

**WEST VALLEY NUCLEAR SERVICES COMPANY
(WVNSCO)**

PROCESSING EQUIPMENT CHARACTERIZATION RESULTS

**WMG Report 4005-RE-024
Revision 3**

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1.0 INTRODUCTION

WMG was engaged by WVNSCO to characterize the vitrification Processing Equipment. The purpose of this report is to summarize WMG Calculation 4005-CA-037⁽¹⁾, Characterization and Classification of the West Valley Processing Equipment.

WVNSCO provided WMG with the required information to characterize the Processing Equipment using dose to curie conversion techniques. The information mentioned above consisted of drawings of the Processing Equipment assembly, measured dose rates along the Processing Equipment cavity centerline, measured dose rates taken at the southernmost lip of each discharge cavity, smears taken in the vitrification cell, and representative isotopic samples.

Section 2 of this report provides an executive summary. Section 3 provides a description of the waste characterization methods including detailed figures showing the geometry of the source within the Processing Equipment cavity. Section 4 provides the characterization results.

2.0 EXECUTIVE SUMMARY

The Processing Equipment was characterized and classified according to DOT regulations. LSA limits were used to classify the Processing Equipment and all associated internal activity while SCO limits were applied to the surface contamination on the exterior of the Processing Equipment.

Dose to curie conversion techniques were used with measured dose rates to characterize the vitrification facility Processing Equipment. A detailed geometry model was prepared using the QAD-GCCP-A computer code and was used to compute a dose to curie conversion factor (DCF), which was used with measured dose rates to determine the Cs-137 activity in the Processing Equipment cavity. A Megashield geometry model was used to compute a DCF for the plugged discharge port, which was used to determine the Cs-137 activity in the discharge port. WVNSCO provided WMG with representative nuclide distributions to determine quantities of hard to detect nuclides. The nuclide distributions are used in conjunction with the total calculated Cs-137 activity to characterize the Processing Equipment.

The Processing Equipment is characterized as of 10/1/2004, the earliest possible shipment date. It is a greater than Type A quantity of LSA-III material. The total Cs-137 activity in the Processing Equipment cavity and the discharge port is 4,314 curies and the total activity is 4,570 curies. The Processing Equipment is a greater than Type A quantity because the A_2 fraction is 463. The maximum average specific activity is 67% the LSA III limit.

The two waste streams found on the exterior of the Processing Equipment are from airborne contamination and from slurry accidentally spilled during vitrification operations. The Processing Equipment meets SCO II limits because the maximum fixed beta/gamma activity on the exterior of the Processing Equipment is 16.7 $\mu\text{Ci}/\text{cm}^2$ from slurry and the maximum fixed alpha activity is 4.43E-02 $\mu\text{Ci}/\text{cm}^2$ from airborne. All of the surface contamination is considered fixed because all exterior surfaces of the Processing Equipment will be coated with PBS™ (a latex fixative coating). The activity from surface contamination represents approximately 0.11% of the total activity.

3.0 WASTE CHARACTERIZATION

The Processing Equipment was characterized using dose to curie conversion techniques. Representative isotopic sample data is used in conjunction with gross radioactivity measurements and point kernel shielding models to estimate activity by nuclide. As a practical matter all the measured gamma radiation can be attributed to Cs-137. Geometry models along with measured dose rates can be used to calculate Cs-137 activity. Representative samples are used to determine Cs-137 based scaling factors to calculate the hard to detect nuclides.

The radioactivity in the Processing Equipment is contained in two separate sources. One source is contained in the Processing Equipment cavity and the other is in the plugged discharge port. The sources are treated separately because a thick layer of refractory material separates them. The refractory material that separates the sources consists mainly of Monofrax Z, which is the best shield material in the refractory assembly, and varies in thickness from approximately 18 to 35 inches.

Due to the relatively complex geometries involved in the Processing Equipment cavity source, a detailed dose to curie model was employed to reduce conservatism in the calculations. Typically, complex geometries can be modeled using simple shapes and conservative assumptions to bound the results. Since excessive conservatism limits disposition options, the best available information was used in conjunction with advanced modeling techniques to provide the most accurate results available. Therefore, the QAD-GCCP-A⁽²⁾ code was used for point kernel modeling. The QAD-CGGP-A code provides for combinatorial geometry input, which allows the user to model complex shapes using unions or intersections of relatively simple shapes. This code is used routinely in the commercial sector to support reactor decommissioning activities. There have been published guidelines regarding integration parameters for point kernel applications⁽³⁾ and these were adhered to in the analysis. Due to relatively simple geometry involved in the discharge port, a less detailed dose to curie model was employed using the Megashield⁽⁴⁾ computer code.

The Processing Equipment cavity model accounted for the inverted pyramidal shape of the residual glass in the cavity as well as a 1/8" internal wall coating up to a fill height of 28". The compounds totaling over 99% of the weight fraction were used to create a custom material type in the QAD-GCCP-A and Megashield models. Table 1 shows the weight fraction by chemical compound and Table 2 shows density by nuclide assuming a density of 2.6 g/cc for the borosilicate glass.

Table 1
Borosilicate Glass Composition

Material	Weight Fraction	Material	Weight Fraction
Li ₂ O	0.039	SiO ₂	0.434
B ₂ O ₃	0.137	K ₂ O	0.053
Na ₂ O	0.085	Fe ₂ O ₃	0.127
MgO	0.009	ZrO ₂	0.014
Al ₂ O ₃	0.064	ThO	0.038

Table 2
Borosilicate Glass Density by Element

Element	Partial Density	Element	Partial Density
Li (3)	0.047	Si (14)	0.528
B (5)	0.110	K (19)	0.114
O (8)	1.184	Fe (26)	0.232
Na (11)	0.164	Zr (40)*	0.027
Mg (12)*	0.015	Th (90)	0.092
Al (13)	0.087		

*Not used in shielding model due to their low partial densities / attenuation percents

A total of ten (10) source regions were required in the QAD-CGGP-A model to accurately duplicate the remaining glass inside the Processing Equipment cavity. Four (4) sources were used to simulate the inverted pyramid shape while six (6) were used for the wall coating. The wall surface coating contributed about 15% to the measured dose rate. Dose locations reported in the RIR⁽⁵⁾ as well as an external dose point recorded on 2/5/04 were used to estimate the Cs-137 activity. A detector was lowered into Nozzles A and BB and recorded dose rates of 749 R/hr and 700 R/hr respectively. A duplicate measurement was taken in Nozzle A of 748 R/hr. A reading of 2.1 R/hr was taken at a 1-foot offset from the lid of the Processing Equipment assembly about midway between nozzles R1 and R2. These points were selected because they provide a profile starting at the center of the cavity and proceed north along the cavity centerline. It is conservatively assumed that the source in the discharge port does not contribute to the dose rates used to characterize the Processing Equipment cavity. See Appendix A for WVNSCO supplied survey data.

The dimensional inputs used to model the Processing Equipment cavity are shown in Figures 1 and 2. The positive X-axis shown in Figure 1 points north. Due to the lack of symmetry, it is necessary to determine the source geometry in the X-Z plane as well as the Y-Z plane. All dimensional inputs were taken from drawings supplied by WVNSCO (see reference drawings 1 and 2). A supplemental program called PICTURE⁽⁶⁾ can be used to verify combinatorial geometry inputs by taking a "slice" through the source and shields modeled. This is a useful tool to ensure the relatively complex geometry inputs are properly input into the code. A PICTURE slice for the characterization model is shown in Figures 3 and 4. Based on the results of this model, the total estimated Cs-137 activity contained in the glass heel in the Processing Equipment cavity as of 10/1/2004 is 4,050 curies. Figures 5 and 6 show slices of the sources and the exterior Processing Equipment geometry. These figures show that the Processing Equipment source was not affected by the shielding on the detector for the reading taken 1-foot above the lid. The glass is known to have penetrated all fissures in the refractory material that had been in contact with the glass to a depth of approximately ½". The glass in the fissures is assumed to have the same specific activity (uCi/g) as the glass in the heel of the Processing Equipment. The total estimated Cs-137 activity in the glass that seeped into the fissures in the Processing Equipment cavity as of 10/1/2004 is 12 curies.

The west discharge port is known to contain a solid plug of glass. Glass is assumed to completely fill the discharge tube as well as the discharge cavity up to a height of four inches. In the Megashield dose to curie model, the discharge cavity and tube were homogenized into a rectangular volume with an equivalent height that was calculated to conserve the total volume of the source. The length and width of the rectangular volume correspond to the length and width of the discharge cavity and are 24 ¾ and 17 ¼ inches respectively. The equivalent height of the rectangular volume was calculated to be approximately 5 ½ inches. A dose rate from the RIR was used in conjunction with the Megashield dose to curie model to calculate Cs-137 activity in the discharge port. A dose rate of 40 R/hr was measured at the southernmost lip of the west discharge cavity. Based on the results of the Megashield model, the total estimated Cs-137 activity in the discharge port as of 10/1/2004 is approximately 252 curies. It was conservatively assumed that the Processing Equipment cavity source does not contribute to the dose rate used to characterize the discharge port source.

Figure 1
Processing Equipment Cavity X-Z Source Geometry

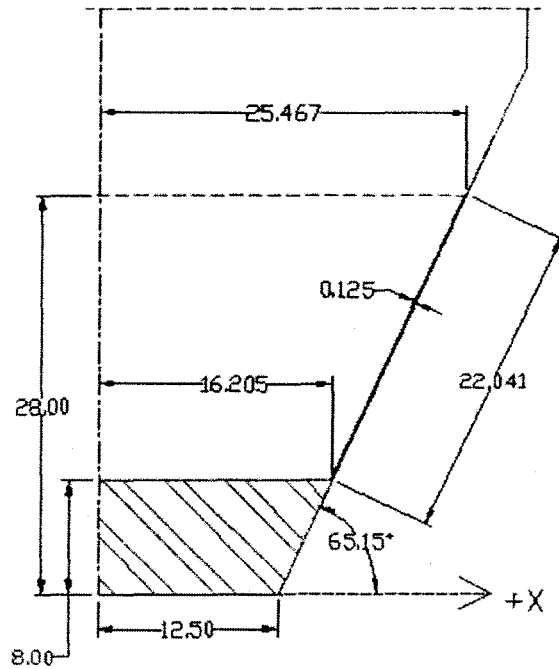


Figure 2
Processing Equipment Cavity Y-Z Source Geometry

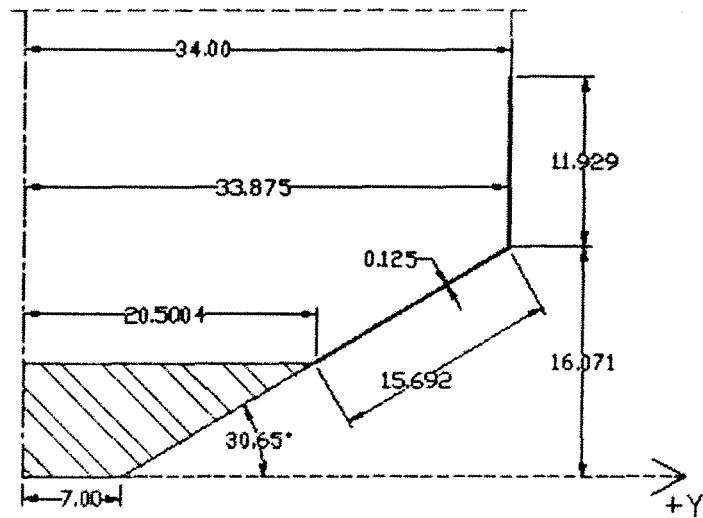


Figure 3
Processing Equipment Cavity Model X-Z PICTURE Slice

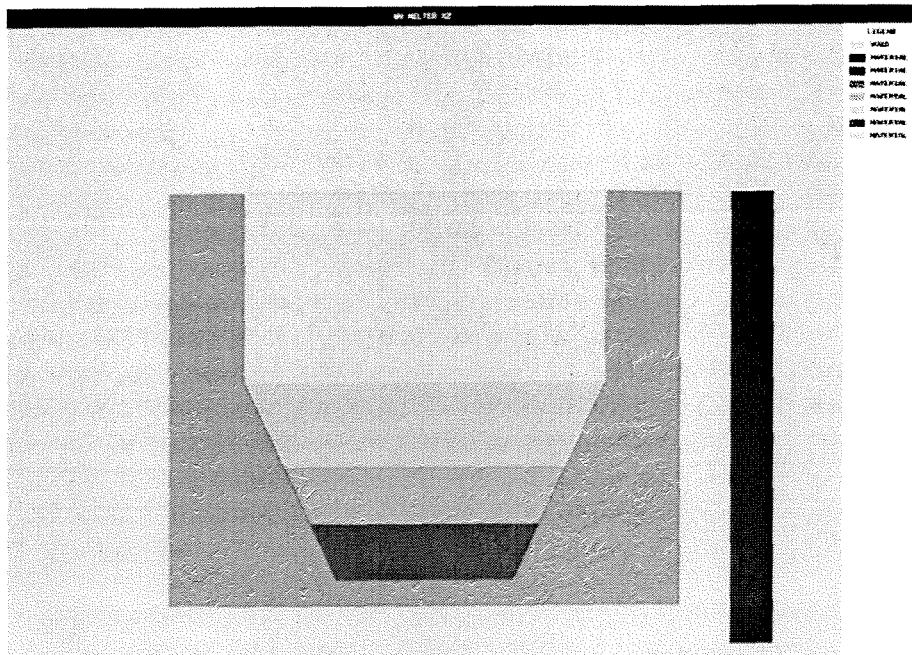


Figure 4
Processing Equipment Cavity Model Y-Z PICTURE Slice

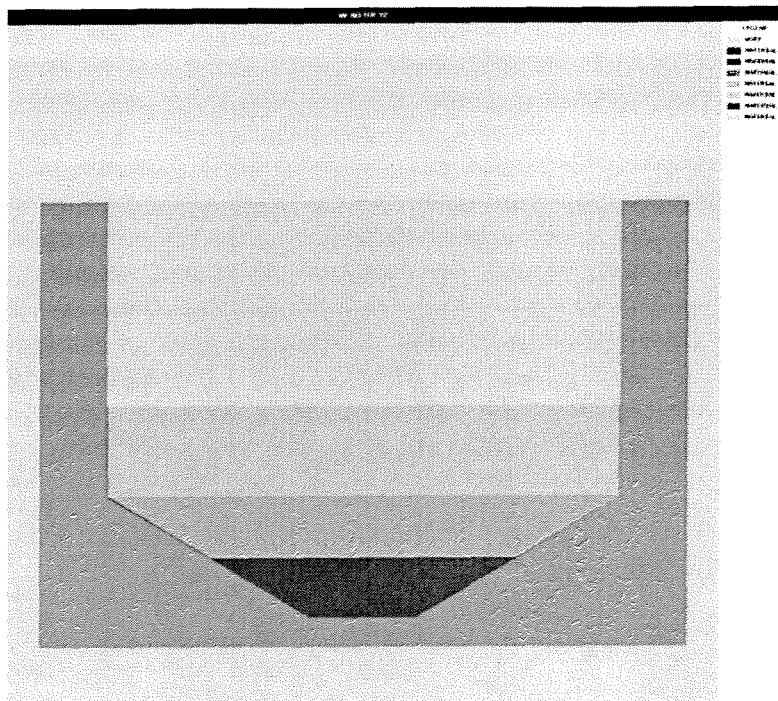


Figure 5
Processing Equipment X-Z Geometry as seen with Shielded Probe

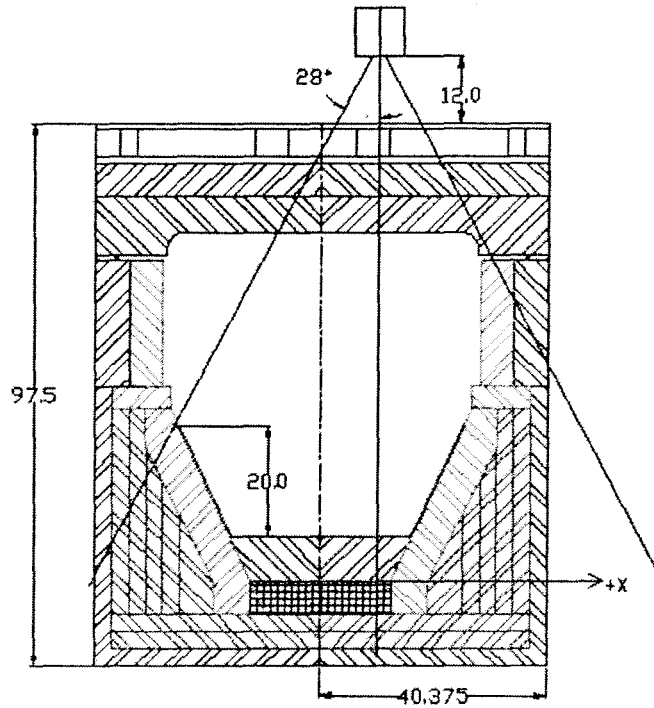
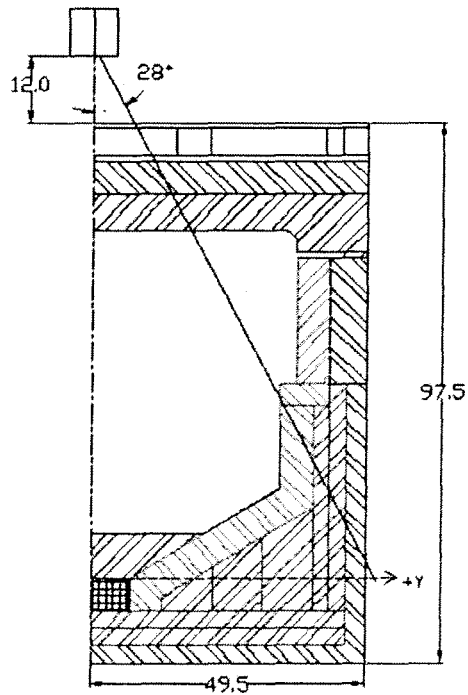


Figure 6
Processing Equipment Y-Z Geometry as seen with Shielded Probe



The other remaining characterization input is the isotopic distribution in the form of relative abundance per nuclide. WVNSCO provided WMG with two glass shard samples, VAST Sample ID 04-0073 and VAST Sample ID 04-0074. See Appendix B for WVNSCO provided samples. Two replicates were reported for each shard sample. The replicates for each sample were analyzed in RADMAN and found to satisfy the NRC criteria (the maximum and minimum activities were within a factor of 10 for each nuclide) for all nuclides. The replicates were then averaged and saved as one sample. WMG's RADMAN program is used throughout the nuclear power industry and at WVNS to characterize and classify low-level waste for disposal. RADMAN uses a geometric average because it smoothes out peaks and valleys in the data over time, and this approach is typically used in the commercial sector and has been approved by the NRC. The average samples for the two shards were then analyzed and found to satisfy the NRC criteria and saved as a sample, which was used to create one waste stream in RADMAN (see Exhibit 1). The calculated Cs-137 activity and the fractional abundance of all isotopes in the RADMAN waste streams were used to determine activity per isotope and total activity.

In order to determine DOT waste type, it is necessary to calculate the total A_2 fraction per gram and the maximum dose rate at 3-meters from the unshielded Processing Equipment. The weight of the glass is used for worst-case DOT type determinations. There are about 300 kg of glass in the residual heel of the Processing Equipment. The glass coating remaining on the Processing Equipment cavity surfaces and in the fissures totals approximately 26 kg of glass. Finally, the plug in the discharge port accounts for approximately 99 kg of glass. The total residual glass weight is approximately 425 kg. The geometry models described above were used with measured dose rates to determine that the 3-meter dose rates on all sides of the Processing Equipment are less than 1 R/hr. The maximum 3-meter dose rate of 790 mR/hr is obtained from the bottom of the Processing Equipment at the opening to the West discharge port.

The external Processing Equipment surface contamination was determined by applying the slurry (West Valley Glass) and airborne (see Reference 7) waste streams to the calculated surface area. The surface area of the Processing Equipment was calculated to be approximately 140,800 in² (9.08E+05 cm²) using the envelope dimensions found in the drawings listed in Section 6. The slurry waste stream is assumed to cover 10% of the exterior of the Processing Equipment while airborne contamination covers the remaining surface area. The maximum surface contamination activity (uCi/cm²) is calculated by using the conservatively calculated Cs-137 activity of 16 uCi/cm², verified in Reference 8, and the slurry nuclide distribution. The calculated slurry contamination of 16.7 uCi/cm² is spread across 10% of the calculated surface area and used with the slurry nuclide distribution to determine activity per nuclide due to slurry contamination. The airborne contamination is calculated using a maximum swipe activity of 100 million dpm/100cm² in conjunction with the WVNSCO supplied vitrification cell airborne waste stream.

Exhibit 1 **RADMAN Waste Stream** **New Waste Stream Data**

Report Date : 3/22/2004 during New Waste Stream Revision Date: 03/22/2004

Waste Description :	West Valley Glass	Chemical Form :	Glass
Generating Process :	Vitrification Operations	Activated Metal :	No
State Code :	N/A	Physical Form :	Solid
Solidification Agent :	<none>	Activity Units :	uCi/gm

Nuclide Name	Activity	Nuclide Type	Scaling Factor	Base Nuclide
H-3	1.89E-02	FP	<LLD>	Cs-137
C-14	1.15E-02	AP	4.84E-06	Cs-137
K-40	4.44E-02	NO	1.87E-05	Cs-137
Mn-54	8.12E-02	AP	3.42E-05	Cs-137
Co-60	4.95E-02	AP	2.08E-05	Cs-137
Ni-63	5.50E-01	AP	2.31E-04	Cs-137
Sr-90	1.36E+02	FP	5.73E-02	Cs-137
Zr-95	1.37E+01	FP	5.76E-03	Cs-137
Tc-99	6.00E-03	FP	2.52E-06	Cs-137
I-129	3.05E-03	FP	<LLD>	Cs-137
Cs-137	2.38E+03	FP	1.00E+00	Cs-137
Ce-144	1.40E+00	FP	<LLD>	Cs-137
Eu-154	6.93E-01	AP	2.92E-04	Cs-137
Th-228	2.85E-02	AP	1.20E-05	Cs-137
Th-230	1.98E-04	AP	8.32E-08	Cs-137
Th-232	2.18E-04	NO	9.15E-08	Cs-137
U-232	2.74E-02	AP	1.15E-05	Cs-137
U-233	1.12E-02	AP	4.71E-06	Cs-137
U-234	5.32E-03	NO	2.24E-06	Cs-137
U-235	2.04E-04	NO	8.58E-08	Cs-137
U-236	6.12E-04	AP	2.57E-07	Cs-137
U-238	1.22E-03	NO	5.13E-07	Cs-137
Np-237	3.36E-03	TR	1.41E-06	Cs-137
Pu-238	3.73E-01	TR	1.57E-04	Cs-137
Pu-239	8.58E-02	TR	3.61E-05	Cs-137
Pu-240	6.55E-02	TR	2.76E-05	Cs-137
Pu-241	1.75E+00	TR	7.36E-04	Cs-137

Nuclide Name	Activity	Nuclide Type	Scaling Factor	Base Nuclide
Am-241	1.63E+00	TR	6.84E-04	Cs-137
Am-243	1.90E-02	TR	7.98E-06	Cs-137
Cm-242	1.16E-01	TR	4.88E-05	Cs-137
Cm-243	9.28E-03	TR	3.90E-06	Cs-137
Cm-244	2.42E-01	TR	1.02E-04	Cs-137

4.0 RESULTS

Based on the results of this analysis, the Processing Equipment was estimated to contain about 4,310 curies of Cs-137 and a total activity of 4,570 curies and is a greater than Type A quantity of material as shown in Table 3. Three separate estimates of average specific activity were made and the LSA III fractions were determined for each by dividing the calculated A_2/g value by the LSA III limit of $2.0E-03 A_2/g$. The three estimates and their fractions are as follow:

1. The A_2 fraction of the heel of glass in the Processing Equipment cavity divided by the cavity glass weight is $1.34E-02$, which is 67% the LSA III limit.
2. The discharge port A_2 fraction divided the port's glass weight is $2.80E-04$, which is 14% the LSA III limit.
3. The total A_2 fraction of the Processing Equipment divided by the weight is $9.41E-06$, which is 0.47% the LSA III limit.

The surface contamination on the Processing Equipment exterior does not exceed SCO II limits. The maximum fixed beta/gamma activity is 16.7 uCi/cm^2 (approximately 84% the limit of 20 uCi/cm^2) from slurry and the maximum fixed alpha activity is $4.43E-02 \text{ uCi/cm}^2$ (approximately 2% the limit of 2 uCi/cm^2) from airborne. The total airborne surface contamination activity is 3.68 Ci and the total slurry contamination activity is 1.52 Ci for a total of 5.2 Ci. The activity from surface contamination represents approximately 0.11% of the total activity. Table 4 shows the surface contamination activity (Ci) per nuclide.

Table 3
Processing Equipment Characterization and Classification Results

Nuclide	RADMAN		1/23/2004 Activity (Ci)	10/1/2004 Activity (Ci)	A2 Value (Ci)	A2 Fraction
	Waste Stream Activity (uCi/g)	Fractional Abundance				
<H-3>	1.89E-02	7.46E-06	3.49E-02	3.35E-02	1.10E+03	N/A
C-14	1.15E-02	4.54E-06	2.12E-02	2.12E-02	8.10E+01	2.62E-04
K-40 (n.o.)	4.44E-02	1.75E-05	8.19E-02	8.19E-02	2.40E+01	3.41E-03
Mn-54	8.12E-02	3.20E-05	1.50E-01	8.57E-02	2.70E+01	3.17E-03
Co-60	4.95E-02	1.95E-05	9.12E-02	8.33E-02	1.10E+01	7.57E-03
Ni-63	5.50E-01	2.17E-04	1.01E+00	1.01E+00	8.10E+02	1.25E-03
Sr-90	1.36E+02	5.38E-02	2.51E+02	2.47E+02	8.10E+00	3.05E+01
Zr-95	1.37E+01	5.41E-03	2.53E+01	1.65E+00	2.20E+01	7.49E-02
Tc-99	6.00E-03	2.37E-06	1.11E-02	1.11E-02	2.40E+01	4.61E-04
<I-129>	3.06E-03	1.21E-06	5.64E-03	5.64E-03	unlimited	N/A
Cs-137	2.38E+03	9.38E-01	4.38E+03	4.31E+03	1.60E+01	2.70E+02
<Ce-144>	1.40E+00	5.52E-04	2.58E+00	1.40E+00	5.40E+00	N/A
Eu-154	6.91E-01	2.73E-04	1.28E+00	1.21E+00	1.60E+01	7.55E-02
Th-228	2.85E-02	1.12E-05	5.25E-02	4.09E-02	2.70E-02	1.51E+00
Th-230	1.98E-04	7.80E-08	3.65E-04	3.65E-04	2.70E-02	1.35E-02
Th-232 (n.o.)	2.18E-04	8.58E-08	4.01E-04	4.01E-04	unlimited	N/A
U-232	2.74E-02	1.08E-05	5.05E-02	5.01E-02	2.70E-02	1.86E+00
U-233	1.12E-02	4.40E-06	2.06E-02	2.06E-02	1.60E-01	1.29E-01
U-234 (n.o.)	5.32E-03	2.10E-06	9.81E-03	9.81E-03	1.60E-01	6.13E-02
U-235 (n.o.)	2.04E-04	8.04E-08	3.76E-04	3.76E-04	unlimited	N/A
U-236	6.12E-04	2.41E-07	1.13E-03	1.13E-03	1.60E-01	7.05E-03
U-238 (n.o.)	1.22E-03	4.81E-07	2.25E-03	2.25E-03	unlimited	N/A
Np-237	3.36E-03	1.33E-06	6.20E-03	6.20E-03	5.40E-02	1.15E-01
Pu-238	3.73E-01	1.47E-04	6.88E-01	6.84E-01	2.70E-02	2.53E+01
Pu-239	8.61E-02	3.40E-05	1.59E-01	1.59E-01	2.70E-02	5.88E+00
Pu-240	6.57E-02	2.59E-05	1.21E-01	1.21E-01	2.70E-02	4.49E+00
Pu-241	1.75E+00	6.91E-04	3.23E+00	3.12E+00	1.60E+00	1.95E+00
Am-241	1.63E+00	6.42E-04	3.00E+00	3.00E+00	2.70E-02	1.11E+02
Am-243	1.90E-02	7.49E-06	3.50E-02	3.50E-02	2.70E-02	1.30E+00
Cm-242	1.16E-01	4.58E-05	2.14E-01	7.33E-02	2.70E-01	2.71E-01
Cm-243	9.28E-03	3.66E-06	1.71E-02	1.68E-02	2.70E-02	6.23E-01
Cm-244	2.42E-01	9.55E-05	4.46E-01	4.35E-01	5.40E-02	8.05E+00
Total	2.53E+03		4.67E+03	4.57E+03		4.63E+02

Note: < > indicates LLD value, (n.o.) indicates a naturally occurring nuclide

Table 4
Surface Contamination Activity (Ci) as of 10/1/2004

	Slurry Activity	Airborne Activity	Total Activity
H-3	<1.13E-05>	7.94E-06	7.94E-06
C-14	6.90E-06	1.56E-03	1.57E-03
K-40 (n.o.)	2.66E-05	----	2.66E-05
Fe-55	----	3.84E-03	3.84E-03
Mn-54	4.87E-05	----	4.87E-05
Co-60	2.97E-05	4.82E-04	5.11E-04
Ni-59	----	2.09E-04	2.09E-04
Ni-63	3.30E-04	6.42E-03	6.75E-03
Sr-90	8.17E-02	9.22E-01	1.00E+00
Zr-95	8.22E-03	----	8.22E-03
Tc-99	3.60E-06	9.08E-06	1.27E-05
I-129	<1.84E-06>	1.59E-04	1.59E-04
Cs-137	1.43E+00	2.66E+00	4.09E+00
<Ce-144>	<8.40E-04>	----	<8.40E-04>
Pm-147	0.00E+00	2.84E-02	2.84E-02
Eu-154	4.15E-04	7.25E-03	7.67E-03
Th-228	1.71E-05	----	1.71E-05
Th-230	1.19E-07	----	1.19E-07
Th-232 (n.o.)	1.30E-07	----	1.30E-07
U-232	1.64E-05	4.21E-04	4.37E-04
U-233	6.69E-06	9.73E-06	1.64E-05
U-234 (n.o.)	3.19E-06	3.41E-06	6.61E-06
U-235 (n.o.)	1.22E-07	3.39E-07	4.62E-07
U-236	3.67E-07	7.92E-07	1.16E-06
U-238 (n.o.)	7.32E-07	2.52E-06	3.25E-06
Np-237	2.02E-06	7.09E-06	9.11E-06
Pu-238	2.24E-04	1.57E-03	1.79E-03
Pu-239	5.16E-05	4.06E-04	4.58E-04
Pu-240	3.94E-05	2.82E-04	3.22E-04
Pu-241	1.05E-03	1.43E-02	1.54E-02
Pu-242	----	2.28E-05	2.28E-05
Am-241	9.75E-04	1.42E-02	1.51E-02
Am-243	1.14E-05	1.17E-03	1.18E-03
Cm-242	6.96E-05	2.89E-04	3.58E-04
Cm-243	5.56E-06	----	5.56E-06
Cm-244	1.45E-04	5.10E-03	5.24E-03
Cm-245	----	1.10E-02	1.10E-02
Cm-246	----	1.79E-03	1.79E-03
Total	1.52E+00	3.68E+00	5.20E+00

Note: < > indicates LLD value, (n.o.) indicates a naturally occurring nuclide

5.0 REFERENCES

1. WMG Calculation 4005-CA-037 rev. 0. February 26, 2004.
2. ORNL CCC-645, QAD-CGGP-A, A Point Kernel Code System for Neutron and Gamma-Ray Shielding Calculations using the GP Buildup Factor, December 1995.
3. Nuclear Technology, "The Selection of Fixed-Order Quadratures in Point-Kernel Shielding Calculations", O.J. Wallace, American Nuclear Society, La Grange Park, Illinois, 1996, Vol. 113, pp.112-122.
4. Megashield Computer Code Version 1.2.
5. West Valley Demonstration Project Vitrification Facility (VF) Radioisotope Inventory Report, RIR-403-010, Revision 1, E. B. Lachapelle and L. E. Rowell, June 17, 2003.
6. NUREG/CR-0200, Revision 6, Volume 3, Section M13, ORNL/NUREG/CSD-2/V3/R6, PICTURE: A 2-D Plotting Program for MARS Geometries, March 2000.
7. Airborne Contamination Sample supplied to WMG based on VAST Sample IDs 99-2059, 99-2061, 99-2062, 99-2060, 99-2085, 99-1959, 99-1960, 99-1961 and Thermo Nutech Release 031: 99-2061 #6, 99-2085 #10.
8. TA#7 Radiation Contamination Survey Report 124255, May 12, 2004.

6.0 REFERENCE DRAWINGS

1. 900D-2780, Rev. 0, 1 (sheets 1 through 3). VIT Facility Processing Equipment Main Assembly.
2. PNL-011, various revision dates (sheets 1 through 18). Processing Equipment Refractory Assembly.
3. 900E-418 Rev. 1, Zirmul Details North Wall & Floor, sheet 1, June 18, 1992.

APPENDIX A

WVNSCO Supplied Survey Data

Table 1

[illegible]

Table 1

Initial Survey Radiation Detector Information	
Instrument Model	<u>2241</u>
Instrument Serial Number	<u>151610</u>
Survey Date/Time	<u>01-22-03 1100</u>
Name of Surveyor	<u>Holly Baker</u> Signature of Surveyor <u>Holly Baker</u>
Nozzle Designation	Radiation Reading
Nozzle "A"	748 R/h
Nozzle "E"	660 R/h
Nozzle "G2"	330 R/h
Nozzle "D"	>1000 R/h
Nozzle "BB"	700 R/h
Nozzle designation of replication reading	Radiation Reading
Nozzle "A"	749 R/h

75653

Survey Plan for Melter

- Survey Point (Pointing toward the Tank/Toward the Floor)

Elevation View (Looking East)

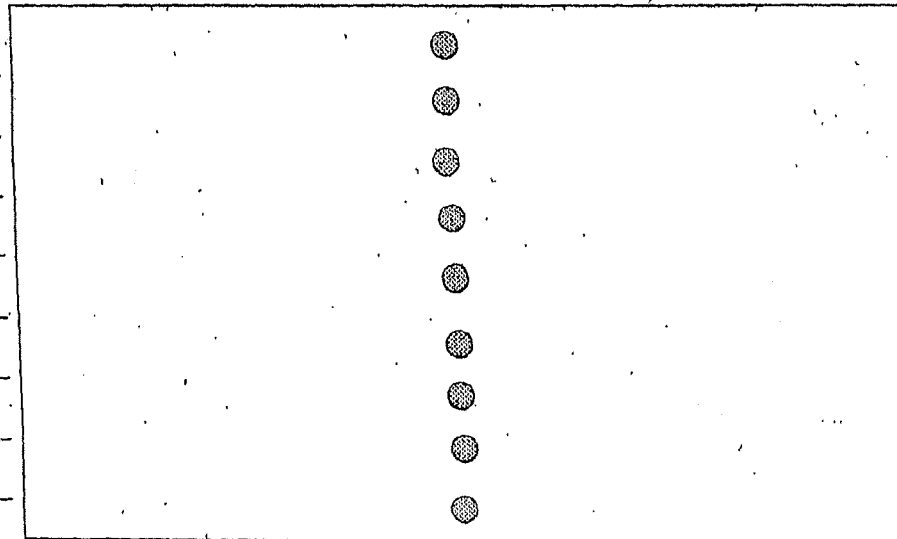
Looking toward melter/Looking down at floor.

Readings to be taken at approximately 1 foot intervals

NOTE: ALL DOSE RATES
IN R/HR

1.61 /
1.18 /
1.05 /
0.70 /
0.44 /
0.40 /
0.395 /
0.430 /
0.325 /

+ I-beam
support

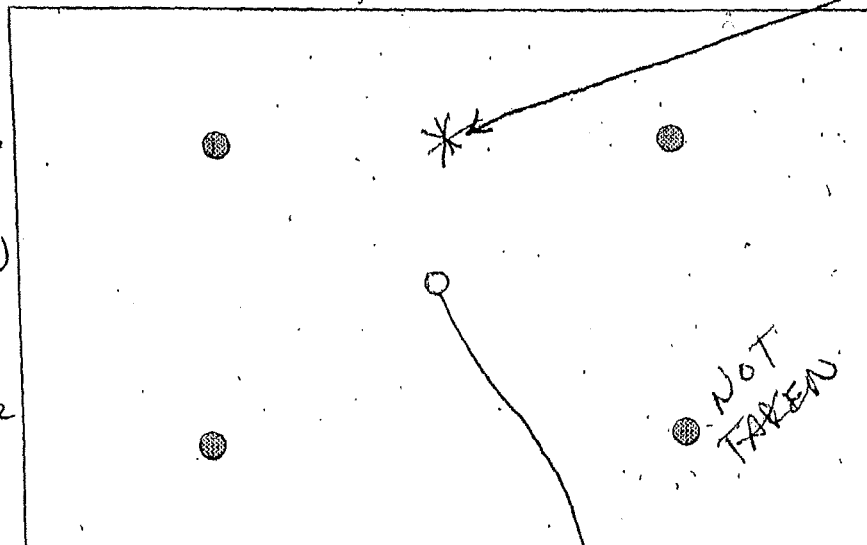


COPY

1.35 R/HR
(Over R1 Flange,
Standoffs contacting)

1.96 R/HR

Southwest of
"D" Flange, legs
contacting surface.



Plan View (Top view)

Readings to be taken approximately at center of 4 quadrants

2.10 R/HR

Between R1 and R2,
Facing
South North near the window,
legs contacting surface

1.12 R/HR
(Over R2 Flange, Standoffs
contacting)

↑ N

2.35 R/HR

Approx 10 feet above, looking
down over "A" in 1

APPENDIX B

VAST Sample ID 04-0073

VAST Sample ID 04-0074

VAST**Vitrification Analytical Sample Tracking****A&PC Report of Analysis**

Page 1

Report Recipients: LAURENE ROWELL (4442)

Copied for Recipients ☒FAXed to Recipients ☒Copied for File ☒

package page 1 of 240

Login Date: 23-Jan-04

VAST Sample ID: 04-0073

Sample Point:	EVACUATED CANISTERS
Sample Type:	POWDER-DUST
Collected:	9/16/2002 1500

Department:	FCP
Customer's ID:	SHD-WV-997-02,-03

Analysis	Result ***	Uncertainty	Lab Use Only
Ag	<3.02E+2	ug/g	Rep19 (1D - RCRA): no flags
Ag	<2.69E+2	ug/g	Rep20 (2D - RCRA): no flags
Ag	<2.96E+2	ug/g	Rep21 (3D - RCRA): no flags
Ag	<2.80E+2	ug/g	Rep22 (4D - RCRA): no flags
Ag	<2.50E+2	ug/g	Rep23 (5D - RCRA): no flags
Ag	<3.49E+2	ug/g	Rep24 (6D - RCRA): no flags
Ag	<2.83E+2	ug/g	Rep25 (7D - RCRA): no flags
Ag	<2.96E+2	ug/g	Rep26 (8D - RCRA): no flags
Ag	<3.32E+2	ug/g	Rep27 (9D - RCRA): no flags
Al	3.48E+4	ug/g	Rep1 (1D): U1
Al	3.47E+4	ug/g	Rep2 (2D): U1
Al	3.37E+4	ug/g	Rep3 (3D): U1
Al	3.77E+4	ug/g	Rep4 (4D): U1
Al	2.30E+4	ug/g	Rep5 (5D): U1
Al	3.91E+4	ug/g	Rep6 (6D): U1
Al	3.88E+4	ug/g	Rep7 (7D): U1
Al	3.20E+4	ug/g	Rep8 (8D): U1
Al	3.49E+4	ug/g	Rep9 (9D): U1
As	6.72E+2	ug/g	Rep19 (1D - RCRA): U1
As	5.10E+2	ug/g	Rep20 (2D - RCRA): U1
As	<3.69E+2	ug/g	Rep21 (3D - RCRA): no flags

Approved By

Jacqueline D. Hill
Name

2/25/04 1348
Date & Time

Report Date: 25-Feb-04



Page 1 of 17

Login Date: 23-Jan-04

VAST Sample ID: 04-0073

Page 2

Sample Point:	EVACUATED CANISTERS	
Sample Type:	POWDER-DUST	
Collected:	9/16/2002	1500

Department	FCP
Customer's ID:	SHD-WV-997-02,-03

Analysis	Result ***	Uncertainty	Lab Use Only
As	<3.50E+2	ug/g	Rep22 (4D - RCRA): no flags
As	3.63E+2	ug/g	Rep23 (5D - RCRA): U1
As	<4.36E+2	ug/g	Rep24 (6D - RCRA): no flags
As	5.62E+2	ug/g	Rep25 (7D - RCRA): U1
As	<3.70E+2	ug/g	Rep26 (8D - RCRA): no flags
As	<4.15E+2	ug/g	Rep27 (9D - RCRA): no flags
B	3.91E+4	ug/g	Rep1 (1D): U1
B	3.83E+4	ug/g	Rep2 (2D): U1
B	3.86E+4	ug/g	Rep3 (3D): U1
B	3.96E+4	ug/g	Rep4 (4D): U1
B	2.66E+4	ug/g	Rep5 (5D): U1
B	4.06E+4	ug/g	Rep6 (6D): U1
B	4.05E+4	ug/g	Rep7 (7D): U1
B	3.87E+4	ug/g	Rep8 (8D): U1
B	3.84E+4	ug/g	Rep9 (9D): U1
Ba	<7.63E+2	ug/g	Rep1 (1D): no flags
Ba	<6.62E+2	ug/g	Rep2 (2D): no flags
Ba	<7.01E+2	ug/g	Rep3 (3D): no flags
Ba	<6.17E+2	ug/g	Rep4 (4D): no flags
Ba	<6.36E+2	ug/g	Rep5 (5D): no flags
Ba	<8.41E+2	ug/g	Rep6 (6D): no flags
Ba	<8.40E+2	ug/g	Rep7 (7D): no flags
Ba	<6.91E+2	ug/g	Rep8 (8D): no flags
Ba	<7.69E+2	ug/g	Rep9 (9D): no flags
Ca	1.45E+3	ug/g	Rep1 (1D): U1
Ca	1.41E+3	ug/g	Rep2 (2D): U1
Ca	1.39E+3	ug/g	Rep3 (3D): U1

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2/25/04 1348
Date & Time

Report Date: 25-Feb-04



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Login Date: 23-Jan-04

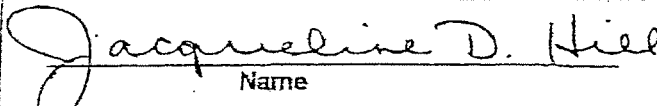
VAST Sample ID: 04-0073

Sample Point:	EVACUATED CANISTERS	
Sample Type:	POWDER-DUST	
Collected:	9/18/2002	1500

Department	FCP
Customer's ID:	SHD-WV-997-02,-03

Analysis	Result ***	Uncertainty	Lab Use Only
Ca	1.57E+3	ug/g	Rep4 (4D): U1
Ca	9.35E+2	ug/g	Rep5 (5D): U1
Ca	1.54E+3	ug/g	Rep6 (6D): U1
Ca	1.78E+3	ug/g	Rep7 (7D): U1
Ca	1.27E+3	ug/g	Rep8 (8D): U1
Ca	1.38E+3	ug/g	Rep9 (9D): U1
Cd	<7.56E+1	ug/g	Rep19 (1D - RCRA): no flags
Cd	7.30E+1	ug/g	Rep20 (2D - RCRA): U1
Cd	7.67E+1	ug/g	Rep21 (3D - RCRA): U1
Cd	7.62E+1	ug/g	Rep22 (4D - RCRA): U1
Cd	<6.25E+1	ug/g	Rep23 (5D - RCRA): no flags
Cd	<8.72E+1	ug/g	Rep24 (6D - RCRA): no flags
Cd	7.50E+1	ug/g	Rep25 (7D - RCRA): U1
Cd	7.93E+1	ug/g	Rep26 (8D - RCRA): U1
Cd	<8.31E+1	ug/g	Rep27 (9D - RCRA): no flags
Ce	2.93E+3	ug/g	Rep1 (1D): U1
Ce	2.99E+3	ug/g	Rep2 (2D): U1
Ce	2.98E+3	ug/g	Rep3 (3D): U1
Ce	2.99E+3	ug/g	Rep4 (4D): U1
Ce	1.93E+3	ug/g	Rep5 (5D): U1
Ce	3.33E+3	ug/g	Rep6 (6D): U1
Ce	3.13E+3	ug/g	Rep7 (7D): U1
Ce	2.93E+3	ug/g	Rep8 (8D): U1
Ce	3.07E+3	ug/g	Rep9 (9D): U1
Cr	2.05E+3	ug/g	Rep1 (1D): U1
Cr	2.00E+3	ug/g	Rep2 (2D): U1
Cr	2.04E+3	ug/g	Rep3 (3D): U1

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 Name

2/25/04 1348
 Date & Time

Report Date: 25-Feb-04



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Login Date: 23-Jan-04

VAST Sample ID: 04-0073

Sample Point:	EVACUATED CANISTERS.
Sample Type:	POWDER-DUST
Collected:	9/15/2002 1500

Department	FCP
Customer's ID:	SHD-WV-997-02,-03

Analysis	Result	Uncertainty	Lab Use Only
Cr	2.07E+3	ug/g	Rep4 (4D): U1
Cr	1.40E+3	ug/g	Rep5 (5D): U1
Cr	2.14E+3	ug/g	Rep6 (6D): U1
Cr	2.17E+3	ug/g	Rep7 (7D): U1
Cr	2.03E+3	ug/g	Rep8 (8D): U1
Cr	2.01E+3	ug/g	Rep9 (9D): U1
Fe	8.35E+4	ug/g	Rep1 (1D): U1
Fe	8.17E+4	ug/g	Rep2 (2D): U1
Fe	8.29E+4	ug/g	Rep3 (3D): U1
Fe	8.53E+4	ug/g	Rep4 (4D): U1
Fe	5.72E+4	ug/g	Rep5 (5D): U1
Fe	8.76E+4	ug/g	Rep6 (6D): U1
Fe	8.75E+4	ug/g	Rep7 (7D): U1
Fe	8.28E+4	ug/g	Rep8 (8D): U1
Fe	8.26E+4	ug/g	Rep9 (9D): U1
Hg	<19100	ng/g	Rep4 (1DB REPEAT): no flags
Hg	<16500	ng/g	Rep5 (2DB REPEAT): no flags
Hg	<17500	ng/g	Rep6 (3DB REPEAT): no flags
Hg	<15400	ng/g	Rep7 (4DB REPEAT): no flags
Hg	<15900	ng/g	Rep8 (5DB REPEAT): no flags
Hg	<21000	ng/g	Rep9 (6DB REPEAT): no flags
Hg	<16000	ng/g	Rep10 (7DB REPEAT): no flags
Hg	<17300	ng/g	Rep11 (8DB REPEAT): no flags
Hg	<19200	ng/g	Rep12 (9DB REPEAT): no flags
K	3.73E+4	ug/g	Rep1 (1D): U1
K	3.68E+4	ug/g	Rep2 (2D): U1
K	3.71E+4	ug/g	Rep3 (3D): U1

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Jacqueline D. Hill
Name

2/25/04 1348
Date & Time



Login Date: 23-Jan-04

VAST Sample ID: 04-0073

Sample Point:	EVACUATED CANISTERS	
Sample Type:	POWDER-DUST	
Collected:	9/18/2002	1500

Department	FCP
Customer's ID:	SHD-WV-997-02,-03

Analysis	Result	Uncertainty	Lab Use Only
K	3.78E+4	ug/g	Rep4 (4D): U1
K	2.58E+4	ug/g	Rep5 (5D): U1
K	3.93E+4	ug/g	Rep6 (6D): U1
K	3.87E+4	ug/g	Rep7 (7D): U1
K	3.76E+4	ug/g	Rep8 (8D): U1
K	3.73E+4	ug/g	Rep9 (9D): U1
Li	1.63E+4	ug/g	Rep1 (1D): U1
Li	1.61E+4	ug/g	Rep2 (2D): U1
Li	1.57E+4	ug/g	Rep3 (3D): U1
Li	1.71E+4	ug/g	Rep4 (4D): U1
Li	1.09E+4	ug/g	Rep5 (5D): U1
Li	1.77E+4	ug/g	Rep6 (6D): U1
Li	1.71E+4	ug/g	Rep7 (7D): U1
Li	1.55E+4	ug/g	Rep8 (8D): U1
Li	1.60E+4	ug/g	Rep9 (9D): U1
Mg	7.59E+3	ug/g	Rep1 (1D): U1
Mg	7.53E+3	ug/g	Rep2 (2D): U1
Mg	7.49E+3	ug/g	Rep3 (3D): U1
Mg	8.15E+3	ug/g	Rep4 (4D): U1
Mg	4.76E+3	ug/g	Rep5 (5D): U1
Mg	8.36E+3	ug/g	Rep6 (6D): U1
Mg	9.22E+3	ug/g	Rep7 (7D): U1
Mg	6.61E+3	ug/g	Rep8 (8D): U1
Mg	7.65E+3	ug/g	Rep9 (9D): U1
Mn	5.90E+3	ug/g	Rep1 (1D): U1
Mn	5.81E+3	ug/g	Rep2 (2D): U1
Mn	5.91E+3	ug/g	Rep3 (3D): U1

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Jacqueline D. Hill
Name

2/25/04 1348
Date & Time



Login Date: 23-Jan-04

VAST Sample ID: 04-0073

Sample Point:	EVACUATED CANISTERS	
Sample Type:	POWDER-DUST	
Collected:	9/16/2002	1500

Department	FCP
Customer's ID:	SHD-WV-997-02,-03

Analysis	Result ***	Uncertainty	Lab Use Only
Mn	6.07E+3	ug/g	Rep4 (4D): U1
Mn	4.05E+3	ug/g	Rep5 (5D): U1
Mn	6.20E+3	ug/g	Rep6 (6D): U1
Mn	6.22E+3	ug/g	Rep7 (7D): U1
Mn	5.90E+3	ug/g	Rep8 (8D): U1
Mn	5.88E+3	ug/g	Rep9 (9D): U1
Na	6.14E+4	ug/g	Rep1 (1D): U1
Na	6.06E+4	ug/g	Rep2 (2D): U1
Na	5.94E+4	ug/g	Rep3 (3D): U1
Na	6.45E+4	ug/g	Rep4 (4D): U1
Na	4.08E+4	ug/g	Rep5 (5D): U1
Na	6.66E+4	ug/g	Rep6 (6D): U1
Na	6.53E+4	ug/g	Rep7 (7D): U1
Na	5.78E+4	ug/g	Rep8 (8D): U1
Na	6.05E+4	ug/g	Rep9 (9D): U1
Nd	<1.91E+3	ug/g	Rep1 (1D): no flags
Nd	<1.65E+3	ug/g	Rep2 (2D): no flags
Nd	<1.75E+3	ug/g	Rep3 (3D): no flags
Nd	<1.54E+3	ug/g	Rep4 (4D): no flags
Nd	<1.59E+3	ug/g	Rep5 (5D): no flags
Nd	<2.10E+3	ug/g	Rep6 (6D): no flags
Nd	<1.60E+3	ug/g	Rep7 (7D): no flags
Nd	<1.73E+3	ug/g	Rep8 (8D): no flags
Nd	<1.92E+3	ug/g	Rep9 (9D): no flags
Ni	6.55E+2	ug/g	Rep1 (1D): U1
Ni	6.38E+2	ug/g	Rep2 (2D): U1
Ni	6.63E+2	ug/g	Rep3 (3D): U1

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Jacqueline D. Hill
Name

2/25/04 1348
Date & Time

Report Date: 25-Feb-04



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Login Date: 23-Jan-04

VAST Sample ID: 04-0073

Sample Point:	EVACUATED CANISTERS	
Sample Type:	POWDER-DUST	
Collected:	9/16/2002	1500

Department	FCP
Customer's ID:	SHD-WV-997-02,-03

Analysis	Result	Uncertainty	Lab Use Only
Ni	6.61E+2	ug/g	Rep4 (4D): U1
Ni	4.32E+2	ug/g	Rep5 (5D): U1
Ni	6.37E+2	ug/g	Rep6 (6D): U1
Ni	7.09E+2	ug/g	Rep7 (7D): U1
Ni	6.63E+2	ug/g	Rep8 (8D): U1
Ni	6.39E+2	ug/g	Rep9 (9D): U1
P	5.71E+3	ug/g	Rep1 (1D): U1
P	5.61E+3	ug/g	Rep2 (2D): U1
P	5.57E+3	ug/g	Rep3 (3D): U1
P	5.35E+3	ug/g	Rep4 (4D): U1
P	3.72E+3	ug/g	Rep5 (5D): U1
P	6.02E+3	ug/g	Rep6 (6D): U1
P	5.98E+3	ug/g	Rep7 (7D): U1
P	5.38E+3	ug/g	Rep8 (8D): U1
P	5.40E+3	ug/g	Rep9 (9D): U1
Pb	<7.562E+02	ug/g	Rep19 (1D - RCRA): no flags
Pb	<6.725E+02	ug/g	Rep20 (2D - RCRA): no flags
Pb	<7.388E+02	ug/g	Rep21 (3D - RCRA): no flags
Pb	<7.004E+02	ug/g	Rep22 (4D - RCRA): no flags
Pb	<6.253E+02	ug/g	Rep23 (5D - RCRA): no flags
Pb	<8.716E+02	ug/g	Rep24 (6D - RCRA): no flags
Pb	<7.084E+02	ug/g	Rep25 (7D - RCRA): no flags
Pb	<7.398E+02	ug/g	Rep26 (8D - RCRA): no flags
Pb	<8.309E+02	ug/g	Rep27 (9D - RCRA): no flags
Ru	3.55E+2	ug/g	Rep1 (1D): U1
Ru	3.60E+2	ug/g	Rep2 (2D): U1
Ru	<3.52E+2	ug/g	Rep3 (3D): no flags

Approved By

Jacqueline D. Hill
Name

2/25/04 1348
Date & Time



Login Date: 23-Jan-04

VAST Sample ID: 04-0073

Sample Point:	EVACUATED CANISTERS
Sample Type:	POWDER-DUST
Collected:	9/16/2002 1500

Department	FCP
Customer's ID:	SHD-WV-997-02,-03

Analysis	Result ***	Uncertainty	Lab Use Only
Ru	3.81E+2	ug/g	Rep4 (4D): U1
Ru	<2.83E+2	ug/g	Rep5 (5D): no flags
Ru	<4.43E+2	ug/g	Rep6 (6D): no flags
Ru	3.82E+2	ug/g	Rep7 (7D): U1
Ru	<3.84E+2	ug/g	Rep8 (8D): no flags
Ru	<4.01E+2	ug/g	Rep9 (9D): no flags
S	<1.65E+3	ug/g	Rep1 (1D): no flags
S	<1.56E+3	ug/g	Rep2 (2D): no flags
S	<1.76E+3	ug/g	Rep3 (3D): no flags
S	<1.59E+3	ug/g	Rep4 (4D): no flags
S	<1.42E+3	ug/g	Rep5 (5D): no flags
S	<2.22E+3	ug/g	Rep6 (6D): no flags
S	<1.80E+3	ug/g	Rep7 (7D): no flags
S	<1.82E+3	ug/g	Rep8 (8D): no flags
S	<2.00E+3	ug/g	Rep9 (9D): no flags
Se	3.23E+2	ug/g	Rep19 (1D - RCRA): U1
Se	8.66E+2	ug/g	Rep20 (2D - RCRA): U1
Se	4.89E+2	ug/g	Rep21 (3D - RCRA): U1
Se	2.96E+2	ug/g	Rep22 (4D - RCRA): U1
Se	<2.50E+2	ug/g	Rep23 (5D - RCRA): no flags
Se	4.18E+2	ug/g	Rep24 (6D - RCRA): U1
Se	7.39E+2	ug/g	Rep25 (7D - RCRA): U1
Se	<2.96E+2	ug/g	Rep26 (8D - RCRA): no flags
Se	<3.32E+2	ug/g	Rep27 (9D - RCRA): no flags
Si	2.00E+5	ug/g	Rep1 (1D): U1
Si	1.97E+5	ug/g	Rep2 (2D): U1
Si	1.99E+5	ug/g	Rep3 (3D): U1

Approved By

Jacqueline D. Hill
Name

2/25/04 1348
Date & Time



Login Date: 23-Jan-04

VAST Sample ID: 04-0073

Sample Point:	EVACUATED CANISTERS	
Sample Type:	POWDER-DUST	
Collected:	9/16/2002	1500

Department	FCP
Customer's ID:	SHD-WV-997-02,-03

Analysis	Result	Uncertainty	Lab Use Only
Si	2.04E+5	ug/g	Rep4 (4D): U1
Si	1.36E+5	ug/g	Rep5 (5D): U1
Si	2.08E+5	ug/g	Rep6 (6D): U1
Si	2.08E+5	ug/g	Rep7 (7D): U1
Si	2.00E+5	ug/g	Rep8 (8D): U1
Si	1.98E+5	ug/g	Rep9 (9D): U1
Sr	<8.26E+2	ug/g	Rep1 (1D): no flags
Sr	<7.78E+2	ug/g	Rep2 (2D): no flags
Sr	<8.79E+2	ug/g	Rep3 (3D): no flags
Sr	<7.97E+2	ug/g	Rep4 (4D): no flags
Sr	<7.09E+2	ug/g	Rep5 (5D): no flags
Sr	<1.11E+3	ug/g	Rep6 (6D): no flags
Sr	<9.01E+2	ug/g	Rep7 (7D): no flags
Sr	<9.09E+2	ug/g	Rep8 (8D): no flags
Sr	<1.00E+3	ug/g	Rep9 (9D): no flags
Th	1.87E+3	ug/g	Rep1 (1D): U1
Th	1.89E+3	ug/g	Rep2 (2D): U1
Th	1.88E+3	ug/g	Rep3 (3D): U1
Th	1.90E+3	ug/g	Rep4 (4D): U1
Th	1.22E+3	ug/g	Rep5 (5D): U1
Th	2.09E+3	ug/g	Rep6 (6D): U1
Th	1.98E+3	ug/g	Rep7 (7D): U1
Th	1.86E+3	ug/g	Rep8 (8D): U1
Th	1.90E+3	ug/g	Rep9 (9D): U1
Ti	5.13E+3	ug/g	Rep1 (1D): U1
Ti	5.01E+3	ug/g	Rep2 (2D): U1
Ti	5.07E+3	ug/g	Rep3 (3D): U1

Approved By

Jacqueline D. Hill
Name

2/25/04
Date & Time

1348



Login Date: 23-Jan-04

VAST Sample ID: 04-0073

Sample Point:	EVACUATED CANISTERS	
Sample Type:	POWDER-DUST	
Collected:	9/16/2002	1500

Department	FCP
Customer's ID:	SHD-WV-997-02,-03

Analysis	Result	Uncertainty	Lab Use Only
Ti	5.20E+3	ug/g	Rep4 (4D): U1
Ti	3.47E+3	ug/g	Rep5 (5D): U1
Ti	5.32E+3	ug/g	Rep6 (6D): U1
Ti	5.31E+3	ug/g	Rep7 (7D): U1
Ti	5.07E+3	ug/g	Rep8 (8D): U1
Ti	5.02E+3	ug/g	Rep9 (9D): U1
U	3.38E+3	ug/g	Rep1 (1D): U1
U	3.32E+3	ug/g	Rep2 (2D): U1
U	3.35E+3	ug/g	Rep3 (3D): U1
U	3.44E+3	ug/g	Rep4 (4D): U1
U	2.31E+3	ug/g	Rep5 (5D): U1
U	3.54E+3	ug/g	Rep6 (6D): U1
U	3.52E+3	ug/g	Rep7 (7D): U1
U	3.39E+3	ug/g	Rep8 (8D): U1
U	3.34E+3	ug/g	Rep9 (9D): U1
Zn	<8.26E+2	ug/g	Rep1 (1D): no flags
Zn	<7.78E+2	ug/g	Rep2 (2D): no flags
Zn	<8.79E+2	ug/g	Rep3 (3D): no flags
Zn	<7.97E+2	ug/g	Rep4 (4D): no flags
Zn	<7.09E+2	ug/g	Rep5 (5D): no flags
Zn	<1.11E+3	ug/g	Rep6 (6D): no flags
Zn	<9.01E+2	ug/g	Rep7 (7D): no flags
Zn	<9.09E+2	ug/g	Rep8 (8D): no flags
Zn	<1.00E+3	ug/g	Rep9 (9D): no flags
Zr	1.02E+4	ug/g	Rep1 (1D): U1
Zr	9.97E+3	ug/g	Rep2 (2D): U1
Zr	1.01E+4	ug/g	Rep3 (3D): U1

Approved By

Jacqueline D. Hill
Name

2/25/04 1348
Date & Time



Login Date: 23-Jan-04

VAST Sample ID: 04-0073

Sample Point:	EVACUATED CANISTERS
Sample Type:	POWDER-DUST
Collected:	9/16/2002 1500

Department	FCP
Customer's ID:	SHD-WV-997-02,-03

Analysis	Result ***	Uncertainty	Lab Use Only
Zr	1.04E+4	ug/g	Rep4 (4D): U1
Zr	6.93E+3	ug/g	Rep5 (5D): U1
Zr	1.06E+4	ug/g	Rep6 (6D): U1
Zr	1.06E+4	ug/g	Rep7 (7D): U1
Zr	1.01E+4	ug/g	Rep8 (8D): U1
Zr	1.00E+4	ug/g	Rep8 (9D): U1
GrossAlpha	5.04E+0	uCi/g 4.42E+0	Rep4 (1DB Reprep): no flags
GrossAlpha	5.23E+0	uCi/g 4.19E+0	Rep5 (2DB Reprep): no flags
GrossAlpha	2.80E+0	uCi/g 3.17E+0	Rep6 (3DB Reprep): no flags
GrossBeta	2.69E+3	uCi/g 1.25E+2	Rep4 (1DB Reprep): no flags
GrossBeta	2.78E+3	uCi/g 1.25E+2	Rep5 (2DB Reprep): no flags
GrossBeta	2.62E+3	uCi/g 1.21E+2	Rep6 (3DB Reprep): no flags
H3	<1.31E-2	uCi/g	Rep1 (#1 Leach): no flags
H3	<9.26E-3	uCi/g	Rep2 (#2 Leach): no flags
H3	<1.09E-2	uCi/g	Rep3 (#3 Leach): no flags
Sr90	1.27E+2	uCi/g 3.61E+0	Rep1 (1DB): no flags
Sr90	1.30E+2	uCi/g 3.68E+0	Rep2 (2DB): no flags
Sr90	1.25E+2	uCi/g 3.54E+0	Rep3 (3DB): no flags
Tc99	9.67E-3	uCi/g 4.03E-4	Rep1 (SHD-WV-997 02,03): no flags
Tc99	9.42E-3	uCi/g 4.44E-4	Rep2 (#2): no flags
Tc99	9.86E-3	uCi/g 4.65E-4	Rep3 (#3): no flags
C-14	<8.79E-3	uCi/g	Rep1 (#1 Leach): no flags
C-14	<6.01E-3	uCi/g	Rep2 (#2 Leach): no flags
C-14	<7.05E-3	uCi/g	Rep3 (#3 Leach): no flags
Fe55	<2.94E-2	uCi/g	Rep1 (1DB REPEAT): no flags
Fe55	<6.44E-2	uCi/g	Rep2 (2DB REPEAT): no flags
Fe55	<2.15E-2	uCi/g	Rep3 (3DB REPEAT): no flags

Approved By

Jacqueline D. Hill
Name

2/25/04 1348
Date & Time



Login Date: 23-Jan-04

VAST Sample ID: 04-0073

Sample Point:	EVACUATED CANISTERS
Sample Type:	POWDER-DUST
Collected:	9/16/2002 1500

Department	FCP
Customer's ID:	SHD-WV-997-Q2,-03

Analysis	Result	Uncertainty	Lab Use Only
Am241	1.49E+0	uCi/g 8.98E-2	Rep1 (1DB REPEAT): no flags
Am241	1.51E+0	uCi/g 9.08E-2	Rep2 (2DB REPEAT): no flags
Am241	1.48E+0	uCi/g 8.90E-2	Rep3 (3DB REPEAT): no flags
Am243	1.47E-2	uCi/g 9.32E-4	Rep1 (1DB REPEAT): no flags
Am243	1.49E-2	uCi/g 9.42E-4	Rep2 (2DB REPEAT): no flags
Am243	1.48E-2	uCi/g 9.24E-4	Rep3 (3DB REPEAT): no flags
Cm242	1.02E-1	uCi/g 7.85E-3	Rep1 (1DB REPEAT): no flags
Cm242	1.05E-1	uCi/g 7.85E-3	Rep2 (2DB REPEAT): no flags
Cm242	1.02E-1	uCi/g 7.72E-3	Rep3 (3DB REPEAT): no flags
Cm243/244	2.26E-1	uCi/g 1.38E-2	Rep1 (1DB REPEAT): no flags
Cm243/244	2.29E-1	uCi/g 1.39E-2	Rep2 (2DB REPEAT): no flags
Cm243/244	2.24E-1	uCi/g 1.36E-2	Rep3 (3DB REPEAT): no flags
Np237	3.85E-3	uCi/g 5.24E-4	Rep1 (1DB REPEAT): no flags
Np237	2.68E-3	uCi/g 3.72E-4	Rep2 (2DB REPEAT): no flags
Np237	Not Measured	uCi/g Not Measured	Rep3 (3DB REPEAT): no flags
Pu-238	3.54E-1	uCi/g 8.35E-3	Rep1 (3DB REPEAT): no flags
Pu-239+240	1.44E-1	uCi/g 4.18E-3	Rep1 (3DB REPEAT): no flags
Pu-241	1.54E+0	uCi/g 2.32E-1	Rep1 (1DB): no flags
Pu-241	1.85E+0	uCi/g 2.45E-1	Rep2 (2DB): no flags
Pu-241	1.88E+0	uCi/g 1.69E-1	Rep3 (3DB): no flags
Pu238	<2.81E-6	uCi/g	Rep1 (1DB REPEAT): no flags
Pu238	<2.96E-6	uCi/g	Rep2 (2DB REPEAT): no flags
Pu238	Not Measured	uCi/g Not Measured	Rep3 (3DB REPEAT): no flags
Pu238	3.34E-1	uCi/g 2.05E-2	Rep1 (1DB REPEAT): no flags
Pu238	3.52E-1	uCi/g 2.15E-2	Rep2 (2DB REPEAT): no flags
Pu238	Not Measured	uCi/g Not Measured	Rep3 (3DB REPEAT): no flags
Pu239/240	1.35E-1	uCi/g 8.60E-3	Rep1 (1DB REPEAT): no flags

Approved By

Jacqueline D. Hill
Name

2/25/04 1348
Date & Time



Login Date: 23-Jan-04

VAST Sample ID: 04-0073

Sample Point:	EVACUATED CANISTERS	
Sample Type:	POWDER-DUST	
Collected:	9/16/2002	1500

Department	FCP
Customer's ID:	SHD-WV-997-02,-03

Analysis	Result ***	Uncertainty	Lab Use Only
Pu239/240	1.42E-1	uCi/g 8.95E-3	Rep2 (2DB REPEAT): no flags
Pu239/240	Not Measured	uCi/g Not Measured	Rep3 (3DB REPEAT): no flags
Pu242	<4.61E-4	uCi/g	Rep1 (1DB REPEAT): no flags
Pu242	<4.18E-4	uCi/g	Rep2 (2DB REPEAT): no flags
Pu242	Not Measured	uCi/g Not Measured	Rep3 (3DB REPEAT): no flags
Th228	2.94E-2	uCi/g 1.93E-3	Rep1 (1DB REPEAT): no flags
Th228	2.72E-2	uCi/g 1.77E-3	Rep2 (2DB REPEAT): no flags
Th228	3.12E-2	uCi/g 2.02E-3	Rep3 (3DB REPEAT): no flags
Th229	<9.77E-5	uCi/g	Rep1 (1DB REPEAT): no flags
Th229	<1.06E-4	uCi/g	Rep2 (2DB REPEAT): no flags
Th229	<1.04E-4	uCi/g	Rep3 (3DB REPEAT): no flags
Th230	2.10E-4	uCi/g 3.75E-5	Rep1 (1DB REPEAT): no flags
Th230	1.94E-4	uCi/g 3.46E-5	Rep2 (2DB REPEAT): no flags
Th230	2.23E-4	uCi/g 3.97E-5	Rep3 (3DB REPEAT): no flags
Th232	2.45E-4	uCi/g 5.70E-5	Rep1 (1DB REPEAT): no flags
Th232	1.88E-4	uCi/g 4.60E-5	Rep2 (2DB REPEAT): no flags
Th232	1.61E-4	uCi/g 4.58E-5	Rep3 (3DB REPEAT): no flags
TotAlphaPu	4.98E-1	uCi/g 1.25E-2	Rep1 (3DB REPEAT): no flags
U232	2.66E-2	uCi/g 1.65E-3	Rep1 (1DB REPEAT): no flags
U232	2.82E-2	uCi/g 1.62E-3	Rep2 (2DB REPEAT): no flags
U232	2.83E-2	uCi/g 1.77E-3	Rep3 (3DB REPEAT): no flags
U233/234	1.60E-2	uCi/g 1.01E-3	Rep1 (1DB REPEAT): no flags
U233/234	1.57E-2	uCi/g 9.93E-4	Rep2 (2DB REPEAT): no flags
U233/234	1.70E-2	uCi/g 1.08E-3	Rep3 (3DB REPEAT): no flags
U235/236	8.46E-4	uCi/g 9.21E-5	Rep1 (1DB REPEAT): no flags
U235/236	7.34E-4	uCi/g 5.66E-5	Rep2 (2DB REPEAT): no flags
U235/236	7.93E-4	uCi/g 6.16E-5	Rep3 (3DB REPEAT): no flags

Approved By

Jacqueline D. Hill
Name

2/25/04 1348
Date & Time



Login Date: 23-Jan-04

VAST Sample ID: 04-0073

Sample Point:	EVACUATED CANISTERS	
Sample Type:	POWDER-DUST	
Collected:	9/16/2002	1500

Department	FCP
Customer's ID:	SHD-WV-997-02,-03

Analysis	Result	Uncertainty	Lab Use Only
U238	1.15E-3	uCi/g 1.06E-4	Rep1 (1DB REPEAT): no flags
U238	1.20E-3	uCi/g 1.08E-4	Rep2 (2DB REPEAT): no flags
U238	8.78E-4	uCi/g 9.31E-5	Rep3 (3DB REPEAT): no flags
Ac-227	<2.88E-1	uCi/g	Rep4 (1 DB REPEAT): no flags
Ac-227	<8.34E-1	uCi/g	Rep5 (2 DB REPEAT): no flags
Ac-227	<3.86E-1	uCi/g	Rep6 (3 DB REPEAT): no flags
Ag-110	<2.24E-1	uCi/g	Rep4 (1 DB REPEAT): no flags
Ag-110	<4.68E-1	uCi/g	Rep5 (2 DB REPEAT): no flags
Ag-110	<2.66E-1	uCi/g	Rep6 (3 DB REPEAT): no flags
Bi-212	<3.33E-1	uCi/g	Rep4 (1 DB REPEAT): no flags
Bi-212	<7.00E-1	uCi/g	Rep5 (2 DB REPEAT): no flags
Bi-212	<3.14E-1	uCi/g	Rep6 (3 DB REPEAT): no flags
Ce-144	<7.87E-1	uCi/g	Rep4 (1 DB REPEAT): no flags
Ce-144	<1.40E+0	uCi/g	Rep5 (2 DB REPEAT): no flags
Ce-144	<8.93E-1	uCi/g	Rep6 (3 DB REPEAT): no flags
Co-60	4.04E-2	uCi/g 1.47E-2	Rep4 (1 DB REPEAT): no flags
Co-60	<2.97E-2	uCi/g	Rep5 (2 DB REPEAT): no flags
Co-60	<1.59E-2	uCi/g	Rep6 (3 DB REPEAT): no flags
Cs-134	<7.19E-2	uCi/g	Rep4 (1 DB REPEAT): no flags
Cs-134	<1.32E-1	uCi/g	Rep5 (2 DB REPEAT): no flags
Cs-134	<9.39E-2	uCi/g	Rep6 (3 DB REPEAT): no flags
Cs-137	2.19E+3	uCi/g 5.88E+1	Rep4 (1 DB REPEAT): no flags
Cs-137	2.26E+3	uCi/g 6.08E+1	Rep5 (2 DB REPEAT): no flags
Cs-137	2.46E+3	uCi/g 6.78E+1	Rep6 (3 DB REPEAT): no flags
Eu-152	<8.78E-2	uCi/g	Rep4 (1 DB REPEAT): no flags
Eu-152	<1.74E-1	uCi/g	Rep5 (2 DB REPEAT): no flags
Eu-152	<1.04E-1	uCi/g	Rep6 (3 DB REPEAT): no flags

Approved By

Jacqueline D. Hill
Name

2/25/04 1348
Date & Time



Login Date: 23-Jan-04

VAST Sample ID: 04-0073

Sample Point:	EVACUATED CANISTERS	
Sample Type:	POWDER-DUST	
Collected:	9/16/2002	1500

Department	FCP
Customer's ID:	SHD-WV-997-02,-03

Analysis	Result	Uncertainty	Lab Use Only
Eu-154	6.56E-1	uCi/g 4.90E-2	Rep4 (1 DB REPEAT): no flags
Eu-154	5.94E-1	uCi/g 7.58E-2	Rep5 (2 DB REPEAT): no flags
Eu-154	5.51E-1	uCi/g 6.00E-2	Rep6 (3 DB REPEAT): no flags
Eu-155	<1.00E-1	uCi/g	Rep4 (1 DB REPEAT): no flags
Eu-155	<1.91E-1	uCi/g	Rep5 (2 DB REPEAT): no flags
Eu-155	<1.57E-1	uCi/g	Rep6 (3 DB REPEAT): no flags
I-129	<1.11E-3	uCi/g	Rep1 (Caustic leach 1): no flags
I-129	<9.41E-4	uCi/g	Rep2 (#2): no flags
I-129	<1.35E-3	uCi/g	Rep3 (#3): no flags
K-40	<1.98E-2	uCi/g	Rep4 (1 DB REPEAT): no flags
K-40	4.44E-2	uCi/g 3.74E-2	Rep5 (2 DB REPEAT): no flags
K-40	<2.57E-2	uCi/g	Rep6 (3 DB REPEAT): no flags
Mn-54	8.12E-2	uCi/g 7.80E-2	Rep4 (1 DB REPEAT): no flags
Mn-54	<3.85E-2	uCi/g	Rep5 (2 DB REPEAT): no flags
Mn-54	<4.34E-2	uCi/g	Rep6 (3 DB REPEAT): no flags
Nb-94	<1.62E-2	uCi/g	Rep4 (1 DB REPEAT): no flags
Nb-94	<2.61E-2	uCi/g	Rep5 (2 DB REPEAT): no flags
Nb-94	<1.98E-2	uCi/g	Rep6 (3 DB REPEAT): no flags
Ni59	<2.97E-1	uCi/g	Rep1 (1DB REPEAT): no flags
Ni59	<7.76E-2	uCi/g	Rep2 (2DB REPEAT): no flags
Ni59	<3.20E-1	uCi/g	Rep3 (3DB REPEAT): no flags
Ni63	4.84E-1	uCi/g 1.70E-1	Rep1 (1DB REPEAT): no flags
Ni63	5.48E-1	uCi/g 1.87E-1	Rep2 (2DB REPEAT): no flags
Ni63	5.14E-1	uCi/g 1.77E-1	Rep3 (3DB REPEAT): no flags
Np-239	<6.40E-2	uCi/g	Rep4 (1 DB REPEAT): no flags
Np-239	<1.22E-1	uCi/g	Rep5 (2 DB REPEAT): no flags
Np-239	<6.89E-2	uCi/g	Rep6 (3 DB REPEAT): no flags

Approved By

Jacqueline D. Hill
Name

2/25/04 1348
Date & Time



Login Date: 23-Jan-04

VAST Sample ID: 04-0073

Sample Point:	EVACUATED CANISTERS	
Sample Type:	POWDER-DUST	
Collected:	9/16/2002	1500

Department:	FCP
Customer's ID:	SHD-WV-997-02,-03

Analysis	Result ***	Uncertainty	Lab Use Only
Pa-231	<1.40E+0	uCi/g	Rep4 (1 DB REPEAT): no flags
Pa-231	<3.02E+0	uCi/g	Rep5 (2 DB REPEAT): no flags
Pa-231	<2.30E+0	uCi/g	Rep6 (3 DB REPEAT): no flags
Pb-212	<1.61E-1	uCi/g	Rep4 (1 DB REPEAT): no flags
Pb-212	<3.09E-1	uCi/g	Rep5 (2 DB REPEAT): no flags
Pb-212	<1.73E-1	uCi/g	Rep6 (3 DB REPEAT): no flags
Ra-226	<9.24E-1	uCi/g	Rep4 (1 DB REPEAT): no flags
Ra-226	<1.75E+0	uCi/g	Rep5 (2 DB REPEAT): no flags
Ra-226	<1.18E+0	uCi/g	Rep6 (3 DB REPEAT): no flags
Ra-228	<7.37E-2	uCi/g	Rep4 (1 DB REPEAT): no flags
Ra-228	<1.63E-1	uCi/g	Rep5 (2 DB REPEAT): no flags
Ra-228	<5.14E-2	uCi/g	Rep6 (3 DB REPEAT): no flags
Ru-106	<1.02E+0	uCi/g	Rep4 (1 DB REPEAT): no flags
Ru-106	<1.44E+0	uCi/g	Rep5 (2 DB REPEAT): no flags
Ru-106	<1.04E+0	uCi/g	Rep6 (3 DB REPEAT): no flags
Sb-125	<3.57E-1	uCi/g	Rep4 (1 DB REPEAT): no flags
Sb-125	<7.90E-1	uCi/g	Rep5 (2 DB REPEAT): no flags
Sb-125	<5.04E-1	uCi/g	Rep6 (3 DB REPEAT): no flags
Zr-95	<3.31E+0	uCi/g	Rep4 (1 DB REPEAT): no flags
Zr-95	1.37E+1	uCi/g 7.30E+0	Rep5 (2 DB REPEAT): no flags
Zr-95	<2.92E+0	uCi/g	Rep6 (3 DB REPEAT): no flags

Approved By

Jaqueline D. Hill
Name

2/25/04 1348
Date & Time



Login Date: 23-Jan-04

VAST Sample ID: 04-0073

Sample Point:	EVACUATED CANISTERS	
Sample Type:	POWDER-DUST	
Collected:	9/16/2002	1500

Department	FCP
Customer's ID:	SHD-WV-997-02,-03

Analysis	Result ***	Uncertainty	Lab Use Only
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NOTES: (Contact the A&PC Supervisor if you have questions.)

The uncertainty, if provided, pertains to the 95% confidence level on counting statistics.

*** The instrument used to determine gamma measurements is calibrated for samples of a specified matrix. The density associated with oil samples is not consistent with that of the specified sample matrix. Therefore, due to matrix of the sample and the unknown accuracy in which the sample was prepared, gamma results associated with oil samples are approximate.

Lab Use Only Flags: A0 - unknown approval error; A1 - approval not defined; A2 - approval not entered; A3 - result rejected

U0 - unknown uncertainty error; U1 - uncertainty not defined; U2 - uncertainty not entered

Approved By

Jaqueline D. Hill
Name

2/25/04 1348
Date & Time

Report Date: 25-Feb-04



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VAST

Vitrification Analytical Sample Tracking

A&PC Report of Analysis

Report Recipients: LAURENE ROWELL

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Copied for Recipients ☒FAXed to Recipients ☒Copied for File ☒

package page 7 of 201

Login Date: 23-Jan-04

VAST Sample ID: 04-0074

Sample Point:	EVACUATED CANISTERS
Sample Type:	POWDER-DUST
Collected:	9/20/2002 0930

Department	FCP
Customer's ID:	SHD-WV-998-01,02

Analysis	Result	Uncertainty	Lab Use Only
Ag	<3.43E+2	ug/g	Rep10 (1DB REPEAT): no flags
Ag	<2.92E+2	ug/g	Rep11 (2DB REPEAT): no flags
Ag	<2.74E+2	ug/g	Rep12 (3DB REPEAT): no flags
Ag	<2.71E+2	ug/g	Rep13 (4DB REPEAT): no flags
Ag	<2.82E+2	ug/g	Rep14 (5DB REPEAT): no flags
Ag	<2.53E+2	ug/g	Rep15 (6DB REPEAT): no flags
Ag	<2.78E+2	ug/g	Rep16 (7DB REPEAT): no flags
Ag	<2.75E+2	ug/g	Rep17 (8DB REPEAT): no flags
Ag	<2.86E+2	ug/g	Rep18 (9DB REPEAT): no flags
Al	3.89E+4	ug/g	Rep10 (1DB REPEAT): U1
Al	3.95E+4	ug/g	Rep11 (2DB REPEAT): U1
Al	4.05E+4	ug/g	Rep12 (3DB REPEAT): U1
Al	4.20E+4	ug/g	Rep13 (4DB REPEAT): U1
Al	3.81E+4	ug/g	Rep14 (5DB REPEAT): U1
Al	3.58E+4	ug/g	Rep15 (6DB REPEAT): U1
Al	3.45E+4	ug/g	Rep16 (7DB REPEAT): U1
Al	4.00E+4	ug/g	Rep17 (8DB REPEAT): U1
Al	3.85E+4	ug/g	Rep18 (9DB REPEAT): U1
As	3.65E+2	ug/g	Rep1 (1DB): U1
As	<2.26E+2	ug/g	Rep2 (2DB): no flags
As	<2.85E+2	ug/g	Rep3 (3DB): no flags

Approved By

Jacqueline D. Hill
Name

2/25/04 1426
Date & Time

Report Date: 25-Feb-04



Page 1 of 17

Login Date: 23-Jan-04

VAST Sample ID: 04-0074

Page 19

Sample Point:	EVACUATED CANISTERS
Sample Type:	POWDER-DUST
Collected:	9/20/2002 0930

Department	FCP
Customer's ID:	SHD-WV-998-01,02

Analysis	Result ***	Uncertainty	Lab Use Only
As	<2.73E+2	ug/g	Rep4 (4DB): no flags
As	<2.44E+2	ug/g	Rep5 (5DB): no flags
As	<2.66E+2	ug/g	Rep8 (8DB): no flags
As	<2.78E+2	ug/g	Rep7 (7DB): no flags
As	<2.78E+2	ug/g	Rep8 (8DB): no flags
As	<2.64E+2	ug/g	Rep9 (9DB): no flags
B	3.88E+4	ug/g	Rep1 (1DB): U1
B	3.83E+4	ug/g	Rep2 (2DB): U1
B	3.90E+4	ug/g	Rep3 (3DB): U1
B	3.76E+4	ug/g	Rep4 (4DB): U1
B	3.81E+4	ug/g	Rep5 (5DB): U1
B	3.86E+4	ug/g	Rep6 (6DB): U1
B	3.89E+4	ug/g	Rep7 (7DB): U1
B	3.89E+4	ug/g	Rep8 (8DB): U1
B	3.84E+4	ug/g	Rep18 (8DB REPEAT): U1
Ba	<7.10E+2	ug/g	Rep10 (1DB REPEAT): no flags
Ba	<5.11E+2	ug/g	Rep11 (2DB REPEAT): no flags
Ba	<5.49E+2	ug/g	Rep12 (3DB REPEAT): no flags
Ba	<5.70E+2	ug/g	Rep13 (4DB REPEAT): no flags
Ba	<4.80E+2	ug/g	Rep14 (5DB REPEAT): no flags
Ba	<4.94E+2	ug/g	Rep15 (6DB REPEAT): no flags
Ba	<5.15E+2	ug/g	Rep16 (7DB REPEAT): no flags
Ba	<5.16E+2	ug/g	Rep17 (8DB REPEAT): no flags
Ba	<5.48E+2	ug/g	Rep18 (9DB REPEAT): no flags
Ca	1.65E+3	ug/g	Rep1 (1DB): U1
Ca	1.43E+3	ug/g	Rep2 (2DB): U1
Ca	1.46E+3	ug/g	Rep3 (3DB): U1

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VAST Sample ID: 04-0074

Sample Point:	EVACUATED CANISTERS	
Sample Type:	POWDER-DUST	
Collected:	9/20/2002	0930

Department	FCP
Customer's ID:	SHD-WV-998-01,02

Analysis	Result***	Uncertainty	Lab Use Only
Ca	1.45E+3	ug/g	Rep4 (4DB): U1
Ca	1.47E+3	ug/g	Rep5 (5DB): U1
Ca	1.43E+3	ug/g	Rep6 (6DB): U1
Ca	1.45E+3	ug/g	Rep7 (7DB): U1
Ca	1.50E+3	ug/g	Rep8 (8DB): U1
Ca	1.46E+3	ug/g	Rep9 (9DB): U1
Cd	7.93E+1	ug/g	Rep1 (1DB): U1
Cd	7.04E+1	ug/g	Rep2 (2DB): U1
Cd	7.64E+1	ug/g	Rep3 (3DB): U1
Cd	7.61E+1	ug/g	Rep4 (4DB): U1
Cd	7.74E+1	ug/g	Rep5 (5DB): U1
Cd	7.53E+1	ug/g	Rep6 (6DB): U1
Cd	7.71E+1	ug/g	Rep7 (7DB): U1
Cd	7.69E+1	ug/g	Rep8 (8DB): U1
Cd	8.12E+1	ug/g	Rep9 (9DB): U1
Ce	3.45E+3	ug/g	Rep10 (1DB REPEAT): U1
Ce	3.16E+3	ug/g	Rep11 (2DB REPEAT): U1
Ce	2.09E+3	ug/g	Rep12 (3DB REPEAT): U1
Ce	<1.42E+3	ug/g	Rep13 (4DB REPEAT): no flags
Ca	2.96E+3	ug/g	Rep14 (5DB REPEAT): U1
Ce	3.04E+3	ug/g	Rep15 (6DB REPEAT): U1
Ce	2.96E+3	ug/g	Rep16 (7DB REPEAT): U1
Ce	3.22E+3	ug/g	Rep17 (8DB REPEAT): U1
Ce	3.06E+3	ug/g	Rep18 (9DB REPEAT): U1
Cr	1.95E+3	ug/g	Rep1 (1DB): U1
Cr	2.00E+3	ug/g	Rep2 (2DB): U1
Cr	2.04E+3	ug/g	Rep3 (3DB): U1

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Login Date: 23-Jan-04

VAST Sample ID: 04-0074

Sample Point:	EVACUATED CANISTERS	
Sample Type:	POWDER-DUST	
Collected:	9/20/2002	0930

Department	FCP
Customer's ID:	SHD-WV-998-01,02

Analysis	Result ***	Uncertainty	Lab Use Only
Cr	1.97E+3	ug/g	Rep4 (4DB): U1
Cr	2.04E+3	ug/g	Rep5 (5DB): U1
Cr	2.01E+3	ug/g	Rep6 (6DB): U1
Cr	2.03E+3	ug/g	Rep7 (7DB): U1
Cr	2.04E+3	ug/g	Rep8 (8DB): U1
Cr	2.56E+3	ug/g	Rep9 (9DB): U1
Fe	8.32E+4	ug/g	Rep1 (1DB): U1
Fe	8.24E+4	ug/g	Rep2 (2DB): U1
Fe	8.35E+4	ug/g	Rep3 (3DB): U1
Fe	8.10E+4	ug/g	Rep4 (4DB): U1
Fe	8.22E+4	ug/g	Rep5 (5DB): U1
Fe	8.23E+4	ug/g	Rep6 (6DB): U1
Fe	8.39E+4	ug/g	Rep7 (7DB): U1
Fe	8.37E+4	ug/g	Rep8 (8DB): U1
Fe	8.20E+4	ug/g	Rep18 (9DB REPEAT): U1
Hg	<17700	ng/g	Rep1 (SHD-WV998-01 1DB): no flags
Hg	<10700	ng/g	Rep2 (SHD-WV998-01 2DB): no flags
Hg	<13700	ng/g	Rep3 (SHD-WV998-01 3DB): no flags
Hg	<14200	ng/g	Rep4 (SHD-WV998-01 4DB): no flags
Hg	<12000	ng/g	Rep5 (SHD-WV998-01 5DB): no flags
Hg	<12300	ng/g	Rep6 (SHD-WV998-01 6DB): no flags
Hg	<12900	ng/g	Rep7 (SHD-WV998-01 7DB): no flags
Hg	<12900	ng/g	Rep8 (SHD-WV998-01 8DB): no flags
Hg	<13700	ng/g	Rep9 (SHD-WV998-01 9DB): no flags
K	3.67E+4	ug/g	Rep1 (1DB): U1
K	3.65E+4	ug/g	Rep2 (2DB): U1
K	3.84E+4	ug/g	Rep3 (3DB): U1

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Login Date: 23-Jan-04

VAST Sample ID: 04-0074

Sample Point:	EVACUATED CANISTERS	
Sample Type:	POWDER-DUST	
Collected:	9/20/2002	0930

Department	FCP
Customer's ID:	SHD-WV-998-01,02

Analysis	Result ***	Uncertainty	Lab Use Only
K	3.59E+4	ug/g	Rep4 (4DB): U1
K	3.70E+4	ug/g	Rep5 (5DB): U1
K	3.70E+4	ug/g	Rep6 (6DB): U1
K	3.70E+4	ug/g	Rep7 (7DB): U1
K	3.75E+4	ug/g	Rep8 (8DB): U1
K	3.65E+4	ug/g	Rep9 (9DB): U1
Li	1.63E+4	ug/g	Rep1 (1DB): U1
Li	1.59E+4	ug/g	Rep2 (2DB): U1
Li	1.46E+4	ug/g	Rep3 (3DB): U1
Li	1.42E+4	ug/g	Rep4 (4DB): U1
Li	1.37E+4	ug/g	Rep5 (5DB): U1
Li	1.38E+4	ug/g	Rep6 (6DB): U1
Li	1.48E+4	ug/g	Rep7 (7DB): U1
Li	1.40E+4	ug/g	Rep8 (8DB): U1
Li	1.49E+4	ug/g	Rep9 (9DB): U1
Mg	8.31E+3	ug/g	Rep1 (1DB): U1
Mg	7.71E+3	ug/g	Rep2 (2DB): U1
Mg	7.55E+3	ug/g	Rep3 (3DB): U1
Mg	7.58E+3	ug/g	Rep4 (4DB): U1
Mg	7.76E+3	ug/g	Rep5 (5DB): U1
Mg	7.27E+3	ug/g	Rep6 (6DB): U1
Mg	7.49E+3	ug/g	Rep7 (7DB): U1
Mg	7.92E+3	ug/g	Rep8 (8DB): U1
Mg	7.84E+3	ug/g	Rep9 (9DB): U1
Mn	5.82E+3	ug/g	Rep1 (1DB): U1
Mn	5.83E+3	ug/g	Rep2 (2DB): U1
Mn	5.90E+3	ug/g	Rep3 (3DB): U1

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VAST Sample ID: 04-0074

Sample Point:	EVACUATED CANISTERS	
Sample Type:	POWDER-DUST	
Collected:	9/20/2002	0930

Department	FCP
Customer's ID:	SHD-WV-998-01,02

Analysis	Result	Uncertainty	Lab Use Only
Mn	5.74E+3	ug/g	Rep4 (4DB): U1
Mn	5.37E+3	ug/g	Rep5 (5DB): U1
Mn	5.82E+3	ug/g	Rep6 (6DB): U1
Mn	5.94E+3	ug/g	Rep7 (7DB): U1
Mn	5.97E+3	ug/g	Rep8 (8DB): U1
Mn	5.84E+3	ug/g	Rep9 (9DB): U1
Na	6.38E+4	ug/g	Rep1 (1DB): U1
Na	6.24E+4	ug/g	Rep2 (2DB): U1
Na	5.92E+4	ug/g	Rep3 (3DB): U1
Na	5.64E+4	ug/g	Rep4 (4DB): U1
Na	5.54E+4	ug/g	Rep5 (5DB): U1
Na	5.43E+4	ug/g	Rep6 (6DB): U1
Na	5.82E+4	ug/g	Rep7 (7DB): U1
Na	5.61E+4	ug/g	Rep8 (8DB): U1
Na	5.89E+4	ug/g	Rep9 (9DB): U1
Nd	<1.77E+3	ug/g	Rep10 (1DB REPEAT): no flags
Nd	<1.28E+3	ug/g	Rep11 (2DB REPEAT): no flags
Nd	<1.37E+3	ug/g	Rep12 (3DB REPEAT): no flags
Nd	<1.42E+3	ug/g	Rep13 (4DB REPEAT): no flags
Nd	<1.20E+3	ug/g	Rep14 (5DB REPEAT): no flags
Nd	<1.23E+3	ug/g	Rep15 (6DB REPEAT): no flags
Nd	<1.29E+3	ug/g	Rep16 (7DB REPEAT): no flags
Nd	<1.29E+3	ug/g	Rep17 (8DB REPEAT): no flags
Nd	<1.37E+3	ug/g	Rep18 (9DB REPEAT): no flags
Ni	7.99E+2	ug/g	Rep1 (1DB): U1
Ni	8.22E+2	ug/g	Rep2 (2DB): U1
Ni	8.19E+2	ug/g	Rep3 (3DB): U1

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VAST Sample ID: 04-0074

Sample Point:	EVACUATED CANISTERS	
Sample Type:	POWDER-DUST	
Collected:	9/20/2002	0930

Department	FCP
Customer's ID:	SHD-WV-998-01,02

Analysis	Result	Uncertainty	Lab Use Only
Ni	8.05E+2	ug/g	Rep4 (4DB): U1
Ni	8.46E+2	ug/g	Rep5 (5DB): U1
Ni	7.95E+2	ug/g	Rep6 (6DB): U1
Ni	8.35E+2	ug/g	Rep7 (7DB): U1
Ni	8.41E+2	ug/g	Rep8 (8DB): U1
Ni	1.14E+3	ug/g	Rep9 (9DB): U1
P	4.84E+3	ug/g	Rep1 (1DB): U1
P	4.95E+3	ug/g	Rep2 (2DB): U1
P	4.89E+3	ug/g	Rep3 (3DB): U1
P	4.79E+3	ug/g	Rep4 (4DB): U1
P	5.07E+3	ug/g	Rep5 (5DB): U1
P	5.54E+3	ug/g	Rep6 (6DB): U1
P	5.40E+3	ug/g	Rep7 (7DB): U1
P	5.32E+3	ug/g	Rep8 (8DB): U1
P	5.05E+3	ug/g	Rep9 (9DB): U1
Pb	<6.531E+02	ug/g	Rep1 (1DB): no flags
Pb	<4.521E+02	ug/g	Rep2 (2DB): no flags
Pb	<5.696E+02	ug/g	Rep3 (3DB): no flags
Pb	<5.459E+02	ug/g	Rep4 (4DB): no flags
Pb	<4.880E+02	ug/g	Rep5 (5DB): no flags
Pb	<5.316E+02	ug/g	Rep6 (6DB): no flags
Pb	<5.561E+02	ug/g	Rep7 (7DB): no flags
Pb	<5.567E+02	ug/g	Rep8 (8DB): no flags
Pb	<5.285E+02	ug/g	Rep9 (9DB): no flags
Ru	5.39E+2	ug/g	Rep1 (1DB): U1
Ru	5.23E+2	ug/g	Rep2 (2DB): U1
Ru	3.47E+2	ug/g	Rep3 (3DB): U1

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VAST Sample ID: 04-0074

Sample Point:	EVACUATED CANISTERS	
Sample Type:	POWDER-DUST	
Collected:	9/20/2002	0930

Department	FCP
Customer's ID:	SHD-WV-998-01,02

Analysis	Result ***	Uncertainty	Lab Use Only
Ru	4.11E+2	ug/g	Rep4 (4DB): U1
Ru	3.72E+2	ug/g	Rep5 (5DB): U1
Ru	4.05E+2	ug/g	Rep6 (6DB): U1
Ru	4.62E+2	ug/g	Rep7 (7DB): U1
Ru	4.51E+2	ug/g	Rep8 (8DB): U1
Ru	3.68E+2	ug/g	Rep9 (9DB): U1
S	<1.31E+3	ug/g	Rep1 (1DB): no flags
S	<9.04E+2	ug/g	Rep2 (2DB): no flags
S	<1.14E+3	ug/g	Rep3 (3DB): no flags
S	<1.09E+3	ug/g	Rep4 (4DB): no flags
S	<9.76E+2	ug/g	Rep5 (5DB): no flags
S	<1.06E+3	ug/g	Rep6 (6DB): no flags
S	<1.11E+3	ug/g	Rep7 (7DB): no flags
S	<1.11E+3	ug/g	Rep8 (8DB): no flags
S	<1.06E+3	ug/g	Rep9 (9DB): no flags
Se	<2.61E+2	ug/g	Rep1 (1DB): no flags
Se	<1.81E+2	ug/g	Rep2 (2DB): no flags
Se	4.24E+2	ug/g	Rep3 (3DB): U1
Sa	<2.18E+2	ug/g	Rep4 (4DB): no flags
Se	3.08E+2	ug/g	Rep5 (5DB): U1
Se	4.37E+2	ug/g	Rep6 (6DB): U1
Sa	2.59E+2	ug/g	Rep7 (7DB): U1
Se	<2.23E+2	ug/g	Rep8 (8DB): no flags
Se	<2.11E+2	ug/g	Rep9 (9DB): no flags
Si	2.09E+5	ug/g	Rep10 (1DB REPEAT): U1
Si	2.10E+5	ug/g	Rep11 (2DB REPEAT): U1
Si	2.11E+5	ug/g	Rep12 (3DB REPEAT): U1

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VAST Sample ID: 04-0074

Sample Point:	EVACUATED CANISTERS	
Sample Type:	POWDER-DUST	
Collected:	9/20/2002	0930

Department	FCP
Customer's ID:	SHD-WV-998-01,02

Analysis	Result	Uncertainty	Lab Use Only
Si	2.05E+5	ug/g	Rep13 (4DB REPEAT): U1
Si	2.09E+5	ug/g	Rep14 (5DB REPEAT): U1
Si	2.10E+5	ug/g	Rep15 (6DB REPEAT): U1
Si	2.07E+5	ug/g	Rep16 (7DB REPEAT): U1
Si	2.10E+5	ug/g	Rep17 (8DB REPEAT): U1
Si	1.97E+5	ug/g	Rep18 (9DB REPEAT): U1
Sr	<6.53E+2	ug/g	Rep1 (1DB): no flags
Sr	<4.52E+2	ug/g	Rep2 (2DB): no flags
Sr	<5.70E+2	ug/g	Rep3 (3DB): no flags
Sr	<5.46E+2	ug/g	Rep4 (4DB): no flags
Sr	<4.88E+2	ug/g	Rep5 (5DB): no flags
Sr	<5.32E+2	ug/g	Rep6 (6DB): no flags
Sr	<5.56E+2	ug/g	Rep7 (7DB): no flags
Sr	<5.57E+2	ug/g	Rep8 (8DB): no flags
Sr	<5.29E+2	ug/g	Rep9 (9DB): no flags
Th	2.37E+3	ug/g	Rep10 (1DB REPEAT): U1
Th	2.18E+3	ug/g	Rep11 (2DB REPEAT): U1
Th	1.54E+3	ug/g	Rep12 (3DB REPEAT): U1
Th	7.40E+2	ug/g	Rep13 (4DB REPEAT): U1
Th	2.04E+3	ug/g	Rep14 (5DB REPEAT): U1
Th	2.12E+3	ug/g	Rep15 (6DB REPEAT): U1
Th	2.13E+3	ug/g	Rep16 (7DB REPEAT): U1
Th	2.19E+3	ug/g	Rep17 (8DB REPEAT): U1
Th	2.15E+3	ug/g	Rep18 (9DB REPEAT): U1
Ti	5.09E+3	ug/g	Rep1 (1DB): U1
Ti	5.00E+3	ug/g	Rep2 (2DB): U1
Ti	5.12E+3	ug/g	Rep3 (3DB): U1

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Login Date: 23-Jan-04

VAST Sample ID: 04-0074

Sample Point:	EVACUATED CANISTERS
Sample Type:	POWDER-DUST
Collected:	9/20/2002 0930

Department	FCP
Customer's ID:	SHD-WV-998-01,02

Analysis	Result	Uncertainty	Lab Use Only
Ti	4.91E+3	ug/g	Rep4 (4DB): U1
Ti	4.98E+3	ug/g	Rep5 (5DB): U1
Ti	5.05E+3	ug/g	Rep6 (6DB): U1
Ti	5.10E+3	ug/g	Rep7 (7DB): U1
Ti	5.10E+3	ug/g	Rep8 (8DB): U1
Ti	4.95E+3	ug/g	Rep9 (9DB): U1
U	3.49E+3	ug/g	Rep10 (1DB REPEAT): U1
U	3.52E+3	ug/g	Rep11 (2DB REPEAT): U1
U	3.47E+3	ug/g	Rep12 (3DB REPEAT): U1
U	3.36E+3	ug/g	Rep13 (4DB REPEAT): U1
U	3.44E+3	ug/g	Rep14 (5DB REPEAT): U1
U	3.35E+3	ug/g	Rep15 (6DB REPEAT): U1
U	3.31E+3	ug/g	Rep16 (7DB REPEAT): U1
U	3.43E+3	ug/g	Rep17 (8DB REPEAT): U1
U	3.32E+3	ug/g	Rep18 (9DB REPEAT): U1
Zn	<6.53E+2	ug/g	Rep1 (1DB): no flags
Zn	<4.52E+2	ug/g	Rep2 (2DB): no flags
Zn	<5.70E+2	ug/g	Rep3 (3DB): no flags
Zn	<5.46E+2	ug/g	Rep4 (4DB): no flags
Zn	<4.88E+2	ug/g	Rep5 (5DB): no flags
Zn	<5.32E+2	ug/g	Rep6 (6DB): no flags
Zn	<5.56E+2	ug/g	Rep7 (7DB): no flags
Zn	<5.57E+2	ug/g	Rep8 (8DB): no flags
Zn	<5.29E+2	ug/g	Rep9 (9DB): no flags
Zr	1.03E+4	ug/g	Rep1 (1DB): U1
Zr	1.02E+4	ug/g	Rep2 (2DB): U1
Zr	1.04E+4	ug/g	Rep3 (3DB): U1

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Login Date: 23-Jan-04

VAST Sample ID: 04-0074

Sample Point:	EVACUATED CANISTERS
Sample Type:	POWDER-DUST
Collected:	9/20/2002 0930

Department	FCP
Customer's ID:	SHD-WV-998-01,02

Analysis	Result	Uncertainty	Lab Use Only
Zr	1.00E+4	ug/g	Rep4 (4DB): U1
Zr	1.01E+4	ug/g	Rep5 (5DB): U1
Zr	1.02E+4	ug/g	Rep6 (6DB): U1
Zr	1.04E+4	ug/g	Rep7 (7DB): U1
Zr	1.04E+4	ug/g	Rep8 (8DB): U1
Zr	1.02E+4	ug/g	Rep18 (9DB REPEAT): U1
GrossAlpha	2.78E+0	uCi/g 1.06E+0	Rep1 (1DB): no flags
GrossAlpha	2.59E+0	uCi/g 8.57E-1	Rep2 (2DB): no flags
GrossAlpha	2.15E+0	uCi/g 8.20E-1	Rep3 (3DB): no flags
GrossBeta	3.03E+3	uCi/g 1.14E+2	Rep1 (1DB): no flags
GrossBeta	2.37E+3	uCi/g 1.07E+2	Rep2 (2DB): no flags
GrossBeta	2.49E+3	uCi/g 9.35E+1	Rep3 (3DB): no flags
H3	<1.57E-2	uCi/g	Rep1 (#1 Leach): no flags
H3	<1.89E-2	uCi/g	Rep2 (#2 Leach): no flags
H3	<1.34E-2	uCi/g	Rep3 (#3 Leach): no flags
Sr90	1.79E+2	uCi/g 5.01E+0	Rep1 (1DB): no flags
Sr90	1.65E+2	uCi/g 4.62E+0	Rep2 (2DB): no flags
Sr90	1.05E+2	uCi/g 2.94E+0	Rep3 (3DB): no flags
Tc99	3.69E-3	uCi/g 2.26E-4	Rep1 (SHD-WV-99802): no flags
Tc99	3.92E-3	uCi/g 3.41E-4	Rep2 (#2): no flags
Tc99	3.59E-3	uCi/g 2.70E-4	Rep3 (#3): no flags
C-14	<1.06E-2	uCi/g	Rep1 (#1 Leach): no flags
C-14	<1.23E-2	uCi/g	Rep2 (#2 Leach): no flags
C-14	1.15E-2	uCi/g 7.43E-3	Rep3 (#3 Leach): no flags
Fe55	<3.26E-2	uCi/g	Rep1 (1DB): no flags
Fe55	<8.52E-2	uCi/g	Rep2 (2DB): no flags
Fe55	<7.01E-2	uCi/g	Rep3 (3DB): no flags

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VAST Sample ID: 04-0074

Sample Point:	EVACUATED CANISTERS	
Sample Type:	POWDER-DUST	
Collected:	9/20/2002	0930

Department	FCP
Customer's ID:	SHD-WV-998-01.02

Analysis	Result	Uncertainty	Lab Use Only
Am241	2.22E+0	uCi/g 1.33E-1	Rep1 (1DB Actinide): no flags
Am241	1.97E+0	uCi/g 1.18E-1	Rep2 (2DB Actinide): no flags
Am241	1.27E+0	uCi/g 7.64E-2	Rep3 (3DB Actinide): no flags
Am243	3.07E-2	uCi/g 1.89E-3	Rep1 (1DB Actinide): no flags
Am243	2.72E-2	uCi/g 1.68E-3	Rep2 (2DB Actinide): no flags
Am243	1.75E-2	uCi/g 1.09E-3	Rep3 (3DB Actinide): no flags
Cm242	1.78E-1	uCi/g 1.22E-2	Rep1 (1DB Actinide): no flags
Cm242	1.38E-1	uCi/g 9.48E-3	Rep2 (2DB Actinide): no flags
Cm242	9.12E-2	uCi/g 6.65E-3	Rep3 (3DB Actinide): no flags
Cm243/244	3.58E-1	uCi/g 2.17E-2	Rep1 (1DB Actinide): no flags
Cm243/244	3.09E-1	uCi/g 1.87E-2	Rep2 (2DB Actinide): no flags
Cm243/244	1.97E-1	uCi/g 1.20E-2	Rep3 (3DB Actinide): no flags
Np237	Not Measured	uCi/g Not Measured	Rep1 (1DB Actinide): no flags
Np237	4.42E-3	uCi/g 5.57E-4	Rep2 (2DB Actinide): no flags
Np237	2.80E-3	uCi/g 2.61E-4	Rep3 (3DB Actinide): no flags
Pu-238	4.90E-1	uCi/g 9.73E-3	Rep1 (1 DB): no flags
Pu-239+240	1.98E-1	uCi/g 4.94E-3	Rep1 (1 DB): no flags
Pu-241	2.29E+0	uCi/g 2.19E-1	Rep1 (#1DB): no flags
Pu-241	2.08E+0	uCi/g 3.06E-1	Rep2 (#2DB): no flags
Pu-241	1.43E+0	uCi/g 2.11E-1	Rep3 (#3DB): no flags
Pu236	Not Measured	uCi/g Not Measured	Rep1 (1DB Actinide): no flags
Pu236	<1.51E-5	uCi/g	Rep2 (2DB Actinide): no flags
Pu236	<1.04E-5	uCi/g	Rep3 (3DB Actinide): no flags
Pu238	Not Measured	uCi/g Not Measured	Rep1 (1DB Actinide): no flags
Pu238	4.39E-1	uCi/g 2.67E-2	Rep2 (2DB Actinide): no flags
Pu238	3.01E-1	uCi/g 1.82E-2	Rep3 (3DB Actinide): no flags
Pu239/240	Not Measured	uCi/g Not Measured	Rep1 (1DB Actinide): no flags

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VAST Sample ID: 04-0074

Sample Point:	EVACUATED CANISTERS	
Sample Type:	POWDER-DUST	
Collected:	9/20/2002	0930

Department	FCP
Customer's ID:	SHD-WV-996-01,02

Analysis	Result	Uncertainty	Lab Use Only
Pu239/240	1.79E-1	uCi/g 1.11E-2	Rep2 (2DB Actinide): no flags
Pu239/240	1.26E-1	uCi/g 7.67E-3	Rep3 (3DB Actinide): no flags
Pu242	Not Measured	uCi/g Not Measured	Rep1 (1DB Actinide): no flags
Pu242	<4.44E-4	uCi/g	Rep2 (2DB Actinide): no flags
Pu242	<1.54E-4	uCi/g	Rep3 (3DB Actinide): no flags
Th228	3.57E-2	uCi/g 2.32E-3	Rep1 (1DB Actinide): no flags
Th228	3.01E-2	uCi/g 1.92E-3	Rep2 (2DB Actinide): no flags
Th228	1.98E-2	uCi/g 1.30E-3	Rep3 (3DB Actinide): no flags
Th229	<1.79E-4	uCi/g	Rep1 (1DB Actinide): no flags
Th229	<8.03E-5	uCi/g	Rep2 (2DB Actinide): no flags
Th229	<6.33E-5	uCi/g	Rep3 (3DB Actinide): no flags
Th230	2.41E-4	uCi/g 3.79E-5	Rep1 (1DB Actinide): no flags
Th230	2.04E-4	uCi/g 3.18E-5	Rep2 (2DB Actinide): no flags
Th230	1.34E-4	uCi/g 2.10E-5	Rep3 (3DB Actinide): no flags
Th232	3.23E-4	uCi/g 6.94E-5	Rep1 (1DB Actinide): no flags
Th232	2.62E-4	uCi/g 4.93E-5	Rep2 (2DB Actinide): no flags
Th232	1.69E-4	uCi/g 3.94E-5	Rep3 (3DB Actinide): no flags
TotAlphaPu	8.88E-1	uCi/g 1.47E-2	Rep1 (1 DB): no flags
U232	2.98E-2	uCi/g 1.86E-3	Rep1 (1DB Actinide): no flags
U232	2.92E-2	uCi/g 1.80E-3	Rep2 (2DB Actinide): no flags
U232	2.45E-2	uCi/g 1.51E-3	Rep3 (3DB Actinide): no flags
U233/234	1.80E-2	uCi/g 1.14E-3	Rep1 (1DB Actinide): no flags
U233/234	1.76E-2	uCi/g 1.11E-3	Rep2 (2DB Actinide): no flags
U233/234	1.48E-2	uCi/g 9.27E-4	Rep3 (3DB Actinide): no flags
U235/236	9.05E-4	uCi/g 8.79E-5	Rep1 (1DB Actinide): no flags
U235/236	8.87E-4	uCi/g 6.60E-5	Rep2 (2DB Actinide): no flags
U235/236	7.44E-4	uCi/g 5.53E-5	Rep3 (3DB Actinide): no flags

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2/25/04 1426
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Login Date: 23-Jan-04

VAST Sample ID: 04-0074

Sample Point:	EVACUATED CANISTERS	
Sample Type:	POWDER-DUST	
Collected:	9/20/2002	0930

Department	FCP
Customer's ID:	SHD-WV-998-01,02

Analysis	Result ***	Uncertainty	Lab Use Only
U238	1.47E-3	uCi/g 1.46E-4	Rep1 (1DB Actinide): no flags
U238	1.70E-3	uCi/g 1.51E-4	Rep2 (2DB Actinide): no flags
U238	1.09E-3	uCi/g 9.15E-5	Rep3 (3DB Actinide): no flags
Ac-227	<5.02E-1	uCi/g	Rep1 (#1DB): no flags
Ac-227	<4.39E-1	uCi/g	Rep2 (#2DB): no flags
Ac-227	<5.78E-1	uCi/g	Rep3 (#3DB): no flags
Ag-110	<3.89E-1	uCi/g	Rep1 (#1DB): no flags
Ag-110	<3.11E-1	uCi/g	Rep2 (#2DB): no flags
Ag-110	<4.04E-1	uCi/g	Rep3 (#3DB): no flags
Bi-212	<3.18E-1	uCi/g	Rep1 (#1DB): no flags
Bi-212	<2.76E-1	uCi/g	Rep2 (#2DB): no flags
Bi-212	<3.64E-1	uCi/g	Rep3 (#3DB): no flags
Ce-144	<1.06E+0	uCi/g	Rep1 (#1DB): no flags
Ce-144	<1.30E+0	uCi/g	Rep2 (#2DB): no flags
Ce-144	<1.07E+0	uCi/g	Rep3 (#3DB): no flags
Co-60	<1.61E-2	uCi/g	Rep1 (#1DB): no flags
Co-60	6.06E-2	uCi/g 2.55E-2	Rep2 (#2DB): no flags
Co-60	<1.78E-2	uCi/g	Rep3 (#3DB): no flags
Cs-134	<1.30E-1	uCi/g	Rep1 (#1DB): no flags
Cs-134	<9.80E-2	uCi/g	Rep2 (#2DB): no flags
Cs-134	<9.73E-2	uCi/g	Rep3 (#3DB): no flags
Cs-137	2.47E+3	uCi/g 6.66E+1	Rep1 (#1DB): no flags
Cs-137	2.50E+3	uCi/g 6.69E+1	Rep2 (#2DB): no flags
Cs-137	2.40E+3	uCi/g 6.62E+1	Rep3 (#3DB): no flags
Eu-152	<1.25E-1	uCi/g	Rep1 (#1DB): no flags
Eu-152	<1.51E-1	uCi/g	Rep2 (#2DB): no flags
Eu-152	<1.26E-1	uCi/g	Rep3 (#3DB): no flags

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Login Date: 23-Jan-04

VAST Sample ID: 04-0074

Sample Point:	EVACUATED CANISTERS	
Sample Type:	POWDER-DUST	
Collected:	9/20/2002	0930

Department	FCP
Customer's ID:	SHD-WV-998-01,02

Analysis	Result	Uncertainty	Lab Use Only
Eu-154	9.57E-1	uCi/g 7.86E-2	Rep1 (#1DB): no flags
Eu-154	9.40E-1	uCi/g 6.46E-2	Rep2 (#2DB): no flags
Eu-154	5.66E-1	uCi/g 5.79E-2	Rep3 (#3DB): no flags
Eu-155	<2.37E-1	uCi/g	Rep1 (#1DB): no flags
Eu-155	<2.02E-1	uCi/g	Rep2 (#2DB): no flags
Eu-155	<2.47E-1	uCi/g	Rep3 (#3DB): no flags
I-129	<3.06E-3	uCi/g	Rep1 (Caustic leach 1): no flags
I-129	<2.54E-3	uCi/g	Rep2 (#2): no flags
I-129	<2.66E-3	uCi/g	Rep3 (#3): no flags
K-40	<5.78E-2	uCi/g	Rep1 (#1DB): no flags
K-40	<3.15E-2	uCi/g	Rep2 (#2DB): no flags
K-40	<4.70E-2	uCi/g	Rep3 (#3DB): no flags
Mn-54	<4.53E-2	uCi/g	Rep1 (#1DB): no flags
Mn-54	<4.25E-2	uCi/g	Rep2 (#2DB): no flags
Mn-54	<5.34E-2	uCi/g	Rep3 (#3DB): no flags
Nb-94	<1.94E-2	uCi/g	Rep1 (#1DB): no flags
Nb-94	<1.66E-2	uCi/g	Rep2 (#2DB): no flags
Nb-94	<1.42E-2	uCi/g	Rep3 (#3DB): no flags
Ni59	<3.18E-1	uCi/g	Rep1 (1DB REPEAT): no flags
Ni59	<8.13E-2	uCi/g	Rep2 (2DB REPEAT): no flags
Ni59	<3.08E-1	uCi/g	Rep3 (3DB REPEAT): no flags
Ni63	6.14E-1	uCi/g 2.09E-1	Rep1 (1DB REPEAT): no flags
Ni63	5.75E-1	uCi/g 1.95E-1	Rep2 (2DB REPEAT): no flags
Ni63	5.74E-1	uCi/g 1.95E-1	Rep3 (3DB REPEAT): no flags
Np-239	<1.26E-1	uCi/g	Rep1 (#1DB): no flags
Np-239	<1.29E-1	uCi/g	Rep2 (#2DB): no flags
Np-239	<9.41E-2	uCi/g	Rep3 (#3DB): no flags

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Login Date: 23-Jan-04

VAST Sample ID: 04-0074

Sample Point:	EVACUATED CANISTERS
Sample Type:	POWDER-DUST
Collected:	9/20/2002 0930

Department	FCP
Customer's ID:	SHD-WV-998-01,02

Analysis	Result	Uncertainty	Lab Use Only
Pa-231	<3.09E+0	uCi/g	Rep1 (#1DB): no flags
Pa-231	<2.48E+0	uCi/g	Rep2 (#2DB): no flags
Pa-231	<3.62E+0	uCi/g	Rep3 (#3DB): no flags
Pb-212	<2.98E-1	uCi/g	Rep1 (#1DB): no flags
Pb-212	<2.67E-1	uCi/g	Rep2 (#2DB): no flags
Pb-212	<2.58E-1	uCi/g	Rep3 (#3DB): no flags
Ra-226	<1.57E+0	uCi/g	Rep1 (#1DB): no flags
Ra-226	<1.43E+0	uCi/g	Rep2 (#2DB): no flags
Ra-226	<2.21E+0	uCi/g	Rep3 (#3DB): no flags
Ra-228	<8.75E-2	uCi/g	Rep1 (#1DB): no flags
Ra-228	<7.12E-2	uCi/g	Rep2 (#2DB): no flags
Ra-228	<6.31E-2	uCi/g	Rep3 (#3DB): no flags
Ru-106	<1.78E+0	uCi/g	Rep1 (#1DB): no flags
Ru-106	<1.52E+0	uCi/g	Rep2 (#2DB): no flags
Ru-106	<2.08E+0	uCi/g	Rep3 (#3DB): no flags
Sb-125	<7.38E-1	uCi/g	Rep1 (#1DB): no flags
Sb-125	<4.49E-1	uCi/g	Rep2 (#2DB): no flags
Sb-125	<5.58E-1	uCi/g	Rep3 (#3DB): no flags
Zr-95	<4.08E+0	uCi/g	Rep1 (#1DB): no flags
Zr-95	<3.72E+0	uCi/g	Rep2 (#2DB): no flags
Zr-95	<3.91E+0	uCi/g	Rep3 (#3DB): no flags

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Login Date: 23-Jan-04

VAST Sample ID: 04-0074

Sample Point:	EVACUATED CANISTERS
Sample Type:	POWDER-DUST
Collected:	9/20/2002 0930

Department	FCP
Customer's ID:	SHD-WV-998-01,02

Analysis	Result	Uncertainty	Lab Use Only
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NOTES: (Contact the A&PC Supervisor if you have questions.)

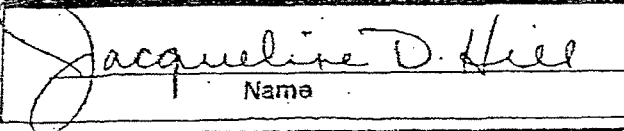
The uncertainty, if provided, pertains to the 95% confidence level on counting statistics.

*** The instrument used to determine gamma measurements is calibrated for samples of a specified matrix. The density associated with oil samples is not consistent with that of the specified sample matrix. Therefore, due to matrix of the sample and the unknown accuracy in which the sample was prepared, gamma results associated with oil samples are approximate.

Lab Use Only Flags: A0 - unknown approval error; A1 - approval not defined; A2 - approval not entered; A3 - result rejected

U0 - unknown uncertainty error; U1 - uncertainty not defined; U2 - uncertainty not entered

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