Analysis Results for Building 241 702-AZ A Train

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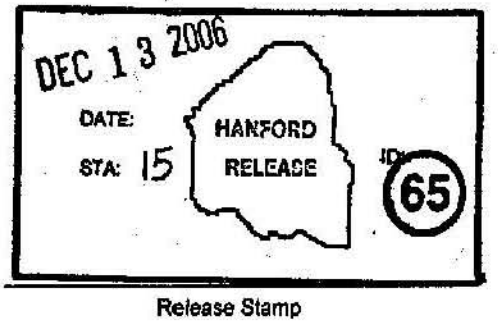
Abstract: This report presents the analyses results for three samples obtained under RPP-PLAN-28509, Sampling and Analysis Plan for Building 241 702-AZ A Train. The sampling and analysis was done in response to problem evaluation request number PER-2004-6139, 702-AZ Filter Rooms Need Radiological Cleanup Efforts.



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Analysis Results for Building 241 702-AZ A Train

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ACRONYMS

CFU	colony-forming units
DSC	differential scanning calorimetry
EDS	energy dispersive X-ray spectroscopy
GEA	gamma energy analysis
GM	Geiger-Mueller
HEMA	high-efficiency mist eliminator
HEPA	high-efficiency particulate air
IC	ion chromatography
ICP	inductively coupled plasma spectroscopy
NA	not applicable
PCB	polychlorinated biphenyls
PER	problem evaluation request
PBS	phosphate buffered saline
PLM	polarized light microscopy
PPE	personal protective equipment
RODAC®	replicate organism detection and counting. A registered trademark of B-D Laboratories, West Chester, Pennsylvania
SAB	Sabouraud dextrose agar
SEM	scanning electron microscopy
TGA	thermogravimetric analysis
TOC/TIC	total inorganic carbon/total inorganic carbon
TSA	trypticase soy agar
XRD	X-ray diffraction

1. INTRODUCTION

1.1 SAMPLES

This report presents the analyses results for three samples obtained under RPP-PLAN-28509, *Sampling and Analysis Plan for Building 241 702-AZ A Train.* The samples are entered into the 222-S Laboratory LABCORE system as S06E001025 for the external ventilation duct crystalline material, S0E6001026 for the floor material, SO6E001042 for the resampled floor material blended with SOE6001026, and S06E001029 for a pipe section from the tie-in line between AZ-702 and AZ-301. The field sampling reports are contained in Appendix A. The laboratory sample identification is presented in Appendix B. Samples are reported by the primary LABCORE number as indicated above and then by subsamples for the different analyses performed. For example, the external ventilation dust crystalline material identified as SO6E001025 is further divided into subsamples identified as SO6E001034 (IC–NH_4), SO6E001035 (ICP–RECRA Metals), SO6E001036 (IC-Anions/Small Org), SOE6001037 (SVOA Extraction), and S06E001045 (DSC-TA). The results are reported in this final report under SO6E001025. The pipe section contained only enough material to perform a scanning electron microscopy (SEM) analyses; therefore microbiological analysis was not performed on this sample as originally planned.

The sampling and analysis was done in response to problem evaluation request (PER) number PER-2004-6139, "702-AZ Filter Rooms Need Radiological Cleanup Efforts." This PER described an unknown condition within the 702-AZ Ventilation System Filter Room A caused by leakage of a crystalline substance from around the heater section and subsequent accumulation on the floor. Sampling of the unknown substances was recommended by the PER "with complete disclosure of chemical, radiological and biological results." Based on the sample results, personnel protective equipment (PPE) can be prescribed for performing the necessary facility repairs, clean-up, and decontamination.

1.2 BACKGROUND

The 702-AZ train is used to filter emissions from the ventilation of the primary tank headspaces in double-shell tanks 241-AY-101 (AY-101), 241-AY-102 (AY-102), 241-AZ-101 (AZ-101), and 241-AZ-102 (AZ-102). When the 702-AZ ventilation system was first put into service in March 1998, condensate buildup and internal flooding was experienced throughout the 702-AZ system. The "A"-side parallel exhaust clean-up train was being operated at the time that flooding occurred. As a result of the event, the unit was shut down to remedy the problem, and therefore the 702-AZ parallel B-train was not exposed to the liquid. It was not immediately obvious that the high-efficiency particulate air (HEPA) filter on the A-train was wet. When this was noted, the HEPA filters were changed on both trains. The heater section upstream of the HEPA filters on the A-train was found to be wet also, and the system was dried out as much as possible with rags. The presence of condensate in the system and additional leakage appears to be intermittent and may be dependent on waste-intrusive work activity in the tanks, as well as the operational efficiency of the tank ventilation system moisture removal subsystems.

In 2004, the 702-AZ condensate drainage and collection system experienced plugging, primarily in the drain from the seal pot to the condensate receiver catch tank. Efforts to investigate and clear drainage problems revealed that a construction test blank was left in place in the drain from the primary condenser during systems startup in 1998, which caused the condenser to fill up with condensate and carry over entrained moisture (e.g., droplets, mists) into adjoining ductwork and equipment. Condensate seal pot drainage problems also caused condensate back-up into the high-efficiency mist eliminator (HEME), contributing to carry-over of entrained moisture in the air stream to the exhaust HEPA filter clean-up trains. Intermittent operation of individual tank ventilation recirculation cooling loops also contributed to high system moisture content and resultant condensate in the system.

Leakage from the 702-AZ Filter Room A heater section and onto the floor was first documented in operator routine-round data sheets in April 2004, and subsequently reported April 16, 2004, in PER-2004-2155, "702-AZ Filter Room Area Posted High Contamination Area." A work package was generated to decontaminate the area. Before initiating the clean-up effort, sampling and analysis of the deposits formed from the leak was required to prescribe appropriate PPE (see PER-2004-6139).

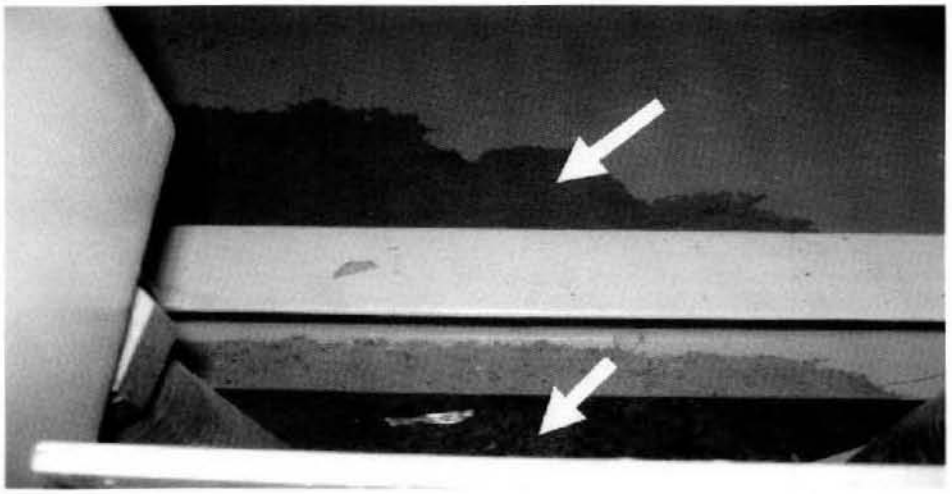
In Spring 2006, condensate drain system plugging again contributed to back-up of condensate into the ventilation system. As before, carry-over of entrained moisture from the HEME to the filter clean-up trains occurred, where it was primarily collected in the airstream heater sections upstream of the exhaust HEPA filters. Additional leakage from the heater section as a result of this event appears likely due to the moist appearance of the deposits.

The same external leakage problem is not as apparent for the B-train housing as it is on the A-train. Over the last 2 years B-train has been operated more than A-train. Figure 1 shows a crystalline substance emanating from behind the heater housing stainless-steel face flange of the A-train (left arrow). Also, there appears to be additional material and/or corrosion products accumulating below the lower edge of the heater face flange (right arrow).

Figure 1. Unknown External Ventilation Duct Crystalline Substance.

Figure 2 shows an area with material on the floor directly below the A-train heater housing and some staining. The area of interest is indicated by the lower arrow. The area indicated by the lower arrow may be the accumulation from the initial ventilation duct "leak" site and the upper arrow could indicate material that seeped under the I-beam. This floor material was found directly beneath the crystalline material shown in Figure 1.

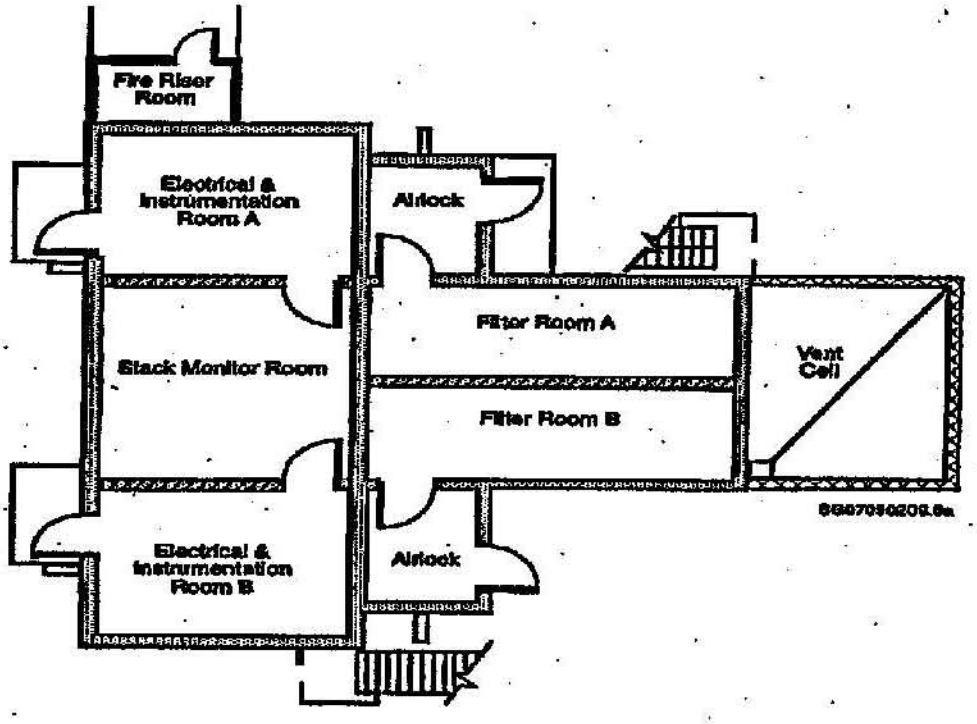
Figure 2. Unknown Brownish-black Floor Material.



Samples of the crystalline substance external to the A-train heater section and the material deposited on the floor were collected on May 25, 2006, and submitted to the 222-S Laboratory for chemical and physical analysis to characterize the unknown materials. The floor material was resampled on July 31, 2006, to supplement the small amount of material obtained in May 2006. Additional samples were obtained at various locations during the May 2006 sampling event for microbiological analysis to evaluate potential biological hazards. The primary area of concern leading to the sampling event is Filter Room A located in Building 702-AZ as shown in Figure 3.

The 702-AZ Ventilation System is described in detail in RPP-15127, *System Design Description for AY and AZ Tank Farm Primary Ventilation System (DSA-Based),* and shown in Figure 3. The system description includes the system functions, requirements, facility layout, flow diagrams, major components, configuration, operation, and maintenance.

Figure 3. 702-AZ Ventilation Building.



1.3 ANALYSES

The samples of the duct crystalline material and the floor substance were subjected to microbiological and chemical analyses. Analytical grade ammonium nitrate and ammonium nitrate mixed with sodium chloride were also analyzed for their thermal behavior. The chemical analyses performed are shown in Table 1. The microbiological analyses conducted are shown in Table 2.

1.4 SAMPLE IDENTIFICATION

Table 3 shows the field sample identification numbers, sample types, associated analyses, and sample locations for all the samples taken except for a sample of piping. The pipe section, removed during tie-in of the new AZ-301 condensate receiver tank to the 702-AZ ventilation building, had an unknown substance adhering to a small area on its inside surface.

Table 1. Chemical Analyses.

Analyses	
Analysis	**Analyte(s)**
Gamma energy analysis (GEA)	Radionuclide speciation (will describe radioactive isotopes present in the samples)
Scanning electron microscopy with energy dispersive X-ray spectroscopy	Morphology, particle identification, with elemental analysis
Polarized light microscopy (PLM)	Optical microscopy to gather crystalline phase information
X-ray diffraction (XRD)	Identification of compounds associated with the crystalline mass
Solid pH	pH of the samples
Polychlorinated biphenyls (PCB) screen	Necessary for the lab to properly dispose of waste from analyses unless there is prior knowledge of sample PCB content
Differential scanning calorimetry (DSC) and thermogravimetric analysis (TGA)	Measurement of the thermal transition of a sample (DSC); measurement of the weight loss of a sample (TGA).
Ammonium	Ammonium ion
Water digest followed by ion chromatography	Anions (fluoride, chloride, nitrite, nitrate, bromide, phosphate, sulfate, formate, acetate, glycolate, oxalate) in the water soluble fraction of the solid samples
Acid digest/inductively coupled plasma spectroscopy	Metal cations in the acid-digested sample of the solids (most metals except mercury)
Total inorganic carbon/total organic carbon	Total inorganic carbon and total organic carbon.
Organic extract/gas chromatography-mass spectroscopy analysis	Identification and quantification of organic soluble organic compounds present in the solids
DSC using analytical-grade ammonium nitrate	Measurement of the thermal transition of analytical-grade ammonium nitrate
DSC using analytical-grade ammonium nitrate plus chloride	Measurement of the effects of chloride at 0.2 wt% on the thermal transition of ammonium nitrate

Table 2. Microbiological Analyses.

Sample	Analysis	Analyte
Crystalline material	Microbiological total population enumeration per unit mass.	Bacteria/fungi
Floor stain, brownish-black material on floor	Microbiological surface enumeration per unit area and per unit total mass.	Bacteria/fungi

Table 3. Field Sample Identification.

Item	Sample Number	Type/Sample Container	Analysis	Location
Crystalline Material				
1	702-AZ-1	Bulk/8- or 16-oz. tared, sterile wide-mouth jar	SEM, PLM, XRD, GEA, pH, bacteria, fungus, PCB, DSC/TGA, ammonium, anions, metal cations, TOC/TIC, and soluble organic species.	A-train, below heater section
2	702-AZ-1A	Laboratory plate counts	Bacteria (TSA medium)	N/A
3	702-AZ-1B	Laboratory plate counts	Fungi (SAB medium)	N/A
Floor Stain Material				
4	702-AZ-2 702-AZ-3	Bulk/8- or 16-oz. tared, sterile wide-mouth jar	SEM, PLM, XRD, GEA, pH, DSC/TGA, ammonium, anions, metal cations, TOC/TIC, and soluble organic species.	A-train, on floor below heater
5	702-AZ-2A	RODAC® plate w/TSA	Bacteria (TSA medium)	A-train, on floor below heater
6	702-AZ-2B	RODAC® plate w/SAB	Fungi (SAB medium)	A-train, on floor below heater
7	702-AZ-2C	RODAC® plate w/TSA	Bacteria (TSA medium)	A-train, on floor below heater
8	702-AZ-2D	RODAC® plate w/SAB	Fungi (SAB medium)	A-train, on floor below heater
9	702-AZ-2E	RODAC® plate w/TSA	Bacteria (TSA medium)	A-train, on floor below heater
10	702-AZ-2F	RODAC® plate w/SAB	Fungi (SAB medium)	A-train, on floor below heater
Blanks				
11	702-AZ-TSA-BLK	RODAC® plate w/TSA blank unopened	Bacteria (TSA medium)	NA
12	702-AZ-SAB-BLK	RODAC® plate w/SAB, blank unopened	Fungi (SAB medium)	NA
13	702-AZ-TSA-FBLK	RODAC® plate w/TSA, field blank	Bacteria (TSA medium)	A-train, on floor, clean area
14	702-AZ-SAB-FBLK	RODAC® plate w/SAB, field blank	Fungi (SAB medium)	A-train, on floor, clean area
15	702-AZ-TSA-TRPBLK	Petri plate/PBS w/TSA trip blank	Bacteria (TSA medium)	NA
16	702-AZ-SAB-TRPBLK	Petri plate/PBS w/SAB trip blank	Fungi (SAB medium)	NA

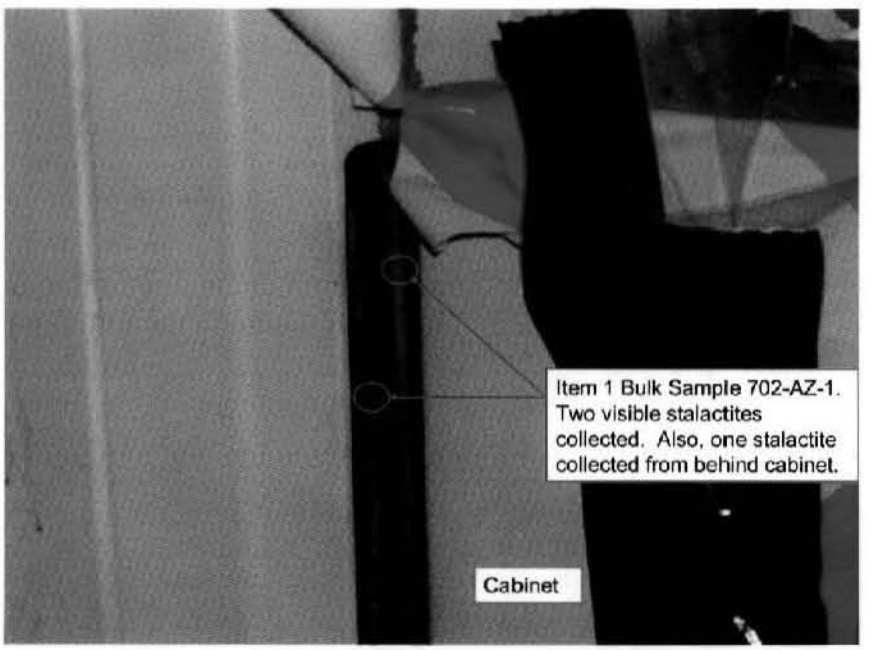
DSC/TGA = differential scanning calorimetry/thermogravimetric analysis
GEA = gamma energy analysis
NA = not applicable
PBS = Phosphate-buffered saline
PCB = polychlorinated biphenyls
PLM = polarized light microscopy
RODAC® = replicate organism detection and counting. A registered trademark of B-D Laboratories, West Chester, Pennsylvania.
SAB = Sabouraud dextrose agar
SEM = scanning electron microscopy
TOC/TIC = total organic carbon/total inorganic carbon
TSA = trypticase soy agar
XRD = X-ray diffraction

Sample 702-AZ-1 is identified in LABCORE as S06E001025, sample 702-AZ-2 is identified in LABCORE as S06E001026, and the retake of the floor material (702-AZ-3) and subsequent blending with the S06E001026 floor material is identified in LABCORE as SO6E001042. The section of pipe did not have a field sample number and is tracked in LABCORE as S06E001029.

1.5 SAMPLE LOCATION

Figure 4 shows the sample location for the external ventilation duct crystalline material, S06E001025. Figure 5 shows the sample location for the floor material, S06E001026. The retake of the floor sample, 702-AZ-3 was from the same location identified in Figure 5. Figure 6 shows the sample locations for the microbial surface enumeration using RODAC[1] plates. Figure 7 shows the uncontaminated concrete surface control area for the microbiological analysis.

Figure 4. Sample location for External Ventilation Duct Crystalline Material.



[1] RODAC is a registered trademark of B-D Laboratories, West Chester, Pennsylvania.

Figure 5. Sample Location for Floor Material.

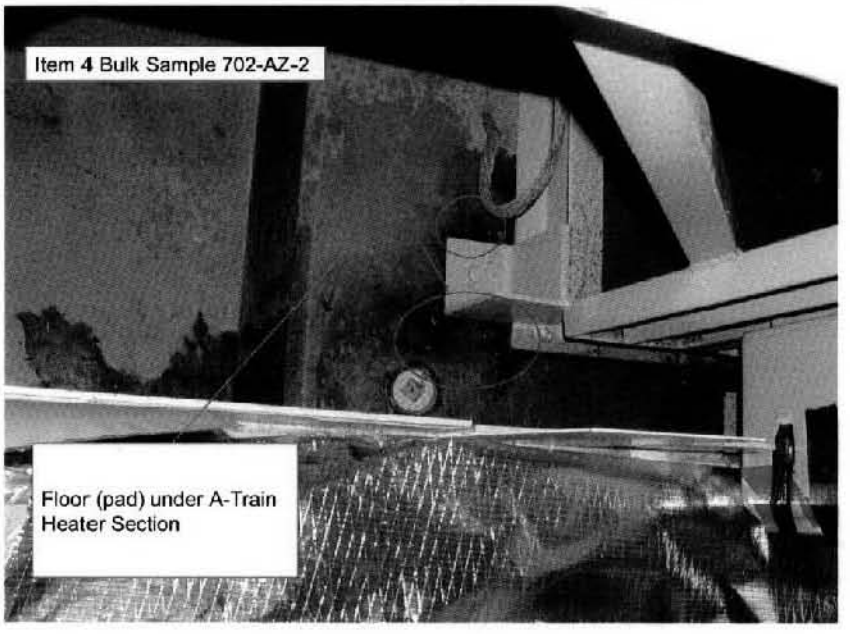


Figure 6. Microbiological Surface Sample Locations.

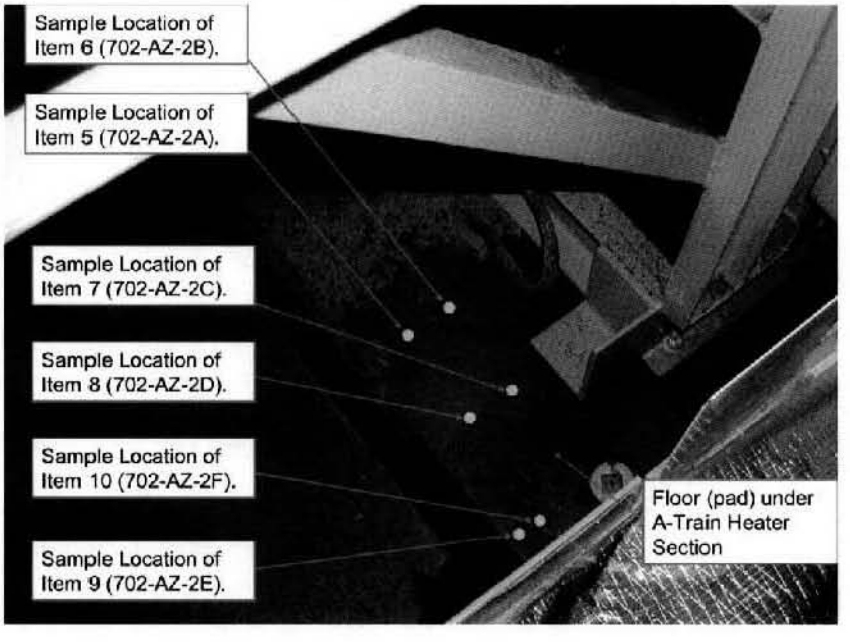
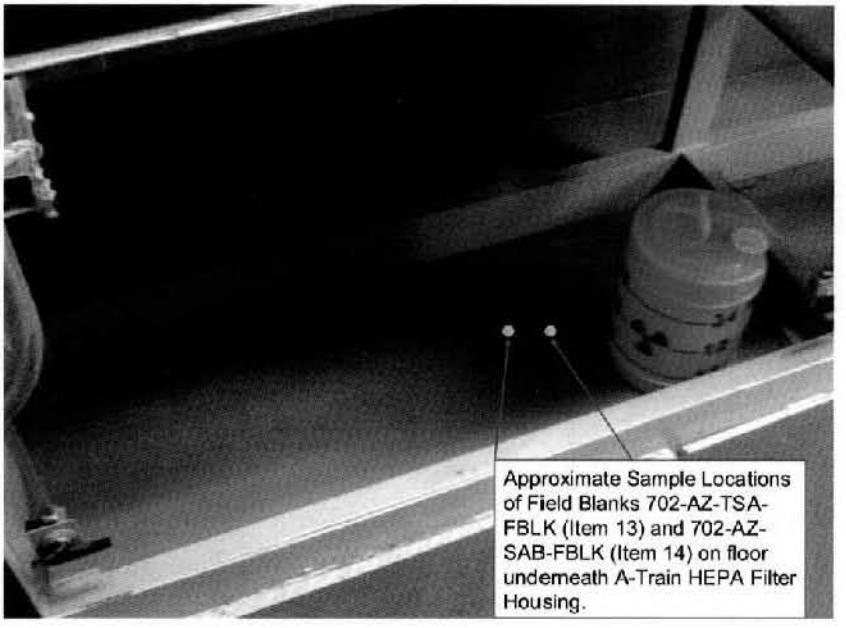


Figure 7. Uncontaminated Concrete Microbiological Control Sample Location.



2. ANALYSES RESULTS

2.1 MICROBIOLOGICAL ANALYSES

2.1.1 Surface Enumeration

Microbial enumeration of the floor stain material was accomplished by pressing against the test area a RODAC® plate containing trypticase soy agar (general heterotrophic bacterial agar) (Appendix C-1) and a RODAC® plate containing Sabouraud's dextrose agar (general heterotrophic fungi agar) (Appendix C-2). The plates were incubated at room temperature and counted over 5 days and the ending microbial growth reported. There was no confluent growth observed early in the incubation on the RODAC® places. The results are presented in Table 4.

2.1.2 Dilution Plate Counts

A known mass of sample was weighed from S06E001025 (crystalline material) and S06E001026 (floor material) and solubilized in 2 mL of sterile phosphate buffered saline (PBS) (Appendix C-3). Tenfold dilutions beginning with 10^1 and up to 10^3 were made from the solubilized material and plated on TSA (Appendix C-4) and SAB (Appendix C-5) agar. A spread plate technique was used to cover the agar surface. The plates were incubated at room temperature and counted over 5 days and the ending microbial growth reported. Table 5 presents the results from the 702-AZ material. As an indicator of microbial abundance in soil, a random sample was generated from soil gathered from the 300 Area near Building 331 and is identified as "soil sample" in Table 5.

Table 4. RODAC® Plate Results.

Sample Number	Agar Type	Colony-Forming Units per Plate[a]	dpm[b]
702-AZ-2A	TSA	88	500
702-AZ-2B	SAB	41	350
702-AZ-2C	TSA	82	1,100
702-AZ-2D	SAB	21	800
702-AZ-2E	TSA	68	1,500
702-AZ-2F	SAB	27	1,000
702-AZ-TSA-BLK[c]	TSA	No growth	NA[d]
702-AZ-SAB-BLK[c]	SAB	No growth	NA
702-AZ-TSA-FBLK[e]	TSA	110	<50
702-AZ-SAB-FBLK[e]	SAB	71	<50
702-AZ-TSA-TRPBLK[f]	TSA	No growth	NA
702-AZ-SAB-TRPBLK[f]	SAB	No growth	NA

[a] Agar area is 3.97 square inches.
[b] dpm = disintegrations per minute (The associated dpm readings is for relative indicators only. The counts were taken using a Geiger-Mueller (GM) counter through the bottom of the RODAC® plate.).
[c] BLK =Blank control, unopened RODAC® plate.
[d] NA = not applicable.
[e] FBLK = Field blank, contact plate from adjacent non-stained area, see Figure 7.
[f] TRPBLK = Trip blank, opened but not contacted RODAC® plate.

Table 5. Microbial Plate Count Results.

S06E001025 (crystalline material)		
Growth Medium	**Sample Mass**	**CFU/g**
TSA for heterotrophic bacteria	0.145	1.5E+03
SAB for heterotrophic fungi	0.145	No growth
S06E001026 (floor material)		
TSA for heterotrophic bacteria	0.132	1.1E+03
SAB for heterotrophic fungi	0.132	5.9E+02
300 Area Soil Sample		
TSA for heterotrophic bacteria	0.2	3.5E+04
SAB for heterotrophic fungi	0.2	8.9E+03

2.2 CHEMICAL ANALYSES

2.2.1 Material from 702AZ A-Train

The results of the initial chemical testing performed on samples of the external ventilation duct crystalline material and the floor substance are presented in Table 6. These analyses were carried out before the floor substance was resampled (702-AZ-3) and blended with the 702-AZ-2 initial floor sample. The resample and blending allowed enough floor material to be subjected to all requested chemical analysis at the best analytical method detection level possible. Table 7 presents the secondary chemical results of the crystalline and blended materials. Where duplicate analysis was performed, the average values are presented. The complete analytical results are included in Appendix D. Only results found above detection limits are reported in Table 7.

Table 6. Initial Analytical Results for SO6E001025 (crystalline material) and SO6E001026 (floor material).

Analysis	Sample			
	S06E001025		S06E001026	
GEA (counting error)	^{137}Cs	0.338 µCi/g (3.98%)	^{137}Cs	0.638 µCi/g (3.99%)
SEM with energy dispersive X-ray spectroscopy (EDS)	NH_4NO_3		Mixture of NH_4NO_3 and $NaNO_3$ with organic (carbon rich) coating.	
PLM	Not done (see text)		$NaNO_3$, $NaNO_2$, and/or NH_4NO_3 along with organic material.	
XRD	NH_4NO_3		NH_4NO_3, $NaNO_3$ and a noncrystalline phase	
Solid pH	3.94		4.68	
PCB screen	None detected		None detected	

As shown in Table 6, the only radionuclide that was found in both samples, using a gamma energy analysis (GEA) scan, was ^{137}Cs. All other radionuclides were at the less than detect level. The scanning electron microscope (SEM) using dispersive X-ray spectroscopy (EDS) indicated that the crystalline material was essentially ammonium nitrate. The floor material was found to be primarily a mixture of ammonium nitrate, sodium nitrate, and an organic coating with minor amounts of chlorine, calcium and iron. The X-ray diffraction (XRD) analysis confirmed the SEM results. The polarized light microscopy (PLM) for S06E001025 (crystalline material) was not performed. This was because the diagnostic PLM test for ammonium nitrate involves heating the sample and observing the sample optically as the sample cools. Currently, the PLM procedure for analysis of radiologically contaminated samples requires a radiation survey before it is brought out of the hood to the laboratory bench. The time that it would take to affect a radiation survey would have allowed the sample to cool before it could be examined on the PLM. Since the PLM would only reconfirm the findings of the XRD and the SEM for S06E001025, it was decided to only examine S06E001026 (floor material) by PLM. Analysis of S06E001026 by PLM was performed because of the more complex nature of the sample including the apparent high organic content based on the SEM/EDS results.

The crystalline material and floor substance are both mildly acidic with pH of 3.93 and 4.68, respectively. For comparison purposes, a 0.1 molar (moles/L) ammonium nitrate solution has a pH of 5.43 (*The Merck Index, an Encyclopedia of Chemicals, Drugs, and Biologicals*, Windholz et al. 1983).

For more complete descriptions of the analyses carried out with the SEM/EDS, PLM, XRD, see Appendixes E, F, and G, respectively.

Table 7. Analysis Results of SO6E001025 (crystalline material) and SO6E001042 (blended floor sample).

Analysis (units)	Sample	
	S06E001025	S06E001042
DSC, J/g	9.73E+02	1.16E+03
% water[a]	100	79.7
TOC, µg/g	2.35E+04	8.43E+04
TIC, µg/g	254	203
Aluminum, µg/g	ND[b]	74.5
Barium, µg/g	7.29	15.8
Boron, µg/g	519	1.22E+03
Calcium, µg/g	1.34E+03	5.10E+03
Chromium, µg/g	12.0[c]	4.82
Copper, µg/g	13.8	31.2
Europium, µg/g	0.353	1.14
Iron, µg/g	30.0	985
Lead, µg/g	ND	10.4
Lithium, µg/g	ND	2.01
Magnesium, µg/g	9.96E+02	1.99E+03
Manganese, µg/g	3.93	21.3
Molybdenum, µg/g	2.48	2.98
Phosphorus, µg/g	409	879
Potassium, µg/g	1.40E+03	2.20E+03
Silicon, µg/g	12.8	128
Sodium, µg/g	3.46E+04	3.58E+04
Strontium, µg/g	1.62	6.58
Sulfur, µg/g	362	976
Thorium, µg/g	ND	1.80
Titanium, µg/g	ND	8.40
Uranium, µg/g	7.40	10.4
Zinc, µg/g	27.5	146
Zirconium	ND	0.407
Ammonium ion, µg/g	1.81E+05	1.38E+05
Nitrate, µg/g	6.16E+05	4.68E+05
Acetate, µg/g	ND	4.05E+3
Chloride, µg/g	1.71E+03	3.73E+03
Glycolate, µg/g	ND	4.76E+03
Sulfate, µg/g	ND	1.94E+03
Butylbenzylphthalate, µg/kg	3.36E+03[d]	2.73E+03[d]
Di-n-butylphthalate, µg/kg	8.31E+03[d]	ND
Di-n-octylphthalate, µg/kg	3.15E+03	3.48E+03

[a] % Water is the % weight loss at 250 °C from the TGA scan (see Appendix D). In this case other volatile phases are responsible for this weight loss.
[b] Less than detection limit.
[c] The relative percent difference of the result and duplicate is >127% because the duplicate was found to be below the detection limit. Only the result is reported.
[d] Blank contaminated; the blank contained more than the sample.

Due to the energetics found with the differential scanning calorimetry (DSC) analysis reported in Table 7 for both the crystalline and floor materials, it was decided to compare DSC scans of analytical-grade ammonium nitrate and a mixture of analytical-grade ammonium nitrate with

0.2 wt% chloride. Additionally, the DSC is normally carried out under an inert gas atmosphere, which would lower the energetics if oxygen in air enters into the thermally induced chemical reactions. Therefore, a DSC analysis was carried out on both the crystalline material and floor material under an air purge. The residues from the DSC analyses were characterized using SEM/EDS and the results reported in Appendix E. Table 8 presents all DSC results (see Appendix D for the DSC scans).

Table 8. Results of Differential Scanning Calorimetry.

Sample	Atmosphere	Activation Temperature (°C)	Energy (J/g)
SO6E001025 (crystalline material)	Nitrogen	179	973
SO6E001042 (floor material)	Nitrogen	213	1,160
SO6E001043 (ammonium nitrate)	Nitrogen	269	302
SO6E001044 (ammonium nitrate plus 0.2 wt% chloride)	Nitrogen	234	504
SO6E001025 (crystalline material)	Air	171	523
SO6E001042 (floor material)	Air	192	1,867

The semivolatile organic carbon analysis gas chromatographic traces of SO6E001025 and SO6E001042 are presented in Appendix D. Note the rise in baseline for both chromatographs. This series of peaks in these chromatograms is typically observed in mixtures of hydrocarbons. Based on the averaged mass spectral data, it appears that the "hump" exhibited in the chromatogram resembles a petroleum-based product such as an oil or grease.

2.2.2 Analyses of Material Internal to Pipe Segment

During the tie-in of a new pipeline between the 702-AZ ventilation system seal pot and the new AZ-301 condensate receiver tank, some unknown material was encountered internal to the old pipe section removed during the installation . The pipe section was sent to 222-S Laboratory for analyses under RPP-PLAN-28509.

Sample S06E001029 consisted of the small amount of material that was recovered by scraping the inside of the pipe. Due to the paucity of material, the only analyses that was possible was SEM/EDS. The SEM/EDS indicated carbon-rich material and material consistent with zeolite. Appendix H gives a complete description of the analysis.

3. CONCLUSIONS AND RECOMMENDATIONS

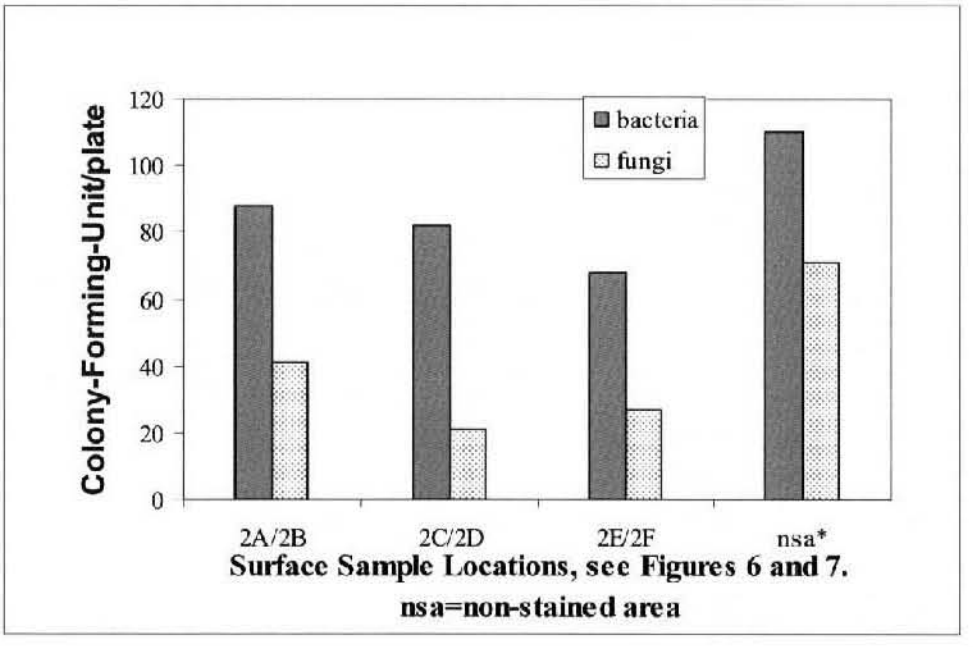
3.1 MICROBIOLOGICAL ANALYSIS

The objective of the microbiological characterization was to determine if the floor stain or the crystalline material might be a result of microbial biofilm growth and thus of potential concern to

workers. Prior to conducting the work, the criteria for concern was defined by microbiologists as a microbial population approaching or exceeding 10^6 colony-forming units (CFU)/g on dilution plates, or confluent growth observed early in the incubation on either dilution plates or RODAC® contact plates.

The floor stains are not a result of microbial biofilm formation. RODAC® contact plate results show that the non-stained floor area has the highest heterotrophic bacterial and fungal population as compared to the three floor stain areas tested (Figure 8). A reverse correlation appears to exist between the radioactivity and the microbial population (Figures 8 and 9). The non-stained area with lowest radioactivity (<50 dpm/plate) has the highest microbial counts; while the stained areas, with radioactivity range from 350 to 1500 dpm/plate, all have lower microbial densities. It is possible that the chemical and/or radiation properties of the floor stain inhibit the number of cultured microbes.

Figure 8. Results of Surface Enumeration by Contact Plate.



Microbial enumeration of both solid materials (crystalline formation and brownish-black material on the floor) by dilution plate counts indicates that the number of cultured microbes was approximately 1000 times lower than the predefined criteria of concern, and approximately 10 times lower than the control soil sample (Figure 10). While floor material harbors low concentrations of both bacteria and fungi, no fungal growth was found in the crystalline material.

In conclusion, as expected, the samples contained bacteria and/or fungi. However, the number of culturable heterotrophic bacteria and fungi in the samples were low and far below the densities expected for a microbial biofilm. Thus the floor stain and crystalline material are not of concern with respect to a potential microbiological hazard.

Figure 9. Radioactivity (dpm) in Contact Plate.

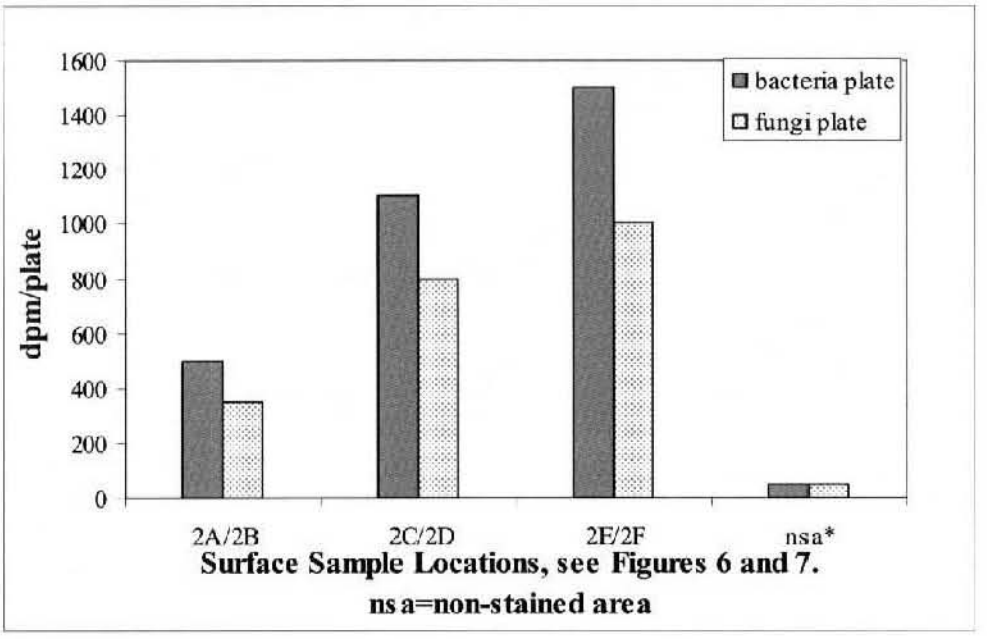
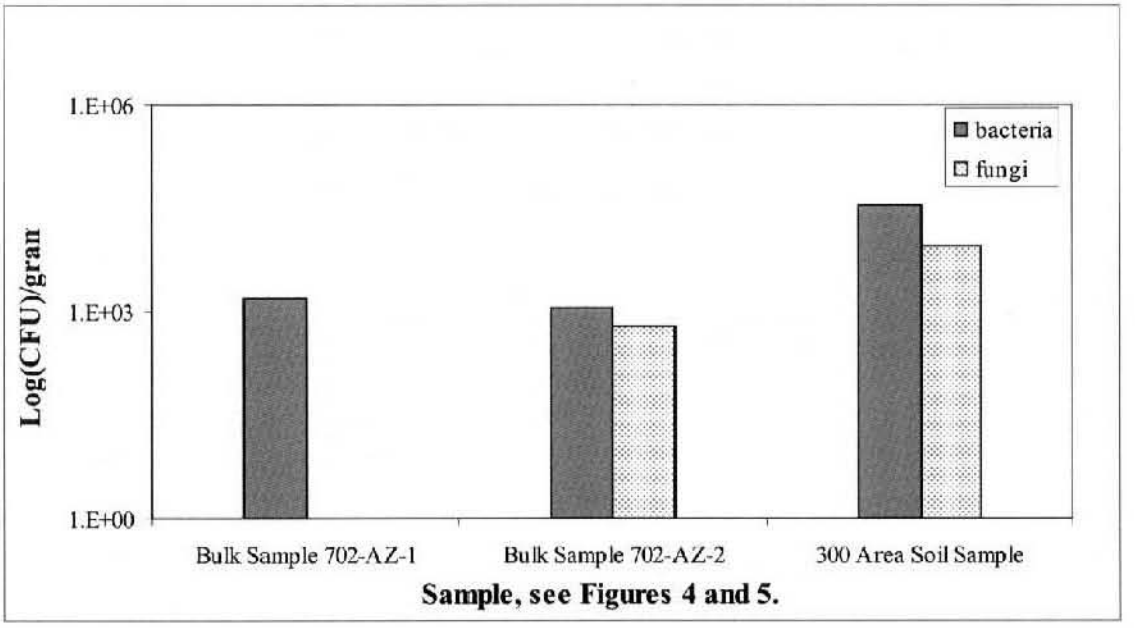


Figure 10. Microbial Population in Solid Materials by Dilution Plate Counts.



3.2 CHEMICAL ANALYSIS

The samples SO6E001025 and SO6E001042 had significant levels of total organic carbon at 2.35E+04 µg/g and 8.43E+04 µg/g, respectively. The organics were indicated in the gas chromatographic trace as a petroleum-based product such as oil or grease. This coupled with the ammonium nitrate concentrations of 1.81E+05 µg/g (SO6E001025) and 1.38E+05 µg/g (SO6E001042) may well act as an accelerant during periods of high temperature excursions. This is underscored by the DSC temperature/energy differences of pure ammonium nitrate and ammonium nitrate plus 0.2 wt% chloride (both had higher activation temperatures and lower energies), as compared to the samples collected from the 702-AZ Filter Room A external ventilation duct and floor. Also, the DSCs of the 702-AZ A-train samples were energetic enough to expel residue produced by the chemical reactions occurring in the measurement containers from the container vent ports.

Therefore, clean up and disposal of the ammonium nitrate external to the ventilation duct in Filter Room A needs to be carried out with caution. Although ammonium nitrate is considered a very stable salt, when allowed to heat up to temperatures on the order of 200 °C to 230 °C, exothermic decomposition occurs (*Encyclopedia of Chemical Technology*, Kirk-Othmer 1992). Additional work is recommended to validate the chemical composition of any ammonium-nitrate-bearing materials accumulating internal to the ventilation duct, particularly in the heater section where temperatures are high.

3.3 PATH FORWARD FOR CLEANING AND DISPOSING OF EXTERNAL VENT DUCT AND FLOOR MATERIALS

The crystalline and floor materials are water soluble. The deposits can be collected in the solid phase and added to a carboy filled with water to dissolve the materials. The solution can then be pumped back into the condensate collection system and returned to the tank farm. This would eliminate the potential reactivity of the bulk of the material if it were to be disposed of in a waste drum.

The residue remaining on the ventilation duct surfaces and floor area after recovering the bulk of the materials can be further cleaned using damp rags. If practical, triple rinse the used rags in separate batches of clean water to extract any residual ammonium nitrate from the rags prior to disposal as solid waste. The rinse water can be pumped back to the condensate collection system for transfer back to the tank farm.

Before the clean up commences, PPE needs to be selected to protect against the acidic nature of the solids deposits and the potential for ammonia release when the solids are dissolved in water. Waste designation of the rinsed damp rags should follow the normal process for waste disposal operations.

4. REFERENCES

Kirk-Othmer, 1992, *Encyclopedia of Chemical Technology*, "Ammonium Nitrate," John Wiley & Sons, Inc., Hoboken, New Jersey.

PER-2004-2155, "702-AZ Filter Room Area Posted High Contamination Area," CH2M HILL Hanford Group, Inc., Richland, Washington, dated April 16, 2004.

PER-2004-6139, "702-AZ Filter Rooms Need Radiological Cleanup Efforts," CH2M HILL Hanford Group, Inc., Richland, Washington, dated December 15, 2004.

RPP-PLAN-28509, 2006, *Sampling and Analysis Plan for Building 241702-AZ A Train*, Rev. 1, CH2M HILL Hanford Group, Inc., Richland, Washington.

RPP-15127, 2005, *System Design Description for AY and AZ Tank Farm Primary Ventilation System (DSA-Based)*, Rev. 2, CH2M HILL Hanford Group, Inc., Richland, Washington.

Windholz, M., S. Budavari, R. F. Blumetti, and E. S. Otterbein (Editors), 1983, *The Merck Index, an Encyclopedia of Chemicals, Drugs, and Biologicals*, Merck & Co. Inc., Whitehouse Station, New Jersey.

APPENDIX A
FIELD SAMPLING REPORTS FROM DURATEK

ENERGYSOLUTIONS

Duratek™

July 5, 2006

MAW-06-4426

R. D. Gustavson
CH2M Hill Hanford S5-25
Post Office Box 1500
Richland, Washington 99354-1500

Dear Mr. Gustavson:

702-AZ VENTILATION BUILDING – BIOLOGICAL SAMPLES – 200 EAST AREA

Duratek Federal Services, Inc. completed the subject sampling event on May 25, 2006. Attached for your records are copies of the Chain of Custody, sampling logbook entries and other associated documentation pertinent to the sampling tasks performed.

Thank you for the opportunity to be of service. If there are any questions, please contact me at 308-5721.

Very truly yours,

Victor L. Magnus, Manager
Sampling and Well Services

maw

Attachment

DTSNW – V. L. Magnus File/LB
RC6021

345 Hills Street • Richland, Washington 99354-5507
509-376-7055 • Fax: 509-372-1435 • www.energysolutions.com

PROJECT FILE CHECKLIST		
SAF #: 506-051	CUST. PROJ. #: 502087/FAGO	DATE: 5/25/06
PROJECT TITLE: 702-AZ VENTILATION BUILDING Biological Samples 200 East Area		
POSSIBLE ITEMS		**✔ IF INCLUDED**
Logbook Entry DTS-SAWS-H 100 Pages 57-163		✓
Chain of Custody		✓
Shipping Documentation: Rad. Shipment Record, ORSR, OPC, etc.)		
Project Notes (DSI's, email, etc.)		✓
Chain of Custody/RSA for RAD Screening		
RAD Results		
Sample Authorization Form - SAF w/ Field Sampling Requirements		
SAF Request Form, SAP or Letter of Instruction		
~~Timely Order Memo~~ Sampling & Analysis Plan		✓
MSDS Tank Farm Work Ins.		✓
SAWS Job Completion List		
Other:		
Other:		
Generator Knowledge Information		✓

Reviewer: M.A. Wolfe

Ready For File (Initial) MAW

Letter #: 44216 Date Sent

Abbv. Code ~~RT 5021~~ RC6021

Requestor/customer: R.D. Gustavson 3-5090

55-25

Project: 702-AZ, A TRAIN SAMPLES Notebook No. DTS-SAWS-H100

Continues from Page None

SAF# 306-051 5-25-06 CHARGE CODE: 502087/FA60

WORK DONE TO RCRA PROTOCOL

LOCATION: 702-AZ VENTILATION BUILDING, 200 EAST AREA

PERSONNEL:		
JG	HOGAN	NCO/SAMPLER
C	KEARNEY	NCO/CHG
MJ	BUSSELMAN	NCO/CHG
JM	TOON	HPT
RD	CHANNEL	HPT
DA	ANDERSON	HPT
WL	ADAMS	IH
JS	TOLE	IH
SR	CHAPMAN	PIC
RD	GUSTAVSON	ENGINEER/CUSTOMER 3-5090

PURPOSE: WASTE CHARACTERIZATION

SAP# RPP-PLAN-28509, REV 0 RWP# WTO-022-REV 1

WORK PACKAGE: WFO-WO-05-000646

PPE: ONE SET OF ANTI-C's, SCBA, NITRILE GLOVES

SAMPLE EVENT: THE 702-AZ "A" TRAIN HAS BEEN OBSERVED TO HAVE A BROWNISH CRYSTALLINE MATERIAL OF UNKNOWN ORIGIN EMANATING FROM AN AREA BELOW THE EXHAUST HEATER AND FILTER HOUSING AS WELL AS A BROWNISH-BLACK TAR LIKE MATERIAL ON THE FLOOR IN CLOSE PROXIMITY TO THE FILTER HOUSING, ALSO OF UNKNOWN ORIGIN. BOTH MATERIALS ARE RADIOACTIVELY CONTAMINATED TO HCA LEVELS. THE MATERIALS APPEAR TO BE A RESULT OF A PLUGGED CONDENSATE PIPE WHICH ALLOWED CONDENSATE TO ACCUMULATE IN THE SYSTEM SINCE 1998. THE OBJECTIVE IS TO CHARACTERIZE THE MATERIALS FOR BOTH CHEMICAL AND BIOLOGICAL COMPONENTS TO ENABLE CLEANUP AND DECONTAMINATION OF THE FACILITY.

Continued on Page 58

Read and Understood By

DURATEK JG Hogan JUN 23 2006

Project [illegible] Notebook No. [illegible]

Continues from Page 57

SAMPLE METHOD: SAMPLES OF THE CRYSTALLINE MATERIAL WERE COLLECTED BY USING A STERILIZED SCOOP TO CHIP OFF PIECES OF THE HANGING STALACTITES AND PLACING THEM INTO THE SAMPLE CONTAINERS PROVIDED BY ATL. THREE OF THE STALACTITES WERE COLLECTED, EACH APPROXIMATELY 12" LONG. THE SURFACE MICROBIOLOGICAL ANALYSES OF THE BROWNISH-BLACK MATERIAL ON THE FLOOR WAS PERFORMED USING "RODAC" (REPLICATE ORGANISM DETECTION AND COUNTING) PLATES CONTAINING TSA AND SAB. THE PLATES WERE OPENED AND PRESSED ONTO THE MATERIAL AND THEN RECAPPED. (SEE PICTURE ON PAGE 63 FOR LOCATIONS). A TRIP BLANK OF BOTH PLATES ACCOMPANIED THE SAMPLES TO THE LAB. A FIELD BLANK WAS COLLECTED BY PRESSING BOTH PLATE TYPES TO THE FLOOR OF A TRAIN AWAY FROM ANY CONTAMINATION. A BULK SAMPLE FOR CHEMICAL ANALYSES WAS ALSO COLLECTED BY USING A STERILE SCOOP TO SCRAPE UP THE TARLIKE MATERIAL AND PLACING IT INTO SAMPLE CONTAINERS PROVIDED BY ATL. ALL OF THE SAMPLES COLLECTED WERE CONTAMINATED. THE SAMPLE CONTAINERS WERE SEALED WITH EVIDENCE TAPE, SURVEYED FROM THE ZONE BY THE HPT AND PLACED IN DOUBLE BAGS ON THE STEP OFF PAD.

TRANSPORTATION: THE SAMPLES WERE PLACED IN A COOLER WITH BLUE ICE AND THEN SHIPPED DIRECTLY TO THE 222-S LAB ON AN "ONSITE ROUTINE RADIOACTIVE SHIPMENT RECORD, SITE-03-EXCEPTED, COPY #55."

6-23-06

Sample Point: **Crystals**

Lead Sampler: **HOGAN, J.G.** *Sample Matrix:* **OTHER**

Sample ID	Date Collected / Time Collected	Analysis	Preservative(s)	Container	Lot #	Laboratory / COC#
702-AZ-1	6/25/2006 / 1345	PLM, SEM w/EDS; X-Ray Diffraction, GEA, pH, Bacteria/Fungus	Cool 4C	120 m P	N/A	222-S / 102977

6-23-0

NOTE: ONE FORM ATTACHED THIS PAGE

Continued on Page 59

Read and Understood By

DURATEK
J. G. HOGAN

Signed — Date: JUN 23 2006

Signed — Date

Project 702 AZ, A TRAIN SAMPLES Notebook No. DTS-SAWS-H100 5

Continues from Page 58

Sample Point: **Oily Material**

Lead Sampler: **HOGAN, J.G.** *Sample Matrix:* **OTHER**

Sample ID	Date Collected / Time Collected	Analysis	Preservative(s)	Container	Lot #	Laboratory / COC#
702-AZ-2	5/25/2006 1335	PLM, SEM w/EDS, X-Ray Diffraction, GEA, pH	Cool 4C	120 m P	N/A	222-S 102977

Sample Point: **Bacterial**

Lead Sampler: **HOGAN, J.G.** *Sample Matrix:* **OTHER**

Sample ID	Date Collected / Time Collected	Analysis	Preservative(s)	Container	Lot #	Laboratory / COC#
702-AZ-2A	5/25/2006 1320	Bacteria, TSA	Cool 4C	5 m P	N/A	222-S 102977
702-AZ-2B	5/25/2006 1320	Fungi, SAB	Cool 4C	5 m P	N/A	222-S 102977
702-AZ-2C	5/25/2006 1322	Bacteria, TSA	Cool 4C	5 m P	N/A	222-S 102977
702-AZ-2D	5/25/2006 1322	Fungi, SAB	Cool 4C	5 m P	N/A	222-S 102977
702-AZ-2E	5/25/2006 1327	Bacteria, TSA	Cool 4C	5 m P	N/A	222-S 102977
702-AZ-2F	5/25/2006 1327	Fungi, SAB	Cool 4C	5 m P	N/A	222-S 102977

Sample Point: **Field Blank**

Lead Sampler: **HOGAN, J.G.** *Sample Matrix:* **OTHER**

Sample ID	Date Collected / Time Collected	Analysis	Preservative(s)	Container	Lot #	Laboratory / COC#
702-AZ-SAB-FBLK	5/25/2006 1315	Fungi, SAB	Cool 4C	5 m P	N/A	222-S 102977
702-AZ-TSA-FBLK	5/25/2006 1315	Bacteria, TSA	Cool 4C	5 m P	N/A	222-S 102977

Sample Point: **Trip Blank**

Lead Sampler: **HOGAN, J.G.** *Sample Matrix:* **OTHER**

Sample ID	Date Collected / Time Collected	Analysis	Preservative(s)	Container	Lot #	Laboratory / COC#
702-AZ-SAB-TRPBLK	5/25/2006 0800	Fungi, SAB	Cool 4C	5 m P	N/A	222-S 102977
702-AZ-TSA-TRPBLK	5/25/2006 0800	Bacteria, TSA	Cool 4C	5 m P	N/A	222-S 102977

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DURATEK J. G. HOGAN Read and Understood By JUN 22 2006

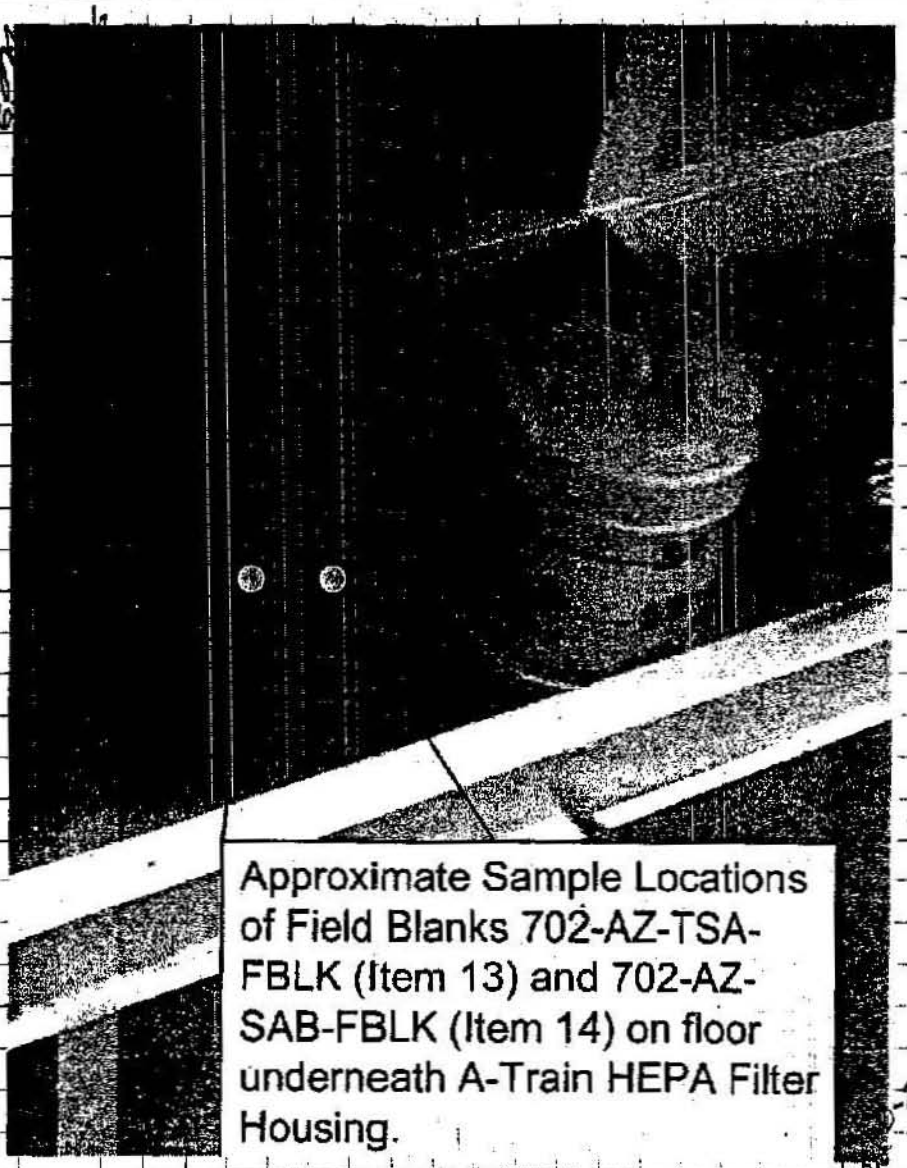
Project [illegible] Notebook No. [illegible]

Continues from Page 59

Sample Point: **Blank**

Lead Sampler: **HOGAN, J.G.** *Sample Matrix:* **OTHER**

Sample ID	Date Collected / Time Collected	Analysis	Preservative(s)	Container	Lot #	Laboratory / COC#
702-AZ-SAB-BLK	5/25/2006 0800	Fungi, SAB	Cool 4C	5 m P	N/A	222-S 102977
702-AZ-TSA-BLK	5/25/2006 0800	Bacteria, TSA	Cool 4C	6 m P	N/A	222-S 102977



Approximate Sample Locations of Field Blanks 702-AZ-TSA-FBLK (Item 13) and 702-AZ-SAB-FBLK (Item 14) on floor underneath A-Train HEPA Filter Housing.

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Project 702 AZ, A TRAIN SAMPLES Notebook No. DTS-SAWS-H/W

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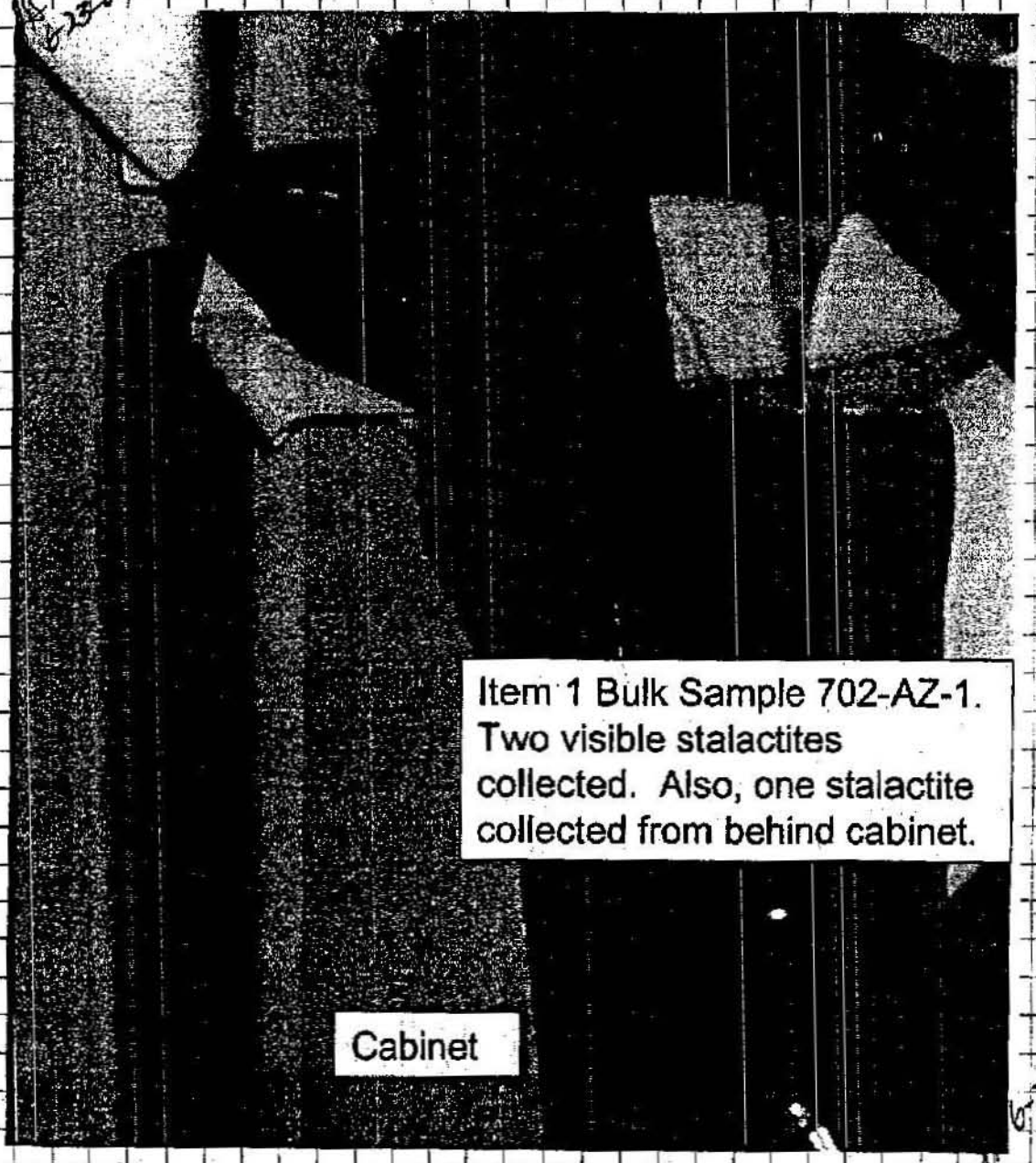
6-23-06



6-23-06

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Project: [illegible] Notebook No.: [illegible]

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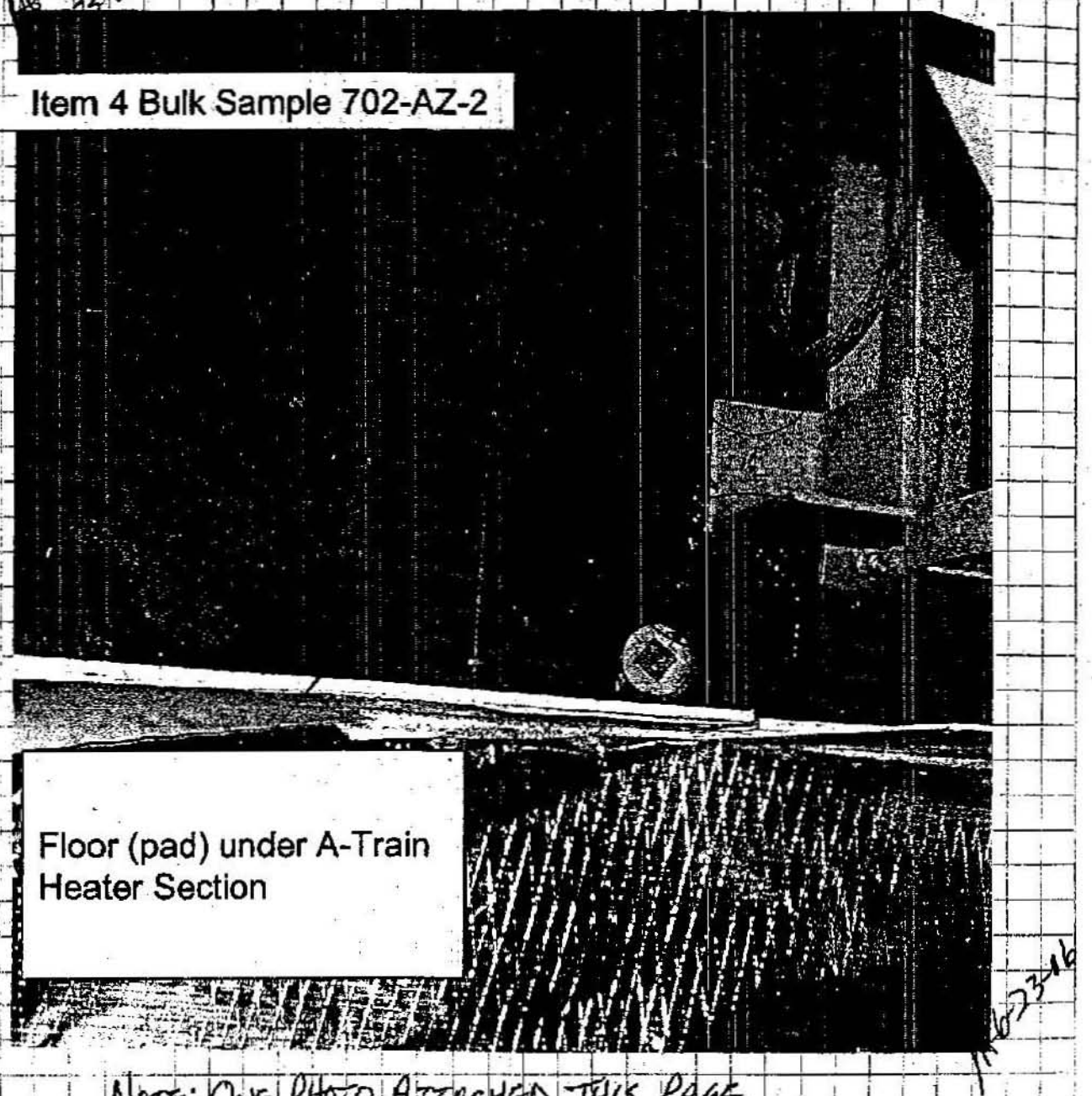

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Project # 702-AZ, A TRAIN SAMPLES Notebook No. DTS-SAWS-H100 63

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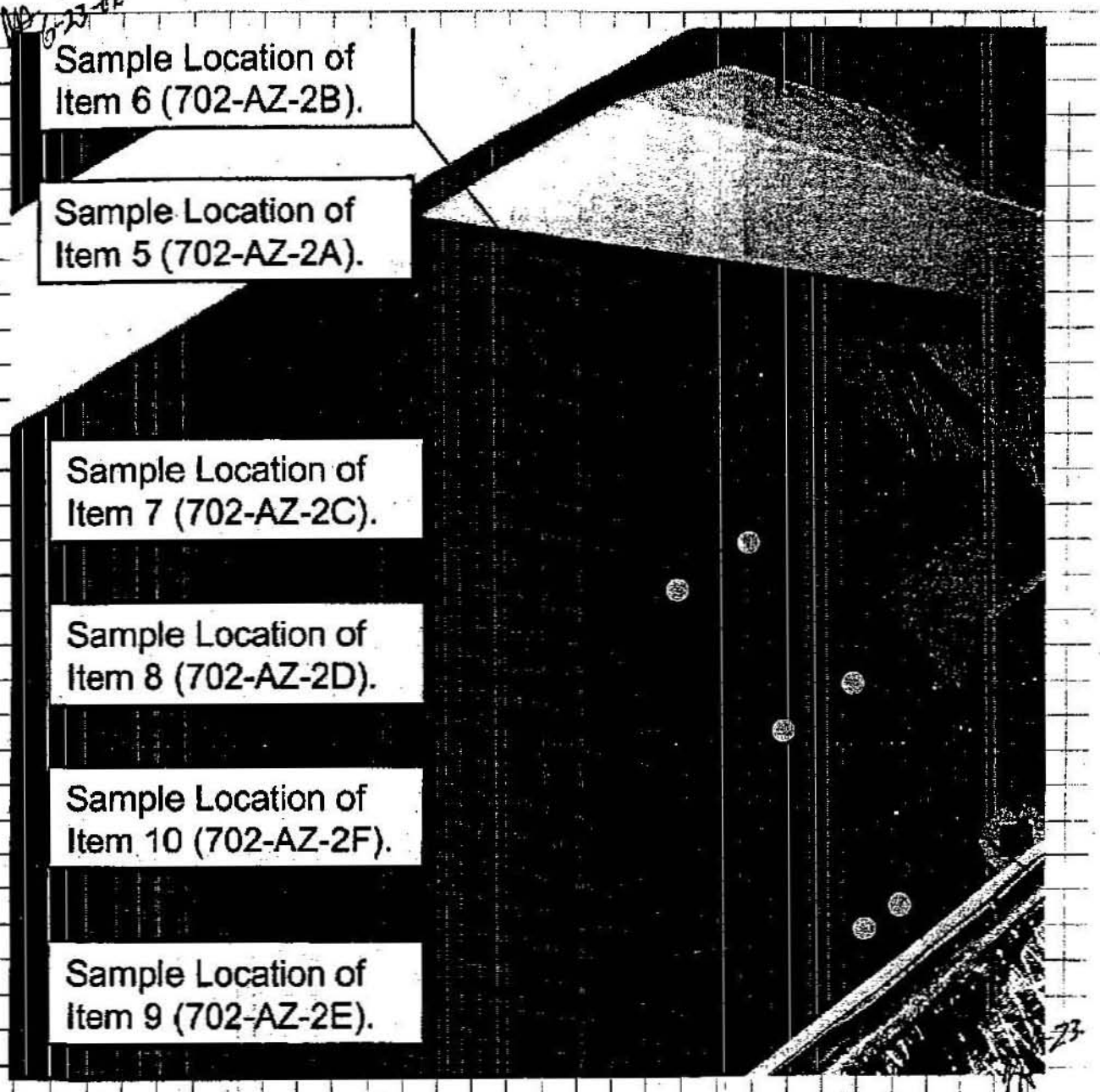
10/6-23-16



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Read and Understood By

Duratek Federal Services

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

C.O.C # 102977

Page 1 of 2

Collector HOGAN, J.G.	Contact/Requestor TEMPLETON, A.M.	Tel. No. 373-5589	MSIN S5-07 FAX
SAF Number S06-051	Sample Origin 702 AZ	Purchase Order/Charge Code	502087/FA60
Project Title 702-AZ Biological Samples	Logbook # DTS-SAWS-14100	Ice Chest #	Temp.
Shipped To (Lab) 222-S	Method of Shipment GOVT TRUCK	Bill of Lading/Air Bill No.	
Protocol RCRA	Data Turnaround 45 DAYS	Offsite Property No.	

Sample No.	Lab. ID	*	Date	Time	No/Type Container	Sample Analysis	Perservative
702-AZ-1		X	5/25/2006	1345	(1) 120 P	PLM, SEM w/EDS, X-Ray Diffraction, GEA, pH, Bacteria/Fungus	Cool 4C
702-AZ-2		X	5/25/2006	1335	(1) 120 P	PLM, SEM w/EDS,. X-Ray Diffraction, GEA, pH	Cool 4C
702-AZ-2A		X	5/25/2006	1320	(1) 5 P	Bacteria, TSA	Cool 4C
702-AZ-2B		X	5/25/2006	1320	(1) 5 P	Fungi, SAB	Cool 4C
702-AZ-2C		X	5/25/2006	1322	(1) 5 P	Bacteria, TSA	Cool 4C
702-AZ-2D		X	5/25/2006	1322	(1) 5 P	Fungi, SAB	Cool 4C
702-AZ-2E		X	5/25/2006	1327	(1) 5 P	Bacteria, TSA	Cool 4C
702-AZ-2F		X	5/25/2006	1327	(1) 5 P	Fungi, SAB	Cool 4C
702-AZ-SAB-BLK		X	5/25/2006	0800	(1) 5 P	Fungi, SAB	Cool 4C
702-AZ-SAB-FBLK		X	5/25/2006	1315	(1) 5 P	Fungi, SAB	Cool 4C
702-AZ-SAB-TBLK		X	5/25/2006	0800	(1) 5 P	Fungi, SAB	Cool 4C
702-AZ-TSA-BLK		X	5/25/2006	0800	(1) 5 P	Bacteria, TSA	Cool 4C

RPP-RPT-31298, Rev. 0

A-10

POSSIBLE SAMPLE HAZARDS/REMARKS MSDS Yes ☐ No ☐

List all known wastes.

RADIOACTIVE

SPECIAL INSTRUCTIONS Hold Time

Will verify sample HS upon
closing RT Stock 5/25/06 1500

Relinquished By	Print	Sign	Date/Time	Received By	Print	Sign	Date/Time
DURATEK	J. G. HOGAN		MAY 25 2006 1500	R P Slaggle			5/25/06 1500
Relinquished By			Date/Time	Received By			Date/Time
Relinquished By			Date/Time	Received By			Date/Time
Relinquished By			Date/Time	Received By			Date/Time

Matrix *

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

FINAL SAMPLE DISPOSITION — Disposal Method e.g. Return to customer, per lab procedure, used in process. Disposed By Date/Time

DFNW-SS-010

Duratek Federal Services

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

C.O.C # 102977

Page 2 of 2

Collector HOGAN, J.G.	Contact/Requestor TEMPLETON, A.M.	Tel. No. 373-5589 MSIN S5-07 FAX
SAF Number S06-051	Sample Origin 702 AZ	Purchase Order/Charge Code 502087/FA60
Project Title 702-AZ Biological Samples	Logbook # DTS-SAWS-H100	Ice Chest # Temp. /
Shipped To (Lab) 222-S	Method of Shipment GOVT. TRUCK	Bill of Lading/Air Bill No.
Protocol RCRA	Data Turnaround 45 DAYS	Offsite Property No.

Sample No.	Lab. ID	*	Date	Time	No/Type Container	Sample Analysis	Perservative
702-AZ-TSA-FBLK		X	5/25/2006	1315	(1) S P	Bacteria, TSA	Cool 4C
702-AZ-TSA-TBLK		X	5/25/2006	0800	(1) S P	Bacteria, TSA	Cool 4C

Will verify sample #s upon opening RHStoelb 5/25/06 1500

POSSIBLE SAMPLE HAZARDS/REMARKS List all known wastes.	MSDS Yes ☐ No ☐	SPECIAL INSTRUCTIONS	Hold Time

Relinquished By	Print	Sign	Date/Time	Received By	Print	Sign	Date/Time
	DURATEK J. G. HOGAN		MAY 25 2006 1500	RH Stoelb	RHStoelb		5/25/06 1500
Relinquished By			Date/Time	Received By			Date/Time
Relinquished By			Date/Time	Received By			Date/Time
Relinquished By			Date/Time	Received By			Date/Time

Matrix *

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

FINAL SAMPLE DISPOSITION | Disposal Method e.g. Return to customer, per lab procedure, used in process. | Disposed By | Date/Time

DFNW-SS-010

A-11

RPP-RPT-31293, Rev. 0

Hogan, James G

From: Templeton, Andrew M
Sent: Tuesday, March 28, 2006 4:19 PM
To: Gardner, Martin G (Marty); Hogan, James G
Cc: Frye, Jann M; Duncan, James B; Gustavson, Robert D; Jorgensen, David M
Subject: FW: SAP
Attachments: 702AZ SAP 3_20_06.doc

Marty and Jim,

Marty, I understand that Dave Jorgensen had talked to you some time ago about this sampling. We are assuming that you will be doing the sampling. Please find attached a draft sampling and analysis plan for your review. Section 4.0 deals with the sampling and will probably the section that is applicable to you guys.

If you have any questions please don't hesitate to call me at 373-5589 or on my cell # 438=0701.

Thanks!

Andrew M. Templeton
Component/System Engineer
DST Projects & Maintenance Engineering
CH2M Hill Hanford Group, Inc.

Ph. 509-373-5589
Fax 509-372-3106
Cell 438-0701
Andrew_M_Templeton@rl.gov
At CH2MHILL, Safety is no accident

From: Duncan, James B
Sent: Monday, March 20, 2006 3:06 PM
To: Templeton, Andrew M
Cc: Frye, Jann M
Subject: SAP

Andrew,

I have incorporated your comments and merged with Bob Gustavson's comments. There are still some places to be filled in, like describe the HEPA and HEGA filters. If you want me to do that I can, but I thought TF might want to input specific to the filter manufacture rather than have a "how it works" paragraph.

After you get the SAP and have a chance to review and have it reviewed, please send back and we will get the tech editing done.

Thanks.

Jim

Hogan, James G

From: Marty Gardner [MGGARDNER@duratekinc.com]
Sent: Tuesday, April 11, 2006 6:40 AM
To: Meldrom, Clarence A Jr
Cc: Lippert, Tracy D; Reining, Timothy L; Hogan, James G
Subject: 702AZ Sampling

Al,

REgarding the upcoming sampling at 702-AZ, we have been told that we are not to charge this work to the CHG sampling task under Wellingham. Duratek does not have a contract or task in place to support this sampling. Will need to get one placed and a CACN provided for the FH samplers to charge their time to. Let me know how you want to proceed.

Marty Gardner

Hogan, James G

From: Duncan, James B
Sent: Wednesday, April 26, 2006 9:14 AM
To: Hogan, James G; Li, Shu-Mei W
Cc: Frye, Jann M; Duncan, James B
Subject: RODAC Surface sampling

Jim / Shu-Mei

Jann and I were discussing the RODAC sampling and decided to leave the SAP as is. The reason is we don't know the extent of the area to be sampled so it probably would be best to leave the plan as is. Besides not extending the RODAC sampling will minimize Jim's time on the walkway.

Thanks.

Jim

Hogan, James G

From: Duncan, James B
Sent: Monday, April 24, 2006 12:28 PM
To: Hogan, James G
Subject: FW: PNNL Work

From: LI, Shu-Mei W [mailto:shumei.li@pnl.gov]
Sent: Monday, April 24, 2006 12:03 PM
To: Duncan, James B; Frye, Jann M
Cc: LI, Shu-Mei W; Knight, Imalyn A; Quackenbush, Tonya P
Subject: RE: PNNL Work

Jim:

I have asked Toni to reserve room 69/331 building for 4/25/06, 3:00-4:00 PM. It is located in the 3rd floor. Please forward this mail to whoever you want to invite to the meeting. Thanks.

Shu-mei

From: LI, Shu-Mei W
Sent: Monday, April 24, 2006 8:12 AM
To: Knight, Imalyn A
Subject: RE: PNNL Work

Imalyn:

Please schedule a meeting room in 331 bldg. for Tuesday, April 25, 2006 3:00 PM-4:00 PM. Thanks.

Shu-mei

From: LI, Shu-Mei W
Sent: Saturday, April 22, 2006 2:31 PM
To: Knight, Imalyn A
Subject: FW: PNNL Work

Imalyn:

Do we have a meeting room available at that time? Thanks.

Shu-mei

From: LI, Shu-Mei W
Sent: Thursday, April 20, 2006 4:50 PM
To: Duncan, James B

Cc: Knight, Imalyn A
Subject: RE: PNNL Work
Tuesday, April 25, 2006 3:00 PM-4:00 PM.
Jim:

I have received your phone message. 6/25/06 Tuesday at 3 PM is fine with me. I will ask our administrator Imalyn to reserve a room at 331 building. Thanks.
Shu-mei

Imalyn: Please set up a meeting place for us. Thanks.

From: Duncan, James B
Sent: Thursday, April 20, 2006 2:45 PM
To: Templeton, Andrew M
Cc: Li, Shu-Mei W; Brockman, Fred J
Subject: PNNL Work

Andrew,

I spoke with Shu-Mei and she has not yet have a work package. I need to set up a meeting with her, Jim Hogan, Jann and myself to converge on all sampling items and get them on order.

Could you check on the status and email Shu-Mei and Fred to give PNNL a POC for checking into the status of the work package.

Thanks.

Jim

RPP-PLAN-28509, Rev. 0

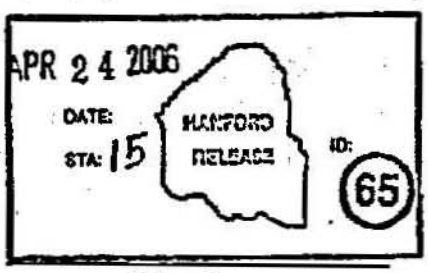
Sampling and Analysis Plan for Building 241 702-AZ A Train

J. B. Duncan and J. M. Frye
CH2M HILL Hanford group, Inc.
Richland, WA 99352
U.S. Department of Energy Contract DE-AC27-99RL14047

EDT/ECN: DRF UC:
Cost Center: 75110 Charge Code:
B&R Code: Total Pages: 21

Key Words: sampling, analysis, plan, 702-AZ, A train, PER, ventilation, filter room, microbiological, radiological, PCB, crystalline, methods, requirements, trypticase soy agar, Sabouraud dextrose agar, biological

Abstract: The 702 AZ A train has been observed to have crystalline material of unknown origin emanating from an area below the exhaust heater and filter housing as well as a brownish-black material on the floor in close proximity to the filter housing, also of unknown origin. The purpose of this plan is to outline the key elements for sampling and analyzing both the crystalline material and the material on the floor.



J. B. Duncan 4/24/06
Release Approval Date

Release Stamp

Approved For Public Release

A-6002-767 (03/01)

702-AZ A-Train Leakage Sample Evolution (WFO-WO-05-000646) 5/25/2006

Sample Locations

Refer to RPP-PLAN-28509, Table 7 for Sample Collection Identification Numbers

REQUEST FOR SAMPLE ANALYSIS (RSA)

5-25-06 DA

Group ID No. (For lab use only)

1. Sample Origin	2. Date Sampled	4. Requestor's Name	6. CACN/COA	7. Cost Center
702-AZ 5-25-06	~~06/10/05~~	Andrew M. Templeton	502087/EA60	7T200

Customer/Project Code	3. Submitted By	5. Requestor's Phone/MSIN/FAX
	Andrew M. Templeton	373-5589 S5-07 372-3106

8. Customer ID No	9. Laboratory Sample No.	10. Volume of Sample	11. Matrix of Sample	12. Requested Analyses	13. Expected Range
702-AZ-1			S	PLM, SEM w/EDS, and X-ray Diffraction.	Unknown
			S	pH, Bacteria/Fungus	Unknown
			S	GEA, pH	Unknown
~~702-AZ-1A~~			S	~~Bacteria, TSA~~ DA 5-25-06	Unknown
~~702-AZ-1B~~			S	~~Bacteria, SAB~~ DA 5-25-06	Unkwown
702-AZ-2			S	PLM, SEM w/EDS, X-ray Diff., GEA, pH.	Unkwown
702-AZ-2A			S	Bacteria, TSA	Unkwown
702-AZ-2B			S	Fungi, SAB	Unkwown
702-AZ-2C			S	Bacteria, TSA	Unkwown
702-AZ-2D			S	Fungi, SAB	Unkwown
702-AZ-2E			S	Bacteria, TSA	Unkwown
702-AZ-2F			S	Fungi, SAB	Unkwown
702-AZ-TSA-BLK			S	Bacteria, TSA	Unknown
-SAB-BLK			S	Fungi, SAB	↓
-TSA-FBLK			S	Bacteria, TSA	
-SAB-FBLK			S	Fungi, SAB	
-TSA-TRPBLK			S	Bacteria	
-SAB-TRPBLK			S	Fungi	
				Will verify Sample #s upon opening RS 5/25/06	

14. Sample Disposition
- ☐ Return to Customer
- ☐ Samples found to contain PCBs will be returned to the customer
- ☒ Dispose of per facility procedures with applied charges for analyses and disposal

Sample(s) Dose Rate at Contact

HPT Signature

15. QC Required ☒ Per 222-S Laboratory Quality Assurance Plan (HNF-SD-CP-QAPP-016)

☐ Other (list reference document or attach)

16. Special Instructions (Special Storage Requirements, Reporting format, holding times, etc.)
See RPP-PLAN-28509

17. Requested Turnaround Time
☐ 2 Weeks ☐ 4 Weeks ☐ Other 50 days

18. Sample Received By: RS Stahl Date 5/25/06 Time 1500

19. Chain of Custody
DA 5-25-06 ○ No ◉ Yes Number: 102977

A-6002-365 (03/02)

RWP
WTO-022-REV 1

WORK ORDER
WFO-WO-05-000646

C KEARNEY	NCO			
M BUSSELMAN	NCO			
R D GUSTAVSON	ENG			
W L ADAMS	IH			
J S TOLE	IH			
J J TOON	HPT			
D D ANDERSON	↓			
R CHANNEL				
D JORGENSON	PLANNER			
S R CHAPMAN	PIC	3-3770	308-7806	

Jim - The Agar plates are in Ref. # 1 Cm 2 SA. If need 845-3672 (C) 373-1972 (O) Jim

Table 7. Sample Collection.

Item	Sample Number	Type/Sample Container	Analysis	Location
Crystalline Material				
1	702-AZ-1	Bulk/8- or 16-oz. tared, sterile wide-mouth jar	SEM, PLM, XRD, GEA, pH, bacteria, fungus	A train, below heater
2	702-AZ-1A	Laboratory plate counts	Bacteria, TSA	N/A
3	702-AZ-1B	Laboratory plate counts	Fungi, SAB	N/A
Floor Stain Material				
4	702-AZ-2	Bulk/8- or 16-oz. tared, sterile wide-mouth jar	SEM, PLM, XRD, GEA, pH	A train, on floor below heater
5	702-AZ-2A	RODAC plate w/TSA	Bacteria, TSA	A train, on floor below heater
6	702-AZ-2B	RODAC plate w/SAB	Fungi, SAB	A train, on floor below heater
7	702-AZ-2C	RODAC plate w/TSA	Bacteria, TSA	A train, on floor below heater
8	702-AZ-2D	RODAC plate w/SAB	Fungi, SAB	A train, on floor below heater
9	702-AZ-2E	RODAC plate w/TSA	Bacteria, TSA	A train, on floor below heater
10	702-AZ-2F	RODAC plate w/SAB	Fungi, SAB	A train, on floor below heater
Blanks				
11	702-AZ-TSA-BLK	RODAC plate w/TSA blank unopened	Bacteria, TSA	N/A
12	702-AZ-SAB-BLK	RODAC plate w/SAB, blank unopened	Fungi, SAB	N/A
13	702-AZ-TSA-FBLK	RODAC plate w/TSA, field blank	Bacteria, TSA	A train, on floor, clean area
14	702-AZ-SAB-FBLK	RODAC plate w/SAB, field blank	Fungi, SAB	A train, on floor, clean area
15	702-AZ-TSA-TRPBLK	Petri plate/PSB w/TSA trip blank	Bacteria	N/A
16	702-AZ-SAB-TRPBLK	Petri plate/PSB w/SAB trip blank	Fungi	N/A

GEA = gamma energy analysis
PLM = polarized light microscopy
SEM = scanning electron microscopy
XRD = X-ray diffraction
TSA = trypticase soy agar
SAB = Sabouraud dextrose agar

4.4.1.2 Crystalline and Floor Stain Material 222-S Laboratory Analyses

A known mass of the samples (crystalline and floor stain) collected will be subjected to pH, using the procedure LA-212-105, "pH Determination of Solid Wastes," method. The material will also be analyzed for PCBs using LA-523-141, "Screening Procedure for Polychlorinated Biphenyls." A gamma energy analyses will be performed using the procedure LA-508-165, "Gamma Energy Analysis - The Genie 2K System." For quality control parameters see Table 8.

CH2M HILL DOCUMENT RELEASE FORM

(1) Document Number: RPP-PLAN-28509	(2) Revision Number: 0	(3) Effective Date: April 2006	
(4) Document Type: ☐ Digital Image ☒ Hard copy ☐ PDF ☐ Video	(a) Number of pages (including the DRF) or number of digital images: 21		
(5) Release Type: ☒ New ☐ Cancel	☐ Page Change	☐ Complete Revision	
(6) Document Title: Sampling and Analysis Plan for Building 241 702-AZ A Train			
(7) Change/Release Description: N/A			
(8) Change Justification: N/A			

(9) Associated Structure, System, and Component (SSC) and Building Number:	(a) Structure Location: N/A	(c) Building Number: N/A	
	(b) System Designator: N/A	(d) Equipment ID Number (EIN): N/A	

(10) Impacted Documents:	(a) Document Type	(b) Document Number	(c) Document Revision
	N/A		

(11) Approvals:

(a) Author (Print/Sign): J. B. Duncan	J B Duncan	Date: 4/24/06
(b) Responsible Manager (Print/Sign): C. M. Seidel	Cary M Seidel	Date: 4/24/2006
(c) Reviewer (Optional, Print/Sign): J. M. Frye	Jana M Frye	Date: 4/24/06
(d) Reviewer (Optional, Print/Sign): See page 2		Date:

(12) Distribution:

(a) Name	(b) MSIN	(a) Name	(b) MSIN
W. L. Adams	S5-12	C. M. Seidel	T6-14
S. G. Barrett	S5-07	A. M. Templeton	S5-07
J. B. Duncan	T6-50		
T. L. Faust	T6-03		
L. A. Flowers	S5-12		
J. M. Frye	T6-07		
R. D. Gustavson	S5-25		

Release Stamp: APR 24 2006 DATE: STA: 15 HANFORD RELEASE ID: 65

(13) Clearance	(a) Cleared for Public Release	(b) Restricted Information?	(c) Restriction Type:
	☒ Yes ☐ No	☐ Yes ☒ No	

(14) Clearance Review (Print/Sign): T. D. Aardal / Jane Aardal Date: 4/24/2006

A-6003-881 (05/05)

CH2M HILL DOCUMENT RELEASE FORM (Continued)

(1) Document Number: RPP-PLAN-28509	(2) Revision Number: 0	(3) Effective Date: 4/2006

(11) Approvals: (Continued)	
(c) Environmental Compliance (Print/Sign) T. L. Faust SRTaust	Date 4/24/06
(d) Industrial Hygiene (Print/Sign): W. L. Adams W L Adams	Date 4/20/06
(e) Project Maintenance and Engineering (Print/Sign): A. M. Templeton	Date 4/20/06
(f) RADCON (Print/Sign): S. G. Barrett	Date 4/20/06
(g) Safety (Print/Sign) L. A. Flowers	Date 4/20/06
(h) System Engineer (Print/Sign) R. D. Gustavson RD Gust	Date 4/20/06

CH2MHILL

JOB SPECIFIC JOB HAZARD ANALYSIS

JHA NO: WFO-WO-05-000646

TITLE: 702-AZ Sampling under Filter Housing

DESCRIPTION AND LOCATION OF WORK: Perform sampling and analysis of the unknown substance on the floor under the Filter Housing and the control panel beneath and adjacent to the Filter Housing on the A-Train filter side at 702-AZ.

ASSUMPTIONS/ANALYSIS: Follow task specific RWP

JTA/JHA SECTIONS

GENERAL HAZARDS:

HAZARDS	CONTROL	METHOD OF IMPLEMENTATION
Fall (Slip, Trip)	▪ Worker awareness briefing ▪ Secure hoses, cords, lines portable equipment ▪ Material control before /during activity. ▪ Housekeeping before/during activity ▪ Sturdy work boots	Controls within the qualification or training of the worker that are often used do not need to be discussed in the work instructions.
Awkward position of shoulders, knees, back, and neck	▪ Minimize duration ▪ Warm up and stretch prior to the work activity	Controls within the qualification or training of the worker that are often used do not need to be discussed in the work instructions.
Spread of potential radioactive contamination	▪ ALARACT 4 ▪ ALARACT 16	Packaging and Transportation Waste Potentially Contaminated Ventilation System
Respiratory Protection	▪ SCBA	Controls within the qualification or training of the worker that are often used do not need to be discussed in the work instructions.
	▪	

TASK 1: Prepare area for sampling

HAZARDS	CONTROL	METHOD OF IMPLEMENTATION
Spread radioactive contamination	▪ PPE ▪ Ground Cover	Controls within the qualification or training of the worker that are often used do not need to be discussed in the work instructions.
Noise (>85 dBA 8hr. TWA)	▪ Switch fans to B-train or wear hearing protection ▪	Controls within the qualification or training of the worker but are seldom used and are applicable to the entire work activity should be placed in the precautions as a reminder that the hazard exists and the workers are expected to take the appropriate actions.

TASK 2: Perform baseline survey		
HAZARDS	**CONTROL**	**METHOD OF IMPLEMENTATION**
Spread of contamination	• PPE • Clean area Survey only • Building Ventilation on • Door closed	Controls within the qualification or training of the worker that are often used do not need to be discussed in the work instructions.
Air Borne Radioactivity	• Air Sampler	Controls within the qualification or training of the worker that are often used do not need to be discussed in the work instructions.

TASK 3: Monitor for organics		
HAZARDS	**CONTROL**	**METHOD OF IMPLEMENTATION**
Chemicals /VOC	• IH monitoring-area (Before and after)	Controls within the qualification or training of the worker that are often used do not need to be discussed in the work instructions.

TASK 4: Take sample of substance on floor		
HAZARDS	**CONTROL**	**METHOD OF IMPLEMENTATION**
	•	
Airborne	• Building contamination • Ensure building ventilation system is on	Controls within the qualification or training of the worker that are often used do not need to be discussed in the work instructions.
Spread of contamination	• Ground cover • PPE – Tyvek suit, two pairs of gloves • Wrap container outer • Collection tools	Controls within the qualification or training of the worker that are often used do not need to be discussed in the work instructions.
Contact w/ substance	• Two pair gloves, outer pair Nitrile • Tyvek suit for sample takers • Knee pads if desired	Controls within the qualification or training of the worker but are seldom used and are applicable to the entire work activity should be placed in the precautions as a reminder that the hazard exists and the workers are expected to take the appropriate actions.
	•	

TASK 5: Take sample of material on control panel (adjacent to filter housing)		
HAZARDS	**CONTROL**	**METHOD OF IMPLEMENTATION**
	•	
Airborne	▪ Ensure building ventilation system is on	Controls within the qualification or training of the worker that are often used do not need to be discussed in the work instructions.
Spread of contamination	▪ Ground cover ▪ PPE – Tyvek suit, two pairs of gloves ▪ Wrap container outer ▪ Collection tools ▪ Re-tape cut opening in plastic ▪	Controls within the qualification or training of the worker that are often used do not need to be discussed in the work instructions.
	▪	
Contact w/ substance	▪ Two pair gloves, outer pair Nitrile ▪ Tyvek suit for sample takers	Controls within the qualification or training of the worker but are seldom used and are applicable to the entire work activity should be placed in the precautions as a reminder that the hazard exists and the workers are expected to take the appropriate actions.
Sharp Objects	▪ Sheathe when not in use ▪ Cut materials such that cutting motion is away from the body vs. toward the body to prevent injury in case of slipping.	Controls within the qualification or training of the worker that are often used do not need to be discussed in the work instructions.

TASK 6: Prepare for transport (chain of custody)		
HAZARDS	**CONTROL**	**METHOD OF IMPLEMENTATION**
Spread of contamination	▪ Remove wrapping ▪ DECON ▪ Survey – Rad/smear ▪ Package for transport ▪ Label package	Controls within the qualification or training of the worker that are often used do not need to be discussed in the work instructions.

TASK 7: Clean up area		
HAZARDS	**CONTROL**	**METHOD OF IMPLEMENTATION**
Spread of contamination	• Area Sample • Post job Survey • Down post •	Controls within the qualification or training of the worker that are often used do not need to be discussed in the work instructions.

RADIOLOGICAL WORK PERMIT

Contractor:	RWP Number
CH2M HILL Hanford Group, Inc.	WTO-0022 Rev. 1

General: [ ] Job Specific: [X]	Start Date	End Date	Technical Document Number(s):	AMW Number
	04/20/2006	10/20/2006	WFO-WO-05-000646	AW-0953

Job Location:	Brief Job Description and Type of Area:
702AZ	Perform sampling and packaging of radioactive substances that have dripped out of the A-train ventilation ductwork. RBA/CA/HCA/ARA

Radiation Emitted	Estimated Dose Rates	Estimated Contamination Levels	Job Dose Estimate	Risk Value
[X] Alpha [X] Beta [X] Gamma [ ] Neutrons	General Area: < 0.5 mrem/hr Maximum Contact: < 5 mrem/hr Radiological Worker Training Req. [ ] I [X] II	Beta/Gamma: 125,000 dpm/100 cm² Alpha: <20 dpm/100 cm²	<200 person-mrem	Medium

Internal Dosimetry Requirements: [ ] 3 minute WBC [X] 10 minute WBC [ ] Urinalysis/Isotopes [ ] Chest Count

	DOSIMETRY
X	HSD-TLD
	HCND-TLD
	Pocket Dosimeter
	Electronic Dosimeter
	Finger Rings
	Time Keeping
X	Entry Control System
X	Brick
	7-Day ACES Auth.

	PERSONAL PROTECTIVE EQUIPMENT		
SI6	Coveralls		Shoe Covers
	Waterproof Suit	SI6	Canvas Boots
	Goretex Suit	SI6	Rubber Overshoes
	Cap		Rubber Boots
SI6	Hood		Face Shield
SI6	Surgeon's Gloves	SI6	Full Face Respirator
SI6	Leather Gloves		PAPR
SI6	Canvas & Surgeon's Gloves		Supplied Air Respirator
SI6	Waterproof Gloves		SCBA
SI6	Arm Sleeves		Undressing Assistance

	SURVEY REQUIREMENTS
SI8	Grab Air Sampling Required
SI8	Lapel Air Sampling Required
SI7	Auto. Survey Device
SI7	Self Survey (if qualified)
SI7	HPT Exit Survey Required

	HPT COVERAGE
SI4	Continuous
SI4	Intermittent

SPECIAL INSTRUCTIONS

1. VOID LIMITS

- HCA (accessed by partial body entries): Removable contamination ≥ 39 mrad/hr/100cm² beta-gamma (open window, uncorrected, on contact) or ≥ 420 dpm/100 cm² alpha.
- CA: Removable contamination ≥ 100,000 dpm/100cm² beta-gamma or ≥ 420 dpm/100 cm² alpha.
- Extremity Dose Rate: ≥ 1,000 mrad/hr (open window, uncorrected).

2. SAFE CONDITION LEVELS

- Extremity Dose Rate: ≥ 800 mrad/hr (open window, uncorrected)

3. ACTION LEVELS

- Extremity Dose Rate: ≥ 200 mrad/hr (open window, uncorrected) apply one or more of the following:
  1. Minimize handling/exposure time.
  2. Use tongs or extension device to maintain distance from source.
  3. Wear leaded gloves.
  4. Apply rubber matting as process shielding.

4. HPT COVERAGE

- Continuous Coverage required during sample collection and sample handling.
- Intermittent Coverage required for all other work.

5. DOSIMETRY/ACES

- Personnel assigned hands on work will use ACES Permit Roles WW1.
- For partial body entry from CA to HCA use ACES Permit Role WW2.
- Escorted personnel use role GWE or AE2 (must be escorted by person qualified as WW1).

6. PERSONAL PROTECTIVE EQUIPMENT

- Single set of PPE required for entry into CA.
- Single set of PPE and APR with particulate filter required for entry into ARA.
- Leather gloves, additional pair(s) of surgeon's gloves (neoprene or nitrile), waterproof gloves, or approved electrician gloves may be substituted for canvas gloves.
- Single set of PPE, APR with particulate filter and additional pair of arm sleeves and gloves (outer pair nitrile) required when only hands and arms will enter HCA.

7. SURVEY

- Beta gamma and alpha surveys required during course of work.
- Alpha surveys of personnel and equipment required if alpha contamination was detected during the course of work.
- Beta gamma and alpha surveys required when performing surveys to verify the adequacy of engineering controls (i.e. sleeving).
- Perform whole body self survey upon exit from CA. Perform a follow-up survey in an automated survey device.
- Survey requirements after partial body (hands and arms) entries into HCA:
  - Perform a survey of hands, arms, chest and face each time hands and arms are removed from an HCA or CA.
  - If background radiation levels are too high to perform survey at HCA boundary, perform a preliminary survey at the boundary to confirm contamination levels are < CA Void Limits. Remove outer gloves at boundary and move to a low background area for final survey.

8. AIR SAMPLING

- Perform Work place grab air sampling in work area to verify appropriate level of respiratory protection and to verify the effectiveness of engineering controls (Sleeving).
- Lapel air samplers required for ARA entry. Immediately exit area if lapel sampler stops.

9. SPECIAL PREJOB BRIEFING

- NA

10. OTHER

- Samples will be transported using routine radioactive shipping report (blue card). Ensure samples are packaged and labeled as specified on the applicable blue card.

RWP Prepared By: J. Marks/S. Barrett			Phone: 373-5372	HPT Phone: 373-2526	
Line Mgt.	Print: Sign:			Phone:	Date:
RC Sup. Initial:	RC Dir.	Print: Sign:		Phone:	Date:
Acknowledged by:	AJRG Chair (High Risk)	Print: Sign:	Date:	Other: Print: Sign:	Date:
RWP Field Change Approvals:	Line Mgt.	Print: Sign:	Date:	RC Mgt. Print: Sign:	Date:

A-5003-902 (01/06)

RPP-RPT-31293, Rev. 0

RADIOLOGICAL WORK PERMIT

Contractor:	RWP Number
CH2M HILL Hanford Group, Inc.	WTO-0022

General: [ ] Job Specific: [X]	Start Date	End Date	Technical Document Number(s):	AMW Number
	03/27/2006	09/26/2007	WFO-WO-05-000646	AW-0953

Job Location:	Brief Job Description and Type of Area:
702AZ	Perform sampling and packaging of radioactive substances that have dripped out of the A-train ventilation ductwork. RBA/CA/HCA

Radiation Emitted	Estimated Dose Rates	Estimated Contamination Levels	Job Dose Estimate	Risk Value
[X] Alpha	General Area: < 0.5 mrem/hr	Beta/Gamma: 125,000 dpm/100 cm²	<200 person-mrem	Medium
[X] Beta	Maximum Contact: < 5 mrem/hr	Alpha: <20 dpm/100 cm²		
[X] Gamma [ ] Neutrons	Radiological Worker Training Req. [ ] I [X] II	Internal Dosimetry Requirements: [ ] 3 minute WBC [X] 10 minute WBC [ ] Urinalysis/Isotopes [ ] Chest Count		

DOSIMETRY		PERSONAL PROTECTIVE EQUIPMENT				SURVEY REQUIREMENTS	
X	HSD-TLD	SI8	Coveralls		Shoe Covers	SI8	Grab Air Sampling Required
	HCND-TLD		Waterproof Suit	SI6	Canvas Boots		Lapel Air Sampling Required
	Pocket Dosimeter		Goretex Suit	SI6	Rubber Overshoes	SI7	Auto. Survey Device
	Electronic Dosimeter		Cap		Rubber Boots	SI7	Self Survey (if qualified)
	Finger Rings	SI8	Hood		Face Shield	SI7	HPT Exit Survey Required
	Time Keeping	SI6	Surgeon's Gloves		Full Face Respirator		
X	Entry Control System	SI6	Leather Gloves		PAPR	HPT COVERAGE	
X	Brick	SI6	Canvas & Surgeon's Gloves		Supplied Air Respirator	SI4	Continuous
	7-Day ACES Auth.	SI6	Waterproof Gloves		SCBA	SI4	Intermittent
		SI6	Arm Sleeves		Undressing Assistance		

SPECIAL INSTRUCTIONS

1. VOID LIMITS

- HCA (accessed by partial body entries): Removable contamination ≥ 39 mrad/hr/100cm² beta-gamma (open window, uncorrected, on contact) or ≥ 420 dpm/100 cm² alpha.
- CA: Removable contamination ≥ 100,000 dpm/100cm² beta-gamma or ≥ 420 dpm/100 cm² alpha.
- **Extremity Dose Rate:** ≥ 1,000 mrad/hr (open window, uncorrected).

2. SAFE CONDITION LEVELS

- **Extremity Dose Rate:** ≥ 800 mrad/hr (open window, uncorrected).

3. ACTION LEVELS

- **Extremity Dose Rate:** ≥ 200 mrad/hr (open window, uncorrected) apply one or more of the following:
  1. Minimize handling/exposure time.
  2. Use tongs or extension device to maintain distance from source.
  3. Wear leaded gloves.
  4. Apply rubber matting as process shielding.

4. HPT COVERAGE

- Continuous Coverage required during sample collection and sample handling.
- Intermittent Coverage required for all other work.

5. DOSIMETRY/ACES

- Personnel assigned hands on work will use ACES Permit Roles WW1.
- For partial body entry from CA to HCA use ACES Permit Role WW2.
- Escorted personnel use role GWE or AE2 (must be escorted by person qualified as WW1).

6. PERSONAL PROTECTIVE EQUIPMENT

- Single set of PPE required for entry into CA.
- Single set of PPE and an additional pair of arm sleeves and gloves required when only hands and arms will enter a HCA.
- Leather gloves, additional pair(s) of surgeon's gloves (neoprene or nitrile), waterproof gloves, or approved electrician gloves may be substituted for canvas gloves.

7. SURVEY

- Beta gamma and alpha surveys required during course of work.
- Alpha surveys of personnel and equipment required if alpha contamination was detected during the course of work.
- Beta gamma and alpha surveys required when performing surveys to verify the adequacy of engineering controls (i.e. sleeving).
- Perform whole body self survey upon exit from CA. Perform a follow-up survey in an automated survey device.

SURVEY (Continued)

- Survey requirements after partial body (hands and arms) entries into HCA:
  - Perform a survey of hands, arms, chest and face each time hands and arms are removed from an HCA or CA.
  - If background radiation levels are too high to perform survey at HCA boundary, perform a preliminary survey at the boundary to confirm contamination levels are < CA Void Limits. Remove outer gloves at boundary and move to a low background area for final survey.

8. AIR SAMPLING

- Grab Air Sample required during sample collection to verify posting.

9. SPECIAL PREJOB BRIEFING

- NA

10. OTHER

- Post, or otherwise control, the area surrounding localized HCA(s) as a CA to allow for whole body personnel access to the CA. Personnel access to the HCA(s) will be via partial body entry. Upon completion of sampling activities, survey area and repost for existing conditions.
- Samples will be transported using routine radioactive shipping report (blue card). Ensure samples are packaged and labeled as specified on the applicable blue card.

RWP Prepared By: J. Marks/S. Barrett			Phone: 373-5372		HPT Phone: 373-2526		
Line Mgt.	Print: S R Chapman		Phone: 373-3770			Date: 3/20/2006	
	Sign: S R Chapman						
RC Sup. Initial: D. Hogen DH	RC Dir.	Print: Curtis Bean	Phone: 373-5480			Date: 3/20/2006	
		Sign: Curtis Bean					
Acknowledged by:	AJRG Chair (High Risk)	Print: NA	Date:	Other:	Print: NA		Date:
		Sign:			Sign:		
RWP Field Change Approvals:	Line Mgt.	Print:	Date:	RC Mgt.	Print:		Date:
		Sign:			Sign:		

A-5003-902 (01/06)

Figure 1. Unknown Crystalline Structure.

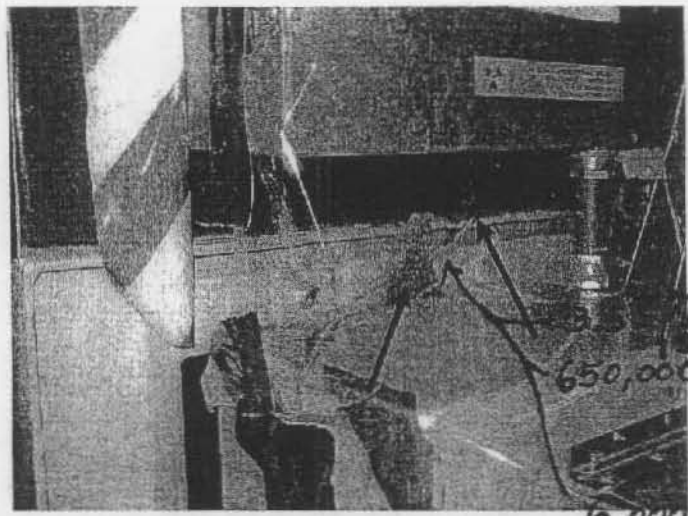
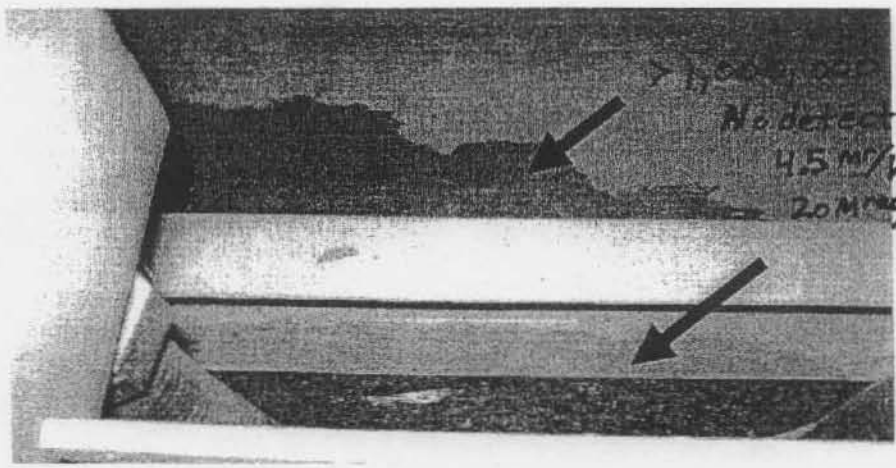


Figure 2 shows an area with material on the floor and some staining. The area of interest is indicated by the bottom arrow. The area indicated by the lower arrow may possibly be the initial "leak" and the upper arrow indicates that material that seeped under the I-beam.

Figure 2. Unknown Floor Stain.

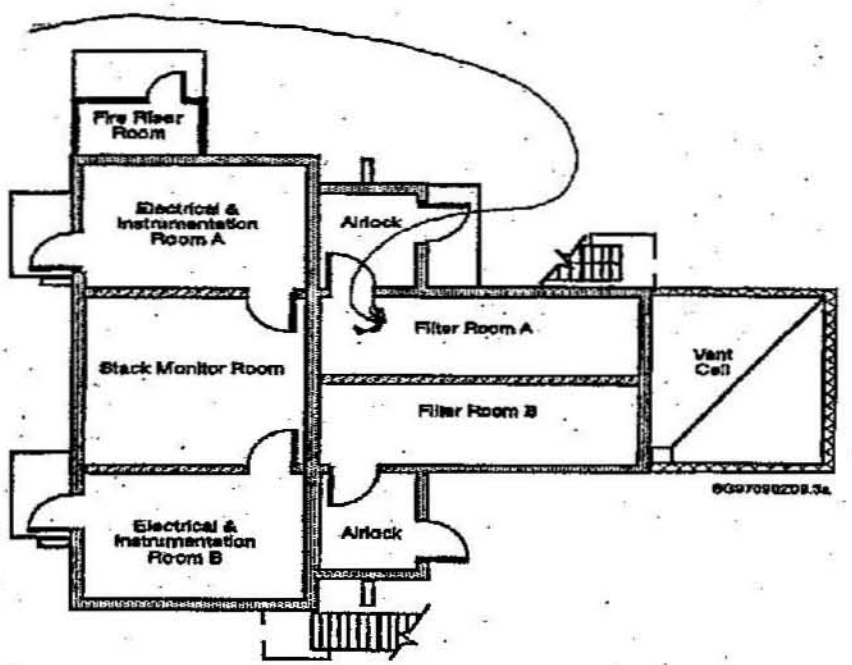


1.3 Physical Description

The 702-AZ ventilation system services the vapor space for four tanks, namely tanks 241-AY-101, 241-AY-102, 241-AZ-101 and 241-AZ-102. The 702-AZ ventilation system includes three buildings: a ventilation building, a generator/service building, and a control building. It also includes four recirculation/cooling cells. The 702-AZ ventilation system provides a maximum 28.3 m^3/min (1000 scfm) flow from the four

The 702-AZ ventilation system provides a maximum 28.3 m^3/min (1000 scfm) flow from the four tanks (2.83 m^3/min [100 scfm] nominal from each tank). The structures are of independent construction. The area of concern is Filter Room A located in Building 702-AZ as shown in Figure 3.

Figure 3. 702-AZ Ventilation Building.



The 702-AZ ventilation system is sized such that a negative differential pressure with respect to atmospheric pressure can be maintained under normal operating conditions to contain radioactive and non-radioactive gases, vapors, suspended droplets, and airborne particulates within the system until appropriately treated and discharged.

Exhaust air from the primary tank system is treated to minimize releases of radioactive and hazardous effluents to the atmosphere. The filtered airstream is continuously sampled for gross beta and gamma. Instruments record and alarm before allowable radioactive release limits are exceeded.

Water vapor removed from the tanks is condensed, and the condensate is returned to AY or AZ high heat tanks.

1.4 List of Contaminants of Potential Concern

Contaminates of potential concern are:

- Biological
- Radiological
- Hazardous chemicals
- Polychlorinated biphenyls

More specifically a list of radionuclides and non-radionuclides was generated in the Tank Waste Remediation System Basis for Interim Operation (HNF-SD-WM-BIO-001 REV 0-D) for the 702-AZ exhaust train. Although this BIO has been superseded, the follow on safety authorization documents do not discuss the tank chemistry as does the BIO. For the chemistry references, the BIO is included in this Sampling and Analysis Plan (SAP). Tables 1 through 3 show the generated radionuclides and chemicals.

Table 1. Tank Waste Liquid Analyte Concentrations [a]

Concentration (g/L) [a]	
Analyte	**Double Shell Tank Liquids**
Ammonia (NH3)	7.1E+00
Antimony (Sb)	6.4E-03
Arsenic (As)	1.1E-02
Barium (Ba)	3.3E-02
Beryllium (Be)	3.8E-03
Cadmium (Cd)	7.0E-02
Calcium (Ca)	1.3E+00
Cerium (Ce)	5.8E-02
Cobalt (Co)	8.8E-03
Cyanide (CN)	9.1E-02
Lanthanum (La)	1.0E+00
Mercury (Hg)	2.4E-04
Neodymium (Nd)	5.6E-03
Selenium (Se)	2.8E-01
Sodium Hydroxide (NaOH)	2.1E+02
Tellurium (Te)	2.7E-03
Thallium (Tl)	3.7E-02
Total organic carbon (TOPC)	4.0E+01
Uranium (U)	1.1E+01
Vanadium (V)	2.1E-01

[a] The information in this table is from Van Keuren, J.C., and J.S. Davis, 1996, Toxic Chemical Considerations for Tank Farm Releases, WHC-SD-WM-SARR-011, Rev 2, Westinghouse Hanford Company, Richland, Washington.

Table 2. Headspace Gas Composite Concentrations [a]

Worst Case Composite		
Gas	**Concentration (ppmv)**	**Concentration (mg/m^3) [c,b]**
Acetonitrile	13	21.8
Ammonia	61,300	40,000
Benzene	0.4	1.3
1,3-Butadiene	0.1	0.19
Butanol	58	164
Dodecane	45	296
2-Hexanone	0.8	2.7
Methylene chloride	2	22
Nitrous Oxide	67,000	110,000
Propanenitrile	5	11
Tributyl phosphate	1	12
Tridecane	50	390

[a] The information in this table is from Van Keuren, J.C., and J.S. Davis, 1996, Toxic Chemical Considerations for Tank Farm Releases, WHC-SD-WM-SARR-011, Rev 2, Westinghouse Hanford Company, Richland, Washington.
[b] Based on worst case composites including slurry gas released.
[c] The conversion from ppmv to mg/m^3 assumes a temperature of 38 °C (110 ° F) and a pressure of 740 Torr (0.1 MPA).

Table 3. In-Tank Concentrations for 11 Radionuclides Aging Waste Facility Liquids [a]

Isotope	Bq/L
^{60}Co	7.71E+05
^{90}Sr	5.60E+09
^{90}Y	5.60E+09
^{137}Cs	8.87E+10
^{154}Eu	N/A
^{237}Np	9.20E+04
^{238}Pu	2.75E+03
^{239}Pu	1.20E+06
^{241}Pu	3.39E+05
^{241}Am	1.10E+06
^{244}Cm	1.10E+04

[a] Cowley, W.L., 1996, Development of Radiological Concentrations Unit Liter Doses for TWRS FSAR Radiological Consequence Calculations, WHC-SD-WM-SARR-037, Rev 0, Westinghouse Hanford Company, Richland, Washington.

1.5 Problem Definition

A health physics technician (HPT) while doing weekly routines in the 702-AZ Building, discovered that an HCA sign was posted across the walkway of the lower 'A' train side of the filter banks. Further investigation and smear surveys of the area enabled the re-opening of the walkway and down posting back to the area of the stain and the crystalline mass. The observed 'crystalline' like substance, yellowish/brown in color, was growing above the heater control panel just below the heater. This is from an on-going leak from around the heater. There is also a large pool of a thick substance, like peanut butter mixed with oil, on the floor directly below the duct work where the heater is located. Both the crystal and the substance on the floor are contaminated to HCA/RA levels.

This building also possibly has a fungus growing with-in the condensate system. Green and black material was observed in the seal pot during the plugging issue investigation. The analysis of the condensate is beyond the scope of this SAP. It is unknown if possible fungi exist in the constituents on the floor and heater control panel. The material needs to be appropriately characterized for both chemical and biological components so that the cleanup and decontamination of the facility can be achieved.

2.0 PROJECT ORGANIZATION and RESPONSIBILITIES

Table 4 lists the individuals who will be the contact points for the sampling and analysis effort.

Table 4. Points of Contact

Responsibility	Organization/ Function	Name/Phone
WFO Operations, point of contact	WFO Operations	Bill Parnell, 373-5090
WFO Engineering point of contacts	WFO Engineering	Andrew Templeton, 373-5589 Bob Gustavson, 373-2615
WFO Planning point of contact	WFO Planning	Dave Jorgensen, 373-6065
Analysis of Biological determinations	Microbiology, PNNL	Fred Brockman, 376-1252 Shu-Mei Li, 376-4023
222-S Laboratory point of contact (off hours)	Analytical Services	Laboratory Leader, 373-2435
222-S Laboratory point of contact Advanced Technologies and Laboratories International, Inc. (ATL)	Analytical Services	Heather Anastos, 373-4629
222-S Laboratory sample management	Sample Management Office, POC	John Prilucik ,373-3830
Laboratory Technical point of Contacts	Analytical Process Development, POC	Jim Duncan, 373-1972 Jann Frye, 376-8624
Samplers (Duratek)	Duratek Field Services, Northwest Operations	Marty Gardner, 372-8029 Jim Hogan, 373-7063

3.0 SAMPLING OBJECTIVES

Sampling will be directed to encompass the areas of biological, radionuclides, organic, and inorganic analyses. There will be two areas of analyses, the crystalline material and the brownish-black material indicated by the bottom arrow in Figure 2. Those samples, along with requisite blanks will comprise the sampling for 702AZ Train A.

The following tables indicate sample or sample location, analysis, and analytes for the particular analysis. The biological analyses (Table 5) will be performed with the support of PNNL. The surface microbiological analyses (floor stain) will be performed using RODAC[1] plates. The RODAC® plates that will be used for general microbial counts and population will contain trypticase soy agar (TSA). Those RODAC® plates used for fungi will contain Sabouraud dextrose agar (SAB). The agar plates will be returned to 222-S Laboratory incubated and a PNNL microbiologist will interpret the resulting growth. For the crystalline material, a known mass will be diluted in sterile phosphate buffer, serial dilutions will be made and a spread plate technique will be used to enumerate colony forming units at various dilutions to $1{:}10^5$.

Table 5. Biological Analysis

Sample	Analysis	Analyte
Crystalline Formation	Microbiological total population enumeration per unit mass.	Bacteria / Fungi
Floor Stain	Microbiological surface enumeration per unit area.	Bacteria / Fungi

Table 6 indicates the laboratory analyses to be performed. The table is divided into two sections; the primary analyses will be carried out on the samples from 702AZ. The secondary (optional) analyses may or may not be performed. The driver for the secondary analyses will be the results of the microbiological testing and the primary analyses, and the decision by Tank Farms management as to the necessity to continue analyses.

Table 6. Analyses of Crystalline Material and Floor Stain

Primary Analyses	
Analysis	**Analyte(s)**
GEA	Radionuclide speciation (will detail what radioactive isotopes are present in the samples)
Scanning Electron Microscopy with EDS	Morphology, crystal identification and individual constituents such as iron, etc.
Polarized Light Microscopy	Optical microscopy to gather crystalline phase information

[1] RODAC is a registered trademark of B-D Laboratories, West Chester, Pennsylvania

X-ray Diffraction	Identification of compounds associated with the crystalline mass
Solid pH	pH of the samples.
PCB Screen	Necessary for the lab to properly dispose of waste from analyses unless there is prior knowledge of sample PCB content.
Secondary Analyses	
Water Digest followed by Ion Chromatography	Anions(fluoride, chloride, nitrite, nitrate, bromide, phosphate, sulfate, formate, acetate, glycolate, oxalate) in the water soluble fraction of the solid samples
Acid Digest /ICP	Metal cations in the acid digested sample of the solids(most metals except mercury)
TIC/TOC	Total inorganic carbon and total organic carbon
Organic Extract/ GC-MS analysis	Identification and quantification of organic soluble organic compounds present in the solids.

4.0 SAMPLING AND HANDLING METHODS AND REQUIREMENTS

Personnel from Duratek will take the identified samples in accordance with approved sampling procedures or this sampling plan. The samples will be transferred to the laboratory by the sampling team where the samples will be analyzed for the constituents/parameters listed in Table 5 and the primary analytes in Table 6.

4.1 Sampling Locations

The sampling locations will be the crystalline material, and brownish-black material within the 702-AZ building.

4.2 Sampling Equipment and Containers

Sampling equipment and containers will be supplied by the 222-S laboratory and the PNNL microbiological laboratory.

4.3 Sample Collection

Duratek samplers will perform all sampling. The crystalline material will be separated from the exhaust ductwork in its natural state and placed into the sample containers. No liquid will be applied to the material. ~~Microbiological sampling will be carried out by pressing RODAC® plates containing TSA and SAB onto the surface of the floor material.~~ For the crystalline material, a known mass will be diluted in sterile phosphate buffered saline (PBS), serial dilutions will be made and a spread plate technique will be used to enumerate colony forming units at various dilutions to $1:10^5$.

The brownish-black material will be sampled in the vicinity of the area indicated by the lower arrow in Figure 2. A visually representative area will be selected and a sample will be taken in a 10 cm by 10 cm area. A scraper (plastic putty knife) will likely be required to collect a representative sample. For the microbiological surface samples, RODAC® plates containing TSA and SAB will be pressed on the surface of the stain.

Table 7 addresses the sample collection.

Table 7. Sample Collection

Item	Sample Number	Type/Sample Container	Analysis	Location
Crystalline Material				
1	702-AZ-1	Bulk/8 or 16 oz tared sterile wide mouth jar	SEM, PLM, X-Ray Diffraction, GEA, pH	A-Train, below heater
2	702-AZ-1A	Laboratory Plate Counts	Bacteria, TSA	A-Train, below heater
3	702-AZ-1B	Laboratory Plate Counts	Fungi, SAB	A-Train, below heater
Floor Stain Material				
4	702-AZ-2	Bulk/8 or 16 oz tared sterile wide mouth jar	SEM, PLM, X-Ray Diffraction, GEA, pH	A-Train, on floor below heater
5	702-AZ-2A	RODAC® Plate w/TSA	Bacteria	A-Train, on floor below heater
6	702-AZ-2B	RODAC® Plate w/SAB	Fungi	A-Train, on floor below heater
Blanks				
7	702-AZ-TSA-BLK	RODAC® Plate w/TSA Blank unopened	Bacteria	N/A
8	702-AZ-SAB-BLK	RODAC® Plate w/SAB, Blank unopened	Fungi	N/A
9	702-AZ-TSA-FBLK	RODAC® Plate w/TSA, Field Blank	Bacteria	A-Train, on floor, clean area
10	702-AZ-SAB-FBLK	RODAC® Plate w/SAB, Field Blank	Fungi	A-Train, on floor, clean area
11	702-AZ-TSA-TRPBLK	Petri Plate/PSB w/TSA Trip Blank	Bacteria	N/A
12	702-AZ-SAB-TRPBLK	Petri Plate/PSB w/SAB Trip Blank	Fungi	N/A

4.4 QA/QC Samples

4.4.1 Primary Analyses

Microbiological Analyses

For the crystalline material, microbiological sampling will consist of using a known mass and initially diluting 1:10 with sterile phosphate buffered saline (PBS). From this initial dilution, a series of dilutions will be made to achieve up to a dilution of $1:10^5$. From each dilution, an aliquot will be spread onto agar plates (Petri dishes containing either TSA for bacterial enumeration or SAB for fungal enumeration) in three replicates each. Trip blanks (to ensure sterility of the PBS) will be run prior to and after completion of the spread plates.

For the floor stain material, RODAC® plates of each agar type will be used for surface contact determination of bacterial and fungal populations. RODAC® plates of each agar type will be pressed against the floor stain and a second set of RODAC® plates will be pressed against the concrete inside the building in an area that appears "clean", these will act as field blanks.

Crystalline and Floor Stain Material 222-S Laboratory Analyses

A known mass of the samples (crystalline and floor stain) collected will be subjected to pH, using the procedure *pH Determination Of Solid Wastes*, method (LA-212-105). The material will also be analyzed for PCBs using Screening Procedure For Polychlorinated Biphenyls (LA-523-141). A gamma energy analyses will be performed using the procedure *Gamma Energy Analysis - The Genie 2K System* (LA-508-165). For quality control parameters see Table 8.

The crystalline and floor stain material will also be analyzed using 1) scanning electron microscopy with electron dispersive spectroscopy using the procedure *Sample Preparation and Operating Procedure for Scanning Electron Microscopes* (LT-161-100), 2) polarized light microscopy using procedure *Polarized Light Microscopy* (LT-519-107), and 3) X-ray diffraction (XRD) using the procedure *X-Ray Diffractometry* (LT-507-101).

4.4.2 Secondary Analyses

Should secondary analyses (Table 6) be deemed necessary, the *222-S Laboratory Quality Assurance Plan* (HNF-SD-CP-QAPP-016) specifies the quality control parameters for primary analytes. ATL personnel operate to *ATL Quality Assurance Project Plan for 222-S Laboratory* (ATL-MP-1011).

Table 8 is extracted from the QAPP for those analyses identified in Table 6.

Table 8. Quality Control Parameters for Primary Analytes

Analytes	Method	QC Acceptance Criteria		
		LCS % Recovery	Spike % Recovery	Duplicate/MSD RPD[1]
Al, Sb, As, Ba, Be, Cd, Cr, Co, Cu, Fe, Pb, Mn, Ni, Se, Ag, Sr, Tl, U, V, Zn	ICP/AES LA-505-158	80-120	75-125	≤20
F^-, NO_2^-, NO_3^-, NH_4^+	IC LA-533-107	80-120	75-125	≤20
OH^-	pH LA-212-105	±0.1 pH Units	NA	NA
PCBs	GC/ECD LA-523-141	70-130	70-130	≤30
Inorganic Carbon	TIC LA-342-100	80-120	75-125	≤20
Organic Carbon	TOC LA-342-100	80-120	75-125	≤20
^{60}Co, ^{137}Cs	GEA LA-508-165	80-120	NA	≤20
^{152}Eu, ^{154}Eu, ^{155}Eu, ^{125}Sb	GEA LA-508-165	NA	NA	≤20
^{129}I	GEA LA-508-165	80-120	NA	≤20

Notes:

ICP/AES	Inductively Coupled Plasma / Atomic Emission Spectroscopy
IC	Ion Chromatography
GC/ECD	Gas Chromatography / Electron Capture Detection
TIC	Total Inorganic Carbon
TOC	Total Organic Carbon
GEA	Gamma Energy Analysis

[1] If primary and duplicate results are available above detection limits, RPD will be based on these results.

4.5 Chain of Custody

Sampling personnel will manage the collected samples in accordance with approved procedures. The sampling team will be responsible for initiating and maintaining the chain-of-custody from the time of sampling until custody transfer at the analytical laboratory. The Chain of Custody will serve as the primary document for all analytical requests. Copies of the chain of custody documentation will be provided with the laboratory data reports. Form A 6002-990, Generator Knowledge Information, will be submitted to help the lab determine potential waste characteristics for disposal of unused samples after the final report is issued.

4.6 Field Logbook

A record of the sampling activities will be documented in a field logbook that is permanently bound, and has sequentially numbered pages. The field logbook entries will be made in accordance with approved procedures. The logbook will describe the general location of the sampling activity, type (matrix) of material sampled, sample method, sample source and specific location for each sample, sample number (corresponding to the sample label), weight of sample collected, date and time of sample collection, and any

problems encountered or deviations from this SAP. The logbook will also identify all the sampling and handling procedure numbers and titles used in conjunction with the sampling activity (i.e. taking the sample, equipment cleaning, handling and chain-of-custody, packaging and shipping, assigning sample numbers, etc.) Drawings, diagrams and photographs should be used when needed to clearly describe the sampling event. Each logbook entry will be signed and dated by the person making the logbook entry. Upon completion of the sampling project, a photocopy of the field logbook pages pertaining to the sampling activity will be included in the final sampling report.

Any problems encountered during sampling or major deviations from this SAP will be documented in the field logbook and communicated to the project manager as quickly as possible. Where a problem or deviation could affect the usability of the data, the sampling coordinator will contact the project manager and technical support personnel to determine the appropriate action to be taken (e.g., discontinue sampling, modify the sampling procedure, or continue sampling).

During the sampling campaign, any major deviations from this SAP will be reviewed and approved by the Engineering Point of Contact, the Laboratory Point of Contact and the WFO Planning Point of Contact. This SAP will be revised to reflect the changes and/or modifications by submittal of an addendum to the original document via e-mail, DSI, internal memo, or revision of the SAP.

4.7 Sample Handling, Labeling and Shipping

Following collection, samples will be packaged and shipped in accordance with approved procedures. Each sample will be identified and labeled with a unique sample number. Numbers will be assigned in accordance with approved procedures. The sample location and corresponding sample numbers will be documented in the field logbook.

4.8 Additional Samples

A material was encountered during the tie-in of the new line between AZ-702 and AZ-301. The material was off white and was the described as slime. A piece of the pipe containing the material was set aside in a RMA for subsequent sampling. This material will be delivered to the laboratory separate from the 702-AZ A-train sampling and will also be analyzed for the primary analyses listed in Tables 7 and 8.

Table 9. Biological Analysis of Internal Pipe Residue

Sample	Analysis	Analyte
Internal Pipe Residue	Microbiological total population enumeration.	Bacteria / Mold

Table 7 indicates the laboratory analyses to be performed. The table is divided into two sections; the primary analyses will be carried out on the samples from 702AZ. The secondary (optional) analyses may or may not be performed. The driver for the secondary analyses will be the results of the microbiological testing and the primary analyses, and the decision by Tank Farms as to the necessity to continue analyses.

Subcontract 25499-19
SAMPLNG FOR BUILDING 241 702-AZ TRAIN A

The purpose of this contract release is for the coordination and management of sample collection bottles or devices that meet the applicable chain of custody and sampling analysis form requirements, and if requested, sample collection both the crystalline material and the material on the floor in coordination with Tank Farm Contractor 702-AZ Train A.

A health physics technician (HPT) while doing weekly routines in the 702-AZ Building, discovered that an HCA sign was posted across the walkway of the lower 'A' train side of the filter banks. Further investigation and smear surveys of the area enabled the re-opening of the walkway and down posting back to the area of the stain and the crystalline mass. The observed 'crystalline' like substance, yellowish/brown in color, was growing above the heater control panel just below the heater. This is from an on-going leak from around the heater. There is also a large pool of a thick substance, like peanut butter mixed with oil, on the floor directly below the duct work where the heater is located. Both the crystal and the substance on the floor are contaminated to HCA/RA levels.

This building also possibly has a fungus growing with-in the condensate system. Green and black material was observed in the seal pot during the plugging issue investigation. The analysis of the condensate is beyond the scope of this SAP. It is unknown if possible fungi exist in the constituents on the floor and heater control panel. The material needs to be appropriately characterized for both chemical and biological components so that the cleanup and decontamination of the facility can be achieved.

Personnel from Duratek will take the identified samples in accordance with approved sampling procedures or this sampling plan. The samples will be transferred to the laboratory by the sampling team.

The sampling locations will be the crystalline material, and brownish-black material within the 702-AZ building.

Duratek samplers will perform all sampling. The crystalline material will be separated from the exhaust ductwork in its natural state and placed into the sample containers. No liquid will be applied to the material. Microbiological sampling will be carried out by pressing RODAC® plates containing TSA and SAB onto the surface of the floor material. For the crystalline material, a known mass will be diluted in sterile phosphate buffered saline (PBS), serial dilutions will be made and a spread plate technique will be used to enumerate colony forming units at various dilutions to $1:10^5$.

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INFORMATION TO SUPPORT THE ABOVE RELEASE

Estimated total cost is $5,000.

Start is April 17, 2006 through September 30, 2006

Safety code is F

CACN 502087
COA EJ00

Approvals are:

Andrew Templeton, Technical POC
Mark Wright, CAM for evaporator
Yousef Shehadeah, BTR for Blanket Master
Peggy Duvall, Cost Analyst

RPP-PLAN-28509
Revision 0

Sampling and Analysis Plan for Building 241 702-AZ A Train

J. B. Duncan
J. M. Frye
CH2M HILL Hanford Group, Inc.

Date Published
April 2006

CH2MHILL
Hanford Group, Inc.

Prepared for the U.S. Department of Energy
Office of River Protection

Contract No. DE-AC27-99RL14047

TABLE OF CONTENTS

1. INTRODUCTION

The 702-AZ A train has been observed to have brownish crystalline material of unknown origin emanating from an area below the exhaust heater and filter housing as well as a brownish-black material on the floor in close proximity to the filter housing, also of unknown origin. The brownish-black material extends beneath the raised floor. Both materials are radioactively contaminated. The crystalline material and the floor stain may be related, and this sampling and analyses plan (SAP) will address both entities to answer PER-2004-6139, "702-AZ Filter Rooms Need Radiological Cleanup Efforts," in part. Based on historical information, this material may be ammonium nitrate and/or sodium nitrate.

1.1 PURPOSE

The purpose of this SAP is to outline the key elements for sampling and analyzing both the crystalline material and the material on the floor.

1.2 BACKGROUND

The 702-AZ train is used to filter emissions from the ventilation of the primary tank headspaces in double-shell tanks 241-AY-101 (AY-101), 241-AY-102 (AY-102), 241-AZ-101 (AZ-101), and 241-AZ-102 (AZ-102). When the 702-AZ ventilation system was first put into service in March of 1998, condensate build-up and flooding was experienced throughout the 702-AZ system. The A train was being operated at the time that flooding occurred. As a result of the event, the unit was shut down to remedy the problem, and therefore the 702-AZ parallel B train was not exposed to the liquid. It was not immediately obvious that the high efficiency particulate air (HEPA) filter on the A train was wet. When this was noted, the HEPA filters were changed on both trains. The heater upstream of the HEPA filters on the A train was found to be wet also, and the system was dried out as much as possible with rags. The presence of condensate in the system and additional leakage appears to be intermittent and may be dependent on waste-intrusive work activity in the tanks, as well as the operational efficiency of the tank ventilation system moisture removal subsystems.

In 2005, the condensate drainage and collection system was plugged in the drain from the seal pot to the catch tank. Efforts to investigate and clear drainage problems revealed that a construction test blank was left in place since 1998 in the drain from the system's primary condenser, which caused the condenser to fill up with condensate and spill over into adjoining ductwork. Additionally, operation of tank ventilation recirculation loops has been intermittent, therefore contributing to high moisture content and resultant condensate in the system.

The same leakage problem is not apparent for the B train. Over the last 2 years B train has been operated more than A train. Figure 1 shows what appears to be a crystalline structure emanating from a seam in the metal heater housing of the A train. Also, there appears to be corrosion along the same seam (right arrow).

Figure 1. Unknown Crystalline Structure.

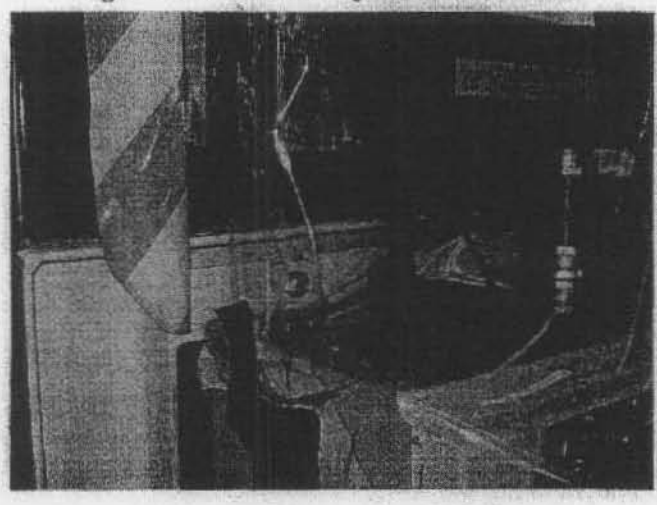
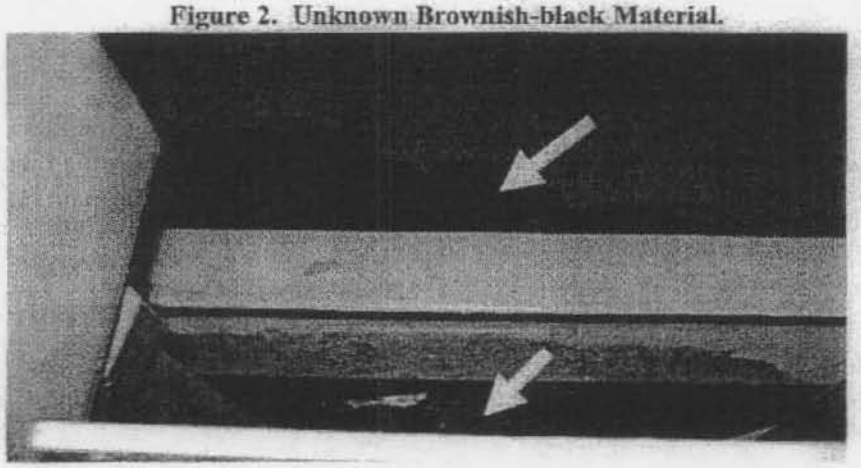


Figure 2 shows an area with material on the floor and some staining. The area of interest is indicated by the bottom arrow. The area indicated by the lower arrow may possibly be the initial "leak," and the upper arrow indicates material that seeped under the I-beam.

Figure 2. Unknown Brownish-black Material.



1.3 PHYSICAL DESCRIPTION

The 702-AZ ventilation system services the primary tank vapor space for four double-shell tanks: AY-101, AY-102, AZ-101, and AZ-102. The 702-AZ ventilation system includes three buildings: ventilation, generator/service, and control. It also includes four recirculation/cooling cells. The 702-AZ ventilation system provides a maximum 28.3 m^3/min (1000 scfm) flow from the four tanks [2.83 m^3/min (100 scfm) nominal from each tank]. The structures are of

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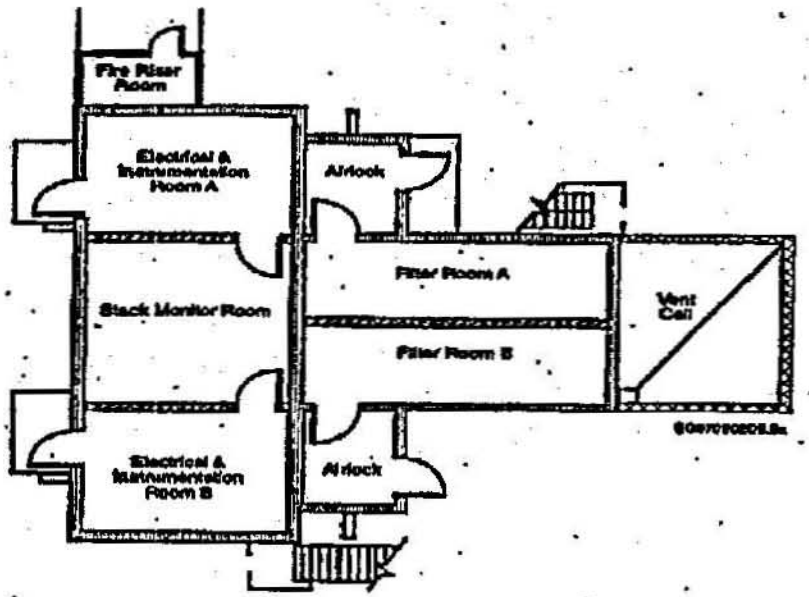
Figure 3. 702-AZ Ventilation Building.



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Water vapor removed from the tanks is condensed, and the condensate is returned to AY or AZ high heat tanks.

1.4 LIST OF CONTAMINANTS OF POTENTIAL CONCERN

Contaminants of potential concern are

a. Biological.
b. Radiological.
c. Hazardous chemicals.
d. Polychlorinated biphenyls.

More specifically a list of radionuclides and nonradionuclides was generated in HNF-SD-WM-BIO-001, *Tank Waste Remediation System Basis for Interim Operation*, for the 702-AZ exhaust train. Although this document was superseded, the follow-on safety authorization documents do not discuss the tank chemistry as does HNF-SD-WM-BIO-001. For the chemistry references, HNF-SD-WM-BIO-001 is included in this SAP. Tables 1 through 3 show the generated radionuclides and chemicals. No information is known about the biological makeup of the ventilation system condensate.

Table 1. Tank Waste Liquid Analyte Concentrations.

Concentration (g/L)[a]	
Analyte	Double-Shell Tank Liquids
Ammonia (NH_3)	7.1E+00
Antimony (Sb)	6.4E-03
Arsenic (As)	1.1E-02
Barium (Ba)	3.3E-02
Beryllium (Be)	3.8E-03
Cadmium (Cd)	7.0E-02
Calcium (Ca)	1.3E+00
Cerium (Ce)	5.8E-02
Cobalt (Co)	8.8E-03
Cyanide (CN)	9.1E-02
Lanthanum (La)	1.0E+00
Mercury (Hg)	2.4E-04
Neodymium (Nd)	5.6E-03
Selenium (Se)	2.8E-01
Sodium hydroxide (NaOH)	2.1E+02
Tellurium (Te)	2.7E-03
Thallium (Tl)	3.7E-02
Total organic carbon (TOPC)	4.0E+01
Uranium (U)	1.1E+01
Vanadium (V)	2.1E-01

[a] Source: WHC-SD-WM-SARR-011, *Toxic Chemical Considerations for Tank Farm Releases*.

Table 2. Headspace Gas Composite Concentrations.[a]

Worst Case Composite		
Gas	Concentration (ppmv)	Concentration (mg/m³)[b,c]
Acetonitrile	13	21.8
Ammonia	61,300	40,000
Benzene	0.4	1.3
1,3-Butadiene	0.1	0.19
Butanol	58	164
Dodecane	45	296
2-Hexanone	0.8	2.7
Methylene chloride	2	22
Nitrous oxide	67,000	110,000
Propanenitrile	5	11
Tributyl phosphate	1	12
Tridecane	50	390

[a] Source: WHC-SD-WM-SARR-011.
[b] Based on worst-case composites including slurry gas released.
[c] The conversion from ppmv to mg/m³ assumes a temperature of 38 °C (110 °F) and a pressure of 740 torr (0.1 MPA).

Table 3. In-Tank Concentrations for Eleven Radionuclides Aging Waste Facility Liquids[a]

Isotope	Bq/L
^{60}Co	7.71E+05
^{90}Sr	5.60E+09
^{90}Y	5.60E+09
^{137}Cs	8.87E+10
^{154}Eu	N/A
^{237}Np	9.20E+04
^{238}Pu	2.75E+03
^{239}Pu	1.20E+06
^{241}Pu	3.39E+05
^{241}Am	1.10E+06
^{244}Cm	1.10E+04

[a] WHC-SD-WM-SARR-037, *Development of Radiological Concentrations and Unit Liter Doses for TWRS FSAR Radiological Consequence Calculations.*

1.5 PROBLEM DEFINITION

A Problem Evaluation Request (PER-2004-6139) was submitted after a health physics technician, while doing weekly routines in the 702-AZ Building, discovered that a High Contamination Area (HCA) sign was posted across the walkway of the lower A-train side of the filter banks. Further investigation and smear surveys of the area enabled the reopening of the

walkway and down posting back to the area of the stain and the crystalline mass. The observed 'crystalline'-like substance, yellowish/brown in color, was growing above the heater control panel just below the heater. This is the result of an ongoing leak from around the heater. A large pool of a thick substance, like peanut butter mixed with oil, is also on the floor directly below the duct work where the heater is located. Both the crystal and the substance on the floor are contaminated to HCA levels.

It is also stated in the PER that there is a possibility of fungus growing within the condensate system. Green and black material was observed in the seal pot during the plugging issue investigation. It is unknown if possible fungi exist in the constituents on the floor and heater control panel.

It does not visually appear that microbiological activity is present as mold or fungi; however, the crystalline and material located on the floor should be characterized for both chemical and biological components to enable cleanup and decontamination of the facility.

2. PROJECT ORGANIZATION AND RESPONSIBILITIES

Table 4 lists the individuals who will be the points of contact (POC) for the sampling and analysis effort.

Table 4. Points of Contact.

Responsibility	Organization/Function	Name / Phone
WFO Operations POC	WFO Operations	W. L. Parnell, 373-5090
WFO Engineering POC	WFO Engineering	A. M. Templeton, 373-5589 R. D. Gustavson, 373-2615
WFO Planning POC	WFO Planning	D. M. Jorgensen, 373-6065
Analysis of biological determinations	Microbiology, Pacific Northwest National Laboratory (PNNL)	F. J. Brockman, 376-1252 S. W. Li, 376-4023
222-S Laboratory POC (off hours)	Analytical Services	Laboratory Leader, 373-2435
222-S Laboratory POC Advanced Technologies and Laboratories International, Inc. (ATL)	Analytical Services	H. L. Anastos, 373-4629
222-S Laboratory sample management	Sample Management Office	J. R. Prilucik, 373-3830
Laboratory Technical POC	Analytical Process Development (APD)	J. B. Duncan, 373-1972 J. M. Fryc, 376-8624
Samplers (Duratek)	Duratek Federal Services of Hanford, Inc. Northwest Operations (Duratek)	M. G. Gardner, 372-8029 J. G. Hogan, 373-7063

3. SAMPLING OBJECTIVES

The objective of sampling the crystalline and the material located on the floor is to characterize the materials for both chemical and biological components to enable cleanup and decontamination of the facility. Sampling will be directed to encompass the areas of biological, radionuclides, physical, organic, and inorganic analyses. There will be two areas of analyses, the crystalline material and the brownish-black material indicated by the bottom arrow in Figure 2. Those samples along with requisite blanks will comprise the sampling for the 702-AZ A train.

The following tables indicate sample, analysis, and analytes for the particular analysis. The biological analyses (Table 5) will be performed with the support of Pacific Northwest National Laboratory (PNNL) (SOW 22490 release 102). The surface microbiological analyses (brownish-black material located on the floor) will be performed using RODAC[1] (Replicate Organism Detection and Counting) plates. The RODAC plates that will be used for general microbial counts and population will contain trypticase soy agar (TSA). Those RODAC plates used for fungi will contain Sabouraud dextrose agar (SAB). The agar plates will be returned to 222-S Laboratory, incubated, and a PNNL microbiologist will interpret the resulting growth. For the crystalline material, a known mass will be diluted in sterile phosphate buffer, serial dilutions will be made, and a spread plate technique will be used to enumerate colony-forming units at various dilutions to $1:10^5$.

Table 5. Biological Analysis.

Sample	Analysis	Analyte
Crystalline formation	Microbiological total population enumeration per unit mass	Bacteria/fungi
Floor stain, brownish-black material on floor	Microbiological surface enumeration per unit area	Bacteria/fungi

Table 6 indicates the Analytical Process Development (APD) and Advanced Technologies and Laboratories International, Inc. (ATL) laboratory analyses to be performed. The table is divided into two sections; the primary analyses will be carried out on the samples from 702-AZ. The secondary (optional) analyses may or may not be performed. The driver for the secondary analyses will be the results of the microbiological testing and the primary analyses, and the decision by tank farms management to proceed to the secondary level.

4. SAMPLING AND HANDLING METHODS AND REQUIREMENTS

Personnel from Duratek will take the identified samples in accordance with approved sampling procedures and/or this SAP. The samples will be transferred to the laboratory by the sampling team where the samples will be analyzed for the constituents/parameters listed in Table 5 and the primary analytes in Table 6.

[1] RODAC® is a registered trademark of B-D Laboratories, West Chester, Pennsylvania.

Table 6. Analyses of Crystalline Material and Floor Stain.

Primary Analyses	
Analysis	**Analyte(s)**
Gamma energy analysis (GEA)	Radionuclide speciation (will describe radioactive isotopes present in the samples)
Scanning electron microscopy (SEM) with energy dispersive X-ray spectroscopy (EDS)	Morphology, crystal identification, and individual constituents such as iron, etc.
Polarized light microscopy (PLM)	Optical microscopy to gather crystalline phase information
X-ray diffraction (XRD)	Identification of compounds associated with the crystalline mass
Solid pH	pH of the samples
Polychlorinated biphenyls (PCB) screen	Necessary for the lab to properly dispose of waste from analyses unless there is prior knowledge of sample PCB content
Secondary Analyses	
Water digest followed by ion chromatography (IC)	Anions (fluoride, chloride, nitrite, nitrate, bromide, phosphate, sulfate, formate, acetate, glycolate, oxalate) in the water soluble fraction of the solid samples
Acid digest /inductively coupled plasma spectroscopy (ICP)	Metal cations in the acid-digested sample of the solids (most metals except mercury)
Total inorganic carbon/total organic carbon	Total inorganic carbon and total organic carbon.
Organic extract/gas chromatography-mass spectroscopy analysis	Identification and quantification of organic soluble organic compounds present in the solids

4.1 SAMPLING LOCATIONS

The sampling locations will be the crystalline material and brownish-black material within Filter Room A of the 702-AZ building. The crystalline material will be sampled in the area identified in Figure 1. The brownish-black material will be sampled in a representative area in the vicinity of Figure 2. The exact sample locations will be identified by one of the DST Maintenance and Engineering contacts.

4.2 SAMPLING EQUIPMENT AND CONTAINERS

Sampling equipment and containers will be supplied by the 222-S Laboratory and the PNNL microbiological laboratory.

4.3 SAMPLE COLLECTION

Duratek samplers will perform all sampling. The crystalline material will be separated from the exhaust ductwork in its natural state and 5-10 g of the material will be placed into the sample containers. No liquid will be applied to the material.

The brownish-black material will be sampled in the vicinity of the area indicated by the lower arrow in Figure 2. The exact sample locations will be identified by one of the DST Maintenance

and Engineering contacts. A visually representative area will be selected and a 2-5 g sample will be collected. A sterile scraper will be required to collect a representative sample.

For the microbiological surface samples, RODAC plates containing TSA and SAB will be pressed on the surface of the floor material in three selected locations. The exact sample locations will be identified by one of the DST Maintenance and Engineering contacts.

Table 7 shows the sample numbers, sample type, sample container, analysis, and location.

4.4 QUALITY ASSURANCE/QUALITY CONTROL SAMPLES

A set of RODAC plates will be unopened; these will act as laboratory blanks. Another set of RODAC plates will be pressed against the concrete inside the building in an area that appears "clean"; these will act as controls.

A set of Petri plates, one with TSA and one with SAB, will be provided as trip blanks and will leave the laboratory in the sample collection cooler and return to the laboratory in the same cooler.

4.4.1 Primary Analyses

4.4.1.1 Microbiological Analyses

For the crystalline material, microbiological analysis will consist of using a known mass and initially diluting 1:10 with sterile phosphate buffered saline (PBS). From this initial dilution, a series of dilutions will be made to achieve up to a dilution of $1:10^5$. From each dilution, an aliquot will be spread onto agar plates (petri dishes containing either TSA for bacterial enumeration or SAB for fungal enumeration) in three replicates each. Trip blanks (to ensure sterility of the PBS) will be run prior to and after completion of the spread plates.

For the floor stain material, RODAC plates of each agar type (TSA and SAB) will be used for surface contact determination of bacterial and fungal populations. RODAC plates of each agar type will be pressed against selected area containing the floor stain. These samples will be collected in triplicate. A set of RODAC plates will be pressed against the concrete inside the building in an area that appears to be free from floor stain; these will act as controls.

Table 7. Sample Collection.

Item	Sample Number	Type/Sample Container	Analysis	Location
Crystalline Material				
1	702-AZ-1	Bulk/8- or 16-oz. tared, sterile wide-mouth jar	SEM, PLM, XRD, GEA, pH, bacteria, fungus	A train, below heater
2	702-AZ-1A	Laboratory plate counts	Bacteria, TSA	N/A
3	702-AZ-1B	Laboratory plate counts	Fungi, SAB	N/A
Floor Stain Material				
4	702-AZ-2	Bulk/8- or 16-oz. tared, sterile wide-mouth jar	SEM, PLM, XRD, GEA, pH	A train, on floor below heater
5	702-AZ-2A	RODAC plate w/TSA	Bacteria, TSA	A train, on floor below heater
6	702-AZ-2B	RODAC plate w/SAB	Fungi, SAB	A train, on floor below heater
7	702-AZ-2C	RODAC plate w/TSA	Bacteria, TSA	A train, on floor below heater
8	702-AZ-2D	RODAC plate w/SAB	Fungi, SAB	A train, on floor below heater
9	702-AZ-2E	RODAC plate w/TSA	Bacteria, TSA	A train, on floor below heater
10	702-AZ-2F	RODAC plate w/SAB	Fungi, SAB	A train, on floor below heater
Blanks				
11	702-AZ-TSA-BLK	RODAC plate w/TSA blank unopened	Bacteria, TSA	N/A
12	702-AZ-SAB-BLK	RODAC plate w/SAB, blank unopened	Fungi, SAB	N/A
13	702-AZ-TSA-FBLK	RODAC plate w/TSA, field blank	Bacteria, TSA	A train, on floor, clean area
14	702-AZ-SAB-FBLK	RODAC plate w/SAB, field blank	Fungi, SAB	A train, on floor, clean area
15	702-AZ-TSA-TRPBLK	Petri plate/PSB w/TSA trip blank	Bacteria	N/A
16	702-AZ-SAB-TRPBLK	Petri plate/PSB w/SAB trip blank	Fungi	N/A

GEA = gamma energy analysis
PLM = polarized light microscopy
SEM = scanning electron microscopy
XRD = X-ray diffraction
TSA = trypticase soy agar
SAB = Sabouraud dextrose agar

4.4.1.2 Crystalline and Floor Stain Material 222-S Laboratory Analyses

A known mass of the samples (crystalline and floor stain) collected will be subjected to pH, using the procedure LA-212-105, "pH Determination of Solid Wastes," method. The material will also be analyzed for PCBs using LA-523-141, "Screening Procedure for Polychlorinated Biphenyls." A gamma energy analyses will be performed using the procedure LA-508-165, "Gamma Energy Analysis - The Genie 2K System." For quality control parameters see Table 8.

Table 8. Quality Control Parameters for Primary Analytes.

Analytes	Method	Quality Control Acceptance Criteria		
		LCS % Recovery	Spike % Recovery	Duplicate/MSD RPD[a]
Al, Sb, As, Ba, Be, Cd, Cr, Co, Cu, Fe, Pb, Mn, Ni, Se, Ag, Sr, Tl, U, V, Zn	ICP/AES LA-505-158	80-120	75-125	≤20
F^-, NO_2^-, NO_3^-, NH_4^+	IC LA-533-107	80-120	75-125	≤20
OH^-	pH LA-212-105	±0.1 pH units	NA	NA
PCBs	GC/ECD LA-523-141	70-130	70-130	≤30
Inorganic carbon	TIC LA-342-100	80-120	75-125	≤20
Organic carbon	TOC LA-342-100	80-120	75-125	≤20
^{60}Co, ^{137}Cs	GEA LA-508-165	80-120	NA	≤20
^{152}Eu, ^{154}Eu, ^{155}Eu, ^{125}Sb	GEA LA-508-165	NA	NA	≤20
^{129}I	GEA LA-508-165	80-120	NA	≤20

[a] If primary and duplicate results are available above detection limits, RPD will be based on these results.

Notes:

GC/ECD = gas chromatography/electron capture detection
GEA = gamma energy analysis
IC = ion chromatography
ICP/AES = inductively coupled plasma/atomic emission spectroscopy
MSD = matrix spike duplicate
RPD = relative percent difference
TIC = total inorganic carbon
TOC = total organic carbon

The crystalline and floor stain material will also be analyzed using (1) SEM with EDS using the procedure LT-161-100, "Sample Preparation and Operating Procedure for Scanning Electron Microscopes," (2) PLM using procedure LT-519-107, "Polarized Light Microscopy," and (3) XRD using the procedure LT-507-101, "X-Ray Diffractometry."

4.4.2 Secondary Analyses

Should secondary analyses (Table 6) be deemed necessary, HNF-SD-CP-QAPP-016, *222-S Laboratory Quality Assurance Plan* (QAPP-016), specifies the quality control parameters for primary analytes. ATL personnel operate to ATL-MP-1011, *ATL Quality Assurance Project Plan for 222-S Laboratory*. Table 8 is extracted from QAPP-016 for those analyses identified in Table 6.

4.5 CHAIN OF CUSTODY

Sampling personnel will manage the collected samples in accordance with approved procedures. The sampling team will be responsible maintaining the chain of custody from the time of sampling until custody transfer at the analytical laboratory. The chain of custody will serve as the primary document for all analytical requests. Copies of the chain of custody documentation will be provided with the laboratory data reports. Form A 6002-990, Generator Knowledge Information, will be submitted to help the lab determine potential waste characteristics for disposal of unused samples after the final report is issued.

4.6 FIELD LOGBOOK

A record of the sampling activities will be documented in a field logbook that is permanently bound and has sequentially numbered pages. The field logbook entries will be made in accordance with approved procedures. The logbook will describe the general location of the sampling activity, type (matrix) of material sampled, sample method, sample source and specific location for each sample, sample number (corresponding to the sample label), date and time of sample collection, and any problems encountered or deviations from this SAP. The logbook will also identify all the sampling and handling procedure numbers and titles used in conjunction with the sampling activity (i.e., taking the sample, equipment cleaning, handling and chain of custody, packaging and shipping, assigning sample numbers, etc.) Drawings, diagrams, and photographs should be used when needed to clearly describe the sampling event. Each logbook entry will be signed and dated by the person making the logbook entry. On completion of the sampling project, a photocopy of the field logbook pages pertaining to the sampling activity will be included in the final sampling report.

Any problems encountered during sampling or major deviations from this SAP will be documented in the field logbook and communicated to the project manager as quickly as possible. Where a problem or deviation could affect the usability of the data, the samplers will contact the Laboratory Technical POC and/or the WFO Engineering and Planning POC to determine the appropriate action to be taken (e.g., discontinue sampling, modify the sampling procedure, or continue sampling).

During the sampling event, any major deviations from this SAP will be reviewed and approved by the POC for Engineering, the Laboratory, and WFO Planning. This SAP will be revised to reflect the changes and/or modifications by submittal of an addendum to the original document via e-mail, DSI, internal memo, or revision of the SAP.

4.7 SAMPLE HANDLING, LABELING, AND SHIPPING

Following collection, samples will be packaged and shipped in accordance with approved procedures. Each sample will be identified and labeled with a unique sample number. Numbers will be assigned in accordance with approved procedures and this SAP. The sample location and corresponding sample numbers will be documented in the field logbook.

4.8 ADDITIONAL SAMPLES

A material was encountered during the tie-in of the new line between AZ-702 and AZ-301. The material was off white and was described as slime. A piece of the pipe containing the material was set aside in a Radioactive Material Area for subsequent sampling. This material was delivered to the laboratory and will be analyzed for the primary analyses listed in Tables 9 and 10.

Table 9. Biological Analysis of Internal Pipe Residue.

Sample	Analysis	Analyte
Internal pipe residue	Microbiological total population enumeration.	Bacteria/fungi

Table10 is divided into two sections; the primary analyses will be carried out on the samples from AZ-301. The secondary (optional) analyses may or may not be performed. The driver for the secondary analyses will be the results of the microbiological testing and the primary analyses, and the decision by tank farms management as to the necessity to continue analyses.

Table 10. Analyses of Internal Pipe Residue.

Primary Analyses	
Analysis	**Analyte(s)**
GEA	Radionuclide speciation (will describe what radioactive isotopes are present in the samples).
SEM with EDS	Morphology, identification, and individual constituents such as iron, etc.
PLM	Optical microscopy to gather phase information.
XRD	Identification of compounds associated with the residue mass.
Solid pH	pH of the samples.
PCB screen	Necessary for the lab to properly dispose of waste from analyses unless there is prior knowledge of sample PCB content.
Secondary Analyses	
Water digest followed by IC	Anions (fluoride, chloride, nitrite, nitrate, bromide, phosphate, sulfate, formate, acetate, glycolate, oxalate) in the water soluble fraction of the solid samples.
Acid Digest /ICP	Metal cations in the acid-digested sample of the solids (most metals except mercury).
TIC/TOC	Total inorganic carbon and total organic carbon.
Organic extract/gas chromatography-mass spectroscopy analysis	Identification and quantification of organic soluble organic compounds present in the solids.

5. ANALYTICAL LABORATORY

All samples will be analyzed by 222-S Laboratory personnel, with the exception of the biological samples that will be analyzed at 222-S laboratory under the direction of a PNNL microbiologist.

The samples will be sent to the laboratory for the primary analyses as indicated in Table 5 and 6. The following deliverables will be provided by the laboratory:

a. ATL will provide preliminary analysis results to APD within 60 days of sample receipt unless otherwise specified. Initial preliminary results will be provided as they are determined and will be transmitted via e-mail.

b. PNNL will provide preliminary analysis results via e-mail within 50 days of sample receipt to APD. Also, PNNL will provide a final letter report under separate cover to DST Project and Maintenance Engineering with 60 days of sample receipt.

c. APD will provide preliminary analysis results to DST Project and Maintenance Engineering within 60 days of sample receipt unless otherwise specified. Initial preliminary results will be provided as they are determined and will be transmitted via e-mail.

d. ATL will provide the final analytical results with a quality assurance review and a list of the analytical procedures used to APD within 70 days of sample receipt unless secondary analyses are required.

e. APD will provide a final letter report to the DST Project and Maintenance Engineering within 90 days of sample receipt, to include a list of the procedures used, unless secondary analyses are required.

5.1 LABORATORY WASTE DISPOSAL

Any waste generated during the analyses of samples will be disposed of in accordance with ATS-LO-100-151, "ATS Laboratory Waste Generation."

5.2 DISPOSITION OF UNUSED SAMPLE MATERIAL

Final disposition of unused samples will be the responsibility of the 200 Area Surveillance and Maintenance Organization (200 Area S&M). Provided all analyses are satisfactory, 200 Area S&M will pick up unused samples no longer than 30 days after receipt of final report. The laboratory can dispose of the unused samples in 60 days after receipt of the final report.

6. QUALITY ASSURANCE

Sample collection, packaging, handling, and quality control shall be performed in accordance with the applicable requirements of DOE/RL-96-68, *Hanford Analytical Services Quality Assurance Requirements Document* (HASQARD) as described in Duratek Federal Services, DFSNW-QAM-001, *Northwest Operations Quality Assurance Manual.*

Sample analysis and laboratory quality control shall be performed in accordance with the applicable requirements of QAPP-016 and ATL-MP-1011.

Microbiological analyses will be conducted according to the PNNL SOW 22490 release 102 and in accordance with PNNL's Quality Assurance Program, which is implemented in the Standards Based Management System. The Quality Assurance Program is based on the requirements of DOE O 414.1A, *Quality Assurance*, and ANSI/ASQ Z1.13-1999, *Quality Guidelines for Research*.

7. REFERENCES

ANSI/ASQ Z1.13-1999, *Quality Guidelines for Research*, American National Standards Institute, New York, New York.

ATL-MP-1011, 2006, *ATL Quality Assurance Project Plan for 222-S Laboratory*, Rev. 2, Advanced Technologies and Laboratories International, Inc., Richland, Washington.

ATS-LO-100-151, Rev K-3, "ATS Laboratory Waste Generation," CH2M HILL Hanford Group, Inc., Richland, Washington.

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DOE O 414.1A, 1998, *Quality Assurance*, U.S. Department of Energy, Washington, D.C.

DOE/RL-96-68, 1998, *Hanford Analytical Services Quality Assurance Requirements Documents*, Revision 2, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

HNF-SD-CP-QAPP-016, 2005, *222-S Laboratory Quality Assurance Plan*, Revision 9, CH2M HILL Hanford Group, Inc., Richland, Washington.

HNF-SD-WS-BIO-001, 1998, *Tank Waste Remediation System Basis for Interim Operation*, Rev. 0, Lockheed Martin Hanford Company, Richland, Washington.

LA-212-105, Rev E-0, "pH Determination of Solid Wastes," CH2M HILL Hanford Group, Inc., Richland, Washington.

LA-508-165, Rev B-0, "Gamma Energy Analysis - The Genie 2K System," CH2M HILL Hanford Group, Inc., Richland, Washington.

LA-523-141, Rev B-0, "Screening Procedure for Polychlorinated Biphenyls," CH2M HILL Hanford Group, Inc., Richland, Washington.

LT-161-100, Rev C-0, "Sample Preparation and Operating Procedure for Scanning Electron Microscopes," CH2M HILL Hanford Group, Inc., Richland, Washington.

LT-507-101, Rev D-0, "X-Ray Diffractometry," CH2M HILL Hanford Group, Inc., Richland, Washington.

LT-519-107, Rev C-0, "Polarized Light Microscopy," CH2M HILL Hanford Group, Inc., Richland, Washington.

PER-2004-6139, "702-AZ Filter Rooms Need Radiological Cleanup Efforts," CH2M HILL Hanford Group, Inc., Richland, Washington, dated December 15, 2004.

WHC-SD-WM-SARR-011, 1996, *Toxic Chemical Considerations for Tank Farm Releases*, Rev 2, Westinghouse Hanford Company, Richland, Washington.

WHC-SD-WM-SARR-037, 1996, *Development of Radiological Concentrations Unit and Liter Doses for TWRS FSAR Radiological Consequence Calculations*, Rev 0, Westinghouse Hanford Company, Richland, Washington.

RPP-RPT-31293, Rev. 0

Tank Farm Work Instruction

WFO-WO-05-000646

702-AZ Sampling Under Filter Housing

1.0 SCOPE

- The scope of work is to perform sampling of the unknown substance on the concrete floor and crystal like material on the side and just beneath adjacent to the A-Train filter housing at 702-AZ building. The data obtained from this work order will be used to determine if a biological/chemical hazard exists.
- System Engineering has identified the equipment being worked on as GS.

2.0 PRECAUTIONS AND LIMITATIONS

[ ] 2.1. During the performance of this work package, normally inaccessible and potentially radiological highly contaminated areas will be exposed. An HPT shall be available to perform radiation/contamination surveys.

[ ] 2.2. Radiation protection measures to be determined by the Radiological Control Organization and hazardous material protection measures to be determined by the Safety and Health Organization.

[ ] 2.3. This work package will be utilizing radiological limits and controls specified on RWP WTO-0022

[ ] 2.4. RWP SAFE CONDITION LEVELS:

- Notify SOM of conditions encountered and actions taken per the contingency plan.
- If any of the "Safe Condition Levels" (WTO-0022) are detected or exceeded, the FWS will perform the following:
  - FWS to stop normal work; place non-essential workers in a safe location as determined by HPT/FWS. HPT will attempt to locate the source of increased radiation or radioactivity levels and reduce to ALARA by installing shielding or wiping/decontaminating to below Safe Condition Level.

- o If levels cannot be reduced then the FWS shall instruct workers to place equipment in a safe configuration and evacuate the area.
- o FWS to notify shift manager.

[ ] 2.5. RSR numbers associated with this work shall be recorded on the RSR Log.

[ ] 2.6. Radcon has risk ranked this package to be Medium Risk.

3.0 PREREQUISITES

[ ] 3.1. Conduct a Pre-Job Briefing.

[ ] 3.1.1. FWS shall review applicable Lessons Learned, AMW, and RWP. Contingencies shall be identified and discussed during the pre-job briefing with all personnel assigned to the work activity.

[ ] 3.1.2. Ensure that the SSW is present at the pre-job.

[ ] 3.1.3. Ensure that the sample transport crew is at the Pre-Job and present at the work site.

[ ] 3.2. Prepare and Label (if needed) all sampling tools, containers, decontamination materials prior to taking them into the work area to enable effective release of equipment from HCA/CA.

[ ] 3.3. Stage all tooling including additional types of sample collection tools in or near the work area.

4.0 SPECIFIC WORK INSTRUCTIONS

[ ] 4.1. Set-up step off pad on the A-Train filter side at 702-AZ and ensure area is adequate for sampling.

[ ] 4.2. HPT perform baseline Pre-Job dose rate and removable contamination survey(s) of the work area and record RSR number.

[ ] 4.3. During collection of substance to be sampled IH&S Technician shall conduct continuous vapor monitoring for organics and ammonia (any air changes for data points).

Warning

When reaching into HCA while laying on grating, workers should be aware of all hardware that may come in contact with PPE to ensure PPE will not become damaged during sample collection. (See Lessons Learned-L-2001-OR-BJCPAD-0201)

[ ] 4.4. Perform sampling per RPP-PLAN-28509 Sampling and Analysis Plan for Building 241 702-AZ Train A.

[ ] 4.5. After samples are collected, prepare the samples for transportation to the analytical lab using Chain of Custody process. HPT survey each sample container and approve release from HCA/CA.

[ ] 4.6. Dispose of sampling waste such as gloves and collecting devices per the Waste Planning Checklist.

5.0 POST MAINTENANCE TESTING

[ ] 5.1. Post-Maintenance testing is not required.

6.0 RESTORATION ACTIONS

[ ] 6.1. Job Site Cleanup

[ ] 6.1.1. HPT perform Pre-clean-up removable contamination survey.

[ ] 6.1.2. Operator, decontaminate existing plastic covering and area as required.

[ ] 6.1.3. HPT perform post job radiation/contamination survey and document "as-left" conditions.

[ ] 6.1.4. FWS ensure that the job site has been cleaned up and equipment restored to as found condition.

[ ] 6.2. Notify the Shift Manager that the work is completed and restore the system per direction of shift manager.

GENERATOR KNOWLEDGE INFORMATION

1. Chain of Custody Number N/A CACN/COA 502087 Customer Identification Number 702-AZ

2. List generator knowledge or description of process that produced sample. Or list description of sample source:
Material was found in the 702-AZ, A-train filter building. The material appears to be leaking from beneath the heater prior to the airstream entering the filters and has leaked onto the floor.
MSDS Available? (●) No ( ) Yes Hanford MSDS No. _____

3. List all waste codes and constituents associated with the waste or media that was sampled, regardless of CERCLA status.
a) Does the sample contain any of the following listed waste codes?
By checking "unknown" the customer understands that no knowledge is available following a careful search.

	List Federal Waste Code(s):	List Constituent(s):			
P Codes:			( ) Yes	(●) No	( ) Unknown
U Codes:			( ) Yes	(●) No	( ) Unknown
K Codes:			( ) Yes	(●) No	( ) Unknown
F Codes:			( ) Yes	(●) No	( ) Unknown

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

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

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

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

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

WT01:	( ) Yes	( ) No	(●) Unknown		WP01:	( ) Yes	(●) No	( ) Unknown
WT02:	( ) Yes	( ) No	(●) Unknown		WP02:	( ) Yes	(●) No	( ) Unknown
W001:	( ) Yes	(●) No	( ) Unknown		WP03:	( ) Yes	(●) No	( ) Unknown
List constituents and concentrations:				(*State mixture rule for ignitability)	F003:*	( ) Yes	(●) No	( ) Unknown

4. Is this material TSCA regulated for PCBs? ( ) Yes (●) No ( ) Unknown ( ) Analysis Requested
List concentration if applicable: _____
If yes, what is the source of the PCBs? (see TSCA PCB Hanford Site User Guide, DOE/RL-2001-50)

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

5. Is this material TRU? ( ) Yes (●) No ( ) Unknown

6. ACCURACY OF INFORMATION
Based on my inquiry of those individuals immediately responsible for obtaining this information, that to the best of my knowledge, the information entered in this document is true, accurate, and complete.
Print & Sign JEAN T. QUIGLEY / Jean T. Quigley Date 05-23-06

A-6002-990 (08/03)

ENERGYSOLUTIONS

Duratek Federal Services

August 28, 2006 MAW-06-4514

A. M. Templeton
CH2M Hill Hanford S5-07
Post Office Box 1500
Richland, Washington 99354-1500

Dear Mr Templeton:

702AZ VENTILATION BUILDING, 200 EAST AREA

Duratek Federal Services, Inc. completed the subject sampling event on July 31, 2006. Attached for your records are copies of the Chain of Custody, sampling logbook entries and other associated documentation pertinent to the sampling tasks performed.

Thank you for the opportunity to be of service. If there are any questions, please contact me at 308-5721.

Very truly yours,

Victor L Magnus

Victor L. Magnus
Sampling and Well Services

maw

Attachment

DTSNW – V. L. Magnus File/LB
RC6021

345 Hills Street • Richland, Washington 99354-5507
509-376-7055 • Fax: 509-372-1435 • www.energysolutions.com

PROJECT FILE CHECKLIST		
SAF #: S06-073	CUST. PROJ. #: 122224 ES10	DATE: 7/31/06
PROJECT TITLE: 702AZ Ventilation Bldg., 200 East Area		

POSSIBLE ITEMS	✔ IF INCLUDED
Logbook Entry DTS-SAWS-H 100 Pages 78, 79	✓
Chain of Custody	✓
Shipping Documentation: Rad. Shipment Record, ORSR, OPC, etc.)	
Project Notes (DSI's, email, etc.)	✓
Chain of Custody/RSA for RAD Screening	✓
RAD Results	
Sample Authorization Form - SAF w/ Field Sampling Requirements	
SAF Request Form, SAP or Letter of Instruction	
Timely Order Memo	
MSDS	
SAWS Job Completion List	
Other:	
Other:	
Generator Knowledge Information	✓

Reviewer: M.A. Wolfe

Ready For File (Initial) MAW

Letter #: 4514 Date Sent 8/29/06

Abbv. Code RC6021

Requestor/customer: A.M Templeton 373-5589
55-07

78

Project 702AZ-A TRAIN RESAMPLE ~~RPP-RPT-31293, Rev. 0~~ Notebook No DTS-SAWS-H100

Continues from Page 63

SAF# S06-073 7-31-06 CHARGECODE: 122224/ES10

WORK DONE TO RCRA PROTOCOL

LOCATION: 702-AZ VENTILATION BUILDING, 200 EAST AREA

PERSONNEL:		
	JG HOGAN	NCO/SAMPLER
	TK NEARING	NCO/CHG
	CL KEARNEY	NCO/CHG
	MJ BUSSLEMAN	NCO/CHG
	DA ANDERSON	HPT
	RL WRIGHT	PIC
	AM TEMPLETON	CUSTOMER 3-5589 S5-07

PURPOSE: WASTE CHARACTERIZATION RWP: WTO-022-REV 1

SAP# RPP-PLAN-28509, REV 0 WORK PACKAGE: WFO-WO-05-000646

DPE: ONE SET ANTI-C's, APR, NITRILE GLOVES

SAMPLE EVENT: THE TAR LIKE MATERIAL UNDER THE 702-AZ "A" TRAIN WAS PREVIOUSLY SAMPLED ON 5-25-06 (SEE PAGES 57-63 OF THIS LOGBOOK). DUE TO A REQUEST FROM THE 222-S LAB, AN ADDITIONAL 10 GRAMS OF THE MATERIAL WAS NEEDED TO COMPLETE ALL OF THE ANALYTICAL REQUESTS.

SAMPLE METHOD: AN ENTRY WAS MADE AND AN ADDITIONAL SAMPLE WAS COLLECTED OF THE BROWNISH/BLACK TAR MATERIAL FROM THE FLOOR UNDER THE "A" TRAIN BY USING A CLEAN SPATULA TO SCOOP THE MATERIAL FROM THE FLOOR INTO A PRE-TARED SAMPLE CONTAINER PROVIDED BY THE 222-S LAB. EXTRA SAMPLE OF THE CRYSTALLINE MATERIAL FROM UNDER THE HEATER WAS ALSO COLLECTED AND PLACED IN THE BOTTLE. THE SAMPLE BOTTLE WAS WIPED CLEAN WITH A DAMP RAG, SURVEYED FROM THE ZONE, SEALED WITH EVIDENCE TAPE, DOUBLE BAGGED AND PLACED IN A COOLER. THE SAMPLE WAS SHIPPED TO THE 222-S LAB ON AN "ONSITE ROUTINE RADIOACTIVE SHIPMENT RECORD, SITE-03- EXCEPTED, CAY 110."

Continued on Page 79

IRATEK
J. HOGAN JG Hogan

Read and Understood By

AUG 04 2006

Witness

Date

Project 702-AZ "A" TRAIN RESAMPLE Notebook No. DTS-SAWS-H100 79

Continues from Page 78

8-4-06

Sample Point: **702-AZ "A" Train**

Lead Sampler: **HOGAN, J.G.** Sample Matrix: **OTHER**

Sample ID	Date Collected / Time Collected	Analysis	Preservative(s)	Container	Lot #	Laboratory / COC#
702-AZ-3	7/31/2006 1030	IC, ICP, TIC/TOC NH4, DSC, TGA, GC-MS	NONE	120 m P	Lab Provided	222-S 103013

8-4-06 A

NOTE: ONE FORM ATTACHED THIS PAGE

Continued on Page NONE

DURATEK
J. G. HOGAN
Signed

AUG 04 2006
Date

Read and Understood By

Signed

Date

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

C.O.C. No. 103013

Page 1 of 1

Collector: JG HOGAN	Contact/Requestor: A.M. TEMPLETON	Telephone No.: 373-5589 MSIN: S5-07 FAX: 372-3106
SAF No.: 506-073	Sample Origin: 702-AZ A TRAIN	Purchase Order/Charge Code: 502087/FA60
Project Title: 702-AZ	Logbook No.: DTS-SAWS-H100	Ice Chest No.: GUSS-6 Temp.
Shipped To (Lab): 222-S	Method of Shipment: GOVT. TRUCK	Bill of Lading/Air Bill No.: N/A
Protocol: PER CONTRACT	Data Turnaround: PER CONTRACT	Offsite Property No.: N/A

Sample No.	Lab ID	A	Date	Time	No./Type Container	Sample Analysis	Preservative
702-AZ-3		A	7-31-06	1050	(1)X20 mL P	IC, ICP, TIC/TOC, NH4, DSC, TGA, GC-MS	NONE
		X					

POSSIBLE SAMPLE HAZARDS/REMARKS (List all known wastes) MSDS ☐ Yes ☐ No

RADIOACTIVE MATERIAL

SPECIAL INSTRUCTIONS Hold Time

Relinquished By (Print / Sign)	Date/Time	Received By (Print / Sign)	Date/Time
JG HOGAN / JG Hogan	7-31-06 1200	KB Hulse / KB Hulse	7-31-06 1200
KB Hulse / KB Hulse	7-31-06 1300	RL Chamberlain / RL Chamberlain	7-31-06 1300
Relinquished By	Date/Time	Received By	Date/Time
Relinquished By	Date/Time	Received By	Date/Time

Matrix*

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

FINAL SAMPLE DISPOSITION: Disposal Method (e.g., Return to customer, per lab procedure, used in process) Disposed By Date/Time

All samples containing hazardous materials shall be picked up by requestor and returned to parent container or site of origin.

A-6003-432 (05/02)

RPP-RPT-31293, Rev. 0

A-70

Hogan, James G

From: Jorgensen, David M
Sent: Tuesday, July 25, 2006 11:00 AM
To: Parnell, William L (Bill); Templeton, Andrew M; Gustavson, Robert D; Meldrom, Clarence A Jr; Hogan, James G; Chapman, Stephen R; Jorgensen, David M
Subject: RE: Actions for sampling 702AZ A-train WFO-WO-05-000646

Folks,

I just talked to Jim Hogan and he said he could support it early next week so could we have Bill Parnell set it up for Monday to do the prejob and sample on the floor. ??

Jim said he has everything we need as far as both tools and charge code.

I will take pkg to Steve Chapman and it will be ready to go.

Dave Jorgensen

From: Parnell, William L (Bill)
Sent: Tuesday, July 25, 2006 10:16 AM
To: Jorgensen, David M; Templeton, Andrew M; Gustavson, Robert D; Meldrom, Clarence A Jr; Hogan, James G; Chapman, Stephen R
Subject: RE: Actions for sampling 702AZ A-train WFO-WO-05-000646
This package is on the schedule for next week. With the attention this system is getting, we need to hold the schedule.

From: Jorgensen, David M
Sent: Tuesday, July 25, 2006 10:01 AM
To: Templeton, Andrew M; Jorgensen, David M; Gustavson, Robert D; Meldrom, Clarence A Jr; Hogan, James G; Chapman, Stephen R; Parnell, William L (Bill)
Subject: Actions for sampling 702AZ A-train WFO-WO-05-000646

Folks we need to collect at least 10 grams more material from the floor under the filter housing.

Here are the actions and questions as I see it:

Jim Hogan - 373-7063 308-0141
Do you still have what you need to come take this sample for work charges ect.? If issues call Al Meldrom or Andrew Templeton.
Able to ace in still?
Can we have you supply the container and scooper this time that you would normally use. These are not microbiological samples this time so what ever clean items you would normally use should work fine..

Al Meldrom - 373-2542 438-9666
If Jim Hogan is needing something different than last time you will need to supply this. - $ contract ect.

Steve Chapman - 373-3770 308-7806
You will need to hold a Prejob and set up to do this collection again. I would hold up until we make sure Jim Hogan is ok with coming and has the collection tools needed. If Jim says he is ready then lets go get it done.
Please make sure we do not do this sample Aug 8-10 as Andrew Templeton wants to be with the sampler when it is done.

Andrew Templeton - 373-5589 438-0701
is getting the sample plan revised to match the new testing requirements...this will not hold up us getting the material sampled and perhaps tested.

Dave Jorgensen -373-6065 Planner - I will be on vacation July 26 & 27th

This is East tank farms highest priority according to their priority list the other day so we need to move on it and make it happen.

Hogan, James G

From: Jorgensen, David M
Sent: Tuesday, July 25, 2006 12:49 PM
To: Reining, Timothy L; Hogan, James G; Jorgensen, David M; Parnell, William L (Bill); Chapman, Stephen R; Meldrom, Clarence A Jr; Templeton, Andrew M
Subject: RE: FW: Actions for sampling 702AZ A-train WFO-WO-05-000646

Tim,

This is East Tank farms top priority job. We have large cast of folks that support this job.

When I talked to Jim Hogan about and hour ago he said he had nothing scheduled for that day so it should be no problem that day.
We really need to stay with Monday July 31 7:45 AM M0511

This has extremely high visibility right now including the state, Environmental, DOE and Roy Shepens.

Dave Jorgensen 373-6065

From: Timothy Reining [mailto:TLREINING@energysolutions.com]
Sent: Tuesday, July 25, 2006 11:49 AM
To: Jorgensen, David M
Subject: Re: FW: Actions for sampling 702AZ A-train WFO-WO-05-000646

David,

If necessary, can this work be performed on the back shift? I have several jobs pending for NCO support and not enough staff to go around. We are in the process with Fluor IR in hiring two additional NCO's and three temporary, Thanks.

TL Reining
Supervisor/Planner Scheduler
Duratek Federal Services Inc Groundwater Sampling Services
376-0415 or 438-7728

>>> Jorgensen, David M 7/25/2006 10:19 AM >>>
FYI,

Hopefully Jim is around and not on 5 week vacation :-)
Dave Jorgensen 373-6065

From: Parnell, William L (Bill)
Sent: Tuesday, July 25, 2006 10:16 AM
To: Jorgensen, David M; Templeton, Andrew M; Gustavson, Robert D; Meldrom, Clarence A Jr; Hogan, James G; Chapman, Stephen R
Subject: RE: Actions for sampling 702AZ A-train WFO-WO-05-000646

This package is on the schedule for next week. With the attention this system

is getting, we need to hold the schedule.

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Sent: Tuesday, July 25, 2006 10:01 AM
To: Templeton, Andrew M; Jorgensen, David M; Gustavson, Robert D; Meldrom, Clarence A Jr; Hogan, James G; Chapman, Stephen R; Parnell, William L (Bill)
Subject: Actions for sampling 702AZ A-train WFO-WO-05-000646

Folks we need to collect at least 10 grams more material from the floor under the filter housing.

Here are the actions and questions as I see it:

Jim Hogan - 373-7063 308-0141
Do you still have what you need to come take this sample for work charges ect.? If issues call Al Meldrom or Andrew Templeton.
Able to ace in still?
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You will need to hold a Prejob and set up to do this collection again. I would hold up until we make sure Jim Hogan is ok with coming and has the collection tools needed. If Jim says he is ready then lets go get it done.
Please make sure we do not do this sample Aug 8-10 as Andrew Templeton wants to be with the sampler when it is done.

Andrew Templeton - 373-5589 438-0701
is getting the sample plan revised to match the new testing requirements...this will not hold up us getting the material sampled and perhaps tested.

Dave Jorgensen -373-6065 Planner - I will be on vacation July 26 & 27th

This is East tank farms highest priority according to their priority list the other day so we need to move on it and make it happen.

Thanks
Dave Jorgensen

WTD-0072 REV 1
RON WRIGHT AGH PIC

REQUEST FOR SAMPLE ANALYSIS (RSA)

Group ID No. (For lab use only)

1. Sample Origin	2. Date Sampled	4. Requestor's Name	6. CACN/COA	7. Cost Center
702-AZ	7/31/06	Andrew M. Templeton	502087/FA60	7T200

Customer/Project Code	3. Submitted By	5. Requestor's Phone/MSIN/FAX
	Andrew M. Templeton	373-5589 S5-07 372-3106

8. Customer ID No.	9. Laboratory Sample No.	10. Volume of Sample	11. Matrix of Sample	12. Requested Analyses	13. Expected Range
702-AZ-3			S	IC, ICP, TIC/TOC, NH4, DSC, and TGA,	Unknown
				GC-MS	

14. Sample Disposition
- ☐ Return to Customer
- ☐ Samples found to contain PCBs will be returned to the customer
- ☒ Dispose of per facility procedures with applied charges for analyses and disposal

Sample(s) Dose Rate at Contact: 35 mrem/hr @ Contact

HPT Signature:

15. QC Required
- ☒ Per 222-S Laboratory Quality Assurance Plan (HNF-SD-CP-QAPP-016)
- ☐ Other (list reference document or attach) _____

16. Special Instructions (Special Storage Requirements, Reporting format, holding times, etc.)

17. Requested Turnaround Time
- ☐ 2 Weeks ☐ 4 Weeks
- ☒ Other 30 days

18. Sample Received By: _____ Date: 7-31-06 Time: 1300

19. Chain of Custody
- ○ No ◉ Yes

Number: _____

A-6002-365 (03/02)

GENERATOR KNOWLEDGE INFORMATION

1. Chain of Custody Number N/A CACN/COA 502087 Customer Identification Number 702-AZ-3

2. List generator knowledge or description of process that produced sample. Or list description of sample source:
material was found in the 702-AZ, A-train filter building. The material appears to be leaking from beneath the heater prior to the airstream entering the filters and has leaked onto the floor.
MSDS Available? ● No ○ Yes Hanford MSDS No. _____

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

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

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

	List Federal Waste Code(s):	List Constituent(s):			
P Codes:			○ Yes	● No	○ Unknown
U Codes:			○ Yes	● No	○ Unknown
K Codes:			○ Yes	● No	○ Unknown
F Codes:			○ Yes	● No	○ Unknown

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

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

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

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

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

WT01:	○ Yes	○ No	● Unknown			("State mixture rule for ignitability)		
WT02:	○ Yes	○ No	● Unknown	WP01:	○ Yes	● No	○ Unknown	
W001:	○ Yes	● No	○ Unknown	WP02:	○ Yes	● No	○ Unknown	
List constituents and concentrations:				WP03:	○ Yes	● No	○ Unknown	
				F003:*	○ Yes	● No	○ Unknown	

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

List concentration if applicable: _____

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

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

5. Is this material TRU? ○ Yes ● No ○ Unknown

6. ACCURACY OF INFORMATION

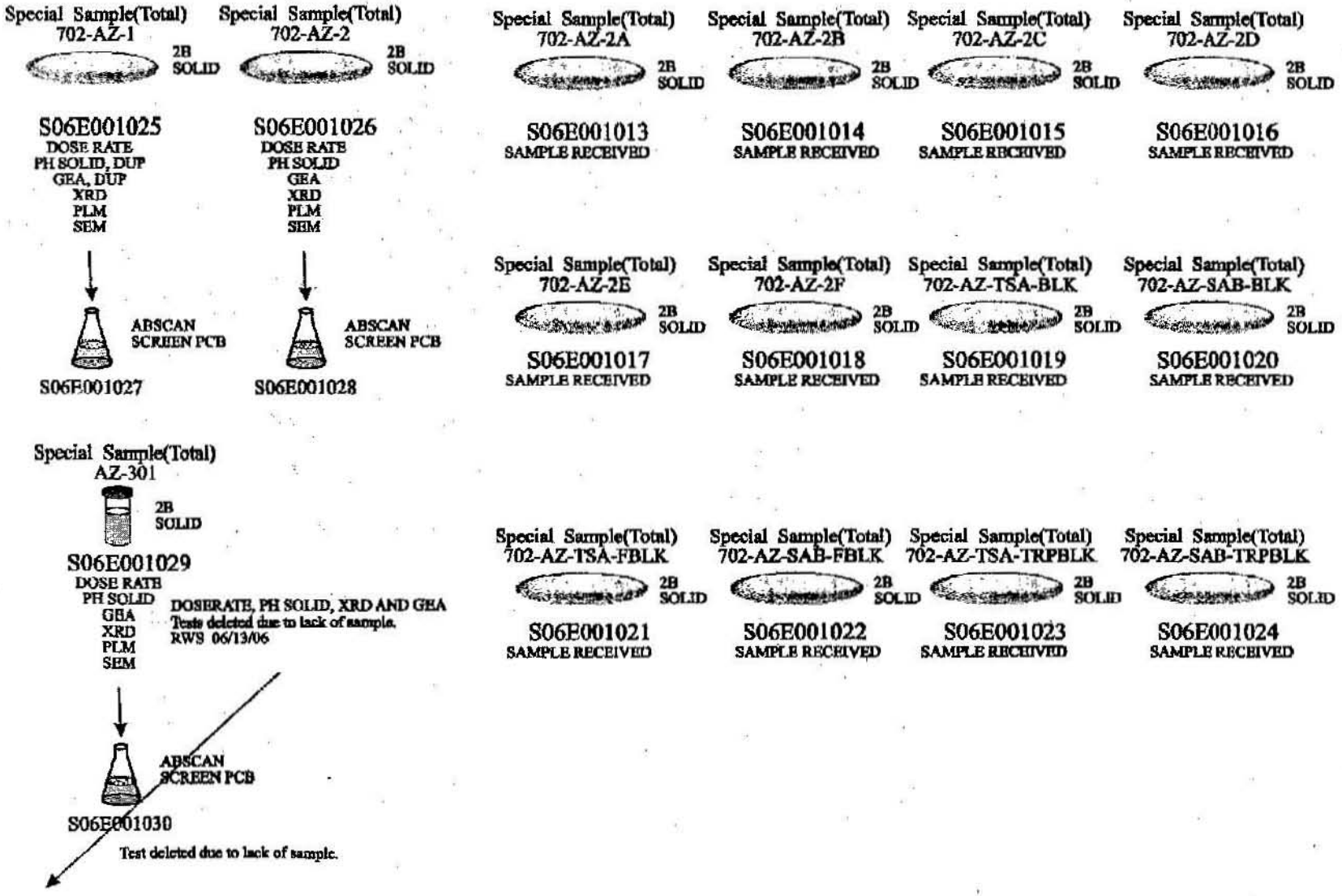
Based on my inquiry of those individuals immediately responsible for obtaining this information, that to the best of my knowledge, the information entered in this document is true, accurate, and complete.

Print & Sign Andrew W. Templeton Date 7-31-06

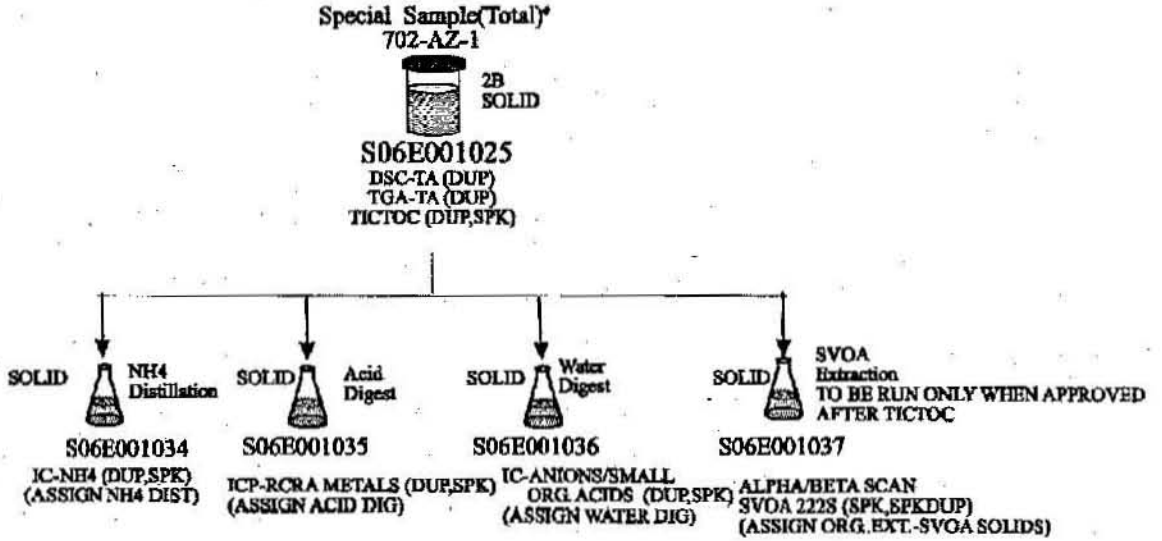
A-6002-990 (08/03)

APPENDIX B
LABORATORY SAMPLE BREAKDOWN DIAGRAMS

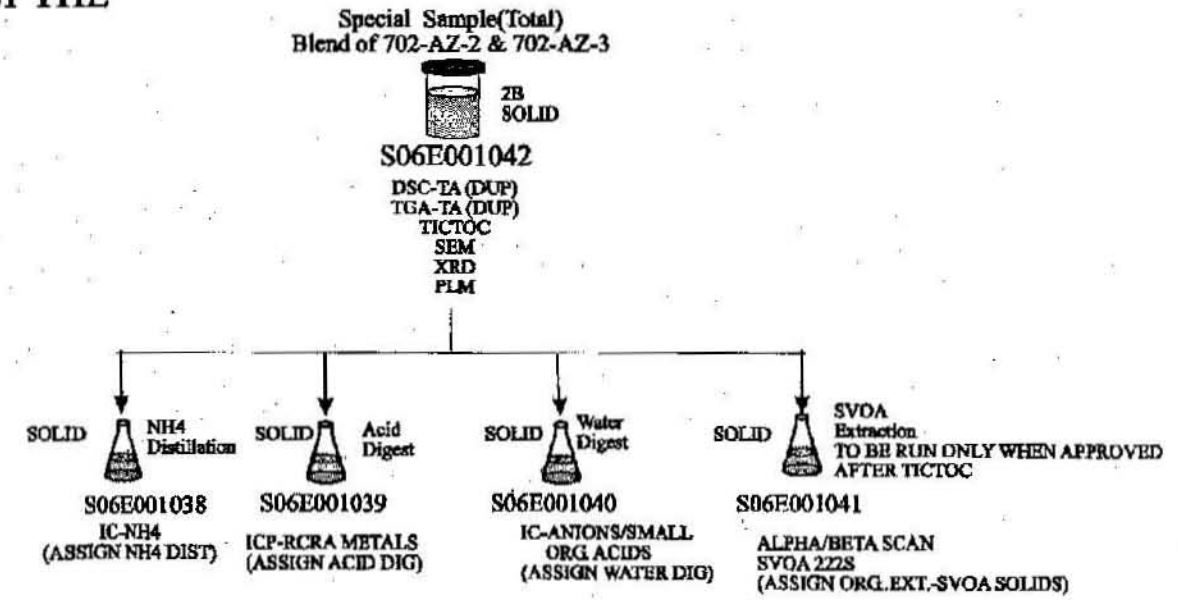
702AZ TRAIN
Due Date: 06/23/06
Primary Analyses
Location: 2B
Group 20060609



702AZ TRAIN
Due Date: 08/29/06
Secondary Analyses
Location: 2B
Group 20060609



DUP AND SPK ONLY THE SAMPLES SHOWN



702AZ TRAIN
Due Date: 09/06/06
Secondary Analyses Additional
Location: 2B
Group 20060609

Special Sample (Total)
NH4NO3

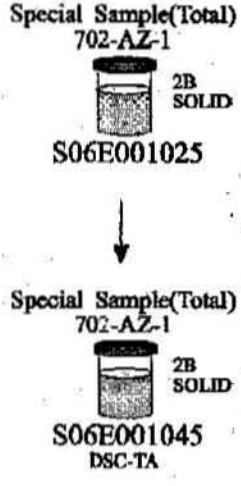
2B
SOLID
S06E001043
DSC-TA

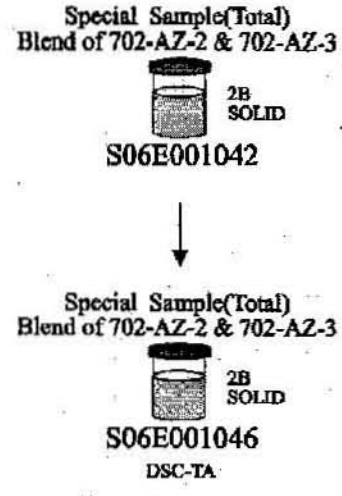
Special Sample (Total)
NH4NO3-NACL

2B
SOLID
S06E001044
DSC-TA

NO DUP AND SPK on these SAMPLES

702AZ TRAIN
Due Date: 10/05/06
Additional Samples
Location: 2B
Group 20060609





These samples and group are already logged in. This is additional work on these samples.

Special note - these samples are to be run using air as a cover gas.

APPENDIX C
MICROBIAL MEDIA AND PLATE COUNT RAW DATA

Appendix C-1. Trypticase Soy Agar RODAC® for General Surface Bacteria Counting
(Catalogue #221238, Becton Dickinson, Sparks, MD)
per liter:

Pancreatic Digest of Casein	15 g
Papaic Digest of Soybean Meal	5 g
Sodium Chloride	5 g
Lecithin	0.7 g
Polysorbate 80	5 g
Agar	15 g

Appendix C-2. Sabouraud Dextrose Agar RODAC® for General Surface Fungi Counting
(Catalogue #221233, Becton Dickinson, Sparks, MD)
per liter:

Pancreatic Digest of Casein	5 g
Peptic Digest of Animal Tissue	5 g
Dextrose	40 g
Agar	15 g

pH ~5.6

Appendix C-3. Phosphate-Buffered-Saline (PBS)
per liter

$Na_2HPO_4 .7H_2O$	2.22 g
$NaH_2PO_4 .H_2O$	0.223 g
NaCl	8.5 g

pH to 7.0

Appendix C-4. Trypticase Soy Agar for General Bacteria Plate Count
(Catalogue # 0369-17, Becton Dickinson, Sparks, MD)
per liter:

Bacto Tryptone	15 g
Bacto Soytone	5 g
Sodium Chloride	5 g
Bacto Agar	15 g

Final pH 7.3±0.2 at 25°C

Appendix C-5. Sabouraud Dextrose Agar for General Fungi Plate Count
(Difco Catalogue # 0109-15, Becton Dickinson, Sparks, MD)
per liter:

Bacto Neopeptone	10 g
Bacto Dextrose	40 g
Bacto Agar	15 g

Final pH 5.6±0.2 at 25°C

Appendix C-6. Microbial Enumeration for S06E001025 and S06E001026

Microbial Plate Counts							
The plates were inoculated on June 28, 2006, put in a closed container, and read on July 3, 2006.							
The samples were suspended in 2 mL of sterile PBS							
Sample number							
S06E001025 (brown crystal material)							
Agar	Dilution	colony-forming-units, CFU			Average (CFU)	Sample Weight (gram)	CFU/gram[a]
		rep 1	rep 2	rep 3			
TSA	10[b]	120	104	Contaminated[c]	112	0.145	**1.5E+03**
	100	1	1				
	1000	NG[d]	NG				
SAB	10	NG	NG		0	0.145	**bd[e]**
	100	NG	NG				
	1000	NG	NG				
S06E001026 (floor material)							
TSA	10	65	78	Not Counted[f]	72	0.132	**1.1E+03**
	100	NG	NG				
	1000	NG	NG				
SAB	10	39	1		39	0.132	**5.9E+02**
	100	NG	NG				
	1000	NG	NG				
(a): CFU/gm = (Average CFU/plate) x (plate/1mL) x (2 mL/mass in gram)							
(b): 1 mL of initial dilution (weighed out mass diluted in 2 ml PBS)							
(c): The third replicate (rep 3) from the sample was overgrown with bacterial colonies (*Proteus sp.*) and not countable, likely caused by airborne contamination. Statistically significant counts range from 30 to 300 CFUs.							
(d) NG = No growth							
(e) below detecting limit of 4.1E+00 CFU/gram							
(f) Replication 3 was overpopulated (not contaminated) when first prepared and unable to distinguish individual colony foci to allow counting, possibly caused by nonhomogeneity of the sample preparation. The rep 3 of the sample preparation may have contained a microscopic particle on which a plethora of individual microbial cells were attached such that when the spread plate was created the microbial cells were spread over the surface of the agar. Excessive colony foci growth was not observable when the plate was read on three different occasions.							

Appendix C-7. Soil Sample from 300 Area as comparison for enumeration of sample microbe counts.

* 0.1 mL spread on agar plates (SAB for fungi and TSA for bacteria)										
* 10-fold serial dilutions prepared to 10^-5 with PBS (1 mL+9 mL)										
* 0.1 mL spread on agar plates (SAB for fungi and TSA for bacteria)										
* Incubation: 30 °C, in dark										
* Colony-forming-unit (CFU) counted 3 days after incubation										
Results:	TSA, CFU/plate					SAB, CFU/plate				
Dilution	rep. 1	rep. 2	rep. 3	ave	sd	rep. 1	rep. 2	rep. 3	ave	sd
10^-1	150	125	140	138.3	12.6[a]	39	30	38	35.7	4.9
10^-2	18	19	10			5	4	4		
10^-3	1	2	8			1	1	0		
10^-4	0	1	5			1	0	0		
10^-5	0	0	0			0	0	0		
[b]CFU/g				**3.5E+04**					**8.9E+03**	
log(CFU/g)				**4.5**					**4.0**	
(a) Standard deviations were not carried out on higher dilutions as the counts were outside of the statistically significant 30 to 300 colonies.										
(b) CFU/g = (average CFU/plate) x (plate/0.1 mL) x (5 mL/0.2g)										

APPENDIX D
ANALYTICAL RESULTS

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DSRHardcopyWLimits 2.0
DSR.Jar v. 2.7.19

DSR - 20060609
702AZ TRAIN

Sample Group: 20060609
Core Number: 20060609
Sample Portion: Special Sample (Total)
Customer Sample ID: 702-AZ-1

Sample#	R	A#	Analyte	Unit	Control Limits Lower	Control Limits Upper	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Qual Flags
S06E001025			Actinium-228	uCi/g	None	None	n/a	<7.74E-05	<8.95E-05	n/a	n/a	n/a	n/a	8.95E-05	U
S06E001025			Aluminum-28	uCi/g	None	None	n/a	<8.10E-04	<8.04E-04	n/a	n/a	n/a	n/a	8.04E-04	U
S06E001025			Americium-241	uCi/g	None	None	n/a	<1.95E-05	<1.54E-04	n/a	n/a	n/a	n/a	1.54E-04	U
S06E001025			Americium-243	uCi/g	None	None	n/a	<1.32E-05	<8.25E-05	n/a	n/a	n/a	n/a	8.25E-05	U
S06E001025			Antimony-124	uCi/g	None	None	n/a	<1.55E-05	<1.29E-04	n/a	n/a	n/a	n/a	1.29E-04	U
S06E001025			Antimony-125	uCi/g	None	None	n/a	<4.06E-05	<7.59E-04	n/a	n/a	n/a	n/a	7.59E-04	U
S06E001025			Antimony-126	uCi/g	None	None	n/a	<1.74E-05	<4.53E-05	n/a	n/a	n/a	n/a	4.53E-05	U
S06E001025			Argon-41	uCi/g	None	None	n/a	<3.45E-05	<3.62E-05	n/a	n/a	n/a	n/a	3.62E-05	U
S06E001025			Barium-133	uCi/g	None	None	n/a	<1.72E-05	<2.85E-04	n/a	n/a	n/a	n/a	2.86E-04	U
S06E001025			Barium-140	uCi/g	None	None	n/a	<5.60E-05	<6.60E-04	n/a	n/a	n/a	n/a	6.60E-04	U
S06E001025			Beryllium-7	uCi/g	None	None	n/a	<1.03E-04	<2.30E-03	n/a	n/a	n/a	n/a	2.30E-03	U
S06E001025			Bismuth-207	uCi/g	None	None	n/a	<2.51E-05	<2.83E-05	n/a	n/a	n/a	n/a	2.83E-05	U
S06E001025			Bismuth-212	uCi/g	None	None	n/a	<1.46E-04	<2.65E-04	n/a	n/a	n/a	n/a	2.65E-04	U
S06E001025			Bismuth-214	uCi/g	None	None	n/a	<3.73E-05	<2.69E-04	n/a	n/a	n/a	n/a	2.69E-04	U
S06E001025			Cadmium-109	uCi/g	None	None	n/a	<1.43E-04	<1.43E-03	n/a	n/a	n/a	n/a	1.43E-03	U
S06E001025			Cerium-139	uCi/g	None	None	n/a	<9.01E-06	<1.09E-04	n/a	n/a	n/a	n/a	1.09E-04	U
S06E001025			Cerium-141	uCi/g	None	None	n/a	<1.23E-05	<1.39E-04	n/a	n/a	n/a	n/a	1.39E-04	U
S06E001025			Cerium-144	uCi/g	None	None	n/a	<5.14E-05	<5.86E-04	n/a	n/a	n/a	n/a	5.86E-04	U
S06E001025			Cerium/Praseodymium-144	uCi/g	None	None	n/a	<1.03E-04	<1.17E-03	n/a	n/a	n/a	n/a	1.17E-03	U
S06E001025			Cesium-134	uCi/g	None	None	n/a	<1.63E-05	<1.29E-04	n/a	n/a	n/a	n/a	1.29E-04	U
S06E001025			Cesium-136	uCi/g	None	None	n/a	<1.73E-05	<2.73E-05	n/a	n/a	n/a	n/a	2.73E-05	U
S06E001025			Cesium-137	uCi/g	None	None	99.1	<1.81E-05	0.338	n/a	n/a	n/a	n/a	2.43E-04	
S06E001025			Cesium-138	uCi/g	None	None	n/a	<8.50E-05	<8.84E-05	n/a	n/a	n/a	n/a	8.84E-05	U
S06E001025			Chlorine-38	uCi/g	None	None	n/a	<1.38E-04	<1.53E-04	n/a	n/a	n/a	n/a	1.53E-04	U
S06E001025			Chromium-51	uCi/g	None	None	n/a	<1.03E-04	<1.47E-03	n/a	n/a	n/a	n/a	1.47E-03	U
S06E001025			Cobalt-56	uCi/g	None	None	n/a	<1.72E-05	<2.53E-05	n/a	n/a	n/a	n/a	2.53E-05	U
S06E001025			Cobalt-57	uCi/g	None	None	n/a	<6.84E-06	<7.27E-05	n/a	n/a	n/a	n/a	7.27E-05	U
S06E001025			Cobalt-58	uCi/g	None	None	n/a	<1.59E-05	<2.75E-05	n/a	n/a	n/a	n/a	2.75E-05	U

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DSRHardcopyWLimits 2.0
DSR.Jar v. 2.7.19

DSR - 20060609
702AZ TRAIN

Sample Group: 20060609
Core Number: 20060609
Sample Portion: Special Sample (Total)
Customer Sample ID: 702-AZ-1

Sample#	R	A#	Analyte	Unit	Control Limits Lower	Control Limits Upper	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Qual Flags
S06E001025			Cobalt-60	uCi/g	None	None	102	<1.92E-05	<2.29E-05	n/a	n/a	n/a	n/a	2.29E-05	U
S06E001025			Copper-64	uCi/g	None	None	n/a	<4.46E-03	<4.57E-03	n/a	n/a	n/a	n/a	4.57E-03	U
S06E001025			Copper-68	uCi/g	None	None	n/a	<4.55E-03	<5.14E-03	n/a	n/a	n/a	n/a	5.14E-03	U
S06E001025			Europium-152	uCi/g	None	None	n/a	<9.51E-05	<1.02E-04	n/a	n/a	n/a	n/a	1.02E-04	U
S06E001025			Europium-154	uCi/g	None	None	n/a	<6.13E-05	<6.79E-05	n/a	n/a	n/a	n/a	6.79E-05	U
S06E001025			Europium-155	uCi/g	None	None	n/a	<2.35E-05	<2.57E-04	n/a	n/a	n/a	n/a	2.57E-04	U
S06E001025			Gold-198	uCi/g	None	None	n/a	<1.18E-05	<2.21E-04	n/a	n/a	n/a	n/a	2.21E-04	U
S06E001025			Hafnium-181	uCi/g	None	None	n/a	<1.47E-05	<2.85E-04	n/a	n/a	n/a	n/a	2.85E-04	U
S06E001025			Iodine-129	uCi/g	None	None	n/a	<1.33E-04	<1.01E-03	n/a	n/a	n/a	n/a	1.01E-03	U
S06E001025			Iodine-131	uCi/g	None	None	n/a	<1.33E-05	<2.18E-04	n/a	n/a	n/a	n/a	2.18E-04	U
S06E001025			Iron-59	uCi/g	None	None	n/a	<3.86E-05	<4.00E-05	n/a	n/a	n/a	n/a	4.00E-05	U
S06E001025			Krypton-85	uCi/g	None	None	n/a	<4.20E-03	<0.0439	n/a	n/a	n/a	n/a	0.0439	U
S06E001025			Lanthanum-140	uCi/g	None	None	n/a	<2.32E-05	<1.95E-05	n/a	n/a	n/a	n/a	1.95E-05	U
S06E001025			Lead-210	uCi/g	None	None	n/a	<2.66E-04	<1.66E-03	n/a	n/a	n/a	n/a	1.66E-03	U
S06E001025			Lead-212	uCi/g	None	None	n/a	<2.09E-05	<2.63E-04	n/a	n/a	n/a	n/a	2.63E-04	U
S06E001025			Lead-214	uCi/g	None	None	n/a	<3.11E-05	<4.53E-04	n/a	n/a	n/a	n/a	4.53E-04	U
S06E001025			Manganese-54	uCi/g	None	None	n/a	<1.75E-05	<2.58E-05	n/a	n/a	n/a	n/a	2.58E-05	U
S06E001025			Manganese-56	uCi/g	None	None	n/a	<2.38E-05	<3.53E-05	n/a	n/a	n/a	n/a	3.53E-05	U
S06E001025			Mercury-203	uCi/g	None	None	n/a	<1.27E-05	<1.68E-04	n/a	n/a	n/a	n/a	1.68E-04	U
S06E001025			Neptunium-237	uCi/g	None	None	n/a	<4.92E-05	<4.38E-04	n/a	n/a	n/a	n/a	4.38E-04	U
S06E001025			Neptunium-238	uCi/g	None	None	n/a	<6.27E-05	<7.87E-05	n/a	n/a	n/a	n/a	7.87E-05	U
S06E001025			Neptunium-239	uCi/g	None	None	n/a	<2.27E-05	<2.49E-04	n/a	n/a	n/a	n/a	2.49E-04	U
S06E001025			Niobium-94	uCi/g	None	None	n/a	<1.68E-05	<2.63E-05	n/a	n/a	n/a	n/a	2.63E-05	U
S06E001025			Plutonium-239	uCi/g	None	None	n/a	<0.0900	<1.02	n/a	n/a	n/a	n/a	1.02	U
S06E001025			Potassium-40	uCi/g	None	None	n/a	<4.56E-04	<4.32E-04	n/a	n/a	n/a	n/a	4.32E-04	U
S06E001025			Protactinium-233	uCi/g	None	None	n/a	<2.55E-05	<3.65E-04	n/a	n/a	n/a	n/a	3.65E-04	U
S06E001025			Protactinium-234	uCi/g	None	None	n/a	<3.09E-03	<3.32E-03	n/a	n/a	n/a	n/a	3.32E-03	U
S06E001025			Radium-224	uCi/g	None	None	n/a	<2.45E-04	<3.01E-03	n/a	n/a	n/a	n/a	3.01E-03	U

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DSRHardcopyWLimits 2.0
DSR.Jar v. 2.7.19

DSR - 20060609
702AZ TRAIN

Sample Group: 20060609
Core Number: 20060609
Sample Portion: Special Sample (Total)
Customer Sample ID: 702-AZ-1

Sample#	R	A#	Analyte	Unit	Control Limits		Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Qual Flags
					Lower	Upper									
S06E001025			Radium-226	uCi/g	None	None	n/a	<2.72E-04	<3.29E-03	n/a	n/a	n/a	n/a	3.29E-03	U
S06E001025			Rubidium/Rhodium-106	uCi/g	None	None	n/a	<3.04E-04	<2.51E-03	n/a	n/a	n/a	n/a	2.51E-03	U
S06E001025			Ruthenium-103	uCi/g	None	None	n/a	<1.48E-05	<2.29E-04	n/a	n/a	n/a	n/a	2.29E-04	U
S06E001025			Scandium-46	uCi/g	None	None	n/a	<2.29E-05	<2.25E-05	n/a	n/a	n/a	n/a	2.25E-05	U
S06E001025			Selenium-75	uCi/g	None	None	n/a	<1.63E-05	<2.10E-04	n/a	n/a	n/a	n/a	2.10E-04	U
S06E001025			Selenium-79	uCi/g	None	None	n/a	<1.33E-03	<0.0151	n/a	n/a	n/a	n/a	0.0151	U
S06E001025			Silver-108	uCi/g	None	None	n/a	<1.81E-05	<3.46E-05	n/a	n/a	n/a	n/a	3.46E-05	U
S06E001025			Silver-110	uCi/g	None	None	n/a	<1.65E-05	<1.32E-03	n/a	n/a	n/a	n/a	1.32E-03	U
S06E001025			Sodium-22	uCi/g	None	None	n/a	<2.11E-05	<2.34E-05	n/a	n/a	n/a	n/a	2.34E-05	U
S06E001025			Sodium-24	uCi/g	None	None	n/a	<2.08E-05	<2.16E-05	n/a	n/a	n/a	n/a	2.16E-05	U
S06E001025			Strontium-85	uCi/g	None	None	n/a	<1.82E-05	<1.90E-04	n/a	n/a	n/a	n/a	1.90E-04	U
S06E001025			Tantalum-182	uCi/g	None	None	n/a	<6.33E-05	<6.41E-05	n/a	n/a	n/a	n/a	6.41E-05	U
S06E001025			Tellurium-123	uCi/g	None	None	n/a	<9.11E-06	<1.01E-04	n/a	n/a	n/a	n/a	1.01E-04	U
S06E001025			Tellurium-125	uCi/g	None	None	n/a	<1.72E-05	<2.59E-04	n/a	n/a	n/a	n/a	2.59E-04	U
S06E001025			Thallium-208	uCi/g	None	None	n/a	<1.97E-05	<1.56E-04	n/a	n/a	n/a	n/a	1.56E-04	U
S06E001025			Thorium-228	uCi/g	None	None	n/a	<4.64E-04	<5.71E-03	n/a	n/a	n/a	n/a	5.71E-03	U
S06E001025			Thorium-229	uCi/g	None	None	n/a	<4.42E-05	<4.83E-04	n/a	n/a	n/a	n/a	4.83E-04	U
S06E001025			Thorium-234	uCi/g	None	None	n/a	<1.85E-04	<1.42E-03	n/a	n/a	n/a	n/a	1.42E-03	U
S06E001025			Tin-113	uCi/g	None	None	n/a	<1.67E-05	<2.96E-04	n/a	n/a	n/a	n/a	2.96E-04	U
S06E001025			Tin-126	uCi/g	None	None	n/a	<1.19E-05	<1.16E-04	n/a	n/a	n/a	n/a	1.16E-04	U
S06E001025			Uranium-232	uCi/g	None	None	n/a	<3.74E-03	<0.0280	n/a	n/a	n/a	n/a	0.0280	U
S06E001025			Uranium-235	uCi/g	None	None	n/a	<1.67E-05	<1.98E-04	n/a	n/a	n/a	n/a	1.98E-04	U
S06E001025			Uranium-237	uCi/g	None	None	n/a	<1.92E-05	<2.17E-04	n/a	n/a	n/a	n/a	2.17E-04	U
S06E001025			Uranium/Thorium-233	uCi/g	None	None	n/a	<7.70E-03	<0.109	n/a	n/a	n/a	n/a	0.109	U
S06E001025			Xenon-131	uCi/g	None	None	n/a	<3.68E-04	<4.44E-03	n/a	n/a	n/a	n/a	4.44E-03	U
S06E001025			Yttrium-88	uCi/g	None	None	n/a	<1.68E-05	<1.48E-05	n/a	n/a	n/a	n/a	1.48E-05	U
S06E001025			Yttrium-91	uCi/g	None	None	n/a	<7.67E-03	<6.91E-03	n/a	n/a	n/a	n/a	6.91E-03	U
S06E001025			Zinc-65	uCi/g	None	None	n/a	<4.41E-05	<4.41E-05	n/a	n/a	n/a	n/a	4.41E-05	U

Limit Violated

DSR - 20060609
702AZ TRAIN

Sample Group: 20060609
Core Number: 20060609
Sample Portion: Special Sample (Total)
Customer Sample ID: 702-AZ-1

Sample#	R	A#	Analyte	Unit	Control Limits Lower	Control Limits Upper	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Qual Flags
S06E001025			Zirconium/Niobium-95	uCi/g	None	None	n/a	<3.27E-05	<5.68E-05	n/a	n/a	n/a	n/a	5.68E-05	U
S06E001025			pH	pH	None	None	n/a	n/a	3.93	3.95	3.94	0.508	n/a	0.0100	
S06E001025			Polarized Light Microscopy		None	None	n/a	n/a	Complete	n/a	n/a	n/a	n/a	n/a	
S06E001025			Scanning Electron Microscope		None	None	n/a	n/a	Complete	n/a	n/a	n/a	n/a	n/a	
S06E001025			Phase ID by X-ray Diffraction		None	None	n/a	n/a	Complete	n/a	n/a	n/a	n/a	n/a	
S06E001025			Differential Scanning Calorimetry E	Joules/g	None	None	n/a	n/a	9.05E+02	1.04E+03	9.73E+02	14.0	n/a	n/a	
S06E001025			%WATER	%	None	None	99.0	n/a	100	100	100	0.100	n/a	0.0100	
S06E001025			Total Inorganic Carbon	ug/g	None	None	101	<5.00	224	285	254	24.0	101	42.0	J
S06E001025			Total Organic Carbon	ug/g	None	None	95.0	<40.0	2.32E+04	2.38E+04	2.35E+04	2.55	54.7	336	
S06E001027		O	PCB Prep for Screening		None	None	n/a	n/a	EGATIVE	n/a	n/a	n/a	n/a	0.0100	Q
S06E001046			Differential Scanning Calorimetry E	Joules/g	None	None	n/a	n/a	523	n/a	n/a	n/a	n/a	n/a	

Customer Sample ID: 702-AZ-1 ACID

Sample#	R	A#	Analyte	Unit	Control Limits Lower	Control Limits Upper	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Qual Flags
S06E001035		A	Aluminium	ug/g	None	None	97.2	<0.0270	<5.37	<5.20	n/a	3.33	94.9	5.37	U
S06E001035		A	Antimony	ug/g	None	None	92.9	<0.0280	<5.57	<5.39	n/a	3.33	91.3	5.67	U
S06E001035		A	Arsenic	ug/g	None	None	103	<0.0590	<11.7	<11.4	n/a	3.33	102	11.7	U
S06E001035		A	Barium	ug/g	None	None	96.6	<7.00E-03	7.53	7.05	7.29	6.60	93.4	1.39	J
S06E001035		A	Beryllium	ug/g	None	None	104	<1.20E-03	<0.239	<0.231	n/a	3.33	99.9	0.239	U
S06E001035		A	Bismuth	ug/g	None	None	90.1	<0.102	<20.3	<19.6	n/a	3.32	86.6	20.3	U
S06E001035		A	Boron	ug/g	None	None	92.1	<0.0180	534	505	519	5.59	95.5	3.58	
S06E001035		A	Cadmium	ug/g	None	None	92.9	<3.00E-03	<0.597	<0.577	n/a	3.33	90.7	0.597	U
S06E001035		A	Calcium	ug/g	None	None	116	<0.0800	1.36E+03	1.33E+03	1.34E+03	2.63	131	15.9	be
S06E001035		A	Cerium	ug/g	None	None	96.1	<0.0150	<2.98	<2.89	n/a	3.33	92.8	2.98	U
S06E001035		A	Chromium	ug/g	None	None	96.5	<0.0140	12.0	<2.69	7.35	127	92.8	2.79	J
S06E001035		A	Cobalt	ug/g	None	None	94.2	<8.00E-03	<1.59	<1.54	n/a	3.32	91.7	1.59	U
S06E001035		A	Copper	ug/g	None	None	94.7	<0.0140	14.1	13.5	13.8	3.74	92.2	2.79	J

Limit Violated

DSR - 20060609
702AZ TRAIN

Sample Group: 20060609
Core Number: 20060609
Sample Portion: Special Sample (Total)
Customer Sample ID: 702-AZ-1 ACID

Sample#	R	A#	Analyte	Unit	Control Limits Lower	Control Limits Upper	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Qual Flags
S06E001035		A	Europium	ug/g	None	None	94.8	<1.00E-03	0.412	0.294	0.353	33.2	91.7	0.199	J
S06E001035		A	Iron	ug/g	None	None	94.6	<0.0130	29.8	30.2	30.0	1.54	90.4	2.59	
S06E001035		A	Lanthanum	ug/g	None	None	95.2	<8.00E-03	<1.59	<1.54	n/a	3.32	92.0	1.59	U
S06E001035		A	Lead	ug/g	None	None	92.7	<0.0360	<7.16	<6.93	n/a	3.33	90.6	7.16	U
S06E001035		A	Lithium	ug/g	None	None	98.7	<9.00E-03	<1.79	<1.73	n/a	3.33	95.3	1.79	U
S06E001035		A	Magnesium	ug/g	None	None	89.4	<0.0150	1.01E+03	9.77E+02	9.96E+02	3.83	100	2.98	
S06E001035		A	Manganese	ug/g	None	None	94.5	<7.00E-03	4.04	3.82	3.93	5.47	91.6	1.39	J
S06E001035		A	Molybdenum	ug/g	None	None	95.2	<3.00E-03	2.63	2.33	2.48	12.3	92.6	0.597	J
S06E001035		A	Neodymium	ug/g	None	None	94.1	<8.00E-03	<1.59	<1.54	n/a	3.32	91.0	1.59	U
S06E001035		A	Nickel	ug/g	None	None	94.2	<0.0220	<4.38	<4.23	n/a	3.33	91.2	4.38	U
S06E001035		A	Phosphorus	ug/g	None	None	94.7	<0.0430	418	401	409	4.16	94.8	8.56	
S06E001035		A	Potassium	ug/g	None	None	99.7	<0.295	1.42E+03	1.38E+03	1.40E+03	3.03	99.2	58.7	
S06E001035		A	Samarium	ug/g	None	None	96.0	<0.0170	<3.38	<3.27	n/a	3.33	92.7	3.38	U
S06E001035		A	Selenium	ug/g	None	None	93.8	<0.0640	<12.7	<12.3	n/a	3.33	96.1	12.7	U
S06E001035		A	Silicon	ug/g	None	None	84.6	<0.0460	13.5	12.1	12.8	10.8	81.6	9.15	J
S06E001035		A	Silver	ug/g	None	None	93.3	<4.00E-03	<0.796	<0.770	n/a	3.33	90.5	0.796	U
S06E001035		A	Sodium	ug/g	None	None	96.6	<0.0420	3.88E+04	3.05E+04	3.46E+04	24.1	1.20E+03	8.36	cf
S06E001035		A	Strontium	ug/g	None	None	96.7	<7.00E-03	1.67	1.58	1.62	5.01	93.5	1.39	J
S06E001035		A	Sulfur	ug/g	None	None	88.7	<0.0580	366	358	362	2.20	94.3	11.5	
S06E001035		A	Thallium	ug/g	None	None	104	<0.0560	<11.1	<10.8	n/a	3.33	98.4	11.1	U
S06E001035		A	Thorium	ug/g	None	None	87.2	<9.00E-03	<1.79	<1.73	n/a	3.33	85.2	1.79	U
S06E001035		A	Titanium	ug/g	None	None	95.8	<2.00E-03	<0.398	<0.385	n/a	3.33	93.0	0.398	U
S06E001035		A	Uranium	ug/g	None	None	92.1	<0.0310	<6.17	8.64	7.40	33.3	89.6	6.17	U
S06E001035		A	Vanadium	ug/g	None	None	96.7	<6.00E-03	<1.19	<1.15	n/a	3.33	94.2	1.19	U
S06E001035		A	Yttrium	ug/g	None	None	94.5	<0.0110	<2.19	<2.12	n/a	3.33	91.6	2.19	U
S06E001035		A	Zinc	ug/g	None	None	91.2	0.105	27.8	27.3	27.5	1.64	87.3	0.796	B
S06E001035		A	Zirconium	ug/g	None	None	99.6	<2.00E-03	<0.398	<0.385	n/a	3.33	96.6	0.398	U

Limit Violated

DSR - 20060609
702AZ TRAIN

Sample Group: 20060609
Core Number: 20060609
Sample Portion: Special Sample (Total)
Customer Sample ID: 702-AZ-1 NH4

Sample#	R	A#	Analyte	Unit	Control Limits Lower	Control Limits Upper	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Qual Flags
S06E001034		S	Ammonium Ion	ug/g	None	None	102	<6.44E-03	1.97E+05	1.64E+05	1.81E+05	18.2	115	0.725	

Customer Sample ID: 702-AZ-1 SVOA

Sample#	R	A#	Analyte	Unit	Control Limits Lower	Control Limits Upper	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Qual Flags
S06E001037			Alpha/Beta Organic Scan		None	None	n/a	n/a	Complete	n/a	n/a	n/a	n/a	n/a	
S06E001037		O	1,2,4-Trichlorobenzene	ug/Kg	None	None	74.8	<1.62E+03	<908	n/a	n/a	n/a	79.9	908	U
S06E001037		O	1,2-Dichlorobenzene	ug/Kg	None	None	n/a	<2.76E+03	<1.54E+03	n/a	n/a	n/a	n/a	1.54E+03	U
S06E001037		O	1,4-Dichlorobenzene	ug/Kg	None	None	71.3	<1.67E+03	<935	n/a	n/a	n/a	72.9	935	U
S06E001037		O	2,2'-oxybis(1-Chloropropane)	ug/Kg	None	None	n/a	<1.98E+03	<1.11E+03	n/a	n/a	n/a	n/a	1.11E+03	U
S06E001037		O	2,4,5-Trichlorophenol	ug/Kg	None	None	n/a	<1.56E+03	<873	n/a	n/a	n/a	n/a	873	U
S06E001037		O	2,4,6-Trichlorophenol	ug/Kg	None	None	n/a	<1.62E+03	<905	n/a	n/a	n/a	n/a	905	U
S06E001037		O	2,4-Dichlorophenol	ug/Kg	None	None	n/a	<1.51E+03	<846	n/a	n/a	n/a	n/a	846	U
S06E001037		O	2,4-Dimethylphenol	ug/Kg	None	None	n/a	<1.18E+03	<661	n/a	n/a	n/a	n/a	661	U
S06E001037		O	2,4-Dinitrophenol	ug/Kg	None	None	n/a	<823	<461	n/a	n/a	n/a	n/a	461	U
S06E001037		O	2,4-Dinitrotoluene	ug/Kg	None	None	97.0	<1.79E+03	<999	n/a	n/a	n/a	95.7	999	U
S06E001037		O	2,6-Dinitrotoluene	ug/Kg	None	None	n/a	<1.72E+03	<962	n/a	n/a	n/a	n/a	962	U
S06E001037		O	2-Butoxyethanol	ug/Kg	None	None	n/a	<3.01E+04	<1.68E+04	n/a	n/a	n/a	n/a	1.68E+04	U
S06E001037		O	2-Chloronaphthalene	ug/Kg	None	None	n/a	<1.64E+03	<919	n/a	n/a	n/a	n/a	919	U
S06E001037		O	2-Chlorophenol	ug/Kg	None	None	78.2	<1.63E+03	<914	n/a	n/a	n/a	89.6	914	U
S06E001037		O	2-Methylnaphthalene	ug/Kg	None	None	n/a	<1.73E+03	<969	n/a	n/a	n/a	n/a	969	U
S06E001037		O	2-Methylphenol	ug/Kg	None	None	n/a	<1.70E+03	<952	n/a	n/a	n/a	n/a	952	U
S06E001037		O	2-Nitroaniline	ug/Kg	None	None	n/a	<1.75E+03	<980	n/a	n/a	n/a	n/a	980	U
S06E001037		O	2-Nitrophenol	ug/Kg	None	None	n/a	<1.50E+03	<840	n/a	n/a	n/a	n/a	840	U
S06E001037		O	3 & 4 Methylphenol Total	ug/Kg	None	None	n/a	<1.65E+03	<922	n/a	n/a	n/a	n/a	922	U
S06E001037		O	3-Nitroaniline	ug/Kg	None	None	n/a	<987	<552	n/a	n/a	n/a	n/a	552	U
S06E001037		O	4,6-Dinitro-2-methylphenol	ug/Kg	None	None	n/a	<1.19E+03	<663	n/a	n/a	n/a	n/a	663	U
S06E001037		O	4-Bromophenyl-phenylether	ug/Kg	None	None	n/a	<1.72E+03	<963	n/a	n/a	n/a	n/a	963	U

Limit Violated

DSR - 20060609
702AZ TRAIN

Sample Group: 20060609
Core Number: 20060609
Sample Portion: Special Sample (Total)
Customer Sample ID: 702-AZ-1 SVOA

Sample#	R	A#	Analyte	Unit	Control Limits Lower	Control Limits Upper	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Qual Flags
S06E001037		O	4-Chloro-3-methylphenol	ug/Kg	None	None	69.1	<1.68E+03	<938	n/a	n/a	n/a	87.6	938	U
S06E001037		O	4-Chloroaniline	ug/Kg	None	None	n/a	<3.45E+03	<1.93E+03	n/a	n/a	n/a	n/a	1.93E+03	U
S06E001037		O	4-Chlorophenyl-phenylether	ug/Kg	None	None	n/a	<1.71E+03	<958	n/a	n/a	n/a	n/a	958	U
S06E001037		O	4-Nitroaniline	ug/Kg	None	None	n/a	<2.01E+03	<1.13E+03	n/a	n/a	n/a	n/a	1.13E+03	U
S06E001037		O	4-Nitrophenol	ug/Kg	None	None	113	<1.59E+03	<888	n/a	n/a	n/a	75.5	888	U
S06E001037		O	Acenaphthene	ug/Kg	None	None	79.3	<1.73E+03	<969	n/a	n/a	n/a	87.0	969	U
S06E001037		O	Acenaphthylene	ug/Kg	None	None	n/a	<1.91E+03	<1.07E+03	n/a	n/a	n/a	n/a	1.07E+03	U
S06E001037		O	Anthracene	ug/Kg	None	None	n/a	<1.86E+03	<1.04E+03	n/a	n/a	n/a	n/a	1.04E+03	U
S06E001037		O	Benzo(a)anthracene	ug/Kg	None	None	n/a	<1.66E+03	<929	n/a	n/a	n/a	n/a	929	U
S06E001037		O	Benzo(a)pyrene	ug/Kg	None	None	n/a	<1.58E+03	<885	n/a	n/a	n/a	n/a	885	U
S06E001037		O	Benzo(b)fluoranthene	ug/Kg	None	None	n/a	<1.57E+03	<876	n/a	n/a	n/a	n/a	876	U
S06E001037		O	Benzo(g,h,i)perylene	ug/Kg	None	None	n/a	<1.58E+03	<885	n/a	n/a	n/a	n/a	885	U
S06E001037		O	Benzo(k)fluoranthene	ug/Kg	None	None	n/a	<1.64E+03	<915	n/a	n/a	n/a	n/a	915	U
S06E001037		O	Butylbenzylphthalate	ug/Kg	None	None	n/a	5.71E+03	3.36E+03	n/a	n/a	n/a	n/a	1.88E+03	BJ
S06E001037		O	Chrysene	ug/Kg	None	None	n/a	<1.63E+03	<911	n/a	n/a	n/a	n/a	911	U
S06E001037		O	Di-n-butylphthalate	ug/Kg	None	None	n/a	2.54E+04	8.31E+03	n/a	n/a	n/a	n/a	6.29E+03	BJ
S06E001037		O	Di-n-octylphthalate	ug/Kg	None	None	n/a	<2.01E+03	3.15E+03	n/a	n/a	n/a	n/a	1.12E+03	J
S06E001037		O	Dibenz(a,h)anthracene	ug/Kg	None	None	n/a	<1.54E+03	<859	n/a	n/a	n/a	n/a	859	U
S06E001037		O	Dibenzofuran	ug/Kg	None	None	n/a	<1.71E+03	<957	n/a	n/a	n/a	n/a	957	U
S06E001037		O	Diethylphthalate	ug/Kg	None	None	n/a	<2.29E+03	<1.28E+03	n/a	n/a	n/a	n/a	1.28E+03	U
S06E001037		O	Dimethylphthalate	ug/Kg	None	None	n/a	<1.75E+03	<981	n/a	n/a	n/a	n/a	981	U
S06E001037		O	Diphenylamine	ug/Kg	None	None	n/a	<6.98E+03	<3.90E+03	n/a	n/a	n/a	n/a	3.90E+03	U
S06E001037		O	Fluoranthene	ug/Kg	None	None	n/a	<1.78E+03	<993	n/a	n/a	n/a	n/a	993	U
S06E001037		O	Fluorene	ug/Kg	None	None	n/a	<1.71E+03	<959	n/a	n/a	n/a	n/a	959	U
S06E001037		O	Hexachlorobenzene	ug/Kg	None	None	n/a	<1.69E+03	<944	n/a	n/a	n/a	n/a	944	U
S06E001037		O	Hexachlorobutadiene	ug/Kg	None	None	n/a	<1.80E+03	<1.01E+03	n/a	n/a	n/a	n/a	1.01E+03	U
S06E001037		O	Hexachlorocyclopentadiene	ug/Kg	None	None	n/a	<285	<159	n/a	n/a	n/a	n/a	159	U
S06E001037		O	Hexachloroethane	ug/Kg	None	None	n/a	<1.65E+03	<924	n/a	n/a	n/a	n/a	924	U

Limit Violated

DSR - 20060609
702AZ TRAIN

Sample Group: 20060609
Core Number: 20060609
Sample Portion: Special Sample (Total)
Customer Sample ID: 702-AZ-1 SVOA

Sample#	R	A#	Analyte	Unit	Control Limits Lower	Control Limits Upper	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Qual Flags
S06E001037		O	Indeno(1,2,3-cd)pyrene	ug/Kg	None	None	n/a	<1.60E+03	<895	n/a	n/a	n/a	n/a	895	U
S06E001037		O	Isophorone	ug/Kg	None	None	n/a	<1.54E+03	<861	n/a	n/a	n/a	n/a	861	U
S06E001037		O	N-Nitrosodipropylamine	ug/Kg	None	None	80.5	<1.60E+03	<898	n/a	n/a	n/a	80.0	896	U
S06E001037		O	Naphthalene	ug/Kg	None	None	n/a	<1.72E+03	<961	n/a	n/a	n/a	n/a	961	U
S06E001037		O	Nitrobenzene	ug/Kg	None	None	n/a	<1.79E+03	<998	n/a	n/a	n/a	n/a	998	U
S06E001037		O	Pentachlorophenol	ug/Kg	None	None	88.3	<1.34E+03	<750	n/a	n/a	n/a	88.6	750	U
S06E001037		O	Phenanthrene	ug/Kg	None	None	n/a	<1.69E+03	<944	n/a	n/a	n/a	n/a	944	U
S06E001037		O	Phenol	ug/Kg	None	None	76.9	<1.65E+03	<920	n/a	n/a	n/a	92.1	920	U
S06E001037		O	Pyrene	ug/Kg	None	None	92.9	<1.72E+03	<960	n/a	n/a	n/a	115	960	U
S06E001037		O	Pyridine	ug/Kg	None	None	n/a	<1.58E+03	<884	n/a	n/a	n/a	n/a	884	U
S06E001037		O	Tri-n-butylphosphate	ug/Kg	None	None	n/a	5.38E+03	<1.21E+03	n/a	n/a	n/a	n/a	1.21E+03	U
S06E001037		O	bis(2-Chloroethoxy)methane	ug/Kg	None	None	n/a	<1.79E+03	<1.00E+03	n/a	n/a	n/a	n/a	1000	U
S06E001037		O	bis(2-Ethylhexyl)phthalate	ug/Kg	None	None	n/a	<2.49E+04	<1.39E+04	n/a	n/a	n/a	n/a	1.39E+04	U
S06E001037		O	bis-(2-Chloroethyl) ether	ug/Kg	None	None	n/a	<1.77E+03	<991	n/a	n/a	n/a	n/a	991	U

Customer Sample ID: 702-AZ-1 WATER

Sample#	R	A#	Analyte	Unit	Control Limits Lower	Control Limits Upper	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Qual Flags
S06E001036		W	Nitrate	ug/g	None	None	101	<6.95	5.98E+05	6.34E+05	6.16E+05	5.93	104	5.59E+03	
S06E001036		W	Acetate	ug/g	None	None	96.9	<578	<2.36E+03	<2.34E+03	n/a	0.838	106	2.36E+03	U
S06E001036		W	Bromide	ug/g	None	None	99.9	<312	<1.27E+03	<1.26E+03	n/a	0.834	101	1.27E+03	U
S06E001036		W	Chloride	ug/g	None	None	106	<0.850	2.17E+03	1.25E+03	1.71E+03	54.2	98.9	173	c
S06E001036		W	Fluoride	ug/g	None	None	101	<30.0	<122	<121	n/a	0.838	103	122	U
S06E001036		W	Formate	ug/g	None	None	104	<11.6	<2.36E+03	<2.34E+03	n/a	0.838	107	2.36E+03	U
S06E001036		W	Glycolate	ug/g	None	None	99.2	<476	<1.95E+03	<1.93E+03	n/a	0.836	105	1.95E+03	U
S06E001036		W	Nitrite	ug/g	None	None	102	<5.40	<1.10E+03	<1.09E+03	n/a	0.835	103	1.10E+03	U
S06E001036		W	Oxalate	ug/g	None	None	98.5	<5.25	<1.07E+03	<1.06E+03	n/a	0.832	100	1.07E+03	U
S06E001036		W	Phosphate	ug/g	None	None	102	<302	<1.23E+03	<1.22E+03	n/a	0.839	103	1.23E+03	U

Limit Violated

DSR - 20060609
702AZ TRAIN

Sample Group: 20060609
Core Number: 20060609
Sample Portion: Special Sample (Total)
Customer Sample ID: 702-AZ-1 WATER

Sample#	R	A#	Analyte	Unit	Control Limits Lower	Control Limits Upper	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Qual Flags
S06E001036		W	Sulfate	ug/g	None	None	102	<6.90	<1.41E+03	<1.40E+03	n/a	0.838	106	1.41E+03	U

Customer Sample ID: 702-AZ-2

Sample#	R	A#	Analyte	Unit	Control Limits Lower	Control Limits Upper	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Qual Flags
S06E001026			Actinium-228	uCi/g	None	None	n/a	<7.74E-05	<2.50E-04	n/a	n/a	n/a	n/a	2.50E-04	U
S06E001026			Aluminum-28	uCi/g	None	None	n/a	<8.10E-04	<2.51E-03	n/a	n/a	n/a	n/a	2.51E-03	U
S06E001026			Americium-241	uCi/g	None	None	n/a	<1.95E-05	<3.84E-04	n/a	n/a	n/a	n/a	3.84E-04	U
S06E001026			Americium-243	uCi/g	None	None	n/a	<1.32E-05	<3.32E-04	n/a	n/a	n/a	n/a	3.32E-04	U
S06E001026			Antimony-124	uCi/g	None	None	n/a	<1.55E-05	<2.88E-04	n/a	n/a	n/a	n/a	2.88E-04	U
S06E001026			Antimony-125	uCi/g	None	None	n/a	<4.06E-05	<1.83E-03	n/a	n/a	n/a	n/a	1.83E-03	U
S06E001026			Antimony-126	uCi/g	None	None	n/a	<1.74E-05	<1.03E-04	n/a	n/a	n/a	n/a	1.03E-04	U
S06E001026			Argon-41	uCi/g	None	None	n/a	<3.46E-05	<1.14E-04	n/a	n/a	n/a	n/a	1.14E-04	U
S06E001026			Barium-133	uCi/g	None	None	n/a	<1.72E-05	<6.80E-04	n/a	n/a	n/a	n/a	6.80E-04	U
S06E001026			Barium-140	uCi/g	None	None	n/a	<5.60E-05	<1.55E-03	n/a	n/a	n/a	n/a	1.55E-03	U
S06E001026			Beryllium-7	uCi/g	None	None	n/a	<1.03E-04	<5.62E-03	n/a	n/a	n/a	n/a	5.62E-03	U
S06E001026			Bismuth-207	uCi/g	None	None	n/a	<2.51E-05	<8.87E-05	n/a	n/a	n/a	n/a	8.87E-05	U
S06E001026			Bismuth-212	uCi/g	None	None	n/a	<1.46E-04	<6.12E-04	n/a	n/a	n/a	n/a	6.12E-04	U
S06E001026			Bismuth-214	uCi/g	None	None	n/a	<3.73E-05	<5.99E-04	n/a	n/a	n/a	n/a	5.99E-04	U
S06E001026			Cadmium-109	uCi/g	None	None	n/a	<1.43E-04	<3.48E-03	n/a	n/a	n/a	n/a	3.48E-03	U
S06E001026			Cerium-139	uCi/g	None	None	n/a	<9.01E-06	<2.60E-04	n/a	n/a	n/a	n/a	2.60E-04	U
S06E001026			Cerium-141	uCi/g	None	None	n/a	<1.23E-05	<3.34E-04	n/a	n/a	n/a	n/a	3.34E-04	U
S06E001026			Cerium-144	uCi/g	None	None	n/a	<5.14E-05	<1.40E-03	n/a	n/a	n/a	n/a	1.40E-03	U
S06E001026			Cerium/Praseodymium-144	uCi/g	None	None	n/a	<1.03E-04	<2.81E-03	n/a	n/a	n/a	n/a	2.81E-03	U
S06E001026			Cesium-134	uCi/g	None	None	n/a	<1.63E-05	<2.87E-04	n/a	n/a	n/a	n/a	2.87E-04	U
S06E001026			Cesium-136	uCi/g	None	None	n/a	<1.73E-05	<6.37E-05	n/a	n/a	n/a	n/a	6.37E-05	U
S06E001026			Cesium-137	uCi/g	None	None	99.1	<1.81E-05	0.638	n/a	n/a	n/a	n/a	5.65E-04	
S06E001026			Cesium-138	uCi/g	None	None	n/a	<8.50E-05	<2.26E-04	n/a	n/a	n/a	n/a	2.26E-04	U

Limit Violated

DSR - 20060609
702AZ TRAIN

Sample Group: 20060609
Core Number: 20060609
Sample Portion: Special Sample (Total)
Customer Sample ID: 702-AZ-2

Sample#	R	A#	Analyte	Unit	Control Limits Lower	Control Limits Upper	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Qual Flags
S06E001026			Chlorine-38	uCi/g	None	None	n/a	<1.39E-04	<5.00E-04	n/a	n/a	n/a	n/a	5.00E-04	U
S06E001026			Chromium-51	uCi/g	None	None	n/a	<1.03E-04	<3.49E-03	n/a	n/a	n/a	n/a	3.49E-03	U
S06E001026			Cobalt-56	uCi/g	None	None	n/a	<1.72E-05	<6.33E-05	n/a	n/a	n/a	n/a	6.33E-05	U
S06E001026			Cobalt-57	uCi/g	None	None	n/a	<6.64E-05	<1.74E-04	n/a	n/a	n/a	n/a	1.74E-04	U
S06E001026			Cobalt-58	uCi/g	None	None	n/a	<1.59E-05	<6.40E-05	n/a	n/a	n/a	n/a	6.40E-05	U
S06E001026			Cobalt-60	uCi/g	None	None	102	<1.92E-05	<6.17E-05	n/a	n/a	n/a	n/a	6.17E-05	U
S06E001026			Copper-64	uCi/g	None	None	n/a	<4.46E-03	<0.0142	n/a	n/a	n/a	n/a	0.0142	U
S06E001026			Copper-65	uCi/g	None	None	n/a	<4.55E-03	<0.0154	n/a	n/a	n/a	n/a	0.0154	U
S06E001026			Europium-152	uCi/g	None	None	n/a	<9.51E-05	<2.98E-04	n/a	n/a	n/a	n/a	2.98E-04	U
S06E001026			Europium-154	uCi/g	None	None	n/a	<6.13E-05	<2.23E-04	n/a	n/a	n/a	n/a	2.23E-04	U
S06E001026			Europium-155	uCi/g	None	None	n/a	<2.35E-05	<6.20E-04	n/a	n/a	n/a	n/a	6.20E-04	U
S06E001026			Gold-198	uCi/g	None	None	n/a	<1.18E-05	<5.25E-04	n/a	n/a	n/a	n/a	5.25E-04	U
S06E001026			Hafnium-181	uCi/g	None	None	n/a	<1.47E-05	<6.95E-04	n/a	n/a	n/a	n/a	6.95E-04	U
S06E001026			Iodine-129	uCi/g	None	None	n/a	<1.33E-04	<2.62E-03	n/a	n/a	n/a	n/a	2.62E-03	U
S06E001026			Iodine-131	uCi/g	None	None	n/a	<1.33E-05	<5.17E-04	n/a	n/a	n/a	n/a	5.17E-04	U
S06E001026			Iron-59	uCi/g	None	None	n/a	<3.86E-05	<1.17E-04	n/a	n/a	n/a	n/a	1.17E-04	U
S06E001026			Krypton-85	uCi/g	None	None	n/a	<4.20E-03	<0.106	n/a	n/a	n/a	n/a	0.106	U
S06E001026			Lanthanum-140	uCi/g	None	None	n/a	<2.32E-05	<6.39E-05	n/a	n/a	n/a	n/a	6.39E-05	U
S06E001026			Lead-210	uCi/g	None	None	n/a	<2.66E-04	<4.24E-03	n/a	n/a	n/a	n/a	4.24E-03	U
S06E001026			Lead-212	uCi/g	None	None	n/a	<2.09E-05	<6.40E-04	n/a	n/a	n/a	n/a	6.40E-04	U
S06E001026			Lead-214	uCi/g	None	None	n/a	<3.11E-05	<1.08E-03	n/a	n/a	n/a	n/a	1.08E-03	U
S06E001026			Manganese-54	uCi/g	None	None	n/a	<1.75E-05	<6.63E-05	n/a	n/a	n/a	n/a	6.63E-05	U
S06E001026			Manganese-56	uCi/g	None	None	n/a	<2.38E-05	<8.81E-05	n/a	n/a	n/a	n/a	8.81E-05	U
S06E001026			Mercury-203	uCi/g	None	None	n/a	<1.27E-05	<4.04E-04	n/a	n/a	n/a	n/a	4.04E-04	U
S06E001026			Neptunium-237	uCi/g	None	None	n/a	<4.92E-05	<1.06E-03	n/a	n/a	n/a	n/a	1.06E-03	U
S06E001026			Neptunium-238	uCi/g	None	None	n/a	<6.27E-05	<2.11E-04	n/a	n/a	n/a	n/a	2.11E-04	U
S06E001026			Neptunium-239	uCi/g	None	None	n/a	<2.27E-05	<6.01E-04	n/a	n/a	n/a	n/a	6.01E-04	U
S06E001026			Niobium-94	uCi/g	None	None	n/a	<1.68E-05	<6.76E-05	n/a	n/a	n/a	n/a	6.76E-05	U

Limit Violated

DSR - 20060609
702AZ TRAIN

Sample Group: 20060609
Core Number: 20060609
Sample Portion: Special Sample (Total)
Customer Sample ID: 702-AZ-2

Sample#	R	A#	Analyte	Unit	Control Limits Lower	Control Limits Upper	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Qual Flags
S06E001026			Plutonium-239	uCi/g	None	None	n/a	<0.0900	<2.46	n/a	n/a	n/a	n/a	2.46	U
S06E001026			Potassium-40	uCi/g	None	None	n/a	<4.56E-04	<1.48E-03	n/a	n/a	n/a	n/a	1.48E-03	U
S06E001026			Protactinium-233	uCi/g	None	None	n/a	<2.55E-05	<8.69E-04	n/a	n/a	n/a	n/a	8.69E-04	U
S06E001026			Protactinium-234	uCi/g	None	None	n/a	<3.09E-03	<0.0104	n/a	n/a	n/a	n/a	0.0104	U
S06E001026			Radium-224	uCi/g	None	None	n/a	<2.45E-04	<7.30E-03	n/a	n/a	n/a	n/a	7.30E-03	U
S06E001026			Radium-226	uCi/g	None	None	n/a	<2.72E-04	<7.84E-03	n/a	n/a	n/a	n/a	7.84E-03	U
S06E001026			Rubidium/Rhodium-106	uCi/g	None	None	n/a	<3.04E-04	<5.43E-03	n/a	n/a	n/a	n/a	5.43E-03	U
S06E001026			Ruthenium-103	uCi/g	None	None	n/a	<1.48E-05	<5.50E-04	n/a	n/a	n/a	n/a	5.50E-04	U
S06E001026			Scandium-46	uCi/g	None	None	n/a	<2.29E-05	<7.89E-05	n/a	n/a	n/a	n/a	7.89E-05	U
S06E001026			Selenium-75	uCi/g	None	None	n/a	<1.63E-05	<5.07E-04	n/a	n/a	n/a	n/a	5.07E-04	U
S06E001026			Selenium-79	uCi/g	None	None	n/a	<1.33E-03	<0.0366	n/a	n/a	n/a	n/a	0.0366	U
S06E001026			Silver-108	uCi/g	None	None	n/a	<1.81E-05	<8.11E-05	n/a	n/a	n/a	n/a	8.11E-05	U
S06E001026			Silver-110	uCi/g	None	None	n/a	<1.65E-05	<3.24E-03	n/a	n/a	n/a	n/a	3.24E-03	U
S06E001026			Sodium-22	uCi/g	None	None	n/a	<2.11E-05	<7.67E-05	n/a	n/a	n/a	n/a	7.67E-05	U
S06E001026			Sodium-24	uCi/g	None	None	n/a	<2.08E-05	<6.85E-05	n/a	n/a	n/a	n/a	6.85E-05	U
S06E001026			Strontium-85	uCi/g	None	None	n/a	<1.82E-05	<4.58E-04	n/a	n/a	n/a	n/a	4.58E-04	U
S06E001026			Tantalum-182	uCi/g	None	None	n/a	<6.33E-05	<2.23E-04	n/a	n/a	n/a	n/a	2.23E-04	U
S06E001026			Tellurium-123	uCi/g	None	None	n/a	<9.11E-06	<2.42E-04	n/a	n/a	n/a	n/a	2.42E-04	U
S06E001026			Tellurium-125	uCi/g	None	None	n/a	<1.72E-05	<6.79E-04	n/a	n/a	n/a	n/a	6.79E-04	U
S06E001026			Thallium-208	uCi/g	None	None	n/a	<1.97E-05	<3.58E-04	n/a	n/a	n/a	n/a	3.58E-04	U
S06E001026			Thorium-228	uCi/g	None	None	n/a	<4.64E-04	<0.0103	n/a	n/a	n/a	n/a	0.0103	U
S06E001026			Thorium-229	uCi/g	None	None	n/a	<4.42E-05	<1.18E-03	n/a	n/a	n/a	n/a	1.18E-03	U
S06E001026			Thorium-234	uCi/g	None	None	n/a	<1.85E-04	<3.55E-03	n/a	n/a	n/a	n/a	3.55E-03	U
S06E001026			Tin-113	uCi/g	None	None	n/a	<1.67E-05	<7.03E-04	n/a	n/a	n/a	n/a	7.03E-04	U
S06E001026			Tin-126	uCi/g	None	None	n/a	<1.19E-05	<2.82E-04	n/a	n/a	n/a	n/a	2.82E-04	U
S06E001026			Uranium-232	uCi/g	None	None	n/a	<3.74E-03	<0.0701	n/a	n/a	n/a	n/a	0.0701	U
S06E001026			Uranium-235	uCi/g	None	None	n/a	<1.67E-05	<4.73E-04	n/a	n/a	n/a	n/a	4.73E-04	U
S06E001026			Uranium-237	uCi/g	None	None	n/a	<1.92E-05	<5.27E-04	n/a	n/a	n/a	n/a	5.27E-04	U

Limit Violated

DSR - 20060609
702AZ TRAIN

Sample Group: 20060609
Core Number: 20060609
Sample Portion: Special Sample (Total)
Customer Sample ID: 702-AZ-2

Sample#	R	A#	Analyte	Unit	Control Limits Lower	Control Limits Upper	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Qual Flags
S06E001026			Uranium/Thorium-233	uCi/g	None	None	n/a	<7.70E-03	<0.264	n/a	n/a	n/a	n/a	0.264	U
S06E001026			Xenon-131	uCi/g	None	None	n/a	<3.68E-04	<0.0106	n/a	n/a	n/a	n/a	0.0106	U
S06E001026			Yttrium-88	uCi/g	None	None	n/a	<1.68E-05	<6.07E-05	n/a	n/a	n/a	n/a	6.07E-05	U
S06E001026			Yttrium-91	uCi/g	None	None	n/a	<7.67E-03	<0.0259	n/a	n/a	n/a	n/a	0.0259	U
S06E001026			Zinc-65	uCi/g	None	None	n/a	<4.41E-05	<1.56E-04	n/a	n/a	n/a	n/a	1.56E-04	U
S06E001026			Zirconium/Niobium-95	uCi/g	None	None	n/a	<3.27E-05	<1.42E-04	n/a	n/a	n/a	n/a	1.42E-04	U
S06E001026			pH	pH	None	None	n/a	n/a	4.68	n/a	n/a	n/a	n/a	0.0100	
S06E001026			Polarized Light Microscopy		None	None	n/a	n/a	Complete	n/a	n/a	n/a	n/a	n/a	
S06E001026			Scanning Electron Microscope		None	None	n/a	n/a	Complete	n/a	n/a	n/a	n/a	n/a	
S06E001026			Phase ID by X-ray Diffraction		None	None	n/a	n/a	Complete	n/a	n/a	n/a	n/a	n/a	
S06E001028		O	PCB Prep for Screening		None	None	n/a	n/a	EGATIVE	n/a	n/a	n/a	n/a	0.0100	Q

Customer Sample ID: 702-AZ-2/3

Sample#	R	A#	Analyte	Unit	Control Limits Lower	Control Limits Upper	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Qual Flags
S06E001042			Differential Scanning Calorimetry E	Joules/g	None	None	n/a	n/a	1.16E+03	n/a	n/a	n/a	n/a	n/a	
S06E001042			Polarized Light Microscopy		None	None	n/a	n/a	Complete	n/a	n/a	n/a	n/a	n/a	
S06E001042			Scanning Electron Microscope		None	None	n/a	n/a	Complete	n/a	n/a	n/a	n/a	n/a	
S06E001042			%WATER	%	None	None	97.6	n/a	78.9	80.6	79.7	2.10	n/a	0.0100	
S06E001042			Total Inorganic Carbon	ug/g	None	None	96.6	<5.00	179	227	203	23.6	94.8	70.0	J
S06E001042			Total Organic Carbon	ug/g	None	None	87.9	<40.0	8.32E+04	8.54E+04	8.43E+04	2.61	-379	564	
S06E001042			Phase ID by X-ray Diffraction		None	None	n/a	n/a	Complete	n/a	n/a	n/a	n/a	n/a	
S06E001046			Differential Scanning Calorimetry E	Joules/g	None	None	n/a	n/a	1.87E+03	n/a	n/a	n/a	n/a	n/a	

Customer Sample ID: 702-AZ-2/3 ACID

Sample#	R	A#	Analyte	Unit	Control Limits Lower	Control Limits Upper	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Qual Flags
S06E001039		A	Aluminium	ug/g	None	None	97.2	<0.0270	74.5	n/a	n/a	n/a	n/a	5.20	

Limit Violated

DSR - 20060609
702AZ TRAIN

Sample Group: 20060609
Core Number: 20060609
Sample Portion: Special Sample (Total)
Customer Sample ID: 702-AZ-2/3 ACID

Sample# R	A#	Analyte	Unit	Control Limits Lower	Control Limits Upper	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Qual Flags
S06E001039	A	Antimony	ug/g	None	None	92.9	<0.0260	<5.40	n/a	n/a	n/a	n/a	5.39	U
S06E001039	A	Arsenic	ug/g	None	None	103	<0.0590	<11.4	n/a	n/a	n/a	n/a	11.4	U
S06E001039	A	Barium	ug/g	None	None	96.6	<7.00E-03	15.8	n/a	n/a	n/a	n/a	1.35	
S06E001039	A	Beryllium	ug/g	None	None	104	<1.20E-03	<0.231	n/a	n/a	n/a	n/a	0.231	U
S06E001039	A	Bismuth	ug/g	None	None	90.1	<0.102	<19.7	n/a	n/a	n/a	n/a	19.7	U
S06E001039	A	Boron	ug/g	None	None	92.1	<0.0180	1.22E+03	n/a	n/a	n/a	n/a	3.47	
S06E001039	A	Cadmium	ug/g	None	None	92.9	<3.00E-03	<0.578	n/a	n/a	n/a	n/a	0.578	U
S06E001039	A	Calcium	ug/g	None	None	116	<0.0800	5.10E+03	n/a	n/a	n/a	n/a	15.4	
S06E001039	A	Cerium	ug/g	None	None	96.1	<0.0150	<2.89	n/a	n/a	n/a	n/a	2.89	U
S06E001039	A	Chromium	ug/g	None	None	96.5	<0.0140	4.82	n/a	n/a	n/a	n/a	2.70	J
S06E001039	A	Cobalt	ug/g	None	None	94.2	<8.00E-03	<1.54	n/a	n/a	n/a	n/a	1.54	U
S06E001039	A	Copper	ug/g	None	None	94.7	<0.0140	31.2	n/a	n/a	n/a	n/a	2.70	
S06E001039	A	Europium	ug/g	None	None	94.8	<1.00E-03	1.14	n/a	n/a	n/a	n/a	0.193	J
S06E001039	A	Iron	ug/g	None	None	94.6	<0.0130	985	n/a	n/a	n/a	n/a	2.50	
S06E001039	A	Lanthanum	ug/g	None	None	95.2	<8.00E-03	<1.54	n/a	n/a	n/a	n/a	1.54	U
S06E001039	A	Lead	ug/g	None	None	92.7	<0.0360	10.4	n/a	n/a	n/a	n/a	6.94	J
S06E001039	A	Lithium	ug/g	None	None	98.7	<9.00E-03	2.01	n/a	n/a	n/a	n/a	1.73	J
S06E001039	A	Magnesium	ug/g	None	None	89.4	<0.0150	1.99E+03	n/a	n/a	n/a	n/a	2.89	
S06E001039	A	Manganese	ug/g	None	None	94.5	<7.00E-03	21.3	n/a	n/a	n/a	n/a	1.35	
S06E001039	A	Molybdenum	ug/g	None	None	95.2	<3.00E-03	2.98	n/a	n/a	n/a	n/a	0.578	J
S06E001039	A	Neodymium	ug/g	None	None	94.1	<8.00E-03	<1.54	n/a	n/a	n/a	n/a	1.54	U
S06E001039	A	Nickel	ug/g	None	None	94.2	<0.0220	<4.24	n/a	n/a	n/a	n/a	4.24	U
S06E001039	A	Phosphorus	ug/g	None	None	94.7	<0.0430	879	n/a	n/a	n/a	n/a	8.29	
S06E001039	A	Potassium	ug/g	None	None	99.7	<0.295	2.20E+03	n/a	n/a	n/a	n/a	56.8	
S06E001039	A	Samarium	ug/g	None	None	96.0	<0.0170	<3.28	n/a	n/a	n/a	n/a	3.28	U
S06E001039	A	Selenium	ug/g	None	None	93.8	<0.0640	<12.3	n/a	n/a	n/a	n/a	12.3	U
S06E001039	A	Silicon	ug/g	None	None	84.6	<0.0460	128	n/a	n/a	n/a	n/a	8.86	
S06E001039	A	Silver	ug/g	None	None	93.3	<4.00E-03	<0.771	n/a	n/a	n/a	n/a	0.771	BU

Limit Violated

DSR - 20060609
702AZ TRAIN

Sample Group: 20060609
Core Number: 20060609
Sample Portion: Special Sample (Total)
Customer Sample ID: 702-AZ-2/3 ACID

Sample#	R	A#	Analyte	Unit	Control Limits Lower	Control Limits Upper	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Qual Flags
S06E001039		A	Sodium	ug/g	None	None	96.6	<0.0420	3.58E+04	n/a	n/a	n/a	n/a	8.09	
S06E001039		A	Strontium	ug/g	None	None	96.7	<7.00E-03	6.58	n/a	n/a	n/a	n/a	1.35	J
S06E001039		A	Sulfur	ug/g	None	None	88.7	<0.0580	976	n/a	n/a	n/a	n/a	11.2	
S06E001039		A	Thallium	ug/g	None	None	104	<0.0560	<10.8	n/a	n/a	n/a	n/a	10.8	U
S06E001039		A	Thorium	ug/g	None	None	87.2	<9.00E-03	1.80	n/a	n/a	n/a	n/a	1.73	J
S06E001039		A	Titanium	ug/g	None	None	95.8	<2.00E-03	8.40	n/a	n/a	n/a	n/a	0.385	
S06E001039		A	Uranium	ug/g	None	None	92.1	<0.0310	10.4	n/a	n/a	n/a	n/a	5.97	J
S06E001039		A	Vanadium	ug/g	None	None	96.7	<6.00E-03	<1.16	n/a	n/a	n/a	n/a	1.16	U
S06E001039		A	Yttrium	ug/g	None	None	94.5	<0.0110	<2.12	n/a	n/a	n/a	n/a	2.12	U
S06E001039		A	Zinc	ug/g	None	None	91.2	0.105	146	n/a	n/a	n/a	n/a	0.771	B
S06E001039		A	Zirconium	ug/g	None	None	99.6	<2.00E-03	0.407	n/a	n/a	n/a	n/a	0.385	J

Customer Sample ID: 702-AZ-2/3 NH4

Sample#	R	A#	Analyte	Unit	Control Limits Lower	Control Limits Upper	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Qual Flags
S06E001038		S	Ammonium Ion	ug/g	None	None	102	<6.44E-03	1.48E+05	1.30E+05	1.38E+05	10.9	n/a	0.719	

Customer Sample ID: 702-AZ-2/3 SVOA

Sample#	R	A#	Analyte	Unit	Control Limits Lower	Control Limits Upper	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Qual Flags
S06E001041			Alpha/Beta Organic Scan		None	None	n/a	n/a	Complete	n/a	n/a	n/a	n/a	n/a	
S06E001041		O	1,2,4-Trichlorobenzene	ug/Kg	None	None	74.8	<1.62E+03	<833	n/a	n/a	n/a	n/a	833	U
S06E001041		O	1,2-Dichlorobenzene	ug/Kg	None	None	n/a	<2.76E+03	<1.42E+03	n/a	n/a	n/a	n/a	1.42E+03	U
S06E001041		O	1,4-Dichlorobenzene	ug/Kg	None	None	71.3	<1.67E+03	<858	n/a	n/a	n/a	n/a	858	U
S06E001041		O	2,2'-oxybis(1-Chloropropane)	ug/Kg	None	None	n/a	<1.98E+03	<1.02E+03	n/a	n/a	n/a	n/a	1.02E+03	U
S06E001041		O	2,4,5-Trichlorophenol	ug/Kg	None	None	n/a	<1.56E+03	<801	n/a	n/a	n/a	n/a	801	U
S06E001041		O	2,4,6-Trichlorophenol	ug/Kg	None	None	n/a	<1.62E+03	<830	n/a	n/a	n/a	n/a	830	U
S06E001041		O	2,4-Dichlorophenol	ug/Kg	None	None	n/a	<1.51E+03	<776	n/a	n/a	n/a	n/a	776	U

Limit Violated

DSR - 20060609
702AZ TRAIN

Sample Group: 20060609
Core Number: 20060609
Sample Portion: Special Sample (Total)
Customer Sample ID: 702-AZ-2/3 SVOA

Sample#	R	A#	Analyte	Unit	Control Limits Lower	Control Limits Upper	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Qual Flags
S06E001041		O	2,4-Dimethylphenol	ug/Kg	None	None	n/a	<1.18E+03	<607	n/a	n/a	n/a	n/a	607	U
S06E001041		O	2,4-Dinitrophenol	ug/Kg	None	None	n/a	<823	<423	n/a	n/a	n/a	n/a	423	U
S06E001041		O	2,4-Dinitrotoluene	ug/Kg	None	None	97.0	<1.79E+03	<917	n/a	n/a	n/a	n/a	917	U
S06E001041		O	2,6-Dinitrotoluene	ug/Kg	None	None	n/a	<1.72E+03	<883	n/a	n/a	n/a	n/a	883	U
S06E001041		O	2-Butoxyethanol	ug/Kg	None	None	n/a	<3.01E+04	<1.54E+04	n/a	n/a	n/a	n/a	1.54E+04	U
S06E001041		O	2-Chloronaphthalene	ug/Kg	None	None	n/a	<1.64E+03	<844	n/a	n/a	n/a	n/a	844	U
S06E001041		O	2-Chlorophenol	ug/Kg	None	None	78.2	<1.63E+03	<839	n/a	n/a	n/a	n/a	839	U
S06E001041		O	2-Methylnaphthalene	ug/Kg	None	None	n/a	<1.73E+03	<889	n/a	n/a	n/a	n/a	889	U
S06E001041		O	2-Methylphenol	ug/Kg	None	None	n/a	<1.70E+03	<874	n/a	n/a	n/a	n/a	874	U
S06E001041		O	2-Nitroaniline	ug/Kg	None	None	n/a	<1.75E+03	<900	n/a	n/a	n/a	n/a	900	U
S06E001041		O	2-Nitrophenol	ug/Kg	None	None	n/a	<1.50E+03	<771	n/a	n/a	n/a	n/a	771	U
S06E001041		O	3 & 4 Methylphenol Total	ug/Kg	None	None	n/a	<1.65E+03	<846	n/a	n/a	n/a	n/a	846	U
S06E001041		O	3-Nitroaniline	ug/Kg	None	None	n/a	<987	<507	n/a	n/a	n/a	n/a	507	U
S06E001041		O	4,6-Dinitro-2-methylphenol	ug/Kg	None	None	n/a	<1.19E+03	<608	n/a	n/a	n/a	n/a	608	U
S06E001041		O	4-Bromophenyl-phenylether	ug/Kg	None	None	n/a	<1.72E+03	<884	n/a	n/a	n/a	n/a	884	U
S06E001041		O	4-Chloro-3-methylphenol	ug/Kg	None	None	69.1	<1.68E+03	<861	n/a	n/a	n/a	n/a	861	U
S06E001041		O	4-Chloroaniline	ug/Kg	None	None	n/a	<3.45E+03	<1.77E+03	n/a	n/a	n/a	n/a	1.77E+03	U
S06E001041		O	4-Chlorophenyl-phenylether	ug/Kg	None	None	n/a	<1.71E+03	<879	n/a	n/a	n/a	n/a	879	U
S06E001041		O	4-Nitroaniline	ug/Kg	None	None	n/a	<2.01E+03	<1.03E+03	n/a	n/a	n/a	n/a	1.03E+03	U
S06E001041		O	4-Nitrophenol	ug/Kg	None	None	113	<1.59E+03	<815	n/a	n/a	n/a	n/a	815	U
S06E001041		O	Acenaphthene	ug/Kg	None	None	79.3	<1.73E+03	<889	n/a	n/a	n/a	n/a	889	U
S06E001041		O	Acenaphthylene	ug/Kg	None	None	n/a	<1.91E+03	<982	n/a	n/a	n/a	n/a	982	U
S06E001041		O	Anthracene	ug/Kg	None	None	n/a	<1.86E+03	<954	n/a	n/a	n/a	n/a	954	U
S06E001041		O	Benzo(a)anthracene	ug/Kg	None	None	n/a	<1.66E+03	<852	n/a	n/a	n/a	n/a	852	U
S06E001041		O	Benzo(a)pyrene	ug/Kg	None	None	n/a	<1.58E+03	<813	n/a	n/a	n/a	n/a	813	U
S06E001041		O	Benzo(b)fluoranthene	ug/Kg	None	None	n/a	<1.57E+03	<804	n/a	n/a	n/a	n/a	804	U
S06E001041		O	Benzo(g,h,i)perylene	ug/Kg	None	None	n/a	<1.58E+03	<812	n/a	n/a	n/a	n/a	812	U
S06E001041		O	Benzo(k)fluoranthene	ug/Kg	None	None	n/a	<1.64E+03	<840	n/a	n/a	n/a	n/a	840	U

Limit Violated

DSR - 20060609
702AZ TRAIN

Sample Group: 20060609
Core Number: 20060609
Sample Portion: Special Sample (Total)
Customer Sample ID: 702-AZ-2/3 SVOA

Sample#	R	A#	Analyte	Unit	Control Limits Lower	Control Limits Upper	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Qual Flags
S06E001041		O	Butylbenzylphthalate	ug/Kg	None	None	n/a	5.71E+03	2.73E+03	n/a	n/a	n/a	n/a	1.73E+03	BJ
S06E001041		O	Chrysene	ug/Kg	None	None	n/a	<1.63E+03	<836	n/a	n/a	n/a	n/a	836	U
S06E001041		O	Di-n-butylphthalate	ug/Kg	None	None	n/a	2.54E+04	<5.77E+03	n/a	n/a	n/a	n/a	5.77E+03	U
S06E001041		O	Di-n-octylphthalate	ug/Kg	None	None	n/a	<2.01E+03	3.48E+03	n/a	n/a	n/a	n/a	1.03E+03	U
S06E001041		O	Dibenz(a,h)anthracene	ug/Kg	None	None	n/a	<1.54E+03	<788	n/a	n/a	n/a	n/a	788	U
S06E001041		O	Dibenzofuran	ug/Kg	None	None	n/a	<1.71E+03	<878	n/a	n/a	n/a	n/a	878	U
S06E001041		O	Diethylphthalate	ug/Kg	None	None	n/a	<2.29E+03	<1.18E+03	n/a	n/a	n/a	n/a	1.18E+03	U
S06E001041		O	Dimethylphthalate	ug/Kg	None	None	n/a	<1.75E+03	<900	n/a	n/a	n/a	n/a	900	U
S06E001041		O	Diphenylamine	ug/Kg	None	None	n/a	<6.98E+03	<3.58E+03	n/a	n/a	n/a	n/a	3.58E+03	U
S06E001041		O	Fluoranthene	ug/Kg	None	None	n/a	<1.78E+03	<912	n/a	n/a	n/a	n/a	912	U
S06E001041		O	Fluorene	ug/Kg	None	None	n/a	<1.71E+03	<880	n/a	n/a	n/a	n/a	880	U
S06E001041		O	Hexachlorobenzene	ug/Kg	None	None	n/a	<1.69E+03	<867	n/a	n/a	n/a	n/a	867	U
S06E001041		O	Hexachlorobutadiene	ug/Kg	None	None	n/a	<1.80E+03	<924	n/a	n/a	n/a	n/a	924	U
S06E001041		O	Hexachlorocyclopentadiene	ug/Kg	None	None	n/a	<285	<146	n/a	n/a	n/a	n/a	146	U
S06E001041		O	Hexachloroethane	ug/Kg	None	None	n/a	<1.65E+03	<848	n/a	n/a	n/a	n/a	848	U
S06E001041		O	Indeno(1,2,3-cd)pyrene	ug/Kg	None	None	n/a	<1.60E+03	<822	n/a	n/a	n/a	n/a	822	U
S06E001041		O	Isophorone	ug/Kg	None	None	n/a	<1.54E+03	<790	n/a	n/a	n/a	n/a	790	U
S06E001041		O	N-Nitrosodipropylamine	ug/Kg	None	None	80.5	<1.60E+03	<823	n/a	n/a	n/a	n/a	823	U
S06E001041		O	Naphthalene	ug/Kg	None	None	n/a	<1.72E+03	<882	n/a	n/a	n/a	n/a	882	U
S06E001041		O	Nitrobenzene	ug/Kg	None	None	n/a	<1.79E+03	<916	n/a	n/a	n/a	n/a	916	U
S06E001041		O	Pentachlorophenol	ug/Kg	None	None	88.3	<1.34E+03	<689	n/a	n/a	n/a	n/a	689	U
S06E001041		O	Phenanthrene	ug/Kg	None	None	n/a	<1.69E+03	<866	n/a	n/a	n/a	n/a	866	U
S06E001041		O	Phenol	ug/Kg	None	None	76.9	<1.65E+03	<845	n/a	n/a	n/a	n/a	845	U
S06E001041		O	Pyrene	ug/Kg	None	None	92.9	<1.72E+03	<881	n/a	n/a	n/a	n/a	881	U
S06E001041		O	Pyridine	ug/Kg	None	None	n/a	<1.58E+03	<811	n/a	n/a	n/a	n/a	811	U
S06E001041		O	Tri-n-butylphosphate	ug/Kg	None	None	n/a	5.38E+03	<1.11E+03	n/a	n/a	n/a	n/a	1.11E+03	U
S06E001041		O	bis(2-Chloroethoxy)methane	ug/Kg	None	None	n/a	<1.79E+03	<920	n/a	n/a	n/a	n/a	920	U
S06E001041		O	bis(2-Ethylhexyl)phthalate	ug/Kg	None	None	n/a	<2.49E+04	<1.28E+04	n/a	n/a	n/a	n/a	1.28E+04	U

Limit Violated

DSR - 20060609
702AZ TRAIN

Sample Group: 20060609
Core Number: 20060609
Sample Portion: Special Sample (Total)
Customer Sample ID: 702-AZ-2/3 SVOA

Sample#	R	A#	Analyte	Unit	Control Limits Lower	Control Limits Upper	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Qual Flags
S06E001041		O	bis-(2-Chloroethyl) ether	ug/Kg	None	None	n/a	<1.77E+03	<909	n/a	n/a	n/a	n/a	909	U

Customer Sample ID: 702-AZ-2/3 WATER

Sample#	R	A#	Analyte	Unit	Control Limits Lower	Control Limits Upper	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Qual Flags
S06E001040		W	Nitrate	ug/g	None	None	101	<6.95	4.68E+05	n/a	n/a	n/a	n/a	5.23E+03	
S06E001040		W	Acetate	ug/g	None	None	96.9	<578	4.05E+03	n/a	n/a	n/a	n/a	2.21E+03	J
S06E001040		W	Bromide	ug/g	None	None	99.9	<312	<1.19E+03	n/a	n/a	n/a	n/a	1.19E+03	U
S06E001040		W	Chloride	ug/g	None	None	106	<0.850	3.73E+03	n/a	n/a	n/a	n/a	162	
S06E001040		W	Fluoride	ug/g	None	None	101	<30.0	<115	n/a	n/a	n/a	n/a	115	U
S06E001040		W	Formate	ug/g	None	None	104	<11.6	<2.21E+03	n/a	n/a	n/a	n/a	2.21E+03	U
S06E001040		W	Glycolate	ug/g	None	None	99.2	<478	4.76E+03	n/a	n/a	n/a	n/a	1.82E+03	J
S06E001040		W	Nitrite	ug/g	None	None	102	<5.40	<1.03E+03	n/a	n/a	n/a	n/a	1.03E+03	U
S06E001040		W	Oxalate	ug/g	None	None	96.5	<5.25	<1.00E+03	n/a	n/a	n/a	n/a	1000	U
S06E001040		W	Phosphate	ug/g	None	None	102	<302	<1.16E+03	n/a	n/a	n/a	n/a	1.16E+03	U
S06E001040		W	Sulfate	ug/g	None	None	102	<6.90	1.94E+03	n/a	n/a	n/a	n/a	1.32E+03	J

Customer Sample ID: 702-AZ-2A

Sample#	R	A#	Analyte	Unit	Control Limits Lower	Control Limits Upper	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Qual Flags
S06E001013			Received Sample		None	None	n/a	n/a	Complete	n/a	n/a	n/a	n/a	n/a	

Customer Sample ID: 702-AZ-2B

Sample#	R	A#	Analyte	Unit	Control Limits Lower	Control Limits Upper	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Qual Flags
S06E001014			Received Sample		None	None	n/a	n/a	Complete	n/a	n/a	n/a	n/a	n/a	

Limit Violated

DSR - 20060609
702AZ TRAIN

Sample Group: 20060609
Core Number: 20060609
Sample Portion: Special Sample (Total)

Customer Sample ID: 702-AZ-2C

Sample#	R	A#	Analyte	Unit	Control Limits Lower	Control Limits Upper	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Qual Flags
S06E001015			Received Sample		None	None	n/a	n/a	Complete	n/a	n/a	n/a	n/a	n/a	

Customer Sample ID: 702-AZ-2D

Sample#	R	A#	Analyte	Unit	Control Limits Lower	Control Limits Upper	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Qual Flags
S06E001016			Received Sample		None	None	n/a	n/a	Complete	n/a	n/a	n/a	n/a	n/a	

Customer Sample ID: 702-AZ-2E

Sample#	R	A#	Analyte	Unit	Control Limits Lower	Control Limits Upper	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Qual Flags
S06E001017			Received Sample		None	None	n/a	n/a	Complete	n/a	n/a	n/a	n/a	n/a	

Customer Sample ID: 702-AZ-2F

Sample#	R	A#	Analyte	Unit	Control Limits Lower	Control Limits Upper	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Qual Flags
S06E001018			Received Sample		None	None	n/a	n/a	Complete	n/a	n/a	n/a	n/a	n/a	

Customer Sample ID: 702-AZ-SAB-BLK

Sample#	R	A#	Analyte	Unit	Control Limits Lower	Control Limits Upper	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Qual Flags
S06E001020			Received Sample		None	None	n/a	n/a	Complete	n/a	n/a	n/a	n/a	n/a	

Customer Sample ID: 702-AZ-SAB-FBLK

Sample#	R	A#	Analyte	Unit	Control Limits Lower	Control Limits Upper	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Qual Flags
S06E001022			Received Sample		None	None	n/a	n/a	Complete	n/a	n/a	n/a	n/a	n/a	

Limit Violated

DSR - 20060609
702AZ TRAIN

Sample Group: 20060609
Core Number: 20060609
Sample Portion: Special Sample (Total)

Customer Sample ID: 702-AZ-SAB-TRPBLK

Sample#	R	A#	Analyte	Unit	Control Limits Lower	Control Limits Upper	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Qual Flags
S06E001024			Received Sample		None	None	n/a	n/a	Complete	n/a	n/a	n/a	n/a	n/a	

Customer Sample ID: 702-AZ-TSA-BLK

Sample#	R	A#	Analyte	Unit	Control Limits Lower	Control Limits Upper	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Qual Flags
S06E001019			Received Sample		None	None	n/a	n/a	Complete	n/a	n/a	n/a	n/a	n/a	

Customer Sample ID: 702-AZ-TSA-FBLK

Sample#	R	A#	Analyte	Unit	Control Limits Lower	Control Limits Upper	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Qual Flags
S06E001021			Received Sample		None	None	n/a	n/a	Complete	n/a	n/a	n/a	n/a	n/a	

Customer Sample ID: 702-AZ-TSA-TRPBLK

Sample#	R	A#	Analyte	Unit	Control Limits Lower	Control Limits Upper	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Qual Flags
S06E001023			Received Sample		None	None	n/a	n/a	Complete	n/a	n/a	n/a	n/a	n/a	

Customer Sample ID: 702AZ TRAIN NH4NO3

Sample#	R	A#	Analyte	Unit	Control Limits Lower	Control Limits Upper	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Qual Flags
S06E001043			Differential Scanning Calorimetry E	Joules/g	None	None	n/a	n/a	302	n/a	n/a	n/a	n/a	n/a	

Customer Sample ID: 702AZ TRAIN NH4NO3-NACL

Sample#	R	A#	Analyte	Unit	Control Limits Lower	Control Limits Upper	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Qual Flags
S06E001044			Differential Scanning Calorimetry E	Joules/g	None	None	n/a	n/a	504	n/a	n/a	n/a	n/a	n/a	

Limit Violated

DSR - 20060609
702AZ TRAIN

Sample Group: 20060609
Core Number: 20060609
Sample Portion: Special Sample (Total)
Customer Sample ID: AZ-301

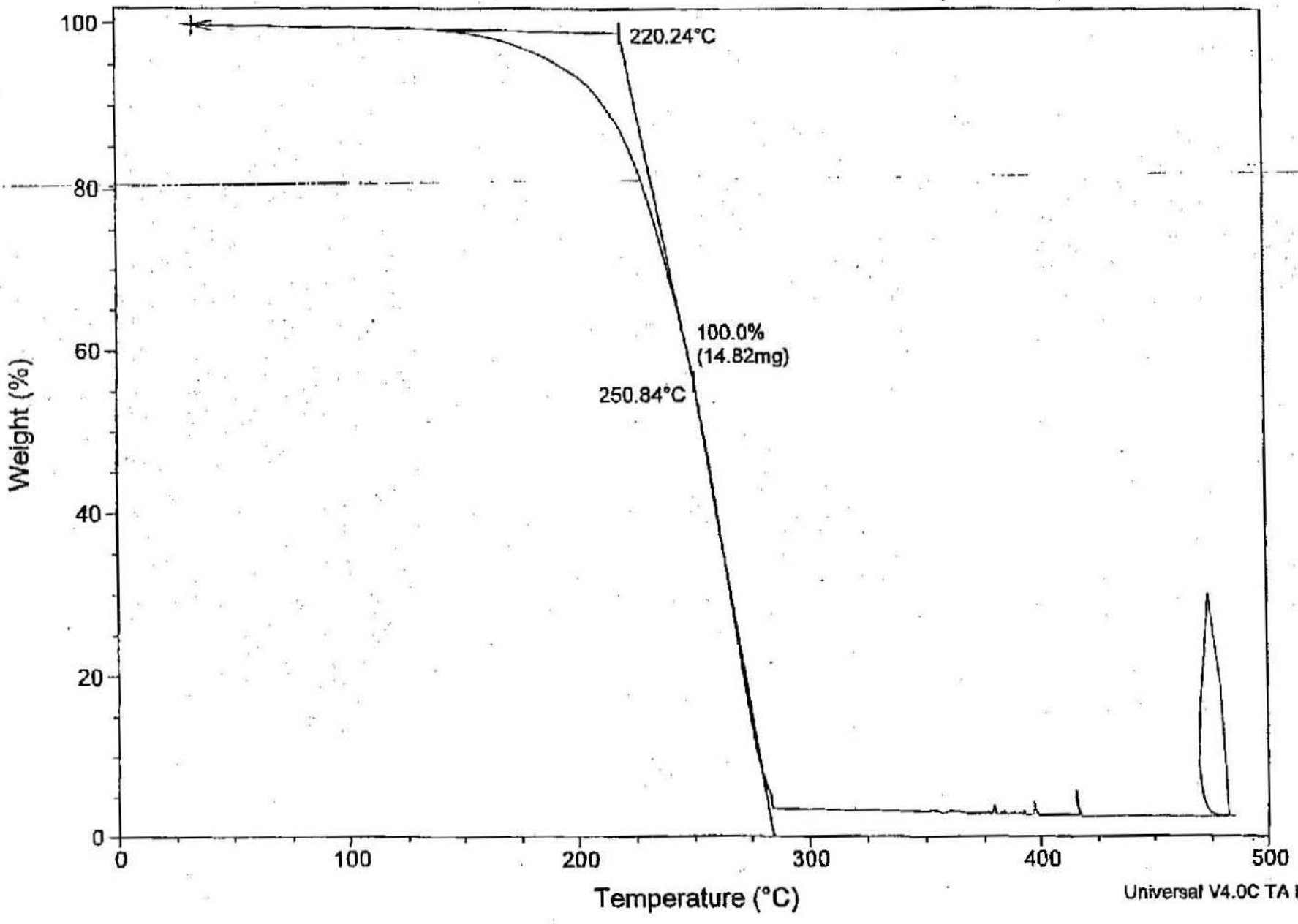
Sample#	R	A#	Analyte	Unit	Control Limits		Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Qual Flags
					Lower	Upper									
S06E001029			Polarized Light Microscopy		None	None	n/a	n/a	Complete	n/a	n/a	n/a	n/a	n/a	
S06E001029			Scanning Electron Microscope		None	None	n/a	n/a	Complete	n/a	n/a	n/a	n/a	n/a	

Limit Violated

Sample: S06E001025
Size: 14.8200 mg
Method: Sample
Comment: 702AZ TRAIN

TGA

File: C:\TA\Data\TGA-6\SAM072406.001
Operator: RWK
Run Date: 24-Jul-2006 10:10
Instrument: 2050 TGA V5.4A



Universal V4.0C TA Instruments

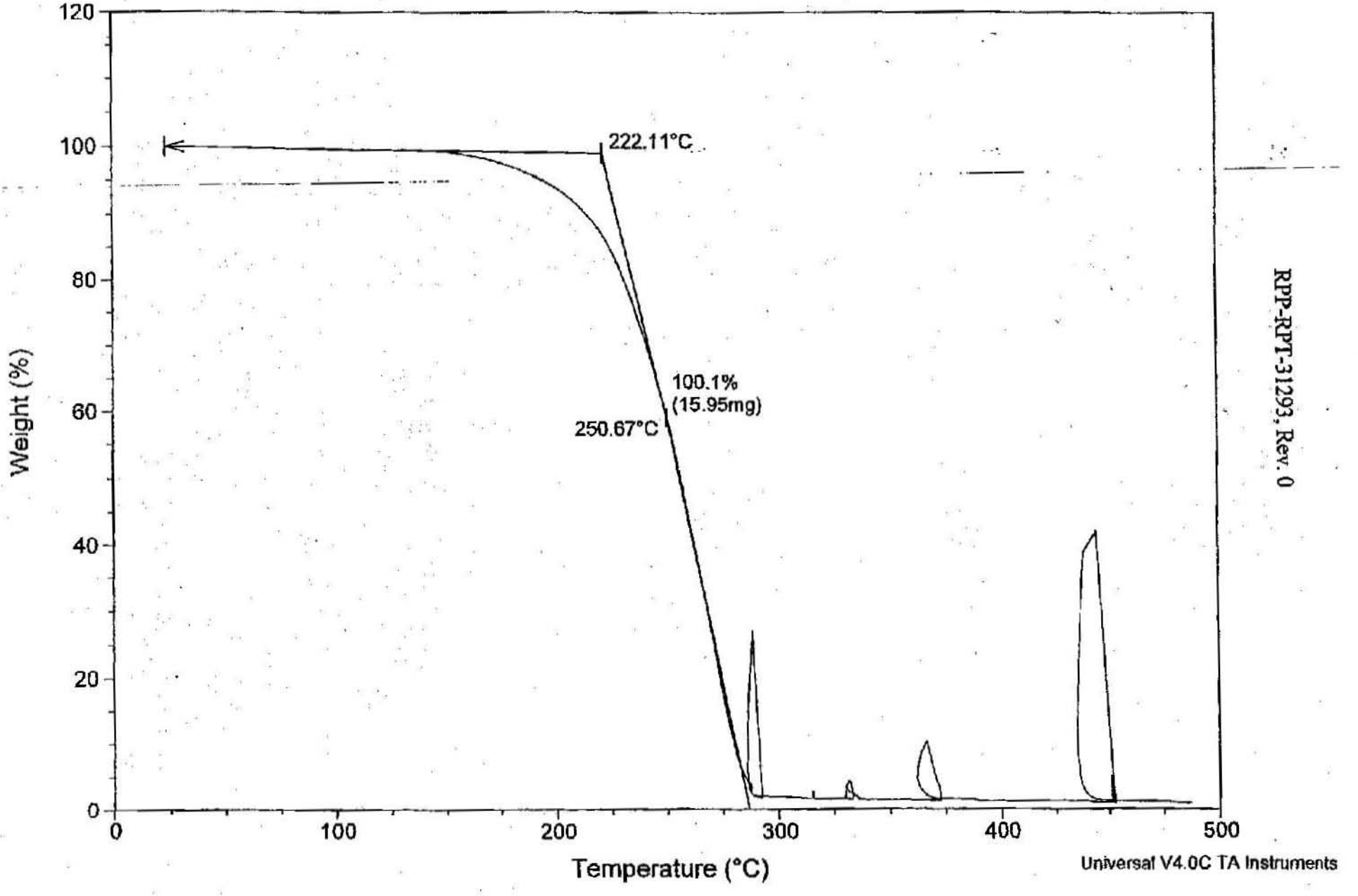
D-21

RPP-RPT-31293, Rev. 0

Sample: S06E001025 DUP
Size: 15.9300 mg
Method: Sample
Comment: 702AZ TRAIN

TGA

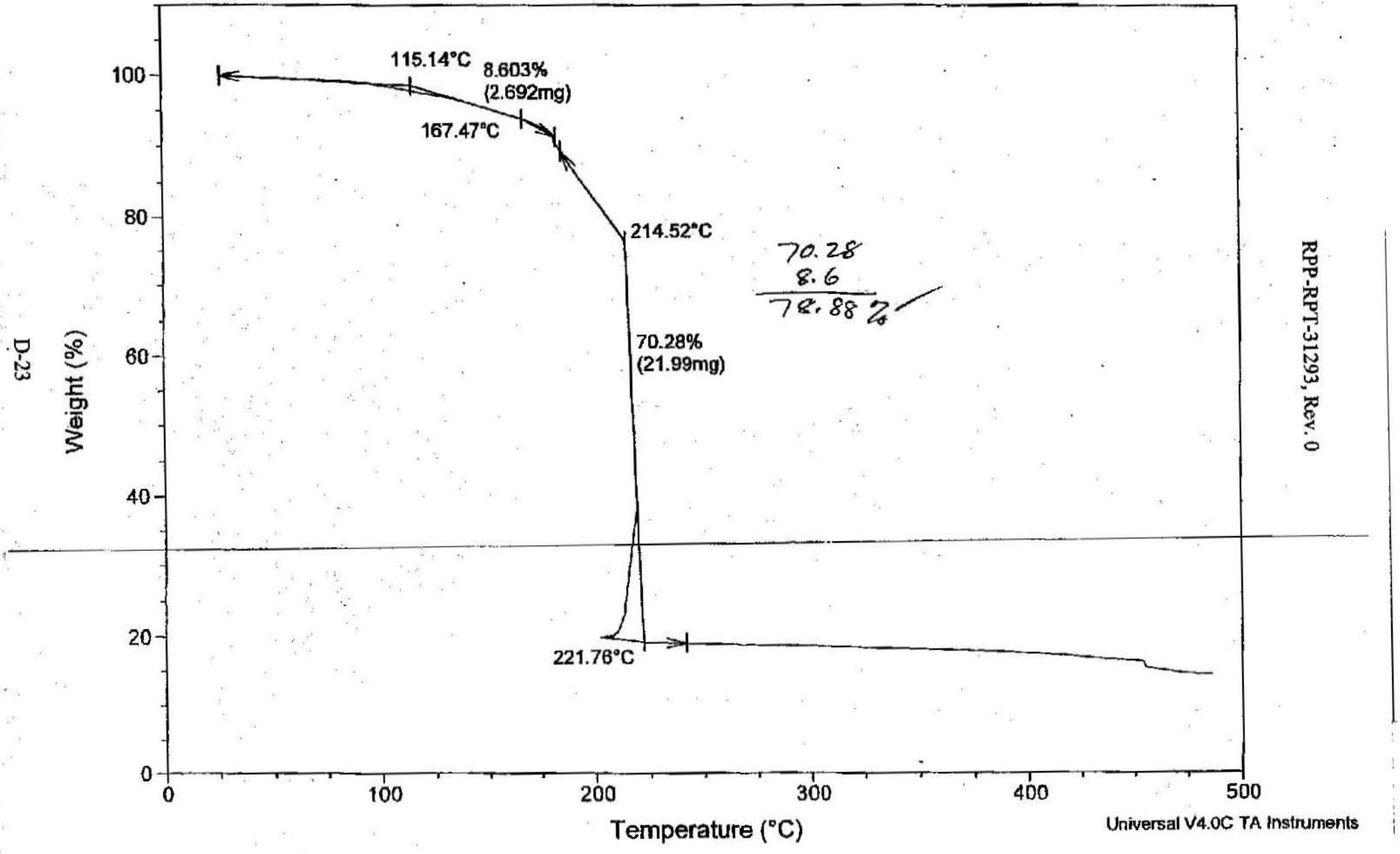
File: C:\TA\Data\TGA-6\SAM072406.002
Operator: RWK
Run Date: 24-Jul-2006 12:52
Instrument: 2050 TGA V5.4A



Sample: S06E001042
Size: 31.2950 mg
Method: Sample
Comment: 702 AZ TRAIN

TGA

File: C:\TA\Data\TGA-6\SAM080806.001
Operator: RWK
Run Date: 08-Aug-2006 11:15
Instrument: 2050 TGA V5.4A



70.28
8.6
78.88 %

D-23

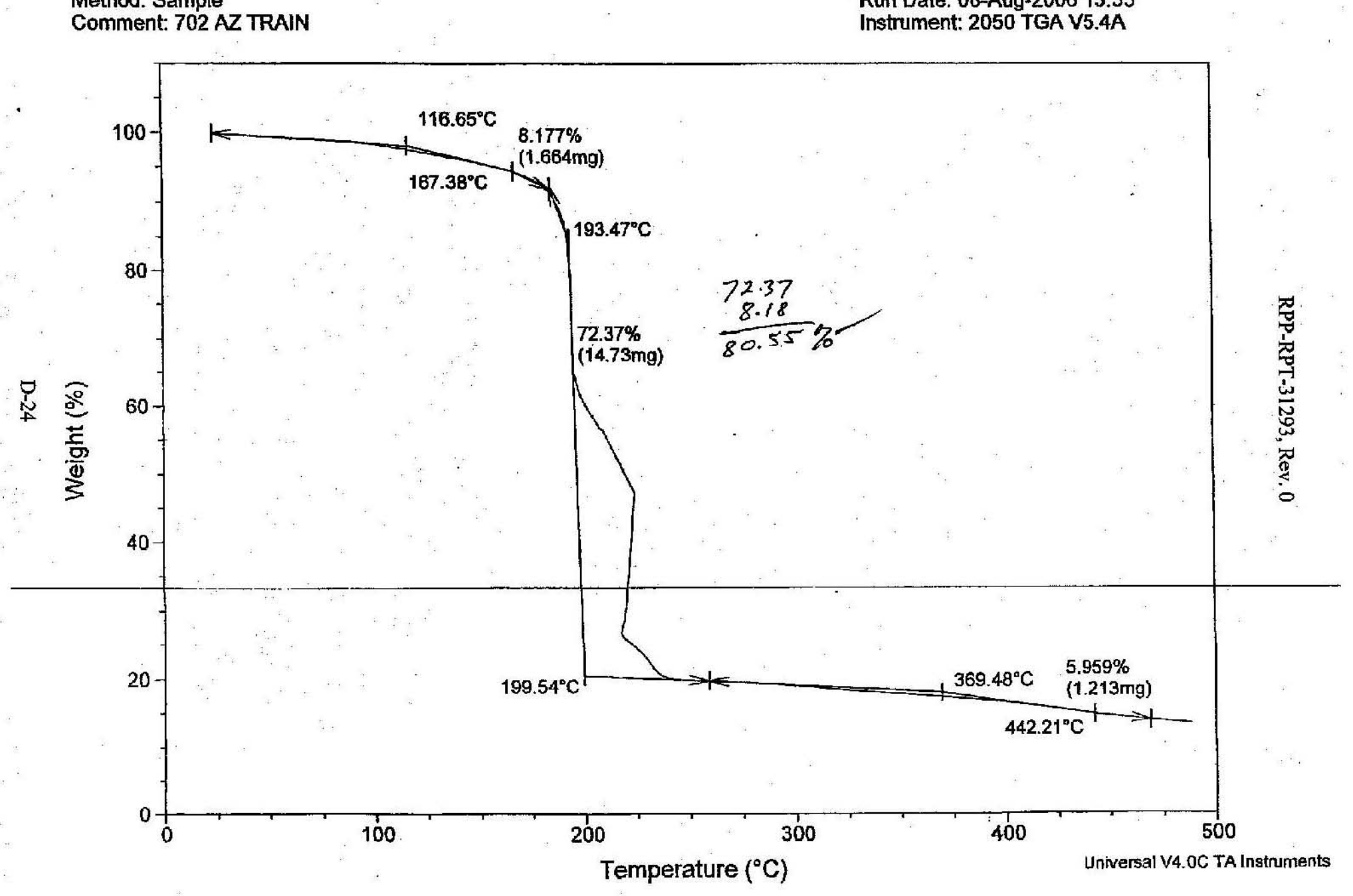
RPP-RPT-31293, Rev. 0

Universal V4.0C TA Instruments

Sample: S06E001042 DUP
Size: 20.3540 mg
Method: Sample
Comment: 702 AZ TRAIN

TGA

File: C:\TA\Data\TGA-6\SAM080806.002
Operator: RWK
Run Date: 08-Aug-2006 13:35
Instrument: 2050 TGA V5.4A



Universal V4.0C TA Instruments

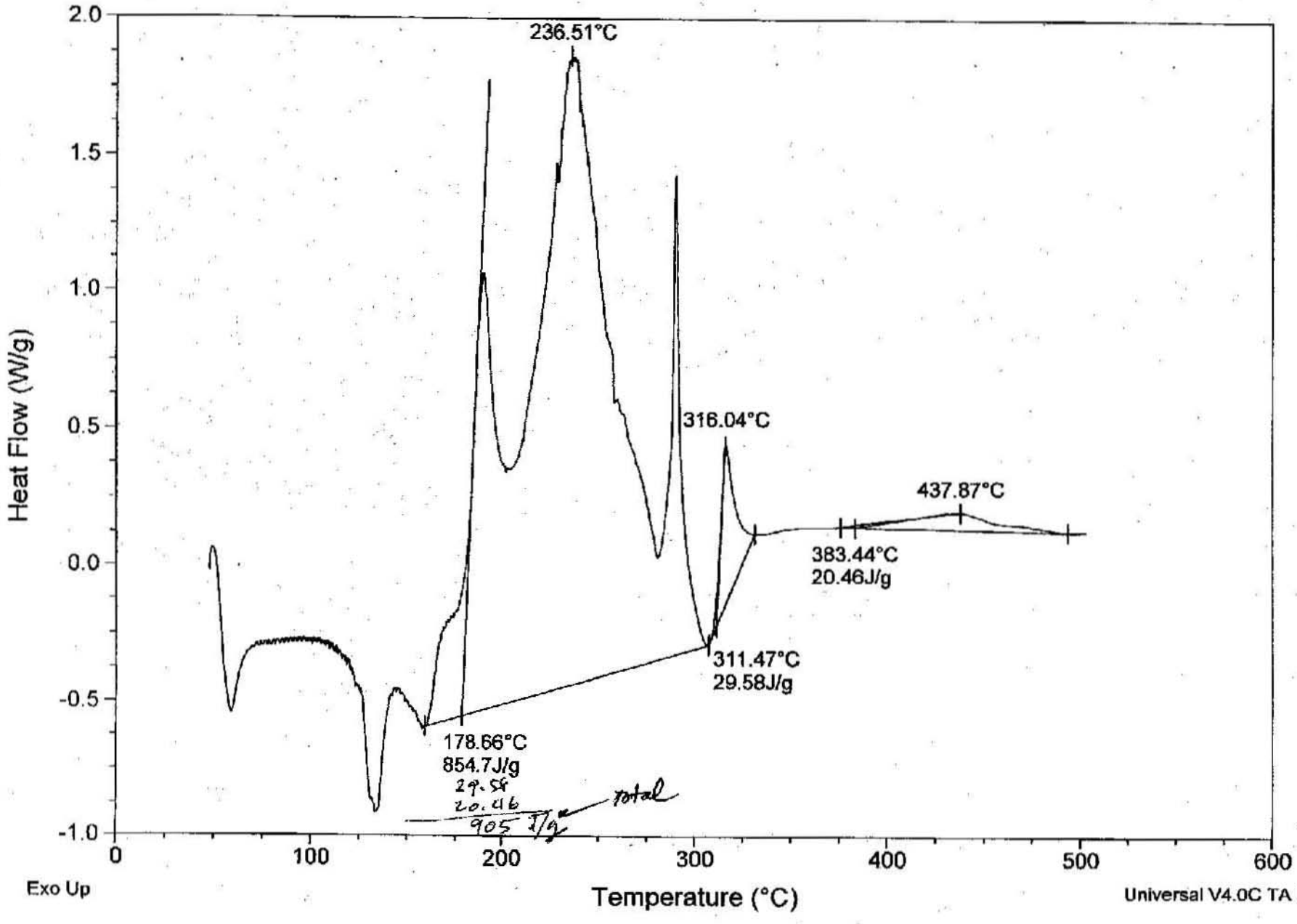
D-24

RPP-RPT-31293, Rev. 0

Sample: S06E001025
Size: 11.6700 mg
Method: Sample
Comment: SAM

DSC

File: C:\TA\Data\DSC-4\SAM080806.A01
Operator: RWK
Run Date: 08-Aug-2006 13:26
Instrument: 2920 DSC V2.6A



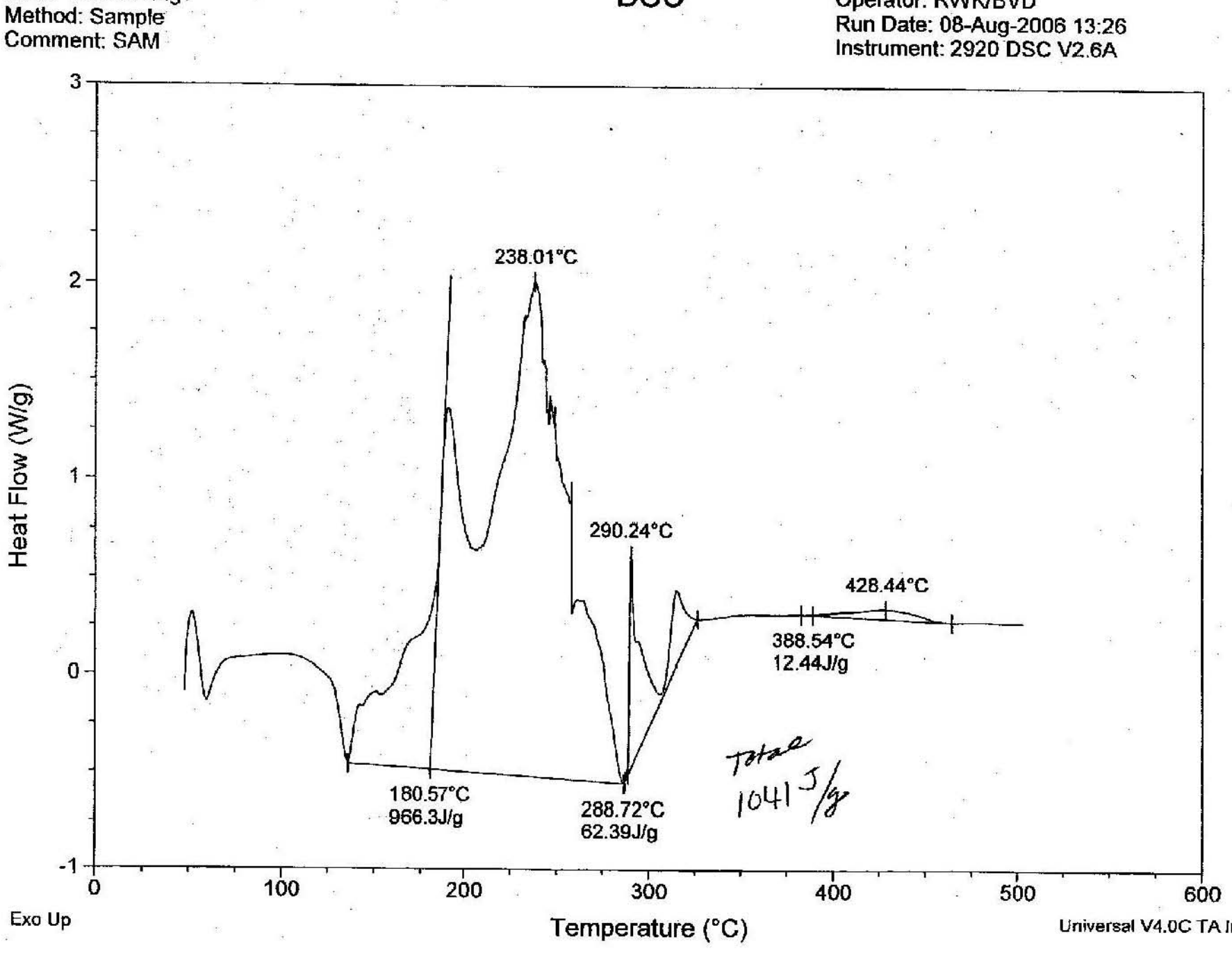
D-25

RPP-RPT-31293, Rev. 0

Sample: S06E001025 DUP
Size: 11.2400 mg
Method: Sample
Comment: SAM

DSC

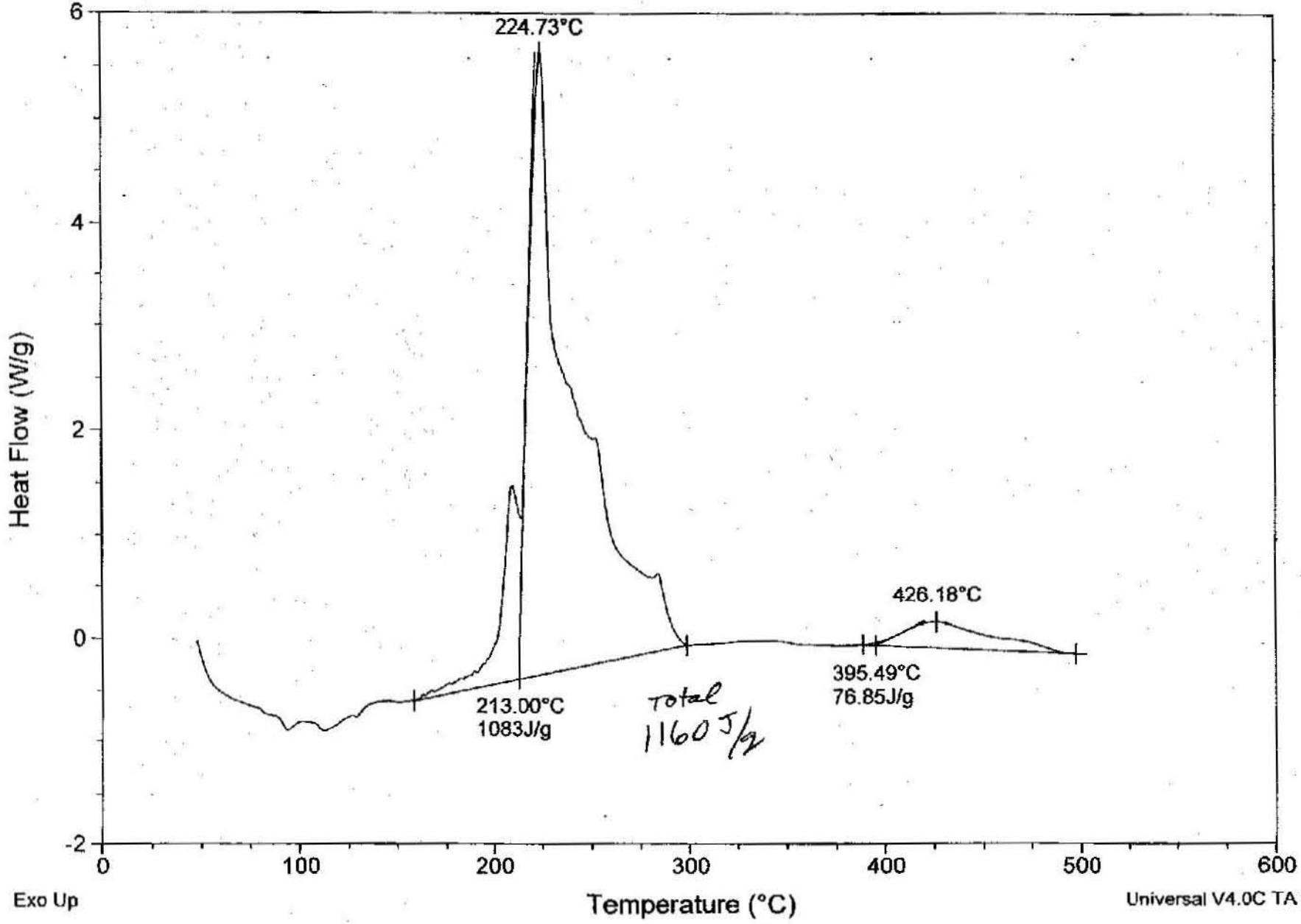
File: C:\TA\Data\DSC-4\SAM080806.B01
Operator: RWK/BVD
Run Date: 08-Aug-2006 13:26
Instrument: 2920 DSC V2.6A



Sample: S06E001042
Size: 24.9300 mg
Method: Sample
Comment: SAM

DSC

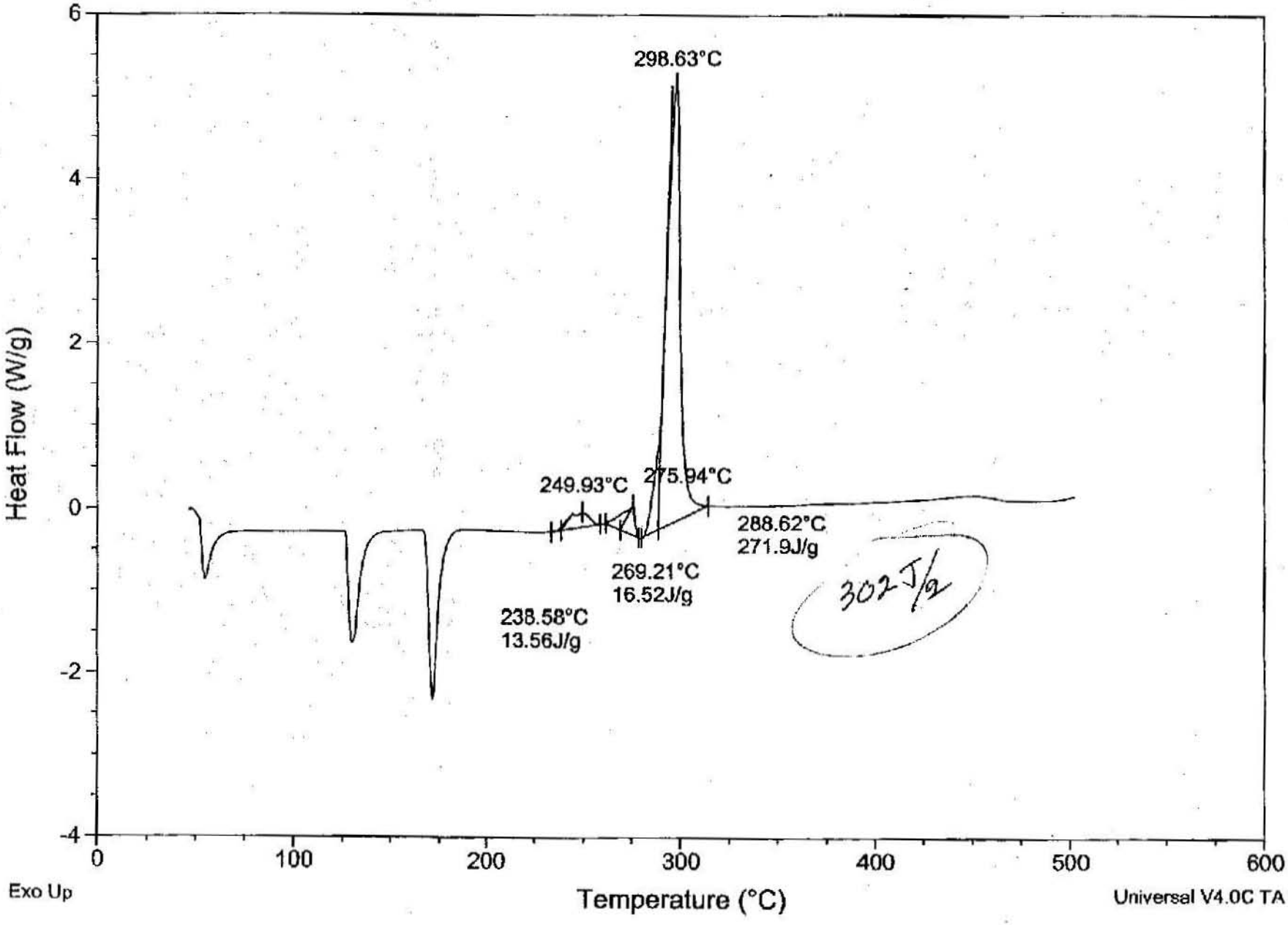
File: C:\TA\Data\DSC-4\SAM080806.A02
Operator: RWK
Run Date: 08-Aug-2006 14:59
Instrument: 2920 DSC V2.6A



Sample: S06E001043
Size: 10.7500 mg
Method: Sample

DSC

File: C:\TA\Data\DSC-5\SAM092706.A01
Operator: RWK
Run Date: 27-Sep-2006 10:53
Instrument: 2920 DSC V2.6A



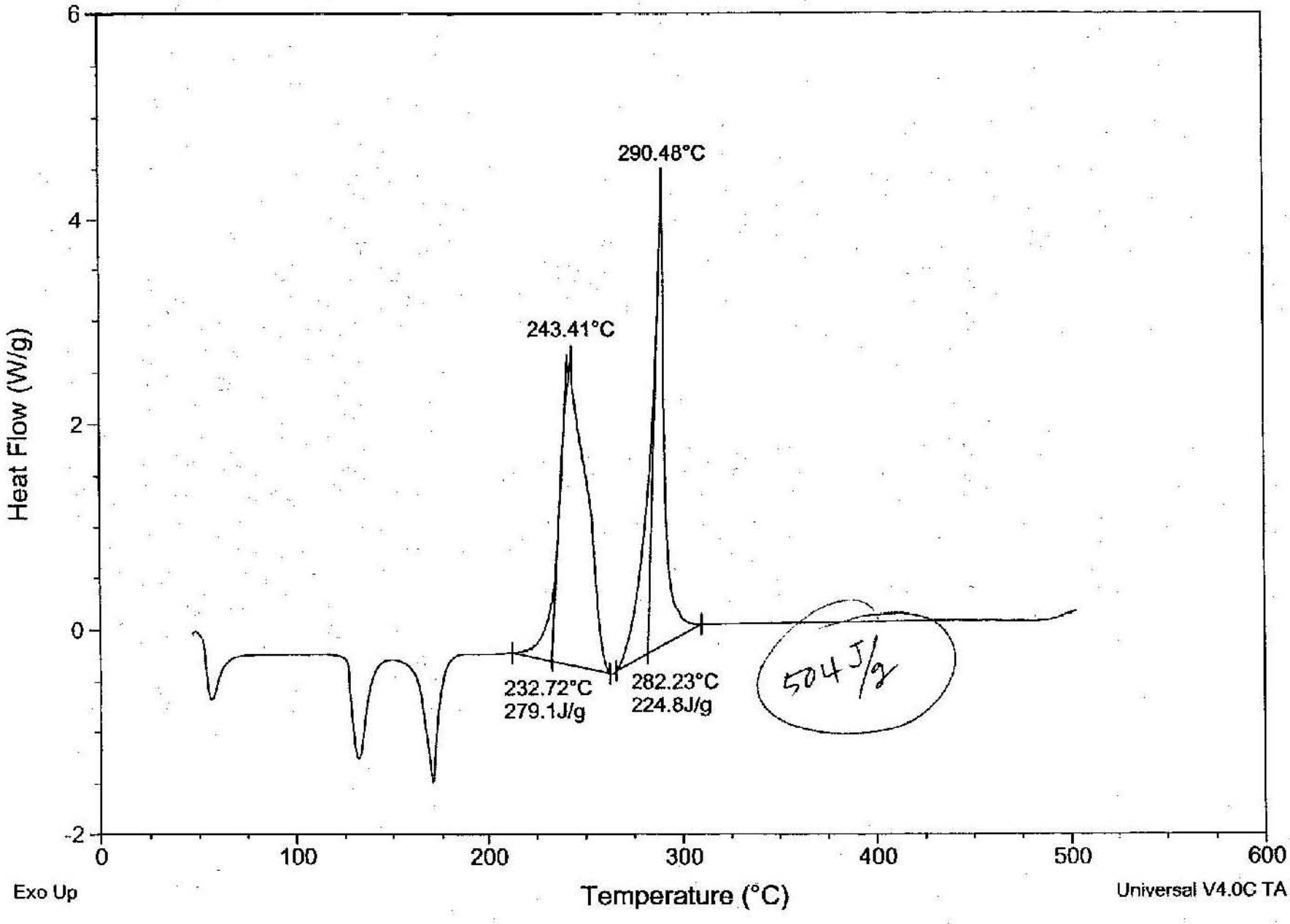
D-28

RPP-RPT-31293, Rev. 0

Sample: S06E001044
Size: 17.9700 mg
Method: Sample

DSC

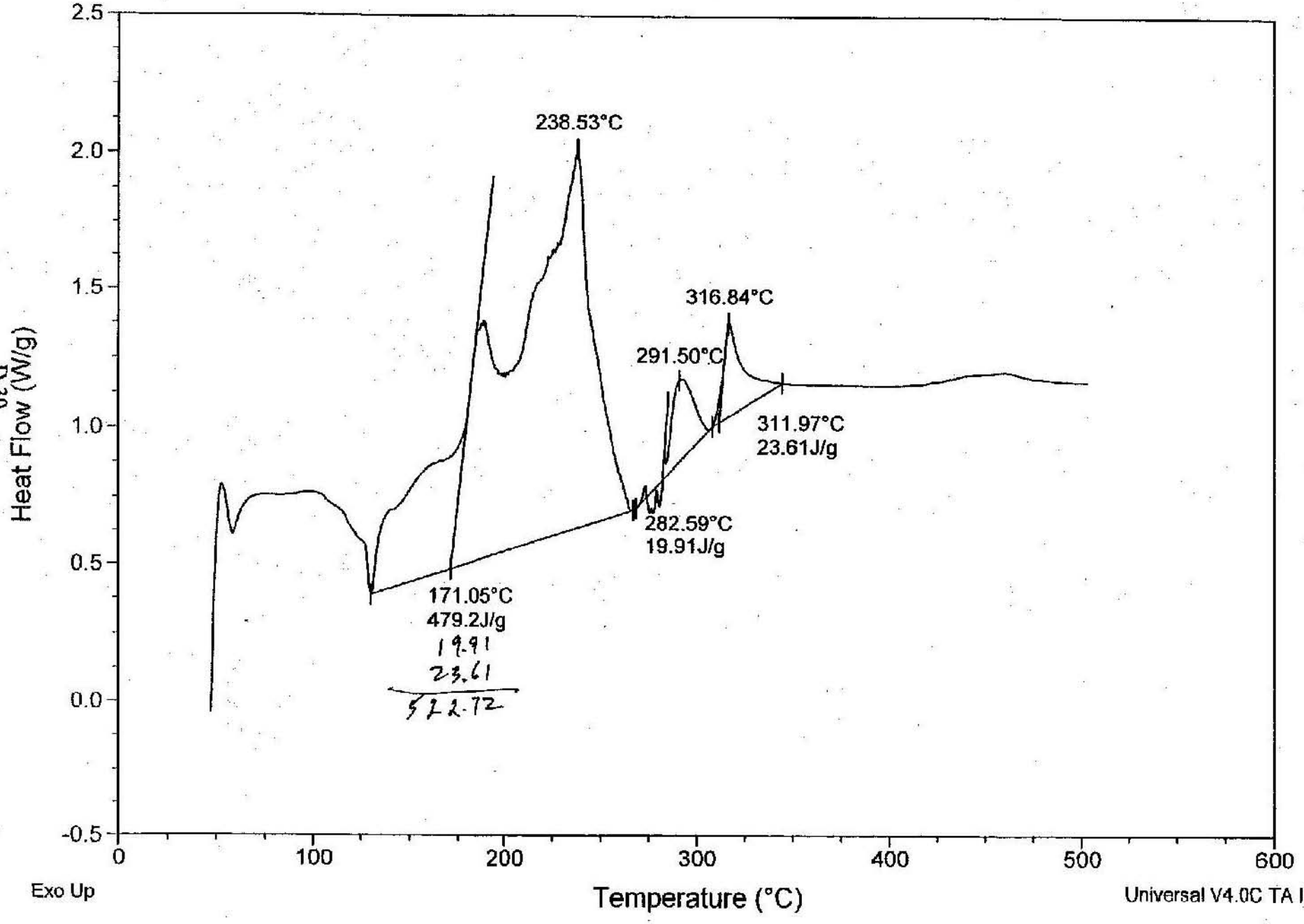
File: C:\TA\Data\DSC-5\SAM092706.B01
Operator: RWK
Run Date: 27-Sep-2006 10:53
Instrument: 2920 DSC V2.6A



Sample: S06E001045
Size: 11.1300 mg
Method: Sample
Comment: Air Purge

DSC

File: C:\TA\Data\DSC-5\SAM100506.A01
Operator: KRM
Run Date: 05-Oct-2006 10:00
Instrument: 2920 DSC V2.6A

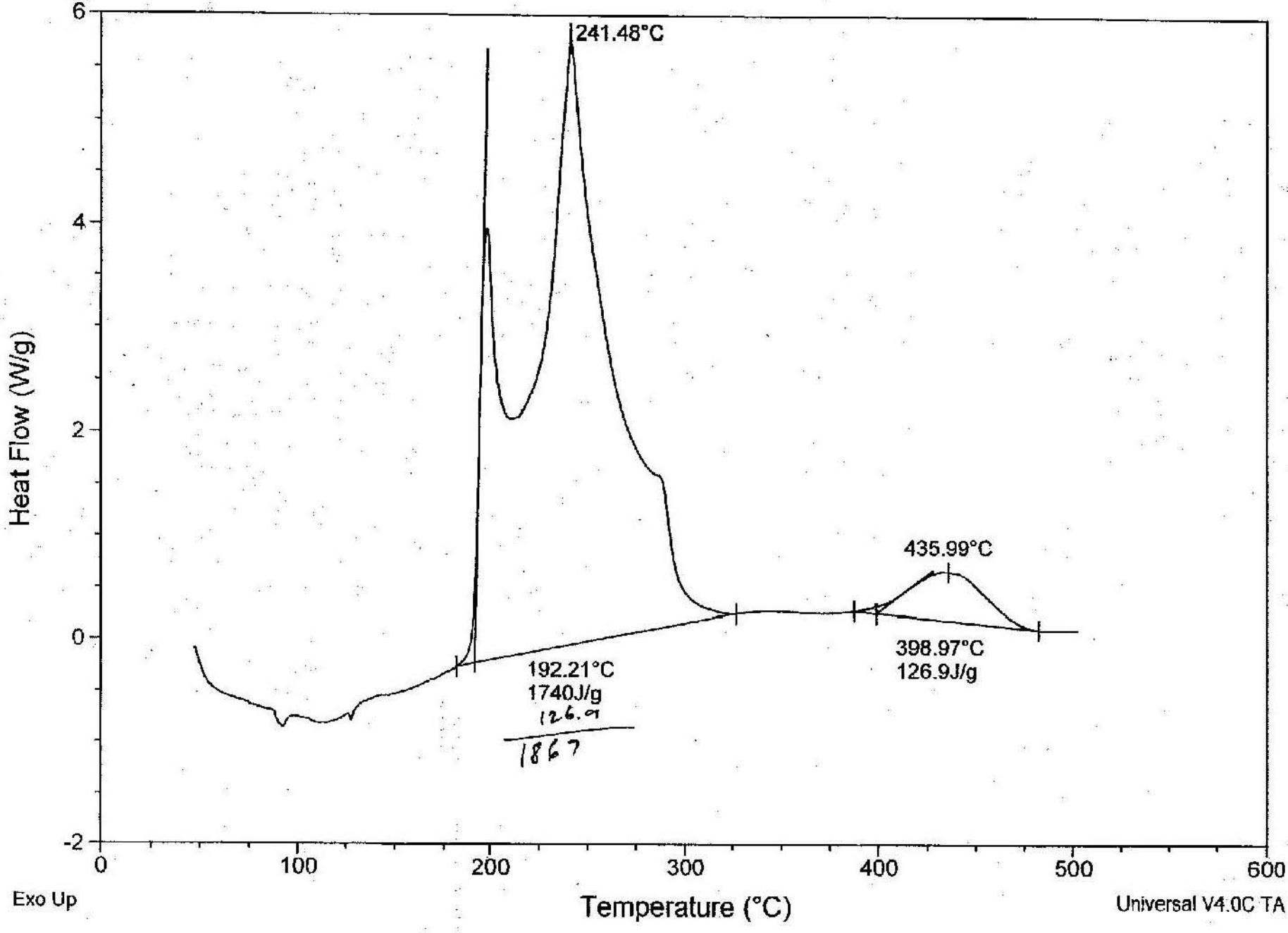


RPP-RPT-31293, Rev. 0

Sample: S06E001046
Size: 9.7000 mg
Method: Sample
Comment: Air Purge

DSC

File: C:\TA\Data\DSC-5\SAM100506.B01
Operator: KRM
Run Date: 05-Oct-2006 10:00
Instrument: 2920 DSC V2.6A



D-31

RPP-RPT-31293, Rev. 0

Universal V4.0C TA Instrument

APPENDIX E
SCANNING ELECTRON MICROSCOPY

Sample S06E001025

Figure E-1. Grains of ammonium nitrate, note shrinkage cracks.

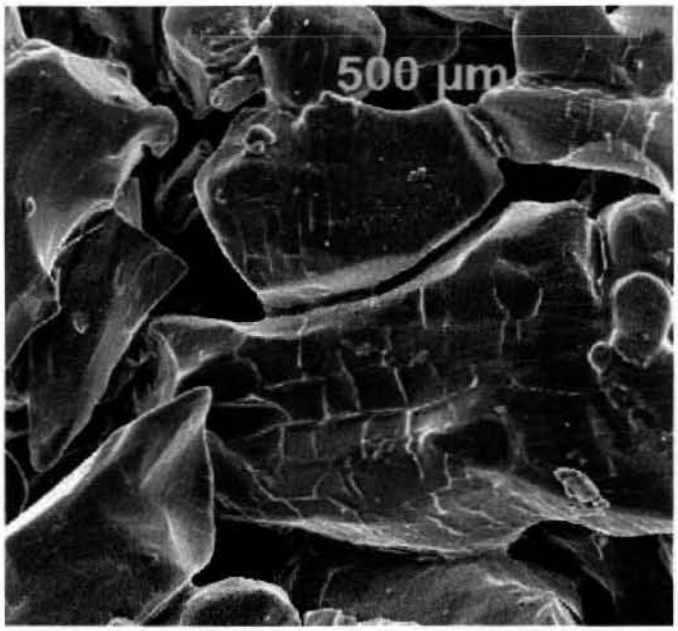
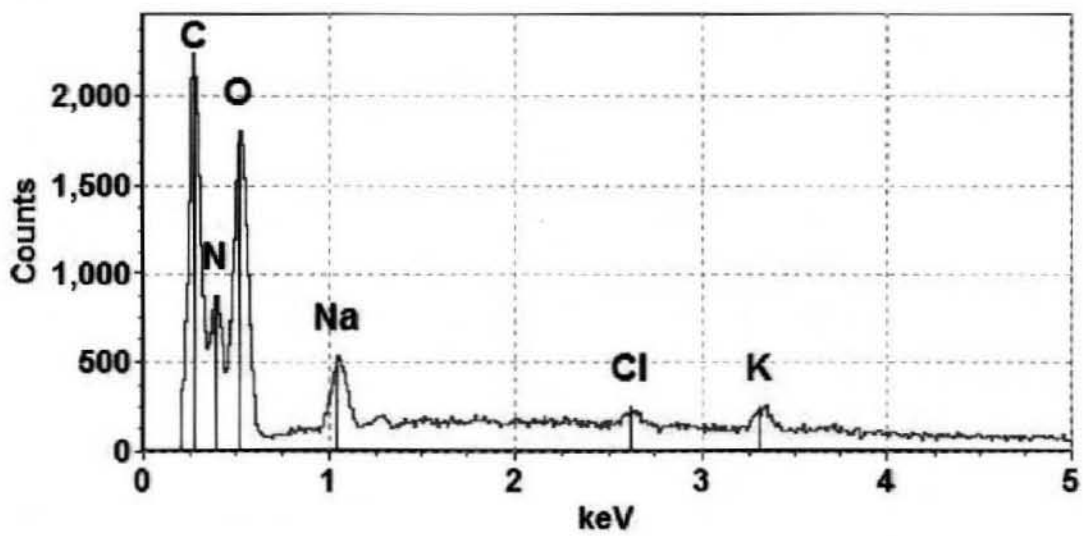


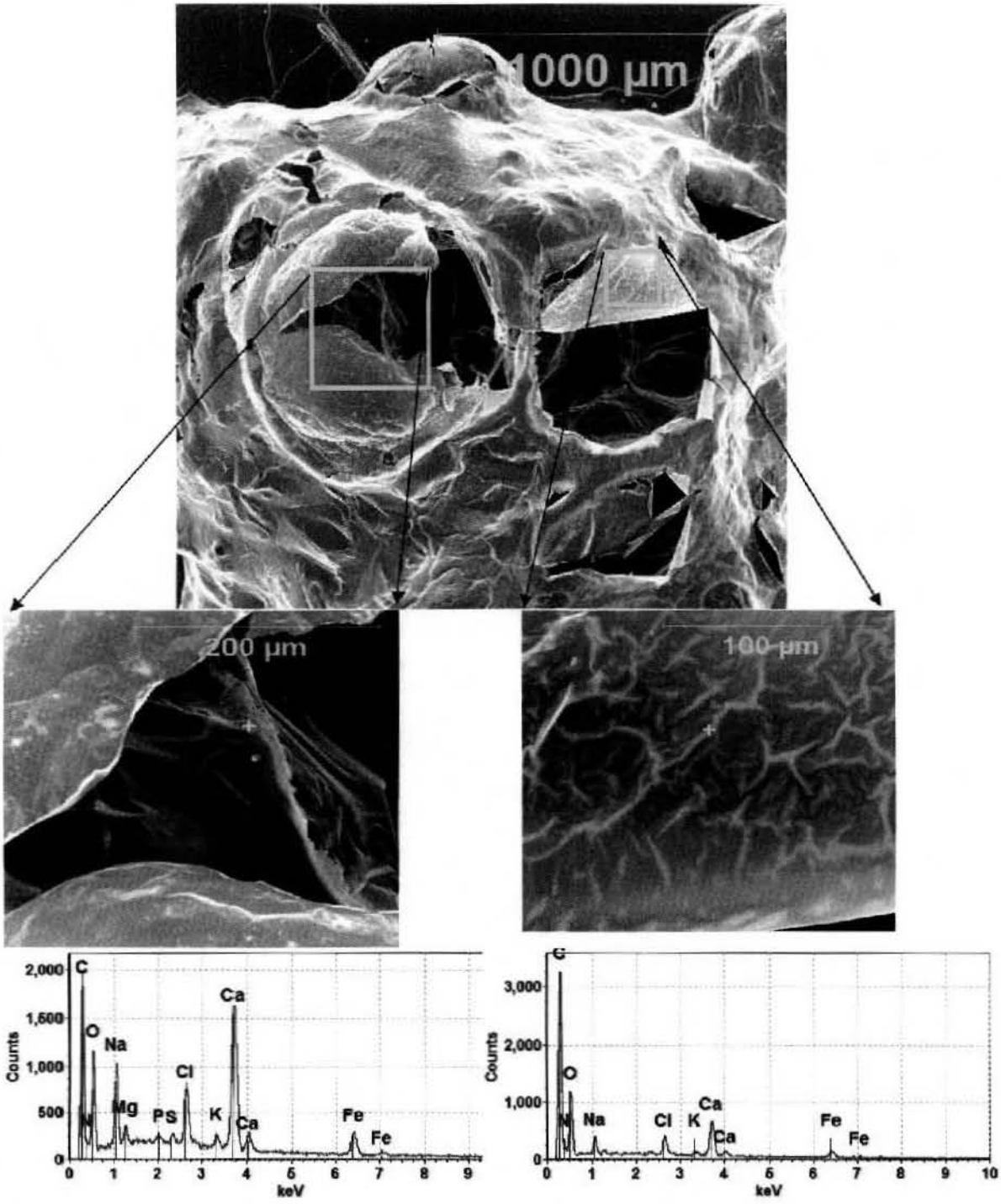
Figure E-2. EDS spectra of ammonium nitrate crystals in Figure E-1.



Note the strong nitrogen peak in the Figure E-2 EDS spectra. The nitrogen peak is typically not observable in EDS spectra because of masking by the carbon (C) peak, unless it is prevalent as a major element of the material. The large C peak is an artifact of SEM slide preparation..

Sample S06E001026

Figure E-3. The upper photo is low magnification "field view" of organic-cemented aggregate from sample S06E001026. Yellow boxes mark area expanded in the photos below. The EDS results from the spot marked with a "+" in the photo above the corresponding spectrum.



Sample S06E001042

Figure E-4. Portion of sample rinsed with methanol showing particle of ammonium nitrate, note dissolution features. Right image is blow up of area in box on left image

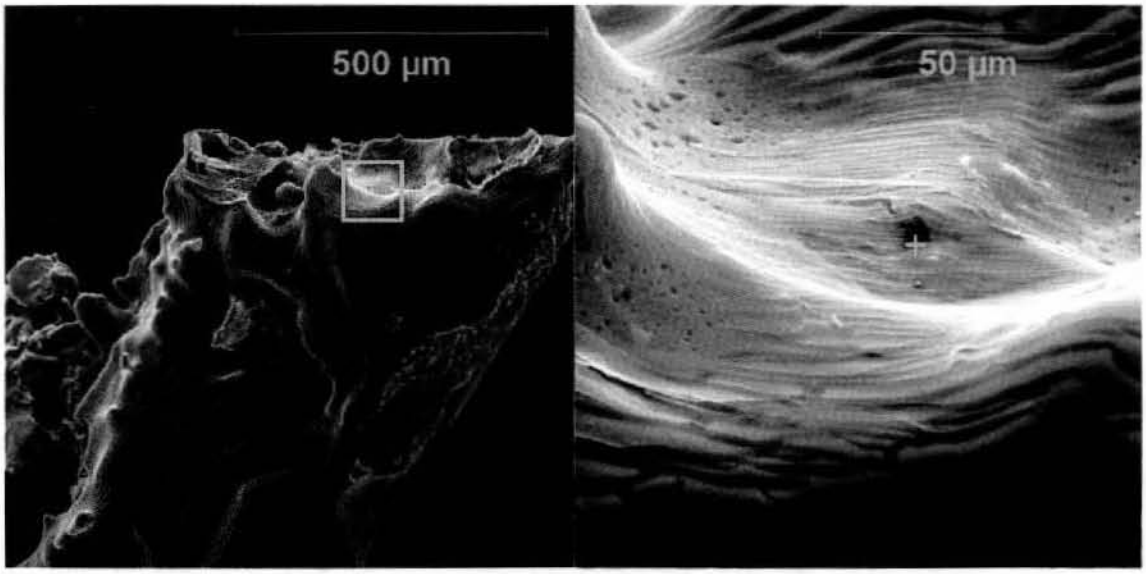


Figure E-5. EDS Spectrum from spot marked with + on Figure E-4

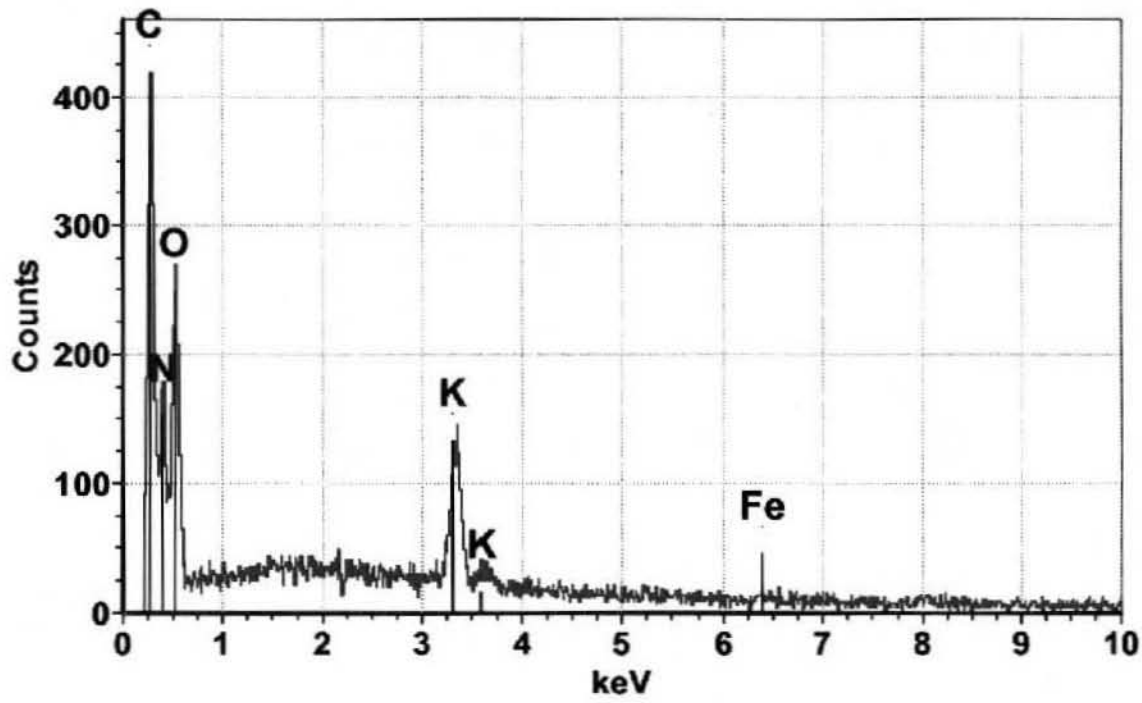


Figure E-6. Portion of sample not rinsed with methanol showing organic coating. Right image is blow up of area in box on left image

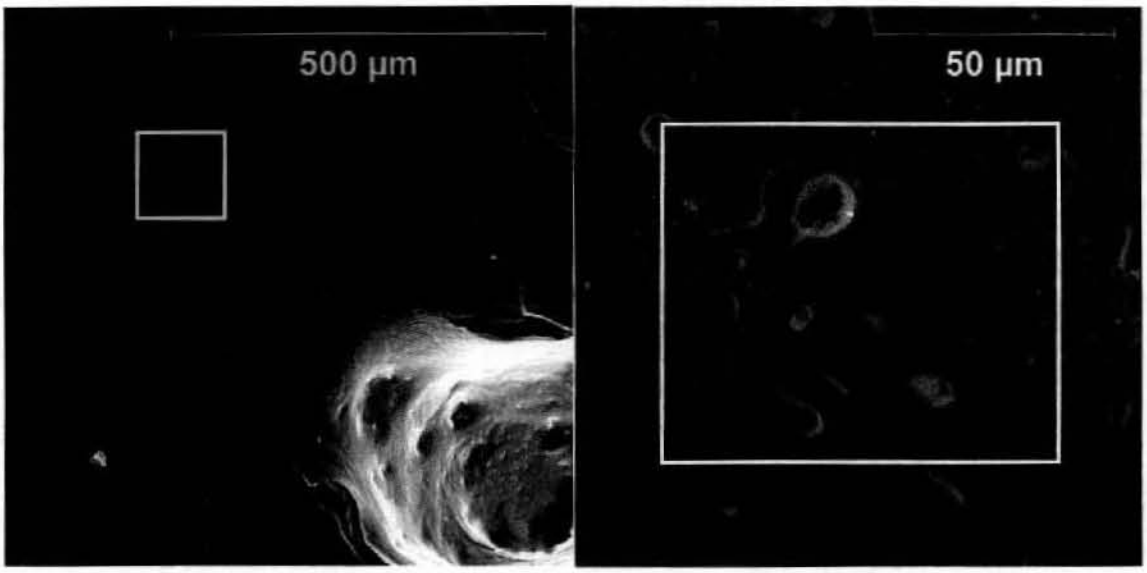
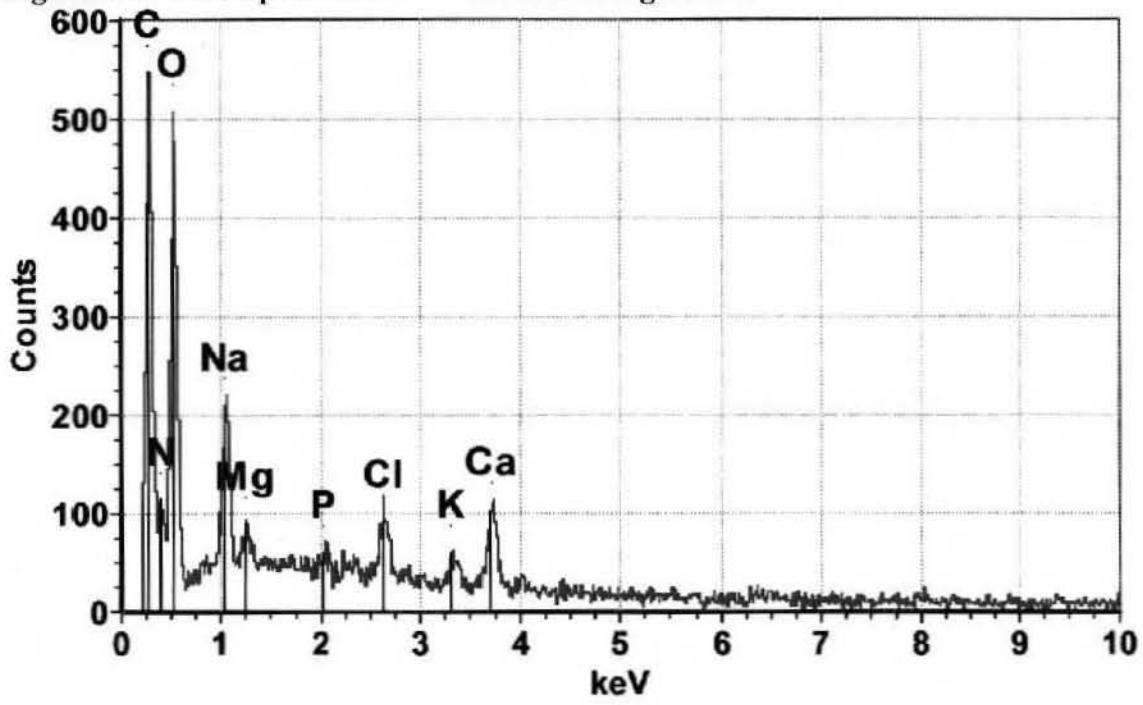


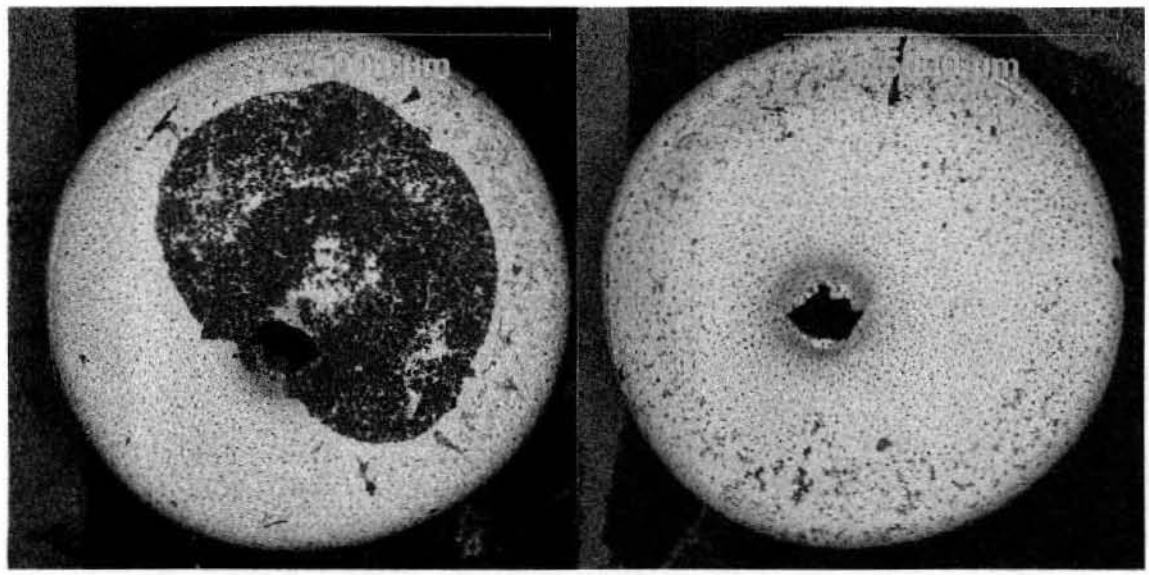
Figure E-7. EDS Spectrum from material in Figure E-6



Samples of DSC Residues from Crystalline and Floor Materials

The two sample containers of crystalline and floor material that were analyzed by DCS with air as the purge gas were recovered and examined by the SEM. These small containers were mounted directly in the SEM specimen chamber for analysis. Figure E-8 is a pair of low magnification Backscatter Electron Images (BEI) of these two containers.

Figure E-8. Backscatter Electron Images of S06E001025 (left) and S06E001042 (right) containers after DSC analysis with air purge.



Both containers show a dark layer of particulate that was ejected from the inside, through the vent hole and deposited on the surface of the container. The sample S06E001025 material was apparently ejected with less forcefulness and a substantial amount of it remained in a continuous layer spreading over a portion of the container surface. The Sample S06E001042 material was apparently ejected more forcefully as evidenced by the more dispersed appearance of the residue across the surface of the container.

The EDS spectra of the particulate from each sample are shown in Figures E-9 (S06E001025) and E-10 (S06E001042). The more volatile carbon and nitrogen are depleted in these heated residues. The particulate from heating of S06E001025 shows a mix of more refractory elements, including Na, K, Ca, Mg, S, and P, while the residue from sample S06E001042 is dominated by Na.

Figure E-9. EDS Spectrum from dark material on DSC sample container from air purge run of Sample S06E001025.

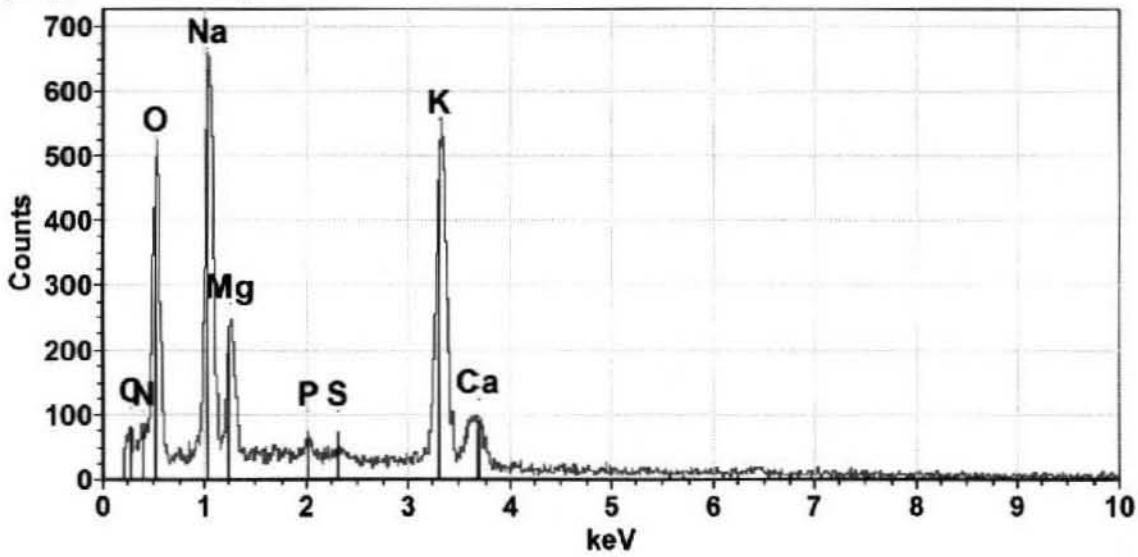
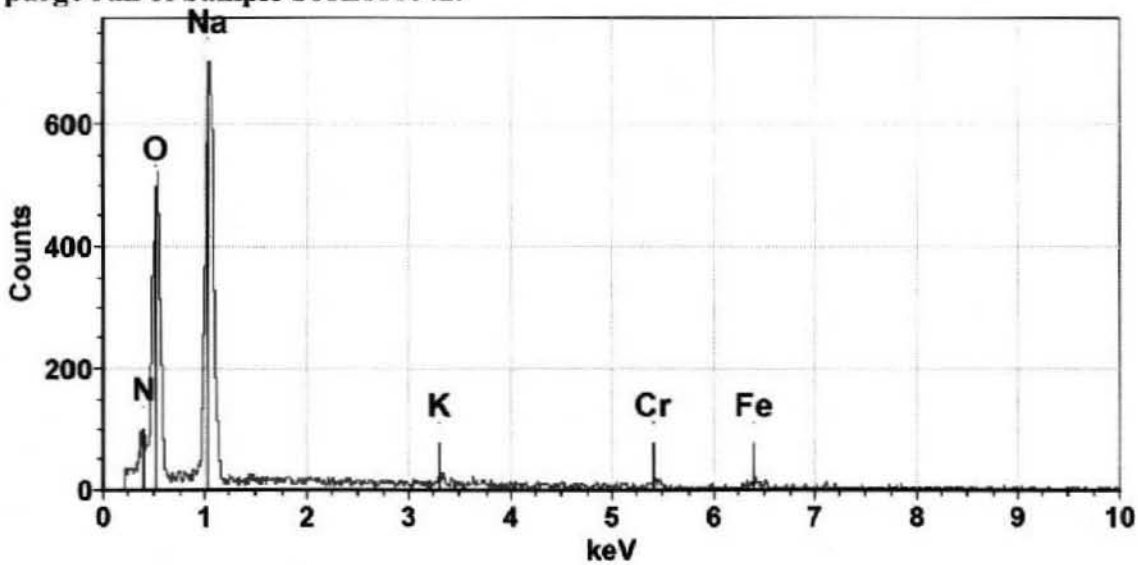


Figure E-10. EDS Spectrum from dark material on DSC sample container from air purge run of Sample S06E001042.



APPENDIX F
POLARIZED LIGHT MICROSCOPY RESULTS

Polarized Light Microscopy Results for 702-AZ Floor Sample S06E00126 (unblended floor sample)

(1) The sample definitely contains $NaNO_3$.
(2) There is non-specific evidence that the sample contains NH_4NO_3.
(3) There is no evidence of "life forms" – no mold spores or filaments, no single-celled amoebas, no isotropic particulate that might be bacterial, etc.

The dark-colored viscous organic liquid phase (see Figure F-1) was definitely a major feature of the sample. There is no evidence of any particulate matter – living or otherwise – in this organic phase.

The major solid phases were the irregular rock-shaped crystals and elongated "canoe-shaped" crystals prominent in Figure F-2. Both were highly birefringent, suggesting $NaNO_3$, $NaNO_2$, and/or NH_4NO_3. (Those are the most common, but not the only, highly-birefringent salt crystals). The rock-shaped crystals lack sufficiently defined edges to determine extinction position, so could be any of the candidate salts. For those crystals with defined edges (e.g., Figure F-3), the extinction position was mainly symmetrical, indicating $NaNO_3$ unambiguously, though at least one crystal with defined edges had parallel extinction (i.e., was not $NaNO_3$).

Ammonium nitrate crystallizes in several different phases at different temperatures. The phase that's stable at room temperature is described in the literature as "pseudo-tetragonal long prisms" with relatively high birefringence ($\eta_z - \eta_x = 0.224$). The elongated crystals visible in Figure F-2 have high birefringence, so are consistent with NH_4NO_3. They also have parallel extinction, ruling out $NaNO_3$. Since the XRD identified NH_4NO_3 but not $NaNO_2$ in the sample, the elongated crystals are most likely NH_4NO_3.

Figure F-4 shows a higher-magnification look at the smaller particulate matter. The bright crystals are irregular in shape and have high birefringence, so are likely $NaNO_3$ and/or NH_4NO_3. The smaller blue and orange crystals have lower birefringence, which is much more common than high birefringence, and could be any number of things, including $CaCl_2 \cdot 4H_2O$ (Ca and Cl having been identified in the SEM/EDS).

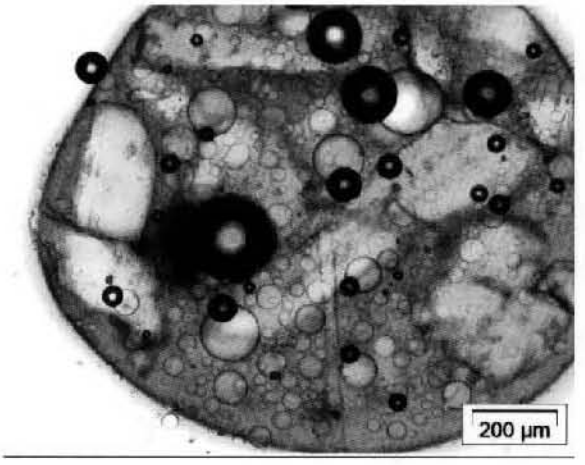


Figure F-1. Uncrossed polars, low mag; orange color is the organic phase, apparently a thick liquid (oil, grease?); large block crystals and elongated crystals visible within globule; dark circles are air bubbles; light circles are liquid bubbles, probably aqueous salt solution.

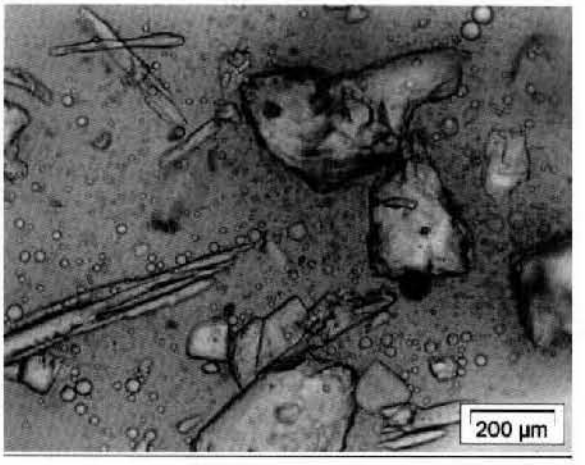


Figure F-2. Uncrossed polars, low mag; orange color of organic phase still visible but diluted; embedded crystals much more visible.

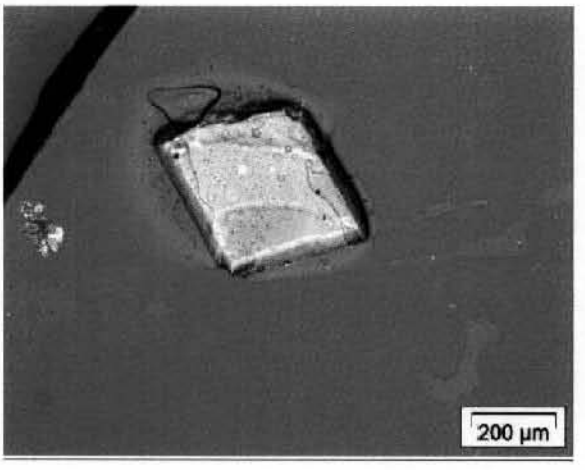


Figure F-3. Crossed polars with Red I compensator, low mag; single large crystal of NaNO3; orange organic visible around edges of crystal.

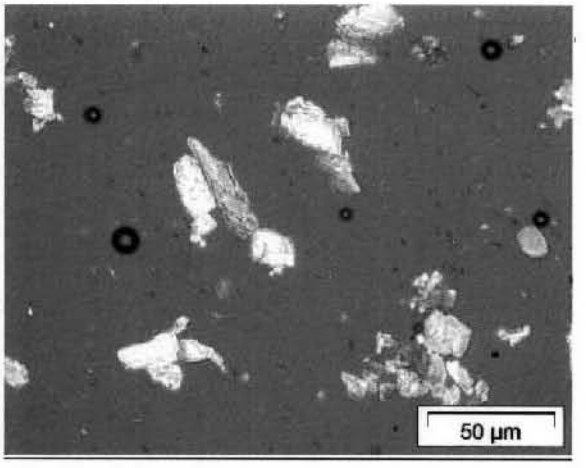


Figure F-4. Crossed polars with Red I compensator, high mag; focus on smaller particulate; bright crystals with irregular shape *could* be $NaNO_3$ or NH_4NO_3. Smaller blue/orange crystals *could* be $CaCl_2 \cdot 4H_2O$ (but could also be any of a myriad of other possibilities).

SO6E001042

Polarized Light Microscopy Results for 702-AZ Floor Sample S06E001042 (blended floor samples)

The sample contains a mixture of large NH_4NO3 crystals, large $NaNO_3$ crystals, and very tiny crystals of indeterminate [by PLM] composition.

Figure F-5 is a low-mag overview of the sample. All of the larger bright particles are either NH_4NO_3 or $NaNO_3$ – can't tell which is which in this view because of their irregular shape. Both crystals have very high birefringence [$NaNO_3$ = 0.26, NH_4NO_3 = 0.22], which makes them very difficult to tell apart from one another based on polarization colors. They're easy to tell apart by their interference figures (see next page) *if* you can detect the interference figures.

Figure F-6 is a close-up showing the prevalence of the 3rd phase – the tiny particulate of unknown composition that coats the larger particles and fills the spaces between them.

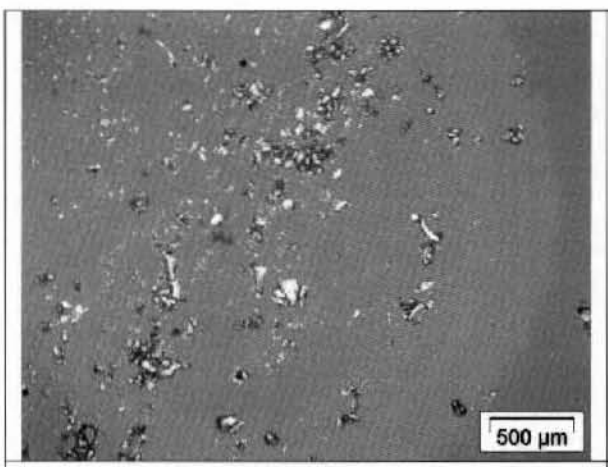


Figure F-5

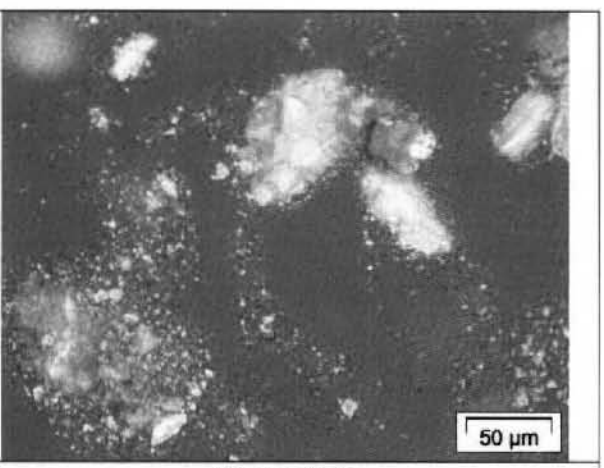


Figure F-6

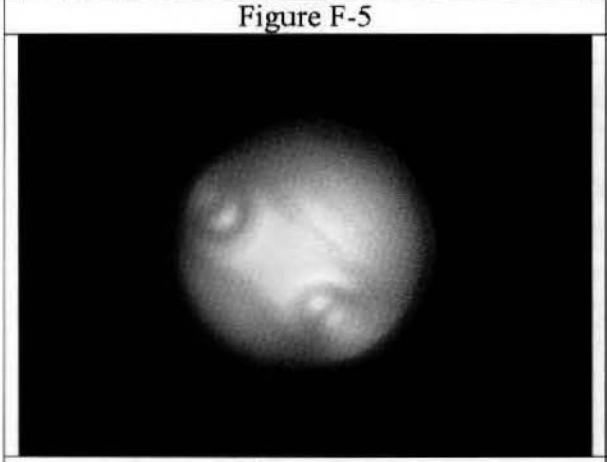


Figure F-7

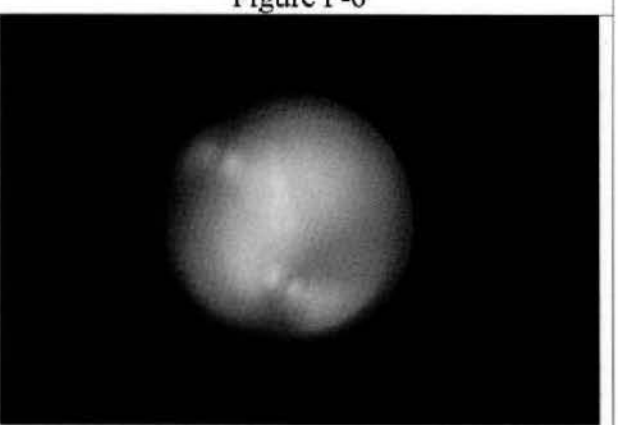


Figure F-8

Figures F-7 and F-8 are conoscopic interference figures of the large NH_4NO_3 crystal in the center of Figure F-9. Figure F-7 has the quarter-wave plate inserted and Figure F-8 has it removed. The clearly biaxial figure indicates the crystal is NH_4NO_3 and not $NaNO_3$. NH_4NO_3 crystals are orthorhombic at room temp (two optic axes – biaxial). $NaNO_3$ crystals are rhombohedral but not orthorhombic – they belong to the hexagonal system, though they don't appear to be hexagonal at all. They have one optic axis (uniaxial).

The large crystal in Figure F-10 also gives a biaxial interference figure—it is NH_4NO_3.

In Figure F-11, the crystal marked 'a' is NH_4NO_3, and the one marked 'b' is $NaNO_3$. The others in the figure gave no recognizable interference figure, so it could not be determined whether they were ammonium or sodium. Of all the crystals evaluated, "indeterminate" (no recognizable interference figure—could be either NH_4NO_3 or $NaNO_3$) was the most common, followed by NH_4NO_3 (which was very common), and then by $NaNO_3$ (which was rare). Figure F-12 is the highest magnification get of the tiny particulate—can not tell anything about it, except that it is birefringent.

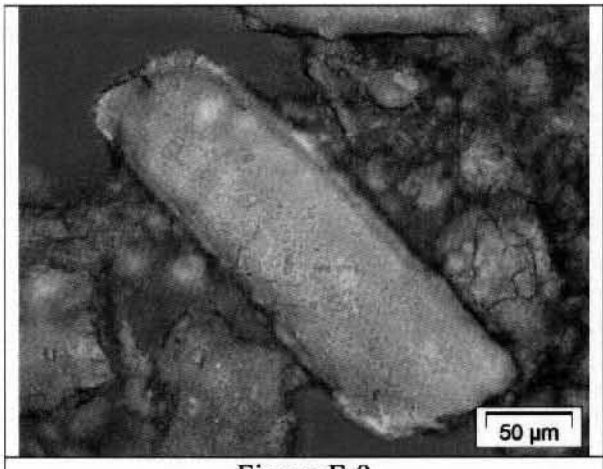


Figure F-9

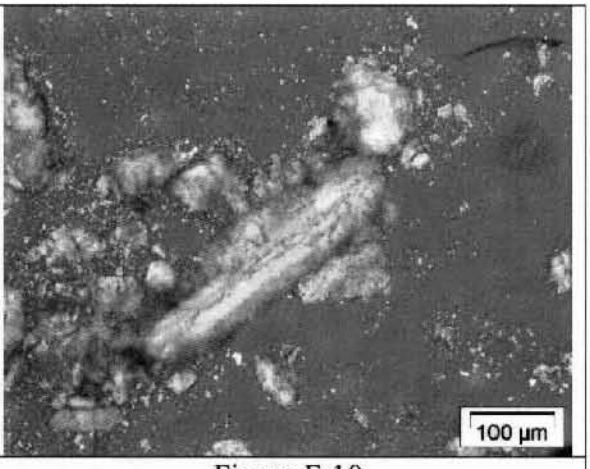


Figure F-10

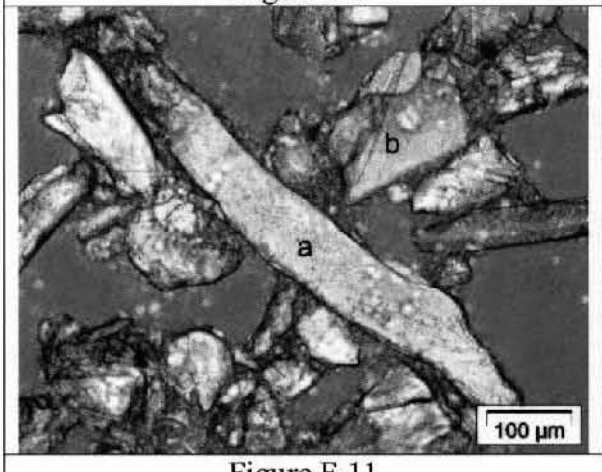


Figure F-11
a = NH_4NO_3 b = $NaNO_3$

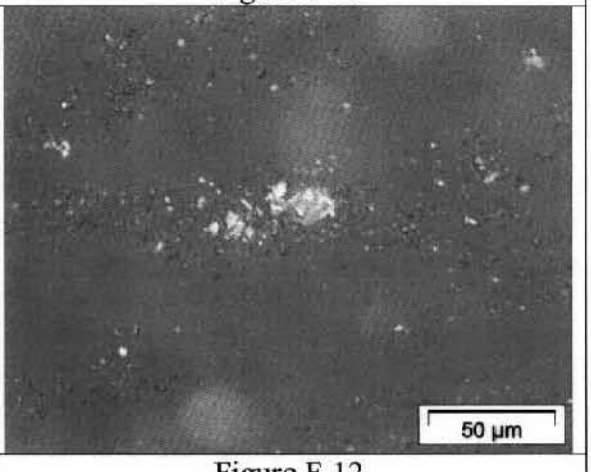


Figure F-12

APPENDIX G
X-RAY DIFFRACTION RESULTS

Figure G-1. XRD spectra of S06E001025 showing ammonium nitrate.

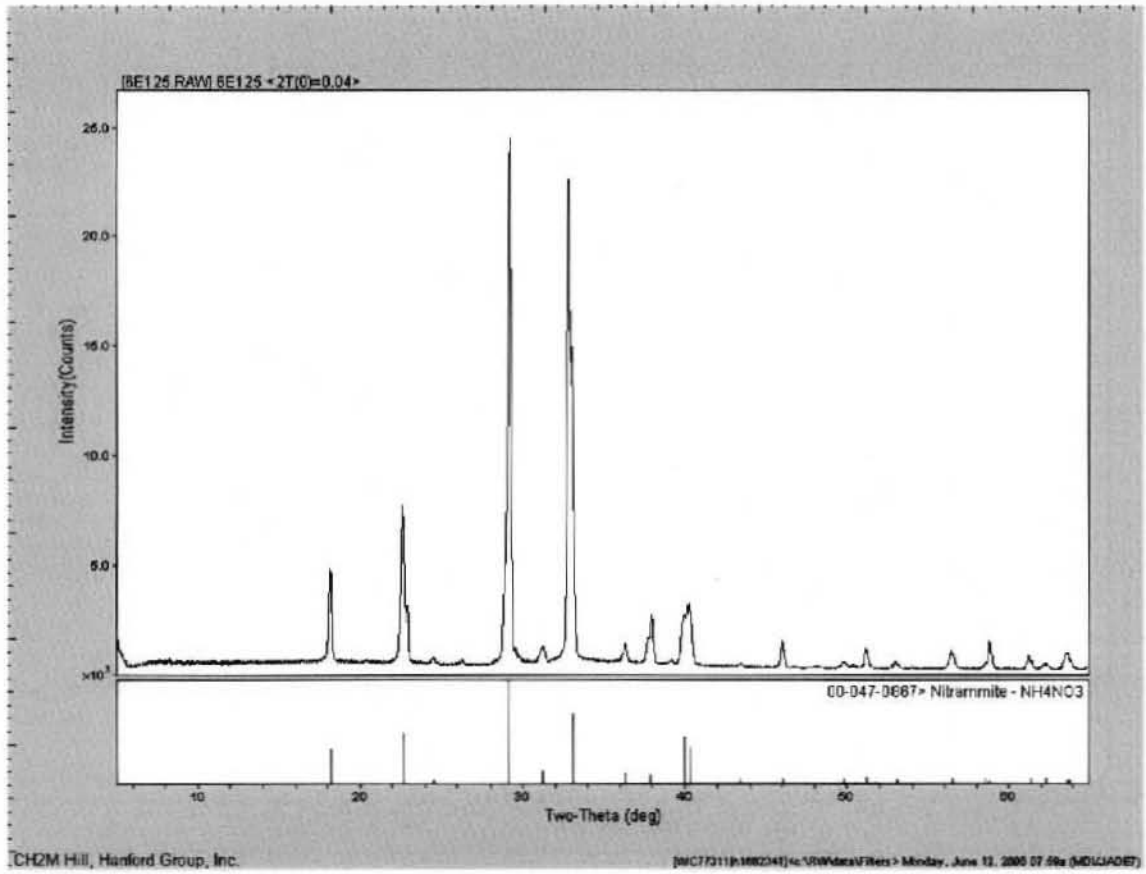


Figure G-2. Sample S06E001026 showing a mixture of ammonium nitrate and sodium nitrate.

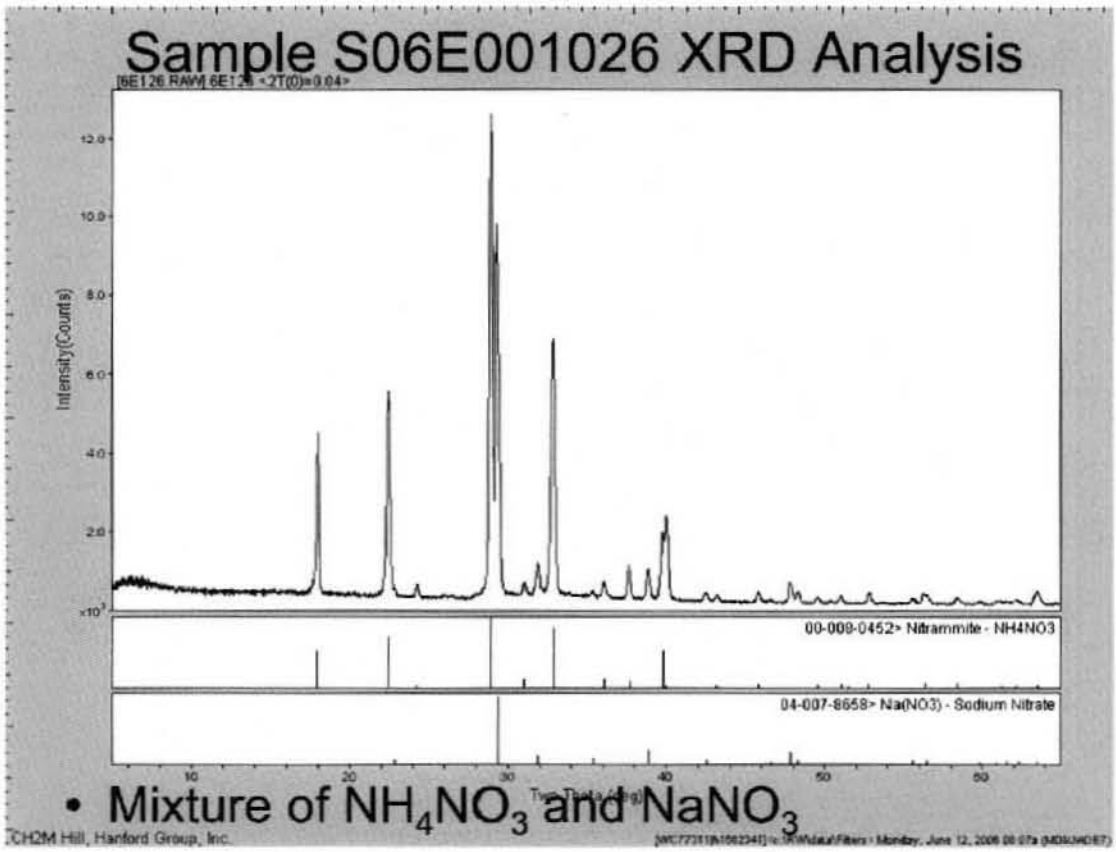
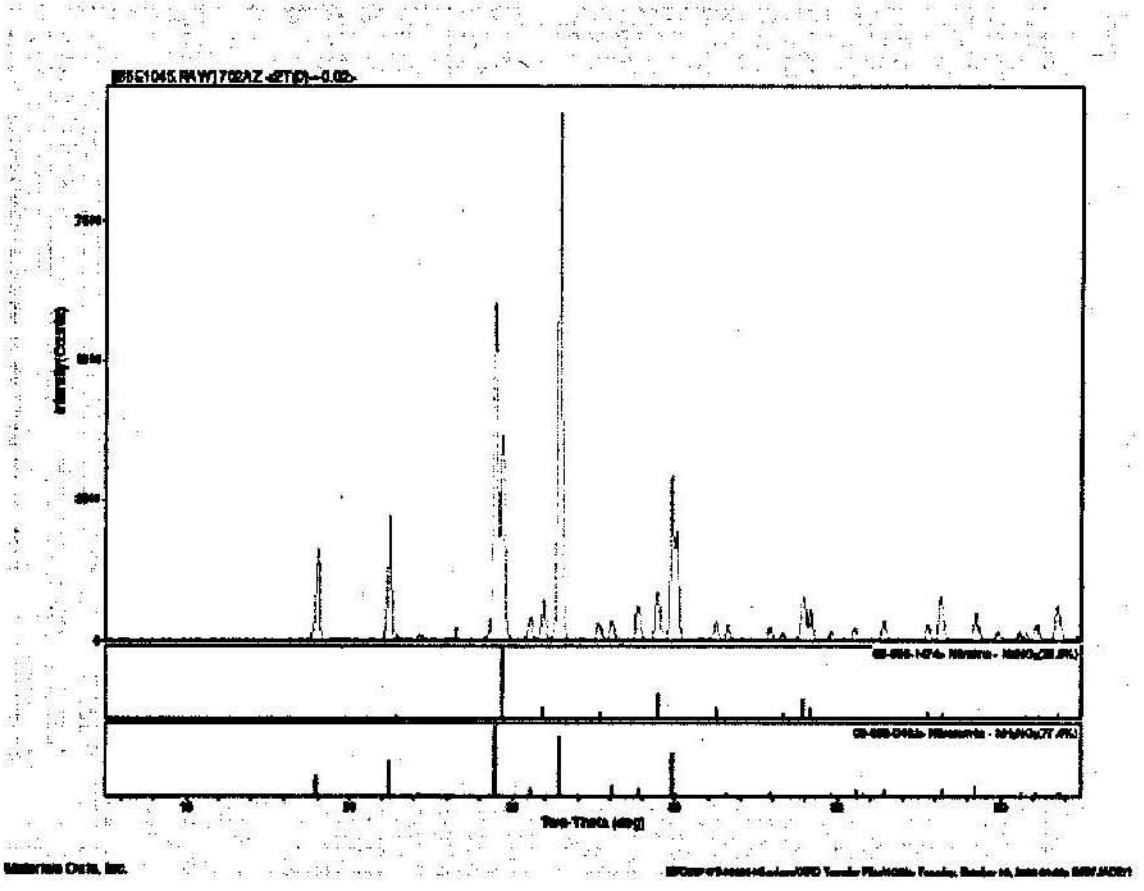


Figure G-3. Sample S06E001042 showing a mixture of ammonium nitrate and sodium nitrate.



APPENDIX H
SCANNING ELECTRON MICROSCOPY OF SAMPLE S06E001029 (PIPE)

Examination of the pipe interior revealed a loose scattering of coarse white particulate near the ends of the pipe section and a bulge of material attached to the interior wall of the pipe, approximately halfway along its length. A portion of the white particulate was recovered into a Petri dish and a spatula was inserted in the tube to sample the material adhering to the interior wall. This deposit was, in fact, a hollow blister that was firmly attached to the tube wall. The surface of the blister was thin and fragile and broke apart easily when scraped with the spatula. Several fragments of this material were recovered.

Figure H-1. The field image, below shows several of the small white particles and large flakes from the blister

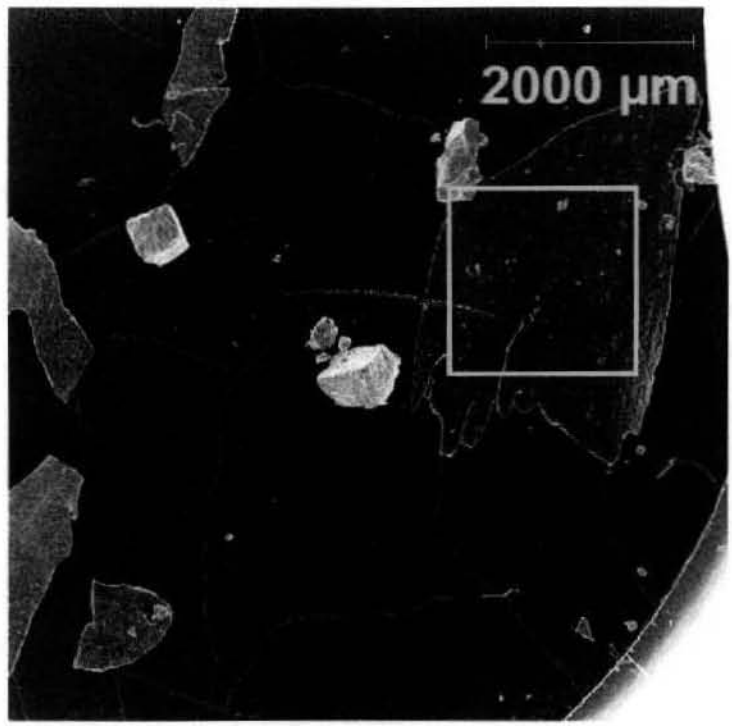


Figure H-2. An EDS X-Ray spectrum from the center of the yellow box shows that carbon makes up the dominant element in the blister material

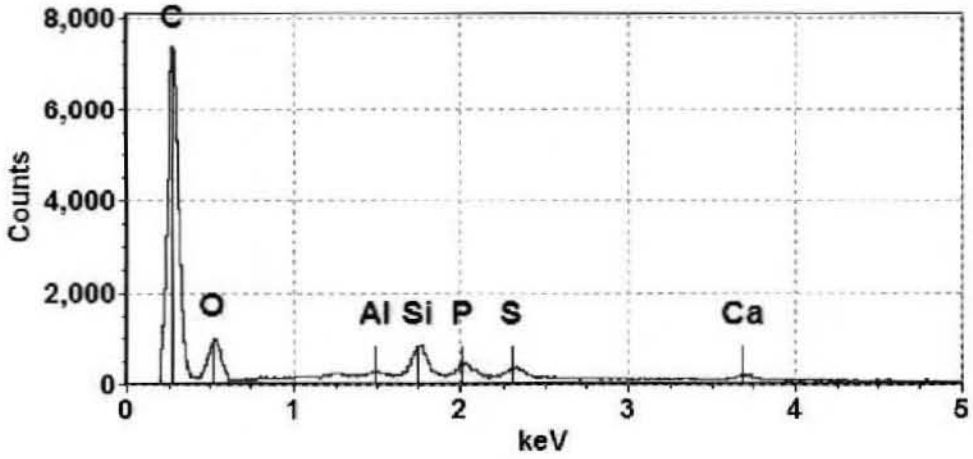


Figure H-3. The white particulate was observed to be coarse aggregates of fine-grained material with a chemical composition (again, obtained from the center of the yellow box) that is consistent with a zeolite.

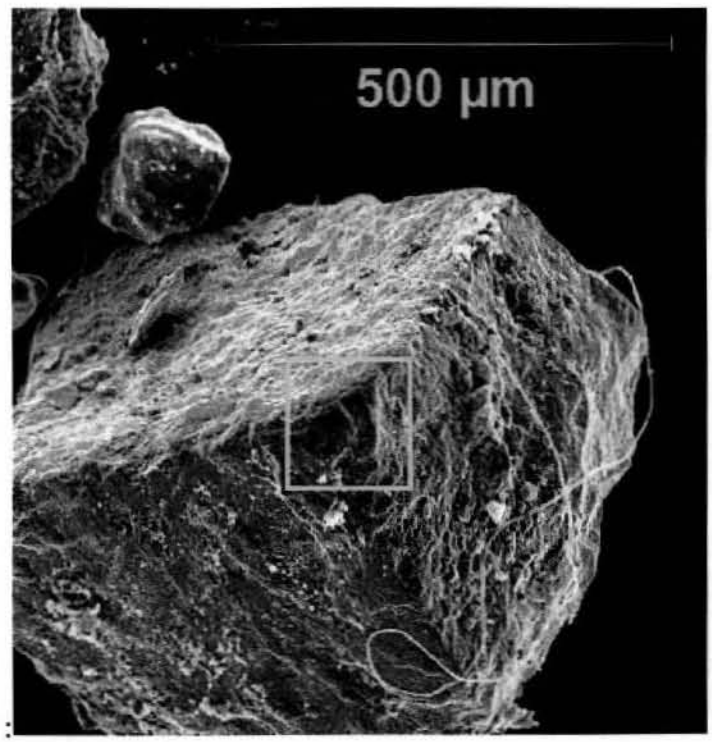


Figure H-4. EDS spectra of material from Figure H-3.