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Our ref: HEM-12-41
Date: March 28, 2012

Subject: ADDITIONAL INFORMATION CONCERNING SCALING FACTORS FOR RADIOACTIVE WASTE ASSOCIATED WITH A REQUEST FOR ADDITIONAL ALTERNATIVE DISPOSAL APPROVAL AND EXEMPTIONS (LICENSE NO. SNM-00033, DOCKET NO. 070-00036)

Reference: 1) Westinghouse (G. J. Rood) letter to NRC (Document Control), HEM-12-2, dated January 11, 2012, Request for Additional Alternate Disposal Approval and Exemptions for Specific Hematite Decommissioning Project Waste at US Ecology Idaho (License No. SNM-00033, Docket No. 070-00036)

Dear Sirs:

In Reference 1 Westinghouse Electric Company LLC (Westinghouse) requested that the U.S. Nuclear Regulatory Commission (NRC) approve alternate disposal of exemptions for specified low-activity radioactive materials from our Hematite Decommissioning Project (HDP), License No. SNM-0033, for certain waste containing source material, byproduct material and Special Nuclear Material (SNM).

Attachment 1 to Enclosure 1 to Reference 1 listed a reference 3.1, HDP-TBD-WM-901, Scaling Factors for Radioactive Waste Associated with the Above Slab Portion of the Process Buildings. Since a copy this reference was not included with the submission, we are including it as Enclosure 1 to this letter for your information.

Please contact Kevin Davis of my staff at 314-810-3348, should you have questions or need additional information.

Respectfully,

Robert D. Copp

Robert D. Copp
Director, Hematite Decommissioning Project

Enclosure: 1) HDP-TBD-WM-901, Scaling Factors for Radioactive Waste Associated with the Above Slab Portion of the Process Buildings

cc: w/o Enclosure
J. J. Hayes, NRC/FSME/DWMEP/DURLD
J. W. Smetanka, Westinghouse
M. M. LaFranzo, NRC Region III/DNMS/MCID
P. Michalak, NRC/FSME/DWMEP/DURLD/MD
Chad Hyslop, US Ecology Idaho, Inc.

Enclosure 1 to HEM-12-41

HDP-TBD-WM-901, Scaling Factors for Radioactive Waste Associated with the Above Slab Portion of the Process Buildings

Westinghouse Electric Company LLC, Hematite Decommissioning Project

Docket No. 070-00036

Westinghouse

Hematite Decommissioning Project

Technical Basis Document

NUMBER: **HDP-TBD-WM-901**

TITLE: **SCALING FACTORS FOR RADIOACTIVE WASTE ASSOCIATED WITH THE ABOVE SLAB PORTION OF THE PROCESS BUILDINGS**

REVISION: **4**

EFFECTIVE DATE: **See Final Approved Date Below**

Approvals:

Author: D. Chris Cummin*

Owner / Manager: Gerald J. Rood*

**** Electronically approved records are authenticated in the electronic document management system. This record was final approved on Mar-08-2012. (This statement was added by the EDMS system to the quality record upon its validation.)***

REVISION LOG	
Revision #	**Change(s)**
0 04/13/09	Initial issuance
1 10/19/10	Document title changed from *Scaling Factors for Radioactive Waste Associated with the Process Buildings* to *Scaling Factors For Radioactive Waste Associated with the Above Slab Portion of the Process Buildings.* Document revised to include additional sampling data obtained for concrete wall structures and to identify radionuclides that are required to be listed in manifests. Due to extensive changes, revision bars not used.
2 11/16/10	Changed Proprietary Class 2 to Non Proprietary Class 3
3 07/14/11	Changed Non-Proprietary Class 3 to Proprietary Class 2
4 See Cover Page	Changed Proprietary Class 2 to Non-Proprietary Class 3

1.0 PURPOSE

The purpose of this Technical Basis Document is to evaluate results obtained from samples taken in the process buildings and to establish scaling factors for hard-to-detect isotopes based on those results. Additionally, the isotopes that must be listed for shipping and disposal paperwork are identified.

Smear samples were obtained from the various process building areas on 10/22/04. Ten (10) smears were collected from each building area and were composited to a single sample per area as identified in Attachment 9.11. These samples were analyzed by Severn Trent Laboratories. In April 2010, nine (9) biased concrete samples were obtained from the process building walls in accordance with Reference 4.3 and were analyzed by Pace Analytical Services, Inc.

Sample results were not decay-corrected as part of the scaling factor calculation due to the relatively long half-lives of the parent isotopes of concern compared to the elapsed time since sampling. Short half-life daughter products will have established equilibrium with the parent isotopes.

2.0 APPLICABILITY

The scaling factors will be used to calculate activities of hard-to-detect isotopes in waste that originates from the process buildings including the process building structures.

3.0 DEFINITIONS/ACRONYMS

3.1. Definitions

3.1.1 Scaling factor is a unit-less number that is the ratio of a hard-to-detect isotope to an easily detected isotope.

4.0 REFERENCES

4.1. USNRC Low-Level Licensing Branch, Technical Position on Radioactive Waste Classification

4.2. DO-08-005, Historical Site Assessment

4.3 WP-2010-002, Concrete Sampling from Process Building Floors and Walls

4.4 49 CFR, Transportation

4.5 ORNL/TM-7343. State Background-Radiation Levels: Results of Measurements Taken During 1975-1979

4.6 10 CFR 61, Licensing Requirements for Land Disposal of Radioactive Waste

5.0 DATA AND DATA EVALUATION

5.1. Data

5.1.1. Smear sample results for samples W-102204-1 (Building 240 Red Room), W-102204-2 (Building 240 Green Room), W-102204-3 (Building Maintenance and Decon Room), W-102204-4 (Building 253), W-102204-5 (Building 254), W-102204-6 (Building 256), W-102204-7 (Building 255) and, W-102204-8 (Building 260) are provided in attachments 9.1 through 9.8. Laboratory QC test results are provided in attachment 9.9. A subsequent assessment of the laboratory analysis by Test America is provided in attachment 9.10. Attachment 9.11 is the description of the sampling plan.

5.1.2 Concrete sample results and QC test results from Pace Analytical Service, Inc. are provided in attachment 9.12. Sample locations from Reference 4.3 are identified on attachment 9.13.

5.2. De-Listing Criteria

5.2.1 Criteria for listing isotopes on waste manifests come from two major sources.

1. Reference 4.4, 49 CFR 173.433 requires isotopes to be listed on shipping paperwork that exist at a sum of fractions value of 95% of the isotopes activity as related to the isotopes A_2 value.
2. Reference 4.1, USNRC Low-Level Licensing Branch, Technical Position on Radioactive Waste Classification requires the isotopes, H-3, C-14, Tc-99 and I-129 to be listed, if present. Additionally, isotopes are to be listed if they exceed 0.01 times the concentration of the nuclide listed in Table 1 or 0.01 times the lowest concentration listed in Table 2 to 10 CFR 61.55 (Reference 4.6). The total quantity of source and special nuclear material should also be listed, if present.

5.2.2 The following isotopes were not detected in any sample and are not considered to be present for waste management purposes.

- Cesium 137 (Cs-137)
- Iron 55 (Fe-55)
- Nickel 59 (Ni-59)
- Nickel 63 (Ni-63)
- Plutonium 238 (Pu-238)
- Curium 243/244 (Cm-243/244)

5.2.3 The following isotopes have no history of being present at the Hematite Site (Reference 4.2).

- H-3
- C-14
- I-129

5.2.4 The following isotopes were detected in at least 1 sample, but were eliminated due to inconsistency in results as noted.

- Plutonium 239/240 (Pu-239/240) was detected in 1 sample analyzed by Severn Trent Laboratories, but the detection was within the uncertainty of the measurement and MDC.
- Plutonium 241 (Pu-241) was detected in 1 sample analyzed by Severn Trent laboratories at elevated activity, but no corresponding Am-241 was detected. Am-241 as a daughter of Pu-241 must be present for a valid result. Additionally the detected value was within the uncertainty of the measurement and MDC. See attachment 9.10 evaluation of the result.
- Curium 242 (Cm-242) was reported as detected in one sample from Severn Trent Laboratories, but the statistics had zero reported for the MDC which is inconsistent as an MDC value. Based on attachment 9.10, the reported value and the MDC values were switched. The sample was actually less than MDC.

5.2.5 The following isotopes were detected in the samples, but are the short lived daughters in equilibrium with parent isotopes which will be reported as identified in 49 CFR 173.433(c)(2).

- Actinium 228 daughter of Thorium 232
- Bismuth 212 daughter of Thorium 232
- Bismuth 214 daughter of Uranium 238
- Lead 212 daughter of Thorium 232
- Lead 214 daughter of Uranium 238
- Protactinium 231 daughter of Uranium 235
- Radium 226 daughter of Uranium 238*
- Thorium 228 daughter of Thorium 232
- Thorium 231 daughter of Uranium 235
- Thorium 234 daughter of Uranium 238
- Protactinium 234m daughter of Uranium 238

*Ra-226 was detected at concentrations consistent with natural uranium that occurs as a minor contaminate in concrete and soil. The range of Ra-226 activity in Missouri soil is between 0.31 and 1.4 pCi/g as identified in Reference 4.5.

5.2.6 Strontium 89 (Sr-89) was eliminated as an isotope of concern due its short half-life of 52.7 days and that a means of production of additional Sr-89 is not available on site.

5.2.7 The data for Strontium 90 (Sr-90) from Severn Trent Laboratories and from Pace Analytical Services, Inc. is probably due to U-234 carry over during sample preparation in the laboratory and is not actually present in the samples. The major reasons for suspecting the Sr-90 data include:

- Sr-89 was identified and a means of production of Sr-89 is not available, which indicates the possibility of U-234 carry-over.
- The HDP has no history of the presence of Sr-90.
- Pace Analytical Services reported Sr-90 in the concrete cores associated with the concrete floor from the Process Buildings. During a subsequent re-analysis for Sr-90, a U-234 carry over problem was identified and corrected in samples with elevated U-234 content.

Since the samples sent Severn Trent Laboratory were not available for re-analyzes for Sr-90, the data was assumed to be real, but suspect. Sr-90 was subsequently de-listed as allowed by regulation.

5.3 Isotopes to Be Evaluated for Listing

5.3.2 The following isotopes and their associated half-lives were detected in at least one sample and with an activity to justify their use as nuclides that should be evaluated for listing on radioactive waste shipment manifests.

Isotope	Half-life
Potassium 40 (K-40)	1.26E+09 years
Strontium 90 (Sr-90)	27.7 years
Technetium 99 (Tc-99)	2.12E+05 years
Uranium 234 (U-234)	2.47E+05 years
Uranium 235 (U-235)	7.1E+08 years
Uranium 238 (U-238)	4.51E+09 years
Thorium 230 (Th-230)	8.0E+04 years
Thorium 232 (Th-232)	1.41 E+10 years
Neptunium 237 (Np-237)*	2.14E+06 years
Americium 241 (Am-241)	458 years

*Neptunium-237 was identified on Pace Analytical Services, Inc. sample analysis report as having an interference with U-234. Reported results are expected to be higher than actual activity.

6.0 ASSUMPTIONS

6.1 If an isotope sample result was reported at less than MDC, then the MDC value was reported as a positive result in the calculation.

6.2 All isotopes of concern were scaled to Uranium 235.

6.3 Scaling factors for the process buildings will be calculated on a per sample basis and an average scaling factor will be determine for each isotope of concern.

6.4 The effective limit for U-235 activity for Studsvik is 6.5 pCi/g based on a total allowable U content of approximately 150 pCi/g and a U-235 enrichment of 5%.

6.5 The effective limit for U-235 activity for the Energy Solutions Clive site is 1190 pCi/g as identified in that sites waste acceptance criteria.

6.6 The average waste density was assumed to be 2.0 g/cm^3.

7.0 CALCULATIONS

7.1. Attachment 9.14 is a spreadsheet output. The spreadsheet has imbedded formulas for the calculation of scaling factors relative to U-235 and mass enrichment.

Scaling factor

Scaling Factor (SF) = Activity of Isotope/ Activity of U-235

Enrichment

Activity of U-234/Specific Activity U-234= grams U-234
Activity of U-235/Specific Activity U-235= grams U-235
Activity of U-238/Specific Activity U-238= grams U-238

$$\text{Enrichment \%} = \frac{\text{Grams U-235 X 100\%}}{\text{(Grams U-234+Grams U-235+Grams U-238)}}$$

7.2 Calculations for De Listing Isotopes per 49 CFR are imbedded in the Attachment 9.14 spreadsheet. The basic formula for A_2 fraction is

(U-235 Activity)(Scaling Factor for the isotope)/A_2 value= DOT Fraction

Listed Isotopes =95% of sum of DOT fraction

7.3 Calculations for isotopes required to be reported per reference 4.1 are calculated using the formula

.01< Concentration of isotope/Table 1 or Table 2 Concentration

8.0 CONCLUSION

8.1 The isotopes listed in paragraph 5.3.2 were evaluated against the applicable criteria for listing on shipping paper and waste manifests as shown on attachment 9.14. Most of the isotopes are not required to be listed due to presence at levels less than the applicable criteria. The following isotopes are required to be listed on shipping paperwork and waste manifests.

- Technetium 99 (Tc-99)
- Uranium 234 (U-234)
- Uranium 235 (U-235)
- Uranium 238 (U-238)

8.2 The scaling factors to be used for completion of waste manifests are listed in the table below.

Isotope	Scaling Factor to U-235
Tc-99	4.78E-01
U-234	2.03E+01*

*U-234 may also be calculated based on measured levels of U-235, U-238 and the V&V'ed enrichment calculation spreadsheet.

9.0 ATTACHMENTS

9.1 W-102204-1, Building 240 Red Room
9.2 W-102204-2, Building 240 Green Room
9.3 W-102204-3, Building 240 Maintenance and Decon Room
9.4 W-102204-4, Building 253
9.5 W-102204-5, Building 254
9.6 W-102204-6, Building 256
9.7 W-102204-7, Building 255
9.8 W-102204-8, Building 260
9.9 Severn Trent Laboratory QC Results
9.10 Laboratory Analysis Assessment by Test America
9.11 Sample Plan Description
9.12 Concrete Sample and QC Results From Pace Analytical Services
9.13 Wall Sample Locations from WP-2010-002
9.14 Calculation and Data Summary for Sample Results

Attachment 9.1

LVI Environmental Services, Inc.

Client Sample ID: W-102204-01

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F4J290245-001
Work Order: GVT3P
Matrix: SOLID

Date Collected: 10/22/04 1200
Date Received: 10/29/04 0900

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	MDC	Prep Date	Analysis Date	Batch #	Yld %
Iso URANIUM (SHORT CT) DOE A-01-R MOD				pCi/sample	A-01-R MOD			
Uranium 234	19400		1500	50	11/02/04	11/10/04	4308437	99
Uranium 235	860		160	30	11/02/04	11/10/04	4308437	99
Uranium 238	2810		310	30	11/02/04	11/10/04	4308437	99
Iso THORIUM (SHORT CT) DOE A-01-R MOD				pCi/sample	A-01-R MOD			
Thorium 228	3.4		1.7	1.7	11/02/04	11/06/04	4308435	75
Thorium 230	5.6		1.9	1.3	11/02/04	11/06/04	4308435	75
Thorium 232	0.33	U	0.48	0.66	11/02/04	11/06/04	4308435	75
TC-99 by LSC by DOE TC-02-RC Mod.				pCi/sample	TC-02-RC MOD			
Technetium 99	392		43	14	11/04/04	11/09/04	4309246	100
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				pCi/sample	GA-01-R MOD			
ium 137	-0.9	U	2.8	5.3	11/04/04	11/04/04	4309327	
tactinium 234M	630	U	360	780	11/04/04	11/04/04	4309327	
Thorium 234	300		45	25	11/04/04	11/04/04	4309327	
--- Other Detected Radionuclides ---								
Thorium 231	108		25	21	11/04/04	11/04/04	4309327	
Uranium 235	98		37	39	11/04/04	11/04/04	4309327	
Uranium 238	300		38	25	11/04/04	11/04/04	4309327	
Iron-55 by Liquid Scint. Spectrometry				pCi/sample	STL-RC-0055			
Iron 55	-29	U	44	35	11/04/04	11/08/04	4309372	90
GROSS A/B BY GFPC SW846 9310 MOD				pCi/sample	9310 MOD			
Gross Alpha	23400		2400	10	11/03/04	11/05/04	4310287	
Gross Beta	6090		620	10	11/03/04	11/05/04	4310287	
Ni-59 & Ni-63 by Liquid Scint. Spec.				pCi/sample	STL-RC-0055			
Nickel 59	0.0	U	0.0	23	11/04/04	11/08/04	4309373	90
Nickel 63	17	U	13	21	11/04/04	11/08/04	4309373	90
SR-89 BY GFPC DOE SR-01-RC MOD				pCi/sample	SR-01-RC MOD			
Strontium 89	3.9	U	4.4	7.1	11/05/04	11/15/04	4310368	69
SR-90 BY GFPC DOE SR-03-RC MOD				pCi/sample	SR-03-RC MOD			
Strontium 90	2.8	U	4.1	6.8	11/05/04	11/15/04	4310367	65
onium-241 by Liquid Scintillation				pCi/sample	STL-RC-0245			
onium 241	500	U	460	940	11/02/04	11/15/04	4308438	87

LVI Environmental Services, Inc.

Client Sample ID: W-102204-01

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F4J290245-001
Work Order: GVT3P
Matrix: SOLID

Date Collected: 10/22/04 1200
Date Received: 10/29/04 0900

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	MDC	Prep Date	Analysis Date	Batch #	Yld %
Iso PLUTONIUM (SHORT CT) DOE A-01-R MOD				pCi/sample	A-01-R			
Plutonium 238	0.0	U	0.0	0.8	11/11/04	11/12/04	4316228	87
Plutonium 239/40	0.33	J	0.44	0.30	11/11/04	11/12/04	4316228	87
Am241, Cm243/244 (SHORT CT) DOE A-01-R MOD				pCi/sample	A-01-R MOD			
Americium 241	0.0	U	0.0	2.8	11/11/04	11/12/04	4316226	17
Curium 243/244	0.0	U	0.0	5.6	11/11/04	11/12/04	4316226	17
Curium 242	2.4 D		0.0	0.0 2.4	11/11/04	11/12/04	4316226	17
ISO NEPTUNIUM (SHORT CT) DOE A-01-R MOD				pCi/sample	A-01-R MOD			
Neptunium 237	1.80		0.87	0.56	11/08/04	11/10/04	4313294	116

NOTE(S)

are incomplete without the case narrative.

determined by instrument performance only.

B results are greater than the MDC

J Result is greater than sample detection limit but less than stated reporting limit.

U Result is less than the sample detection limit.

LVI Environmental Services, Inc.

Client Sample ID: W-102204-01 DUP

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F4J290245-001X
Work Order: GVT3P
Matrix: SOLID

Date Collected: 10/22/04 1200
Date Received: 10/29/04 0900

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	MDC	Prep Date	Analysis Date	Batch #	Yld %
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				pCi/sample	GA-01-R MOD			
Cesium 137	0.2	U	1.9	3.7	11/04/04	11/05/04	4309327	
Protactinium 234M	360	U	330	700	11/04/04	11/05/04	4309327	
Thorium 234	**324**		**47**	**29**	**11/04/04**	**11/05/04**	**4309327**	
--- Other Detected Radionuclides ---								
Thorium 231	**97**		**26**	**23**	**11/04/04**	**11/05/04**	**4309327**	
Uranium 235	**80**		**34**	**38**	**11/04/04**	**11/05/04**	**4309327**	
Uranium 238	**324**		**39**	**29**	**11/04/04**	**11/05/04**	**4309327**	

NOTE(S)

are incomplete without the case narrative.

s determined by instrument performance only.
results are greater than the MDC

U Result is less than the sample detection limit.

Attachment 9.2

LVI Environmental Services, Inc.

Client Sample ID: W-102204-02

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F4J290245-002
Work Order: GVT31
Matrix: SOLID

Date Collected: 10/22/04 1200
Date Received: 10/29/04 0900

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	MDC	Prep Date	Analysis Date	Batch #	Yld %
Iso URANIUM (SHORT CT) DOE A-01-R MOD				pCi/sample	A-01-R MOD			
Uranium 234	43500		3400	70	11/02/04	11/10/04	4308437	97
Uranium 235	1910		350	80	11/02/04	11/10/04	4308437	97
Uranium 238	5890		660	70	11/02/04	11/10/04	4308437	97
Iso THORIUM (SHORT CT) DOE A-01-R MOD				pCi/sample	A-01-R MOD			
Thorium 228	2.3		1.1	0.7	11/02/04	11/06/04	4308435	92
Thorium 230	6.8		1.9	0.7	11/02/04	11/06/04	4308435	92
Thorium 232	0.66	J	0.57	0.51	11/02/04	11/06/04	4308435	92
ISO NEPTUNIUM (SHORT CT) DOE A-01-R MOD				pCi/sample	A-01-R MOD			
Neptunium 237	0.66	J	0.53	0.25	11/02/04	11/05/04	4308430	108
TC-99 by LSC by DOE TC-02-RC Mod.				pCi/sample	TC-02-RC MOD			
hnetium 99	44		11	14	11/04/04	11/09/04	4309246	100
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				pCi/sample	GA-01-R MOD			
Cesium 137	1.6	U	2.2	4.7	11/04/04	11/04/04	4309327	
Protactinium 234M	660	U	450	950	11/04/04	11/04/04	4309327	
Thorium 234	651		83	37	11/04/04	11/04/04	4309327	
--- Other Detected Radionuclides ---								
Thorium 231	172		38	33	11/04/04	11/04/04	4309327	
Uranium 235	201		63	44	11/04/04	11/04/04	4309327	
Uranium 238	651		66	37	11/04/04	11/04/04	4309327	
Iron-55 by Liquid Scint. Spectrometry				pCi/sample	STL-RC-0055			
Iron 55	-40	U	180	50	11/04/04	11/08/04	4309372	57
GROSS A/B BY GFPC SW846 9310 MOD				pCi/sample	9310 MOD			
Gross Alpha	53900		5500	30	11/03/04	11/05/04	4310287	
Gross Beta	12600		1300	20	11/03/04	11/05/04	4310287	
Ni-59 & Ni-63 by Liquid Scint. Spec.				pCi/sample	STL-RC-0055			
Nickel 59	0.0	U	0.0	21	11/04/04	11/08/04	4309373	88
Nickel 63	2	U	11	20	11/04/04	11/08/04	4309373	88
SR-89 BY GFPC DOE SR-01-RC MOD				pCi/sample	SR-01-RC MOD			
Strontium 89	9.8		5.0	7.6	11/05/04	11/15/04	4310368	67
0 BY GFPC DOE SR-03-RC MOD				pCi/sample	SR-03-RC MOD			
ntium 90	-5.9	U	5.5	9.7	11/05/04	11/15/04	4310367	59

LVI Environmental Services, Inc.

Client Sample ID: W-102204-02

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F4J290245-002
Work Order: GVT31
Matrix: SOLID

Date Collected: 10/22/04 1200
Date Received: 10/29/04 0900

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	MDC	Prep Date	Analysis Date	Batch #	Yld %
Plutonium-241 by Liquid Scintillation				pCi/sample	STL-RC-0245			
Plutonium 241	2900		1800	2400	11/02/04	11/15/04	4308438	85
Iso PLUTONIUM (SHORT CT) DOE A-01-R MOD				pCi/sample	A-01-R			
Plutonium 238	0.13	U	0.48	0.84	11/11/04	11/12/04	4316228	85
Plutonium 239/40	0.11	U	0.31	0.30	11/11/04	11/12/04	4316228	85
Am241, Cm243/244 (SHORT CT) DOE A-01-R MOD				pCi/sample	A-01-R MOD			
Americium 241	0.0	U	0.0	1.7	11/11/04	11/12/04	4316226	39
Curium 243/244	0.0	U	0.0	2.4	11/11/04	11/12/04	4316226	39
Curium 242	0.0	U	0.0	1.2	11/11/04	11/12/04	4316226	39

NOTE(S)

are incomplete without the case narrative.

s determined by instrument performance only.
results are greater than the MDC

J Result is greater than sample detection limit but less than stated reporting limit.
U Result is less than the sample detection limit.

Attachment 9.3

LVI Environmental Services, Inc.

Client Sample ID: W-102204-03

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F4J290245-003
Work Order: GVT33
Matrix: SOLID

Date Collected: 10/22/04 1200
Date Received: 10/29/04 0900

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	MDC	Prep Date	Analysis Date	Batch #	Yld %
Iso URANIUM (SHORT CT) DOE A-01-R MOD				pCi/sample	A-01-R MOD			
Uranium 234	36700		2900	100	11/02/04	11/10/04	4308437	107
Uranium 235	1590		310	70	11/02/04	11/10/04	4308437	107
Uranium 238	4830		570	80	11/02/04	11/10/04	4308437	107
Iso THORIUM (SHORT CT) DOE A-01-R MOD				pCi/sample	A-01-R MOD			
Thorium 228	5.1		2.2	1.9	11/02/04	11/06/04	4308435	66
Thorium 230	7.5		2.3	1.1	11/02/04	11/06/04	4308435	66
Thorium 232	0.39	U	0.69	1.0	11/02/04	11/06/04	4308435	66
ISO NEPTUNIUM (SHORT CT) DOE A-01-R MOD				pCi/sample	A-01-R MOD			
Neptunium 237	0.69	J	0.56	0.27	11/02/04	11/05/04	4308430	99
TC-99 by LSC by DOE TC-02-RC Mod.				pCi/sample	TC-02-RC MOD			
Technetium 99	29.7		9.9	14	11/04/04	11/09/04	4309246	96
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				pCi/sample	GA-01-R MOD			
Cesium 137	-2.7	U	2.2	3.3	11/04/04	11/04/04	4309327	
Protactinium 234M	470	U	380	790	11/04/04	11/04/04	4309327	
Thorium 234	537		69	32	11/04/04	11/04/04	4309327	
--- Other Detected Radionuclides ---								
Thorium 231	136		30	24	11/04/04	11/04/04	4309327	
Uranium 235	135		47	44	11/04/04	11/04/04	4309327	
Uranium 238	537		55	32	11/04/04	11/04/04	4309327	
Iron-55 by Liquid Scint. Spectrometry				pCi/sample	STL-RC-0055			
Iron 55	-30	U	180	40	11/04/04	11/08/04	4309372	67
GROSS A/B BY GFPC SW846 9310 MOD				pCi/sample	9310 MOD			
Gross Alpha	38800		4000	20	11/03/04	11/05/04	4310287	
Gross Beta	10700		1100	20	11/03/04	11/05/04	4310287	
Ni-59 & Ni-63 by Liquid Scint. Spec.				pCi/sample	STL-RC-0055			
Nickel 59	0.0	U	0.0	18	11/04/04	11/08/04	4309373	91
Nickel 63	-4	U	14	20	11/04/04	11/08/04	4309373	91
SR-89 BY GFPC DOE SR-01-RC MOD				pCi/sample	SR-01-RC MOD			
Strontium 89	5.2	U	1.5	8.4	11/05/04	11/15/04	4310368	63
-90 BY GFPC DOE SR-03-RC MOD				pCi/sample	SR-03-RC MOD			
Strontium 90	10.5		5.2	7.9	11/05/04	11/15/04	4310367	58

LVI Environmental Services, Inc.

Client Sample ID: W-102204-03

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F4J290245-003
Work Order: GVT33
Matrix: SOLID

Date Collected: 10/22/04 1200
Date Received: 10/29/04 0900

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	MDC	Prep Date	Analysis Date	Batch #	Yld %
Plutonium-241 by Liquid Scintillation				**pCi/sample**	**STL-RC-0245**			
Plutonium 241	1300	U	1100	2000	11/02/04	11/15/04	4308438	82
Iso PLUTONIUM (SHORT CT) DOE A-01-R MOD				**pCi/sample**	**A-01-R**			
Plutonium 238	0.1	U	0.40	0.74	11/11/04	11/12/04	4316228	82
Plutonium 239/40	0.29	U	0.42	0.58	11/11/04	11/12/04	4316228	82
Am241, Cm243/244 (SHORT CT) DOE A-01-R MOD				**pCi/sample**	**A-01-R MOD**			
Americium 241	0.3	U	1.3	2.8	11/11/04	11/12/04	4316226	17
Curium 243/244	1.3	U	2.5	3.9	11/11/04	11/12/04	4316226	17
Curium 242	0.0	U	0.0	1.4	11/11/04	11/12/04	4316226	17

NOTE(S)

are incomplete without the case narrative.

s determined by instrument performance only.
d results are greater than the MDC

J Result is greater than sample detection limit but less than stated reporting limit.
U Result is less than the sample detection limit.

Attachment 9.4

LVI Environmental Services, Inc.

Client Sample ID: W-102204-04

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F4J290245-004
Work Order: GVT34
Matrix: SOLID

Date Collected: 10/22/04 1200
Date Received: 10/29/04 0900

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	MDC	Prep Date	Analysis Date	Batch #	Yld %
Iso URANIUM (SHORT CT) DOE A-01-R MOD				pCi/sample	A-01-R MOD			
Uranium 234	10700		910	40	11/02/04	11/10/04	4308437	96
Uranium 235	420		110	40	11/02/04	11/10/04	4308437	96
Uranium 238	1420		200	30	11/02/04	11/10/04	4308437	96
Iso THORIUM (SHORT CT) DOE A-01-R MOD				pCi/sample	A-01-R MOD			
Thorium 228	0.0	U	0.0	2.1	11/02/04	11/06/04	4308435	54
Thorium 230	16.4		3.9	1.5	11/02/04	11/06/04	4308435	54
Thorium 232	0.0	U	0.0	0.9	11/02/04	11/06/04	4308435	54
ISO NEPTUNIUM (SHORT CT) DOE A-01-R MOD				pCi/sample	A-01-R MOD			
Neptunium 237	0.0	U	0.0	0.3	11/02/04	11/05/04	4308430	103
TC-99 by LSC by DOE TC-02-RC Mod.				pCi/sample	TC-02-RC MOD			
hnetium 99	43		11	14	11/04/04	11/09/04	4309246	99
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				pCi/sample	GA-01-R MOD			
Cesium 137	1.2	U	2.3	4.4	11/04/04	11/04/04	4309327	
Protactinium 234M	190	U	310	620	11/04/04	11/04/04	4309327	
Thorium 234	178		39	25	11/04/04	11/04/04	4309327	
--- Other Detected Radionuclides ---								
Thorium 231	42		18	21	11/04/04	11/04/04	4309327	
Uranium 235	54		29	33	11/04/04	11/04/04	4309327	
Uranium 238	178		37	25	11/04/04	11/04/04	4309327	
GROSS A/B BY GFPC SW846 9310 MOD				pCi/sample	9310 MOD			
Gross Alpha	11700		1200	10	11/03/04	11/05/04	4310287	
Gross Beta	3400		350	10	11/03/04	11/05/04	4310287	
Ni-59 & Ni-63 by Liquid Scint. Spec.				pCi/sample	STL-RC-0055			
Nickel 59	0.0	U	0.0	23	11/04/04	11/08/04	4309373	87
Nickel 63	0.2	U	9.2	21	11/04/04	11/08/04	4309373	87
SR-89 BY GFPC DOE SR-01-RC MOD				pCi/sample	SR-01-RC MOD			
Strontium 89	16.8		3.4	7.2	11/05/04	11/15/04	4310368	69
SR-90 BY GFPC DOE SR-03-RC MOD				pCi/sample	SR-03-RC MOD			
Strontium 90	9.3		4.9	7.5	11/05/04	11/15/04	4310367	60
tonium-241 by Liquid Scintillation				pCi/sample	STL-RC-0245			
tonium 241	700	U	1300	1300	11/02/04	11/15/04	4308438	85

LVI Environmental Services, Inc.

Client Sample ID: W-102204-04

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F4J290245-004
Work Order: GVT34
Matrix: SOLID

Date Collected: 10/22/04 1200
Date Received: 10/29/04 0900

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	MDC	Prep Date	Analysis Date	Batch #	Yld %
Iso PLUTONIUM (SHORT CT) DOE A-01-R MOD				**pCi/sample**	**A-01-R**			
Plutonium 238	0.0	U	0.0	0.8	11/11/04	11/12/04	4316228	85
Plutonium 239/40	0.0	U	0.0	0.3	11/11/04	11/12/04	4316228	85
Am241, Cm243/244 (SHORT CT) DOE A-01-R MOD				**pCi/sample**	**A-01-R MOD**			
Americium 241	0.07	U	0.59	1.3	11/11/04	11/12/04	4316226	39
Curium 243/244	0.0	U	0.0	2.1	11/11/04	11/12/04	4316226	39
Curium 242	0.0	U	0.0	1	11/11/04	11/12/04	4316226	39
Iron-55 by Liquid Scint. Spectrometry				**pCi/sample**	**STL-RC-0055**			
Iron 55	30	U	29	80	11/09/04	11/10/04	4314427	82

NOTE(S)

are incomplete without the case narrative.

s determined by instrument performance only.
results are greater than the MDC

U Result is less than the sample detection limit.

Attachment 9.5

LVI Environmental Services, Inc.

Client Sample ID: W-102204-05

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F4J290245-005
Work Order: GVT37
Matrix: SOLID

Date Collected: 10/22/04 1200
Date Received: 10/29/04 0900

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	MDC	Prep Date	Analysis Date	Batch #	Yld %
Iso URANIUM (SHORT CT) DOE A-01-R MOD				pCi/sample	A-01-R MOD			
Uranium 234	32300		2600	100	11/02/04	11/10/04	4308437	91
Uranium 235	1360		290	80	11/02/04	11/10/04	4308437	91
Uranium 238	4330		530	70	11/02/04	11/10/04	4308437	91
Iso THORIUM (SHORT CT) DOE A-01-R MOD				pCi/sample	A-01-R MOD			
Thorium 228	2.9		1.5	1.5	11/02/04	11/06/04	4308435	98
Thorium 230	3.6		1.4	0.8	11/02/04	11/06/04	4308435	98
Thorium 232	0.0	U	0.0	0.7	11/02/04	11/06/04	4308435	98
TC-99 by LSC by DOE TC-02-RC Mod.				pCi/sample	TC-02-RC MOD			
Technetium 99	12.1	U	8.6	14	11/04/04	11/09/04	4309246	100
uma Cs-137 & Hits by DOE GA-01-R MOD.				pCi/sample	GA-01-R MOD			
ium 137	-1.7	U	2.7	5.0	11/04/04	11/05/04	4309327	
tactinium 234M	440	U	330	530	11/04/04	11/05/04	4309327	
Thorium 234	484		64	27	11/04/04	11/05/04	4309327	
--- Other Detected Radionuclides ---								
Thorium 231	135		27	23	11/04/04	11/05/04	4309327	
Uranium 235	143		47	38	11/04/04	11/05/04	4309327	
Uranium 238	484		52	27	11/04/04	11/05/04	4309327	
GROSS A/B BY GFPC SW846 9310 MOD				pCi/sample	9310 MOD			
Gross Alpha	37700		3800	20	11/03/04	11/05/04	4310287	
Gross Beta	9470		980	20	11/03/04	11/05/04	4310287	
Ni-59 & Ni-63 by Liquid Scint. Spec.				pCi/sample	STL-RC-0055			
Nickel 59	0.0	U	0.0	29	11/04/04	11/08/04	4309373	91
Nickel 63	0.09	U	0.86	21	11/04/04	11/08/04	4309373	91
SR-89 BY GFPC DOE SR-01-RC MOD				pCi/sample	SR-01-RC MOD			
Strontium 89	40.9		5.3	7.5	11/05/04	11/15/04	4310368	64
SR-90 BY GFPC DOE SR-03-RC MOD				pCi/sample	SR-03-RC MOD			
Strontium 90	33.6		7.7	9.8	11/05/04	11/15/04	4310367	60
Plutonium-241 by Liquid Scintillation				pCi/sample	STL-RC-0245			
Plutonium 241	20	U	70	1800	11/02/04	11/15/04	4308438	90
PLUTONIUM (SHORT CT) DOE A-01-R MOD				pCi/sample	A-01-R			
tonium 238	0.17	U	0.44	0.72	11/11/04	11/12/04	4316228	90
Plutonium 239/40	0.0	U	0.0	0.5	11/11/04	11/12/04	4316228	90

LVI Environmental Services, Inc.

Client Sample ID: W-102204-05

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F4J290245-005
Work Order: GVT37
Matrix: SOLID

Date Collected: 10/22/04 1200
Date Received: 10/29/04 0900

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	MDC	Prep Date	Analysis Date	Batch #	Yld %
Am241, Cm243/244 (SHORT CT) DOE A-01-R MOD				**pCi/sample**	**A-01-R MOD**			
Americium 241	0.0	U	0.0	1.4	11/11/04	11/12/04	4316226	76
Curium 243/244	0.0	U	0.0	1.9	11/11/04	11/12/04	4316226	76
Curium 242	0.0	U	0.0	1.3	11/11/04	11/12/04	4316226	76
ISO NEPTUNIUM (SHORT CT) DOE A-01-R MOD				**pCi/sample**	**A-01-R MOD**			
Neptunium 237	1.69		0.83	0.50	11/08/04	11/10/04	4313294	114
Iron-55 by Liquid Scint. Spectrometry				**pCi/sample**	**STL-RC-0055**			
Iron 55	-3.6	U	2.0	78	11/09/04	11/10/04	4314427	83

NOTE(S)

* are incomplete without the case narrative.

. determined by instrument performance only.
results are greater than the MDC

U Result is less than the sample detection limit.

Attachment 9.6

LVI Environmental Services, Inc.

Client Sample ID: W-102204-06

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F4J290245-006
Work Order: GVT38
Matrix: SOLID

Date Collected: 10/22/04 1200
Date Received: 10/29/04 0900

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	MDC	Prep Date	Analysis Date	Batch #	Yld %
Iso URANIUM (SHORT CT) DOE A-01-R MOD				pCi/sample	A-01-R MOD			
Uranium 234	13900		1200	40	11/02/04	11/10/04	4308437	87
Uranium 235	620		150	20	11/02/04	11/10/04	4308437	87
Uranium 238	2160		280	30	11/02/04	11/10/04	4308437	87
Iso THORIUM (SHORT CT) DOE A-01-R MOD				pCi/sample	A-01-R MOD			
Thorium 228	0.9	U	1.1	1.5	11/02/04	11/06/04	4308435	83
Thorium 230	2.5		1.1	0.7	11/02/04	11/06/04	4308435	83
Thorium 232	0.09	U	0.25	0.49	11/02/04	11/06/04	4308435	83
ISO NEPTUNIUM (SHORT CT) DOE A-01-R MOD				pCi/sample	A-01-R MOD			
Neptunium 237	0.46	U	0.51	0.62	11/02/04	11/05/04	4308430	106
-99 by LSC by DOE TC-02-RC Mod.				pCi/sample	TC-02-RC MOD			
netium 99	4.0	U	8.2	14	11/04/04	11/09/04	4309246	100
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				pCi/sample	GA-01-R MOD			
Cesium 137	-1.4	U	2.3	3.9	11/04/04	11/05/04	4309327	
Protactinium 234M	230	U	370	740	11/04/04	11/05/04	4309327	
Thorium 234	200		43	33	11/04/04	11/05/04	4309327	
--- Other Detected Radionuclides ---								
Thorium 231	56		29	26	11/04/04	11/05/04	4309327	
Uranium 235	55		28	39	11/04/04	11/05/04	4309327	
Uranium 238	200		41	33	11/04/04	11/05/04	4309327	
GROSS A/B BY GFPC SW846 9310 MOD				pCi/sample	9310 MOD			
Gross Alpha	12500		1300	10	11/03/04	11/05/04	4310287	
Gross Beta	3730		380	10	11/03/04	11/05/04	4310287	
Ni-59 & Ni-63 by Liquid Scint. Spec.				pCi/sample	STL-RC-0055			
Nickel 59	0.0	U	0.0	23	11/04/04	11/08/04	4309373	85
Nickel 63	-0.9	U	14	22	11/04/04	11/08/04	4309373	85
SR-89 BY GFPC DOE SR-01-RC MOD				pCi/sample	SR-01-RC MOD			
Strontium 89	14.6		5.1	7.1	11/05/04	11/15/04	4310368	64
SR-90 BY GFPC DOE SR-03-RC MOD				pCi/sample	SR-03-RC MOD			
Strontium 90	3.6	U	4.7	7.7	11/05/04	11/15/04	4310367	61
tonium-241 by Liquid Scintillation				pCi/sample	STL-RC-0245			
Plutonium 241	-300	U	1300	1000	11/02/04	11/15/04	4308438	80

LVI Environmental Services, Inc.

Client Sample ID: W-102204-06

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F4J290245-006
Work Order: GVT38
Matrix: SOLID

Date Collected: 10/22/04 1200
Date Received: 10/29/04 0900

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	MDC	Prep Date	Analysis Date	Batch #	Yld %
Iso PLUTONIUM (SHORT CT) DOE A-01-R MOD				**pCi/sample**	**A-01-R**			
Plutonium 238	0.04	U	0.30	0.67	11/11/04	11/12/04	4316228	81
Plutonium 239/40	0.0	U	0.0	0.3	11/11/04	11/12/04	4316228	81
Am241, Cm243/244 (SHORT CT) DOE A-01-R MOD				**pCi/sample**	**A-01-R MOD**			
Americium 241	0.0	U	0.0	1.7	11/11/04	11/12/04	4316226	45
Curium 243/244	0.0	U	0.0	2.9	11/11/04	11/12/04	4316226	45
Curium 242	0.0	U	0.0	1.4	11/11/04	11/12/04	4316226	45
Iron-55 by Liquid Scint. Spectrometry				**pCi/sample**	**STL-RC-0055**			
Iron 55	11.5	U	8.6	68	11/09/04	11/10/04	4314427	91

NOTE(S)

t are incomplete without the case narrative.

s determined by instrument performance only.
results are greater than the MDC

U Result is less than the sample detection limit.

Attachment 9.7

LVI Environmental Services, Inc.

Client Sample ID: W-102204-07

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F4J290245-007
Work Order: GVT39
Matrix: SOLID

Date Collected: 10/22/04 1200
Date Received: 10/29/04 0900

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	MDC	Prep Date	Analysis Date	Batch #	Yld %
Iso URANIUM (SHORT CT) DOE A-01-R MOD				pCi/sample	A-01-R MOD			
Uranium 234	21800		1700	50	11/02/04	11/10/04	4308437	96
Uranium 235	1020		180	30	11/02/04	11/10/04	4308437	96
Uranium 238	3040		330	40	11/02/04	11/10/04	4308437	96
Iso THORIUM (SHORT CT) DOE A-01-R MOD				pCi/sample	A-01-R MOD			
Thorium 228	2.5		1.4	1.4	11/02/04	11/06/04	4308435	85
Thorium 230	3.8		1.4	0.7	11/02/04	11/06/04	4308435	85
Thorium 232	0.24	U	0.45	0.70	11/02/04	11/06/04	4308435	85
TC-99 by LSC by DOE TC-02-RC Mod.				pCi/sample	TC-02-RC MOD			
Technetium 99	1.6	U	8.4	14	11/04/04	11/09/04	4309246	98
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				pCi/sample	GA-01-R MOD			
ium 137	0.5	U	2.3	4.3	11/04/04	11/05/04	4309327	
tactinium 234M	770		370	440	11/04/04	11/05/04	4309327	
Thorium 234	341		48	27	11/04/04	11/05/04	4309327	
--- Other Detected Radionuclides ---								
Thorium 231	77		20	22	11/04/04	11/05/04	4309327	
Uranium 235	106		43	35	11/04/04	11/05/04	4309327	
Uranium 238	341		40	27	11/04/04	11/05/04	4309327	
GROSS A/B BY GFPC SW846 9310 MOD				pCi/sample	9310 MOD			
Gross Alpha	23700		2400	20	11/03/04	11/05/04	4310287	
Gross Beta	6810		700	20	11/03/04	11/05/04	4310287	
Ni-59 & Ni-63 by Liquid Scint. Spec.				pCi/sample	STL-RC-0055			
Nickel 59	0.0	U	0.0	18	11/04/04	11/08/04	4309373	82
Nickel 63	9	U	11	21	11/04/04	11/08/04	4309373	82
SR-89 BY GFPC DOE SR-01-RC MOD				pCi/sample	SR-01-RC MOD			
Strontium 89	-5.89	U	0.90	7.3	11/05/04	11/15/04	4310368	66
SR-90 BY GFPC DOE SR-03-RC MOD				pCi/sample	SR-03-RC MOD			
Strontium 90	40.9		7.2	7.4	11/05/04	11/15/04	4310367	60
Plutonium-241 by Liquid Scintillation				pCi/sample	STL-RC-0245			
Plutonium 241	-510	U	660	910	11/02/04	11/15/04	4308438	90
PLUTONIUM (SHORT CT) DOE A-01-R MOD				pCi/sample	A-01-R			
tonium 238	0.02	U	0.42	0.81	11/11/04	11/12/04	4316228	90
Plutonium 239/40	0.0	U	0.0	0.3	11/11/04	11/12/04	4316228	90

LVI Environmental Services, Inc.

Client Sample ID: W-102204-07

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F4J290245-007
Work Order: GVT39
Matrix: SOLID

Date Collected: 10/22/04 1200
Date Received: 10/29/04 0900

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	MDC	Prep Date	Analysis Date	Batch #	Yld %
Am241, Cm243/244 (SHORT CT) DOE A-01-R MOD				pCi/sample	A-01-R MOD			
Americium 241	0.5	U	1.2	1.8	11/11/04	11/12/04	4316226	68
Curium 243/244	0.0	U	0.0	2.8	11/11/04	11/12/04	4316226	68
Curium 242	0.63	U	0.81	1.1	11/11/04	11/12/04	4316226	68
ISO NEPTUNIUM (SHORT CT) DOE A-01-R MOD				pCi/sample	A-01-R MOD			
Neptunium 237	0.85	J	0.60	0.26	11/08/04	11/10/04	4313294	118
Iron-55 by Liquid Scint. Spectrometry				pCi/sample	STL-RC-0055			
Iron 55	8.9	U	6.2	73	11/09/04	11/10/04	4314427	85

NOTE(S)

) are incomplete without the case narrative.

s determined by instrument performance only.
results are greater than the MDC

J Result is greater than sample detection limit but less than stated reporting limit.

U Result is less than the sample detection limit.

Attachment 9.8

LVI Environmental Services, Inc.

Client Sample ID: W-102204-08

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F4J290245-008
Work Order: GVT4A
Matrix: SOLID

Date Collected: 10/22/04 1200
Date Received: 10/29/04 0900

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	MDC	Prep Date	Analysis Date	Batch #	Yld %
Iso URANIUM (SHORT CT) DOE A-01-R MOD				pCi/sample	A-01-R MOD			
Uranium 234	31400		2700	100	11/02/04	11/10/04	4308437	82
Uranium 235	1750		350	80	11/02/04	11/10/04	4308437	82
Uranium 238	4420		570	50	11/02/04	11/10/04	4308437	82
Iso THORIUM (SHORT CT) DOE A-01-R MOD				pCi/sample	A-01-R MOD			
Thorium 228	2.2		1.1	0.9	11/02/04	11/06/04	4308435	99
Thorium 230	2.01		0.95	0.47	11/02/04	11/06/04	4308435	99
Thorium 232	0.0	U	0.0	0.5	11/02/04	11/06/04	4308435	99
ISO NEPTUNIUM (SHORT CT) DOE A-01-R MOD				pCi/sample	A-01-R MOD			
Neptunium 237	0.82	J	0.61	0.56	11/02/04	11/06/04	4308430	108
TC-99 by LSC by DOE TC-02-RC Mod.				pCi/sample	TC-02-RC MOD			
hnetium 99	214		26	14	11/04/04	11/09/04	4309246	99
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				pCi/sample	GA-01-R MOD			
Cesium 137	-0.003	U	2.3	4.2	11/04/04	11/05/04	4309327	
Protactinium 234M	520	U	340	760	11/04/04	11/05/04	4309327	
Thorium 234	436		58	33	11/04/04	11/05/04	4309327	
--- Other Detected Radionuclides ---								
Thorium 231	102		33	28	11/04/04	11/05/04	4309327	
Uranium 235	90		40	34	11/04/04	11/05/04	4309327	
Uranium 238	436		48	33	11/04/04	11/05/04	4309327	
Iron-55 by Liquid Scint. Spectrometry				pCi/sample	STL-RC-0055			
Iron 55	-47	U	76	47	11/04/04	11/08/04	4309372	61
GROSS A/B BY GFPC SW846 9310 MOD				pCi/sample	9310 MOD			
Gross Alpha	34300		3500	20	11/03/04	11/05/04	4310287	
Gross Beta	8580		880	20	11/03/04	11/05/04	4310287	
Ni-59 & Ni-63 by Liquid Scint. Spec.				pCi/sample	STL-RC-0055			
Nickel 59	0.0	U	0.0	14	11/04/04	11/08/04	4309373	91
Nickel 63	-2	U	12	19	11/04/04	11/08/04	4309373	91
SR-89 BY GFPC DOE SR-01-RC MOD				pCi/sample	SR-01-RC MOD			
Strontium 89	2.35	U	0.44	7.9	11/05/04	11/15/04	4310368	65
90 BY GFPC DOE SR-03-RC MOD				pCi/sample	SR-03-RC MOD			
ontium 90	24.9		5.9	7.5	11/05/04	11/15/04	4310367	64

LVI Environmental Services, Inc.

Client Sample ID: W-102204-08

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F4J290245-008
Work Order: GVT4A
Matrix: SOLID

Date Collected: 10/22/04 1200
Date Received: 10/29/04 0900

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	MDC	Prep Date	Analysis Date	Batch #	Yld %
Plutonium-241 by Liquid Scintillation				**pCi/sample**	**STL-RC-0245**			
Plutonium 241	110	U	320	1900	11/02/04	11/15/04	4308438	86
Iso PLUTONIUM (SHORT CT) DOE A-01-R MOD				**pCi/sample**	**A-01-R**			
Plutonium 238	0.09	U	0.38	0.71	11/11/04	11/12/04	4316228	86
Plutonium 239/40	0.0	U	0.0	0.6	11/11/04	11/12/04	4316228	86
Am241, Cm243/244 (SHORT CT) DOE A-01-R MOD				**pCi/sample**	**A-01-R MOD**			
Americium 241	0.0	U	0.0	2.6	11/11/04	11/12/04	4316226	45
Curium 243/244	0.0	U	0.0	3.2	11/11/04	11/12/04	4316226	45
Curium 242	0.0	U	0.0	1.4	11/11/04	11/12/04	4316226	45

NOTE(S)

are incomplete without the case narrative.

s determined by instrument performance only.

d results are greater than the MDC

J Result is greater than sample detection limit but less than stated reporting limit.

U Result is less than the sample detection limit.