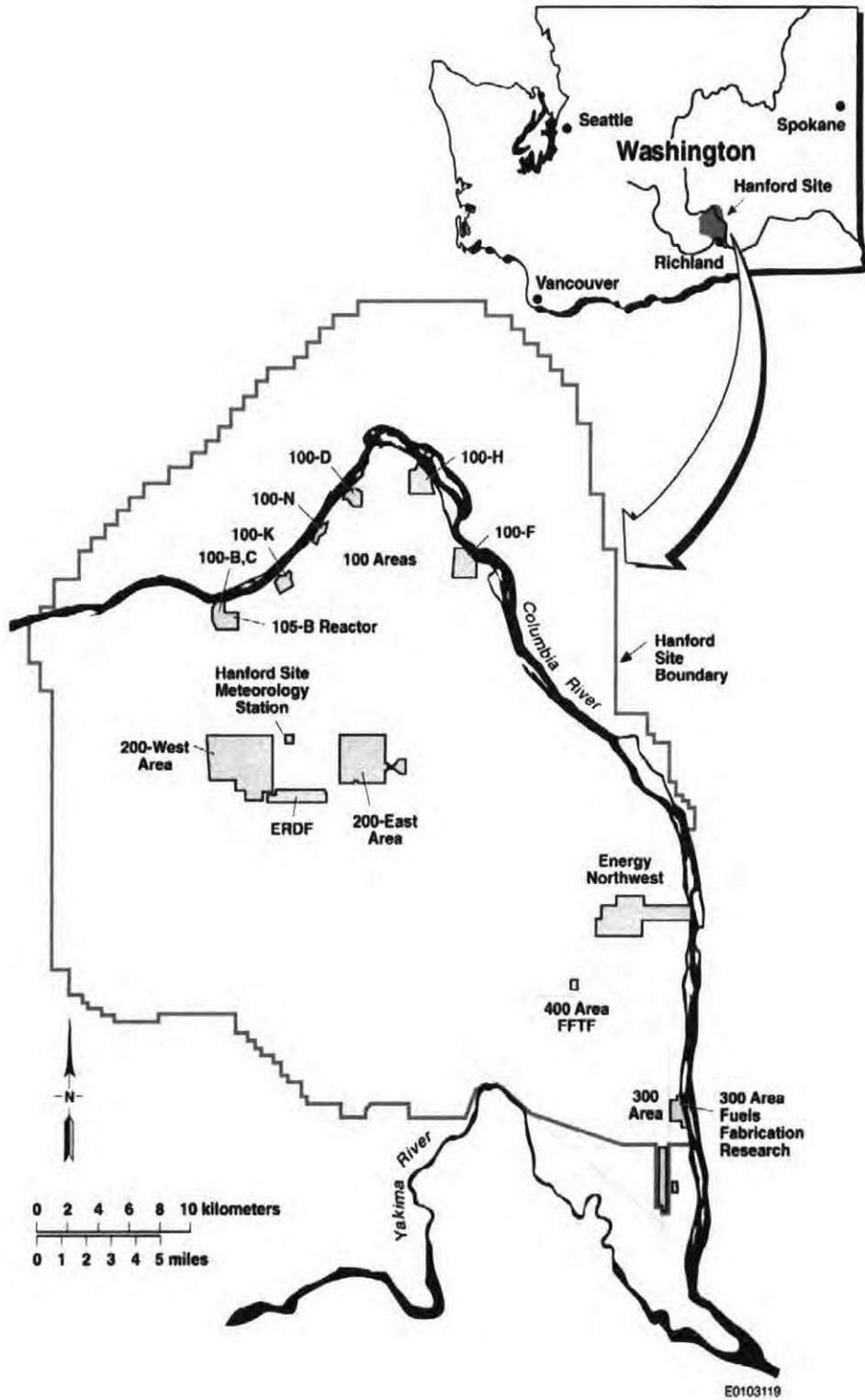


Figure 1-2. U Plant Zone.

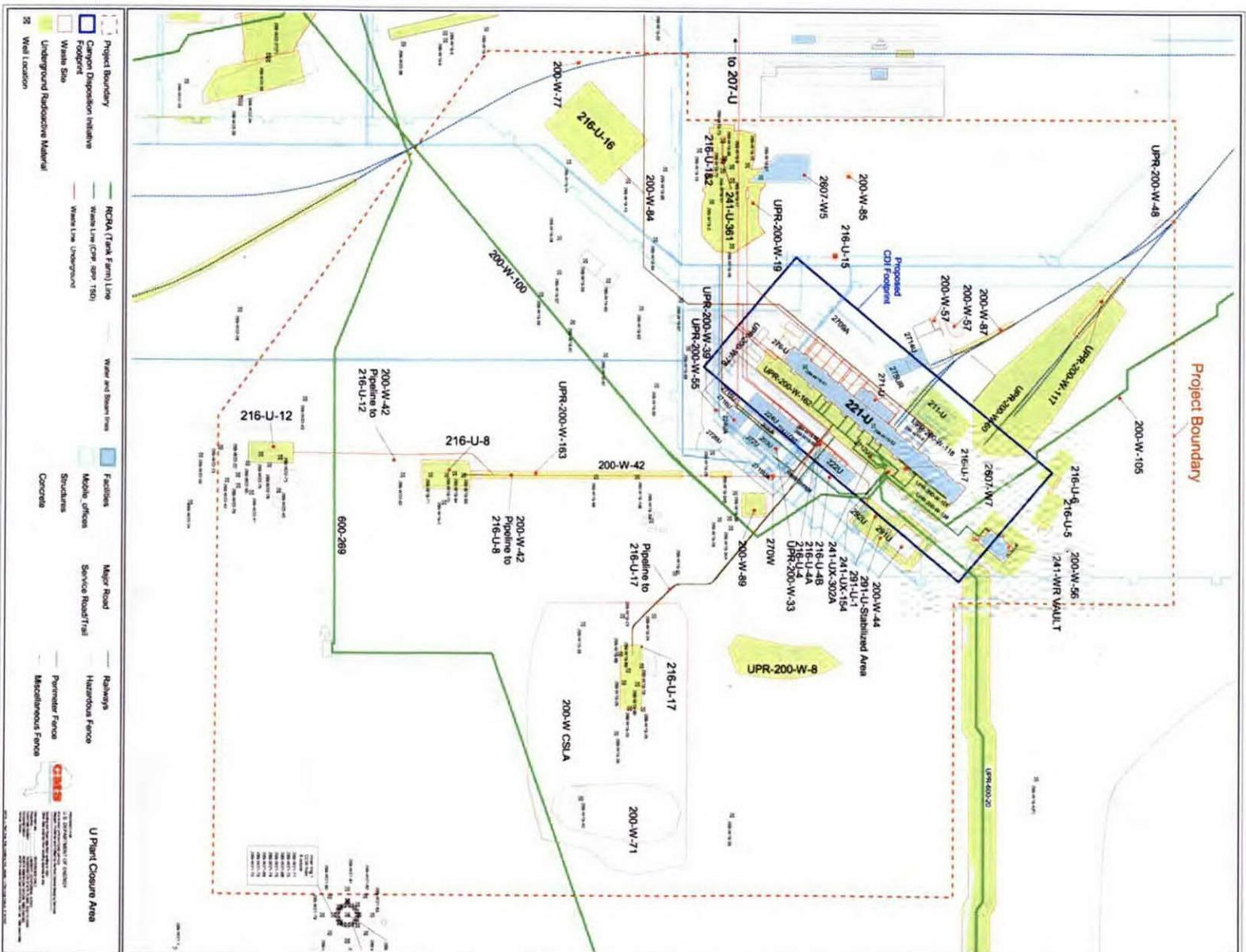
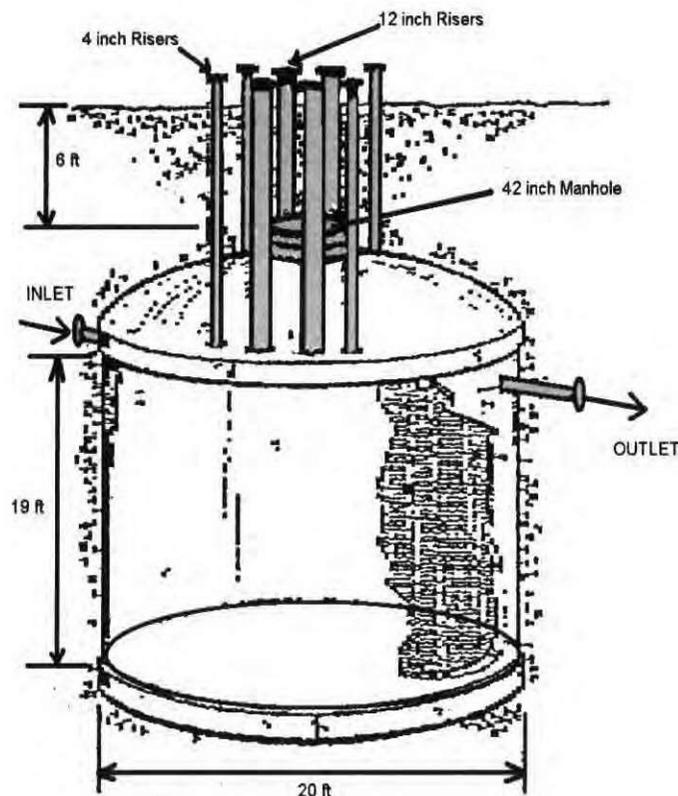


Figure 1-3. 241-U-361 Settling Tank.



1.2 Project Goals

The goals of this project, as listed in the 241-U-361 DQO Summary Report, are:

- (1) use historical and process knowledge to the maximum extent practical to identify the chemical and radiological hazards within the 241-U-361 Settling Tank;
- (2) determine if existing data are sufficient to characterize waste materials for disposal in place, or at the Environmental Restoration Disposal Facility (ERDF) and Effluent Treatment Facility (ETF);
- (3) identify the waste streams, including the sludge and supernate, that will be dispositioned;
- (4) establish sampling and analytical requirements for additional characterization of the tank contents;
- (5) determine, based on results of the characterization effort, which disposition option is most feasible; and
- (6) perform all activities in a manner that is protective of human health and the environment.

Items (1)-(3) were documented in the 241-U-361 DQO Final Report (D&D-28702). Based on that report, a sampling and analysis plan (SAP) (DOE/RL-2006-34, Revision 1, *Sampling and Analysis Plan for the 241-U-361 Settling Tank within the 200-UW-1 Operable Unit*), was generated. Samples of 241-U-361 headspace, supernate liquid, and sludge were collected and analyzed in accordance with the SAP [Item (4)]. This characterization report documents the results of the 241-U-361 tank sample analysis and the evaluation of the tank characterization results against project decision statements. Item (5) will be

conducted using the data and data analysis provided in this characterization report. All field work was conducted in accordance with item (6).

1.3 241-U-361 Settling Tank Description

The 241-U-361 Settling Tank is located southwest of the 221-U Facility, north of 16th Street. The 216-U-1 and 216-U-2 Cribs and the 241-U-361 Settling Tank are collocated in a common radiologically-controlled area that is posted with Underground Radioactive Material Area signs. The tank is posted with Inactive Miscellaneous Underground Storage Tank signs. The 241-U-361 Settling Tank was constructed in 1944-1945 and had an adjacent reverse well. However, the reverse well was never used and, in December 1949, the inlet lines to the well were cut and plugged. The 241-U-361 Settling Tank waste line was then extended to the 216-U-1 and 216-U-2 Cribs. The 241-U-361 Settling Tank is a circular underground settling tank 6.1 m (20 ft) in diameter by 5.8 m (19 ft) in height, constructed of 15 cm (6 in.) steel reinforced pre-stressed concrete. The top of the tank is approximately 2 m (6 ft) below grade, and several vents and risers penetrated the ground surface. The bottom of the tank is located approximately 7.6 m (25 ft) below grade.

The tank received liquid waste from 1952 through 1967. Table 1-1 summarizes the source of waste streams and time frame.

Table 1-1. Contributions to 241-U-361 Tank.
(from WHC-SD-EN-ES-040)

Waste Stream	Source	Time Frame
Cell Drainage from Tank 5-6	221-U	1952 - 1957
UO ₃ Conversion Waste	224-U	1957 (one month)
276-U Solvent Scrubbing Waste	276-U	1957 (one month)
UO ₃ Equipment Decontamination	224-U	1957 - 1967

The U Plant wastes flowed from the 241-U-361 Settling Tank to the 216-U-1 Crib (which lies 26 m [85 ft] to the west), and then to the 216-U-2 Crib.

In the spring of 1953, organic wastes and cell drainage from the TBP (tributyl phosphate) process in the 221-U Facility and waste from the 224-U Building overflowed to the ground by way of the 241-U-361 Settling Tank risers and 216-U-1 and 216-U-2 Crib vents. Contamination readings of 11.5 rad/h at a distance of 7.6 cm (3 in.) were reported over an area of approximately 4.6 m² (50 ft²). In 1953, decontamination was attempted. The area was backfilled, delineated by a wooden fence, and posted with Radiation Zone signs. In 1992, the area was surface stabilized by scraping the contaminated surface soil and consolidating it near the 241-U-361 Settling Tank. The contaminated soil was covered with 46 to 61 cm (18 to 24 in.) of clean backfill. The surface surrounding the 241-U-361 Settling Tank was covered with a stabilizer. In 1994, contamination was found on the surface again, presumably caused by insect intrusion.

The project has historical characterization data (BHI-00033, *Surface and Near Surface Field Investigation Data Summary Report for the 200-UP-2 Operable Unit*; BHI-00034, *Borehole Summary Report for the 200-UP-2 Operable Unit, 200 West Area*; and BHI-01018, *Environmental Restoration Contractor Management Plan for Inactive Miscellaneous Underground Storage Tanks [IMUSTs]*) associated with the past investigations pertaining to the 216-U-1 and 216-U-2 Cribs. The data were used to establish the primary sources of contamination and to support the determination of the list of contaminants of potential concern (COPC). These data are analyzed in DOE/RL-2003-23, *Focused Feasibility Study for the 200-UW-1 Operable Unit* and also in the 241-U-361 DQO Summary Report.

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2.0 TANK INSPECTION AND PRELIMINARY SAMPLING

2.1 Phase I inspection

On December 5, 2006, the interior of the 241-U-361 tank was inspected and videotaped, and the tank headspace was sampled (CH2M HILL 2006). The vapor sampling was conducted using a direct-reading Rae photoionization instrument with a 10.6 e.V. lamp.

The tank inspection noted more supernate than had been previously noted, and that the tank interior, and riser #4 condition was acceptable for use as a tank contents sampling location. There was no removable contamination on the riser flange or inside the top 6 inches of the riser and no detectable dose rates over the open riser. A dose rate of less than 150 mR/hr was measured near the supernate surface within the tank.

Tank vapor was sampled at 5 ft inside the riser. The tank atmosphere was found to be 18% oxygen, and was 3% LEL (Lower Explosive Limit). Volatile organic carbons were detected at 35 parts per million (ppm). The breathing space of workers performing the inspections read from 57-1900 parts per billion (ppb).

Results of the 241-U-361 Phase I work including interior inspection and vapor sampling are documented in *241-U-361 Settling Tank Phase I Final Report (Video and Dose Readings)* (D&D-32500).

2.2 Additional Vapor Sampling Results

In addition, during 241-U-361 sampling activities, the tank headspace vapor was sampled in a Tedlar[®] bag via the sampling truck drill string purge. The bag contents were analyzed using a field-portable gas chromatograph/mass spectrometer (GC/MS) (memo Zabel to Bean, et al., 9/26/07) (CH2M HILL 2007). The results (Table 2-1) confirmed the presence of some chlorinated hydrocarbons and kerosene-range petroleum hydrocarbons.

Table 2-1. Field GC/MS Sampling of Drill String Purge Vapor.
(from CH2M HILL 2007).

Compound	Concentration in vapor (ppm)	OEL, 8 hr TWA (ppm)
1,1,1-Trichloroethane	0.1	350
Trichloroethylene	0.1	10
Tetrachloroethylene	1	25
Petroleum hydrocarbons	8 to 80	200

Note: Petroleum hydrocarbon compounds positively identified include decane, 3- and 4-methyldecane, undecane, dodecane, and decahydromethylnaphthalene.

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3.0 SAMPLE ANALYSIS RESULTS

3.1 Field Sampling

Tank 241-U-361 was sampled during August and September, 2007, using a push-mode sampling truck and 19-inch core samplers. The sampling design consisted of two grab samples from the tank supernate layer, and a full-length core sample, made up of individual 19-inch core segments, taken from a single riser. The design was performed with the exception that the entire core length was distributed between two riser locations. The sludge depth was found to be 11.08 feet, with approximately 5.5 inches of supernate on top. Sampling of the supernate and first four segments (6.33 feet of total sampled sludge depth) was accomplished from riser 4 without issue. The next segment was unable to be recovered. Several attempts were made to recover sludge at this depth, and at greater depth, without success. The drill string was able to be pushed, but the samplers did not recover any sludge and when the samplers were recovered, the plungers were unlocked, but still in the "down" position, indicating that vacuum was maintained as the plungers were retracted. The sampling team speculated that an object or some material was encountered that blocked sludge from entering the sampler. At one point, the entire drill string was retracted from the riser, and redeployed after 12 hours of letting the tank contents "re-settle." Sludge samples were still unable to be recovered below 6.33 feet in depth from riser 4.

The project team decided to move to another riser to continue the core sampling. Logistically, riser 5, located 180 degrees across the tank from riser 4, was the easiest to access. The sampling truck was moved to the new riser, and recovered the final 3 samples, beginning at the 6.33' depth and extending to the bottom of the tank.

Sixteen individual samples were generated during the 241-U-361 Tank sampling campaign. These included:

- Two supernate samples
- Seven sludge core segments
- Seven field blanks.

In addition, four empty samplers were submitted to the laboratory. These samplers represented core segments from the lower half of the tank at riser 4 that were unable to be collected. The reason for the sampler failure is presumed due to some unknown obstruction or condition within the tank.

All core samples, whether containing liquid or solid samples, were loaded into transportation casks and transported by truck to the laboratory. The casks were allowed to be retained in the field for a maximum of 48 hours in order to optimize the loading of the transportation truck.

All samples were accompanied by chain-of-custody documentation which provides information on the sample.

3.2 Core segment Extrusion, Composite Sample Preparation, and Laboratory Subsampling

3.2.1 Extrusion

Samplers were received by 222-S within transportation casks. The samplers were withdrawn from the casks and loaded into a hot cell equipped with an extrusion apparatus. The sampler was placed horizontally onto an extrusion tray. The sampler's plunger was held stationary while the sampler barrel was retracted. The sampler contents were deposited onto the extrusion tray as the barrel was retracted.

Any free liquid associated with the sample was collected in a jar through a small drain on the end of the tray.

After extrusion, the segment sample was visually observed, segregated into visible strata, measured, weighed and placed in to sample jars. Photographs of each segment sample are contained in Appendix A.

3.2.2 Composite Sample Preparation

Two sludge composite samples were generated in the 222-S hot cell. Samples of each strata were combined in a weighted average to generate a weight-averaged composite sample, representative of the entire depth of the core.

To accomplish this, laboratory technicians gently stirred each stratum sample to achieve visual homogeneity then weighed out the appropriate mass of material into the composite jar. When each composite jar was filled, it was also gently stirred with a spatula to visual homogeneity. Then the composite was subsampled for volatile organic analysis.

Subsequent to this subsampling, the composites were vigorously homogenized using a tissue homogenizer. Subsamples for the remaining tests were then generated from each composite jar, loaded out of the hot cell, and distributed to the laboratory for the various chemical analysis.

Details of the composition and stratum contributions are documented in the ATL laboratory report (D&D-36146).

3.3 Laboratory Analytical Results

The two supernate samples were processed by the laboratory as duplicate supernate samples.

The seven sludge core segments were individually extruded and individual strata were identified, and segregated into individual sample jars. Two independent composite samples were generated, each representing a mass-weighted combination of each stratum within the entire length of the sludge core.

Five of the field blanks were processed by the laboratory. Two of the collected field blanks were associated with core samplers with zero sample recovery, and were discarded.

Approximately 1,000 individual data results were reported by the laboratory, of which approximately 75% were supporting quality control (QC) data.

Table 3-1 shows the analytical results for each of the contaminants of concern (COC) in the two 241-U-361 supernate samples.

Table 3-2 shows the analytical results for each of the COCs in the two 241-U-361 sludge composites.

The data qualifiers associated with each result are also included in Tables 3-1 and 3-2. These qualifiers were applied by the laboratory and indicate where either some element of laboratory QC did not meet SAP criteria, the result exceeded the calibration range, the result should be considered an estimated value, or the parameter was not detected. A detailed presentation of the SAP QC requirements is presented in section 4.1. A detailed discussion of the QC performance and its impact on the 241-U-361 data is presented in Section 4.2.

Table 3-1. Chemical Analysis of 241-U-361 Supernate Samples.

Analyte	Units	Sample 1		Sample 2	
Percent water	% w/w	95		94.9	
pH	pH units	7.18		6.78	
Specific Gravity	g/mL	1.026		1.03	
ANIONS					
Fluoride	µg/mL	3.13	J	2.72	J
Chloride	µg/mL	264	J	255	J
Nitrite	µg/mL	496	J	486	J
Bromide	µg/mL	<265	U	<265	U
Nitrate	µg/mL	35600		35700	
Sulfate	µg/mL	414	J	525	J
METALS					
Silver	µg/mL	0.271	J	0.335	J
Arsenic	µg/mL	<1.20	U	<1.20	U
Barium	µg/mL	<0.100	U	<0.100	U
Cadmium	µg/mL	0.738	J	0.768	J
Chromium	µg/mL	<0.1	U	<0.100	U
Copper	µg/mL	<0.100	U	0.1	J
Lithium	µg/mL	<0.200	U	4.26	
Nickel	µg/mL	16.2		19.3	
Lead	µg/mL	<1.00	U	<1.00	U
Selenium	µg/mL	<2.00	U	<2.00	U
Mercury	µg/mL	1.03		1.07	
Strontium	µg/mL	77.8		77.1	
Uranium	µg/mL	31		24.3	
RADIONUCLIDES					
Co-60	µCi/mL	8.94E-06		7.75E-06	
Cs-137	µCi/mL	8.07E-03		8.09E-03	
Eu-154	µCi/mL	<1.12E-05	U	<1.18E-05	U
Eu-155	µCi/mL	<4.19E-05	U	<4.58E-05	U
U-233	µg/mL	<2.5E-04	U	<2.50E-04	U
U-234	µg/mL	2.06E-03		1.79E-03	
U-235	µg/mL	0.217		0.198	
U-236	µg/mL	8.16E-03		7.54E-03	
U-238	µg/mL	31.2		28.6	
Tc-99	µCi/mL	3.12E-03		3.23E-03	
Am-241	µCi/mL	<2.54E-06	U	<2.36E-06	U
Np-237	µCi/mL	<1.82E-05	U	<1.82E-05	U
Pu-239/240	µCi/mL	<1.96E-06	U	<1.63E-06	U
Pu-238	µCi/mL	<1.96E-06	U	<1.63E-06	U
Sr 89/90	µCi/mL	0.457		0.455	
VOLATILE ORGANIC COMPOUNDS					
COC					
Acetone	µg/L	77.3	BJ	171	B
Carbon Disulfide	µg/L	<0.750	U	<0.750	U
Bromomethane	µg/L	<2.45	U	<2.45	U
Chloromethane	µg/L	<1.55	U	<1.55	U
2-butanone	µg/L	9.69	J	22.5	J

Table 3-1. Chemical Analysis of 241-U-361 Supernate Samples.

Analyte	Units	Sample 1		Sample 2	
Methylene Chloride	µg/L	<0.850	U	1.27	J
Tetrachloroethene	µg/L	64.3		143	
Toluene	µg/L	0.741	J	0.961	J
Hexane	µg/L	<1.35	U	<1.35	U
METHOD-BASED ANALYTES					
1,1,1-Trichloroethane	µg/L			13.8	
1,1-Dichloroethene	µg/L	<0.850	U	<0.850	U
1-Butanol	µg/L			1060	J
2-Hexanone	µg/L				
2-Pentanone	µg/L				
Hexone	µg/L				
Benzene	µg/L	<0.800	U	<0.800	U
Chloroform	µg/L			4.65	
Chlorobenzene	µg/L	<0.550	U	<0.550	U
Ethylbenzene	µg/L				
Xylenes (total)	µg/L				
Total Trihalomethanes	µg/L			4.65	J
Tetrahydrofuran	µg/L			11	J
Trichloroethene	µg/L	5.18	J	16.5	
o-Xylene	µg/L				
SEMI-VOLATILE ORGANIC COMPOUNDS					
COC					
1,4-dichlorobenzene	µg/L	<103	U	<103	U
Acenaphthene	µg/L	<177	U	<177	U
Bis(2-ethylhexyl) phthalate	µg/L	1250	J	<359	U
2-Chlorophenol	µg/L	<167	U	<167	Ubc
Di-n-butyl phthalate	µg/L	<104	U	<104	U
Pentachlorophenol	µg/L	<57.2	U	<57.2	U
Pyrene	µg/L	<111	U	<111	U
TBP	µg/L	9540		12500	
Benzoic acid	µg/L	<408	U	<408	U
METHOD-BASED ANALYTES					
1,2,4-Trichlorobenzene	µg/L	<179	U	<179	U
2,4-Dinitrotoluene	µg/L	<94.5	U	<94.5	U
4-Chloro-3-methylphenol	µg/L	<122	U	<122	Ub
N-Nitroso-di-n-dipropylamine	µg/L	<167	U	<167	U
Phenol	µg/L	<158	U	<158	Ub
4-Nitrophenol	µg/L	<86.4	U	<86.4	U
POLYCHLORINATED BIPHENYLS					
Aroclor 1016	µg/L	<18.9	U	<18.9	U
Aroclor 1221	µg/L	<3.55	U	<3.55	U
Aroclor 1232	µg/L	<3.20	U	<3.20	U
Aroclor 1242	µg/L	<6.30	U	<6.30	U
Aroclor 1248	µg/L	<3.55	U	<3.55	U
Aroclor 1254	µg/L	7.7	J	21.4	
Aroclor 1260	µg/L	<14.3	U	<14.3	U

Table 3-1. Chemical Analysis of 241-U-361 Supernate Samples.

Analyte	Units	Sample 1	Sample 2
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Qualifiers:

U = Result is less than the calculated detection limit

J = Result should be considered an estimated value

B = Analyte detected in the sample and in the method or prep blank at >5% of the reported analyte concentration

E = Analyte concentration exceeded the calibration range

b = Matrix spike or matrix spike duplicate outside SAP limits (+/- 30%) and the spike concentration was >25% of the reported analyte concentration

c = Relative percent difference between duplicate samples exceeded SAP limits (+/-30%)

Table 3-2. Results of Chemical Analysis of 241-U-361 Sludge Samples.

Analyte	Units ⁽¹⁾	Composite 1		Composite 2	
Percent water	% w/w	71.1		71	
pH	pH units	8.10		8.10	
Bulk Density	g/mL	1.27	Q	1.26	Q
Asbestos		present			
ANIONS					
Fluoride	µg/g	594		658	
Chloride	µg/g	215		218	
Nitrite	µg/g	2190	B	2280	B
Bromide	µg/g	328	J	425	J
Nitrate	µg/g	23700		23700	
Sulfate	µg/g	904	J	944	J
METALS					
Silver	µg/g	138	cf	104	cf
Arsenic	µg/g	<56.4	U	<57.1	U
Barium	µg/g	49.3		49.8	
Cadmium	µg/g	<4.70	U	<4.76	U
Chromium	µg/g	371		363	
Copper	µg/g	59.4		60.3	
Lithium	µg/g	49.3	J	49.5	J
Nickel	µg/g	252		264	
Lead	µg/g	823		795	
Selenium	µg/g	<94.0	U	<95.2	U
Mercury	µg/g	3.72		3.5	
Strontium	µg/g	494		488	
Uranium	µg/g	124000	f	124000	f
RADIONUCLIDES					
Gross alpha	µCi/g	0.0672		0.0622	
Co-60	µCi/g	<4.87E-03	U	<4.74E-03	U
Cs-137	µCi/g	0.245		0.216	
Eu-154	µCi/g	<0.0140	U	<0.0142	U
Eu-155	µCi/g	<8.14E-03	U	<8.46E-03	U
U-233	µg/g	<0.0244	U	<0.0251	U
U-234	µg/g	6.68		6.61	
U-235	µg/g	810		803	
U-236	µg/g	14.3		14.7	
U-238	µg/g	123000		123000	

Table 3-2. Results of Chemical Analysis of 241-U-361 Sludge Samples.

Analyte	Units ⁽¹⁾	Composite 1		Composite 2	
Tc-99	μCi/g	0.0123		0.0125	
Am-241	μCi/g	2.36E-03		2.24E-03	
Np-237	μCi/g	<0.00435	U	<0.00331	U
Pu-239/240	μCi/g	0.0239		0.0224	
Pu-238	μCi/g	<1.13E-03	U	<1.1E-03	U
Sr 89/90	μCi/g	0.651		0.655	
VOLATILE ORGANIC COMPOUNDS					
COC					
Acetone	μg/Kg	1270	J	677	J
Carbon Disulfide	μg/Kg	<0.50	U	<0.475	U
Bromomethane	μg/Kg	<1.63	U	<1.55	U
Chloromethane	μg/Kg	<1.03	U	<0.981	U
2-butanone	μg/Kg	290		121	
Methylene Chloride	μg/Kg	4.38	J	1.53	J
Tetrachloroethene	μg/Kg	3450		2670	
Toluene	μg/Kg	52.6		12.6	
Hexane	μg/Kg	17.2	J	1.81	J
METHOD-BASED ANALYTES					
1,1,1-Trichloroethane	μg/kg	260	E	42	
1,1-Dichloroethene	μg/kg	5.97	B	1.66	J
1-Butanol	μg/kg	49300	E	13400	E
2-Hexanone	μg/kg	69.4	b, c	17.9	J
2-Pentanone	μg/kg	173		54.2	
Hexone	μg/kg	216	E	53.4	
Benzene	μg/kg	2.73	J	0.778	J
Chloroform	μg/kg				
Chlorobenzene	μg/kg	<0.367	U,c	<0.348	U
Ethylbenzene	μg/kg	50		5.31	
Xylenes (total)	μg/kg	123	E	48	
Total Trihalomethanes	μg/kg				
Tetrahydrofuran	μg/kg	258	J	758	E
Trichloroethene	μg/kg	144	E	26.3	
o-Xylene	μg/kg	200	E	20	
SEMI-VOLATILE ORGANIC COMPOUNDS					
COC					
1,4-dichlorobenzene	μg/kg	<7840	DU	<7760	DU
Acenaphthene	μg/kg	<8120	DU	<8030	DU
Bis(2-ethylhexyl) phthalate	μg/kg	<117000	DU	<115000	DU
2-Chlorophenol	μg/kg	<7660	DU	<7580	DU
Di-n-butyl phthalate	μg/kg	<52700	DU	<52200	DU
Pentachlorophenol	μg/kg	<6290	DU ^b	<6220	DU
Pyrene	μg/kg	<8040	DU ^b	<7960	DU
TBP	μg/kg	2190000	DJ	2020000	DJ
Benzoic acid	μg/kg	<45600	DU	<45200	DU
METHOD-BASED ANALYTES					
1,2,4-Trichlorobenzene	μg/kg	<7610	DU	<7530	DU
2,4-Dinitrotoluene	μg/kg	<8370	DU	<8280	DU

Table 3-2. Results of Chemical Analysis of 241-U-361 Sludge Samples.

Analyte	Units ⁽¹⁾	Composite 1		Composite 2	
4-Chloro-3-methylphenol	µg/kg	<7860	DU ^b	<7770	DU
N-Nitroso-di-n-dipropylamine	µg/kg	<7510	DU	<7430	DU
Phenol	µg/kg	<7720	DU	<7630	DU
4-Nitrophenol	µg/kg	<7440	DU ^b	<7370	DU
POLYCHLORINATED BIPHENYLS					
Aroclor1016	µg/Kg	<510	DU	<393	DU
Aroclor 1221	µg/Kg	<84.2	DU	<65.0	DU
Aroclor 1232	µg/Kg	<143	DU	<110	DU
Aroclor 1242	µg/Kg	<341	DU	<263	DU
Aroclor 1248	µg/Kg	<193	DU	<149	DU
Aroclor 1254	µg/Kg	9600	D	8330	D
Aroclor 1260	µg/Kg	<200	DU	<154	DU
OTHER ORGANIC ANALYSES					
Kerosene (NPH)	mg/Kg	8470	D	6740	DJ

⁽¹⁾ All results are for the sample *as received* except for Aroclors, which are reported on a *dry weight* basis.

Qualifiers:

- B = Analyte detected in the sample and in the method or prep blank at >5% of the reported analyte concentration
- D = Result for an organic analyte was reported from a dilution
- E = Analyte concentration exceeded the calibration range
- J = Result should be considered an estimated value
- Q = Result is qualitative only
- U = Result is less than the calculated detection limit
- b = Matrix spike or matrix spike duplicate outside SAP limits (+/- 30%) and the spike concentration was >25% of the reported analyte concentration
- c = Relative percent difference between duplicate samples exceeded SAP limits (+/-30%)
- f = Matrix spike recovery was outside the SAP limits (+/- 30%), but serial dilution results met the internal laboratory QC requirements

3.3.1 Method-Based Parameters

The laboratory provided analytical results for a number of volatile and semivolatile organic compounds that were not specifically identified as COCs. These are compounds for which the method is typically used, and which are included in calibration cocktails used to perform the method. These results are opportunistic in that the results are available within the production approach of the laboratory, even though they were not specifically identified as compounds of interest.

Volatile compounds reported as method-based parameters include 1,1,1-trichloroethane, 1-butanol, 2-hexanone, 2-pentanone, hexone (methyl isobutyl ketone), 1,1-dichloroethene, benzene, chlorobenzene, chloroform, ethylbenzene, xylenes (total), and o-xylene, tetrahydrofuran, total trihalomethanes, and trichloroethene

Semivolatile compounds reported as method-based parameters include 1,2,4-trichlorobenzene, 2,4-dinitrotoluene, 4-chloro-3-methylphenol, N-nitroso-di-n-dipropylamine, phenol, and 4-nitrophenol.

These results are supported by the same QC as the COC compounds and are flagged as appropriate. The method-based parameter results are included in Tables 3-1 and 3-2.

3.3.2 Tentatively-identified compounds

In addition to the specifically-requested volatile and semivolatile organic compounds, and the method-based parameters, the laboratory was directed to identify tentatively-identified compounds (TIC) in the 241-U-361 samples. These compounds are ones which are abundant enough to provide an analytical signal to the GC/MS, but are not recognized as one of the calibrated constituents. In some cases, positive identification of the TIC can be provided by examination of the mass spectrum and comparison to various approved mass spectrum libraries. Where positive compound identification is not possible, sometimes general compound type (e.g., hydrocarbon) may be possible.

The 241-U-361 samples contained significant quantities of kerosene, which is composed of scores of individual hydrocarbon compounds of various carbon length and geometry. Most of the identified TICs were unidentifiable or identifiable only as miscellaneous hydrocarbon compounds. Some nitrated phenolic compounds were detected. However, the laboratory believes that these compounds may have been generated during a sample preparation acidification step, given the very high nitrate levels in the sample. Several field blanks exhibited low levels of difluorodichloromethane (a Freon* compound). Most of the remaining TICs were consistent with the presence of kerosene and added no new information to the report. All TIC results are shown in the laboratory report data tables (Appendix A) but are not included in the data summaries within this section.

3.4 Tank Inventory

The 241-U-361 tank geometry and as-built details are shown in Hanford Site Drawing H-2-1749. Using the dimensions and elevation details, along with the zip-cord readings performed on July 17, 2007, the tank supernate volume is 1002 gal (3794 L) and the sludge volume is 26,400 gal (100,000 L) (see Table 3-3 for volume calculation details). Volume, weight and curie inventory for major constituents are calculated based on this volume and also shown in Table 3-3. Note that only constituents included in the 241-U-361 tank COC listing were included in the inventory. Major inorganic constituents may be present (e.g., Fe, Na, Si, carbonate, etc) and are included in the "other" category.

The tank sludge and supernate volume have been estimated several times in the past. The overall tank contents level has remained fairly constant for the past 20 years. In 1985 contents level was estimated at 141.5 inches; in 1994 it was measured at 142 inches and this sampling campaign measured 141.25 inches. The sludge seems to have settled as previous measurements indicated less than 2 inches of supernate, where this project measured the supernate layer as 5.5 inches thick.

Tank inventories of Sr-90 and Cs-137 in excess of 1,000 curies have been estimated based on historical data (WHC-SD-EN-ES-040). The current data show much lower inventories of these radionuclides. It appears that the Sr-90 and Cs-137 are enriched in the near-surface sludge, based on a much higher dose rate measured for the uppermost sludge sample. Historical samples may have been restricted to the upper layers of the sludge. This may have accounted for the high Cs-137 and Sr-90 inventory estimates, if these concentrations were assumed to be consistent throughout the sludge.

Historically, total uranium estimates for tank 241-U-361 have been reported in a range from 4,000 to 69,000 kg. The current sample results produce a total uranium inventory estimate of 15,800 kg.

* Freon is a registered trade name of E. I. du Pont de Nemours and Company.

Table 3-3. 241-U-361 Settling Tank Inventory ⁽¹⁾

Constituent	Units	Supernate	Sludge	Total
Total Volume	L	3794	100056	103850
Total Mass	Kg	3907	127071	130979
Major Constituents				
Water	Kg	3716	90220	93936
Uranium (total)	Kg	0.12	15757	15757
Nitrate	Kg	140	3012	3152
Sulfate	Kg	2.05	120	122
Kerosene	Kg	<0.1	1076	1076
TBP	Kg	<0.1	278	278
Tetrachloroethylene	Kg	<0.1	0.44	0.44
1-Butanol	Kg	<0.1	6.26	6.26
Other constituents	Kg	54	16601	16655
Radionuclides				
U-234	Ci	4.96e-5	5.36	5.36
U-235	Ci	1.81e-6	0.226	0.226
U-236	Ci	2.03e-6	0.121	0.121
U-238	Ci	4.02e-5	5.31	5.31
Pu-239/240	Ci	<7.44e-6	3.04	3.04
Am-241	Ci	<9.64e-6	0.310	0.310
Sr-90	Ci	1.76	84.1	85.9
Cs-137	Ci	0.031	31.1	31.1
Co-60	Ci	3.21e-05	<1.0	<1.0
Tc-99	Ci	0.0123	1.59	1.60

⁽¹⁾Tank Volume Calculations:

Tank OD - 20' 10" (H-2-1749)

Wall thickness - batters from 5" at top to 6" at bottom - use 5.5"

Tank ID = 19'11" = 19.917'

Radius = 9.9585'

Depth to supernate layer from top of riser 4 (measured July 07) = 11'5" = 11.42'

Depth to sludge layer from top of riser 4 (measured July 07) = 11'10 1/2" = 11.85'

Depth from top of riser 4 to bottom of tank (H-2-1749) = 694.90-671.71 = 23.19'

Depth of sludge layer = 23.19 - 11.85 = 11.34'

Depth of supernate layer = 5 1/2" = 0.43'

Total depth of tank contents = 23.19 - 11.42 = 11.77'

Volume of supernate = $(0.43)(\pi)(9.9585)^2 = 133.97 \text{ cu. ft.} = 1002 \text{ gal} = 3794 \text{ L}$

Volume of sludge = $(11.34)(\pi)(9.9585)^2 = 3533 \text{ cu ft} = 2643 \text{ gal} = 100056 \text{ L}$

Total contents = $(11.77)(\pi)(9.9585)^2 = 3667 \text{ cu ft} = 27433 \text{ gal} = 103849 \text{ L}$

1 cubic foot = 7.481 gal

1 cubic foot = 28.32 Liters

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4.0 DATA QUALITY ASSESSMENT

In accordance with the 241-U-361 SAP (DOE/RL-2006-34), no formal third-party validation was performed. However, the 241-U-361 data were evaluated and assessed by personnel independent of the actual sampling and analytical performance.

The U.S. Environmental Protection Agency (EPA) Data Quality Assessment (DQA) process was used to evaluate the quality and usability of the 241-U-361 data to answer the DQO decision statements. The DQA process compares completed field sampling activities to those proposed in corresponding sampling documents and provides an evaluation of the resulting data. The purpose of the data evaluation is to determine if quantitative data are of the correct type and are of adequate quality and quantity to meet the project DQOs. The EPA DQA process, EPA/600/R-96/084, *Guidance for Data Quality Assessment* (EPA 2000), identifies five steps for evaluating data generated from this project:

Step 1. Review Data Quality Objectives and Sampling Design. This step requires a comprehensive review of the sampling and analytical requirements outlined in the project-specific DQO summary report and SAP. An evaluation of the sampling design and its field implementation is also performed here. This step is documented in Section 4-1.

Step 2. Conduct a Preliminary Data Review. In this step, a comparison is made between the actual quality assurance (QA)/QC achieved (e.g., detection limits, precision, accuracy, completeness) and the requirements determined during the DQO. This step is documented in Section 4-2.

Step 3. Select the Statistical Tests. Using the data evaluated in Step 2, select appropriate statistical hypothesis tests or graphical data analyses and justify this selection. This step is documented in Section 4-3.

Step 4. Verify the Assumptions. Assess the validity of the data analyses by determining if the data support the underlying assumptions necessary for the analyses or if the data set must be modified (e.g., transposed, augmented with additional data) before further analysis. If one or more assumptions is questioned, return to Step 3. This step is documented in Section 4-4.

Step 5. Draw Conclusions from the Data. The data are used to address each of the decision statements developed during the DQO process. This step is documented in Section 4-5.

4.1 STEP 1 - Review Data Quality Objectives and Sampling Design

4.1.1 241-U-361 Settling Tank Contaminants

The 241-U-361 list of Contaminants of Concern (COC) was developed within the 241-U-361 DQO Process (D&D 28702). The DQO team identified all the possible contaminants of potential concern (COPC), based primarily on historical process operation information and existing field data. This relatively large COPC list was then evaluated to exclude contaminants based on sampling data (i.e., remedial investigation data), practical factors (e.g., short radionuclide half-life, process knowledge) and risk information (i.e., toxicological criteria or low/absent risk). Table 4-1 presents the final 241-U-361 COCs.

Table 4-1. Tank 241-U-361 Contaminants of Concern (from D&D 28702).

Nonradioactive COCs	Nonradioactive COCs	Radioactive COCs
1,4-Dichlorobenzene	Lead	Americium-241
2-Butanone	Mercury	Cesium-137
2-Chlorophenol	Methylene chloride	Cobalt-60
Acenaphthene	Nickel	Europium-154
Acetone	Nitrate (as nitrogen)	Europium-155
Arsenic	Nitrite	Neptunium-237
Barium	Normal paraffin hydrocarbon	Plutonium-238
Benzoic acid	Pentachlorophenol	Plutonium-239/240
Bis (2-ethylhexyl) phthalate	Pyrene	Strontium-90
Bromomethane	Selenium	Technetium-99
Cadmium	Silver	Uranium-233/234
Carbon disulfide	Strontium (metal)	Uranium-235
Chloride	Sulfate	Uranium-238
Chloromethane	Tetrachloroethene	
Copper	Total petroleum hydrocarbons	
Di-n-butylphthalate	Toluene	
Fluoride	Tributyl phosphate	
Hexane	Uranium (metal)	
Hexavalent chromium	Polychlorinated biphenyls	
Asbestos		

4.1.2 Quality Objectives and Criteria

DQO Decision Statements

The DQO process developed nine decision statements. The 241-U-361 tank SAP (DOE/RL-2006-34) was developed to gather characterization data that could address these questions, either directly, or in conjunction with other historical, process or engineering data.

- DS #1 – Determine if the radionuclides present in the waste material exceed the radiological criteria for disposal.
- DS #2 – Determine if the chemical and/or physical properties of the waste material exceed the disposal criteria limits.
- DS #3 – Determine if the waste material is regulated as listed dangerous waste.
- DS #4 – Determine if the characteristic dangerous waste codes (e.g., corrosivity, ignitability, reactivity, and toxicity) apply to the waste material.
- DS #5 – Determine if the waste material meets the definition of a toxic dangerous waste in accordance with Washington State criteria.
- DS #6 – Determine if the waste material meets the definition of a persistent dangerous waste in accordance with Washington State criteria.
- DS #7 – Determine if the waste material is regulated due to polychlorinated biphenyl (PCB) concentrations.

DS #8 – Determine if the waste material is regulated due to asbestos content.

DS #9 – Determine if land disposal restrictions (LDR) impose treatment for waste material.

4.1.3 Sampling and Analysis Objectives

The sampling design consisted of two grab samples from the tank supernate layer, and a full-length core sample, made up of individual 19-inch core segments, taken from a single riser. Riser 4 was identified as the single access point for tank contents sampling, based on earlier tank inspections and the assumption that the contents were uniformly and horizontally stratified. This stratification assumption was based on earlier sampling experience with another settling tank (241-Z-361) (refer to DOE/RL-2006-34).

Prior to sampling, a zip-cord would be used to determine the top of the supernate level and also the level of the sludge-supernate interface. It was anticipated that the supernate layer thickness would be thinner than the length of a push-mode sampler (<19 inches). The sampling crew was instructed to lower the sampler to a location within the supernate layer and withdraw the plunger without lowering the drill string. This would draw a supernate sample into the sampler, but would minimize entrainment of sludge solids and would also not include material that may be floating on the surface.

4.1.4 Data Quality Control Criteria

Tables 4-2 and 4-3 display the SAP quality control criteria applicable to the 241-U-361 supernate and sludge samples for radiological and nonradiological parameters, respectively.

Table 4-2. Radiological Analytical Performance Targets.

Contaminants of Concern	Chemical Abstracts Service #	ERDF Criteria (Ci/m3) ^a	Action Level (pCi/g) ^b	Name/Analytical Technology	Detection Limit Targets – Liquid (pCi/L) ^{b,f}	Detection Limit Targets – Sludge (pCi/g) ^{b,f}	Precision Req't (% Relative Percent Difference) ^c	Accuracy Req't (% Recovery) ^d
Americium-241	14596-10-2	0.05	335	Americium isotopic – AEA	1	1	±30%	70-130%
Cesium-137	10045-97-3	32	23.4	GEA	15	0.1	±30%	70-130%
Cobalt-60	10198-40-0	N/A	4.9	GEA	25	0.05	±30%	70-130%
Europium-154	15585-10-1	N/A	10.3	GEA	50	0.1	±30%	70-130%
Europium-155	14391-16-3	N/A	426	GEA	50	0.1	±30%	70-130%
Neptunium-237	13994-20-2	1.5E-03	59.2	Neptunium-237 – AEA	1	1	±30%	70-130%
Plutonium-238	13981-16-3	1.4	470	Plutonium isotopic – AEA	1	1	±30%	70-130%
Plutonium-239/240	PU-239/240	.029	425	Plutonium isotopic – AEA	1	1	±30%	70-130%
Strontium-90	10098-97-2	7000	22.5	Beta counting	2	1	±30%	70-130%
Technetium-99	14133-76-7	1.3	1	Technetium-99 – liquid scintillation	15 ^e	15 ^d	±30%	70-130%
Uranium-233/234	13966-29-5	140	1.76	Uranium isotopic – ICP/MS	1	1	±30%	70-130%
Uranium-235	15117-96-1	2.7E-03	1	Uranium isotopic – ICP/MS	1	1	±30%	70-130%
Uranium-238	U-238	.012	1.69	Uranium isotopic – ICP/MS	1	1	±30%	70-130%

^a ERDF criteria is the lower of the waste designation criteria, universal treatment standards for land disposal restriction (LDR), and component-specific ERDF acceptance criteria (see 40 CFR 268 and WCH-191).

^b The preliminary action level is the lowest regulatory / risk-based value used to determine appropriate analytical requirements (e.g., detection limits), which are consistent with those presented in DOE/RL-2003-23, *Focused Feasibility Study for the 200-UW-1 Operable Unit*.

^c Precision criteria for batch laboratory replicate sample analyses. Precision criteria for batch laboratory sample replicate and matrix spike replicate determinations are only applicable when results are greater than 5 to 10 times the method detection limit.

^d Accuracy criteria for associated batch laboratory control sample percent recoveries. With the exception of GEA, additional analysis-specific evaluations also are performed for matrix spikes, tracers, and carriers as appropriate to the method.

^e Because the Tc-99 action level (1 pCi/g) is lower than the standard laboratory detection limit (15 pCi/g), the laboratory will work to reduce the detection limit to better support design decisions, by increasing the sample size for extraction and/or maintaining a longer scintillation counting time for low-level samples.

^f The requested detection limits may not be achievable, based on sample sizes or dilutions required, because of sample activity or concentration of constituents in the samples.

AEA = alpha energy analysis.
GEA = gamma energy analysis.

ICP = inductively coupled plasma.
MS = mass spectrometry.

Table 4-3. Nonradiological Analytical Performance Targets.

Contaminants of Concern	Chemical Abstracts Service #	ERDF Criteria (mg/kg) ^a	Action Level (mg/kg) ^{b,c}	Name/Analytical Technology ^d	Detection Limit Targets – Sludge ^{e,h}	Detection Limit Targets – Liquid ^{e,h}	Precision Req't (% Relative Percent Difference) ^f	Accuracy Req't (% Recovery) ^g
<i>Metals</i>								
Arsenic	7440-38-2	100	6.47	Metals – 6010B – ICP or 6020 ICP/MS	1 mg/kg	0.5 mg/L	±30%	70-130%
Asbestos	N/A	N/A	N/A	PLM	1 %	N/A	N/A	N/A
Barium	7440-39-3	420	132	Metals – 6010B – ICP or 6020 ICP/MS	2 mg/kg	10 mg/L	±30%	70-130%
Cadmium	7440-43-9	2.2	0.81	Metals – 6010B – ICP or 6020 ICP/MS	0.5 mg/kg	0.005 mg/L	±30%	70-130%
Chromium (total)	7440-47-3	12	N/A	Metals – 6010B – ICP or 6020 ICP/MS	1 mg/kg	0.01 mg/L	±30%	70-130%
Copper	7440-50-8	N/A	217	Metals – 6010B – ICP	1 mg/kg	0.25 mg/L	±30%	70-130%
Lead	7439-92-1	15	118	Metals – 6010B-ICP or 6020 ICP/MS	5 mg/kg	0.1 mg/L	±30%	70-130%
Mercury	7439-97-6	0.5	2.09	Mercury – 7470A – CVAA	N/A	0.0005 mg/L	±30%	70-130%
				Mercury – 7471A – CVAA	0.2 mg/kg	N/A	±30%	70-130%
Nickel	7440-02-0	220	130	Metals – 6010B – ICP or 6020 ICP/MS	4 mg/kg	0.1 mg/L	±30%	70-130%
Selenium	7782-49-2	20	10	Metals – 6010B – ICP or 6020 ICP/MS	2 mg/kg	2 mg/L	±30%	70-130%
Silver	7440-22-4	2.8	13.6	Metals – 6010B – ICP or 6020 ICP/MS	0.2 mg/kg	0.02 mg/L	±30%	70-130%
Strontium	7440-24-6	N/A	2,920	Metals – 6010B – ICP or 60-20 ICP/MS	1 mg/kg	0.1 mg/L	±30%	70-130%
Uranium (metal)	7440-61-1	N/A	3.2	Uranium total – 6020 ICP/MS	1 mg/kg	0.0001 mg/L	±30%	70-130%
<i>Other Inorganics</i>								
Chloride	N/A	N/A	1,000	Anions – 9056 – IC	2 mg/kg	2 mg/L	±30%	70-130%
Fluoride	N/A	N/A	5.78	Anions – 9056 – IC	0.5 mg/kg	0.5 mg/L	±30%	70-130%
Nitrate	N/A	N/A	40	Anions – 9056 – IC	0.75 mg/kg	0.75 mg/L	±30%	70-130%
Nitrite	N/A	N/A	40	Anions – 9056 – IC	0.75 mg/kg	0.75 mg/L	±30%	70-130%
Sulfate	N/A	N/A	1,000	Anions – 9056 – IC	2 mg/kg	2 mg/L	±30%	70-130%

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Table 4-3. Nonradiological Analytical Performance Targets.

Contaminants of Concern	Chemical Abstracts Service #	ERDF Criteria (mg/kg) ¹	Action Level (mg/kg) ^{2,c}	Name/Analytical Technology ^d	Detection Limit Targets – Sludge ^{a,b}	Detection Limit Targets – Liquid ^{a,b}	Precision Req ^t (% Relative Percent Difference) ^f	Accuracy Req ^t (% Recovery) ^g
Organics								
1,4-Dichlorobenzene	106-46-7	6	0.03	8270C	0.005 mg/kg	0.005 mg/L	±30%	70-130%
2-Butanone	78-93-3	36	19.6	8260	19.6 mg/kg	19.6 mg/L	±30%	70-130%
2-Chlorophenol	95-57-8	5.7	0.943	8270C	0.943 mg/kg	0.943 mg/L	±30%	70-130%
Acenaphthene	83-32-9	3.4	133	8270C	0.33 mg/kg	0.33 mg/L	±30%	70-130%
Acetone	67-64-1	160	28.9	8260	0.02 mg/kg	0.02 mg/L	±30%	70-130%
Benzoic acid	65-85-0	N/A	257	8270C	16.5 mg/kg	16.5 mg/L	±30%	70-130%
Bis (2-ethylhexyl) phthalate	117-81-7	N/A	13.9	8270C	0.33 mg/kg	0.33 mg/L	±30%	70-130%
Bromomethane	74-83-9	15	0.01	8260	0.01 mg/kg	0.01 mg/L	±30%	70-130%
Carbon disulfide	75-15-0	96	5.65	8260	0.005 mg/kg	0.005 mg/L	±30%	70-130%
Chloromethane	74-87-3	30	0.0165	8260	0.01 mg/kg	0.01 mg/L	±30%	70-130%
Di-n-butylphthalate	84-74-2	28	56.5	8270C	3.3 mg/kg	3.3 mg/L	±30%	70-130%
Hexane	110-54-3	N/A	96.2	8260	1.0 mg/kg	1.0 mg/L	±30%	70-130%
Methylene chloride	75-09-2	30	0.33	8270C	3.3 mg/kg	3.3 mg/L	±30%	70-130%
Normal paraffin hydrocarbons ¹	TPH-KEROSENE TPH-DIESEL	N/A	2,000	8015D/NWTPH-Dx	5 mg/kg	2 mg/L	±30%	70-130%
Total petroleum hydrocarbons ¹	TPH-KEROSENE	N/A	2,000	8015D/NWTPH-Dx	8 mg/kg	8 mg/L	±30%	70-130%
Polychlorinated biphenyls	N/A	10	N/A	8082	0.02 mg/kg	0.02 mg/L	±30%	70-130%
Pentachlorophenol	87-86-5	7.4	0.33	8270C	3.3 mg/kg	3.3 mg/L	±30%	70-130%
Pyrene	129-00-0	8.2	655	8270C	0.33 mg/kg	0.33 mg/L	±30%	70-130%
Tetrachloroethene	127-18-4	6.0	0.0091	8260	0.005 mg/kg	0.005 mg/L	±30%	70-130%
Toluene	108-88-3	10	7.27	8260	0.005 mg/kg	0.005 mg/L	±30%	70-130%
Tributyl phosphate	126-73-8	N/A	6.18	8270C	3.3 mg/kg	3.3 mg/L	±30%	70-130%
Physical Properties								
pH	N/A	N/A	N/A	9040C/9045D	N/A	N/A	±0.2pH unit	±0.2pH unit
Bulk density (solids)	N/A	N/A	N/A	ASTM D2937 ¹	wt %	N/A	N/A	N/A
Moisture content	N/A	N/A	N/A	ASTM D2216 ¹	wt %	N/A	N/A	N/A
Particle size distribution	N/A	N/A	N/A	ASTM D422 ¹	wt %	N/A	N/A	N/A
Specific Gravity (liquids)	N/A	N/A	N/A	LA-510-112 (liquid)	g/mL	N/A	±30%	70-130%

Table 4-3. Nonradiological Analytical Performance Targets.

Contaminants of Concern	Chemical Abstracts Service #	ERDF Criteria (mg/kg) ^a	Action Level (mg/kg) ^{b,c}	Name/Analytical Technology ^d	Detection Limit Targets – Sludge ^{e,h}	Detection Limit Targets – Liquid ^{e,h}	Precision Req't (% Relative Percent Difference) ^f	Accuracy Req't (% Recovery) ^g
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^a ERDF criteria is the lower of the waste designation criteria, universal treatment standards for land disposal restriction (LDR), and component-specific ERDF acceptance criteria (see 40 CFR 268 and WCH-191). If the waste does not meet the waste designation criteria and is not designated as a dangerous waste, the LDR standards would not apply and the ERDF criteria would typically be much higher and would apply to fewer contaminants. For parameters where the LDR standards apply to the TCLP leachate, a conservative estimate of 20X the leachate concentration limit was used.

^b For waste disposal purposes, the action levels that apply to each of the contaminants of potential concern and contaminants of concern are the Resource Conservation and Recovery Act of 1976 waste designation levels (WAC 173-303, "Dangerous Waste Regulations") and BHI-000139, Environmental Restoration Disposal Facility Waste Acceptance Criteria. Analytical data for the contaminants of concern will be used to designate the waste streams and develop waste profiles.

^c The "Action Level" for the metals is based on total acid soluble metals, not toxicity characteristic leaching procedure by EPA Method 1311.

^d For American Society for Testing and Materials standards: ASTM D422, Standard Test Method for Particle-Size Analysis of Soils; ASTM D2216, Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass; ASTM 2937, Standard Test Method for Density of Soil in Place by the Drive-Cylinder Method.

^e Detection limit requirements are taken from DOE/RL-2003-23, Focused Feasibility Study for the 200-UW-1 Operable Unit.

^f Precision criteria for batch laboratory replicate matrix spike analyses or replicate sample analyses. Compounds spiked in the laboratory control sample or matrix spike are those specified in SW-846. Criteria based on laboratory statistical control limits are acceptable. Precision criteria for batch laboratory sample replicate and matrix spike replicate determinations are applicable only when results are greater than the estimated quantitation limit.

^g Accuracy criteria for associated batch matrix spike percent recoveries. Evaluation based on statistical control of laboratory control samples also is performed.

^h The requested detection limits may not be achievable, based on sample sizes or dilutions required, because of sample activity or concentration of constituents in the samples.

ⁱ Listed method may be substituted with an equivalent laboratory-specific procedure. Particle size/texture information may be provided by visual examination during extrusion.

^j NWTPH-Dx may not be necessary, based on the detectability of NPH within the semivolatiles GC/MS analysis (see text)

CVAA =	cold vapor atomic absorption.	ICP =	inductively coupled plasma.	PLM =	polarized light microscopy.
EPA =	U.S. Environmental Protection Agency.	N/A =	not applicable.	WAC =	Washington Administrative
IC =	ion chromatography.	MS =	mass spectrometry.	Code.	

4.1.5 Holding Time and Storage Condition

Table 4-4 lists the 241-U-361 holding times and preservation conditions prescribed for the COCs.

Holding time limits have been established by regulatory agencies to ensure timely sample analysis and because of potential analyte loss by physical processes from the sample container, and biodegradation, and chemical change after sampling. The sample holding time requirements for volatile organic analysis, PCBs, cyanide, mercury, and select anions, as specified in SW-846 (EPA 1986, as amended), are difficult to meet for many Hanford wastes. The logistics of collecting samples from the tanks, arranging transport to the laboratory, and processing the sample casks in the hot cells may take more time than the holding times allowed by the SW-846 methods. Many of the holding times for analytes other than metals by inductively coupled plasma (ICP) were not met during the sampling of Tank 241-U-361. The holding time for metals analyzed by ICP were met.

In addition to meeting holding times, the storage conditions and preservation requirements of SW-846 must be considered. The storage conditions and preservation requirements are included in the methods to minimize any effects of degradation caused by chemical reaction or light and minimize loss by vaporization.

Table 4-4. Sample Preservation and Holding Time Guidelines.

Analytes	Preservation	Packing Requirements	Holding Time ^a
Radionuclides			
Americium-241	None	None	None
Cesium-137	None	None	None
Cobalt-60	None	None	None
Europium-152	None	None	None
Europium-154	None	None	None
Europium-155	None	None	None
Neptunium-237	None	None	None
Plutonium-238	None	None	None
Plutonium-239/240	None	None	None
Strontium-90	None	None	None
Technetium-99	None	None	None
Uranium-233/234	None	None	None
Uranium-235	None	None	None
Uranium-238	None	None	None
Nonradionuclides			
Asbestos	None	Cool 4 °C	14 days
Polychlorinated biphenyls	None	Cool 4 °C	14/40 days
Volatile organic analytes – EPA Method 8260	None	Cool 4 °C	14 days
Semivolatile organic analytes – EPA Method 8270C	None	Cool 4 °C	14/40 days
pH – EPA Method 9045	None	None	ASAP; based on when water is added to the sample at the laboratory
Tributyl phosphate	None	Cool 4 °C	14/40 days
Inductively coupled plasma metals	None	None	6 months
Mercury	None	None	28 days
NWTPH-Dx	None	Cool 4 °C	14 days

Table 4-4. Sample Preservation and Holding Time Guidelines.

Analytes	Preservation	Packing Requirements	Holding Time ^a
Anions – nitrate – EPA Method 9056	None	Cool 4 °C	None established for analysis
Anions – nitrite – EPA Method 9056	None	Cool 4 °C	28 days/48 hours after extraction
Physical Properties^b			
Bulk density – ASTM D2937 °	None	None	None established for analysis
Moisture content – ASTM D2216 °	None	None	None established for analysis
Particle size distribution – ASTM D422 °	None	None	None established for analysis

^a Where two numbers are indicated with a “/” in between, the first number is the time from sample collection to extraction, and the second number is after extraction through analysis.

^b For American Society for Testing and Materials standards: ASTM D422, *Standard Test Method for Particle-Size Analysis of Soils*; ASTM D2216, *Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass*; ASTM 2937, *Standard Test Method for Density of Soil in Place by the Drive-Cylinder Method*.

^c Method may be substituted with an equivalent laboratory procedure.

ASAP = as soon as possible

NWTPH-Dx = northwest total petroleum hydrocarbons-diesel/kerosene.

4.1.6 Field Implementation and Performance of the Sampling and Subsampling Design

Although the original sampling design was unable to be accomplished due to sampling difficulties, the substitute design can still be considered as representative of the tank contents as the intended design. The base assumption that justified a single core from an arbitrarily-selected riser, is that the tank contents are horizontally stratified uniformly within the tank, and that one location would be as representative as another. Given this assumption, the selection of upper solids from one riser and lower solids from another riser should provide nearly as representative a composite as if all samples had been collected from a single riser. One relative weakness of the modified design would be a higher error if the contents were not stratified in horizontal layers. The greater the angle of stratification, the greater the likelihood of not incorporating some component of the sludge in the modified design relative to the original design. On the other hand, the modified design incorporates material from an incrementally wider lateral area of the tank contents (two locations) than the original design (single location), which may result in greater representativeness. As a single sample cannot evaluate the validity of the fundamental assumption regarding stratification, the modified design is considered as representative as the original.

The compositing process within the laboratory was well documented and accurately represented a weighted average of the entire depth of the tank sludge. One statistic that can be used to look at overall subsampling/compositing bias is the “average analyte error.” This is the average of sum of the relative percent differences between the two supernate samples or the two sludge composite samples. Some values will be positive, indicating the first composite provided a greater result; others will be negative, indicating that composite two yielded a greater concentration. If neither sample is generally biased high, all differences should average out and the average will be neither positive nor negative, but should approach zero.

Total variability exhibited by the two independently-generated 241-U-361 sludge composites, as measured by the average relative percent difference (RPD) between composite sample results, was -12.6% for the supernate samples and 16.9% for the sludge composites. Volatiles results exhibited high variability in the 241-U-361 samples, which is described in section 4.2.1.8. If the volatiles results variability is removed, the resulting total average RPDs reduce to -4.1% for the supernate and 2.9% for

the sludge. The low average RPD shows a lack of significant bias between the two composites, which validates precise compositing technique for all non-volatile parameters.

4.2 STEP 2 - Preliminary Data Review

The quality of the 241-U-361 data was generally adequate and met project objectives as presented in the 241-U-361 SAP. However, many QC elements were not met. The most significant of these were holding times and detection limits.

Most liquid holding times were met. However, due to the long elapsed time between the recovery of the first core segment and the final core segment, the holding times for the sludge composites generally were not met. These holding times were calculated based on the date of recovery of the first core segment which contributed tank sludge material to the composite sample.

The matrix of the sludge impacted the laboratory's ability to meet SAP detection limit targets, by several orders of magnitude in some cases. This was primarily due to the presence of percent levels of uranium, nitrate, kerosene (NPH) and TBP. These were all process or product chemicals and were expected to be present in the tank contents. The presence of these high-concentration parameters either prevented the analytical instrumentation from detecting trace levels of other elements by acting as a direct interferent, or necessitated high dilutions prior to introducing sample material into the analytical instrumentation. Both of these impacts resulted in unavoidable high detection limits for other related elements and compounds.

Detailed discussions of the performance of each type of QC element are presented in the following sections.

4.2.1 QC Element Review

In accordance with the 241-U-361 SAP, no formal third-party validation was performed. However, the following laboratory performance and QC elements were validated by personnel not directly involved with the performance or reporting of analytical laboratory work:

- Required deliverables
- Requested vs. reported analyses
- Transcription errors
- Holding times
- Method blanks
- Laboratory control samples
- Laboratory duplicates
- Surrogate recoveries
- Matrix spike and matrix spike duplicate recoveries.

4.2.1.1 Required Deliverables

All analytical determinations were performed by ATL, Inc in the Hanford 222-S Laboratory, with one exception. The asbestos determination was performed by CH2M HILL personnel, also at the 222-S Laboratory. The laboratory provided a formal narrative report for the 241-U-361 supernate and sludge samples on November 29, 2007 (D&D-36146). The report (D&D-36146) included the following elements:

Introduction: The report should contain a summary of the laboratory work. The summary shall identify (1) the tank; (2) the core; (3) the segment and sub-segments included in the report; and (4) the Letter of Instruction or other work-authorizing documentation used as the basis for the analyses.

Description of the Samples: This includes a brief description of the sample's physical characteristics (color, homogeneity, texture), including any unusual properties of the sample and any problems associated with subsampling or preparation. For core samples, the mass of recovered drainable liquid and the mass of recovered solids was provided. Photographs of each the extruded samples were included in the report.

Discussion of Analytical Results:

- Identification of the analytical methods used and any changes to the SAP-referenced method that may have been necessary to analyze the samples. The procedure number and revision will also be referenced in this section.
- Sample breakdown diagrams which document the way each sample was generated and split in order to perform all of the required analyses.
- Brief description of digestion/dissolution, preparation/separation, or extraction and analytical methods used.
- Identification of any sample QC or method problems (i.e., precision, accuracy, sensitivity) encountered during the analysis that may impact the results and their use for making safety, operations, or other decisions.
- Discussion of any observations that impact the overall quality of the analytical results (i.e., sample integrity).
- Description of any activities (reruns, replicate analyses, procedure modifications) that may have been used to verify the data.
- Description of any assumptions, corrections applied to the data, use of the method of standard additions, or calculations that may be important to interpretation of the data.
- Identification of any samples not analyzed or analyses required by the respective SAP or other work-authorizing document that were not performed, and on what sample each missing analysis was to be run.
- Inclusion of the CH2M HILL report describing the results of the asbestos determinations.

Data QC Results: The QC results are those needed to evaluate the sample, and results (duplicates, spikes, control standards, and preparation blanks). This includes:

- Sample identification, including the laboratory sample number, sample location (segment/core number, auger or grab sample number), and sample type (composite, subsegment, drainable liquid, field blank, preparation);
- Laboratory control standard, including percent recovery;

- Preparation blanks, including identity and concentration of each constituent identified;
- Sample and duplicate results, as well as results from replicate analyses;
- Results of spike, including percent recovery, and relative percent difference for each duplicate sample in the analytical batch;
- Surrogate analysis (gas chromatography/mass spectroscopy, gas chromatography, and high performance liquid chromatography analyses) including percent recovery for each surrogate;
- Detection limits; and
- Counting errors.

4.2.1.2 Requested vs. Reported Analyses

All analytes requested in the 241-U-361 SAP were reported in the ATL analytical report with one exception. Particle size determination was not determined. The SAP identified ASTM Method D422 which is a soil analysis method based on graduated sieves. The radioactivity of the sample would preclude the drying and sieving of significant quantities of the sample. Alternative microscopic methods would not provide the same information. As the 241-U-361 DQO did not specify the actual applicability of the results, and they are not necessary for waste designation or addressing any of the DQO decision statements, the project team decided not to pursue an alternative approach. Photographs and physical descriptions of the recovered sludge samples may be used to estimate gross physical properties of the tank sludge.

4.2.1.3 Transcription errors

No transcription errors were found in the laboratory report.

4.2.1.4 Holding times

Sample preservation and holding times were specified in the 241-U-361 SAP and are based on EPA guidance. Adherence to this guidance provides confidence that volatile or reactive species within samples are not allowed to be lost or to degrade between the time of sampling and the time of analysis. Holding times range from as soon as possible (ASAP) (pH for solids) to 6 months for metals by ICP. Radionuclides, anions by IC (except nitrite), %moisture, specific gravity of liquids, bulk density of solids do not have any holding time requirements identified in the SAP. In addition, no chemical preservation was specified. However, a requirement to cool samples to < 4 degrees C was placed on all organic and anion samples.

Most holding times for the field blank and supernate samples were met. On the other hand, only metals and radionuclide holding times for the sludge samples were met. Difficulties in meeting holding times included logistical delays in the field, transportation of tank cores to the laboratory, and processing the samples in the 222-S hot cells. The field sampling logistics resulted in the tank sludge core segments being collected and provided to the laboratory over a course of several weeks. As all laboratory determinations on the sludge were to be performed on a composite of all segments, the laboratory analysis could not begin until all of the segments had been generated and delivered to the laboratory. The first segment was collected on 8/14. The last segment was collected on 9/29. When the sludge composites were created in the laboratory on 10/8, the holding time for the constituent sludge samples ranged from 10 to 56 days. Table 4-5 shows the dates each sample was generated, and the date that each analysis was performed.

Table 4-5. Timeline of 241-U-361 Sampling and Analysis.

Sample	Date Sampled/ Generated	Delivered to Lab	Extruded	Composited	Asbestos	Mercury	Anions	ICP	Kerosene	PCB Extract	PCB	pH	SVOA Extract	SVOA	SVOA TBP	VOA
Supemate 1	8/14/2007	8/15/2007	8/15/2007			9/10/2007	9/4/2007	9/26/2007		8/26/2007	8/30/2007	9/11/2007	8/21/2007	8/29/2007		8/27/2007
Supemate 2	8/14/2007	8/15/2007	8/15/2007			9/10/2007	9/13/2007	9/26/2007		8/26/2007	8/30/2007	9/11/2007	8/21/2007	8/29/2007		8/27/2007
Segment 1	8/14/2007	8/15/2007	8/15/2007													
Segment 2	8/14/2007	8/15/2007	8/16/2007													
Segment 3	8/14/2007	8/15/2007	8/20/2007													
Segment 4	8/15/2007	8/15/2007	8/20/2007													
Segment 5	9/29/2007	9/29/2007	10/1/2007													
Segment 6	9/29/2007	9/29/2007	10/1/2007													
Segment 7	9/29/2007	9/29/2007	10/1/2007													
Composite 1				10/8/2007	11/9/2007	10/11/2007	10/10/2007	10/15/2007	10/22/2007	10/12/2007	10/22/2007	10/11/2007	10/9/2007	10/17/2007	11/6/2007	10/9/2007
Composite 2				10/8/2007	11/9/2007	10/11/2007	10/10/2007	10/15/2007	10/22/2007	10/12/2007	10/16/2007	10/11/2007	10/9/2007	10/17/2007	11/6/2007	10/9/2007
FB 1	7/23/2007	8/15/2007	8/16/2007			9/10/2007	9/4/2007	9/26/2007		8/26/2007	8/30/2007	9/11/2007	8/21/2007	8/29/2007		8/20/2007
FB 2	7/25/2007	8/15/2007	8/16/2007			9/10/2007	9/4/2007	9/26/2007		8/26/2007	8/30/2007	9/11/2007	8/21/2007	8/29/2007		8/20/2007
FB 3	8/14/2007	8/15/2007	8/16/2007			9/10/2007	9/4/2007	9/26/2007		8/26/2007	8/30/2007	9/11/2007	8/21/2007	8/29/2007		8/20/2007
FB 4	8/15/2007	8/15/2007	8/16/2007			9/10/2007	9/4/2007	9/26/2007		8/26/2007	8/30/2007	9/11/2007	8/21/2007	8/29/2007		8/20/2007
FB 5	9/11/2007	9/12/2007	not used													
FB 6	9/12/2007	9/12/2007	not used													
FB 7	9/29/2007	9/29/2007	10/1/2007			10/9/2007	10/10/2007	10/15/2007		10/12/2007	10/15/2007	10/15/2007	10/8/2007	10/17/2007		10/8/2007

The following subsections discuss specific holding times that were not met.

4.2.1.4.1 Holding Times - Field Blanks

Field blanks 1 and 2 were generated about 3 weeks prior to the generation of the first sample segment. The laboratory retained these samples to be run in the same batches with the sludge samples. Therefore holding times for Field blank 1 and 2 were not met for PCB extraction, Volatile organic analysis, Semivolatile extraction, mercury, anions, TBP, and pH. PCB analyses were performed on day 16 and 17 for field blanks 3 and 4, respectively. This exceeds the 14-day holding time guidance.

All other SAP-prescribed holding times were met for field blank samples.

4.2.1.4.2 Holding Times - Supernate Samples

Supernate pH was performed on day 17, which is past the holding time requirement of the SAP. All other holding times were met for the supernate samples.

4.2.1.4.3 Holding Times - Sludge Samples

All holding times were missed except for pH, nitrite, and metals by ICP, due to laboratory having to wait until all sludge samples had been received to create the composites for analysis.

4.2.1.5 Preservation and Sample Holding Conditions

There was no chemical or temperature preservation of the samples prior to delivery to the laboratory or during the extrusion/subsampling process. The sample casks were maintained within the range of normal ambient temperatures while being staged at the laboratory.

The temperature of the hot cell was documented during compositing/extrusion.

Storage temperature during transport and work in hot cells is difficult to control. Storage of the segments in large transportation casks may be either outside or in rooms in the laboratory. Refrigerators cannot be placed in the hot cells, because of heat overloading on the air handling systems for the hot cells. The samples, therefore, cannot be preserved or stored under cold conditions as typically required for volatiles, PCBs, cyanide for solids and liquids, anions, and mercury on solids until the segment is extruded and waste is subsampled for analysis.

Where Table 4-4 prescribes cooling, the subsamples were stored under refrigerated conditions from the time they are loaded out of the hot cells until analysis has been completed.

The temperature and preservation issues may have contributed to the high volatiles variability and combine with holding time and physical compositing issues to flag all volatiles data as estimates.

4.2.1.6 Field Blanks and Method Blanks

Field blanks were collected for each day that push-mode samples were generated. These blanks were generated in the field by flowing reagent water through a core segment sampler prior to its deployment in the tank. In the laboratory, the field blank water was flowed over the extrusion tray to include a measure of the adequacy of cleaning technique in the hot cells. Thus, these field blanks include potential sample contamination from sampling, transportation and hot cell extrusion activities.

There were four field blanks generated during the 241-U-361 sampling campaign. The field blanks demonstrated no contamination resulting from the field, transportation, and extrusion sequence with the following exceptions:

Field blanks displayed very low levels of various anions, mercury, cesium-137, strontium-89/90, uranium isotopes and bis-(2-ethylhexyl) phthalate. The phthalate ester is a ubiquitous compound usually associated with plastic products. The mercury results are apparently due to a laboratory calibration artifact (see laboratory report – Appendix A for more details). All other low level contamination likely arose from the blank contact with the hot cell extrusion tray and represents carryover from the extremely high levels seen in the supernate and sludge samples, although some of these constituents are present in the laboratory method blanks, which are not contacted by the extrusion tray, but do monitor laboratory-associated contamination. None of the levels impacts the quality of the data as even the most concentrated results represent less than 10% of any reported result for a sludge or supernate sample.

Method blanks are processed and analyzed to identify potential evidence of laboratory contamination. They are generated using laboratory reagent water at the time of sample preparation and are carried through the preparation and analysis sequence with the samples. Over 180 individual analyte determinations on method blanks were performed. All were reported at below detection limits with eight exceptions:

Low levels of mercury were detected in method blanks associated with samples. These levels were approximately 4 orders of magnitude lower than the supernate mercury results. The laboratory report indicates that this is likely to be an artifact of the mercury calibration curve at levels near the detection limit. It does not affect the supernate value which is much higher.

Low levels of mercury were detected in method blanks associated Field Blank samples. They are similar in magnitude to the results reported for field blank samples. The laboratory report indicates that this is likely to be an artifact of the mercury calibration curve at levels near the detection limit. All field blank results are qualified "J" as an approximate value that may be the result of laboratory artifacts.

Low levels of nitrate and nitrite were detected in the method blank associated with the sludge composite samples. This level was over 5 orders of magnitude lower than the reported values for nitrate in the samples so is considered insignificant. However, the nitrite level in the blank was about 10% of that found in the composite sludge samples, so "B" flags were assigned to the sludge nitrate values.

Low levels of strontium-90 were detected in the method blank associated with the supernate samples. This level was over 5 orders of magnitude less than the reported value and is considered insignificant.

Low levels of strontium-90 were detected in the method blank associated with the field blank samples. Low levels of strontium-90 were also detected in the field blank samples. The value was less than 5% of the results for Field Blanks 1 and 3, but was more significant when compared to the results of Field Blank 2 and 4. These values were flagged "B" indicating the potential for the result to be positively biased.

A low level of neptunium-137 was reported in the method blank associated with the sludge composite samples. This detection is similar to the reported level in both composite samples. However, this value is lower than the calculated minimum detectable limit and so all results are flagged as "U."

A low level of acetone was detected in the volatiles method blank associated with the supernate samples. It is less than 5% of the value in the supernate samples and considered insignificant.

Di-n-butyl phthalate was detected in the semivolatiles method blank associated with the sludge composite samples. Although a fairly high concentration (6710 µg/kg), if present, it did not exceed the reporting limits for the composite samples. As described elsewhere, the semivolatile organic compound reporting limits for were greatly inflated for the sludge composites due the presence of very high levels of kerosene and TBP.

4.2.1.7 Laboratory Control Samples

Laboratory control samples are mid-range standards, processed and run along with samples to verify that the analytical system is within operating control with respect to accuracy.

All laboratory control samples were recovered within the SAP-required limits of 70-130% with the following exceptions:

Semivolatile recoveries for acenaphthene, 1,4-dichlorobenzene, and pentachlorophenol were below the SAP requirements. Although less than the 70% SAP criterion, they were still within the laboratory statistical control parameters for these analytes, and represent typical laboratory performance which would not be expected to improve upon re-analysis.

Semivolatile recovery for 1,4-dichlorobenzene and 2-chlorophenol were below SAP requirements. Although less than the 70% SAP criterion, they were still within the laboratory statistical control parameters for these analytes, and represent typical laboratory performance which would not be expected to improve upon re-analysis.

4.2.1.8 Laboratory Duplicates

Laboratory duplicates provide a measure of the precision of the analytical system. The laboratory generated a laboratory duplicate for supernate 1 and also for sludge composite 1. Laboratory duplicates were performed for all methods except VOA, SVAO and kerosene which call for matrix spike/matrix spike duplicates. Duplicates were generated for supernate and sludge composites only. Lab duplicates were not generated for field blank samples.

All supernate duplicates met the SAP precision requirement of +/- 30% RPD.

All sludge composite laboratory duplicates met the SAP precision requirement except for silver which had an RPD of 43%. The laboratory suggests that this may be due to silver precipitation within the sample digestion step or gross heterogeneity in the sample itself. The sample result was flagged with a "c" to indicate duplicate RPD failure.

For the 241-U-361 project, the two supernate samples are considered duplicates. In addition, the two sludge composites are considered duplicates. This gives precision data for all analytes and would include imprecision due to field and compositing variability.

Looking at the two supernate samples as duplicates, all parameters reported above detection limits met the +/-30% precision limit except for PCB (Aroclor 1254) and 3 out of 4 volatile organic compounds. The PCB RPD was 94% and the three VOA exceedances were 75% for acetone, 76% for tetrachloroethene and 80% for 2-butanone. It is interesting to note that one of the samples was higher than the other for all of the volatiles, suggesting that the samples themselves differed. This could be due to true differences in the sampled material or differences in handling or storage conditions that affected all similar constituents similarly.

Within the sludge samples, a similar observation can be made: 5 of the 6 reported VOAs exceeded the SAP precision requirement, ranging from 25-161%RPD. All other parameters met the SAP precision requirement between the two sludge composites.

On the basis of the precision data and the holding time data, all volatiles results should be considered minimum values.

4.2.1.9 Surrogate Recoveries

Volatile, semivolatile, and NWTPH-kerosene analyses use surrogates. Surrogates are compounds that are not likely to be present in a sample but are similar, chemically, to target analytes. They are introduced into the sample prior to the extraction step to monitor the efficiency of the extraction and analysis process. The SAP accuracy criteria or alternative laboratory statistically-based criteria are applicable.

Volatiles liquids surrogates all met SAP-required criteria except for 1,2-dichloroethane-d4 in Field Blank 3 that was recovered at 133%. An over-recovery that is only slightly greater than the criteria is not significant.

Several volatiles surrogates were outside the SAP criteria. The solid samples for volatiles were analyzed at three different sample sizes, as the samples contained large amounts of TBP (a target component) and kerosene (an interferent in this test). Two of the four surrogates were recovered consistently within criteria. The third (toluene-d8) was recovered within limits except for a single overrecovery of 133% on the composite 1 matrix spike duplicate. This is not considered significant. However, the fourth surrogate, bromofluorobenzene was poorly recovered from the actual solids samples throughout all of the volatiles batches. Bromofluorobenzene recovery was significantly above 100% for 9 of the 12 sludge samples analyzed, ranging from 136-888%. One recovery was 0%. The remaining two were barely within range at 128 and 122%.

Thirty-nine of 126 individual semivolatile surrogate results exceeded SAP criteria. When surrogates introduced into semivolatiles samples were evaluated against laboratory administrative limits of 50-150%, the exceedances reduced to 17 out of 126, all on the water-matrix batch. The samples posed challenges to the semivolatile analytical method on the sludge samples, primarily due to the presence of relatively large TBP and kerosene concentrations. These drove significant extract dilutions prior to GC/MS injection, which diluted the surrogates below detectable levels.

For the water matrix batches, 2-fluorobiphenyl was poorly recovered from both field blank and supernate samples. Low recoveries of phenol compounds in the supernate matrix were attributed by the laboratory to nitration of these compounds during a sample acidification step, in the presence of high nitrate concentrations in the samples. This was supported by the appearance of 2-nitrophenol-d4 and 2-fluoro-6-nitrophenol in the samples. These are nitrated surrogates and extremely unlikely to have been present in any field sample.

4.2.1.10 Matrix Spike and Matrix Spike Duplicate Recoveries

Matrix spikes are a measure of how well the analytical system can accurately detect a known concentration of an analyte of interest when it is introduced into the sample itself prior to analysis. The results indicate whether or not sample-specific attributes can attenuate the analytical system's ability to accurately measure an analyte.

Matrix spikes were measured for anions, metals, some radionuclides, Aroclor-1254, and some volatiles and semivolatiles. For the supernate batches, all matrix spike recoveries met SAP requirements except for Sr-89/90 and three semivolatile compounds.

For the Solids batches, all matrix spike recoveries were met except for silver, uranium, Aroclor-1254, kerosene, and three semivolatile compounds. The uranium and kerosene, performance is a direct result of percent levels of uranium, kerosene and TBP in the sample such that the small spike amounts were overwhelmed. The kerosene values were assigned a "D" flag.

The uranium results were verified using serial dilution and post-digestion spike results. These QC criteria were met (see Appendix A). The uranium values were assigned an "f" flag.

The failed spike recovery for silver was attributed to possible precipitation during the acid digestion step. Silver results for supernate were assigned a "J" flag and the sludge results were assigned an "f" flag.

Aroclor 1254 and some semivolatile spike recoveries did not meet the SAP requirements but most were within the laboratories own statistically-based performance control standards. Where even laboratory internal statistical control recoveries were low, a "b" flag was assigned.

4.2.1.11 QC Summary

Due to the holding time issue, all volatiles and nitrite results should be considered minimum values.

The field blank samples generally demonstrated that the sample processing did not add significantly to the contaminant levels in the samples. Low levels of certain parameters were likely due to the exposure to the extrusion tray in the hot cells. This is difficult to clean using the remote handling techniques available. However, the levels of contaminants in the blanks are generally low relative to the levels in the samples themselves. Acetone in the supernate and nitrate in the sludge were the only parameters where a blank value exceeded 5% of a reported value above the detection limit. These two reported results may be slightly biased high.

All laboratory control standard flags were due to SAP requirements being more stringent than statistically-based laboratory standards. These statistically-based standards represent typical laboratory performance and are an acceptable alternative standard to the generic SAP requirements. Laboratory precision as measured by duplicates is acceptable for all parameters except silver in the sludge composites. The silver results were flagged as being potentially underrecovered and should be considered minimum values.

Due to the large amounts of kerosene, TBP and nitrate, volatiles and semivolatile performance was impacted. Most semivolatile detection limits were elevated, samples had to be diluted, and some nitration was evident in the samples, generating spurious compounds. All these are flagged in the data set.

Finally the laboratory flagged many results as "J" or estimated, due to their nearness to a detection limit.

Table 4-6 shows a summary of the numbers of results and the number and percent of those results that were qualified by some type of QC flag. Note that some results may have been assigned more than one QC flag. The overall number of unqualified results, including non-detected values carrying only a "U" flag, represented 79% of the total number of reported results.

Table 4-6. Summary of 241-U-361 Data Qualifiers.

	Number of flagged results	Percent of total
Total number of results	516	100
B	4	0.8
D	34	6.6
E	0	0
J	59	11
Q	16	3.1
U	363	70
b	3	0.6
c	2	0.4
f	2	0.4
Unqualified results (includes U flag with no other flag)	406	79

In summary, the 241-U-361 data qualifiers do not justify rejection of the data for addressing the 241-U-361 DQO Decision Statements, as none of the conclusions rely solely upon flagged data near a decision point. However all data qualifiers and the holding time issue, particularly for the volatiles and nitrite data, must be specifically considered if the data are used for any other purpose.

4.3 STEP 3 – Selection of Statistical Tests

The 241-U-361 Tank DQO process prescribed that tank content characterization decisions would be based upon the highest single-sample concentrations for each constituent of interest. This is a non-statistical data evaluation technique and assumes no specific distribution of the data. There is a tacit assumption that there are no outliers, i.e., all of the reported data are representative of the samples presented to the laboratory and all of the samples generated are representative of the tank material.

4.4 STEP 4 – Verify Assumptions

As selection of the greatest single-sample reported concentration is a non-statistical process. The only assumptions are representativeness of the samples.

4.5 STEP 5 – Draw Conclusions from the Data

Conclusions to be drawn from the 241-U-361 samples were identified during the DQO process and have been presented in the form of decision statements in the DQO final report.

4.5.1 DQO Decision Statements

The DQO process resulted in the development of 9 decision rules which the collected data were to be applied.

DS #1 – Determine if the radionuclides present in the waste material exceed the radiological criteria for disposal.

Result: The radionuclides in the 241-U-361 sludge exceed concentration and total inventory screening criteria found in the ERDF Waste Acceptance Criteria document. A waste specific evaluation and determination by ERDF would be required prior to disposal. Stabilization is likely to be required prior to disposal.

The waste does not exceed 100nCi/g of alpha-emitting transuranic isotopes with half-lives greater than 20 years.

The waste is less than Class C as defined in 10 Code of Federal Regulations (CFR) 61.55.

The waste does not contain pyrophoric material.

See Section 4.5.2.2 for details.

DS #2 – Determine if the chemical and/or physical properties of the waste material exceed the disposal criteria limits.

Result: The waste does not exceed physical or chemical restrictions for ERDF disposal. However, if the waste is designated as dangerous per the toxicity characteristic, treatment would be required to meet land disposal restrictions regulations (DS#9). See Section 4.5.2.3 for details.

DS #3 – Determine if the waste material is regulated as listed dangerous waste.

Result: Determination of the presence of listed dangerous waste in the 241-U-361 waste relies upon a diligent historical record search which is beyond the scope of this characterization report. See Section 4.5.3.1 for details.

DS #4 – Determine if the characteristic dangerous waste codes (e.g., corrosivity, ignitability, reactivity, and toxicity) apply to the waste material.

Result: The 241-U-361 sludge contains certain constituents that may trigger a toxicity characteristic designation at the point of generation, depending on the methodology and nature of the disposition approach, and results of a waste-specific toxicity characteristic leaching procedure (TCLP) test. See Section 4.5.3.2 for details.

DS #5 – Determine if the waste material meets the definition of a toxic dangerous waste in accordance with Washington State criteria.

Result: The 241-U-361 tank waste had not been evaluated for Washington State toxicity at this time. A book designation needs to be performed, if applicable. Washington Administrative Code (WAC)-173-303-100(5). See Section 4.5.3.3 for details.

DS #6 – Determine if the waste material meets the definition of a persistent dangerous waste in accordance with Washington State criteria.

Result: The 241-U-361 tank waste does not meet the definition of a persistent dangerous waste per WAC 173-303-100(6). See Section 4.5.3.4 for details.

DS #7 – Determine if the waste material is regulated due to PCB concentrations.

Result: Although detectable, the PCB concentrations in the 241-U-361 tank contents are below applicable regulatory criteria. See Section 4.5.4 for details.

DS #8 – Determine if the waste material is regulated due to asbestos content.

Result: The 241-U-361 tank sludge was found to contain amosite asbestos at levels that would trigger management requirements in accordance with 40 CFR 61.140 through .157. See Section 4.5.5 for details.

DS #9 – Determine if land disposal restrictions impose treatment for waste material.

Result: In the event that 241-U-361-derived waste is designated as exhibiting the toxicity characteristic at the point of generation, then it is likely that the LDR will impose treatment to remove or immobilize several constituents. See Section 4.5.6 for details.

4.5.2 Comparison to ERDF Acceptance Criteria

The tank content analytical results were compared to acceptance criteria found in the ERDF Waste Acceptance Criteria Document (WCH-191, *Environmental Restoration Disposal Facility Waste Acceptance Criteria*), and the ERDF Supplemental Waste Acceptance Criteria Document (0000X-DC-W001, Rev 6, "Supplemental Waste Acceptance Criteria for Bulk Shipments to the Environmental Restoration Disposal Facility").

4.5.2.1 Free liquids

As the material sits in the tank, the supernate represents free liquid and would be prohibited from being placed directly into ERDF without any additional processing.

4.5.2.2 NRC Classification

NRC Classification was performed in accordance with criteria found in 10 CFR 61.55. This comparison requires isotopic concentrations of Pu-239, -240, and 241 which were not available in the laboratory data. Estimates for these parameters were based on modeling of the fuel portion of the waste as a 6% Pu-240 fuel as specified in Table III of UNI-1983, using a 30-year decay. This was able to provide an estimate of the Pu-239/240 allocation as well as an estimate of Pu-241/Am-241 ratio.

Table 4-7 shows the measured and calculated isotopes of interest, and the results of the classification. Since the 10 CFR 61.55 Table 1 ratio sum-of-the-fractions is less than 1, indicating that the 241-U-361 waste is less than Class C, evaluation against Table 2 criteria is unnecessary.

Table 4-7 also shows the transuranic isotope content calculation. The 241-U-361 sludge does not exceed the threshold of 100 nCi/g.

Table 4-7. 241-U-361 Sludge NRC and Transuranic Isotope Evaluation.

Radionuclide	Concentration ⁽¹⁾ uCi/g	NRC Table 1 ⁽²⁾ Ci/m ³	NRC Table 1 ⁽²⁾ nCi/g	Table 1 ratio ⁽²⁾	Transuranic Isotope nCi/g
Tc-99	1.25E-02	3.00E+00		5.29E-03	
Np-237	4.35E-03		100	4.35E-02	4.35E+00
Pu-238	1.13E-03		100	1.13E-02	1.13E+00
Pu-239 ⁽³⁾	2.15E-02		100	2.15E-01	2.15E+01
Pu-240 ⁽³⁾	2.43E-03		100	2.43E-02	2.43E+00
Pu-241 ⁽⁴⁾	2.26E-02		3500	6.46E-03	
Am-241	2.36E-03		100	2.36E-02	2.36E+00
NRC Table 1 Sum of Fractions				3.29E-01	
Total Transuranic Isotope					3.18E+01

(1) - concentrations from laboratory results - Table 3-1, except as noted

(2) - Table 1 from 40 CFR 60.55

(3) - Pu-239/240 individual concentrations estimated from combined laboratory result and model ratio from 6%Pu-240 fuel from UNI-1983 Table III decayed 30 years

(4) - Pu 241 concentration estimated from Am-241 laboratory results and model ratio from 6%Pu-240 fuel from UNI-1983 Table III decayed 30 years

4.5.2.3 Radiological content

Table 4-8 shows the radioisotope content of the 241-U-361 sludge, along with the associated ERDF acceptance criteria WCH-191. Note that all results have been converted to the units of Ci/m³.

Table 4-8. Comparison of 241-U-361 Results to ERDF Radionuclide Acceptance Criteria.

Radionuclides	Ci/m ³	ERDF Criterion (1)	U-361 max	sum-of-fraction
Americium-241		5.4E-02	3.00E-03	0.0555
Cesium-137		3.2E+01	3.11E-01	0.0097
Cobalt-60		Unlimited	<6.18E-03	
Europium-154		Unlimited	<1.80E-02	
Neptunium-237		1.5E-03	<5.52E-03	3.6830
Plutonium-238		1.5E+00	<1.44E-03	0.0010
Plutonium-239/240		2.9E-02	3.04E-02	1.0467
Plutonium-241 (2)		5.6E+00	2.87E-02	0.0051
Strontium-90		7.0E+03	8.32E-01	0.0001
Technetium-99		1.3E+00	1.59E-02	0.0122
Uranium-233/234		7.4E-02	5.34E-02	0.7223
Uranium-235		2.7E-03	2.26E-03	0.8382
Uranium-238 + daughters		1.2E-02	5.31E-02	4.4260
				10.7997

Shaded cells indicate values that exceed the applicable criterion.

Undetected nuclides were evaluated at the detection limit

(1) from *Environmental Restoration Disposal Facility Waste Acceptance Criteria*, WCH-191, Revision 0, January, 2008.

(2) Pu-241 value was calculated using the method described in Section 4.5.2.2.

As shown in the table, the 241-U-361 sludge does not meet the ERDF radioisotopic screening levels for either U-238 or Pu-239. The sum-of-the-fractions exceed 10 times the ERDF screening criterion of 1.0. Note that the Np-237 maximum detectable activity limit is above the acceptance criteria. This detection limit was used in the evaluation. If the Np-237 was treated as non-contributory, the sum-of-the-fractions would be 7.0, which still exceeds the criterion.

In addition, total uranium and technetium-99 exceed ERDF total Curie "Trigger Levels" listed in WCH-191 as shown in Table 4-9.

Table 4-9. Comparison of 241-U-361 Tank Inventory with ERDF Trigger Levels.

Radionuclide	Trigger Level (total Ci)	U-361 (total Ci)
Total U	3.0	11.0
Tc-99	0.6	1.59

Note: Inventory includes contributions from sludge and supernate.

Although none of these radiological evaluations prohibit disposal at ERDF *per se*, the ERDF acceptance criteria state that inability to meet the published screening levels would require waste-specific evaluation and pre-planning with the ERDF personnel.

4.5.2.4 Chemical Constituents

Table 4-10 shows the physical/chemical ERDF acceptance criteria (WCH-191, Section 4.2.1, Table 1) as well as the maximum 241-U-361 sludge analytical results for those constituents analyzed for. The 241-U-361 tank sludge does not contain individual chemical constituents at levels that exceed the applicable criteria.

Table 4-10. Comparison of 241-U-361 Results to ERDF Chemical Acceptance Criteria.

Constituent	Units	ERDF Criterion	U-361 max
Benzo (a) pyrene	mg/kg	2.5E+04	
Benzo (k) fluoranthene		2.5E+04	
4,4'-DDD		7.6E+05	
4,4'-DDE		5.4E+05	
PCBs		5.0E+02	9.6
Beta-BHC (lindane)		3.3E+03	
Antimony		1.9E+04	
Arsenic		3.0E+03	<57.1
Barium		9.4E+05	49.8
Cadmium		3.9E+04	<4.76
Chromium (total)		5.9E+04	371
Chromium +6		5.9E+04	
Manganese		4.4E+05	
Selenium		4.0E+05	<95.2
Silver		3.5E+05	138
Thallium		5.6E+03	
Vanadium		3.3E+05	
Zinc		3.0E+05	

4.5.2.5 Additional ERDF General Restrictions

WCH-191 lists a number of waste materials that are prohibited from disposal at ERDF. Many of these prohibited materials are specifically addressed elsewhere within section 4.5.2 and 4.5.3. Chemical analysis and waste observation supports the verification that the 241-U-361 is not restricted from disposal at ERDF under the following criteria that are potentially applicable but not addressed specifically elsewhere:

The waste is not capable of detonation, explosive decomposition at normal pressures and temperatures, or explosive reaction with water.

The uranium, although representing a considerable percentage of the waste, is not in metallic form, and does not represent a pyrophoric hazard.

The waste contains less than 10% organic/carbonaceous compounds.

The laboratory analysis does not display any evidence of compounds associated with waste that would carry the F020, F021, F022, F023, F026 or F027 waste codes.

4.5.3 Comparison to RCRA Designation Criteria

4.5.3.1 Listed Dangerous Waste

Several individual constituents potentially associated with "F-001 – F-005" listed waste codes identified in WAC 173-303-9904, were identified in the 241-U-361 waste. The measurable concentrations of 1-butanol are most likely due to the degradation of TBP and were not introduced into the waste independently. In order to determine whether or not other listed wastes were ever introduced into the tank, a diligent search of historical records is required. If this diligent record search identifies how a specific chemical was used and/or how it came to be in the 241-U-361 tank, and that meet the listing description in WAC 173-303-9904, then the appropriate listed waste code would be assigned to the 241-U-361 tank contents. If the search cannot describe any use of that chemical and how it came to be in the tank contents, then the listed waste codes cannot be assigned. This diligent record search is beyond the scope of this characterization report.

4.5.3.2 Characteristic Dangerous Waste

The 241-U-361 waste is not dangerous/hazardous by the characteristics of ignitability (D001), based on the high water content and low hydrocarbon content. The waste is not corrosive (D002), based on the pH, nor reactive (D003), due to physical observation of the waste character and lack of hazardous gases in the headspace sample. However, depending on the methods of disposition of the tank material, it has the potential to be designated as a dangerous waste *at the point of generation* for certain metals (D004 – D011) and/or certain organics (D018 – D043) by exhibiting the toxicity characteristic.

Table 4-11 shows the 241-U-361 supernate and sludge composite results (greatest single-sample result) and *Resource Conservation and Recovery Act (RCRA) of 1976* regulatory TCLP criteria. If the supernate was generated as a separate waste stream, then the data suggest that it would be designated as toxic for mercury. In addition, the detection limits would not be able to demonstrate that the selenium concentrations are under the 1 mg/L toxicity limit.

Table 4-11. Comparison of 241-U-361 Results to RCRA TCLP Criteria ⁽¹⁾

Constituent	Characteristic Criteria mg/L in TCLP	units mg/L	Supernate max value	Sludge composite max value times 1/20 (worst-case TCLP)
Arsenic	5		<1.20	<2.86
Barium	100		<0.100	2.49
Benzene	0.5		<.0008	0.000139
Cadmium	1		0.768	<0.238
Carbon Tetrachloride	0.5			
Chlordane	0.03			
Chloroform	100		0.00465	
Chlorobenzene	6		<.00055	<0.000018
Chromium	5		<0.100	18.55
o-Cresol	200			
m-Cresol	200			
p-Cresol	200			
Cresol	200			
2,4-D	10			
1,4-Dichlorobenzene	7.5		<0.103	<0.392
1,2-Dichloroethane	0.5			
1,1-Dichloroethylene	0.7		<.00085	0.000299
2,4-Dinitrotoluene	0.13		<.0945	<0.419
Endrin	0.02			
Heptachlor (and epoxide)	0.008			
Hexachlorobenzene	0.13			
Hexachlorobutadiene	0.5			
Hexachloroethane	3			
Lead	5		<1.00	41.2
Lindane	0.4			
Mercury	0.2		1.07	0.186
Methoxychlor	10			
Methyl Ethyl Ketone (2-butanone)	200		0.0225	0.0145
Nitrobenzene	2			
Pentachlorophenol	100		<0.0572	<0.315
Pyridine	5			
Selenium	1		<2.00	<4.76
Silver	5		0.335	6.9
Tetrachloroethylene	0.7		0.143	0.173
Toxaphene	0.5			
Trichloroethylene	0.5		0.0165	0.0072
2,4,5-Trichlorophenol	400			
2,4,6-Trichlorophenol	2			
2,4,5-TP (Silvex)	1			
Vinyl Chloride	0.2			

⁽¹⁾ Shaded cells indicate values that exceed applicable criteria

TCLP testing was not part of the SAP-defined protocol. However, the theoretical ability of the sludge composite material to generate a TCLP leachate that exceeds the toxicity criteria may be determined by assuming a worst-case scenario where 100% of the constituents are leached from the sludge into the TCLP leachate. As the TCLP test protocol involves a 1:20 dilution, bulk composite results can be divided by 20 prior to comparison to the toxicity criteria. When this is done, as shown in Table 4-10, there is a *potential* for sufficient constituent mass to generate a TCLP leachate that exceeds TCLP criteria for silver, chromium, or lead. As with the supernate, the selenium detection limits are not low enough to demonstrate that selenium would meet the toxicity criteria. In addition 2,4-Dinitrotoluene detection limits are not low enough to conclusively state that the resulting TCLP would not exceed toxicity criteria. Note that 2,4-Dinitrotoluene is not a COCs based on historical documents are was reported as a method-based analyte.

4.5.3.3 Washington State Toxicity

The Washington State toxicity criteria is defined in WAC 173-303-100(5) in terms of the toxicity of the chemical constituent based on published referenced toxicity studies. If the waste streams derived from 241-U-361 tank content removal activities do not designate as a listed waste and does not display the toxicity characteristic, WAC 173-303-070(3)(a)(iv) requires that the waste is evaluated for Washington State toxicity. per Washington Administrative Code (WAC)-173-303-100(5). This step will be performed as necessary and is beyond the scope of this document.

4.5.3.4 Washington State Persistence

The persistence criteria are defined in WAC 173-303-100(6) in terms of the concentrations of total halogenated hydrocarbons and polycyclic aromatic hydrocarbons (PAH). If the waste streams derived from 241-U-361 tank content removal activities do not designate as a listed waste and does not display the toxicity characteristic, WAC 173-303-070(3)(a)(iv) requires that the waste is evaluated for Washington State persistence per WAC-173-303-100(6).

The sum of all detected halogenated compound concentrations is 0.204 mg/L (.0002%) in the supernate and 5.7 mg/kg (.0006%) in the sludge composites. These numbers are well under the 0.01% lower criteria for designation as persistent and toxic. The PAH criteria of <1% is also met as the two PAHs reported were both below detection limits on the order of 8ppm (.0008%).

As these criteria are applicable to the waste at the point of generation, all results should be evaluated based upon the actual waste generation approach, including potential recombination of the supernate and sludge.

4.5.4 Comparison to PCB Criteria

The 241-U-361 Supernate and Sludge composite samples exhibited measurable concentrations of Aroclor 1254. The maximum single-sample concentrations were 21.4 µg/L (ppb) in the supernate and 9.6 mg/Kg (ppm dry weight) in the sludge. These values are well below the 50 ppm trigger level for management in accordance with 40 CFR 761. The PCB concentrations do not preclude disposal at ERDF.

4.5.5 Comparison to Asbestos Criteria

The 241-U-361 Sludge Composite was inspected for the presence of asbestos fibers by both polarized light microscopy (PLM) and scanning electron microscopy (SEM). Both techniques disclosed the

presence of amosite asbestos fibers. The assignment of amosite was verified by both microscopy techniques and energy dispersive X-ray analysis of major elemental constituents of the fibers.

The laboratory asbestos report (Appendix B) indicates that the asbestos fibers make up at least 1% by volume of the composite sample. This would suggest that there is a total asbestos inventory in the tank that exceeds 1 cubic meter. This seems contrary to historical data as well as expected normal maintenance activities that may have provided asbestos-containing material to the 241-U-361 settling tank.

If the 241-U-361 tank contents exceed 1% asbestos fibers by volume, management would be required to meet 40 CFR 61.140 through 40 CFR 61.157. This would not preclude disposal within ERDF.

4.5.6 RCRA Land Disposal Restrictions

The RCRA Land Disposal Restrictions are not applicable to the 241-U-361 tank contents as they currently sit in the tank, because no waste was added to the tank after August 19, 1987, the effective date for mixed waste in Washington State, and the tank was abandoned.

In the event that the 241-U-361 disposition activities generate a waste stream that is designated as dangerous, then ERDF would require that the waste must meet the applicable treatment standards (UTS) found in 40 CFR 268. For characteristic waste, the treatment standard includes the UTS found in 40 CFR 268.48, depending on the treatment standard in 40 CFR 268.40.

Table 4-12 shows the 241-U-361 sludge analytical results compared to the UTS. As shown, the 241-U-361 sludge, as it currently exists in the tank, would not meet the treatment standards for 1-butanol. The sludge may not meet the treatment standards for TCLP mercury, silver, cadmium, chromium, nickel, and lead, using a simple 1:20 dilution calculation and 100% leachability assumption. Detection limits were too high to demonstrate that the sludge would meet the limits for 1,4-dichlorobenzene, acenaphthene, 2-chlorophenol, di-n-butylphthalate, or phenol. Table 4-12 only shows those UTS applicable to 241-U-361 sludge sample reported parameters.

Table 4-12. Comparison of 241-U-361 Sludge Samples to the RCRA Universal Treatment Standards (40 CFR 268.48) ⁽¹⁾.

Analyte	Units	UTS	Composite 1		Composite 2	
METALS						
Silver	µg/g	0.14 in TCLP	6.9 ⁽²⁾	cf	5.2 ⁽²⁾	cf
Arsenic	µg/g	5.0 in TCLP	<2.82 ⁽²⁾	U	<2.86 ⁽²⁾	U
Barium	µg/g	2.1 in TCLP	2.47 ⁽²⁾		2.49 ⁽²⁾	
Cadmium	µg/g	0.11 in TCLP	<0.24 ⁽²⁾	U	<0.24 ⁽²⁾	U
Chromium	µg/g	0.6 in TCLP	18.6 ⁽²⁾		18.2 ⁽²⁾	
Nickel	µg/g	11 in TCLP	12.6 ⁽²⁾		13.2 ⁽²⁾	
Lead	µg/g	0.75 in TCLP	41.2 ⁽²⁾		39.8 ⁽²⁾	
Selenium	µg/g	5.7 in TCLP	<4.7 ⁽²⁾	U	<4.76 ⁽²⁾	U
Mercury	µg/g	0.025 in TCLP	0.19 ⁽²⁾		0.18 ⁽²⁾	
VOLATILE ORGANIC COMPOUNDS						
COC						
Acetone	µg/Kg	160000	1270	J	677	J
Carbon Disulfide	µg/Kg	4800 in TCLP	<0.025 ⁽¹⁾	U	<0.024 ⁽¹⁾	U
Bromomethane	µg/Kg	15000	<1.63	U	<1.55	U
Chloromethane	µg/Kg	30000	<1.03	U	<0.981	U
2-butanone	µg/Kg	36000	290		121	
Methylene Chloride	µg/Kg	30000	4.38	J	1.53	J

Table 4-12. Comparison of 241-U-361 Sludge Samples to the RCRA Universal Treatment Standards (40 CFR 268.48) ⁽¹⁾.

Analyte	Units	UTS	Composite 1		Composite 2	
Tetrachloroethene	µg/Kg	6000	3450		2670	
Toluene	µg/Kg	10000	52.6		12.6	
METHOD-BASED ANALYTES						
1,1,1-Trichloroethane	µg/kg	6000	260		42	
1,1-Dichloroethene	µg/kg	6000	5.97		1.66	
1-Butanol	µg/kg	26000	49300		13400	
Benzene	µg/kg	10000	2.73		0.778	
Chloroform	µg/kg	6000				
Chlorobenzene	µg/kg	6000	<0.367	U	<0.348	U
Xylenes (total)	µg/kg	30000	123		48	
Trichloroethene	µg/kg	6000	144		26.3	
SEMI-VOLATILE ORGANIC COMPOUNDS						
COC						
1,4-dichlorobenzene	µg/kg	6000	<7840	DU	<7760	DU
Acenaphthene	µg/kg	3400	<8120	DU	<8030	DU
Bis(2-ethylhexyl) phthalate	µg/kg		<117000	DU	<115000	DU
2-Chlorophenol	µg/kg	5700	<7660	DU	<7580	DU
Di-n-butyl phthalate	µg/kg	28000	<52700	DU	<52200	DU
Pentachlorophenol	µg/kg	7400	<6290	DU ^b	<6220	DU
Pyrene	µg/kg	8200	<8040	DU ^b	<7960	DU
METHOD-BASED ANALYTES						
1,2,4-Trichlorobenzene	µg/kg	19000	<7610	U	<7530	U
2,4-Dinitrotoluene	µg/kg	140000	<8370	U	<8280	U
4-Chloro-3-methylphenol	µg/kg	14000	<7860	U	<7770	U
Phenol	µg/kg	6200	<7720	U	<7630	U
4-Nitrophenol	µg/kg	29000	<7440	U	<7370	U
POLYCHLORINATED BIPHENYLS						
Aroclor 1254	µg/Kg	10000	9600	D	8330	D

⁽¹⁾ Shaded cells indicate the value exceeds the applicable criterion.

⁽²⁾ Metals and carbon disulfide results include a 1:20 dilution and 100% leachability calculation to represent the worst-case potential TCLP result. This is then compared to the UTS TCLP criteria. Actual TCLP results would be expected to be much less than this value.

Qualifiers:

- B = Analyte detected in the sample and in the method or prep blank at >5% of the reported analyte concentration
- D = Result for an organic analyte was reported from a dilution
- J = Result should be considered an estimated value
- Q = Result is qualitative only
- U = Result is less than the calculated detection limit
- b = Matrix spike or matrix spike duplicate outside SAP limits (+/- 30%) and the spike concentration was >25% of the reported analyte concentration
- c = Relative percent difference between duplicate samples exceeded SAP limits (+/-30%)
- f = Matrix spike recovery was outside the SAP limits (+/- 30%), but serial dilution results met the internal laboratory QC requirements

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APPENDIX A

**SELECTED DATA TABLES FROM
FINAL REPORT FOR TANK 241-U-361 CORE SAMPLES COLLECTED IN 2007
SAMPLE GROUP NO. 222S20070833**

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Attachment 1
U361
Data Summary Report

Sample Group: 20070833

Customer Group or SDG Number: 222S20070833

Customer Sample ID: 328-1A

Sample Portion: Drainable Liquid (Supernatant Liquid)

Sample#	R	AI	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000241			Acetone	ug/L	104	3.00	77.3	n/a	n/a	n/a	n/a	11.0	n/a	BJ
S07M000241			Carbon disulfide	ug/L	n/a	<0.150	<0.750	n/a	n/a	n/a	n/a	0.750	n/a	U
S07M000241			Bromomethane	ug/L	n/a	<0.490	<2.45	n/a	n/a	n/a	n/a	2.45	n/a	U
S07M000241			Chloromethane	ug/L	n/a	<0.310	<1.55	n/a	n/a	n/a	n/a	1.55	n/a	U
S07M000241			2-Butanone	ug/L	107	<1.33	9.69	n/a	n/a	n/a	n/a	6.65	n/a	J
S07M000241			Methylenechloride	ug/L	n/a	<0.170	<0.850	n/a	n/a	n/a	n/a	0.850	n/a	U
S07M000241			Tetrachloroethene	ug/L	n/a	<0.200	64.3	n/a	n/a	n/a	n/a	1.00	n/a	
S07M000241			Toluene	ug/L	106	<0.120	0.741	n/a	n/a	n/a	n/a	0.600	n/a	J
S07M000241			Hexane	ug/L	n/a	<0.270	<1.35	n/a	n/a	n/a	n/a	1.35	n/a	U
S07M000245			Percent water	%	98.5	n/a	95.0	95.0	95.0	0.0	n/a	0.0100	n/a	
S07M000245			Mercury	ug/mL	100	8.16E-04	1.03	n/a	n/a	n/a	n/a	0.0400	n/a	
S07M000245			Fluoride	ug/mL	99.5	<0.0120	3.13	3.14	3.14	0.319	93.9	0.492	n/a	J
S07M000245			Chloride	ug/mL	96.6	<0.0170	264	247	255	6.67	94.0	38.1	n/a	J
S07M000245			Nitrite	ug/mL	95.8	<0.108	496	494	495	0.321	96.0	229	n/a	J
S07M000245			Bromide	ug/mL	95.5	<0.125	<265	<265	n/a	n/a	95.9	265	n/a	U
S07M000245			Nitrate	ug/mL	93.4	<0.139	3.56E+04	3.55E+04	3.56E+04	0.203	97.5	295	n/a	
S07M000245			Sulfate	ug/mL	96.6	<0.138	414	407	410	1.72	97.8	293	n/a	J
S07M000245			Silver	ug/mL	96.8	<5.00E-03	0.271	0.284	0.278	4.42	97.3	0.100	n/a	J
S07M000245			Arsenic	ug/mL	103	<0.0600	<1.20	<1.20	n/a	n/a	106	1.20	n/a	U
S07M000245			Barium	ug/mL	100	<5.00E-03	<0.100	<0.100	n/a	n/a	95.9	0.100	n/a	U
S07M000245			Cadmium	ug/mL	104	<5.00E-03	0.738	0.736	0.737	0.254	100	0.100	n/a	J
S07M000245			Chromium	ug/mL	106	<5.00E-03	<0.100	<0.100	n/a	n/a	101	0.100	n/a	U
S07M000245			Copper	ug/mL	98.1	<5.00E-03	<0.100	<0.100	n/a	n/a	103	0.100	n/a	U
S07M000245			Lithium	ug/mL	101	<0.0100	<0.200	<0.200	n/a	n/a	91.9	0.200	n/a	U
S07M000245			Nickel	ug/mL	103	<0.0200	16.2	16.4	16.3	1.22	100	0.400	n/a	
S07M000245			Lead	ug/mL	107	<0.0500	<1.00	<1.00	n/a	n/a	108	1.00	n/a	U
S07M000245			Selenium	ug/mL	103	<0.100	<2.00	<2.00	n/a	n/a	105	2.00	n/a	U
S07M000245			Strontium	ug/mL	103	<5.00E-03	77.8	78.6	78.2	1.02	95.3	0.100	n/a	
S07M000245			Uranium	ug/mL	99.0	<0.100	31.0	30.8	30.9	0.724	102	2.00	n/a	

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APP A-1

222S20070833

D&D-36428, REV 0

B - Found in Blank
 U - Less Than Detection Limit

D - Dilution
 b - MS/MSD Outside Range

J - Estimated
 c - RPD Outside Range

Q - Qualitative
 f - MS failed/SERDIL OK

Attachment 1
 U361
 Data Summary Report

Sample Group: 20070833

Customer Group or SDG Number: 222S20070833

Customer Sample ID: 328-1A

Sample Portion: Drainable Liquid (Supernatant Liquid)

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000246			Cobalt-60	uCi/mL	102	<3.24E-06	8.94E-06	7.78E-06	8.36E-06	13.8	n/a	2.87E-06	18.77	
S07M000246			Cesium-137	uCi/mL	105	<3.90E-06	8.07E-03	8.02E-03	8.05E-03	0.671	n/a	1.32E-05	5.51	
S07M000246			Europium-154	uCi/mL	n/a	<9.88E-06	<1.12E-05	<1.14E-05	n/a	n/a	n/a	1.12E-05	n/a	U
S07M000246			Europium-155	uCi/mL	n/a	<6.18E-06	<4.19E-05	<4.18E-05	n/a	n/a	n/a	4.19E-05	n/a	U
S07M000246			Uranium-233	ug/mL	n/a	<1.00E-08	<2.50E-04	n/a	n/a	n/a	n/a	2.50E-04	n/a	U
S07M000246			Uranium-234	ug/mL	n/a	<5.00E-09	2.06E-03	n/a	n/a	n/a	n/a	1.25E-04	n/a	
S07M000246			Uranium-235	ug/mL	90.5	<1.10E-08	0.217	n/a	n/a	n/a	n/a	2.75E-04	n/a	
S07M000246			Uranium-236	ug/mL	n/a	<4.00E-09	8.19E-03	n/a	n/a	n/a	n/a	1.00E-04	n/a	
S07M000246			U 238	ug/mL	93.5	<5.50E-07	31.2	n/a	n/a	n/a	n/a	0.0138	n/a	
S07M000246			pH Measurement	unitless	n/a	n/a	7.18	7.20	7.19	0.278	n/a	0.0100	n/a	
S07M000246			Technetium-99	uCi/mL	111	<7.15E-06	3.12E-03	n/a	n/a	n/a	n/a	6.88E-05	3.02	
S07M000247			Americium-241	uCi/mL	104	<2.29E-06	<2.54E-06	n/a	n/a	n/a	n/a	2.54E-06	100	U
S07M000247			Neptunium-237	uCi/mL	82.9	<1.82E-05	<1.82E-05	<1.82E-05	n/a	n/a	76.3	3.83E-05	293	U
S07M000247			Plutonium-239/240	uCi/mL	99.8	<1.86E-06	<1.96E-06	n/a	n/a	n/a	n/a	1.96E-06	100	U
S07M000247			Plutonium-238	uCi/mL	n/a	<1.88E-06	<1.96E-06	n/a	n/a	n/a	n/a	1.96E-06	100	U
S07M000247			Strontium-89/90	uCi/mL	93.9	5.32E-06	0.457	n/a	n/a	n/a	n/a	3.31E-05	293	
S07M000249	O		1,4-Dichlorobenzene	ug/L	32.2	<14.7	<103	n/a	n/a	n/a	n/a	103	n/a	U
S07M000249	O		Acenaphthene	ug/L	65.5	<25.2	<177	n/a	n/a	n/a	n/a	177	n/a	U
S07M000249	O		Bis(2-ethylhexyl) phthalate	ug/L	n/a	<51.2	1.25E+03	n/a	n/a	n/a	n/a	359	n/a	J
S07M000249	O		2-Chlorophenol	ug/L	73.1	<23.9	<167	n/a	n/a	n/a	n/a	167	n/a	U
S07M000249	O		Di-n-butylphthalate	ug/L	n/a	<14.9	<104	n/a	n/a	n/a	n/a	104	n/a	U
S07M000249	O		Pentachlorophenol	ug/L	64.7	<8.18	<57.2	n/a	n/a	n/a	n/a	57.2	n/a	U
S07M000249	O		Pyrene	ug/L	90.6	<15.8	<111	n/a	n/a	n/a	n/a	111	n/a	U
S07M000249	O		Tributyl phosphate	ug/L	n/a	<6.36	9.54E+03	n/a	n/a	n/a	n/a	44.5	n/a	
S07M000249	O		Benzoic acid	ug/L	n/a	<58.3	<408	n/a	n/a	n/a	n/a	408	n/a	U
S07M000250	O		Aroclor 1016	ug/L	n/a	<5.40	<18.9	n/a	n/a	n/a	n/a	18.9	n/a	U
S07M000250	O		Aroclor 1221	ug/L	n/a	<1.01	<3.55	n/a	n/a	n/a	n/a	3.55	n/a	U
S07M000250	O		Aroclor 1232	ug/L	n/a	<0.914	<3.20	n/a	n/a	n/a	n/a	3.20	n/a	U
S07M000250	O		Aroclor 1242	ug/L	n/a	<1.80	<6.30	n/a	n/a	n/a	n/a	6.30	n/a	U

B - Found in Blank
 U - Less Than Detection Limit

D - Dilution
 b - MS/MSD Outside Range

J - Estimated
 c - RPD Outside Range

Q - Qualitative
 f - MS failed/SERDIL OK

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APP A-2

222S20070833

D&D-36428, REV 0

Attachment 1
U361
Data Summary Report

Sample Group: 20070833

Customer Group or SDG Number: 222S20070833

Customer Sample ID: 328-1A

Sample Portion: Drainable Liquid (Supernatant Liquid)

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000250		O	Aroclor 1248	ug/L	n/a	<1.01	<3.55	n/a	n/a	n/a	n/a	3.55	n/a	U
S07M000250		O	Aroclor 1254	ug/L	88.1	<0.371	7.70	n/a	n/a	n/a	94.8	1.30	n/a	J
S07M000250		O	Aroclor 1260	ug/L	n/a	<4.09	<14.3	n/a	n/a	n/a	n/a	14.3	n/a	U

Sample Portion: Drainable Liquid (Total)

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000235			Drainable Liquid Volume	mL	n/a	n/a	300	n/a	n/a	n/a	n/a	n/a	n/a	Q
S07M000235			Drainable Liquid Weight	g	n/a	n/a	287	n/a	n/a	n/a	n/a	n/a	n/a	
S07M000235			Organic Volume Present	mL	n/a	n/a	0.0	n/a	n/a	n/a	n/a	n/a	n/a	Q
S07M000235			Specific gravity	unitless	100.3	n/a	1.028	1.028	1.028	0.2338	n/a	1.000E-03	n/a	
S07M000235			Volume percent settled solids	%	n/a	n/a	15.0	n/a	n/a	n/a	n/a	5.00	n/a	Q

Sample Portion: Segment Solids (Total)

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000233			Solid Weight	g	n/a	n/a	<0.100	n/a	n/a	n/a	n/a	0.100	n/a	U

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APP A-3

222S20070833

D&D-36428, REV 0

B - Found in Blank
 U - Less Than Detection Limit

D - Dilution
 b - MS/MSD Outside Range

J - Estimated
 c - RPD Outside Range

Q - Qualitative
 f - MS failed/SERDIL OK

Attachment 1
 U361
 Data Summary Report

Sample Group: 20070833

Customer Group or SDG Number: 222S20070833

Customer Sample ID: 328-1AR1

Sample Portion: Drainable Liquid (Supernatant Liquid)

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flag
S07M000251			Acetone	ug/L	104	3.00	171	n/a	n/a	n/a	78.1	11.0	n/a	B
S07M000251			Carbon disulfide	ug/L	n/a	<0.150	<0.750	n/a	n/a	n/a	n/a	0.750	n/a	U
S07M000251			Bromomethane	ug/L	n/a	<0.490	<2.45	n/a	n/a	n/a	n/a	2.45	n/a	U
S07M000251			Chloromethane	ug/L	n/a	<0.310	<1.55	n/a	n/a	n/a	n/a	1.55	n/a	U
S07M000251			2-Butanone	ug/L	107	<1.33	22.5	n/a	n/a	n/a	93.4	6.65	n/a	J
S07M000251			Methylenechloride	ug/L	n/a	<0.170	1.27	n/a	n/a	n/a	n/a	0.850	n/a	J
S07M000251			Tetrachloroethane	ug/L	n/a	<0.200	143	n/a	n/a	n/a	n/a	4.00	n/a	
S07M000251			Toluene	ug/L	106	<0.120	0.961	n/a	n/a	n/a	100	0.800	n/a	J
S07M000251			Hexane	ug/L	n/a	<0.270	<1.35	n/a	n/a	n/a	n/a	1.35	n/a	U
S07M000255			Percent water	%	98.5	n/a	94.9	n/a	n/a	n/a	n/a	0.0100	n/a	
S07M000255			Mercury	ug/mL	100	8.18E-04	1.07	1.03	1.05	3.72	103	0.0400	n/a	
S07M000255			Fluoride	ug/mL	99.5	<0.0120	2.72	n/a	n/a	n/a	n/a	0.492	n/a	J
S07M000255			Chloride	ug/mL	96.8	<0.0170	255	n/a	n/a	n/a	n/a	36.1	n/a	J
S07M000255			Nitrite	ug/mL	95.8	<0.108	488	n/a	n/a	n/a	n/a	229	n/a	J
S07M000255			Bromide	ug/mL	95.5	<0.125	<265	n/a	n/a	n/a	n/a	265	n/a	U
S07M000255			Nitrate	ug/mL	93.4	<0.139	3.57E+04	n/a	n/a	n/a	n/a	295	n/a	
S07M000255			Sulfate	ug/mL	96.6	<0.138	525	n/a	n/a	n/a	n/a	293	n/a	J
S07M000255			Silver	ug/mL	96.8	<5.00E-03	0.335	n/a	n/a	n/a	n/a	0.100	n/a	J
S07M000255			Arsenic	ug/mL	103	<0.0600	<1.20	n/a	n/a	n/a	n/a	1.20	n/a	U
S07M000255			Barium	ug/mL	100	<5.00E-03	<0.100	n/a	n/a	n/a	n/a	0.100	n/a	U
S07M000255			Cadmium	ug/mL	104	<5.00E-03	0.768	n/a	n/a	n/a	n/a	0.100	n/a	J
S07M000255			Chromium	ug/mL	106	<5.00E-03	<0.100	n/a	n/a	n/a	n/a	0.100	n/a	U
S07M000255			Copper	ug/mL	98.1	<5.00E-03	0.100	n/a	n/a	n/a	n/a	0.100	n/a	J
S07M000255			Lithium	ug/mL	101	<0.0100	4.26	n/a	n/a	n/a	n/a	0.200	n/a	
S07M000255			Nickel	ug/mL	103	<0.0200	19.3	n/a	n/a	n/a	n/a	0.400	n/a	
S07M000255			Lead	ug/mL	107	<0.0500	<1.00	n/a	n/a	n/a	n/a	1.00	n/a	U
S07M000255			Selenium	ug/mL	103	<0.100	<2.00	n/a	n/a	n/a	n/a	2.00	n/a	U
S07M000255			Strontium	ug/mL	103	<5.00E-03	77.1	n/a	n/a	n/a	n/a	0.100	n/a	
S07M000255			Uranium	ug/mL	99.0	<0.100	24.3	n/a	n/a	n/a	n/a	2.00	n/a	

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APP A.4

222S20070833

D&D-36428, REV 0

B - Found in Blank
 U - Less Than Detection Limit

D - Dilution
 b - MS/MSD Outside Range

J - Estimated
 c - RPD Outside Range

Q - Qualitative
 f - MS failed/SERDIL OK

Attachment 1
U361
Data Summary Report

Sample Group: 20070833

Customer Group or SDG Number: 222S20070833

Customer Sample ID: 328-1AR1

Sample Portion: Drainable Liquid (Supernatant Liquid)

Sample#	R	AF	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000256			Cobalt-60	uCi/mL	102	<3.24E-06	7.75E-06	n/a	n/a	n/a	n/a	4.23E-06	25.36	
S07M000256			Cesium-137	uCi/mL	105	<3.90E-06	8.09E-03	n/a	n/a	n/a	n/a	1.40E-05	5.51	
S07M000256			Europium-154	uCi/mL	n/a	<9.88E-06	<1.18E-05	n/a	n/a	n/a	n/a	1.18E-05	n/a	U
S07M000256			Europium-155	uCi/mL	n/a	<6.18E-06	<4.58E-05	n/a	n/a	n/a	n/a	4.58E-05	n/a	U
S07M000256			Uranium-233	ug/mL	n/a	<1.00E-08	<2.50E-04	<2.50E-04	n/a	n/a	n/a	2.50E-04	n/a	U
S07M000256			Uranium-234	ug/mL	n/a	<5.00E-09	1.79E-03	1.73E-03	1.76E-03	3.36	n/a	1.25E-04	n/a	
S07M000256			Uranium-235	ug/mL	90.5	<1.10E-08	0.198	0.198	0.198	0.101	110	2.75E-04	n/a	
S07M000256			Uranium-238	ug/mL	n/a	<4.00E-09	7.54E-03	8.02E-03	7.78E-03	6.12	n/a	1.00E-04	n/a	
S07M000256			U 238	ug/mL	93.5	<5.50E-07	28.6	28.7	28.7	0.279	114	0.0138	n/a	
S07M000256			pH Measurement	unitless	n/a	n/a	6.78	n/a	n/a	n/a	n/a	0.0100	n/a	
S07M000256			Technetium-99	uCi/mL	111	<7.15E-06	3.23E-03	3.12E-03	3.18E-03	3.46	105	6.99E-05	2.98	
S07M000257			Americium-241	uCi/mL	104	<2.29E-06	<2.36E-06	<2.40E-06	n/a	n/a	n/a	2.36E-06	17.7	U
S07M000257			Neptunium-237	uCi/mL	82.9	<1.82E-05	<1.82E-05	n/a	n/a	n/a	n/a	3.83E-05	160	U
S07M000257			Plutonium-238/240	uCi/mL	99.8	<1.86E-06	<1.83E-06	<1.73E-06	n/a	n/a	n/a	1.83E-06	100	U
S07M000257			Plutonium-238	uCi/mL	n/a	<1.86E-06	<1.83E-06	<1.73E-06	n/a	n/a	n/a	1.83E-06	100	U
S07M000257			Strontium-89/90	uCi/mL	93.9	5.32E-06	0.455	0.465	0.460	2.17	n/a	3.34E-05	.295	
S07M000259	O		1,4-Dichlorobenzene	ug/L	32.2	<14.7	<103	n/a	n/a	n/a	32.8	103	n/a	U
S07M000259	O		Acenaphthene	ug/L	65.5	<25.2	<177	n/a	n/a	n/a	59.6	177	n/a	U
S07M000259	O		Bis(2-ethylhexyl) phthalate	ug/L	n/a	<51.2	<359	n/a	n/a	n/a	n/a	359	n/a	U
S07M000259	O		2-Chlorophenol	ug/L	73.1	<23.9	<167	n/a	n/a	n/a	23.6	167	n/a	Ubc
S07M000259	O		Di-n-butylphthalate	ug/L	n/a	<14.9	<104	n/a	n/a	n/a	n/a	104	n/a	U
S07M000259	O		Pentachlorophenol	ug/L	64.7	<8.18	<57.2	n/a	n/a	n/a	91.0	57.2	n/a	U
S07M000259	O		Pyrene	ug/L	90.6	<15.8	<111	n/a	n/a	n/a	82.4	111	n/a	U
S07M000259	O		Tributyl phosphate	ug/L	n/a	<8.36	1.25E+04	n/a	n/a	n/a	n/a	44.5	n/a	
S07M000259	O		Benzoic acid	ug/L	n/a	<58.3	<408	n/a	n/a	n/a	n/a	408	n/a	U
S07M000260	O		Aroclor 1016	ug/L	n/a	<5.40	<18.9	n/a	n/a	n/a	n/a	18.9	n/a	U
S07M000260	O		Aroclor 1221	ug/L	n/a	<1.01	<3.55	n/a	n/a	n/a	n/a	3.55	n/a	U
S07M000260	O		Aroclor 1232	ug/L	n/a	<0.914	<3.20	n/a	n/a	n/a	n/a	3.20	n/a	U
S07M000260	O		Aroclor 1242	ug/L	n/a	<1.80	<6.30	n/a	n/a	n/a	n/a	6.30	n/a	U

B - Found in Blank
 U - Less Than Detection Limit

D - Dilution
 b - MS/MSD Outside Range

J - Estimated
 c - RPD Outside Range

Q - Qualitative
 f - MS failed/SERDIL OK

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APP A-5

222S20070833

D&D-36428, REV 0

Attachment 1
U361
Data Summary Report

Sample Group: 20070833

Customer Group or SDG Number: 222S20070833

Customer Sample ID: 328-1AR1

Sample Portion: Drainable Liquid (Supernatant Liquid)

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000260		O	Aroclor 1248	ug/L	n/a	<1.01	<3.55	n/a	n/a	n/a	n/a	3.55	n/a	U
S07M000260		O	Aroclor 1254	ug/L	88.1	<0.371	21.4	n/a	n/a	n/a	n/a	1.30	n/a	
S07M000260		O	Aroclor 1260	ug/L	n/a	<4.09	<14.3	n/a	n/a	n/a	n/a	14.3	n/a	U

Sample Portion: Drainable Liquid (Total)

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000238			Drainable Liquid Volume	mL	n/a	n/a	300	n/a	n/a	n/a	n/a	n/a	n/a	Q
S07M000238			Drainable Liquid Weight	g	n/a	n/a	277	n/a	n/a	n/a	n/a	n/a	n/a	
S07M000238			Organic Volume Present	mL	n/a	n/a	<1.00	n/a	n/a	n/a	n/a	1.00	n/a	Q
S07M000238			Specific gravity	unitless	100.3	n/a	1.030	n/a	n/a	n/a	n/a	1.000E-03	n/a	
S07M000238			Volume percent settled solids	%	n/a	n/a	35.0	n/a	n/a	n/a	n/a	5.00	n/a	Q

Sample Portion: Segment Solids (Total)

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000234			Solid Weight	g	n/a	n/a	<0.100	n/a	n/a	n/a	n/a	0.100	n/a	U

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APP A-6

222S20070833

D&D-36428, REV 0

B - Found In Blank
 U - Less Than Detection Limit

D - Dilution
 b - MS/MSD Outside Range

J - Estimated
 c - RPD Outside Range

Q - Qualitative
 f - MS failed/SERDIL OK

Attachment 1
U361
Data Summary Report

Sample Group: 20070833
Customer Group or SDG Number: 222S20070833
Customer Sample ID: Composite 1
Sample Portion: Core Composite - Solid

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000304			Solid Weight	g	n/a	n/a	200	n/a	n/a	n/a	n/a	0.100	n/a	
S07M000308			Bulk density	g/mL	n/a	n/a	1.27	n/a	n/a	n/a	n/a	1.00E-03	n/a	Q
S07M000308			Acetone	ug/kg	80.3	<4.38	1.27E+03	n/a	n/a	n/a	n/a	179	n/a	J
S07M000308			Carbon disulfide	ug/kg	n/a	<0.300	<0.500	n/a	n/a	n/a	n/a	0.500	n/a	U
S07M000308			Bromomethane	ug/kg	n/a	<0.980	<1.83	n/a	n/a	n/a	n/a	1.83	n/a	U
S07M000308			Chloromethane	ug/kg	n/a	<0.620	<1.03	n/a	n/a	n/a	n/a	1.03	n/a	U
S07M000308			2-Butanone	ug/kg	119	<2.86	290	n/a	n/a	n/a	n/a	18.8	n/a	
S07M000308			Methylenechloride	ug/kg	n/a	<0.340	4.38	n/a	n/a	n/a	n/a	0.567	n/a	J
S07M000308			Tetrachloroethene	ug/kg	n/a	<0.400	3.45E+03	n/a	n/a	n/a	n/a	18.3	n/a	
S07M000308			Toluene	ug/kg	97.5	<0.240	52.6	n/a	n/a	n/a	n/a	1.79	n/a	
S07M000308			Hexane	ug/kg	n/a	<0.680	17.2	n/a	n/a	n/a	n/a	1.47	n/a	
S07M000312			Percent water	%	97.7	n/a	71.1	71.1	71.1	0.0	n/a	0.0100	n/a	
S07M000312			Mercury	ug/g	116	<1.00E-04	3.72	3.55	3.64	4.68	84.3	0.0484	n/a	
S07M000312			pH Measurement	unitless	n/a	n/a	8.10	8.13	8.12	0.370	n/a	0.0100	n/a	
S07M000315		O	Aroclor 1018 Dry	ug/kg	n/a	<31.0	<510	n/a	n/a	n/a	n/a	510	n/a	DU
S07M000315		O	Aroclor 1221 Dry	ug/kg	n/a	<5.12	<84.2	n/a	n/a	n/a	n/a	84.2	n/a	DU
S07M000315		O	Aroclor 1232 Dry	ug/kg	n/a	<8.69	<143	n/a	n/a	n/a	n/a	143	n/a	DU
S07M000315		O	Aroclor 1242 Dry	ug/kg	n/a	<20.7	<341	n/a	n/a	n/a	n/a	341	n/a	DU
S07M000315		O	Aroclor 1248 Dry	ug/kg	n/a	<11.7	<193	n/a	n/a	n/a	n/a	193	n/a	DU
S07M000315		O	Aroclor 1254 Dry	ug/kg	97.6	<7.50	9.60E+03	n/a	n/a	n/a	62.2	123	n/a	D
S07M000315		O	Aroclor 1260 Dry	ug/kg	n/a	<12.1	<200	n/a	n/a	n/a	n/a	200	n/a	DU
S07M000317		O	1,4-Dichlorobenzene	ug/kg	58.4	<838	<7.84E+03	n/a	n/a	n/a	66.5	7.84E+03	n/a	DU
S07M000317		O	Acenaphthene	ug/kg	76.2	<866	<8.12E+03	n/a	n/a	n/a	81.6	8.12E+03	n/a	DU
S07M000317		O	Bis(2-ethylhexyl) phthalate	ug/kg	n/a	<1.24E+04	<1.17E+05	n/a	n/a	n/a	n/a	1.17E+05	n/a	DU
S07M000317		O	2-Chlorophenol	ug/kg	68.6	<817	<7.66E+03	n/a	n/a	n/a	78.5	7.66E+03	n/a	DU
S07M000317		O	Di-n-butylphthalate	ug/kg	n/a	6.71E+03	<5.27E+04	n/a	n/a	n/a	n/a	5.27E+04	n/a	DU
S07M000317		O	Pentachlorophenol	ug/kg	89.8	<871	<6.29E+03	n/a	n/a	n/a	333	6.29E+03	n/a	DUb
S07M000317		O	Pyrene	ug/kg	84.0	<858	<8.04E+03	n/a	n/a	n/a	55.1	8.04E+03	n/a	DUb
S07M000317		O	Tributyl phosphate	ug/kg	n/a	<1.08E+03	2.19E+06	n/a	n/a	n/a	n/a	5.05E+04	n/a	DJ

B - Found in Blank
 U - Less Than Detection Limit

D - Dilution
 b - MS/MSD Outside Range

J - Estimated
 c - RPD Outside Range

Q - Qualitative
 f - MS failed/SERDIL OK

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APP A-7

222S20070833

D&D-36428, REV 0

Attachment 1
U361
Data Summary Report

Sample Group: 20070833
Customer Group or SDG Number: 222S20070833
Customer Sample ID: Composite 1
Sample Portion: Core Composite - Solid

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000317	O		Benzolic acid	ug/kg	n/a	<4.87E+03	<4.58E+04	n/a	n/a	n/a	n/a	4.56E+04	n/a	DU
S07M000319	O		Kerosene	mg/Kg	114	<15.9	8.47E+03	n/a	n/a	n/a	-1.10E+03	781	n/a	D
S07M000321	F		Gross alpha	uCi/g	98.9	<7.76E-04	0.0672	0.0683	0.0677	1.62	82.7	1.50E-03	8.34	
S07M000321	F		Uranium-233	ug/g	n/a	<0.0244	<0.0244	<0.0248	n/a	n/a	n/a	0.0244	n/a	U
S07M000321	F		Uranium-234	ug/g	n/a	<0.0122	6.68	6.75	6.71	1.09	n/a	0.0122	n/a	
S07M000321	F		Uranium-235	ug/g	105	<2.14	810	842	826	3.89	97.2	2.14	n/a	
S07M000321	F		Uranium-236	ug/g	n/a	<9.74E-03	14.3	14.8	14.5	3.20	n/a	9.74E-03	n/a	
S07M000321	F		U 238	ug/g	106	<107	1.23E+05	1.26E+05	1.24E+05	2.38	98.8	107	n/a	
S07M000323	W		Fluoride	ug/g	97.8	<0.0120	594	631	612	6.11	100	14.1	n/a	
S07M000323	W		Chloride	ug/g	98.8	<0.0170	215	218	217	1.57	93.6	19.9	n/a	
S07M000323	W		Nitrite	ug/g	98.6	0.190	2.19E+03	2.23E+03	2.21E+03	1.82	103	127	n/a	B
S07M000323	W		Bromide	ug/g	97.3	<0.125	328	328	328	0.0708	98.9	146	n/a	J
S07M000323	W		Nitrate	ug/g	98.9	0.160	2.37E+04	2.44E+04	2.40E+04	3.14	88.6	183	n/a	
S07M000323	W		Sulfate	ug/g	97.4	<0.138	904	918	911	1.53	93.8	162	n/a	J
S07M000325	A		Americium-241	uCi/g	106	<4.56E-04	2.36E-03	2.44E-03	2.40E-03	3.33	n/a	5.75E-04	4.28	
S07M000325	A		Cobalt-60	uCi/g	102	<4.25E-03	<4.87E-03	<4.87E-03	n/a	n/a	n/a	4.87E-03	n/a	U
S07M000325	A		Cesium-137	uCi/g	102	<5.72E-03	0.245	0.243	0.244	0.949	n/a	6.94E-03	6.51	
S07M000325	A		Europium-154	uCi/g	n/a	<0.0146	<0.0140	<0.0144	n/a	n/a	n/a	0.0140	n/a	U
S07M000325	A		Europium-155	uCi/g	n/a	<6.71E-03	<8.14E-03	<8.30E-03	n/a	n/a	n/a	8.14E-03	n/a	U
S07M000325	A		Silver	ug/g	78.9	<5.00E-03	138	90.1	114	42.1	53.3	4.70	n/a	cf
S07M000325	A		Arsenic	ug/g	92.1	<0.0600	<56.4	<56.2	n/a	n/a	92.1	56.4	n/a	U
S07M000325	A		Barium	ug/g	93.3	<5.00E-03	49.3	49.7	49.5	0.983	101	4.70	n/a	
S07M000325	A		Cadmium	ug/g	90.0	<5.00E-03	<4.70	<4.88	n/a	n/a	101	4.70	n/a	U
S07M000325	A		Chromium	ug/g	91.6	<5.00E-03	371	368	369	0.910	99.6	4.70	n/a	
S07M000325	A		Copper	ug/g	94.6	<5.00E-03	59.4	58.3	58.9	1.85	101	4.70	n/a	
S07M000325	A		Lithium	ug/g	96.2	<0.0100	49.3	51.1	50.2	3.60	109	9.40	n/a	J
S07M000325	A		Nickel	ug/g	90.0	<0.0200	252	258	255	2.39	101	18.8	n/a	
S07M000325	A		Lead	ug/g	90.7	<0.0500	823	823	823	0.0159	104	47.0	n/a	
S07M000325	A		Selenium	ug/g	93.9	<0.100	<94.0	<93.6	n/a	n/a	109	94.0	n/a	U

B - Found in Blank
 U - Less Than Detection Limit

D - Dilution
 b - MS/MSD Outside Range

J - Estimated
 c - RPD Outside Range

Q - Qualitative
 f - MS failed/SERDIL OK

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APP A-8

222S20070833

D&D-36428, REV 0

**Attachment 1
 U361
 Data Summary Report**

Sample Group: 20070833

Customer Group or SDG Number: 222S20070833

Customer Sample ID: Composite 1

Sample Portion: Core Composite - Solid

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000325		A	Strontium	ug/g	94.5	<5.00E-03	494	509	502	3.08	102	4.70	n/a	
S07M000325		A	Uranium	ug/g	88.6	<0.100	1.24E+05	1.26E+05	1.25E+05	2.12	435	94.0	n/a	f
S07M000325		A	Neptunium-237	uCi/g	76.5	3.81E-03	4.35E-03	4.60E-03	4.48E-03	5.59	79.6	6.30E-03	88	U
S07M000325		A	Plutonium-239/240	uCi/g	103	<3.26E-04	0.0239	0.0234	0.0236	2.11	n/a	1.13E-03	2.22	
S07M000325		A	Plutonium-238	uCi/g	n/a	<3.26E-04	<1.13E-03	<1.14E-03	n/a	n/a	n/a	1.13E-03	100	U
S07M000325		A	Strontium-89/90	uCi/g	96.2	<5.76E-04	0.651	0.662	0.656	1.68	n/a	7.39E-04	1.16	
S07M000325		A	Technetium-99	uCi/g	110	<6.51E-04	0.0123	0.0118	0.0120	4.15	104	6.22E-04	4.48	

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APP A-9

222S20070833

D&D-36428, REV 0

B - Found in Blank
 U - Less Than Detection Limit

D - Dilution
 b - MS/MSD Outside Range

J - Estimated
 c - RPD Outside Range

Q - Qualitative
 f - MS failed/SERDIL OK

Attachment 1
 U361
 Data Summary Report

Sample Group: 20070833
 Customer Group or SDG Number: 222S20070833
 Customer Sample ID: Composite 2
 Sample Portion: Core Composite - Solid

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000305			Solid Weight	g	n/a	n/a	200	n/a	n/a	n/a	n/a	0.100	n/a	
S07M000307			Bulk density	g/mL	n/a	n/a	1.26	n/a	n/a	n/a	n/a	1.00E-03	n/a	Q
S07M000309			Acetone	ug/kg	80.3	<4.38	677	n/a	n/a	n/a	n/a	106	n/a	J
S07M000309			Carbon disulfide	ug/kg	n/a	<0.300	<0.475	n/a	n/a	n/a	n/a	0.475	n/a	U
S07M000309			Bromomethane	ug/kg	n/a	<0.980	<1.55	n/a	n/a	n/a	n/a	1.55	n/a	U
S07M000309			Chloromethane	ug/kg	n/a	<0.620	<0.981	n/a	n/a	n/a	n/a	0.981	n/a	U
S07M000309			2-Butanone	ug/kg	119	<2.66	121	n/a	n/a	n/a	n/a	4.21	n/a	
S07M000309			Methylenechloride	ug/kg	n/a	<0.340	1.53	n/a	n/a	n/a	n/a	0.538	n/a	J
S07M000309			Tetrachloroethene	ug/kg	n/a	<0.400	2.67E+03	n/a	n/a	n/a	n/a	9.69	n/a	
S07M000309			Toluene	ug/kg	97.5	<0.240	12.6	n/a	n/a	n/a	n/a	0.380	n/a	
S07M000309			Hexane	ug/kg	n/a	<0.880	1.81	n/a	n/a	n/a	n/a	1.39	n/a	J
S07M000313			Percent water	%	97.7	n/a	71.0	n/a	n/a	n/a	n/a	0.0100	n/a	
S07M000313			Mercury	ug/g	116	<1.00E-04	3.50	n/a	n/a	n/a	n/a	0.0500	n/a	
S07M000313			pH Measurement	unitless	n/a	n/a	8.10	n/a	n/a	n/a	n/a	0.0100	n/a	
S07M000316	O		Aroclor 1016 Dry	ug/kg	n/a	<31.0	<393	n/a	n/a	n/a	n/a	393	n/a	DU
S07M000316	O		Aroclor 1221 Dry	ug/kg	n/a	<5.12	<65.0	n/a	n/a	n/a	n/a	65.0	n/a	DU
S07M000316	O		Aroclor 1232 Dry	ug/kg	n/a	<8.68	<110	n/a	n/a	n/a	n/a	110	n/a	DU
S07M000316	O		Aroclor 1242 Dry	ug/kg	n/a	<20.7	<283	n/a	n/a	n/a	n/a	283	n/a	DU
S07M000316	O		Aroclor 1248 Dry	ug/kg	n/a	<11.7	<149	n/a	n/a	n/a	n/a	149	n/a	DU
S07M000316	O		Aroclor 1254 Dry	ug/kg	97.6	<7.50	8.33E+03	n/a	n/a	n/a	n/a	95.2	n/a	D
S07M000316	O		Aroclor 1260 Dry	ug/kg	n/a	<12.1	<154	n/a	n/a	n/a	n/a	154	n/a	DU
S07M000318	O		1,4-Dichlorobenzene	ug/kg	58.4	<836	<7.76E+03	n/a	n/a	n/a	n/a	7.76E+03	n/a	DU
S07M000318	O		Acenaphthene	ug/kg	76.2	<866	<8.03E+03	n/a	n/a	n/a	n/a	8.03E+03	n/a	DU
S07M000318	O		Bis(2-ethylhexyl) phthalate	ug/kg	n/a	<1.24E+04	<1.15E+05	n/a	n/a	n/a	n/a	1.15E+05	n/a	DU
S07M000318	O		2-Chlorophenol	ug/kg	68.6	<817	<7.58E+03	n/a	n/a	n/a	n/a	7.58E+03	n/a	DU
S07M000318	O		Di-n-butylphthalate	ug/kg	n/a	6.71E+03	<5.22E+04	n/a	n/a	n/a	n/a	5.22E+04	n/a	DU
S07M000318	O		Pentachlorophenol	ug/kg	89.8	<671	<6.22E+03	n/a	n/a	n/a	n/a	6.22E+03	n/a	DU
S07M000318	O		Pyrene	ug/kg	84.0	<858	<7.96E+03	n/a	n/a	n/a	n/a	7.96E+03	n/a	DU
S07M000318	O		Tributyl phosphate	ug/kg	n/a	<1.08E+03	2.02E+06	n/a	n/a	n/a	n/a	5.00E+04	n/a	DJ

B - Found in Blank
 U - Less Than Detection Limit

D - Dilution
 b - MS/MSD Outside Range

J - Estimated
 c - RPD Outside Range

Q - Qualitative
 f - MS failed/SERDIL OK

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APP A-10

222S20070833

D&D-36428, REV 0

Attachment 1
 U361
 Data Summary Report

Sample Group: 20070833

Customer Group or SDG Number: 222S20070833

Customer Sample ID: Composite 2

Sample Portion: Core Composite - Solid

Sample#	R	AF	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000318		O	Benzoic acid	ug/kg	n/a	<4.87E+03	<4.52E+04	n/a	n/a	n/a	n/a	4.52E+04	n/a	DU
S07M000320		O	Kerosene	mg/Kg	114	<15.9	6.74E+03	n/a	n/a	n/a	n/a	693	n/a	DJ
S07M000322		F	Gross alpha	uCi/g	98.9	<7.76E-04	0.0622	n/a	n/a	n/a	n/a	1.54E-03	8.52	
S07M000322		F	Uranium-233	ug/g	n/a	<0.0244	<0.0251	n/a	n/a	n/a	n/a	0.0251	n/a	U
S07M000322		F	Uranium-234	ug/g	n/a	<0.0122	6.61	n/a	n/a	n/a	n/a	0.0125	n/a	
S07M000322		F	Uranium-235	ug/g	105	<2.14	803	n/a	n/a	n/a	n/a	2.21	n/a	
S07M000322		F	Uranium-236	ug/g	n/a	<9.74E-03	14.7	n/a	n/a	n/a	n/a	0.0100	n/a	
S07M000322		F	U 238	ug/g	106	<107	1.23E+05	n/a	n/a	n/a	n/a	110	n/a	
S07M000324		W	Fluoride	ug/g	97.8	<0.0120	658	n/a	n/a	n/a	n/a	13.8	n/a	
S07M000324		W	Chloride	ug/g	96.6	<0.0170	218	n/a	n/a	n/a	n/a	19.5	n/a	
S07M000324		W	Nitrite	ug/g	98.6	0.190	2.28E+03	n/a	n/a	n/a	n/a	124	n/a	B
S07M000324		W	Bromide	ug/g	97.3	<0.125	425	n/a	n/a	n/a	n/a	144	n/a	J
S07M000324		W	Nitrate	ug/g	96.9	0.160	2.37E+04	n/a	n/a	n/a	n/a	180	n/a	
S07M000324		W	Sulfate	ug/g	97.4	<0.138	944	n/a	n/a	n/a	n/a	158	n/a	J
S07M000326		A	Americium-241	uCi/g	106	<4.56E-04	2.24E-03	n/a	n/a	n/a	n/a	5.25E-04	4.14	
S07M000326		A	Cobalt-60	uCi/g	102	<4.25E-03	<4.74E-03	n/a	n/a	n/a	n/a	4.74E-03	n/a	U
S07M000326		A	Cesium-137	uCi/g	102	<5.72E-03	0.216	n/a	n/a	n/a	n/a	7.85E-03	6.77	
S07M000326		A	Europium-154	uCi/g	n/a	<0.0146	<0.0142	n/a	n/a	n/a	n/a	0.0142	n/a	U
S07M000326		A	Europium-155	uCi/g	n/a	<8.71E-03	<8.46E-03	n/a	n/a	n/a	n/a	8.46E-03	n/a	U
S07M000326		A	Silver	ug/g	78.9	<5.00E-03	104	n/a	n/a	n/a	n/a	4.76	n/a	
S07M000326		A	Arsenic	ug/g	92.1	<0.0600	<57.1	n/a	n/a	n/a	n/a	57.1	n/a	U
S07M000326		A	Barium	ug/g	93.3	<5.00E-03	49.8	n/a	n/a	n/a	n/a	4.76	n/a	
S07M000326		A	Cadmium	ug/g	90.0	<5.00E-03	<4.76	n/a	n/a	n/a	n/a	4.76	n/a	U
S07M000326		A	Chromium	ug/g	91.6	<5.00E-03	363	n/a	n/a	n/a	n/a	4.76	n/a	
S07M000326		A	Copper	ug/g	94.6	<5.00E-03	60.3	n/a	n/a	n/a	n/a	4.76	n/a	
S07M000326		A	Lithium	ug/g	96.2	<0.0100	49.5	n/a	n/a	n/a	n/a	9.52	n/a	J
S07M000326		A	Nickel	ug/g	90.0	<0.0200	264	n/a	n/a	n/a	n/a	19.0	n/a	
S07M000326		A	Lead	ug/g	90.7	<0.0500	795	n/a	n/a	n/a	n/a	47.6	n/a	
S07M000326		A	Selenium	ug/g	93.9	<0.100	<95.2	n/a	n/a	n/a	n/a	95.2	n/a	U

B - Found In Blank
 U - Less Than Detection Limit

D - Dilution
 b - MS/MSD Outside Range

J - Estimated
 c - RPD Outside Range

Q - Qualitative
 f - MS failed/SERDIL OK

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APP A-11

222S20070833

D&D-36428, REV 0

Attachment 1
U361
Data Summary Report

Sample Group: 20070833

Customer Group or SDG Number: 222S20070833

Customer Sample ID: Composite 2

Sample Portion: Core Composite - Solid

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000328		A	Strontium	ug/g	94.5	<5.00E-03	488	n/a	n/a	n/a	n/a	4.76	n/a	
S07M000328		A	Uranium	ug/g	88.6	<0.100	1.24E+05	n/a	n/a	n/a	n/a	95.2	n/a	
S07M000328		A	Neptunium-237	uCi/g	76.5	3.81E-03	3.31E-03	n/a	n/a	n/a	n/a	6.38E-03	115	U
S07M000328		A	Plutonium-239/240	uCi/g	103	<3.26E-04	0.0224	n/a	n/a	n/a	n/a	1.10E-03	2.23	
S07M000328		A	Plutonium-238	uCi/g	n/a	<3.26E-04	<1.10E-03	n/a	n/a	n/a	n/a	1.10E-03	100	U
S07M000328		A	Strontium-89/90	uCi/g	96.2	<5.76E-04	0.655	n/a	n/a	n/a	n/a	7.35E-04	1.15	
S07M000328		A	Technetium-99	uCi/g	110	<6.51E-04	0.0125	n/a	n/a	n/a	n/a	6.24E-04	4.43	

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APP A-12

222S20070833

D&D-36428, REV 0

B - Found in Blank
 U - Less Than Detection Limit

D - Dilution
 b - MS/MSD Outside Range

J - Estimated
 c - RPD Outside Range

Q - Qualitative
 f - MS failed/SERDIL OK

Attachment 1
U361
Data Summary Report

Sample Group: 20070833
Customer Group or SDG Number: 222S20070833
Customer Sample ID: Field Blank 1
Sample Portion: Field Blank

Sample#	R	AF	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000209			Acetone	ug/L	95.8	<2.19	<2.43	n/a	n/a	n/a	n/a	2.43	n/a	U
S07M000209			Carbon disulfide	ug/L	n/a	<0.150	<0.167	n/a	n/a	n/a	n/a	0.167	n/a	U
S07M000209			Bromomethane	ug/L	n/a	<0.490	<0.544	n/a	n/a	n/a	n/a	0.544	n/a	U
S07M000209			Chloromethane	ug/L	n/a	<0.310	<0.344	n/a	n/a	n/a	n/a	0.344	n/a	U
S07M000209			2-Butanone	ug/L	104	<1.33	<1.48	n/a	n/a	n/a	n/a	1.48	n/a	U
S07M000209			Methylenechloride	ug/L	n/a	<0.170	<0.189	n/a	n/a	n/a	n/a	0.189	n/a	U
S07M000209			Tetrachloroethene	ug/L	n/a	<0.200	<0.222	n/a	n/a	n/a	n/a	0.222	n/a	U
S07M000209			Toluene	ug/L	107	<0.120	<0.133	n/a	n/a	n/a	n/a	0.133	n/a	U
S07M000209			Hexane	ug/L	n/a	<0.270	<0.300	n/a	n/a	n/a	n/a	0.300	n/a	U
S07M000208			Organic Volume Present	mL	n/a	n/a	0.0	n/a	n/a	n/a	n/a	n/a	n/a	Q
S07M000208			Volume percent settled solids	%	n/a	n/a	0.0	n/a	n/a	n/a	n/a	n/a	n/a	Q
S07M000214			Mercury	ug/mL	99.8	7.92E-04	7.96E-04	n/a	n/a	n/a	n/a	4.00E-04	n/a	J
S07M000214			Fluoride	ug/mL	97.8	<0.0120	0.0200	n/a	n/a	n/a	n/a	0.0120	n/a	J
S07M000214			Chloride	ug/mL	96.6	<0.0170	0.0800	n/a	n/a	n/a	n/a	0.0170	n/a	J
S07M000214			Nitrite	ug/mL	95.8	<0.108	0.200	n/a	n/a	n/a	n/a	0.108	n/a	J
S07M000214			Bromide	ug/mL	95.5	<0.125	<0.125	n/a	n/a	n/a	n/a	0.125	n/a	U
S07M000214			Nitrate	ug/mL	93.4	<0.139	0.930	n/a	n/a	n/a	n/a	0.139	n/a	J
S07M000214			Sulfate	ug/mL	96.6	<0.138	0.170	n/a	n/a	n/a	n/a	0.138	n/a	J
S07M000214			Silver	ug/mL	95.3	<5.00E-03	<5.00E-03	n/a	n/a	n/a	n/a	5.00E-03	n/a	U
S07M000214			Arsenic	ug/mL	101	<0.0600	<0.0600	n/a	n/a	n/a	n/a	0.0600	n/a	U
S07M000214			Barium	ug/mL	100	<5.00E-03	<5.00E-03	n/a	n/a	n/a	n/a	5.00E-03	n/a	U
S07M000214			Cadmium	ug/mL	102	<5.00E-03	<5.00E-03	n/a	n/a	n/a	n/a	5.00E-03	n/a	U
S07M000214			Chromium	ug/mL	104	<5.00E-03	<5.00E-03	n/a	n/a	n/a	n/a	5.00E-03	n/a	U
S07M000214			Copper	ug/mL	98.2	<5.00E-03	<5.00E-03	n/a	n/a	n/a	n/a	5.00E-03	n/a	U
S07M000214			Lithium	ug/mL	99.9	<0.0100	<0.0100	n/a	n/a	n/a	n/a	0.0100	n/a	U
S07M000214			Nickel	ug/mL	102	<0.0200	<0.0200	n/a	n/a	n/a	n/a	0.0200	n/a	U
S07M000214			Lead	ug/mL	105	<0.0500	<0.0500	n/a	n/a	n/a	n/a	0.0500	n/a	U
S07M000214			Selenium	ug/mL	102	<0.100	<0.100	n/a	n/a	n/a	n/a	0.100	n/a	U
S07M000214			Strontium	ug/mL	102	<5.00E-03	<5.00E-03	n/a	n/a	n/a	n/a	5.00E-03	n/a	U

B - Found in Blank
 U - Less Than Detection Limit

D - Dilution
 b - MS/MSD Outside Range

J - Estimated
 c - RPD Outside Range

Q - Qualitative
 f - MS failed/SERDIL OK

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APP A-13

222S20070833

D&D-36428, REV 0

Attachment 1
 U361
 Data Summary Report

Sample Group: 20070833
 Customer Group or SDG Number: 222S20070833
 Customer Sample ID: Field Blank 1
 Sample Portion: Field Blank

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000214			Uranium	ug/mL	98.9	<0.100	<0.100	n/a	n/a	n/a	n/a	0.100	n/a	U
S07M000215			Cobalt-60	uCi/mL	102	<3.24E-06	<3.06E-06	n/a	n/a	n/a	n/a	3.06E-06	n/a	U
S07M000215			Cesium-137	uCi/mL	105	<3.90E-06	1.55E-04	n/a	n/a	n/a	n/a	4.22E-06	6.25	
S07M000215			Europium-154	uCi/mL	n/a	<9.88E-06	<9.91E-06	n/a	n/a	n/a	n/a	9.91E-06	n/a	U
S07M000215			Europium-155	uCi/mL	n/a	<6.18E-06	<6.55E-06	n/a	n/a	n/a	n/a	6.55E-06	n/a	U
S07M000215			Uranium-233	ug/mL	n/a	<1.00E-08	<1.00E-07	n/a	n/a	n/a	n/a	1.00E-07	n/a	U
S07M000215			Uranium-234	ug/mL	n/a	<5.00E-09	5.60E-08	n/a	n/a	n/a	n/a	5.00E-08	n/a	J
S07M000215			Uranium-235	ug/mL	90.5	<1.10E-08	6.32E-06	n/a	n/a	n/a	n/a	1.10E-07	n/a	
S07M000215			Uranium-236	ug/mL	n/a	<4.00E-09	4.57E-07	n/a	n/a	n/a	n/a	4.00E-08	n/a	
S07M000215			U 238	ug/mL	93.5	<5.50E-07	1.12E-03	n/a	n/a	n/a	n/a	5.50E-06	n/a	
S07M000215			pH Measurement	unitless	n/a	n/a	6.21	n/a	n/a	n/a	n/a	0.0100	n/a	
S07M000215			Technetium-99	uCi/mL	111	<7.15E-06	<6.98E-06	n/a	n/a	n/a	n/a	6.96E-06	10.3	U
S07M000216			Americium-241	uCi/mL	104	<2.29E-06	<2.26E-06	n/a	n/a	n/a	n/a	2.26E-06	100	U
S07M000216			Neptunium-237	uCi/mL	82.9	<1.82E-05	<1.82E-05	n/a	n/a	n/a	n/a	3.83E-05	181	U
S07M000216			Plutonium-239/240	uCi/mL	99.6	<1.66E-06	<1.70E-06	n/a	n/a	n/a	n/a	1.70E-06	100	U
S07M000216			Plutonium-238	uCi/mL	n/a	<1.66E-06	<1.70E-06	n/a	n/a	n/a	n/a	1.70E-06	100	U
S07M000216			Strontium-89/90	uCi/mL	93.9	5.32E-06	1.29E-04	n/a	n/a	n/a	n/a	3.23E-06	5.74	
S07M000217	O		1,4-Dichlorobenzene	ug/L	32.2	<14.7	<103	n/a	n/a	n/a	n/a	103	n/a	U
S07M000217	O		Acenaphthene	ug/L	65.5	<25.2	<177	n/a	n/a	n/a	n/a	177	n/a	U
S07M000217	O		Bis(2-ethylhexyl) phthalate	ug/L	n/a	<51.2	<359	n/a	n/a	n/a	n/a	359	n/a	U
S07M000217	O		2-Chlorophenol	ug/L	73.1	<23.9	<167	n/a	n/a	n/a	n/a	167	n/a	U
S07M000217	O		Di-n-butylphthalate	ug/L	n/a	<14.9	<104	n/a	n/a	n/a	n/a	104	n/a	U
S07M000217	O		Pentachlorophenol	ug/L	64.7	<8.18	<57.2	n/a	n/a	n/a	n/a	57.2	n/a	U
S07M000217	O		Pyrene	ug/L	90.6	<15.8	<111	n/a	n/a	n/a	n/a	111	n/a	U
S07M000217	O		Tributyl phosphate	ug/L	n/a	<6.36	<44.5	n/a	n/a	n/a	n/a	44.5	n/a	U
S07M000217	O		Benzoic acid	ug/L	n/a	<58.3	<408	n/a	n/a	n/a	n/a	408	n/a	U
S07M000219	O		Aroclor 1016	ug/L	n/a	<5.40	<18.9	n/a	n/a	n/a	n/a	18.9	n/a	U
S07M000219	O		Aroclor 1221	ug/L	n/a	<1.01	<3.55	n/a	n/a	n/a	n/a	3.55	n/a	U
S07M000219	O		Aroclor 1232	ug/L	n/a	<0.914	<3.20	n/a	n/a	n/a	n/a	3.20	n/a	U

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APP A-14

222S20070833

D&D-36428, REV 0

B - Found in Blank
 U - Less Than Detection Limit

D - Dilution
 b - MS/MSD Outside Range

J - Estimated
 c - RPD Outside Range

Q - Qualitative
 f - MS failed/SERDIL OK

Attachment 1
U361
Data Summary Report

Sample Group: 20070833

Customer Group or SDG Number: 222S20070833

Customer Sample ID: Field Blank 1

Sample Portion: Field Blank

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000219	O		Aroclor 1242	ug/L	n/a	<1.80	<6.30	n/a	n/a	n/a	n/a	6.30	n/a	U
S07M000219	O		Aroclor 1248	ug/L	n/a	<1.01	<3.55	n/a	n/a	n/a	n/a	3.55	n/a	U
S07M000219	O		Aroclor 1254	ug/L	88.1	<0.371	<1.30	n/a	n/a	n/a	n/a	1.30	n/a	U
S07M000219	O		Aroclor 1260	ug/L	n/a	<4.09	<14.3	n/a	n/a	n/a	n/a	14.3	n/a	U

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APP A-15

222S20070833

D&D-36428, REV 0

B - Found in Blank
U - Less Than Detection Limit

D - Dilution
b - MS/MSD Outside Range

J - Estimated
c - RPD Outside Range

Q - Qualitative
f - MS failed/SERDIL OK

Attachment 1
U361
Data Summary Report

Sample Group: 20070833
Customer Group or SDG Number: 222S20070833
Customer Sample ID: Field Blank 2
Sample Portion: Field Blank

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000220			Organic Volume Present	mL	n/a	n/a	0.0	n/a	n/a	n/a	n/a	n/a	n/a	Q
S07M000220			Volume percent settled solids	%	n/a	n/a	0.0	n/a	n/a	n/a	n/a	n/a	n/a	Q
S07M000221			Acetone	ug/L	95.8	<2.19	<2.43	n/a	n/a	n/a	n/a	2.43	n/a	U
S07M000221			Carbon disulfide	ug/L	n/a	<0.150	<0.167	n/a	n/a	n/a	n/a	0.167	n/a	U
S07M000221			Bromomethane	ug/L	n/a	<0.490	<0.544	n/a	n/a	n/a	n/a	0.544	n/a	U
S07M000221			Chloromethane	ug/L	n/a	<0.310	<0.344	n/a	n/a	n/a	n/a	0.344	n/a	U
S07M000221			2-Butanone	ug/L	104	<1.33	<1.48	n/a	n/a	n/a	n/a	1.48	n/a	U
S07M000221			Methylenechloride	ug/L	n/a	<0.170	<0.189	n/a	n/a	n/a	n/a	0.189	n/a	U
S07M000221			Tetrachloroethene	ug/L	n/a	<0.200	<0.222	n/a	n/a	n/a	n/a	0.222	n/a	U
S07M000221			Toluene	ug/L	107	<0.120	<0.133	n/a	n/a	n/a	n/a	0.133	n/a	U
S07M000221			Hexane	ug/L	n/a	<0.270	<0.300	n/a	n/a	n/a	n/a	0.300	n/a	U
S07M000225			Mercury	ug/mL	99.8	7.92E-04	8.28E-04	n/a	n/a	n/a	n/a	4.00E-04	n/a	J
S07M000225			Fluoride	ug/mL	97.8	<0.0120	0.160	n/a	n/a	n/a	n/a	0.0120	n/a	
S07M000225			Chloride	ug/mL	96.6	<0.0170	0.0800	n/a	n/a	n/a	n/a	0.0170	n/a	J
S07M000225			Nitrite	ug/mL	95.8	<0.108	1.25	n/a	n/a	n/a	n/a	0.108	n/a	
S07M000225			Bromide	ug/mL	95.5	<0.125	<0.125	n/a	n/a	n/a	n/a	0.125	n/a	U
S07M000225			Nitrate	ug/mL	93.4	<0.139	2.47	n/a	n/a	n/a	n/a	0.139	n/a	
S07M000225			Sulfate	ug/mL	96.6	<0.138	0.180	n/a	n/a	n/a	n/a	0.138	n/a	J
S07M000225			Silver	ug/mL	95.3	<5.00E-03	<5.00E-03	n/a	n/a	n/a	n/a	5.00E-03	n/a	U
S07M000225			Arsenic	ug/mL	101	<0.0600	<0.0600	n/a	n/a	n/a	n/a	0.0600	n/a	U
S07M000225			Barium	ug/mL	100	<5.00E-03	<5.00E-03	n/a	n/a	n/a	n/a	5.00E-03	n/a	U
S07M000225			Cadmium	ug/mL	102	<5.00E-03	<5.00E-03	n/a	n/a	n/a	n/a	5.00E-03	n/a	U
S07M000225			Chromium	ug/mL	104	<5.00E-03	<5.00E-03	n/a	n/a	n/a	n/a	5.00E-03	n/a	U
S07M000225			Copper	ug/mL	98.2	<5.00E-03	<5.00E-03	n/a	n/a	n/a	n/a	5.00E-03	n/a	U
S07M000225			Lithium	ug/mL	99.9	<0.0100	<0.0100	n/a	n/a	n/a	n/a	0.0100	n/a	U
S07M000225			Nickel	ug/mL	102	<0.0200	<0.0200	n/a	n/a	n/a	n/a	0.0200	n/a	U
S07M000225			Lead	ug/mL	105	<0.0500	<0.0500	n/a	n/a	n/a	n/a	0.0500	n/a	U
S07M000225			Selenium	ug/mL	102	<0.100	<0.100	n/a	n/a	n/a	n/a	0.100	n/a	U
S07M000225			Strontium	ug/mL	102	<5.00E-03	<5.00E-03	n/a	n/a	n/a	n/a	5.00E-03	n/a	U

B - Found in Blank
 U - Less Than Detection Limit

D - Dilution
 b - MS/MSD Outside Range

J - Estimated
 c - RPD Outside Range

Q - Qualitative
 f - MS failed/SERDIL OK

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APP A-16

222S20070833

D&D-36428, REV 0

Attachment 1
U361
Data Summary Report

Sample Group: 20070833
Customer Group or SDG Number: 222S20070833
Customer Sample ID: Field Blank 2
Sample Portion: Field Blank

Sample#	R	As#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000225			Uranium	ug/mL	98.9	<0.100	<0.100	n/a	n/a	n/a	n/a	0.100	n/a	U
S07M000226			Cobalt-60	uCi/mL	102	<3.24E-06	<2.99E-06	n/a	n/a	n/a	n/a	2.99E-06	n/a	U
S07M000226			Cesium-137	uCi/mL	105	<3.90E-06	6.48E-04	n/a	n/a	n/a	n/a	6.01E-06	5.86	
S07M000226			Europium-154	uCi/mL	n/a	<9.88E-06	<9.83E-06	n/a	n/a	n/a	n/a	9.83E-06	n/a	U
S07M000226			Europium-155	uCi/mL	n/a	<6.18E-06	<7.80E-06	n/a	n/a	n/a	n/a	7.80E-06	n/a	U
S07M000226			Uranium-233	ug/mL	n/a	<1.00E-06	<1.00E-07	n/a	n/a	n/a	n/a	1.00E-07	n/a	U
S07M000226			Uranium-234	ug/mL	n/a	<5.00E-09	8.70E-08	n/a	n/a	n/a	n/a	5.00E-08	n/a	J
S07M000226			Uranium-235	ug/mL	90.5	<1.10E-08	1.16E-05	n/a	n/a	n/a	n/a	1.10E-07	n/a	
S07M000226			Uranium-238	ug/mL	n/a	<4.00E-09	5.02E-07	n/a	n/a	n/a	n/a	4.00E-08	n/a	
S07M000226			U 238	ug/mL	93.5	<5.50E-07	1.62E-03	n/a	n/a	n/a	n/a	5.50E-06	n/a	
S07M000226			pH Measurement	unitless	n/a	n/a	6.12	n/a	n/a	n/a	n/a	0.0100	n/a	
S07M000226			Technetium-99	uCi/mL	111	<7.15E-06	<6.91E-06	n/a	n/a	n/a	n/a	6.91E-06	9.55	U
S07M000227			Americium-241	uCi/mL	104	<2.29E-06	<2.34E-06	n/a	n/a	n/a	n/a	2.34E-06	100	U
S07M000227			Neptunium-237	uCi/mL	82.9	<1.82E-05	<1.82E-05	n/a	n/a	n/a	n/a	3.83E-05	136	U
S07M000227			Plutonium-239/240	uCi/mL	99.6	<1.66E-06	<1.60E-06	n/a	n/a	n/a	n/a	1.60E-06	100	U
S07M000227			Plutonium-238	uCi/mL	n/a	<1.66E-06	<1.60E-06	n/a	n/a	n/a	n/a	1.80E-06	100	U
S07M000227			Strontium-89/90	uCi/mL	93.9	5.32E-06	3.28E-05	n/a	n/a	n/a	n/a	3.68E-06	14	B
S07M000230		O	Aroclor 1016	ug/L	n/a	<5.40	<18.9	n/a	n/a	n/a	n/a	18.9	n/a	U
S07M000230		O	Aroclor 1221	ug/L	n/a	<1.01	<3.55	n/a	n/a	n/a	n/a	3.55	n/a	U
S07M000230		O	Aroclor 1232	ug/L	n/a	<0.914	<3.20	n/a	n/a	n/a	n/a	3.20	n/a	U
S07M000230		O	Aroclor 1242	ug/L	n/a	<1.80	<6.30	n/a	n/a	n/a	n/a	6.30	n/a	U
S07M000230		O	Aroclor 1248	ug/L	n/a	<1.01	<3.55	n/a	n/a	n/a	n/a	3.55	n/a	U
S07M000230		O	Aroclor 1254	ug/L	88.1	<0.371	<1.30	n/a	n/a	n/a	n/a	1.30	n/a	U
S07M000230		O	Aroclor 1260	ug/L	n/a	<4.09	<14.3	n/a	n/a	n/a	n/a	14.3	n/a	U
S07M000228		O	1,4-Dichlorobenzene	ug/L	32.2	<14.7	<103	n/a	n/a	n/a	n/a	103	n/a	U
S07M000228		O	Acenaphthene	ug/L	65.5	<25.2	<177	n/a	n/a	n/a	n/a	177	n/a	U
S07M000228		O	Bis(2-ethylhexyl) phthalate	ug/L	n/a	<51.2	1.78E+03	n/a	n/a	n/a	n/a	359	n/a	J
S07M000228		O	2-Chlorophenol	ug/L	73.1	<23.9	<167	n/a	n/a	n/a	n/a	167	n/a	U
S07M000228		O	Di-n-butylphthalate	ug/L	n/a	<14.9	<104	n/a	n/a	n/a	n/a	104	n/a	U

B - Found in Blank
 U - Less Than Detection Limit

D - Dilution
 b - MS/MSD Outside Range

J - Estimated
 c - RPD Outside Range

Q - Qualitative
 f - MS failed/SERDIL OK

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APP A-17

222S20070833

D&D-36428, REV 0

Attachment 1
U361
Data Summary Report

Sample Group: 20070833
Customer Group or SDG Number: 222S20070833
Customer Sample ID: Field Blank 2
Sample Portion: Field Blank

Sample#	R	As	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000228	O		Pentachlorophenol	ug/L	84.7	<8.18	<57.2	n/a	n/a	n/a	n/a	57.2	n/a	U
S07M000228	O		Pyrene	ug/L	90.8	<15.8	<111	n/a	n/a	n/a	n/a	111	n/a	U
S07M000228	O		Tributyl phosphate	ug/L	n/a	<6.36	<44.5	n/a	n/a	n/a	n/a	44.5	n/a	U
S07M000228	O		Benzoic acid	ug/L	n/a	<58.3	<408	n/a	n/a	n/a	n/a	408	n/a	U

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APP A-18

222S20070833

D&D-36428, REV 0

B - Found in Blank
U - Less Than Detection Limit

D - Dilution
b - MS/MSD Outside Range

J - Estimated
c - RPD Outside Range

Q - Qualitative
f - MS failed/SERDI. OK

Attachment 1
U361
Data Summary Report

Sample Group: 20070833

Customer Group or SDG Number: 222S20070833

Customer Sample ID: Field Blank 3

Sample Portion: Field Blank

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000502			Organic Volume Present	mL	n/a	n/a	0.0	n/a	n/a	n/a	n/a	n/a	n/a	Q
S07M000502			Volume percent settled solids	%	n/a	n/a	0.0	n/a	n/a	n/a	n/a	n/a	n/a	Q
S07M000504			Acetone	ug/L	95.8	<2.19	<2.43	n/a	n/a	n/a	n/a	2.43	n/a	U
S07M000504			Carbon disulfide	ug/L	n/a	<0.150	<0.187	n/a	n/a	n/a	n/a	0.187	n/a	U
S07M000504			Bromomethane	ug/L	n/a	<0.490	<0.544	n/a	n/a	n/a	n/a	0.544	n/a	U
S07M000504			Chloromethane	ug/L	n/a	<0.310	<0.344	n/a	n/a	n/a	n/a	0.344	n/a	U
S07M000504			2-Butanone	ug/L	104	<1.33	<1.48	n/a	n/a	n/a	n/a	1.48	n/a	U
S07M000504			Methylenechloride	ug/L	n/a	<0.170	<0.189	n/a	n/a	n/a	n/a	0.189	n/a	U
S07M000504			Tetrachloroethene	ug/L	n/a	<0.200	<0.222	n/a	n/a	n/a	n/a	0.222	n/a	U
S07M000504			Toluene	ug/L	107	<0.120	<0.133	n/a	n/a	n/a	n/a	0.133	n/a	U
S07M000504			Hexane	ug/L	n/a	<0.270	<0.300	n/a	n/a	n/a	n/a	0.300	n/a	U
S07M000509			Mercury	ug/mL	99.8	7.92E-04	8.12E-04	n/a	n/a	n/a	n/a	4.00E-04	n/a	J
S07M000509			Fluoride	ug/mL	97.8	<0.0120	<0.0120	n/a	n/a	n/a	n/a	0.0120	n/a	U
S07M000509			Chloride	ug/mL	96.8	<0.0170	0.0300	n/a	n/a	n/a	n/a	0.0170	n/a	U
S07M000509			Nitrite	ug/mL	95.8	<0.108	<0.108	n/a	n/a	n/a	n/a	0.108	n/a	U
S07M000509			Bromide	ug/mL	95.5	<0.125	<0.125	n/a	n/a	n/a	n/a	0.125	n/a	U
S07M000509			Nitrate	ug/mL	93.4	<0.138	<0.138	n/a	n/a	n/a	n/a	0.138	n/a	U
S07M000509			Sulfate	ug/mL	98.6	<0.138	<0.138	n/a	n/a	n/a	n/a	0.138	n/a	J
S07M000509			Silver	ug/mL	95.3	<5.00E-03	<5.00E-03	n/a	n/a	n/a	n/a	5.00E-03	n/a	U
S07M000509			Arsenic	ug/mL	101	<0.0800	<0.0800	n/a	n/a	n/a	n/a	0.0800	n/a	U
S07M000509			Barium	ug/mL	100	<5.00E-03	<5.00E-03	n/a	n/a	n/a	n/a	5.00E-03	n/a	U
S07M000509			Cadmium	ug/mL	102	<5.00E-03	<5.00E-03	n/a	n/a	n/a	n/a	5.00E-03	n/a	U
S07M000509			Chromium	ug/mL	104	<5.00E-03	<5.00E-03	n/a	n/a	n/a	n/a	5.00E-03	n/a	U
S07M000509			Copper	ug/mL	98.2	<5.00E-03	<5.00E-03	n/a	n/a	n/a	n/a	5.00E-03	n/a	U
S07M000509			Lithium	ug/mL	99.9	<0.0100	<0.0100	n/a	n/a	n/a	n/a	0.0100	n/a	U
S07M000509			Nickel	ug/mL	102	<0.0200	<0.0200	n/a	n/a	n/a	n/a	0.0200	n/a	U
S07M000509			Lead	ug/mL	105	<0.0500	<0.0500	n/a	n/a	n/a	n/a	0.0500	n/a	U
S07M000509			Selenium	ug/mL	102	<0.100	<0.100	n/a	n/a	n/a	n/a	0.100	n/a	U
S07M000509			Strontium	ug/mL	102	<5.00E-03	<5.00E-03	n/a	n/a	n/a	n/a	5.00E-03	n/a	U

B - Found in Blank
 U - Less Than Detection Limit

D - Dilution
 b - MS/MSD Outside Range

J - Estimated
 c - RPD Outside Range

Q - Qualitative
 f - MS failed/SERDIL OK

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APP A-19

222S20070833

D&D-36428, REV 0

Attachment 1
U361
Data Summary Report

Sample Group: 20070833
Customer Group or SDG Number: 222S20070833
Customer Sample ID: Field Blank 3
Sample Portion: Field Blank

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000509			Uranium	ug/mL	98.9	<0.100	<0.100	n/a	n/a	n/a	n/a	0.100	n/a	U
S07M000510			Cobalt-60	uCi/mL	102	<3.24E-08	<3.04E-08	n/a	n/a	n/a	n/a	3.04E-08	n/a	U
S07M000510			Cesium-137	uCi/mL	105	<3.90E-06	3.02E-05	n/a	n/a	n/a	n/a	3.71E-06	10.75	
S07M000510			Europium-154	uCi/mL	n/a	<9.88E-06	<1.02E-05	n/a	n/a	n/a	n/a	1.02E-05	n/a	U
S07M000510			Europium-155	uCi/mL	n/a	<6.18E-06	<6.23E-06	n/a	n/a	n/a	n/a	6.23E-06	n/a	U
S07M000510			Uranium-233	ug/mL	n/a	<1.00E-08	<1.00E-07	n/a	n/a	n/a	n/a	1.00E-07	n/a	U
S07M000510			Uranium-234	ug/mL	n/a	<5.00E-09	<5.00E-08	n/a	n/a	n/a	n/a	5.00E-08	n/a	U
S07M000510			Uranium-235	ug/mL	90.5	<1.10E-08	2.38E-08	n/a	n/a	n/a	n/a	1.10E-07	n/a	
S07M000510			Uranium-238	ug/mL	n/a	<4.00E-09	7.20E-08	n/a	n/a	n/a	n/a	4.00E-08	n/a	J
S07M000510			U 238	ug/mL	93.5	<5.50E-07	3.25E-04	n/a	n/a	n/a	n/a	5.50E-06	n/a	
S07M000510			pH Measurement	unitless	n/a	n/a	7.55	n/a	n/a	n/a	n/a	0.0100	n/a	
S07M000510			Technetium-99	uCi/mL	111	<7.15E-06	<6.85E-06	n/a	n/a	n/a	n/a	6.85E-06	10.6	U
S07M000511			Americium-241	uCi/mL	104	<2.29E-06	<2.45E-06	n/a	n/a	n/a	n/a	2.45E-06	100	U
S07M000511			Neptunium-237	uCi/mL	82.9	<1.82E-05	<1.82E-05	n/a	n/a	n/a	n/a	3.83E-05	500	U
S07M000511			Plutonium-239/240	uCi/mL	99.6	<1.66E-06	<1.61E-06	n/a	n/a	n/a	n/a	1.61E-06	100	U
S07M000511			Plutonium-238	uCi/mL	n/a	<1.66E-06	<1.61E-06	n/a	n/a	n/a	n/a	1.61E-06	100	U
S07M000511			Strontium-89/90	uCi/mL	93.9	5.32E-06	1.74E-04	n/a	n/a	n/a	n/a	3.32E-06	4.95	
S07M000518		O	1,4-Dichlorobenzene	ug/L	32.2	<14.7	<103	n/a	n/a	n/a	n/a	103	n/a	U
S07M000518		O	Acenaphthene	ug/L	65.5	<25.2	<177	n/a	n/a	n/a	n/a	177	n/a	U
S07M000518		O	Bis(2-ethylhexyl) phthalate	ug/L	n/a	<51.2	1.96E+03	n/a	n/a	n/a	n/a	359	n/a	J
S07M000518		O	2-Chlorophenol	ug/L	73.1	<23.9	<167	n/a	n/a	n/a	n/a	167	n/a	U
S07M000518		O	Di-n-butylphthalate	ug/L	n/a	<14.9	<104	n/a	n/a	n/a	n/a	104	n/a	U
S07M000518		O	Pentachlorophenol	ug/L	64.7	<8.18	<57.2	n/a	n/a	n/a	n/a	57.2	n/a	U
S07M000518		O	Pyrene	ug/L	90.6	<15.8	<111	n/a	n/a	n/a	n/a	111	n/a	U
S07M000518		O	Tributyl phosphate	ug/L	n/a	<8.36	<44.5	n/a	n/a	n/a	n/a	44.5	n/a	U
S07M000518		O	Benzoic acid	ug/L	n/a	<58.3	<408	n/a	n/a	n/a	n/a	408	n/a	U
S07M000520		O	Aroclor 1016	ug/L	n/a	<5.40	<18.9	n/a	n/a	n/a	n/a	18.9	n/a	U
S07M000520		O	Aroclor 1221	ug/L	n/a	<1.01	<3.55	n/a	n/a	n/a	n/a	3.55	n/a	U
S07M000520		O	Aroclor 1232	ug/L	n/a	<0.914	<3.20	n/a	n/a	n/a	n/a	3.20	n/a	U

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APP A-20

222S20070833

D&D-36428, REV 0

B - Found in Blank
 U - Less Than Detection Limit

D - Dilution
 b - MS/MSD Outside Range

J - Estimated
 c - RPD Outside Range

Q - Qualitative
 f - MS failed/SERDIL OK

**Attachment 1
 U361
 Data Summary Report**

Sample Group: 20070833
Customer Group or SDG Number: 222S20070833
Customer Sample ID: Field Blank 3
Sample Portion: Field Blank

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000520		O	Aroclor 1242	ug/L	n/a	<1.80	<6.30	n/a	n/a	n/a	n/a	6.30	n/a	U
S07M000520		O	Aroclor 1248	ug/L	n/a	<1.01	<3.55	n/a	n/a	n/a	n/a	3.55	n/a	U
S07M000520		O	Aroclor 1254	ug/L	88.1	<0.371	<1.30	n/a	n/a	n/a	n/a	1.30	n/a	U
S07M000520		O	Aroclor 1280	ug/L	n/a	<4.09	<14.3	n/a	n/a	n/a	n/a	14.3	n/a	U

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APP A-21

222S20070833

D&D-36428, REV 0

B - Found in Blank
 U - Less Than Detection Limit

D - Dilution
 b - MS/MSD Outside Range

J - Estimated
 c - RPD Outside Range

Q - Qualitative
 f - MS failed/SERDIL OK

Attachment 1
U361
Data Summary Report

Sample Group: 20070833

Customer Group or SDG Number: 222S20070833

Customer Sample ID: Field Blank 4

Sample Portion: Field Blank

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000503			Organic Volume Present	mL	n/a	n/a	0.0	n/a	n/a	n/a	n/a	n/a	n/a	Q
S07M000503			Volume percent settled solids	%	n/a	n/a	0.0	n/a	n/a	n/a	n/a	n/a	n/a	Q
S07M000505			Acetone	ug/L	95.8	<2.18	<2.43	n/a	n/a	n/a	n/a	2.43	n/a	U
S07M000505			Carbon disulfide	ug/L	n/a	<0.150	<0.167	n/a	n/a	n/a	n/a	0.167	n/a	U
S07M000505			Bromomethane	ug/L	n/a	<0.490	<0.544	n/a	n/a	n/a	n/a	0.544	n/a	U
S07M000505			Chloromethane	ug/L	n/a	<0.310	<0.344	n/a	n/a	n/a	n/a	0.344	n/a	U
S07M000505			2-Butanone	ug/L	104	<1.33	<1.48	n/a	n/a	n/a	n/a	1.48	n/a	U
S07M000505			Methylenechloride	ug/L	n/a	<0.170	<0.189	n/a	n/a	n/a	n/a	0.189	n/a	U
S07M000505			Tetrachloroethene	ug/L	n/a	<0.200	<0.222	n/a	n/a	n/a	n/a	0.222	n/a	U
S07M000505			Toluene	ug/L	107	<0.120	<0.133	n/a	n/a	n/a	n/a	0.133	n/a	U
S07M000505			Hexane	ug/L	n/a	<0.270	<0.300	n/a	n/a	n/a	n/a	0.300	n/a	U
S07M000515			Mercury	ug/mL	99.8	7.92E-04	7.12E-04	n/a	n/a	n/a	n/a	4.00E-04	n/a	J
S07M000515			Fluoride	ug/mL	97.8	<0.0120	<0.0120	n/a	n/a	n/a	n/a	0.0120	n/a	U
S07M000515			Chloride	ug/mL	96.6	<0.0170	0.0400	n/a	n/a	n/a	n/a	0.0170	n/a	J
S07M000515			Nitrite	ug/mL	95.8	<0.108	<0.108	n/a	n/a	n/a	n/a	0.108	n/a	U
S07M000515			Bromide	ug/mL	95.5	<0.125	<0.125	n/a	n/a	n/a	n/a	0.125	n/a	U
S07M000515			Nitrate	ug/mL	93.4	<0.139	<0.139	n/a	n/a	n/a	n/a	0.139	n/a	U
S07M000515			Sulfate	ug/mL	96.6	<0.138	<0.138	n/a	n/a	n/a	n/a	0.138	n/a	U
S07M000515			Silver	ug/mL	95.3	<5.00E-03	<5.00E-03	n/a	n/a	n/a	n/a	5.00E-03	n/a	U
S07M000515			Arsenic	ug/mL	101	<0.0600	<0.0600	n/a	n/a	n/a	n/a	0.0600	n/a	U
S07M000515			Barium	ug/mL	100	<5.00E-03	<5.00E-03	n/a	n/a	n/a	n/a	5.00E-03	n/a	U
S07M000515			Cadmium	ug/mL	102	<5.00E-03	<5.00E-03	n/a	n/a	n/a	n/a	5.00E-03	n/a	U
S07M000515			Chromium	ug/mL	104	<5.00E-03	<5.00E-03	n/a	n/a	n/a	n/a	5.00E-03	n/a	U
S07M000515			Copper	ug/mL	98.2	<5.00E-03	<5.00E-03	n/a	n/a	n/a	n/a	5.00E-03	n/a	U
S07M000515			Lithium	ug/mL	99.9	<0.0100	<0.0100	n/a	n/a	n/a	n/a	0.0100	n/a	U
S07M000515			Nickel	ug/mL	102	<0.0200	<0.0200	n/a	n/a	n/a	n/a	0.0200	n/a	U
S07M000515			Lead	ug/mL	105	<0.0500	<0.0500	n/a	n/a	n/a	n/a	0.0500	n/a	U
S07M000515			Selenium	ug/mL	102	<0.100	<0.100	n/a	n/a	n/a	n/a	0.100	n/a	U
S07M000515			Strontium	ug/mL	102	<5.00E-03	<5.00E-03	n/a	n/a	n/a	n/a	5.00E-03	n/a	U

B - Found in Blank
 U - Less Than Detection Limit

D - Dilution
 b - MS/MSD Outside Range

J - Estimated
 c - RPD Outside Range

Q - Qualitative
 f - MS failed/SERDIL OK

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APP A-22

222S20070833

D&D-36428, REV 0

Attachment 1
 U361
 Data Summary Report

Sample Group: 20070833
 Customer Group or SDG Number: 222S20070833
 Customer Sample ID: Field Blank 4
 Sample Portion: Field Blank

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000515			Uranium	ug/mL	98.9	<0.100	<0.100	n/a	n/a	n/a	n/a	0.100	n/a	U
S07M000516			Cobalt-60	uCi/mL	102	<3.24E-06	<3.22E-06	n/a	n/a	n/a	n/a	3.22E-06	n/a	U
S07M000516			Cesium-137	uCi/mL	105	<3.90E-06	6.38E-06	n/a	n/a	n/a	n/a	3.38E-08	34.32	J
S07M000516			Europium-154	uCi/mL	n/a	<9.88E-06	<1.00E-05	n/a	n/a	n/a	n/a	1.00E-05	n/a	U
S07M000516			Europium-155	uCi/mL	n/a	<6.18E-06	<6.14E-06	n/a	n/a	n/a	n/a	6.14E-06	n/a	U
S07M000516			Uranium-233	ug/mL	n/a	<1.00E-08	<1.00E-07	n/a	n/a	n/a	n/a	1.00E-07	n/a	U
S07M000516			Uranium-234	ug/mL	n/a	<5.00E-09	4.25E-07	n/a	n/a	n/a	n/a	5.00E-08	n/a	J
S07M000516			Uranium-235	ug/mL	90.5	<1.10E-08	5.30E-05	n/a	n/a	n/a	n/a	1.10E-07	n/a	
S07M000516			Uranium-236	ug/mL	n/a	<4.00E-09	1.17E-06	n/a	n/a	n/a	n/a	4.00E-08	n/a	
S07M000516			U 238	ug/mL	93.5	<5.50E-07	8.08E-03	n/a	n/a	n/a	n/a	5.50E-06	n/a	
S07M000516			pH Measurement	unitless	n/a	n/a	7.37	n/a	n/a	n/a	n/a	0.0100	n/a	
S07M000516			Technetium-99	uCi/mL	111	<7.15E-06	<7.38E-06	n/a	n/a	n/a	n/a	7.38E-06	10.4	U
S07M000517			Americium-241	uCi/mL	104	<2.29E-06	<2.41E-06	n/a	n/a	n/a	n/a	2.41E-06	100	U
S07M000517			Neptunium-237	uCi/mL	82.9	<1.82E-05	<1.90E-05	n/a	n/a	n/a	n/a	3.83E-05	500	U
S07M000517			Plutonium-239/240	uCi/mL	99.6	<1.66E-06	<1.73E-06	n/a	n/a	n/a	n/a	1.73E-06	100	U
S07M000517			Plutonium-238	uCi/mL	n/a	<1.66E-06	<1.73E-06	n/a	n/a	n/a	n/a	1.73E-06	100	U
S07M000517			Strontium-89/90	uCi/mL	93.9	5.32E-06	8.75E-06	n/a	n/a	n/a	n/a	3.28E-06	41.8	BJ
S07M000521	O		1,4-Dichlorobenzene	ug/L	32.2	<14.7	<103	n/a	n/a	n/a	n/a	103	n/a	U
S07M000521	O		Acenaphthene	ug/L	65.5	<25.2	<177	n/a	n/a	n/a	n/a	177	n/a	U
S07M000521	O		Bis(2-ethylhexyl) phthalate	ug/L	n/a	<51.2	<359	n/a	n/a	n/a	n/a	359	n/a	U
S07M000521	O		2-Chlorophenol	ug/L	73.1	<23.9	<167	n/a	n/a	n/a	n/a	167	n/a	U
S07M000521	O		Di-n-butylphthalate	ug/L	n/a	<14.9	<104	n/a	n/a	n/a	n/a	104	n/a	U
S07M000521	O		Pentachlorophenol	ug/L	64.7	<8.18	<57.2	n/a	n/a	n/a	n/a	57.2	n/a	U
S07M000521	O		Pyrene	ug/L	90.6	<15.8	<111	n/a	n/a	n/a	n/a	111	n/a	U
S07M000521	O		Tributyl phosphate	ug/L	n/a	<6.36	212	n/a	n/a	n/a	n/a	44.5	n/a	J
S07M000521	O		Benzoic acid	ug/L	n/a	<58.3	<408	n/a	n/a	n/a	n/a	408	n/a	U
S07M000523	O		Aroclor 1016	ug/L	n/a	<5.40	<18.9	n/a	n/a	n/a	n/a	18.9	n/a	U
S07M000523	O		Aroclor 1221	ug/L	n/a	<1.01	<3.55	n/a	n/a	n/a	n/a	3.55	n/a	U
S07M000523	O		Aroclor 1232	ug/L	n/a	<0.914	<3.20	n/a	n/a	n/a	n/a	3.20	n/a	U

B - Found in Blank
 U - Less Than Detection Limit

D - Dilution
 b - MS/MSD Outside Range

J - Estimated
 c - RPD Outside Range

Q - Qualitative
 f - MS failed/SERDIL OK

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APP A-23

222S20070833

D&D-36428, REV 0

Attachment 1
U361
Data Summary Report

Sample Group: 20070833

Customer Group or SDG Number: 222S20070833

Customer Sample ID: Field Blank 4

Sample Portion: Field Blank

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000523	O		Aroclor 1242	ug/L	n/a	<1.80	<6.30	n/a	n/a	n/a	n/a	6.30	n/a	U
S07M000523	O		Aroclor 1248	ug/L	n/a	<1.01	<3.55	n/a	n/a	n/a	n/a	3.55	n/a	U
S07M000523	O		Aroclor 1254	ug/L	88.1	<0.371	<1.30	n/a	n/a	n/a	n/a	1.30	n/a	U
S07M000523	O		Aroclor 1280	ug/L	n/a	<4.08	<14.3	n/a	n/a	n/a	n/a	14.3	n/a	U

S0

APP A-24

222S20070833

D&D-36428, REV 0

B - Found in Blank
 U - Less Than Detection Limit

D - Dilution
 b - MS/MSD Outside Range

J - Estimated
 c - RPD Outside Range

Q - Qualitative
 f - MS failed/SERDIL OK

Attachment 1
U361
Data Summary Report

Sample Group: 20070833
Customer Group or SDG Number: 222520070833
Customer Sample ID: Field Blank 7
Sample Portion: Field Blank

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000753			Organic Volume Present	mL	n/a	n/a	0.0	n/a	n/a	n/a	n/a	n/a	n/a	n/a Q
S07M000753			Volume percent settled solids	%	n/a	n/a	0.0	n/a	n/a	n/a	n/a	n/a	n/a	n/a Q
S07M000754			Acetone	ug/L	103	<2.19	<2.43	n/a	n/a	n/a	n/a	2.43	n/a	U
S07M000754			Carbon disulfide	ug/L	n/a	<0.150	<0.167	n/a	n/a	n/a	n/a	0.167	n/a	U
S07M000754			Bromomethane	ug/L	n/a	<0.490	<0.544	n/a	n/a	n/a	n/a	0.544	n/a	U
S07M000754			Chloromethane	ug/L	n/a	<0.310	<0.344	n/a	n/a	n/a	n/a	0.344	n/a	U
S07M000754			2-Butanone	ug/L	101	<1.33	<1.48	n/a	n/a	n/a	n/a	1.48	n/a	U
S07M000754			Methylenechloride	ug/L	n/a	<0.170	<0.189	n/a	n/a	n/a	n/a	0.189	n/a	U
S07M000754			Tetrachloroethene	ug/L	n/a	<0.200	<0.222	n/a	n/a	n/a	n/a	0.222	n/a	U
S07M000754			Toluene	ug/L	100	<0.120	<0.133	n/a	n/a	n/a	n/a	0.133	n/a	U
S07M000754			Hexane	ug/L	n/a	<0.270	<0.300	n/a	n/a	n/a	n/a	0.300	n/a	U
S07M000529			Mercury	ug/mL	102	6.08E-04	6.90E-04	6.50E-04	6.70E-04	5.97	100	4.00E-04	n/a	J
S07M000529			Fluoride	ug/mL	97.8	<0.0120	<0.0120	n/a	n/a	n/a	n/a	0.0120	n/a	U
S07M000529			Chloride	ug/mL	96.6	<0.0170	0.0700	n/a	n/a	n/a	n/a	0.0170	n/a	J
S07M000529			Nitrite	ug/mL	98.6	<0.108	<0.108	n/a	n/a	n/a	n/a	0.108	n/a	U
S07M000529			Bromide	ug/mL	97.3	<0.125	<0.125	n/a	n/a	n/a	n/a	0.125	n/a	U
S07M000529			Nitrate	ug/mL	96.9	<0.139	<0.139	n/a	n/a	n/a	n/a	0.139	n/a	U
S07M000529			Sulfate	ug/mL	97.4	<0.138	<0.138	n/a	n/a	n/a	n/a	0.138	n/a	U
S07M000529			Silver	ug/mL	92.5	<5.00E-03	<5.00E-03	n/a	n/a	n/a	n/a	5.00E-03	n/a	U
S07M000529			Arsenic	ug/mL	104	<0.0600	<0.0600	n/a	n/a	n/a	n/a	0.0600	n/a	U
S07M000529			Barium	ug/mL	102	<5.00E-03	<5.00E-03	n/a	n/a	n/a	n/a	5.00E-03	n/a	U
S07M000529			Cadmium	ug/mL	104	<5.00E-03	<5.00E-03	n/a	n/a	n/a	n/a	5.00E-03	n/a	U
S07M000529			Chromium	ug/mL	105	<5.00E-03	<5.00E-03	n/a	n/a	n/a	n/a	5.00E-03	n/a	U
S07M000529			Copper	ug/mL	102	<5.00E-03	<5.00E-03	n/a	n/a	n/a	n/a	5.00E-03	n/a	U
S07M000529			Lithium	ug/mL	106	<0.0100	<0.0100	n/a	n/a	n/a	n/a	0.0100	n/a	U
S07M000529			Nickel	ug/mL	104	<0.0200	<0.0200	n/a	n/a	n/a	n/a	0.0200	n/a	U
S07M000529			Lead	ug/mL	104	<0.0500	<0.0500	n/a	n/a	n/a	n/a	0.0500	n/a	U
S07M000529			Selenium	ug/mL	103	<0.100	<0.100	n/a	n/a	n/a	n/a	0.100	n/a	U
S07M000529			Strontium	ug/mL	101	<5.00E-03	<5.00E-03	n/a	n/a	n/a	n/a	5.00E-03	n/a	U

S1

APP A-25

222520070833

D&D-36428, REV 0

B - Found in Blank
 U - Less Than Detection Limit

D - Dilution
 b - MS/MSD Outside Range

J - Estimated
 c - RPD Outside Range

Q - Qualitative
 f - MS failed/SERDIL OK

Attachment 1
U361
Data Summary Report

Sample Group: 20070833
Customer Group or SDG Number: 222S20070833
Customer Sample ID: Field Blank 7
Sample Portion: Field Blank

Sample#	R	AF	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000529			Uranium	ug/mL	91.1	<0.100	<0.100	n/a	n/a	n/a	n/a	0.100	n/a	U
S07M000530			Cobalt-60	uCi/mL	102	<1.27E-05	<1.04E-05	<1.22E-05	n/a	n/a	n/a	1.04E-05	n/a	U
S07M000530			Cesium-137	uCi/mL	105	<1.52E-05	<1.52E-05	<1.58E-05	n/a	n/a	n/a	1.52E-05	n/a	U
S07M000530			Europium-154	uCi/mL	n/a	<3.64E-05	<3.58E-05	<3.60E-05	n/a	n/a	n/a	3.58E-05	n/a	U
S07M000530			Europium-155	uCi/mL	n/a	<1.72E-05	<1.73E-05	<1.78E-05	n/a	n/a	n/a	1.73E-05	n/a	U
S07M000530			Uranium-233	ug/mL	n/a	<1.00E-08	<2.00E-08	n/a	n/a	n/a	n/a	2.00E-08	n/a	U
S07M000530			Uranium-234	ug/mL	n/a	<5.00E-09	1.12E-07	n/a	n/a	n/a	n/a	1.00E-08	n/a	
S07M000530			Uranium-235	ug/mL	105	<1.10E-08	1.32E-05	n/a	n/a	n/a	n/a	2.20E-08	n/a	
S07M000530			Uranium-236	ug/mL	n/a	<4.00E-09	3.05E-07	n/a	n/a	n/a	n/a	8.00E-09	n/a	
S07M000530			U 238	ug/mL	106	<5.50E-07	1.99E-03	n/a	n/a	n/a	n/a	1.10E-06	n/a	
S07M000530			pH Measurement	unitless	n/a	n/a	7.74	7.75	7.74	0.129	n/a	0.0100	n/a	
S07M000530			Technetium-99	uCi/mL	109	<3.45E-06	<3.37E-06	<3.40E-06	n/a	n/a	n/a	3.37E-06	10.3	U
S07M000531			Americium-241	uCi/mL	98.8	<5.65E-07	<5.63E-07	<8.23E-07	n/a	n/a	n/a	5.63E-07	100	U
S07M000531			Neptunium-237	uCi/mL	80.4	<2.73E-05	<2.58E-05	<3.11E-05	n/a	n/a	n/a	3.35E-05	206	U
S07M000531			Plutonium-239/240	uCi/mL	101	<4.78E-07	<5.58E-07	<5.09E-07	n/a	n/a	n/a	5.58E-07	100	U
S07M000531			Plutonium-238	uCi/mL	n/a	<4.76E-07	<5.58E-07	<5.09E-07	n/a	n/a	n/a	5.58E-07	100	U
S07M000531			Strontium-88/90	uCi/mL	102	<1.50E-06	3.37E-05	3.01E-05	3.19E-05	11.3	n/a	2.02E-06	9.41	
S07M000532	O		1,4-Dichlorobenzene	ug/L	56.4	<14.7	<103	n/a	n/a	n/a	51.1	103	n/a	U
S07M000532	O		Acenaphthene	ug/L	77.3	<25.2	<177	n/a	n/a	n/a	74.1	177	n/a	U
S07M000532	O		Bis(2-ethylhexyl) phthalate	ug/L	n/a	<51.2	<359	n/a	n/a	n/a	n/a	359	n/a	U
S07M000532	O		2-Chlorophenol	ug/L	76.5	<23.9	<187	n/a	n/a	n/a	67.7	187	n/a	U
S07M000532	O		Di-n-butylphthalate	ug/L	n/a	<14.9	<104	n/a	n/a	n/a	n/a	104	n/a	U
S07M000532	O		Pentachlorophenol	ug/L	88.1	<8.17	<57.2	n/a	n/a	n/a	87.5	57.2	n/a	U
S07M000532	O		Pyrene	ug/L	81.5	<15.8	<111	n/a	n/a	n/a	84.2	111	n/a	U
S07M000532	O		Tributyl phosphate	ug/L	n/a	<6.37	<44.6	n/a	n/a	n/a	n/a	44.6	n/a	U
S07M000532	O		Benzoic acid	ug/L	n/a	<58.3	<408	n/a	n/a	n/a	n/a	408	n/a	U
S07M000534	O		Aroclor 1016	ug/L	n/a	<5.40	<19.4	n/a	n/a	n/a	n/a	19.4	n/a	U
S07M000534	O		Aroclor 1221	ug/L	n/a	<1.01	<3.84	n/a	n/a	n/a	n/a	3.84	n/a	U
S07M000534	O		Aroclor 1232	ug/L	n/a	<0.914	<3.28	n/a	n/a	n/a	n/a	3.28	n/a	U

B - Found In Blank
 U - Less Than Detection Limit

D - Dilution
 b - MS/MSD Outside Range

J - Estimated
 c - RPD Outside Range

Q - Qualitative
 f - MS failed/SERDIL OK

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APP A-26

222S20070833

D&D-36428, REV 0

Attachment 1
U361
Data Summary Report

Sample Group: 20070833
Customer Group or SDG Number: 222S20070833
Customer Sample ID: Field Blank 7
Sample Portion: Field Blank

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000534		O	Aroclor 1242	ug/L	n/a	<1.80	<6.46	n/a	n/a	n/a	n/a	6.46	n/a	U
S07M000534		O	Aroclor 1248	ug/L	n/a	<1.01	<3.64	n/a	n/a	n/a	n/a	3.64	n/a	U
S07M000534		O	Aroclor 1254	ug/L	93.5	<0.371	<1.33	n/a	n/a	n/a	87.2	1.33	n/a	U
S07M000534		O	Aroclor 1260	ug/L	n/a	<4.09	<14.7	n/a	n/a	n/a	n/a	14.7	n/a	U

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APP A-27

222S20070833

D&D-36428, REV 0

B - Found in Blank
 U - Less Than Detection Limit

D - Dilution
 b - MS/MSD Outside Range

J - Estimated
 c - RPD Outside Range

Q - Qualitative
 f - MS failed/SERDIL OK

Attachment 1
U361
Data Summary Report

Sample Group: 20070833

Customer Group or SDG Number: 222S20070833

Customer Sample ID: LiBr Blank

Sample Portion: LiBr Blank

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000210			Bromide	ug/mL	95.5	<0.125	2.24E+04	n/a	n/a	n/a	n/a	1.28E+03	n/a	
S07M000210			Lithium	ug/mL	99.9	<0.0100	1.89E+03	n/a	n/a	n/a	n/a	0.200	n/a	

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APP A-28

222S20070833

D&D-36428, REV 0

B - Found in Blank
U - Less Than Detection Limit

D - Dilution
b - MS/MSD Outside Range

J - Estimated
c - RPD Outside Range

Q - Qualitative
f - MS failed/SERDIL OK

Attachment 1
U361
Data Summary Report

Sample Group: 20070833

Customer Group or SDG Number: 222S20070833

Customer Sample ID: 328-1B

Sample Portion: Segment Solids (Stratum 1)

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000272			Solid Volume	mL	n/a	n/a	70.0	n/a	n/a	n/a	n/a	0.100	n/a	Q
S07M000272			Solid Weight	g	n/a	n/a	94.2	n/a	n/a	n/a	n/a	0.100	n/a	

Sample Portion: Segment Solids (Stratum 2)

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000271			Solid Volume	mL	n/a	n/a	90.0	n/a	n/a	n/a	n/a	0.100	n/a	Q
S07M000271			Solid Weight	g	n/a	n/a	98.5	n/a	n/a	n/a	n/a	0.100	n/a	

Sample Portion: Segment Solids (Stratum 3)

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000270			Solid Volume	mL	n/a	n/a	90.0	n/a	n/a	n/a	n/a	0.100	n/a	Q
S07M000270			Solid Weight	g	n/a	n/a	115	n/a	n/a	n/a	n/a	0.100	n/a	

SS

APP A-29

222S20070833

D&D-36428, REV 0

B - Found in Blank
 U - Less Than Detection Limit

D - Dilution
 b - MS/MSD Outside Range

J - Estimated
 c - RPD Outside Range

Q - Qualitative
 f - MS failed/SERDIL OK

Attachment 1
U361
Data Summary Report

Sample Group: 20070833
Customer Group or SDG Number: 222S20070833
Customer Sample ID: 328-2
Sample Portion: Segment Solids (Stratum 1)

Sample#	R	As	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000277			Solid Volume	mL	n/a	n/a	260	n/a	n/a	n/a	n/a	0.100	n/a	Q
S07M000277			Solid Weight	g	n/a	n/a	277	n/a	n/a	n/a	n/a	0.100	n/a	

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APP A-30

222S20070833

D&D-36428, REV 0

B - Found in Blank
U - Less Than Detection Limit

D - Dilution
b - MS/MSD Outside Range

J - Estimated
c - RPD Outside Range

Q - Qualitative
f - MS failed/SERDIL OK

Attachment 1
U361
Data Summary Report

Sample Group: 20070833

Customer Group or SDG Number: 222S20070833

Customer Sample ID: 328-3

Sample Portion: Segments Solids (Stratum 1)

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000282			Solid Volume	mL	n/a	n/a	100	n/a	n/a	n/a	n/a	0.100	n/a	Q
S07M000282			Solid Weight	g	n/a	n/a	65.9	n/a	n/a	n/a	n/a	0.100	n/a	

Sample Portion: Segments Solids (Stratum 2)

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000281			Solid Volume	mL	n/a	n/a	290	n/a	n/a	n/a	n/a	0.100	n/a	Q
S07M000281			Solid Weight	g	n/a	n/a	296	n/a	n/a	n/a	n/a	0.100	n/a	

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APP A-31

222S20070833

D&D-36428, REV 0

B - Found in Blank
 U - Less Than Detection Limit

D - Dilution
 b - MS/MSD Outside Range

J - Estimated
 c - RPD Outside Range

Q - Qualitative
 f - MS failed/SERDIL OK

Attachment 1
U361
Data Summary Report

Sample Group: 20070833

Customer Group or SDG Number: 222S20070833

Customer Sample ID: 328-4

Sample Portion: Drainable Liquid (Total)

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000673			Drainable Liquid Volume	mL	n/a	n/a	28.0	n/a	n/a	n/a	n/a	n/a	n/a	
S07M000673			Drainable Liquid Weight	g	n/a	n/a	28.1	n/a	n/a	n/a	n/a	n/a	n/a	
S07M000673			Organic Volume Present	mL	n/a	n/a	0.0	n/a	n/a	n/a	n/a	n/a	n/a	
S07M000673			Volume percent settled solids	%	n/a	n/a	<5.00	n/a	n/a	n/a	n/a	5.00	n/a	

Sample Portion: Segment Solids (Stratum 1)

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000287			Solid Volume	mL	n/a	n/a	110	n/a	n/a	n/a	n/a	0.100	n/a	Q
S07M000287			Solid Weight	g	n/a	n/a	129	n/a	n/a	n/a	n/a	0.100	n/a	

Sample Portion: Segment Solids (Stratum 2)

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000288			Solid Volume	mL	n/a	n/a	55.0	n/a	n/a	n/a	n/a	0.100	n/a	Q
S07M000288			Solid Weight	g	n/a	n/a	75.7	n/a	n/a	n/a	n/a	0.100	n/a	

Sample Portion: Segment Solids (Stratum 3)

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000285			Solid Volume	mL	n/a	n/a	68.0	n/a	n/a	n/a	n/a	0.100	n/a	Q
S07M000285			Solid Weight	g	n/a	n/a	95.5	n/a	n/a	n/a	n/a	0.100	n/a	

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APP A-32

222S20070833

D&D-36428, REV 0

B - Found in Blank
 U - Less Than Detection Limit

D - Dilution
 b - MS/MSD Outside Range

J - Estimated
 c - RPD Outside Range

Q - Qualitative
 f - MS failed/SERDIL OK

Attachment 1
U361
Data Summary Report

Sample Group: 20070833

Customer Group or SDG Number: 222S20070833

Customer Sample ID: 328-5

Sample Portion: Drainable Liquid (Total)

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000884			Drainable Liquid Volume	mL	n/a	n/a	10.0	n/a	n/a	n/a	n/a	n/a	n/a	
S07M000884			Drainable Liquid Weight	g	n/a	n/a	11.2	n/a	n/a	n/a	n/a	n/a	n/a	

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APP A-33

222S20070833

D&D-36428, REV 0

B - Found in Blank
U - Less Than Detection Limit

D - Dilution
b - MS/MSD Outside Range

J - Estimated
c - RPD Outside Range

Q - Qualitative
f - MS failed/SERDIL OK

**Attachment 1
 U361
 Data Summary Report**

Sample Group: 28070833

Customer Group or SDG Number: 222S20070833

Customer Sample ID: 328-5R1

Sample Portion: Drainable Liquid (Total)

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000293			Drainable Liquid Volume	mL	n/a	n/a	92.0	n/a	n/a	n/a	n/a	n/a	n/a	Q
S07M000293			Drainable Liquid Weight	g	n/a	n/a	93.8	n/a	n/a	n/a	n/a	n/a	n/a	
S07M000293			Organic Volume Present	mL	n/a	n/a	0.0	n/a	n/a	n/a	n/a	n/a	n/a	Q
S07M000293			Volume percent settled solids	%	n/a	n/a	<5.00	n/a	n/a	n/a	n/a	5.00	n/a	Q

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APP-A-34

222S20070833

D&D-36428, REV 0

B - Found in Blank
 U - Less Than Detection Limit

D - Dilution
 b - MS/MSD Outside Range

J - Estimated
 c - RPD Outside Range

Q - Qualitative
 f - MS failed/SERDIL OK

Attachment 1
U361
Data Summary Report

Sample Group: 20070833
Customer Group or SDG Number: 222S20070833
Customer Sample ID: 328-06
Sample Portion: Drainable Liquid (Total)

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000685			Drainable Liquid Volume	mL	n/a	n/a	15.0	n/a	n/a	n/a	n/a	n/a	n/a	
S07M000685			Drainable Liquid Weight	g	n/a	n/a	12.8	n/a	n/a	n/a	n/a	n/a	n/a	

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APP A-35

222S20070833

D&D-36428, REV 0

B - Found in Blank
U - Less Than Detection Limit

D - Dilution
b - MS/MSD Outside Range

J - Estimated
c - RPD Outside Range

Q - Qualitative
f - MS failed/SERDIL OK

Attachment 1
U361
Data Summary Report

Sample Group: 20070833

Customer Group or SDG Number: 222S20070833

Customer Sample ID: 328-07

Sample Portion: Drainable Liquid (Total)

Sample#	R	AE	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000687			Drainable Liquid Volume	mL	n/a	n/a	27.0	n/a	n/a	n/a	n/a	n/a	n/a	
S07M000687			Drainable Liquid Weight	g	n/a	n/a	32.3	n/a	n/a	n/a	n/a	n/a	n/a	

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APP A-36

222S20070833

D&D-36428, REV 0

B - Found in Blank
U - Less Than Delection Limit

D - Dilution
b - MS/MSD Outside Range

J - Estimated
c - RPD Outside Range

Q - Qualitative
f - MS failed/SERDIL OK

Attachment 1
U361
Data Summary Report

Sample Group: 20070833

Customer Group or SDG Number: 222S20070833

Customer Sample ID: 329-05

Sample Portion: Segment Solids (Stratum 1)

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000292			Solid Volume	mL	n/a	n/a	50.0	n/a	n/a	n/a	n/a	0.100	n/a	Q
S07M000292			Solid Weight	g	n/a	n/a	58.4	n/a	n/a	n/a	n/a	0.100	n/a	

Sample Portion: Segment Solids (Stratum 2)

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000291			Solid Volume	mL	n/a	n/a	70.0	n/a	n/a	n/a	n/a	0.100	n/a	Q
S07M000291			Solid Weight	g	n/a	n/a	111	n/a	n/a	n/a	n/a	0.100	n/a	

Sample Portion: Segment Solids (Stratum 3)

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000290			Solid Volume	mL	n/a	n/a	75.0	n/a	n/a	n/a	n/a	0.100	n/a	Q
S07M000290			Solid Weight	g	n/a	n/a	112	n/a	n/a	n/a	n/a	0.100	n/a	

Sample Portion: Segment Solids (Stratum 4)

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000289			Solid Volume	mL	n/a	n/a	90.0	n/a	n/a	n/a	n/a	0.100	n/a	Q
S07M000289			Solid Weight	g	n/a	n/a	103	n/a	n/a	n/a	n/a	0.100	n/a	

Sample Portion: Segment Solids (Stratum 5)

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000757			Solid Volume	mL	n/a	n/a	55.0	n/a	n/a	n/a	n/a	0.100	n/a	
S07M000757			Solid Weight	g	n/a	n/a	33.8	n/a	n/a	n/a	n/a	0.100	n/a	

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B - Found in Blank
 U - Less Than Detection Limit

D - Dilution
 b - MS/MSD Outside Range

J - Estimated
 c - RPD Outside Range

Q - Qualitative
 f - MS failed/SERDIL OK

Attachment 1
U361
Data Summary Report

Sample Group: 20070833

Customer Group or SDG Number: 222S20070833

Customer Sample ID: 329-06

Sample Portion: Segments Solids (Stratum 1)

Sample#	R	AF	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000297			Solid Volume	mL	n/a	n/a	70.0	n/a	n/a	n/a	n/a	0.100	n/a	Q
S07M000297			Solid Weight	g	n/a	n/a	73.7	n/a	n/a	n/a	n/a	0.100	n/a	

Sample Portion: Segments Solids (Stratum 2)

Sample#	R	AF	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000296			Solid Volume	mL	n/a	n/a	200	n/a	n/a	n/a	n/a	0.100	n/a	Q
S07M000296			Solid Weight	g	n/a	n/a	282	n/a	n/a	n/a	n/a	0.100	n/a	

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B - Found in Blank
 U - Less Than Detection Limit

D - Dilution
 b - MS/MSD Outside Range

J - Estimated
 c - RPD Outside Range

Q - Qualitative
 f - MS failed/SERDIL OK

Attachment 1
U361
Data Summary Report

Sample Group: 20070833

Customer Group or SDG Number: 222S20070833

Customer Sample ID: 329-07

Sample Portion: Segments Solids (Stratum 1)

Sample#	R	AF	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000302			Solid Volume	mL	n/a	n/a	70.0	n/a	n/a	n/a	n/a	0.100	n/a	Q
S07M000302			Solid Weight	g	n/a	n/a	89.4	n/a	n/a	n/a	n/a	0.100	n/a	

Sample Portion: Segments Solids (Stratum 2)

Sample#	R	AF	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000301			Solid Volume	mL	n/a	n/a	120	n/a	n/a	n/a	n/a	0.100	n/a	Q
S07M000301			Solid Weight	g	n/a	n/a	168	n/a	n/a	n/a	n/a	0.100	n/a	

Sample Portion: Segments Solids (Stratum 3)

Sample#	R	AF	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000300			Solid Volume	mL	n/a	n/a	100	n/a	n/a	n/a	n/a	0.100	n/a	Q
S07M000300			Solid Weight	g	n/a	n/a	129	n/a	n/a	n/a	n/a	0.100	n/a	

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D&D-36428, REV 0

B - Found in Blank
 U - Less Than Detection Limit

D - Dilution
 b - MS/MSD Outside Range

J - Estimated
 c - RPD Outside Range

Q - Qualitative
 f - MS failed/SERDIL OK

Attachment 4. Composite Preparation Information.

Composite 1 Information

328	1	1	94.2	3.80	7.60	7.63	3.80
		2	98.5	3.97	7.94	7.96	3.97
		3	115.4	4.65	9.31	9.38	4.66
328	2	1	276.9	11.17	22.33	22.37	11.15
328	3	1	65.9	2.66	5.32	5.48	2.73
		2	296.4	11.95	23.91	23.91	11.91
328	4	1	128.6	5.19	10.37	10.37	5.17
		2	75.7	3.05	6.11	6.15	3.06
		3	95.5	3.85	7.70	7.71	3.84
329	5	1	58.4	2.36	4.71	4.74	2.36
		2	111.4	4.49	8.99	9.05	4.51
		3	112.3	4.53	9.06	9.03	4.50
		4	103.2	4.16	8.32	8.41	4.19
		5	33.8	1.36	2.73	2.74	1.37
329	6	1	73.7	2.97	5.94	5.97	2.97
		2	355.2	14.32	28.65	28.71	14.31
329	7	1	89.4	3.61	7.21	7.21	3.59
		2	166	6.69	13.39	13.41	6.68
		3	129.1	5.21	10.41	10.48	5.22
Full Depth Core Wt. (g)			2479.6	Actual Tot. Comp. (g)		200.89	

¹Weight of sample required based on a desired 200 g total composite.

Composite 2 Information

328	1	1	94.2	3.80	7.60	7.63	3.80
		2	98.5	3.97	7.94	7.95	3.96
		3	115.4	4.65	9.31	9.37	4.66
328	2	1	276.9	11.17	22.33	22.35	11.12
328	3	1	65.9	2.66	5.32	5.59	2.78
		2	296.4	11.95	23.91	23.92	11.90
328	4	1	128.6	5.19	10.37	10.37	5.16
		2	75.7	3.05	6.11	6.18	3.08
		3	95.5	3.85	7.70	7.73	3.85
329	5	1	58.4	2.36	4.71	4.73	2.35
		2	111.4	4.49	8.99	9.04	4.50
		3	112.3	4.53	9.06	9.04	4.50
		4	103.2	4.16	8.32	8.41	4.19
		5	33.8	1.36	2.73	2.73	1.36
329	6	1	73.7	2.97	5.94	5.97	2.97
		2	355.2	14.32	28.65	28.74	14.30
329	7	1	89.4	3.61	7.21	7.22	3.59
		2	166	6.69	13.39	13.51	6.72
		3	129.1	5.21	10.41	10.47	5.21
Full Depth Core Wt. (g)			2479.6	Actual Tot. Comp. (g)		200.95	

¹Weight of sample required based on a desired 200 g total composite.

**Attachment 6
 U361
 Opportunistic Analyte Results**

Sample Group: 20070833

Customer Group or SDG Number: 222S20070833

Customer Sample ID: 328-1A

Sample Portion: Drainable Liquid (Supernatant Liquid)

Sample#	R	AF	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000241			1,1-Dichloroethene	ug/L	100	<0.170	<0.850	n/a	n/a	n/a	n/a	0.850	n/a	U
S07M000241			Benzene	ug/L	99.9	<0.160	<0.800	n/a	n/a	n/a	n/a	0.800	n/a	U
S07M000241			Chlorobenzene	ug/L	104	<0.110	<0.550	n/a	n/a	n/a	n/a	0.550	n/a	U
S07M000241			Trichloroethene	ug/L	85.5	<0.150	5.18	n/a	n/a	n/a	n/a	0.750	n/a	J
S07M000249	O		1,2,4-Trichlorobenzene	ug/L	38.7	<25.5	<179	n/a	n/a	n/a	n/a	179	n/a	U
S07M000249	O		2,4-Dinitrotoluene	ug/L	78.1	<13.5	<94.5	n/a	n/a	n/a	n/a	94.5	n/a	U
S07M000249	O		4-Chloro-3-methylphenol	ug/L	71.4	<17.4	<122	n/a	n/a	n/a	n/a	122	n/a	U
S07M000249	O		N-Nitroso-di-n-propylamine	ug/L	62.3	<23.9	<167	n/a	n/a	n/a	n/a	167	n/a	U
S07M000249	O		Phenol	ug/L	71.0	<22.6	<158	n/a	n/a	n/a	n/a	158	n/a	U
S07M000249	O		4-Nitrophenol	ug/L	72.0	<12.3	<86.4	n/a	n/a	n/a	n/a	86.4	n/a	U

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D&D-36428, REV 0

D - Dilution
) - MS/MSD Outside Range

E - Outside Calibration Range
 c - RPD Outside Range

J - Estimated

U - Less Than Detection Limit

**Attachment 6
 U361
 Opportunistic Analyte Results**

Sample Group: 20070833

Customer Group or SDG Number: 222S20070833

Customer Sample ID: 328-1AR1

Sample Portion: Drainable Liquid (Supernatant Liquid)

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000251			1,1,1-Trichloroethane	ug/L	n/a	n/a	13.8	n/a	n/a	n/a	n/a	0.500	n/a	
S07M000251			1,1-Dichloroethane	ug/L	100	<0.170	<0.850	n/a	n/a	n/a	102	0.850	n/a	U
S07M000251			1-Butanol	ug/L	n/a	n/a	1.08E+03	n/a	n/a	n/a	90.2	155	n/a	J
S07M000251			Benzene	ug/L	99.9	<0.160	<0.800	n/a	n/a	n/a	98.5	0.800	n/a	U
S07M000251			Chloroform	ug/L	n/a	n/a	4.65	n/a	n/a	n/a	n/a	0.450	n/a	
S07M000251			Chlorobenzene	ug/L	104	<0.110	<0.550	n/a	n/a	n/a	99.5	0.550	n/a	U
S07M000251			Tetrahydrofuran	ug/L	n/a	n/a	11.0	n/a	n/a	n/a	n/a	2.92	n/a	J
S07M000251			Total Trihalomethanes	ug/L	n/a	n/a	4.65	n/a	n/a	n/a	n/a	2.30	n/a	J
S07M000251			Trichloroethene	ug/L	95.5	<0.150	16.5	n/a	n/a	n/a	88.5	0.750	n/a	
S07M000259	O		1,2,4-Trichlorobenzene	ug/L	38.7	<25.5	<179	n/a	n/a	n/a	37.8	179	n/a	U
S07M000259	O		2,4-Dinitrotoluene	ug/L	78.1	<13.5	<94.5	n/a	n/a	n/a	88.0	94.5	n/a	U
S07M000259	O		4-Chloro-3-methylphenol	ug/L	71.4	<17.4	<122	n/a	n/a	n/a	n/a	122	n/a	Ub
S07M000259	O		N-Nitroso-di-n-propylamine	ug/L	62.3	<23.8	<167	n/a	n/a	n/a	71.7	167	n/a	U
S07M000259	O		Phenol	ug/L	71.0	<22.6	<158	n/a	n/a	n/a	4.81	158	n/a	Ub
S07M000259	O		4-Nitrophenol	ug/L	72.0	<12.3	<86.4	n/a	n/a	n/a	150	86.4	n/a	U

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D&D-36428, REV 0

D - Dilution
 b - MS/MSD Outside Range

E - Outside Calibration Range
 c - RPD Outside Range

J - Estimated

U - Less Than Detection Limit

**Attachment 6
 U361
 Opportunistic Analyte Results**

Sample Group: 20070833
Customer Group or SDG Number: 222S20070833
Customer Sample ID: Composite 1
Sample Portion: Core Composite - Solid

Sample#	R	AN	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000308			1,1,1-Trichloroethane	ug/kg	n/a	n/a	260	n/a	n/a	n/a	n/a	0.333	n/a	E
S07M000308			1,1-Dichloroethene	ug/kg	103	<0.340	5.97	n/a	n/a	n/a	64.2	0.567	n/a	b
S07M000308			1-Butanol	ug/kg	118	n/a	4.93E+04	n/a	n/a	n/a	-1.73E+04	25.9	n/a	E
S07M000308			2-Hexanone	ug/kg	126	n/a	69.4	n/a	n/a	n/a	34.9	2.67	n/a	bc
S07M000308			2-Pentanone	ug/kg	n/a	n/a	173	n/a	n/a	n/a	n/a	5.03	n/a	
S07M000308			Hexone	ug/kg	126	n/a	216	n/a	n/a	n/a	-62.4	2.93	n/a	E
S07M000308			Benzene	ug/kg	99.3	<0.320	2.73	n/a	n/a	n/a	84.1	0.533	n/a	J
S07M000308			Chlorobenzene	ug/kg	99.3	<0.220	<0.367	n/a	n/a	n/a	106	0.367	n/a	Uc
S07M000308			Ethylbenzene	ug/kg	n/a	n/a	50.0	n/a	n/a	n/a	n/a	0.400	n/a	
S07M000308			Xylenes (total)	ug/kg	n/a	n/a	423	n/a	n/a	n/a	n/a	1.03	n/a	E
S07M000308			Tetrahydrofuran	ug/kg	n/a	n/a	258	n/a	n/a	n/a	n/a	26.0	n/a	J
S07M000308			Trichloroethene	ug/kg	93.6	<0.300	144	n/a	n/a	n/a	-586	0.500	n/a	E
S07M000308			o-Xylene	ug/kg	n/a	n/a	200	n/a	n/a	n/a	n/a	0.3	n/a	E
S07M000317	O		1,2,4-Trichlorobenzene	ug/kg	67.0	<812	<7.61E+03	n/a	n/a	n/a	115	7.61E+03	n/a	DU
S07M000317	O		2,4-Dinitrotoluene	ug/kg	81.7	<893	<8.37E+03	n/a	n/a	n/a	47.8	8.37E+03	n/a	DU
S07M000317	O		4-Chloro-3-methylphenol	ug/kg	73.1	<838	<7.88E+03	n/a	n/a	n/a	142	7.88E+03	n/a	DU
S07M000317	O		N-Nitroso-di-n-propylamine	ug/kg	67.1	<801	<7.51E+03	n/a	n/a	n/a	n/a	7.51E+03	n/a	DUB
S07M000317	O		Phenol	ug/kg	70.7	<823	<7.72E+03	n/a	n/a	n/a	74.3	7.72E+03	n/a	DU
S07M000317	O		4-Nitrophenol	ug/kg	80.9	<794	<7.44E+03	n/a	n/a	n/a	n/a	7.44E+03	n/a	DUB

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222S20070833

D&D-36428, REV 0

D - Dilution
 b - MS/MSD Outside Range

E - Outside Calibration Range
 c - RPD Outside Range

J - Estimated

U - Less Than Detection Limit

**Attachment 6
 U361
 Opportunistic Analyte Results**

Sample Group: 20070833

Customer Group or SDG Number: 222S20070833

Customer Sample ID: Composite 2

Sample Portion: Core Composite - Solid

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000309			1,1,1-Trichloroethane	ug/kg	n/a	n/a	42.0	n/a	n/a	n/a	n/a	0.316	n/a	
S07M000309			1,1-Dichloroethene	ug/kg	103	<0.340	1.66	n/a	n/a	n/a	n/a	0.538	n/a	J
S07M000309			1-Butanol	ug/kg	118	n/a	1.34E+04	n/a	n/a	n/a	n/a	24.6	n/a	E
S07M000309			2-Hexanone	ug/kg	128	n/a	17.9	n/a	n/a	n/a	n/a	2.72	n/a	J
S07M000309			2-Pentanone	ug/kg	n/a	n/a	54.2	n/a	n/a	n/a	n/a	4.78	n/a	
S07M000309			Hexone	ug/kg	128	n/a	53.4	n/a	n/a	n/a	n/a	2.78	n/a	
S07M000309			Benzene	ug/kg	99.3	<0.320	0.778	n/a	n/a	n/a	n/a	0.506	n/a	J
S07M000309			Chlorobenzene	ug/kg	99.3	<0.220	<0.348	n/a	n/a	n/a	n/a	0.348	n/a	U
S07M000309			Ethylbenzene	ug/kg	n/a	n/a	5.31	n/a	n/a	n/a	n/a	0.380	n/a	
S07M000309			Xylenes (total)	ug/kg	n/a	n/a	48.0	n/a	n/a	n/a	n/a	0.981	n/a	
S07M000309			Tetrahydrofuran	ug/kg	n/a	n/a	758	n/a	n/a	n/a	n/a	24.6	n/a	E
S07M000309			Trichloroethene	ug/kg	93.6	<0.300	26.3	n/a	n/a	n/a	n/a	0.475	n/a	
S07M000309			o-Xylene	ug/kg	n/a	n/a	20	n/a	n/a	n/a	n/a	0.3	n/a	
S07M000318	O		1,2,4-Trichlorobenzene	ug/kg	67.0	<612	<7.53E+03	n/a	n/a	n/a	n/a	7.53E+03	n/a	DU
S07M000318	O		2,4-Dinitrotoluene	ug/kg	81.7	<893	<8.28E+03	n/a	n/a	n/a	n/a	8.28E+03	n/a	DU
S07M000318	O		4-Chloro-3-methylphenol	ug/kg	73.1	<838	<7.77E+03	n/a	n/a	n/a	n/a	7.77E+03	n/a	DU
S07M000318	O		N-Nitroso-di-n-propylamine	ug/kg	67.1	<801	<7.43E+03	n/a	n/a	n/a	n/a	7.43E+03	n/a	DU
S07M000318	O		Phenol	ug/kg	70.7	<823	<7.63E+03	n/a	n/a	n/a	n/a	7.63E+03	n/a	DU
S07M000318	O		4-Nitrophenol	ug/kg	80.9	<794	<7.37E+03	n/a	n/a	n/a	n/a	7.37E+03	n/a	DU

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222S20070833

D&D-36428, REV 0

D - Dilution
 b - MS/MSD Outside Range

E - Outside Calibration Range
 c - RPD Outside Range

J - Estimated

U - Less Than Detection Limit

**Attachment 6
 U361
 Opportunistic Analyte Results**

Sample Group: 20070833

Customer Group or SDG Number: 222S20070833

Customer Sample ID: Field Blank 1

Sample Portion: Field Blank

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000209			1,1-Dichloroethene	ug/L	110	<0.170	<0.189	n/a	n/a	n/a	n/a	0.189	n/a	U
S07M000209			Benzene	ug/L	104	<0.160	<0.178	n/a	n/a	n/a	n/a	0.178	n/a	U
S07M000209			Chlorobenzene	ug/L	106	<0.110	<0.122	n/a	n/a	n/a	n/a	0.122	n/a	U
S07M000209			Trichloroethene	ug/L	99.3	<0.150	<0.167	n/a	n/a	n/a	n/a	0.167	n/a	U
S07M000217	O		1,2,4-Trichlorobenzene	ug/L	38.7	<25.5	<179	n/a	n/a	n/a	n/a	179	n/a	U
S07M000217	O		2,4-Dinitrotoluene	ug/L	78.1	<13.5	<94.5	n/a	n/a	n/a	n/a	94.5	n/a	U
S07M000217	O		4-Chloro-3-methylphenol	ug/L	71.4	<17.4	<122	n/a	n/a	n/a	n/a	122	n/a	U
S07M000217	O		N-Nitroso-di-n-propylamine	ug/L	82.3	<23.8	<167	n/a	n/a	n/a	n/a	167	n/a	U
S07M000217	O		Phenol	ug/L	71.0	<22.6	<158	n/a	n/a	n/a	n/a	158	n/a	U
S07M000217	O		4-Nitrophenol	ug/L	72.0	<12.3	<86.4	n/a	n/a	n/a	n/a	86.4	n/a	U

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222S20070833

D&D-36428, REV 0

D - Dilution
 b - MS/MSD Outside Range

E - Outside Calibration Range
 c - RPD Outside Range

J - Estimated

U - Less Than Detection Limit

**Attachment 6
 U361
 Opportunistic Analyte Results**

**Sample Group: 20070833
 Customer Group or SDG Number: 222S20070833
 Customer Sample ID: Field Blank 2
 Sample Portion: Field Blank**

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flag
S07M000221			1,1-Dichloroethene	ug/L	110	<0.170	<0.189	n/a	n/a	n/a	n/a	0.189	n/a	U
S07M000221			Benzene	ug/L	104	<0.160	<0.178	n/a	n/a	n/a	n/a	0.178	n/a	U
S07M000221			Chlorobenzene	ug/L	108	<0.110	<0.122	n/a	n/a	n/a	n/a	0.122	n/a	U
S07M000221			Trichloroethene	ug/L	99.3	<0.150	<0.167	n/a	n/a	n/a	n/a	0.167	n/a	U
S07M000228	O		1,2,4-Trichlorobenzene	ug/L	38.7	<25.5	<179	n/a	n/a	n/a	n/a	179	n/a	U
S07M000228	O		2,4-Dinitrotoluene	ug/L	78.1	<13.5	<94.5	n/a	n/a	n/a	n/a	94.5	n/a	U
S07M000228	O		4-Chloro-3-methylphenol	ug/L	71.4	<17.4	<122	n/a	n/a	n/a	n/a	122	n/a	U
S07M000228	O		N-Nitroso-di-n-propylamine	ug/L	62.3	<23.9	<167	n/a	n/a	n/a	n/a	167	n/a	U
S07M000228	O		Phenol	ug/L	71.0	<22.6	<158	n/a	n/a	n/a	n/a	158	n/a	U
S07M000228	O		4-Nitrophenol	ug/L	72.0	<12.3	<86.4	n/a	n/a	n/a	n/a	86.4	n/a	U

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222S20070833

D&D-36428, REV 0

D - Dilution
 b - MS/MSD Outside Range

E - Outside Calibration Range
 c - RPD Outside Range

J - Estimated

U - Less Than Detection Limit

**Attachment 6
 U361
 Opportunistic Analyte Results**

Sample Group: 20070833

Customer Group or SDG Number: 222S20070833

Customer Sample ID: Field Blank 3

Sample Portion: Field Blank

Sample#	R	AF	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000504			1,1-Dichloroethene	ug/L	110	<0.170	<0.189	n/a	n/a	n/a	n/a	0.189	n/a	U
S07M000504			Benzene	ug/L	104	<0.180	<0.178	n/a	n/a	n/a	n/a	0.178	n/a	U
S07M000504			Chlorobenzene	ug/L	106	<0.110	<0.122	n/a	n/a	n/a	n/a	0.122	n/a	U
S07M000504			Trichloroethene	ug/L	99.3	<0.150	<0.167	n/a	n/a	n/a	n/a	0.167	n/a	U
S07M000518	O		1,2,4-Trichlorobenzene	ug/L	38.7	<25.5	<179	n/a	n/a	n/a	n/a	179	n/a	U
S07M000518	O		2,4-Dinitrotoluene	ug/L	78.1	<13.5	<94.5	n/a	n/a	n/a	n/a	94.5	n/a	U
S07M000518	O		4-Chloro-3-methylphenol	ug/L	71.4	<17.4	<122	n/a	n/a	n/a	n/a	122	n/a	U
S07M000518	O		N-Nitroso-di-n-dipropylamine	ug/L	62.3	<23.9	<167	n/a	n/a	n/a	n/a	167	n/a	U
S07M000518	O		Phenol	ug/L	71.0	<22.6	<158	n/a	n/a	n/a	n/a	158	n/a	U
S07M000518	O		4-Nitrophenol	ug/L	72.0	<12.3	<86.4	n/a	n/a	n/a	n/a	86.4	n/a	U

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APP A-47

222S20070833

D&D-36428, REV 0

D - Dilution
 b - MS/MSD Outside Range

E - Outside Calibration Range
 c - RPD Outside Range

J - Estimated

U - Less Than Detection Limit

**Attachment 6
 U361
 Opportunistic Analyte Results**

Sample Group: 20070833

Customer Group or SDG Number: 222S20070833

Customer Sample ID: Field Blank 4

Sample Portion: Field Blank

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flags
S07M000505			1,1-Dichloroethene	ug/L	110	<0.170	<0.189	n/a	n/a	n/a	n/a	0.189	n/a	U
S07M000505			Benzene	ug/L	104	<0.180	<0.178	n/a	n/a	n/a	n/a	0.178	n/a	U
S07M000505			Chlorobenzene	ug/L	106	<0.110	<0.122	n/a	n/a	n/a	n/a	0.122	n/a	U
S07M000505			Trichloroethene	ug/L	99.3	<0.150	<0.167	n/a	n/a	n/a	n/a	0.167	n/a	U
S07M000521	O		1,2,4-Trichlorobenzene	ug/L	38.7	<25.5	<179	n/a	n/a	n/a	n/a	179	n/a	U
S07M000521	O		2,4-Dinitrotoluene	ug/L	78.1	<13.5	<94.5	n/a	n/a	n/a	n/a	94.5	n/a	U
S07M000521	O		4-Chloro-3-methylphenol	ug/L	71.4	<17.4	<122	n/a	n/a	n/a	n/a	122	n/a	U
S07M000521	O		N-Nitroso-di-n-dipropylamine	ug/L	82.3	<23.9	<167	n/a	n/a	n/a	n/a	167	n/a	U
S07M000521	O		Phenol	ug/L	71.0	<22.6	<158	n/a	n/a	n/a	n/a	158	n/a	U
S07M000521	O		4-Nitrophenol	ug/L	72.0	<12.3	<86.4	n/a	n/a	n/a	n/a	86.4	n/a	U

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APP A-48

222S20070833

D&D-36428, REV 0

D - Dilution
 b - MS/MSD Outside Range

E - Outside Calibration Range
 c - RPD Outside Range

J - Estimated

U - Less Than Detection Limit

**Attachment 6
 U361
 Opportunistic Analyte Results**

Sample Group: 20070833
Customer Group or SDG Number: 222S20070833
Customer Sample ID: Field Blank 7
Sample Portion: Field Blank

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err %	Qual Flag
S07M000754			1,1-Dichloroethene	ug/L	102	<0.170	<0.189	n/a	n/a	n/a	n/a	0.189	n/a	U
S07M000754			Benzene	ug/L	98.0	<0.160	<0.178	n/a	n/a	n/a	n/a	0.178	n/a	U
S07M000754			Chlorobenzene	ug/L	100	<0.110	<0.122	n/a	n/a	n/a	n/a	0.122	n/a	U
S07M000754			Trichloroethene	ug/L	93.4	<0.150	<0.167	n/a	n/a	n/a	n/a	0.167	n/a	U
S07M000532	O		1,2,4-Trichlorobenzene	ug/L	62.4	<25.5	<179	n/a	n/a	n/a	57.7	179	n/a	U
S07M000532	O		2,4-Dinitrotoluene	ug/L	84.1	<13.5	<94.6	n/a	n/a	n/a	79.1	94.6	n/a	U
S07M000532	O		Butylbenzylphthalate	ug/L	n/a	n/a	226	n/a	n/a	n/a	n/a	103	n/a	J
S07M000532	O		4-Chloro-3-methylphenol	ug/L	75.7	<17.4	<122	n/a	n/a	n/a	70.5	122	n/a	U
S07M000532	O		N-Nitroso-di-n-propylamine	ug/L	70.5	<23.9	<167	n/a	n/a	n/a	63.5	167	n/a	U
S07M000532	O		Phenol	ug/L	78.3	<22.6	<158	n/a	n/a	n/a	69.4	158	n/a	U
S07M000532	O		4-Nitrophenol	ug/L	85.4	<12.3	<86.4	n/a	n/a	n/a	72.9	86.4	n/a	U

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222S20070833

D&D-36428, REV 0

D - Dilution
 b - MS/MSD Outside Range

E - Outside Calibration Range
 c - RPD Outside Range

J - Estimated

U - Less Than Detection Limit

Attachment 7. Tentatively Identified Compounds

Customer Sample ID: 328-1A

Sample	Alt	Analyte	CAS No.	Retention Time	Unit	Result	Qual Flag
S07M000241		Unknown Hydrocarbon-1		17.44	ug/L	2.77	JT
S07M000241		Unknown-2		17.62	ug/L	3.56	JT
S07M000241		Unknown Hydrocarbon-3		18.25	ug/L	3.46	JT
S07M000241		Unknown Hydrocarbon-4		18.48	ug/L	4.38	JT
S07M000241		Unknown Hydrocarbon-5		19.47	ug/L	7.00	JT
S07M000241		Unknown Hydrocarbon-6		19.64	ug/L	6.46	JT
S07M000249	O	Unknown-1		8.44	ug/L	657	JT
S07M000249	O	2-NITROPHENOL-D4		8.72	ug/L	1.82E+03	JNT
S07M000249	O	2-Fluoro-6-nitrophenol	1526-17-6	8.90	ug/L	1.29E+03	JNT
S07M000249	O	Unknown-2		9.01	ug/L	603	JT
S07M000249	O	2-Fluoro-4-nitrophenol	403-19-0	10.83	ug/L	1.22E+03	JNT
S07M000249	O	Unknown-3		12.61	ug/L	1.27E+03	JT
S07M000249	O	Benzenesulfonamide, N-butyl	3622-84-2	14.53	ug/L	2.36E+03	JNT

Customer Sample ID: 328-1AR1

Sample	Alt	Analyte	CAS No.	Retention Time	Unit	Result	Qual Flag
S07M000251		Unknown-1		5.85	ug/L	3.28	JT
S07M000251		Unknown-2		14.05	ug/L	3.41	JT
S07M000251		Unknown-3		15.37	ug/L	3.19	JT
S07M000251		Unknown Hydrocarbon-4		17.44	ug/L	5.15	JT
S07M000251		Unknown-5		17.62	ug/L	5.87	JT
S07M000251		Unknown-6		17.70	ug/L	3.17	BJT
S07M000251		Unknown-7		18.01	ug/L	2.99	JT
S07M000251		Unknown Hydrocarbon-8		18.26	ug/L	7.09	JT
S07M000251		Unknown Hydrocarbon-9		18.48	ug/L	8.67	JT
S07M000251		Unknown Hydrocarbon-10		19.47	ug/L	11.1	JT
S07M000251		Unknown Hydrocarbon-11		19.65	ug/L	8.30	JT
S07M000259	O	Unknown-1		4.01	ug/L	1.27E+03	JT
S07M000259	O	Unknown-2		5.80	ug/L	2.17E+03	JT
S07M000259	O	Unknown-3		6.53	ug/L	540	JT
S07M000259	O	Unknown-4		6.68	ug/L	437	JT
S07M000259	O	Unknown-5		7.63	ug/L	589	JT
S07M000259	O	Unknown-6		8.44	ug/L	736	JT
S07M000259	O	2-NITROPHENOL-D4		8.72	ug/L	1.59E+03	JNT
S07M000259	O	2-Fluoro-6-nitrophenol	1526-17-6	8.89	ug/L	1.26E+03	JNT
S07M000259	O	Unknown-7		9.01	ug/L	714	JT
S07M000259	O	Unknown-8		10.46	ug/L	1.16E+03	JT
S07M000259	O	Unknown-9		10.56	ug/L	1.51E+03	JT
S07M000259	O	2-Fluoro-4-nitrophenol	403-19-0	10.83	ug/L	1.06E+03	JNT
S07M000259	O	N-Nitrosodiethanolamine	1116-54-7	11.21	ug/L	587	JNT
S07M000259	O	Unknown-10		11.28	ug/L	861	JT
S07M000259	O	Unknown-11		12.61	ug/L	1.03E+03	JT
S07M000259	O	Benzenesulfonamide, N-butyl	3622-84-2	14.53	ug/L	1.08E+03	JNT

Attachment 7. Tentatively Identified Compounds

Customer Sample ID: Composite 1

Sample	Area	CAS #	Retention Time	Unit	Result	Qual Flag
S07M000308	Unknown-1		15.95	ug/kg	2.44E+04	JT
S07M000308	Undecane	1120-21-4	16.37	ug/kg	5.19E+04	JNT
S07M000308	Naphthalene, decahydro	91-17-8	16.51	ug/kg	2.43E+04	JNT
S07M000308	Unknown-2		16.70	ug/kg	3.39E+04	JT
S07M000308	Unknown Hydrocarbon-3		16.93	ug/kg	2.54E+04	JT
S07M000308	Unknown-4		16.99	ug/kg	2.01E+04	JT
S07M000308	Unknown-5		17.03	ug/kg	2.88E+04	JT
S07M000308	Unknown-6		17.11	ug/kg	2.30E+04	JT
S07M000308	Dodecane	112-40-3	17.36	ug/kg	8.01E+04	JNT
S07M000308	Undecane, 2,6-dimethyl	17301-23-4	17.54	ug/kg	6.95E+04	JNT
S07M000308	Unknown-7		17.63	ug/kg	1.90E+04	JT
S07M000308	Unknown-8		17.73	ug/kg	2.68E+04	JT
S07M000308	Unknown-9		18.16	ug/kg	1.85E+04	JT
S07M000308	Unknown-10		18.22	ug/kg	1.87E+04	JT
S07M000308	Unknown-11		18.57	ug/kg	2.05E+04	JT
S07M000317	O Decane	124-18-5	7.10	ug/kg	6.30E+04	JNT
S07M000317	O Unknown-1		7.91	ug/kg	4.47E+04	JT
S07M000317	O Unknown-2		8.16	ug/kg	6.28E+04	JT
S07M000317	O Undecane	1120-21-4	8.23	ug/kg	4.45E+05	DJNT
S07M000317	O Unknown-3		8.52	ug/kg	2.75E+05	JT
S07M000317	O Naphthalene, decahydro	2958-76-1	8.61	ug/kg	2.32E+05	JNT
S07M000317	O Unknown-4		8.73	ug/kg	3.17E+05	JT
S07M000317	O Unknown-5		8.80	ug/kg	4.54E+05	JT
S07M000317	O Unknown-6		8.91	ug/kg	3.54E+05	JT
S07M000317	O Unknown-7		8.98	ug/kg	2.61E+05	JT
S07M000317	O Unknown-8		9.23	ug/kg	2.42E+05	JT
S07M000317	O Dodecane	112-40-3	9.29	ug/kg	2.21E+06	DJNT
S07M000317	O Undecane, 2,6-dimethyl	17301-23-4	9.42	ug/kg	9.28E+05	JNT
S07M000317	O Unknown-9		9.49	ug/kg	2.18E+05	JT
S07M000317	O Unknown-10		9.67	ug/kg	2.46E+05	JT
S07M000317	O Unknown-11		9.81	ug/kg	7.14E+05	JT
S07M000317	O Dodecane, 4-methyl-	6117-97-1	9.87	ug/kg	2.22E+05	JNT
S07M000317	O Unknown-12		9.92	ug/kg	5.20E+05	JT
S07M000317	O Unknown-13		10.01	ug/kg	1.03E+06	JT
S07M000317	O Unknown-14		10.06	ug/kg	2.14E+05	JT
S07M000317	O Unknown-15		10.22	ug/kg	2.15E+05	JT
S07M000317	O Tridecane	629-50-5	10.29	ug/kg	2.22E+06	DJNT
S07M000317	O Unknown-16		10.37	ug/kg	2.72E+05	JT
S07M000317	O Unknown-17		10.44	ug/kg	3.13E+05	JT
S07M000317	O Unknown-18		10.82	ug/kg	7.49E+04	JT
S07M000317	O Unknown-19		10.99	ug/kg	1.24E+05	JT
S07M000317	O Tetradecane	629-59-4	11.22	ug/kg	2.75E+05	DJNT
S07M000317	O Unknown-20		11.75	ug/kg	9.16E+04	JT
S07M000317	O Pentadecane	629-62-9	12.10	ug/kg	8.69E+04	DJNT

Attachment 7. Tentatively Identified Compounds

Customer Sample ID: Composite 2

Sample ID	Compound Name	CAS No.	Retention Time	Unit	Peak	Qual Flag
S07M000309	Methylcyclohexane			ug/kg	4.84	T
S07M000309	m,p-Xylene			ug/kg	26.5	T
S07M000309	Unknown-1		15.95	ug/kg	1.36E+04	JT
S07M000309	Undecane	1120-21-4	16.37	ug/kg	2.89E+04	JNT
S07M000309	Decahydro-naphthalene	493-02-7	16.51	ug/kg	1.51E+04	JNT
S07M000309	Unknown-2		16.70	ug/kg	1.85E+04	JT
S07M000309	Unknown Hydrocarbon-3		16.93	ug/kg	1.43E+04	JT
S07M000309	Unknown-4		16.99	ug/kg	1.13E+04	JT
S07M000309	Unknown-5		17.03	ug/kg	1.62E+04	JT
S07M000309	Unknown-6		17.11	ug/kg	1.29E+04	JT
S07M000309	Dodecane	112-40-3	17.36	ug/kg	4.38E+04	JNT
S07M000309	Undecane, 2,6-dimethyl	17301-23-4	17.54	ug/kg	3.77E+04	JNT
S07M000309	Unknown-7		17.63	ug/kg	1.02E+04	JT
S07M000309	Unknown-8		17.73	ug/kg	1.47E+04	JT
S07M000309	Unknown-9		18.13	ug/kg	1.38E+04	JT
S07M000309	Unknown-10		18.22	ug/kg	1.09E+04	JT
S07M000309	Unknown-11		18.57	ug/kg	9.98E+03	JT
S07M000318	O Decane	124-18-5	7.10	ug/kg	6.17E+04	JNT
S07M000318	O Unknown-1		8.16	ug/kg	5.49E+04	JT
S07M000318	O Undecane	1120-21-4	8.23	ug/kg	4.32E+05	DJNT
S07M000318	O Unknown-2		8.40	ug/kg	2.07E+05	JT
S07M000318	O Unknown-3		8.52	ug/kg	2.16E+05	JT
S07M000318	O Naphthalene, decahydro	2958-76-1	8.61	ug/kg	2.42E+05	JNT
S07M000318	O Unknown-4		8.73	ug/kg	3.93E+05	JT
S07M000318	O Unknown-5		8.80	ug/kg	4.65E+05	JT
S07M000318	O Unknown-6		8.86	ug/kg	1.90E+05	JT
S07M000318	O Unknown-7		8.91	ug/kg	3.83E+05	JT
S07M000318	O Unknown-8		8.98	ug/kg	2.49E+05	JT
S07M000318	O Unknown-9		9.23	ug/kg	2.35E+05	JT
S07M000318	O Dodecane	112-40-3	9.29	ug/kg	2.21E+06	DJNT
S07M000318	O Undecane, 2,6-dimethyl	17301-23-4	9.42	ug/kg	9.25E+05	JNT
S07M000318	O Unknown-10		9.50	ug/kg	2.14E+05	JT
S07M000318	O Unknown-11		9.64	ug/kg	1.89E+05	JT
S07M000318	O Unknown-12		9.68	ug/kg	2.40E+05	JT
S07M000318	O Unknown-13		9.81	ug/kg	6.84E+05	JT
S07M000318	O Dodecane, 4-methyl-	6117-97-1	9.87	ug/kg	1.92E+05	JNT
S07M000318	O Unknown-14		9.92	ug/kg	4.54E+05	JT
S07M000318	O Unknown-15		10.01	ug/kg	9.64E+05	JT
S07M000318	O Tridecane	629-50-5	10.29	ug/kg	2.08E+06	DJNT
S07M000318	O Unknown-16		10.44	ug/kg	2.60E+05	JT
S07M000318	O Unknown-17		10.82	ug/kg	6.87E+04	JT
S07M000318	O Unknown-18		10.88	ug/kg	3.46E+04	JT
S07M000318	O Unknown-19		10.99	ug/kg	1.20E+05	JT
S07M000318	O Tetradecane	629-59-4	11.22	ug/kg	2.67E+05	DJNT
S07M000318	O Unknown-20		11.75	ug/kg	7.96E+04	JT
S07M000318	O Pentadecane	629-62-9	12.10	ug/kg	8.35E+04	DJNT

Attachment 7. Tentatively Identified Compounds

Customer Sample ID: Field Blank 1

Sample	AS	Analyte	CAS No.	Retention Time	Unit	Result	Qual Flag
S07M000209		Difluorochloromethane	75-45-6	4.72	ug/L	0.677	JNT

Customer Sample ID: Field Blank 2

Sample	AS	Analyte	CAS No.	Retention Time	Unit	Result	Qual Flag
S07M000221		Difluorochloromethane	75-45-6	4.73	ug/L	0.713	JNT
S07M000228	O	Octacosane	630-02-4	20.69	ug/L	322	JNT
S07M000228	O	Unknown-1		22.18	ug/L	411	JT

Customer Sample ID: Field Blank 3

Sample	AS	Analyte	CAS No.	Retention Time	Unit	Result	Qual Flag
S07M000504		Difluorochloromethane	75-45-6	4.73	ug/L	0.714	JNT

Customer Sample ID: Field Blank 4

Sample	AS	Analyte	CAS No.	Retention Time	Unit	Result	Qual Flag
S07M000505		Difluorochloromethane	75-45-6	4.75	ug/L	0.560	JNT

B - Found in Blank

D - Dilution

E - Outside Calibration Range

J - Estimated

N - Named TIC

T - Tentatively Identified Compound

U - Less Than Detection Limit

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APPENDIX B

ASBESTOS LETTER REPORT

G. A. Cooke, CH2M HILL to R. A. Bushaw, ATL, Inc., *Polarized Light Microscopy and Scanning
Electron Microscopy Analysis of Tank 241-U-361 Composite Sample,*
CH2M-0702904, November 20, 2007

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CH2M HILL
Hanford Group, Inc.
P.O. Box 1500
Richland, WA 99354



November 20, 2007

CH2M-0702904

Ms. R. A. Bushaw
Advanced Technologies and Laboratories International, Inc.
1979 Snyder, Suite 130, T6-10
Richland, Washington 99354

Dear Ms. Bushaw:

**POLARIZED LIGHT MICROSCOPY AND SCANNING ELECTRON MICROSCOPY
ANALYSIS OF TANK 241-U-361 COMPOSITE SAMPLE**

At your request, samples of the composite sludge from tank 241-U-361 (U-361) were examined to determine if the material contains asbestos fibers. Polarized light microscopy (PLM) and scanning electron microscopy (SEM) were the methods used for this analysis.

The samples tested positive for asbestos.

Portions of samples S07M000311A, S07M000311B, S07M000313A, and S07M000313B were combined into a single sample for SEM analysis. The solid was dispersed in deionized water by sonication. An aliquot was deposited onto a 45-mm diameter, 0.4-micron pore size, polycarbonate filter and dried. A section of the filter was cut and mounted on a carbon planchet covered SEM stub and coated with a conductive layer of carbon using evaporative deposition. For PLM analysis, an aliquot was removed from sample S07M000308B and mounted on a glass slide with 1.68 refractive index oil.

Uranium is ubiquitous in the U-361 sludge. Iron-rich material is also widespread. Diatoms, vermiculite, feldspar, and fiberglass were also observed in the SEM analysis. Organic coatings are common. Amosite (grunerite) asbestos fibers were observed on both the SEM and the PLM. A visual estimate from the SEM analysis indicates that these fibers are present at concentrations greater than 1% by volume. An estimate of the concentration was not possible with the PLM analysis due to the extreme small size (widths often less than 0.2 microns) of most of the fibers.

The PLM analysis was conducted in accordance with the methods described in the *NIOSH Manual of Analytical Methods*, NIOSH Method 9002 Issue 2 (August 1994), "Asbestos (bulk) by PLM." Because of the nature of the composite sludge, a preliminary review with a stereo microscope was not performed. The PLM microscope was not equipped with a dispersion staining objective. The fibers were identified as amosite on the basis of morphology, parallel

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Ms. R. A. Bushaw
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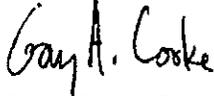
CH2M-0702904

extinction, and positive optical sign. The precise attribution to grunerite was based on the energy dispersive X-ray spectroscopy chemical signature.

A selection of SEM and PLM images of the amosite fibers is included in the Enclosure.

Should you have any questions regarding this matter, please contact me at 373-2154.

Sincerely,



G. A. Cooke, Scientist
Analytical Process Development

yc

Enclosure

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Ms. R. A. Bushaw
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bcc:

Name	Approval	Date
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CH2M HILL Correspondence Control

CH2M HILL Hanford Group, Inc.

K. M. Hall
D. L. Herting
L. L. Lockrem
C. M. Seidel
GAC File/LB

Cary M. Seidel 11/20/07

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Enclosure

SCANNING ELECTRON MICROSCOPY IMAGES, ENERGY DISPERSIVE X-RAY
SPECTROSCOPY SPECTRA AND POLARIZED LIGHT MICROSCOPY IMAGES OF
AMOSITE ASBESTOS FIBERS IN U-361 COMPOSITE SLUDGE SAMPLES

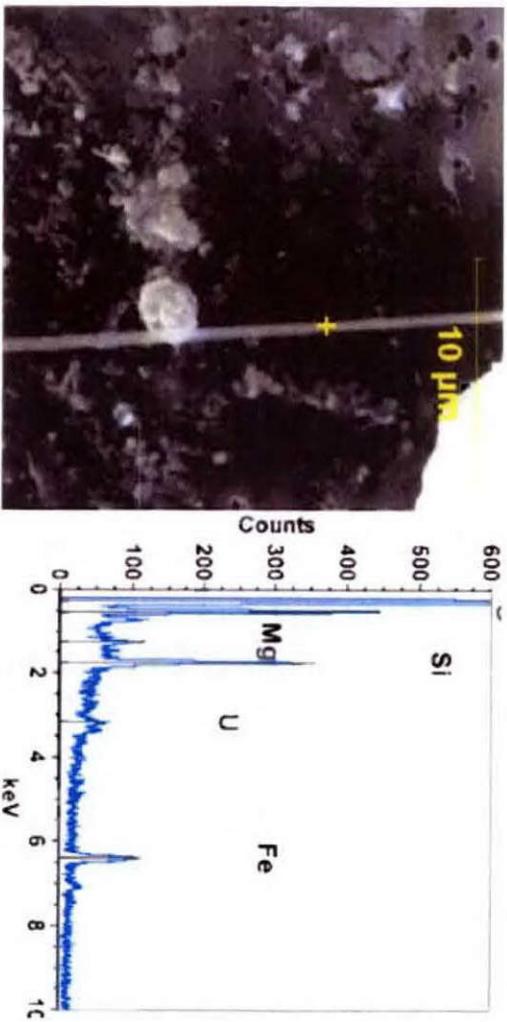
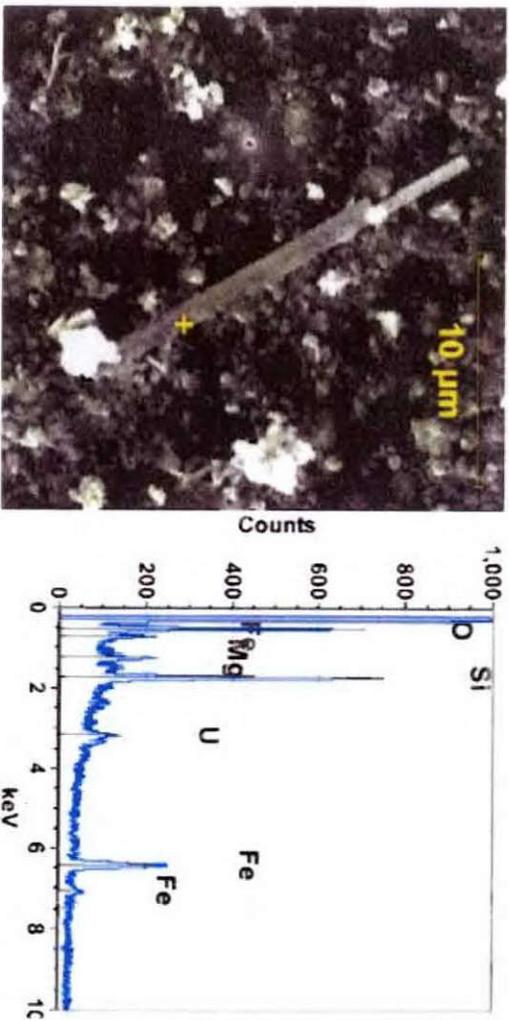
Consisting of 5 pages, including coversheet

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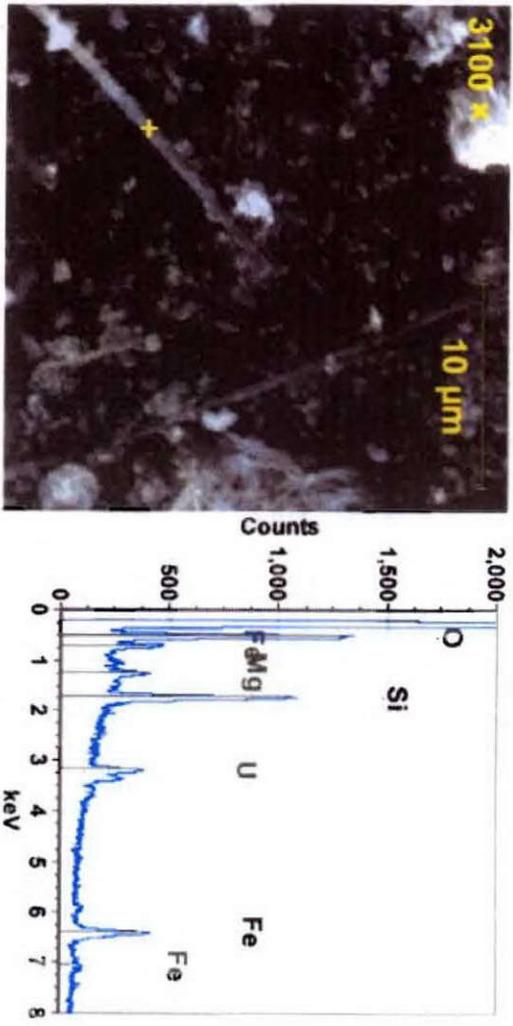
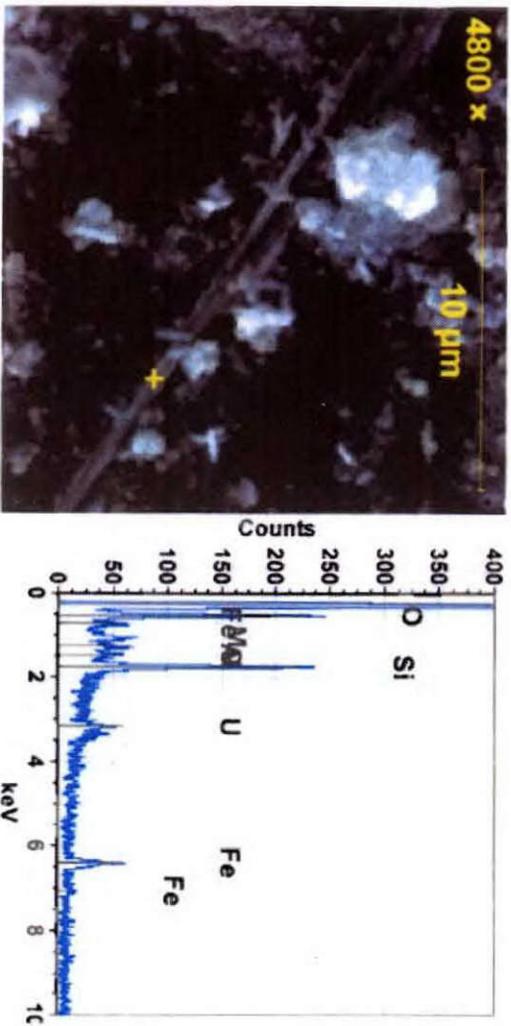
Scanning Electron Microscopy Images, Energy Dispersive X-Ray Spectroscopy Spectra and
Polarized Light Microscopy Images of Amosite Asbestos Fibers in
U-361 Composite Sludge Samples

Left image: SEM Secondary Electron Image
Right image: Energy Dispersive X-Ray Spectrum from the spot marked
with the cross in the SEM image:



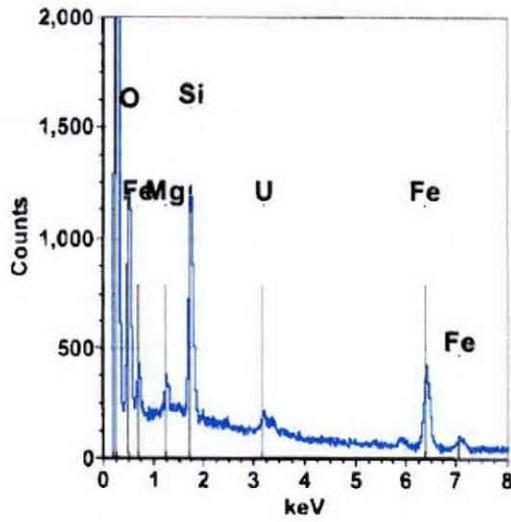
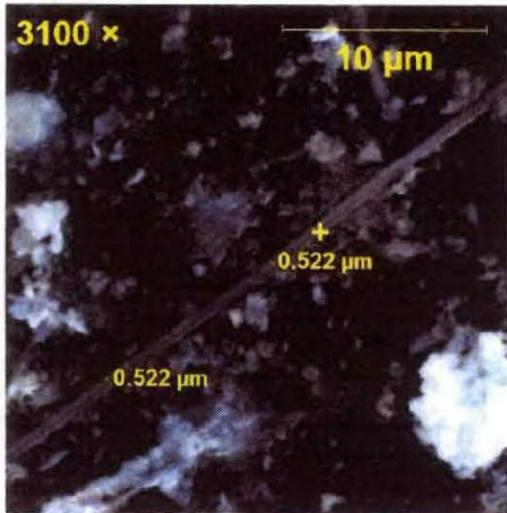
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Enclosure



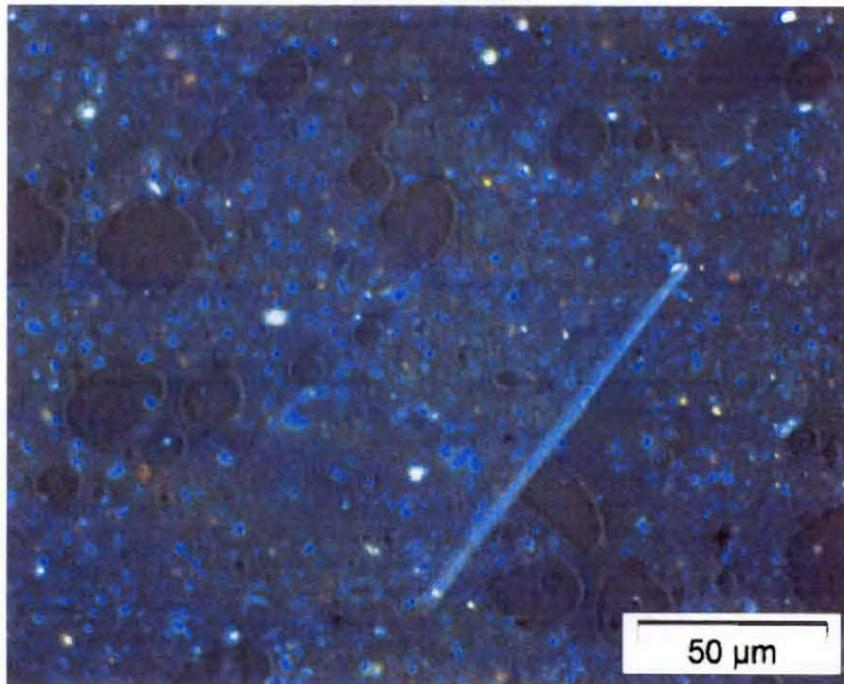
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PLM Images

Crossed Polarizers



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Crossed Polarizers, Red I Compensator

