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1. ECN 629042

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Proj.  
ECN

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	<b>5. Project Title/No./Work Order No.</b> Tank 241-A-102		<b>6. Bldg./Sys./Fac. No.</b> NA	<b>7. Approval Designator</b> Q
	<b>8. Document Numbers Changed by this ECN (includes sheet no. and rev.)</b> WHC-SD-WM-DP-177, REV. 0		<b>9. Related ECN No(s).</b> NA	<b>10. Related PO No.</b> NA
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# "FINAL REPORT FOR TANK 241-A-102, AUGER SAMPLE 96-AUG-003."

Jaiduk Jo  
Westinghouse Hanford Company, Richland, WA 99352  
U.S. Department of Energy Contract DE-AC06-87RL10930

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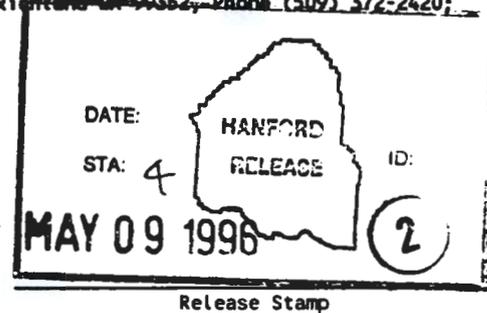
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**WHC-SD-WM-DP-177, REV. 1**

## **ANALYTICAL SERVICES**

# **FINAL REPORT FOR TANK TANK 241-A-102, AUGER SAMPLE 96-AUG-003**

**Project Coordinator: JAIDUK JO**

**Prepared for the U.S. Department of Energy  
Office of Environmental Restoration  
and Waste Management**

**by**

**Westinghouse Hanford Company  
Box 1970  
Richland, Washington**

## WHC-SD-WM-DP-177, REV. 1

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Part I consists of pages 1 through 104, plus page 40.1 and pages 2, 7, 12, 15, 18, 22, 26, 31, 43 and 97 were intentionally left blank.

Part II consists of pages 2-1 through 2-26, and pages 2-4, 2-9, 2-13, and 2-16 were intentionally left blank.

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**NARRATIVE**

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WHC-SD-WM-DP-177, REV. 1

**FINAL REPORT FOR TANK 241-A-102,  
AUGER SAMPLE 96-AUG-003****SUMMARY**

This is the final, format IV, laboratory report for tank 241-A-102 (A-102) auger-mode (96-AUG-003) characterization effort. It transmits additional extrusion information and analytical data not provided in the 45-day report (Jo 1996).

Tank A-102 was auger sampled from Risers 19 and 5 on June 7, 1995 and March 21, 1996, respectively. These samples were received at the 222-S Laboratories on June 9, 1995 and March 21, 1996. The samples were extruded and underwent safety screening analyses consisting of Differential Scanning Calorimetry (DSC), Thermogravimetric Analysis (TGA), bulk density measurements, and total alpha analysis in accordance with the sampling and analysis plan (Jo 1995a).

The summary tables include sample and duplicate results and quality control results associated with the auger samples. Ion chromatography (IC) and inductively coupled plasma atomic emission spectroscopy (ICP) were performed. Total organic carbon (TOC) was analyzed per request from the data review committee (Kirch 1995) and a cyanide (CN) analysis was completed for the 1996 sample.

The test results indicate with 95% confidence, that the mean DSC did not exceed the energetics criterion of 480 J/g (dry). None of the samples for alpha total analyses exceeded the limit of 41  $\mu\text{Ci/g}$  (Jo 1996). The vapor in the tank A-102 dome space is far below 25% of the lower flammability limit [action limit stated in the data quality objective (DQO)].

None of the data indicate that the tank is "unsafe" when compared to the criteria in the Safety Screening Data Quality Objective (Dukelow et al, 1995). Secondary CN analysis on the sample indicated low fuel content. The one-sided 95-percent confidence interval for the TOC result (96-AUG-003) is slightly above the notification limit. However, with a moisture content greater than 17 weight percent (approximately 30%), the tank may be considered "conditionally" safe in accordance with the *Data Quality Objective to Support Resolution of the Organic Complexant Safety Issue* (Turner et al. 1995).

**SCOPE**

This document serves as the final report deliverable for the tank 241-A-102 auger sample collected March 21, 1996. The sample was received, extruded, and analyzed by the 222-S Laboratory in accordance with the sampling and analysis plan (SAP) (Jo 1995a). This document complements the 45-day and final report (Jo 1995b) which contains results from one auger sample taken in June 1995 (95-AUG-033).

This report includes all analytical results from both augers - the safety screening results from both sampling events (tank headspace flammability, DSC, TGA, TOC, and total alpha) and the IC, ICP, CN, and bulk density results from 1996 sampling event. As the final report, the following are also included for the 1996 auger sampling event: chain of custody forms; photographs of extruded segments; bulk density worksheets; and raw data for extrusion, sample preparation, total alpha, specific gravity, IC, ICP, TOC, and CN. Raw data for DSC and TGA were provided in the 45-day report (Jo 1996). A copy of the 45-day report is provided as Part II of this final report.

### **SAMPLE RECEIPT AND EXTRUSION**

A description of the sample receipt and extrusion is contained in the 45-day report (Jo 1996). The chain of custody forms, photographs of the extruded segments, and extrusion worklists are provided in this report. Details of the extrusion and subsampling are provided in the hot cell logbook for tank A-102 (Fuller 1996).

### **TANK HEADSPACE FLAMMABILITY**

A description of the tank headspace flammability measurements taken in tank A-102 prior to auger sampling is provided in the 45-day report (Jo 1996). The combustible gas meter reading was 0 percent of the LFL, indicating no flammability concerns with this tank. Other measurements made were oxygen, 20.2 percent, total organic carbon, 12.4 parts per million (ppm), and ammonia, 300 ppm (appendix).

The vapor in the tank headspace above the waste is safe from a self-propagating chemical reaction (safe from flame or explosion) but is dangerous to breathe. Ammonia concentration is at the threshold (300 ppm) considered by the National Institute of Safety and Health to be "immediately dangerous to life or health." However, the ammonia concentration is less than 5 ppm for 3 feet in the riser and at the breather filter. Therefore, it is not dangerous for the workers to breathe.

### **ANALYTICAL RESULTS**

The results of all analyses performed on the tank A-102 auger samples are provided in the Sample Data Summary tables. Analytical results for DSC, TGA, and total alpha were discussed in the 45-day report (Jo 1996). TOC, CN, IC, and ICP analyses results are also discussed below.

#### **Total Organic Carbon**

The safety screening program requires that TOC be analyzed for any sample that exhibited a DSC exotherm greater than 480 J/g to determine whether or not the organic safety program DQO should be applied. Even though none of the DSC results exceeded the action limit of 480 J/g, the data review committee requested TOC analyses (Kirch 1995).

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TOC analyses were performed by using procedure LA-342-100 Rev. C-0. Sample and duplicate results for the 95-AUG-033 (S95T002697) were both 15,500  $\mu\text{g/g}$ . RPD, spike recovery, and standard recovery were within the limits required by the SAP for sample 95-AUG-033. Sample, duplicate, and triplicate results for the 96-AUG-003 (S96T001620) were 17,900, 10,100, and 14,600  $\mu\text{g C/g}$ , respectively. The triplicate run was completed due to the high RPD (55.7%) result. The triplicate result does not appear in the data summary tables. The spike recovery of 89.2% was slightly outside of the SAP limit (90.0%).

The 95% upper confidence limits for TOC were calculated for samples 95-AUG-033 (15,500  $\mu\text{g C/g}$ ) and 96-AUG-003 (20,800  $\mu\text{g C/g}$ ). The measured values for the TOC and the upper limit for the 95% confidence interval, fall below the action limit of 30,000  $\mu\text{g C/g}$  for both of the auger samples analyzed. However, these results are wet-weight TOC results. The decision rules in the organic DQO are based on a limit of 3 wt% TOC on a dry-weight basis. The dry basis 95% upper confidence limits for 95-AUG-033 and 96-AUG-003 were 22,830 and 32,700  $\mu\text{g C/g}$ , respectively. The 95% upper confidence limit for 96-AUG-003 slightly exceeded the organic DQO limit. However, the organic DQO decision rules state that if the moisture concentration is greater than 17 wt%, the tank may be considered "conditionally" safe, and that monitoring may be required to ensure that the waste will not dry out during interim storage (Turner et al. 1995).

#### Total Inorganic Carbon (TIC)

TIC analysis was also done for the samples. This additional analysis was not required by the Safety Screening DQO. However, since these data are generated when the TOC analysis is performed, the results is included in this report. The SAP does not specify quality assurance/quality control (QA/QC) requirements for these analyses. Consequently they were performed to the laboratory's governing quality documentation.

#### Cyanide

For the 96-AUG-003 sample, a CN analysis was run to determine whether or not the ferrocyanide safety program DQO should be applied. The CN analysis was performed using procedure LA-695-103, Rev. A-0. The results for the sample and duplicate were 48.7 and 49.0  $\mu\text{g/g}$  (dry calculated), respectively. The results show that the CN concentration is well below (approximately three orders of magnitude lower than) the action limit of 39,000  $\mu\text{g/g}$ .

#### IC

A solid sample from 96-AUG-003 was prepared by a water digestion prior to the IC analysis; the water digestion was performed using procedure LA-504-101, Rev. D-0. IC analysis was performed using procedure LA-533-105, Rev. D-1. Nitrite, nitrate, sulfate, phosphate, fluoride, chloride, bromide, and oxalate results are reported for the sample. This analysis was not required by the Safety Screening DQO, but was requested as an opportunistic analysis (Kristofzski 1995). The results are included in this report. The SAP does

**ICP**

ICP analysis was performed for the sample 96-AUG-003 using procedure LA-505-161, Rev. B-0. The sample was prepared by acid digestion prior to the ICP analysis; the acid digestion was performed using procedure LA-505-159, Rev. D-0. Results for ICP elements are reported for the samples. The analysis was not required by the Safety Screening DQO but was requested as an opportunistic analysis (Kristofzski 1995). The results are included in this report. The SAP does not specify QA/QC requirements for these analyses, but if laboratory QA/QC requirements were not met, the data are not reported.

Project Coordinator: Jaiduk Jo

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**SAMPLE DATA SUMMARY**

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CORE NUMBER: 95-AUG-033  
SEGMENT #: 95-AUG-033

SEGMENT PORTION: W Whole Segment

Sample#	R A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S95T001171		% Water by TGA using Mettler	%	100.8	n/a	33.59	3.066e1	3.212e1	9.12	n/a	n/a	n/a
S95T001171		DSC Exotherm Dry Calculated	Joules/g Dry	n/a	n/a	3.19e+02	3.060e2	3.125e2	4.16	n/a	n/a	n/a
S95T001171		DSC Exotherm using Mettler	Joules/g	104.4	n/a	2.16e+02	2.074e2	2.119e2	4.25	n/a	n/a	n/a
S95T001174	F	Alpha of Digested Solid	uCi/g	102.7	<6.220e-2	4.550	3.700e0	4.125e0	20.6	106.1	1.430e-1	7.8
S95T002697		TOC by Persulfate/Coulometry	ug/g	101.7	3.00e-01	1.55e+04	1.550e4	1.550e4	0.00	99.90	40.00	n/a
S95T002697		TIC by Acid/Coulometry	ug/g	101.0	1.700	4.80e+03	4.250e3	4.520e3	12.2	104.5	5.000	n/a

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A-102 Final Report  
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CORE NUMBER: 96-AUG-003  
SEGMENT #: 96-AUG-003

SEGMENT PORTION: W Whole Segment

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S96T001619			Bulk Density of Sample	g/mL	n/a	n/a	1.700	n/a	n/a	n/a	n/a	5.000e-1	n/a
S96T001620			% Water by TGA using Mettler	%	100.0	n/a	36.13	3.663e1	3.638e1	1.37	n/a	n/a	n/a
S96T001620			DSC Exotherm Dry Calculated	Joules/g Dry	n/a	n/a	1.01e+02	1.217e2	1.113e2	18.7	n/a	n/a	n/a
S96T001620			DSC Exotherm using Mettler	Joules/g	100.9	n/a	64.20	7.740e1	7.080e1	18.6	n/a	n/a	n/a
S96T001620			Cyanide Dry - Calculated w TGA	ug/g Dry Wt	n/a	n/a	48.73	4.904e1	4.888e1	0.63	n/a	6.000e-2	n/a
S96T001620			Cyanide EDTA Addition	ug/g	102.1	<3.800e-2	30.10	3.120e1	3.065e1	3.59	82.60	4.020	n/a
S96T001620			TOC by Persulfate/Coulometry	ug/g	90.67	1.800	1.79e+04	1.010e4	1.400e4	55.7	89.20	40.00	n/a
S96T001620			TIC by Acid/Coulometry	ug/g	95.85	1.900	5.36e+03	3.180e3	4.270e3	51.1	88.10	5.000	n/a
S96T001622	F		Alpha of Digested Solid	uci/g	103.1	<1.650e-1	5.230	5.250e0	5.240e0	0.38	84.96	1.830e-1	9.95E+00
S96T001624	A		Silver -ICP-Acid Digest	ug/g	88.60	<1.000e-2	3.83e+02	3.590e2	3.710e2	6.47	133.7	4.030	n/a
S96T001624	A		Aluminium -ICP-Acid Digest	ug/g	89.20	5.80e-02	3.27e+04	3.060e4	3.160e4	6.64	491.2	20.10	n/a
S96T001624	A		Arsenic -ICP-Acid Digest	ug/g	92.20	<1.000e-1	< 40.30	<3.79e1	n/a	n/a	80.80	40.30	n/a
S96T001624	A		Boron -ICP-Acid Digest	ug/g	99.80	3.14e-01	54.80	4.980e1	5.230e1	9.56	92.56	20.10	n/a
S96T001624	A		Barium -ICP-Acid Digest	ug/g	92.40	<5.000e-2	1.44e+02	1.330e2	1.385e2	7.94	91.72	20.10	n/a
S96T001624	A		Beryllium -ICP-Acid Digest	ug/g	97.00	<5.000e-3	< 2.010	<1.89e0	n/a	n/a	94.40	2.010	n/a
S96T001624	A		Bismuth -ICP-Acid Digest	ug/g	87.40	<1.000e-1	3.49e+02	3.230e2	3.360e2	7.74	95.72	40.30	n/a
S96T001624	A		Calcium -ICP-Acid Digest	ug/g	88.60	<1.000e-1	7.10e+02	6.700e2	6.900e2	5.80	85.52	40.30	n/a
S96T001624	A		Cadmium -ICP-Acid Digest	ug/g	87.20	<5.000e-3	78.60	7.430e1	7.645e1	5.62	88.20	2.010	n/a
S96T001624	A		Cerium -ICP-Acid Digest	ug/g	96.40	<1.000e-1	1.62e+02	1.530e2	1.575e2	5.71	97.06	40.30	n/a
S96T001624	A		Cobalt -ICP-Acid Digest	ug/g	90.20	<2.000e-2	11.90	1.180e1	1.185e1	0.84	90.02	8.050	n/a
S96T001624	A		Chromium -ICP-Acid Digest	ug/g	89.40	<1.000e-2	9.05e+03	8.540e3	8.800e3	5.80	199.0	4.030	n/a
S96T001624	A		Copper -ICP-Acid Digest	ug/g	91.00	<1.000e-2	37.30	3.490e1	3.610e1	6.65	87.30	4.030	n/a
S96T001624	A		Iron -ICP-Acid Digest	ug/g	89.80	<5.000e-2	2.02e+04	1.900e4	1.960e4	6.12	71.06	20.10	n/a
S96T001624	A		Potassium -ICP-Acid Digest	ug/g	90.60	<5.000e-1	3.14e+03	3.010e3	3.080e3	4.23	128.4	201.0	n/a
S96T001624	A		Lanthanum -ICP-Acid Digest	ug/g	93.80	<5.000e-2	1.07e+02	9.850e1	1.028e2	8.27	92.80	20.10	n/a
S96T001624	A		Lithium -ICP-Acid Digest	ug/g	93.00	<1.000e-2	< 4.030	<3.79e0	n/a	n/a	92.00	4.030	n/a
S96T001624	A		Magnesium -ICP-Acid Digest	ug/g	85.40	<1.000e-1	4.80e+02	4.550e2	4.675e2	5.35	88.32	40.30	n/a
S96T001624	A		Manganese -ICP-Acid Digest	ug/g	86.60	<1.000e-2	3.48e+03	3.280e3	3.380e3	5.92	126.8	4.030	n/a
S96T001624	A		Molybdenum -ICP-Acid Digest	ug/g	92.20	<5.000e-2	60.30	5.690e1	5.860e1	5.80	92.62	20.10	n/a
S96T001624	A		Sodium -ICP-Acid Digest	ug/g	101.2	4.30e-01	1.34e+05	1.240e5	1.290e5	7.75	937.3	40.30	n/a
S96T001624	A		Neodymium -ICP-Acid Digest	ug/g	92.80	<1.000e-1	2.38e+02	2.210e2	2.295e2	7.41	92.80	40.30	n/a
S96T001624	A		Nickel -ICP-Acid Digest	ug/g	89.60	<2.000e-2	4.26e+02	3.990e2	4.125e2	6.55	89.70	8.050	n/a
S96T001624	A		Phosphorus -ICP-Acid Digest	ug/g	97.40	<2.000e-1	1.65e+03	1.550e3	1.600e3	6.25	150.6	80.50	n/a
S96T001624	A		Lead -ICP-Acid Digest	ug/g	83.20	<1.000e-1	1.44e+03	1.370e3	1.400e3	4.98	96.94	40.30	n/a
S96T001624	A		Sulfur -ICP-Acid Digest	ug/g	89.00	<1.000e-1	5.75e+02	5.330e2	5.540e2	7.58	93.74	40.30	n/a
S96T001624	A		Antimony -ICP-Acid Digest	ug/g	96.00	<6.000e-2	< 24.20	<2.27e1	n/a	n/a	99.20	24.20	n/a
S96T001624	A		Selenium -ICP-Acid Digest	ug/g	87.60	<1.000e-1	< 40.30	<3.79e1	n/a	n/a	87.00	40.30	n/a
S96T001624	A		Silicon -ICP-Acid Digest	ug/g	105.4	7.50e-02	4.03e+03	3.800e3	3.920e3	5.87	108.1	20.10	n/a
S96T001624	A		Samarium -ICP-Acid Digest	ug/g	91.80	<1.000e-1	< 40.30	4.050e1	n/a	n/a	96.00	40.30	n/a
S96T001624	A		Strontium -ICP-Acid Digest	ug/g	92.00	<1.000e-2	32.60	3.030e1	3.145e1	7.31	90.56	4.030	n/a
S96T001624	A		Titanium -ICP-Acid Digest	ug/g	89.80	<1.000e-2	35.80	3.240e1	3.410e1	9.97	88.84	4.030	n/a
S96T001624	A		Thallium -ICP-Acid Digest	ug/g	85.80	<2.000e-1	< 80.50	<7.58e1	n/a	n/a	84.80	80.50	n/a
S96T001624	A		Uranium -ICP-Acid Digest	ug/g	90.40	<5.000e-1	3.67e+04	3.390e4	3.530e4	7.93	229.8	201.0	n/a

WHC-SD-WM-DP-177, REV. 1

6

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S96T001624	A		Vanadium -ICP-Acid Digest	ug/g	89.80	<5.000e-2	< 20.10	<1.89e1	n/a	n/a	90.00	20.10	n/a
S96T001624	A		Zinc -ICP-Acid Digest	ug/g	84.20	<1.000e-2	1.27e+02	1.200e2	1.235e2	5.67	87.34	4.030	n/a
S96T001624	A		Zirconium -ICP-Acid Digest	ug/g	105.6	<1.000e-2	4.92e+02	4.760e2	4.840e2	3.31	147.4	4.030	n/a
S96T002170	W		Bromide by Ion Chromatograph	ug/g	96.70	<1.260e-1	<2.76e+03	<2.62e3	n/a	n/a	98.61	2.760e3	n/a
S96T002170	W		Chloride-IC-Dionex 4000i/4500	ug/g	100.9	3.30e-02	4.24e+03	1.170e4	7.970e3	93.6	92.15	371.8	n/a
S96T002170	W		Fluoride-IC-Dionex 4000i/4500	ug/g	96.27	<1.300e-2	<2.84e+02	<2.70e2	n/a	n/a	105.6	284.2	n/a
S96T002170	W		Nitrite-IC - Dionex 4000i/4500	ug/g	98.09	<1.070e-1	7.98e+04	8.660e4	8.320e4	8.17	104.5	2.340e3	n/a
S96T002170	W		Nitrate by IC-Dionex4000i/4500	ug/g	98.86	<1.400e-1	8.68e+04	9.380e4	9.030e4	7.75	101.8	3.060e3	n/a
S96T002170	W		Oxalate by IC - Dionex 4000i	ug/g	99.63	<1.050e-1	1.13e+04	1.250e4	1.190e4	10.1	100.6	2.300e3	n/a
S96T002170	W		Phosphate-IC-Dionex 4000i/4500	ug/g	100.5	<1.190e-1	6.62e+03	5.970e3	6.290e3	10.3	99.08	2.600e3	n/a
S96T002170	W		Sulfate by IC-Dionex4000i/4500	ug/g	98.42	<1.360e-1	3.87e+03	5.090e3	4.480e3	27.2	95.72	2.970e3	n/a

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9613441.0252

WHC-SD-WM-DP-177, REV. 1

9613441.0253

WHC-SD-WM-DP-177, REV. 1

## **DOME SPACE FLAMMABILITY DATA SHEETS**

**WHC-SD-WM-DP-177, REV. 1**

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WHC-SD-WM-DP-177, REV. 1  
DATA SHEET 1 - IH&S VAPOR SURVEY

2-15-96

Tank No. A-102

Riser No. 5 18

Location (Breather/Vent, Riser, Dome Space, Breathing zone)

Breather Filter

Vapor

Results

O2

20.9%

LEL

0%

TOC

0.0 PPM

NH3

< 5 PPM

Tank No. A-102

Riser No. 5

Location (Breather/Vent, Riser, Dome Space, Breathing zone)

Riser 3 FT IN Riser

Vapor

Results

O2

20.9%

LEL

0%

TDC

1.2 PPM

NH3

< 5 PPM

Tank No. A-102

Riser No. 5

Location (Breather, Vent, Riser, Dome Space, Breathing zone)

Dome space 20FT INSIDE RISER

Vapor

Results

O2

20.2%

LEL

0%

TDC

12.4 PPM

NH3

300 PPM

Bill Spaulding  
2-15-96

A-102 IN-TANK  
VIDEO  
2nd ENTRY

Document No. <b>TO-020-155</b>	Rev/Mod <b>A-4</b>	Page <b>31</b>
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9613441.0255

WHC-SD-WM-DP-177, REV. 1

## STATISTICAL ANALYSIS

**WHC-SD-WM-DP-177, REV. 1**

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L. Jensen 4/1/96									
A-102									
	ug/g	Primary	Duplicate	Triplicate	Count	Mean	SD(mean)	UL(95%)	
Aug-003	S96T001620	TOC	1.79E+04	1.01E+04	1.46E+04	3	1.42E+04	2.26E+03	2.08E+04
Aug-033	S95T002697	TOC	1.55E+04	1.55E+04		2	1.55E+04	0.00E+00	1.55E+04

25

WHC-SD-WM-DP-177, REV. 1

9520 116196

9613441.0257

**WHC-SD-WM-DP-177, REV. 1**

**CHAIN OF CUSTODY FORMS**

WHC-SD-WM-DP-177, REV. 1

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**GOP**

**CHAIN-OF-CUSTODY RECORD FOR AUGER/GRAB SAMPLING**

(1) Shipment Number 200W-08-TF (2) Sample Number 96-Aug-003 (3) Supervisor JAMES SICKELS  
 (4) Tank A-102 (5) Riser 5 (6) Cask/PIG Shipping Container Serial Number C.2005

Radiation Survey Data For Cask/PIG:		(7) FIELD	(31) LABORATORY	(8) Shipment Description	
Over Top Dose Rate	<u>2.5</u>	<u>2.5</u>	<u>0.5</u>	A. Work Package Number	<u>ES-95-00594</u>
Side Dose Rate	<u>40</u>	<u>40</u>	<u>37</u>	B. Cask/PIG Seal Number	<u>1939</u>
Bottom Dose Rate	<u>30</u>	<u>30</u>	<u>18</u>	C. Date and Time Sample	<u>3-21-96 1040</u>
Removable Contamination	<u>220</u>	<u>220</u>	<u>220</u>	Removed from Tank	<u>1040</u>
	(Alpha)	(Alpha)	(Alpha)	D. Expected Liquid Content	<u>10%</u>
	<u>41K</u>	<u>41K</u>	<u>41K</u>	E. Expected Solid Content	<u>90%</u>
	(Beta-Gamma)	(Beta-Gamma)	(Beta-Gamma)	F. Dose Rate Through Drill String (Auger)/On Contact (GRAB)	<u>1R/hr</u>
RCT*	<u>[Signature]</u>	RCT*	<u>[Signature]</u>	G. Expected Sample Length (Auger)/Volume (GRAB)	<u>15"</u>
	(Signature)		(Signature)		

(9) INFORMATION (Include statement of laboratory tests to be performed.)

6

(10) Field Comments

(32) Laboratory Comments

(11) Point of Origin <u>241-A Vign 5</u>	(12) Destination <u>2225</u>	(13) Sender Name (Sign and PRINT) <u>James Sickels JAMES SICKELS</u>	(14) Date/Time <u>3-21-96</u>	(15) Sender Comments
(17) Relinquished By (Sign and PRINT) <u>James Sickels JAMES SICKELS</u>	(18) Received By (Sign and PRINT) <u>J L Hensley J L HENSLEY</u>	(19) Date/Time <u>3-21-96</u>	(20) Receiver Comments	
(21) Relinquished By (Sign and PRINT) <u>J L Hensley J L HENSLEY</u>	(22) Received By (Sign and PRINT) <u>E E Dube E E DUBE</u>	(23) Date/Time <u>3-21-96</u>	(24) Receiver Comments	
(25) Relinquished By (Sign and PRINT)	(26) Received By (Sign and PRINT)	(27) Date/Time	(28) Receiver Comments	

(16) Seal Intact Upon Release? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	(29) Seal Intact Upon Receipt? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	(30) Seal Data Consistent with this Record? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Shipment No. <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Seal No. <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Sample No. <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

WHC-SD-WM-DP-177, REV. 1

9603410050

COPY

CHAIN-OF-CUSTODY RECORD FOR AUGER SAMPLING

(1) Shipment Number 200W-08-TF (2) Sample Number 95-AUG-033 (3) Supervisor R.J. PRAZNIK  
(4) Tank A102 (5) Riser 19 (6) Cask Serial Number C1039

Radiation Survey Data:		(7) FIELD	(8) LABORATORY	(8) Shipment Description
Over Top Dose Rate	<u>20.5 mR/hr</u>	<u>20.5 mR/hr</u>	<u>20.5 mR/hr</u>	A. Work Package Number <u>E3-95-00255-0</u>
Side Dose Rate	<u>12 mR/hr</u>	<u>12 mR/hr</u>	<u>12 mR/hr</u>	B. Cask Seal Number <u>1044</u>
Bottom Dose Rate	<u>4 mR/hr</u>	<u>6 mR/hr</u>	<u>6 mR/hr</u>	C. Date and Time Sample Removed from Tank <u>6-7-95 / 1125hrs</u>
Smearable Contamination	<u>220 dpm</u> (Alpha)	<u>220 dpm</u> (Alpha)	<u>220 dpm</u> (Alpha)	D. Expected Liquid Content * <u>90%</u>
	<u>210000 dpm</u> (Beta-Gamma)	<u>210000 dpm</u> (Beta-Gamma)	<u>210000 dpm</u> (Beta-Gamma)	E. Expected Solid Content <u>10%</u>
RCT: <u>[Signature]</u> (Signature)	RCT: <u>[Signature]</u> (Signature)	RCT: <u>[Signature]</u> (Signature)	RCT: <u>[Signature]</u> (Signature)	F. Dose Rate Through Drill String <u>400 mR/hr</u>
				G. Expected Sample Length <u>12"</u>

(9) INFORMATION (Include statement of laboratory tests to be performed.)  
3

(10) Field Comments (NOTE)  
\* SAMPLE MEDIUM WAS GRITTY SAND LIKE.

(32) Laboratory Comments

(11) Point of Origin <u>A102 4/19</u>	(12) Destination <u>2225 LABS</u>	(13) Sender Name (Sign and PRINT) <u>Daniel DA KRAWN</u>	(14) Date/Time <u>6-9-95/033</u>	(15) Sender Comments
(17) Relinquished By (Sign and PRINT) <u>Daniel DA KRAWN</u>	(18) Received By (Sign and PRINT) <u>Jubal D Helms</u>	(19) Date/Time <u>6/9/95/1233</u>	(20) Receiver Comments	
(21) Relinquished By (Sign and PRINT) <u>Jubal D Helms</u>	(22) Received By (Sign and PRINT) <u>EE Dubes</u>	(23) Date/Time <u>6-9-95 1300</u>	(24) Receiver Comments	
(25) Relinquished By (Sign and PRINT)	(26) Received By (Sign and PRINT)	(27) Date/Time	(28) Receiver Comments	

(16) Seal Intact Upon Release? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	(29) Seal Intact Upon Receipt? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	(30) Seal Data Consistent with this Record? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
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WHC-SD-WM-DP-177, REV. 1

001  
WESTINGHOUSE  
LAB DATA MGMT  
3509 372 2929  
13:36  
08/09/95

9613441.0259

**WHC-SD-WM-DP-177, REV. 1**

**PHOTOGRAPH**

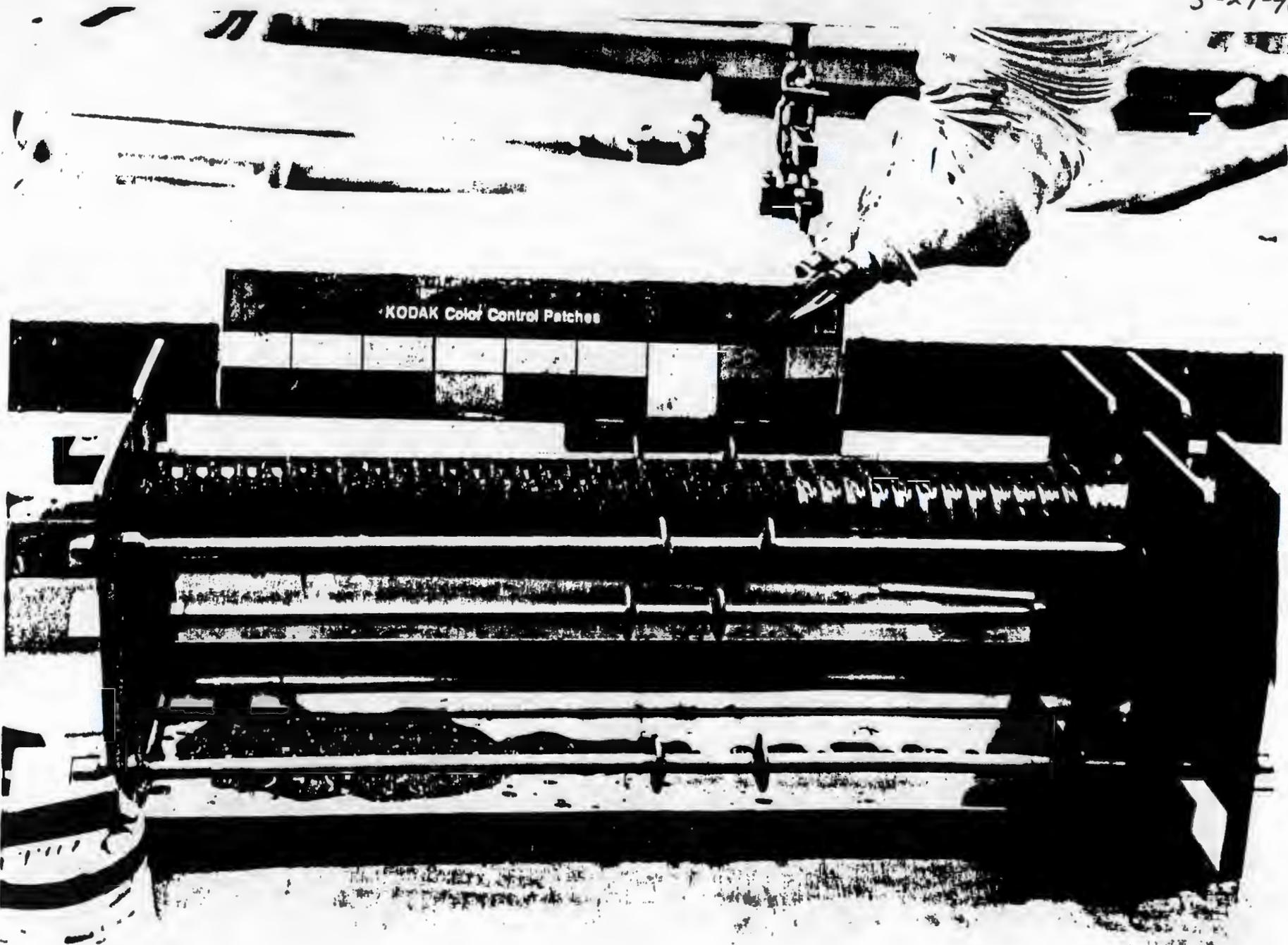
WHC-SD-WM-DP-177, REV. 1

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A-102

96-AUG-003

3-27-96



23

WHC-SD-WM-DP-177, REV. 1

9613441.0260

A-102 95-AUG-033

6-15-95

KODAK Color Control Patches

21

WHC-SD-WM-DP-177, REV. 1

9613441.0261

9613441.0262

**WHC-SD-WM-DP-177, REV. 1**

**SAMPLE PREPARATIONS**

**WHC-SD-WM-DP-177, REV. 1**

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LABCORE Data Entry Template for Worklist#

7097

Analyst: lml Instrument: FUS01 30116355 Book # \_\_\_\_\_

Method: LA-549-141 Rev/Mod FO

Worklist Comment: A-102 96-AUG-003 Fusion Digest rkf

GROUP	PROJECT	S TYPE	SAMPLE#	R A	TEST	MATRIX	ACTUAL	FOUND	DL	UNIT
		1 BLNK-PREP			FUSION01	SOLID	<u>1</u>	<u>.250</u>	N/A	g/L
96000343		2 SAMPLE	S96T001622	0 F	FUSION01	SOLID	N/A	<u>2.0008</u>		g/L
96000343		3 SAMPLE	S96T001622	0	DOSE-02	SOLID	N/A	<u>450</u>		mrads/hour
96000343		4 DUP	S96T001622	0 F	FUSION01	SOLID	<u>2.0008</u>	<u>2.0996</u>	N/A	g/L
96000343		5 DUP	S96T001622	0	DOSE-02	SOLID	<u>450</u>	<u>500</u>	N/A	mrads/hour

Final page for worklist # 7097

[Signature] 4-2-96  
Analyst Signature Date

Keith Fuller 4/5/96  
Analyst Signature Date

S96T001620 → 1622

Reviewed by RK Fuller 4/5/96

Data Entry Comments:

40ml HNO3 → All samples & QC.  
< 1% Solids  
HPT: Bill Bishop

Units shown for QC (SPK & STD) may not reflect the actual units. DL = Detection Limit, S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.

LABCORE Data Entry Template for Worklist#

7999

Analyst: AM Instrument: H2001 SN16355 Book # \_\_\_\_\_

Method: LA-504-101 Rev/Mod E-0

Worklist Comment: A-102 96-AUG-003 RE-PREP H2ODIG01 SKB

**RUSH**

GROUP	PROJECT	S	TYPE	SAMPLE#	R	A	-----TEST-----	MATRIX	ACTUAL	FOUND	DL	UNIT
		1	BLNK-PREP				H2ODIG01	SOLID	<u>1</u>	<u>.100</u>	N/A	g/L
96000343	A-102	2	SAMPLE	S96T002170	0	W	H2ODIG01	SOLID	N/A	<u>.5030</u>		g/L
96000343	A-102	3	SAMPLE	S96T002170	0		DOSE-02	SOLID	N/A	<u>7</u>		mrad/hour
96000343	A-102	4	DUP	S96T002170	0	W	H2ODIG01	SOLID	<u>.5030</u>	<u>.5300</u>	N/A	g/L
96000343	A-102	5	DUP	S96T002170	0		DOSE-02	SOLID	<u>7</u>	<u>7.5</u>	N/A	mrad/hour

Final page for worklist # 7999

AM Murphy 4-26-96  
Analyst Signature Date

Susan Bee 4/26/96  
Analyst Signature Date

Bertrand Griffin II  
4-29-96

596T001620 → 596T002170

Data Entry Comments:

sample was insufficient - could not pull  
a larger size

LABCORE Data Entry Template for Worklist#

7096

Analyst: lmh Instrument: ACD01 201655 Book # WHC1A/36JWHC1AUS  
WHC2/36JWHC2A2

Method: LA-505-159 Rev/Mod D-O

Worklist Comment: A-102 96-AUG-003 Acid Digest rkf

GROUP	PROJECT	S	TYPE	SAMPLE#	R	A	TEST	MATRIX	ACTUAL	FOUND	DL	UNIT
		1	BLNK-PREP				ACIDIG01	SOLID	<u>1</u>	<u>.050</u>	N/A	g/L
		2	STD-PREP				ACIDIG01	SOLID	<u>20</u>	<u>20</u>	N/A	g/L
96000343		3	SAMPLE	S96T001624	0	A	ACIDIG01	SOLID	N/A	<u>4.9660</u>		g/L
				<u>.2483g → .050l</u>								
96000343		4	SAMPLE	S96T001624	0		DOSE-02	SOLID	N/A	<u>350</u>		mrad/hour
96000343		5	DUP	S96T001624	0	A	ACIDIG01	SOLID	<u>4.9660</u>	<u>5.2780</u>	N/A	g/L
				<u>.2639g → .050l</u>								
96000343		6	DUP	S96T001624	0		DOSE-02	SOLID	<u>20</u>	<u>320</u>	N/A	mrad/hour
								<u>4/5/96</u>				
96000343		7	SPK	S96T001624	0	A	ACIDIG01	SOLID	<u>20</u>	<u>20</u>	N/A	g/L
				<u>.252g → .050l</u>								
96000343		8	SPK	S96T001624	0		DOSE-02	SOLID	<u>20</u>	<u>300</u>	N/A	mrad/hour
								<u>4/5/96</u>				

Final page for worklist # 7096

[Signature] 4-2-96  
Analyst Signature Date

Keith Fuller 4/5/96  
Analyst Signature Date

cell 23

S96T001620 → 1624

Reviewed by PK Fuller  
4/5/96

Data Entry Comments:

HPT: Bill Bishop  
< 1% Solids for all Samples & QC.

Units shown for QC (SPK & STD) may not reflect the actual units. DL = Detection Limit, S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.

**WHC-SD-WM-DP-177, REV. 1**

**INORGANIC ANALYSES**

**WHC-SD-WM-DP-177, REV. 1**

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**Due to the large volume,  
a copy of the data  
supporting the Data  
Validation Report and  
the Sample Data Summary,**

**Pages 31 thru 104**

**is available only from  
Central Files.**

**Information regarding this can be  
found in the "Final Guidance on  
Administrative Records for  
Selecting CERCLA Response  
Actions, OSWER Directive  
9833.3A-1, December 1990.  
Page 9 "Verified Sampling Data".**

9613441.0267



**Westinghouse  
Hanford Company**

**WHC-SD-WM-DP-177, REV. 1**

P.O. Box 1970 Richland, WA 99352

PART II

**WHC-SD-WM-DP-177, REV. 0**

**ANALYTICAL SERVICES**

**45-DAY SAFETY SCREENING RESULTS  
FOR TANK 241-A-102, AUGER SAMPLE  
96-AUG-003**

**Project Coordinator: JAIDUK JO**

**Prepared for the U.S. Department of Energy  
Office of Environmental Restoration  
and Waste Management**

by

**Westinghouse Hanford Company  
Box 1970  
Richland, Washington**

**2-1**

WHC-SD-WM-DP-177, REV. 1

WHC-SD-WM-DP-177, REV. 0

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This Document consists of pages 2-1 through 2-26, plus pages 2-4, 2-9, 2-13, and 2-16 were intentionally left blank.

## TRADEMARKS:

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9613441.0269

WHC-SD-WM-DP-177, REV. 1

WHC-SD-WM-DP-177, REV. 0

NARRATIVE

WHC-SD-WM-DP-177, REV. 1  
WHC-SD-WM-DP-177, REV. 0

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## WHC-SD-WM-DP-177, REV. 1

WHC-SD-WM-DP-177, REV. 0

45-DAY SAFETY SCREENING RESULTS FOR TANK 241-A-102,  
AUGER SAMPLE 96-AUG-003Introduction and Summary

This is a, 45-day, format III report for the tank 241-A-102 (A-102) auger sampling characterization effort. This report compliments the 45-day and final report (Jo 1995b) which contains results from one auger sample taken in June 1995. One more auger sample was required to satisfy the safety screening data quality objective (DQO). This report transmits the new analytical data and some portion of the data which was provided in the 45-day and final report (Jo 1995b).

None of the results from this sampling event exceeded the safety screening DQO criteria.

Tank A-102 was auger sampled from Riser 19 and 5 on June 7, 1995 and March 21, 1996, respectively. These samples were received at the 222-S Laboratories on June 9, 1995 and March 21, 1996. The samples were extruded and underwent safety screening analyses consisting of Differential Scanning Calorimetry (DSC), Thermogravimetric Analysis (TGA) and Alpha Total in accordance with the sampling and analysis plan (Jo 1995a). The test results indicate with 95% confidence, that the mean DSC did not exceed the energetics criterion of 480 J/g (dry). None of the samples for alpha total analyses exceeded the limit of 41  $\mu\text{Ci/g}$  limit. The vapor in the tank A-102 dome space is far below the 25% lower flammability limit stated in the DQO. The summary tables include sample and duplicate results and quality control results associated with the auger samples.

Sample Receipt and ExtrusionAuger 95-AUG-033 (Riser 19)

Auger 95-AUG-033 was sampled using a twenty-flute auger (flutes are 1" apart) on June 7, 1995, and received at the 222-S laboratory on June 9, 1995. Extrusion took place on June 15, 1995, with the total amount of solid material recovered being 96.5 grams. No liner liquid was recovered. Flutes 1-6 were clean except the edges. Flutes 7-19 contained hard small black pebbles throughout the sample. Overall, the appearance of the sample was consistent throughout with a gritty, paste-like composition. The black pebbles were archived. The Safety Program was contacted per telecon and approval was given to proceed. The sample was provided to the laboratory for analysis, and results appear in the Table 1 as sample numbers S95T001171 and S95T001174.

Auger 96-AUG-003 (Riser 5)

Auger 96-AUG-003 was sampled using a forty-flute auger (flutes are 1/2 " apart) on March 21, 1996, and received at the 222-S laboratory on March 21, 1996. Extrusion took place on March 27, 1996, with the total amount of solid material recovered being 198.3 grams. No drainable or liner liquid was

## WHC-SD-WM-DP-177, REV. 1

WHC-SD-WM-DP-177, REV. 0

recovered. Flutes 1-26 contained brown, runny, wet, sludge with pebble like material embedded throughout the sample. Most of the sample fell on the tray upon taking the auger out of the sleeve. Overall, the appearance of the sample was consistent throughout with a gritty, paste-like composition. The black pebbles were hard and did not crumble when pressed with a spatula. The sample was provided to the laboratory for analysis, and results appear in the summary table as sample numbers S96T001620 and S96T001622.

### Analytical Results

#### Tank Head Space Flammability

Prior to core sampling, the flammability of the tank headspace was measured to address the vapor flammability issue of the safety screening data quality objective (Dukelow, et al. 1995). The tank vapor space was sampled on February 15, 1996 to determine the flammability of the vapor space gasses. Sampling was done through risers 18 in the dome space. The average combustible gas meter reading was 0 percent of the LFL, indicating no flammability concerns with this tank.

#### Thermogravimetric (TGA) Moisture

The weight percent water by Thermogravimetric Analysis was performed using procedure LA-560-112, Rev. A-2 with a nitrogen purge. The results were between 30.6 and 36.6%. An analysis of variance was performed using the data from this sampling event. The upper limit of the one-sided 95% confidence interval was 37.96% for sample S96T001620 and 22.88% for sample S95T001171. The raw data for sample S95T001171 is placed in Jo (1995b). All samples met the precision and accuracy criteria stated in Jo (1995a).

#### Differential Scanning Calorimetry (DSC)

Differential scanning calorimetry was performed using procedure LA-514-113, Rev. B-1 on a differential scanning calorimetry under a nitrogen purge. All DSC exotherm values were converted to a dry-weight basis using the respective average percent water as determined by TGA. The results were between 100.9 and 319 Joules/g which were below the safety screen notification limit of 480 Joules/g (dry). Therefore no notifications were made. The upper limit of the one-sided 95% confidence interval was 177 J/g (dry) for sample S96T001620 and 354 J/g (dry) for sample S95T001171. The raw data for sample S95T001171 is placed in Jo (1995b). The RPD for sample S96T001620 was 18.7; rerun was not requested for the sample because the average value was approximately four times lower than the notification limit and the TGA results were relatively high (36.4%).

#### Alpha Total

The Alpha Total analyses were performed using procedure LA-508-101, Rev. D-2. The results were roughly an order of magnitude less than the notification limit of 41  $\mu\text{Ci/g}$  with the highest observed value of any sample or duplicate

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being 5.25  $\mu\text{Ci/g}$  (S96T001622). The RPD between sample and duplicate runs was outside of the 10% limit for sample S95T001174. Three sets of sample and duplicate were run and only the results of third set are included in the summary table. The sample and duplicate analyses were run three times because of a high RPD and low spike recovery. The results from all three sets of samples appear similar despite the spike recovery and RPD issues. The mean of the three runs (total of six analyses, 4.08, 3.26, 3.78, 3.26, 4.55, and 3.70  $\mu\text{Ci/g}$ ) is 3.77  $\mu\text{Ci/g}$  with a standard deviation of 0.5  $\mu\text{Ci/g}$ . The upper limit of the one-sided 95% confidence interval was 4.18 and 5.30  $\mu\text{Ci/g}$ .

References:

Dukelow, G. T., J. W. Hunt, H. Babad, and J. E. Meacham, 1995, *Tank Safety Screening Data Quality Objective*, WHC-SD-WM-SP-004, Rev. 2, Westinghouse Hanford Company, Richland, Washington.

Jo, J., 1995a, *Tank 241-A-102 Auger Sampling and Analysis Plan*, WHC-SD-WM-TSAP-004, REV. 0, Westinghouse Hanford Company, Richland, Washington.

Jo, J., 1995b, *45-Day Safety Screen Results and Final Report for Tank 241-A-102, Auger Sample 95-AUG-033*, WHC-SD-WM-DP-136, REV. 0, Westinghouse Hanford Company, Richland, Washington.

Project Coordinator: Jaiduk Jo

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SAMPLE DATA SUMMARY

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# INTERIM

A-102 Safety Screening Report  
A-102

CORE NUMBER: 95-AUG-033  
SEGMENT #: 95-AUG-033

SEGMENT PORTION: W Whole Segment

Sample#	R A#	Analyte	Unit	Action Limits		Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
				Lower	Upper									
S95T001171		% Water by TGA using Mettler	%	None	None	100.8	n/a	33.59	3.066e1	3.212e1	9.12	n/a	n/a	n/a
S95T001171		DSC Exotherm Dry Calculated	Joules/g Dry	-1.0e+00	480.1	n/a	n/a	3.19e+02	3.060e2	3.125e2	4.16	n/a	n/a	n/a
S95T001171		DSC Exotherm using Mettler	Joules/g	-1.0e+00	480.1	104.4	n/a	2.16e+02	2.074e2	2.119e2	4.25	n/a	n/a	n/a
S95T001174	F	Alpha of Digested Solid	uCi/g	-1.0e+00	4.118	102.7	<6.220e-2	4.550	3.700e0	4.125e0	20.6	106.1	1.430e-1	7.8

⇒ Limit violated  
⇒ Selected Limit

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INTERIM

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# INTERIM

A-102 Safety Screening Report  
A-102

CORE NUMBER: 96-AUG-003  
SEGMENT #: 96-AUG-003

SEGMENT PORTION: W Whole Segment

Sample#	R	A#	Analyte	Unit	Action Limits		Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
					Lower	Upper									
S96T001619			Bulk Density of Sample	g/ml	None	None	n/a	n/a	1.700	n/a	n/a	n/a	n/a	5.000e-1	n/a
S96T001620			% Water by TGA using Mettler	%	None	None	100.0	n/a	36.13	3.663e1	3.638e1	1.37	n/a	n/a	n/a
S96T001620			DSC Exotherm Dry Calculated	Joules/g Dry	-1.0e+00	480.1	n/a	n/a	1.01e+02	1.217e2	1.113e2	18.7	n/a	n/a	n/a
S96T001620			DSC Exotherm using Mettler	Joules/g	-1.0e+00	480.1	100.9	n/a	64.20	7.740e1	7.080e1	18.6	n/a	n/a	n/a
S96T001622	F		Alpha of Digested Solid	uCi/g	-1.0e+00	41.10	103.1	<1.650e-1	5.230	5.250e0	5.240e0	0.38	84.96	1.830e-1	9.95E+00

 => Limit violated  
 => Selected Limit

INTERIM

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STATISTICAL ANALYSIS

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WHC-SD-WM-DP-177, REV. 0

Analyte	sample number	result	duplicate	sd	sd(mean)	t-value	mean	95UL
Alpha	s96t001622	5.23	5.25	0.01	0.01	6.31	5.24	5.30

Analyte	sample number	result	duplicate	sd	sd(mean)	t-value	mean	95LL
Water	s95t001171	33.59	30.66	2.07	1.47	6.31	32.13	22.88

Analyte	sample number	result	duplicate	sd	sd(mean)	t-value	mean	95UL
DSC dry	s95t001171	319.00	306.00	9.19	6.50	6.31	312.50	353.54

Analyte	sample number	result	duplicate	sd	sd(mean)	t-value	mean	95UL
DSC dry	s96t001620	100.90	121.70	14.71	10.40	6.31	111.30	176.96

Analyte	sample number	result	duplicate	sd	sd(mean)	t-value	mean	95UL
Water	s96t001620	36.13	36.63	0.35	0.25	6.31	36.38	37.96

Analyte	sample number	results	
Alpha	s95t001174	4.08	
		3.26	
		3.78	
		3.26	
		4.55	
		3.7	
		average	3.77
		sd	0.50
		sd(mean)	0.20
		t-value	2.02
95UL	4.18		

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**INORGANIC ANALYSES**

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**Due to the large volume,  
a copy of the data  
supporting the Data  
Validation Report and  
the Sample Data Summary,**

**Pages 2-17 thru 2-26**

**is available only from  
Central Files.**

**Information regarding this can be  
found in the "Final Guidance on  
Administrative Records for  
Selecting CERCLA Response  
Actions, OSWER Directive  
9833.3A-1, December 1990.  
Page 9 "Verified Sampling Data".**

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