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Concentrations of Radionuclides and Trace Elements in Soils and Vegetation Around the DARHT Facility during 2004

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Cover photo: Collection of samples at DARHT.

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P.R. Fresquez

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CONCENTRATIONS OF RADIONUCLIDES AND TRACE ELEMENTS IN SOILS AND VEGETATION AROUND THE DARHT FACILITY DURING 2004

by

P.R. Fresquez

ABSTRACT

Samples of soil, sediment, and unwashed overstory and understory vegetation were collected at four locations around the Dual-Axis Radiographic Hydrodynamic Test (DARHT) facility at Los Alamos National Laboratory (LANL). All samples were analyzed for concentrations of ^{3}H, ^{137}Cs, ^{90}Sr, ^{238}Pu, $^{239,240}Pu$, ^{241}Am, ^{234}U, ^{235}U, ^{238}U, Ag, As, Ba, Be, Cd, Cr, Cu, Hg, Ni, Pb, Sb, Se, and Tl. These results, which represent five years since the start of operations, were compared with baseline statistical reference level (BSRL) data established over a four-year-long preoperational period prior to DARHT operations, and to LANL and U.S. Environmental Protection Agency Screening Action Levels (SALs). Most radionuclides and trace elements in soil, sediment, and vegetation were below BSRL values and those soils/sediments that were above BSRLs were far below SALs.

I. INTRODUCTION

The U.S. Department of Energy (DOE) prepared and issued a Mitigation Action Plan (MAP) for the Dual-Axis Radiographic Hydrodynamic Test (DARHT) facility in response to a Record of Decision (USDOE 1995a) for the DARHT Environmental Impact Statement (USDOE 1995b). The DARHT MAP documents, in part, the DOE's commitment to protect natural and cultural resources during the construction, operation, and decommissioning phases of the DARHT facility (USDOE 1996). One of the initial tasks identified in section VIII.A.1. (a) of the MAP mandates measurement of baseline concentrations of radioactive and stable materials through the collection and analysis of soils, invertebrates, plants, mammals, birds, and animals killed accidentally on Los Alamos National Laboratory (LANL) roads near the DARHT facility during the construction phase.

A final report was issued in 2001 summarizing all of these environmental data collected during the construction phase (1996 through 1999) and prior to any operational events, thus establishing baseline statistical reference level (BSRL) values for potential environmental contaminants in soils, sediments, vegetation, small mammals, birds, and bees at the DARHT facility (Nyhan et al., 2001a). The BSRL is defined as the mean plus two standard deviations of the data. One portion of this report dealt specifically with BSRL values in soils, sediments, and vegetation (Fresquez et al., 2001).

The objective of this ongoing monitoring study is to compare concentrations of radionuclides and trace elements in soils, sediments, and vegetation around the DARHT facility collected in 2004 with BSRLs. These data reflect five years of monitoring since the beginning of operations in 2000.

II. METHODS AND MATERIALS

a. Soil and Sediment Sampling

Four composite soil surface samples were collected in April of 2004 with a stainless steel soil ring 10 cm (4 in.) in diameter driven 5 cm (2 in.) into the soil (ASTM 1990) approximately 24 m (80 ft) away, but within the large berm wall, from the east, south, and west sides of the DARHT facility at Technical Area (TA) 15 (Fresquez 1996) (Figure 1).

At each site, samples of soil were collected from the center and corners of a square area 10 m (32 ft) per side; the five subsamples were combined and mixed thoroughly in a three-gallon Ziploc® bag to form a composite sample. Four sediment grab samples were also collected at the 0- to 15-cm (0- to 6-in.) depth with a stainless steel scoop within four drainage channel/ponding areas originating from the DARHT facility on the north, east, south, and southwest sides. Most of the sediment material on the north side was a result of erosion off the berm wall; whereas, sediments from the other sites were from erosional processes off the grounds themselves.

All soil and sediment samples collected for radiological analysis were placed in prelabeled 500-mL polypropylene bottles, and prelabeled 125-mL polypropylene bottles were

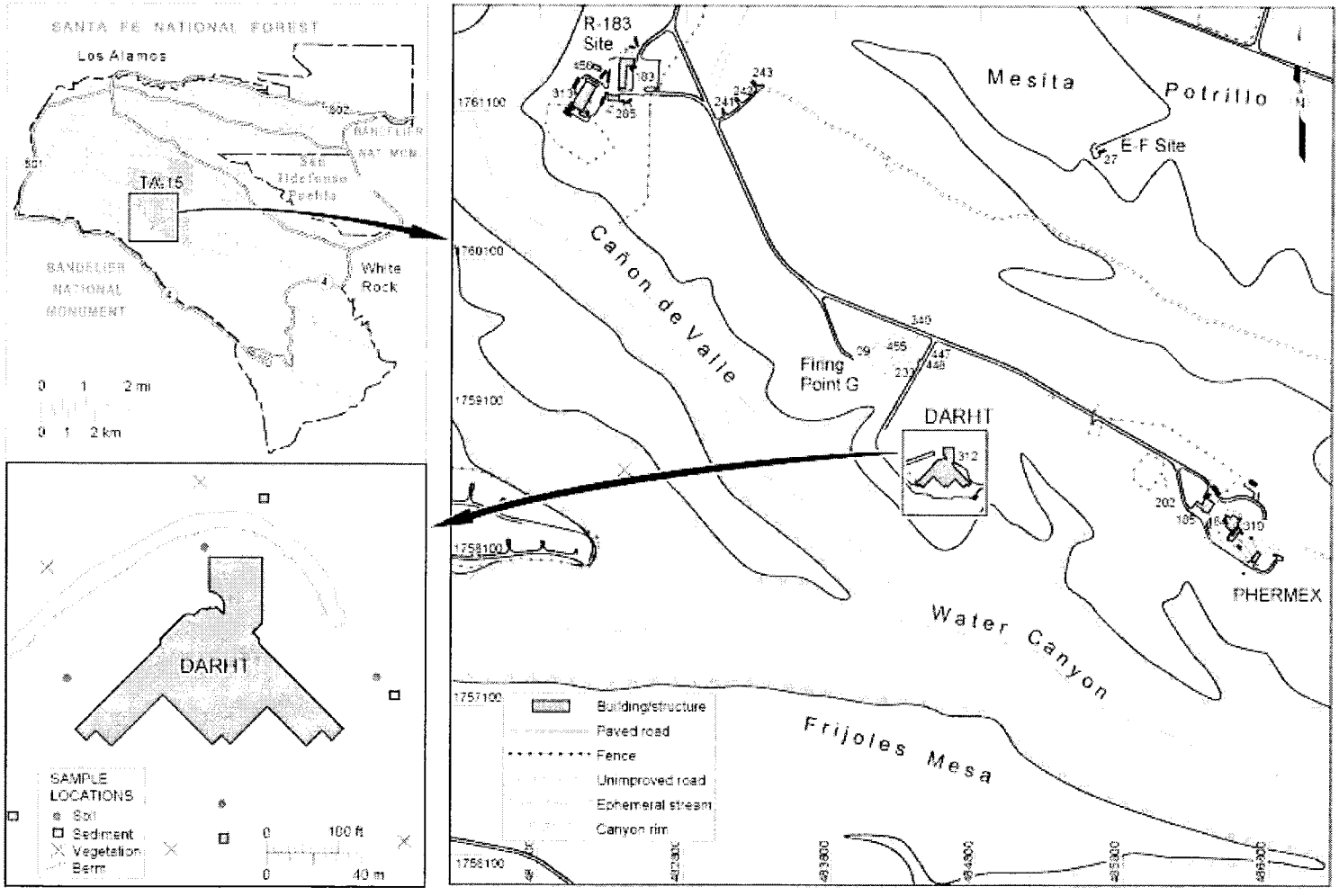

Figure 1. Sampling locations at DARHT at TA-15.

used for trace element analysis. All containers were fitted with chain-of-custody tape, placed into individual Ziploc® plastic bags, transported in a locked ice chest cooled to approximately 4 °C, and submitted to Paragon Analytics, Inc., for the analysis of trace elements (Ag, As, Ba, Be, Cd, Cr, Cu, Hg, Ni, Pb, Sb, Se, and Tl) and radionuclides (^{3}H, ^{137}Cs, ^{238}Pu, $^{239,240}Pu$, ^{90}Sr, ^{241}Am, and ^{tot}U).

All methods of analysis have been previously reported (Purtymun et al. 1987; Fresquez et al., 1996a, 1996b; Nyhan et al., 2001a, 2001b). Results are reported in pCi/mL (of soil moisture) for ^{3}H, pCi/g dry soil for all the other radioisotopes, and μg/g (ppm) for trace elements (dry weight basis) (see Nyhan et al. [2002] for a detailed description of total propagated analytical uncertainty [TPU]).

b. Vegetation Sampling

Vegetation samples were collected from overstory (trees) and understory (grasses and forbs) materials in June of 2004 as close as possible to the soil sampling locations. Overstory samples, mostly ponderosa pine (*Pinus ponderosa*), consisted of tree-shoot tips approximately 2.5 to 5 cm (1 to 2 in.) in length at the 1.2- to 1.5-m (4- to 5-ft) height (Fresquez et al., 1996b). One pine selected for overstory sampling was used as the center of the understory sample plot. Undestory samples were collected from the corners and center of a 10-m by 10-m (32-ft by 32-ft) square. Samples consisted of 0.9 to 1.4 kg (2 to 3 lb) of fresh, composited material and were double bagged in labeled Ziploc® plastic bags before transport to the Meteorology and Air Quality Group laboratory at TA-21 in locked ice chests. At the laboratory, each unwashed sample was divided into three subsamples for preparation and analyses of ^{3}H, other radionuclides, and trace elements.

Subsamples for ^{3}H analysis were placed in an apparatus to collect distillate water (Salazar 1984). Vegetation subsamples for trace element analysis were dried at 70 °C for 48 h then ground in a Wiley mill equipped with a 40-mm screen. The remaining portion of each subsample was placed in 1-L glass beakers and ashed at 500 °C for 120 h, pulverized and homogenized after ashing, transferred to labeled 500-mL polypropylene bottles, and, with the distillate samples, submitted under full chain-of-custody. Paragon Analytics, Inc., analyzed the vegetation samples for radionuclides (^{3}H, ^{137}Cs, ^{238}Pu, $^{239,240}Pu$, ^{90}Sr, ^{241}Am, and ^{tot}U) and trace elements (Ag, As,

Ba, Be, Cd, Cr, Cu, Hg, Ni, Pb, Sb, Se, and Tl). Results were reported in pCi/mL of tissue moisture for ^{3}H, pCi/g of ash for the other radionuclides, and trace elements are reported in μg/g dry (see Nyhan et al. [2002] for a detailed description of TPU).

c. Determining the Composition of Uranium

To determine the source of U in soils and vegetation at the 99% confidence level, the U isotopic distribution of ^{234}U and ^{238}U, which for naturally occurring U is one, was assessed using the following steps: (1) the difference between ^{234}U and ^{238}U was calculated, (2) the squares of their uncertainties were summed and then the square root of this number was taken, (3) the ^{234}U and ^{238}U difference was divided by the pooled square root, (4) if the result was greater than 3, then it was observed whether the ^{234}U value or the ^{238}U value was larger, (5) if the ^{234}U value was larger, then excess enriched U was indicated. Conversely, if the ^{238}U value was larger, then excess depleted U was indicated.

III. RESULTS

Analytical reports for individual sample assays are attached as Appendices A through D.

a. Surface Soils and Sediments

Results of radionuclides determined in soils and sediments collected during 2004 are shown in Table 1. Most soil and especially sediment samples contained radionuclide concentrations that were either nondetectable (i.e., results are lower than three times the TPU level; this is the 99% confidence level) or below BSRL values. Also, most radionuclide concentrations in DARHT soils and sediments were generally similar to radionuclide concentrations found in regional background concentrations (Fresquez et al., 2004a).

Radionuclides that were above the BSRLs included concentrations of ^{137}Cs and ^{238}U in three out of the four soil samples and $^{239,240}Pu$ and ^{241}Am in one out of the four soil samples. These data, at least for ^{137}Cs and ^{238}U, exhibited similar results in past years (Nyhan et al., 2002, Fresquez et al., 2004b). Some of the soil samples had ratios consistent with depleted U. All values, however, were far below SALs. SALs were developed by the Environmental Restoration Project at the Laboratory to identify the contaminants of concern on the basis of a conservative (residential) 15-mrem/yr protective dose limit (ER 2001). Therefore, the concentrations and

Table 1. Radionuclide concentrations (analytical uncertainty at three sigma) in surface soil and sediment collected around the DARHT facility in 2004.[a] (Note: Bold values are greater than both the TPU and BSRL.)

Location	^{3}H (pCi/mL)[b]	^{90}Sr (pCi/g dry)	^{137}Cs (pCi/g dry)	^{238}Pu (pCi/g dry)	$^{239,240}Pu$ (pCi/g dry)	^{241}Am (pCi/g dry)	^{234}U (pCi/g dry)	^{235}U (pCi/g dry)	^{238}U (pCi/g dry)
Soil									
North	0.10 (0.44)	0.14 (0.26)	0.063 (0.083)	0.0010 (0.0072)	0.0030 (0.0077)	0.0061 (0.0087)	1.7 (0.47)	0.098 (0.065)	**3.2**[e] **(0.86)**
East	0.22 (0.45)	0.060 (0.21)	**0.41 (0.13)**	0.0031 (0.0056)	0.012 (0.010)	0.0097 (0.0098)	2.4 (0.65)	0.13 (0.080)	**3.3 (0.89)**
South	0.17 (0.44)	0.040 (0.23)	**0.32 (0.17)**	0.00010 (0.0062)	**0.029 (0.018)**	0.0076 (0.0081)	1.5 (0.42)	0.10 (0.066)	1.8 (0.48)
West	0.11 (0.44)	0.11 (0.23)	**0.41 (0.21)**	-0.0014 (0.0057)	0.017 (0.019)	**0.012 (0.010)**	2.0 (0.54)	0.065 (0.051)	**2.4 (0.63)**
BSRL[c]	0.53	0.34	0.27	0.003	0.017	0.008	2.4	0.10	2.2
SAL[d]	6,400	5.7	5.3	49	44	39	63	17	86
Sediment									
North	0.030 (0.44)	0.060 (0.18)	0.14 (0.10)	0.00080 (0.0062)	0.0033 (0.0062)	0.0015 (0.0054)	1.5 (0.42)	0.073 (0.053)	2.1 (0.57)
East	0.14 (0.60)	0.010 (0.23)	0.34 (0.13)	0.0035 (0.0075)	0.0079 (0.0081)	0.0044 (0.0071)	2.5 (0.68)	0.14 (0.83)	2.8 (0.75)
South	-0.10 (0.44)	0.10 (0.21)	0.19 (0.17)	-0.00080 (0.0057)	0.0063 (0.0089)	0.0046 (0.0057)	1.3 (0.38)	0.081 (0.057)	1.8 (0.50)
Southwest	-0.04 (0.57)	-0.050 (0.20)	0.075 (0.087)	0.0021 (0.0077)	0.0 (0.0077)	0.0070 (0.0074)	0.89 (0.27)	0.067 (0.048)	1.4[e] (0.39)
BSRL	0.90	0.26	0.51	0.005	0.026	0.015	3.7	0.16	3.3
SAL	6,400	5.7	5.3	49	44	39	63	17	86

[a]See Figure 1 for sample location points.
[b]Concentration for ^{3}H is based on soil moisture: a value of 6,400 is equivalent to a Screening Action Level (SAL) value of 890 pCi/g ^{3}H for a soil at a water content of 12%.
[c]Baseline Statistical Reference Level (Fresquez et al., 2001b).
[d]Los Alamos National Laboratory Screening Action Level (ER 2001).
[e]Comprised of depleted U.

distributions of all observed radionuclides in soils from all locations collected in 2004 are of no significant health concern.

Most trace elements in soil and sediment samples collected at the DARHT facility were below BSRLs (Table 2). The metals that were above the BSRLs included Be in one soil sample nearest the firing point and Se and Tl in some samples. Amounts were just above the BSRL, however, and were still within the statistical range of concentrations normally found within the Laboratory boundary (Longmire et al., 1996) and far below the U.S. Environmental Protection Agency SALs. In the last two years, we found elevated concentrations of Sb in many of the soil/sediment sampling locations. This year, the Sb concentrations in all of the soil/sediment samples were at normal levels.

b. Vegetation Samples

Results of radionuclide concentrations in overstory and understory vegetation collected around the DARHT facility during 2004 can be found in Table 3. Most radionuclides, with the exception of ^{238}U in overstory vegetation, were either nondetectable or within BSRL values. All of the overstory vegetation samples collected around the DARHT facility contained ^{238}U concentrations just above the BSRL and correlates very well with the ^{238}U concentrations in soils. The U on all of the overstory (and some understory) plants had ^{234}U and ^{238}U ratios consistent with that of depleted U.

Results of the trace element concentrations in overstory and understory vegetation collected around the DARHT facility in 2004 can be found in Table 4. Most trace elements, with the exception of Cu and Se in overstory and Se in understory vegetation, were below the BSRL values. Copper and Se concentrations in overstory and Se in understory vegetation are similar to past years, albeit they do not correlate very well with the soil's data. The consequences of elevated Cu and particularly Se in plants is discussed in Nyhan et al. (2003).

Table 2. Total trace element concentrations (µg/g dry) in surface soils and sediments collected around the DARHT facility in 2004.[a] (Note: Bold values are greater than both the reporting limit and the BSRL.)

Location	Ag	As	Ba	Be	Cd	Cr	Cu	Hg	Ni	Pb	Sb	Se	Tl
Soil													
North	U[b]	2.4	110	**1.2**	U	6.7	5.8	0.014	5.9	8.8	U	**0.80**	**0.76**
East	U	2.4	83	0.68	U	6.7	5.5	0.013	5.0	9.8	U	U	U
South	U	2.5	95	0.79	U	6.6	4.7	0.012	4.8	11	U	**0.65**	**0.64**
West	U	2.4	130	1.1	U	7.7	6.4	0.020	5.9	11	U	**0.69**	U
RL	0.57	0.57	0.23	0.23	0.28	0.57	0.57	0.012	1.1	0.17	0.45	0.28	0.45
BSRL[c]	1.6	3.2	147	1.1	0.52	14	7.0	0.040	9.6	14	0.40	0.55	0.40
SAL[d]	390	6.1	5400	150	39	210	2900	23	1600	400	31	390	5.5
Sediment													
North	U	2.4	98	0.76	U	6.8	5.5	U	5.8	9.1	U	**0.52**	**0.58**
East	U	1.8	53	0.47	U	6.7	3.9	U	4.2	7.6	U	U	U
South	U	1.9	92	0.77	U	5.7	5.0	U	4.4	9.3	U	U	U
Southwest	U	1.7	66	0.62	U	5.0	4.6	U	4.5	7.1	U	**0.49**	U
RL	0.57	0.57	0.23	0.23	0.28	0.57	0.57	0.012	1.1	0.17	0.45	0.28	0.45
BSRL	1.6	3.5	161	1.2	0.55	12	7.9	0.040	9.5	15	0.38	0.43	0.30
SAL	390	6.1	5400	150	39	210	2900	23	1600	400	31	390	5.5

[a]See Figure 1 for sample location points.
[b]Undetectable; the analyte was analyzed but not detected above the reporting limit.
[c]Baseline Statistical Reference Level (Fresquez et al., 2001b).
[d]EPA Screening Action Level (USEPA 2000).

Table 3. Radionuclide concentrations (analytical uncertainty at three sigma) in overstory and understory vegetation collected around the DARHT facility in 2004.[a] (Note: Bold values are greater than both the TPU and BSRL values.)

Location	^{3}H (pCi/mL)[b]	^{90}Sr (pCi/g ash)	^{137}Cs (pCi/g ash)	^{238}Pu (pCi/g ash)	$^{239,240}Pu$ (pCi/g ash)	^{241}Am (pCi/g ash)	^{234}U pCi/g ash	^{235}U pCi/g ash	^{238}U pCi/g ash
Overstory									
North	0.33 (0.38)	1.1 (0.28)	-0.01 (0.84)	[c]	[c]	0.0016 (0.0021)	0.44 (0.11)	0.031 (0.012)	**2.0 [d] (0.48)**
East	0.65 (0.41)	6.9 (2.4)	0.30 (0.83)	-0.0005 (0.0047)	0.0031 (0.0047)	0.0014 (0.0078)	0.53 (0.13)	**0.054 (0.021)**	**3.6 [d] (0.86)**
South	0.47 (0.39)	4.4 (1.5)	-0.36 (0.78)	-0.0002 (0.0051)	0.0033 (0.0051)	0.0014 (0.0080)	0.24 (0.065)	0.013 (0.0087)	**0.81 [d] (0.20)**
West	0.49 (0.39)	7.1 (2.6)	0.17 (0.87)	-0.0018 (0.0045)	0.0025 (0.0047)	0.0 (0.0060)	0.22 (0.060)	0.020 (0.011)	**0.80 [d] (0.20)**
BSRL[e]	1.0	8.0	1.3	0.028	0.0060	0.016	0.73	0.031	0.65
Understory									
North	0.25 (0.36)	0.61 (0.23)	-0.20 (0.66)	0.0003 (0.0050)	0.0037 (0.0071)	0.0007 (0.0066)	0.19 (0.053)	0.011 (0.0077)	0.38 [d] (0.099)
East	0.27 (0.38)	0.71 (0.26)	-0.50 (0.63)	0.0020 (0.0051)	-0.0010 (0.0050)	0.0 (0.0071)	0.076 (0.026)	0.010 (0.0083)	0.35 [d] (0.090)
South	0.25 (0.36)	1.2 (0.44)	0.16 (0.56)	0.0002 (0.0047)	0.0026 (0.0048)	-0.0005 (0.0071)	0.026 (0.012)	0.0005 (0.0039)	0.036 (0.015)
West	0.24 (0.36)	0.65 (0.24)	0.15 (0.68)	-0.0007 (0.0050)	-0.0005 (0.0050)	0.0046 (0.0071)	0.040 (0.016)	0.0049 (0.0056)	0.053 (0.020)
BSRL	1.0	4.8	0.98	0.0040	0.013	0.011	1.1	0.045	0.96

[a] See Figure 1 for sample location points.
[b] Concentration for ^{3}H is based on moisture in vegetation.
[c] Lost in analysis.
[d] Comprised of depleted U.
[e] Baseline Statistical Reference Level (Fresquez et al., 2001b).

Table 4. Total trace element concentrations (µg/g dry) in overstory and understory vegetation collected around the DARHT facility in 2004.[a] (Bold values are greater than both the reporting limit and BSRLs.)

Location	Ag	As	Ba	Be	Cd	Cr	Cu	Hg	Ni	Pb	Sb	Se	Tl
Overstory													
North	U[b]	U	11	U	U	U	**6.8**	0.010	1.2	1.0	U	**0.59**	U
East	U	U	24	U	U	U	**6.0**	U	U	3.6	U	**0.38**	U
South	U	U	32	U	U	U	**5.4**	U	U	2.8	U	**0.51**	U
West	U	U	44	U	U	U	**7.2**	0.011	U	4.9	U	**0.57**	U
RL[c]	0.50	0.50	0.20	0.20	0.25	0.50	0.50	0.010	1.0	0.15	0.40	0.25	0.40
BSRL[d]	1.0	0.28	68	0.13	0.56	1.0	4.6	0.060	5.0	6.1	8.6	0.35	0.27
Understory													
North	U	U	28	U	U	U	10	U	U	0.77	U	**0.47**	U
East	U	U	23	U	U	U	6.5	U	U	0.78	U	**0.57**	U
South	U	U	20	U	U	U	6.5	U	1.4	0.40	U	**0.65**	U
West	U	U	19	U	U	U	7.3	U	U	1.1	U	**0.62**	U
RL	0.50	0.50	0.20	0.20	0.25	0.50	0.50	0.010	1.0	0.15	0.40	0.25	0.40
BSRL[d]	1.1	0.28	82	0.12	0.56	0.77	12	0.090	5.6	3.3	8.5	0.27	0.27

[a] See Figure 1 for sample location points.
[b] Undetectable; the analyte was analyzed but not detected above the reporting limit.
[c] Reporting Limit
[d] Baseline Statistical Reference Level (Fresquez et al., 2001b).

IV. CONCLUSIONS

Most radionuclides and trace elements in soils, sediments, and vegetation were within baseline data collected prior to active operations at DARHT. The few radionuclide and nonradionuclide elements in soils/sediments that were recorded above preoperational concentrations were far below LANL and U.S. Environmental Protection Agency SALs and do not pose a human health or an environmental hazard.

V. ACKNOWLEDGMENTS

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VI. REFERENCES

ASTM, "Standard Practice for Sampling Surface Soil for Radionuclides," in *Annual Book of ASTM Standards*, American Society for Testing and Materials, Philadelphia, PA (1990).

ER, "Derivation and Use of Radionuclide Screening Action Levels," Los Alamos National Laboratory document LA-UR-01-990 (2001).

Fresquez, P.R., "Study Plan for Soil, Plant, and Biota Contaminant Monitoring at DARHT," Los Alamos National Laboratory memorandum ESH-20/Ecol-96-0657 to Todd Haagenstad (1996).

Fresquez, P.R., D.R. Armstrong, and L. Naranjo, Jr., "Radionuclide and Heavy Metal Concentrations in Soil, Vegetation, and Fish Collected Around and Within Tsicoma Lake in Santa Clara Canyon," Los Alamos National Laboratory report LA-13144-MS (1996a).

Fresquez, P.R., E.L. Vold, and L. Naranjo, Jr., "Radionuclide Concentrations in/on Vegetation at Radioactive-Waste Disposal Area G during the 1995 Growing Season," Los Alamos National Laboratory report LA-13124-PR (1996b).

Fresquez, P.R., J.W. Nyhan, and H.T. Haagenstad, "Baseline Concentrations of Radionuclides and Trace Elements in Soils, Sediments, and Vegetation around the DARHT Facility," pp 13–40 in "Baseline Concentrations of Radionuclides and Trace Elements in Soils, Sediments, Vegetation, Small Mammals, Birds, and Bees around the DARHT Facility; Construction Phase (1996 through 1999)," Los Alamos National Laboratory report LA-13808-MS (2001).

Fresquez, P.R., J. Nyhan, B. Gallaher, and G. Gonzales, "Soil Monitoring," pp. 191–210 in "Environmental Surveillance at Los Alamos during 2002," Los Alamos National Laboratory report LA-14085-MS (2004a).

Fresquez, P.R., J.W. Nyhan, and E.L. Taylor, "Concentrations of Radionuclides and Trace Elements in Soils and Vegetation Around the DARHT Facility during 2003," Los Alamos National Laboratory report LA-14099-PR (2004b).

Longmire, P., S. Reneau, P. Watt, L. McFadden, J. Gardner, C. Duffy, and R. Ryti, "Natural Background Geochemical, Geomorphology, and Pedogenesis of Selected Soil Profiles and Bandelier Tuff," Los Alamos National Laboratory report LA-12913-MS (1996).

Nyhan, J.W., P.R. Fresquez, K.D. Bennett, J.R. Biggs, T.K. Haarmann, D.C. Keller, and H.T. Haagenstad, "Baseline Concentrations of Radionuclides and Trace Elements in Soils, Sediments, Vegetation, Small Mammals, Birds, and Bees around the DARHT Facility; Construction Phase (1996 through 1999)," Los Alamos National Laboratory report LA-13808-MS (2001a).

Nyhan, J.W., P.R. Fresquez, H.T. Haagenstad, and W.R. Velasquez, "Concentrations of Radionuclides and Trace Elements in Soils and Vegetation Around the DARHT Facility during 2000," Los Alamos National Laboratory report LA-13866-MS (2001b).

Nyhan, J.W., P.R. Fresquez, H.T. Haagenstad, and W.R. Velasquez, "Concentrations of Radionuclides and Trace Elements in Soils and Vegetation Around the DARHT Facility during 2001," Los Alamos National Laboratory report LA-13963-MS (2002).

Nyhan, J.W., P.R. Fresquez, and E.L. Taylor, "Concentrations of Radionuclides and Trace Elements in Soils and Vegetation Around the DARHT Facility during 2002," Los Alamos National Laboratory report LA-14056-PR (2003).

Purtymun, W.D., R.J. Peters, T.E. Buhl, M.N. Maes, and F.H. Brown, "Background Concentrations of Radionuclides in Soils and River Sediment in Northern New Mexico, 1974-1986," Los Alamos National Laboratory report LA-11134-MS (1987).

Salazar, J.G., "Produce and Fish Sampling Program of Los Alamos National Laboratory's Environmental Surveillance Group," Los Alamos National Laboratory report LA-10186-MS (1984).

USDOE, "Dual Axis Radiographic Hydrodynamic Test Facility Final Environmental Impact Statement Record of Decision," United States Department of Energy report USDOE/EIS-0228 (1995a).

USDOE, "Final Environmental Impact Statement: Dual Axis Radiographic Hydrodynamic Test Facility," United States Department of Energy report USDOE/EIS-0228 (1995b).

USDOE, "Dual Axis Radiographic Hydrodynamic Test Facility Final Environmental Impact Statement Mitigation Action Plan," United States Department of Energy report USDOE/EIS-0228 (1996).

USEPA, "Human Health Medium Specific Screening Levels," Region 6, Multimedia Planning and Permitting Division, www.epa.gov//region6/6pd/ rcra6/pd7/screen.htm (2000).

APPENDIX A

ANALYTICAL DATA REPORTS OF RADIONUCLIDE CONCENTRATIONS IN SOILS AND SEDIMENTS COLLECTED AROUND THE DARHT FACILITY DURING 2004

CHAIN-OF-CUSTODY RECORD

040421G

Los Alamos

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Soils and Foodstuffs (7H02/CFDW/D361/1000)
P.I. # (505) 667- 0815
RRES-MAQ MS J978

Project Name	Request the following analysis:		Sample Location/Remarks
DARHT Surveillance Program. Soil Samples	Am^{241}, Cs^{137}, Iso Pu, Iso U, Sr^{90} ^{3}H(as pCi/mL), Total U (calculated)		Ring Sampler (0"-2") Soils for Radiological/Metal Analysis Detection levels MDC Am = 0.02 ^{3}H = 700 pCi/mL Cs = 0.5 Sr = 0.5 Iso Pu = 0.02 Iso U = 0.1
Samplers (signatures) Louis Naranjo Jr	Ag, As, Ba, Be, Cd, Cr, Cu, Hg, Ni, Pb, Sb, Se, Tl		Grab Sample (0"-6") Sediment for Radiological/metal analysis. Detection levels MDC Ag = 2 As = 0.5 Ba = 0.2 Be = 0.2 Cd = 0.4 Cr = 0.5 Cu = 1 Hg = 0.01 Ni = 2 Pb = 0.4 Sb = 0.4 Se = 0.4 Tl = 0.4

Date	Time	Sample Name/Number		Sample Location/Remarks
4/20/04	10:30 (1)	EAST	1	East of main building 30yds from end of parking lot. Soil
4/20/04	1:30 (2)	SOUTH	1	South of main building 70yds from end of parking lot. Soil
4/20/04	2:00 (3)	WEST	1	30yds west of berm across the road. Soil
4/21/04	11.30 (4)	NORTH	1	North of the firing pad. Soil
4/20/04	10:45 (5)	SEDI-E	1	East of the main building by water flow meter structure. Sed impkt
4/20/04	1:45 (6)	SEDI-S	1	70yrds south of main building. Sed
4/20/04	2:20 (7)	SEDI-W	1	50yrds West of main building across the road Sed
4/20/04	2:40 (8)	SEDI-N	1	North of the firing point over the berm in drainage channel. Sed.

Relinquished by: (signature)	Date/Time	Received by: (signature)	Relinquished by: (signature)	Date/Time	Received by: (signature)
Louis Naranjo Jr	4/22/04 10:30	[illegible]	[illegible]	04 23 04 945	[illegible]
Relinquished by: (signature)	Date/Time	Received by: (signature)	Relinquished by: (signature)	Date/Time	Received by: (signature)
Relinquished by: (signature)	Date/Time	Received for Lab. by: (signature)	Date/Time	Remarks:	

Tritium Analysis By Liquid Scintillation Sample Results Summary

Client Name: ESH20_LANL
Client Project Name: DARHT Surveillance Program, Soil Samples
Client Project Number: 7H02 CFDW D361 1000

Laboratory Name: Paragon Analytics
PAI Work Order: 0404219

Page: 1 of 1
Reported on: Thursday, May 20, 2004
10:31:41 AM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0404219-1	EAST	Sample	H-3	0.22 +/- 0.30	0.49	pCi/ml	SOIL	3H040509-1	5/19/2004	U
0404219-2	SOUTH	Sample	H-3	0.17 +/- 0.29	0.49	pCi/ml	SOIL	3H040509-1	5/19/2004	U
0404219-3	WEST	Sample	H-3	0.11 +/- 0.29	0.49	pCi/ml	SOIL	3H040509-1	5/19/2004	U
0404219-4	NORTH	Sample	H-3	0.10 +/- 0.29	0.49	pCi/ml	SOIL	3H040509-1	5/19/2004	U
0404219-5	SEDI-E	Sample	H-3	0.14 +/- 0.40	0.66	pCi/ml	SEDIMENT	3H040509-1	5/19/2004	U
0404219-6	SEDI-S	Sample	H-3	-0.10 +/- 0.29	0.49	pCi/ml	SEDIMENT	3H040509-1	5/19/2004	U
0404219-7	SEDI-W	Sample	H-3	-0.04 +/- 0.38	0.64	pCi/ml	SEDIMENT	3H040509-1	5/19/2004	U
0404219-8	SEDI-N	Sample	H-3	0.03 +/- 0.29	0.49	pCi/ml	SEDIMENT	3H040509-1	5/19/2004	U

Comments:

Data Package ID: *h3s0404219-1*

Qualifiers/Flags:

U - Result is less than the sample specific MDC
LT - Result is less than Requested MDC, greater than sample specific MDC.
Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.
Y2 - Chemical Yield outside default limits
M - The requested MDC was not met.
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

Abbreviations:
TPU - Total Propagated Uncertainty (see PAI SOP 743)
MDC - Minimum Detectable Concentration (see PAI SOP 709)

BDL - Below Detection Limit

000003

Strontium-90 Analysis by GFPC Sample Results Summary

Client Name: ESH20_LANL
Client Project Name: DARHT Surveillance Program, Soil Samples
Client Project Number: 7H02 CFDW D361 1000

Laboratory Name: Paragon Analytics
PAI Work Order: 0404219

Reported on: Tuesday, June 22, 2004 4:37:27 PM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0404219-1	EAST	Sample	Sr-90	0.06 +/- 0.14	0.31	pCi/g	SOIL	SR040607-1	6/16/2004	U
0404219-2	SOUTH	Sample	Sr-90	0.04 +/- 0.15	0.34	pCi/g	SOIL	SR040607-1	6/16/2004	U
0404219-3	WEST	Sample	Sr-90	0.11 +/- 0.15	0.33	pCi/g	SOIL	SR040607-1	6/16/2004	U
0404219-4	NORTH	Sample	Sr-90	0.14 +/- 0.17	0.36	pCi/g	SOIL	SR040607-1	6/16/2004	U
0404219-5	SEDI-E	Sample	Sr-90	0.01 +/- 0.15	0.35	pCi/g	SEDIMENT	SR040607-1	6/16/2004	U
0404219-6	SEDI-S	Sample	Sr-90	0.10 +/- 0.14	0.28	pCi/g	SEDIMENT	SR040607-1	6/16/2004	U
0404219-7	SEDI-W	Sample	Sr-90	-0.05 +/- 0.13	0.30	pCi/g	SEDIMENT	SR040607-1	6/16/2004	U
0404219-8	SEDI-N	Sample	Sr-90	0.06 +/- 0.12	0.25	pCi/g	SEDIMENT	SR040607-1	6/16/2004	U

Comments:

Data Package ID: *SRS0404219-1*

Qualifiers/Flags:
U - Result is less than the sample specific MDC.
LT - Result is less than Requested MDC, greater than sample specific MDC.
Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed
Y2 - Chemical Yield outside default limits.
M - The requested MDC was not met.
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

Abbreviations:
TPU - Total Propagated Uncertainty (see PAI SOP 743)
MDC - Minimum Detectable Concentration (see PAI SOP 709)

BDL - Below Detection Limit

Isotopic Americium By Alpha Spectroscopy Sample Results Summary

Client Name: ESH20_LANL
Client Project Name: DARHT Surveillance Program, Soil Samples
Client Project Number: 7H02 CFDW D361 1000

Laboratory Name: Paragon Analytics
PAI Work Order: 0404219

Page: 1 of 1
Reported on: Thursday, June 24, 2004 12:53:47 PM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0404219-1	EAST	Sample	Am-241	0.0097 +/- 0.0065	0.0064	pCi/g	SOIL	AS040601-4	6/9/2004	LT
0404219-2	SOUTH	Sample	Am-241	0.0076 +/- 0.0054	0.0056	pCi/g	SOIL	AS040601-4	6/9/2004	LT
0404219-3	WEST	Sample	Am-241	0.0117 +/- 0.0068	0.0073	pCi/g	SOIL	AS040601-4	6/9/2004	LT
0404219-4	NORTH	Sample	Am-241	0.0061 +/- 0.0058	0.0074	pCi/g	SOIL	AS040601-4	6/9/2004	U
0404219-5	SEDI-E	Sample	Am-241	0.0044 +/- 0.0047	0.0064	pCi/g	SEDIMENT	AS040601-4	6/10/2004	U
0404219-6	SEDI-S	Sample	Am-241	0.0046 +/- 0.0038	0.0021	pCi/g	SEDIMENT	AS040601-4	6/9/2004	LT
0404219-7	SEDI-W	Sample	Am-241	0.0070 +/- 0.0049	0.0051	pCi/g	SEDIMENT	AS040601-4	6/9/2004	LT
0404219-8	SEDI-N	Sample	Am-241	0.0015 +/- 0.0036	0.0053	pCi/g	SEDIMENT	AS040601-4	6/9/2004	U

Comments:

Data Package ID: *am0404219-1*

Qualifiers/Flags:

U - Result is less than the sample specific MDC.
LT - Result is less than Requested MDC, greater than sample specific MDC.
Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.
Y2 - Chemical Yield outside default limits.
M - The requested MDC was not met.
NS - The requested MDC was not met, but the reported activity is greater than the reported MDC.

Abbreviations:
TPU - Total Propagated Uncertainty (see PAI SOP 743)
MDC - Minimum Detectable Concentration (see PAI SOP 759)

BDL - Below Detection Limit

Isotopic Plutonium By Alpha Spectroscopy Sample Results Summary

Client Name: ESH20_LANL
Client Project Name: DARHT Surveillance Program, Soil Samples
Client Project Number: 7H02 CFDW D361 1000

Laboratory Name: Paragon Analytics
PAI Work Order: 0404219

Reported on: Thursday, June 24, 2004
12:55:22 PM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0404219-1	EAST	Sample	Pu-238	0.0031 +/- 0.0037	0.0055	pCi/g	SOIL	AS040601-4	6/9/2004	U
0404219-1	EAST	Sample	Pu-239	0.0121 +/- 0.0067	0.0055	pCi/g	SOIL	AS040601-4	6/9/2004	LT
0404219-2	SOUTH	Sample	Pu-238	0.0001 +/- 0.0041	0.0090	pCi/g	SOIL	AS040601-4	6/9/2004	U
0404219-2	SOUTH	Sample	Pu-239	0.029 +/- 0.012	0.011	pCi/g	SOIL	AS040601-4	6/9/2004	
0404219-3	WEST	Sample	Pu-238	-0.0014 +/- 0.0038	0.0091	pCi/g	SOIL	AS040601-4	6/9/2004	U
0404219-3	WEST	Sample	Pu-239	0.0168 +/- 0.0079	0.0056	pCi/g	SOIL	AS040601-4	6/9/2004	LT
0404219-4	NORTH	Sample	Pu-238	0.0010 +/- 0.0048	0.0026	pCi/g	SOIL	AS040601-4	6/9/2004	U
0404219-4	NORTH	Sample	Pu-239	0.0030 +/- 0.0051	0.0089	pCi/g	SOIL	AS040601-4	6/9/2004	U
0404219-5	SEDI-E	Sample	Pu-238	0.0035 +/- 0.0050	0.0080	pCi/g	SEDIMENT	AS040601-4	6/9/2004	U

Comments:

Data Package ID: *pu0404219-1*

Qualifiers/Flags:

U - Result is less than the sample specific MDC.
LT - Result is less than Requested MDC, greater than sample specific MDC.
Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.
Y2 - Chemical Yield outside default limits.
M - The requested MDC was not met.
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)
MDC - Minimum Detectable Concentration (see PAI SOP 709)
BDL - Below Detection Limit

Isotopic Plutonium By Alpha Spectroscopy Sample Results Summary

Client Name: ESH20_LANL
Client Project Name: DARHT Surveillance Program, Soil Samples
Client Project Number: 7H02 CFDW D361 1000

Laboratory Name: Paragon Analytics
PAI Work Order: 0404219

Page: 2 of 2
Reported on: Thursday, June 24, 2004 12:55:22 PM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0404219-5	SEDI-E	Sample	Pu-239	0.0079 +/- 0.0054	0.0024	pCi/g	SEDIMENT	AS040601-4	6/9/2004	LT
0404219-6	SEDI-S	Sample	Pu-238	-0.0008 +/- 0.0038	0.0057	pCi/g	SEDIMENT	AS040601-4	6/9/2004	U
0404219-6	SEDI-S	Sample	Pu-239	0.0063 +/- 0.0059	0.0083	pCi/g	SEDIMENT	AS040601-4	6/9/2004	U
0404219-7	SEDI-W	Sample	Pu-238	0.0021 +/- 0.0051	0.0076	pCi/g	SEDIMENT	AS040601-4	6/9/2004	U
0404219-7	SEDI-W	Sample	Pu-239	0 +/- 0.0051	0.0076	pCi/g	SEDIMENT	AS040601-4	6/9/2004	U
0404219-8	SEDI-N	Sample	Pu-238	0.0008 +/- 0.0041	0.0022	pCi/g	SEDIMENT	AS040601-4	6/9/2004	U
0404219-8	SEDI-N	Sample	Pu-239	0.0033 +/- 0.0041	0.0022	pCi/g	SEDIMENT	AS040601-4	6/9/2004	LT

Comments:

Data Package ID: *pu0404219-1*

Qualifiers/Flags:

U - Result is less than the sample specific MDC
LT - Result is less than Requested MDC, greater than sample specific MDC.
Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.
Y2 - Chemical Yield outside default limits.
M - The requested MDC was not met.
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)
MDC - Minimum Detectable Concentration (see PAI SOP 709)

BDL - Below Detection Limit

Gamma Spectroscopy Results

PAI 713 Rev 8

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0404219
Client Name: ESH20_LANL
ClientProject ID: DARHT Surveillance Program, Soil Samples 7H02 CFDW D36

Field ID: EAST
Lab ID: 0404219-1

Library: USGS.LIB

Sample Matrix: SOIL
Prep SOP: PAI 739 Rev 8
Date Collected: 20-Apr-04
Date Prepared: 28-May-04
Date Analyzed: 22-Jun-04

Prep Batch: GS040601-2
QCBatchID: GS040601-2-1
Run ID: GS040601-2A
Count Time: 60 minutes
Report Basis: Dry Weight

Final Aliquot: 263 g
Prep Basis: Dry Weight
Moisture(%): NA
Result Units: pCi/g
File Name: 041391D01A

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
10045-97-3	Cs-137	0.414 +/- 0.088	0.094	G

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU
Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed
Y2 - Chemical Yield outside default limits.
LT - Result is less than Requested MDC, greater than sample specific MDC.
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.
M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.
SI - Nuclide identification and/or quantitation is tentative
TI - Nuclide identification is tentative.
R - Nuclide has exceeded 8 halflives
G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)
MDC - Minimum Detectable Concentration (see PAI SOP 709)
BDL - Below Detection Limit

Data Package ID: *GSS0404219-1*

Gamma Spectroscopy Results

PAI 713 Rev 8

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0404219
Client Name: ESH20_LANL
ClientProject ID: DARHT Surveillance Program, Soil Samples 7H02 CFDW D35

Field ID: SOUTH
Lab ID: 0404219-2

Library: USGS.LIB

Sample Matrix: SOIL
Prep SOP: PAI 739 Rev 8
Date Collected: 20-Apr-04
Date Prepared: 28-May-04
Date Analyzed: 22-Jun-04

Prep Batch: GS040601-2
QCBatchID: GS040601-2-1
Run ID: GS040601-2A
Count Time: 60 minutes
Report Basis: Dry Weight

Final Aliquot: 226 g
Prep Basis: Dry Weight
Moisture(%): NA
Result Units: pCi/g
File Name: 041027D02A

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
10045-97-3	Cs-137	0.32 +/- 0.11	0.13	M3,G

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

BDL - Below Detection Limit

Data Package ID: *GSS0404219-1*

Gamma Spectroscopy Results

PAI 713 Rev 8

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0404219
Client Name: ESH20_LANL
ClientProject ID: DARHT Surveillance Program, Soil Samples 7H02 CFDW D36

Field ID: WEST
Lab ID: 0404219-3

Library: USGS.LIB

Sample Matrix: SOIL
Prep SOP: PAI 739 Rev 8
Date Collected: 20-Apr-04
Date Prepared: 28-May-04
Date Analyzed: 22-Jun-04

Prep Batch: GS040601-2
QCBatchID: GS040601-2-1
Run ID: GS040601-2A
Count Time: 60 minutes
Report Basis: Dry Weight

Final Aliquot: 205 g
Prep Basis: Dry Weight
Moisture(%): NA
Result Units: pCi/g
File Name: 040947D07A

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
10045-97-3	Cs-137	0.41 +/- 0.14	0.15	M3,G

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.
Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed
Y2 - Chemical Yield outside default limits.
LT - Result is less than Requested MDC, greater than sample specific MDC.
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.
M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.
SI - Nuclide identification and/or quantitation is tentative.
TI - Nuclide identification is tentative.
R - Nuclide has exceeded 8 halflives.
G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)
MDC - Minimum Detectable Concentration (see PAI SOP 709)
BDL - Below Detection Limit

Data Package ID: *GSS0404219-1*

Gamma Spectroscopy Results

PAI 713 Rev 8

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0404219
Client Name: ESH20_LANL
ClientProject ID: DARHT Surveillance Program, Soil Samples 7H02 CFDW D36

Field ID: NORTH
Lab ID: 0404219-4

Library: USGS.LIB

Sample Matrix: SOIL
Prep SOP: PAI 739 Rev 8
Date Collected: 21-Apr-04
Date Prepared: 28-May-04
Date Analyzed: 22-Jun-04

Prep Batch: GS040601-2
QCBatchID: GS040601-2-1
Run ID: GS040601-2A
Count Time: 90 minutes
Report Basis: Dry Weight

Final Aliquot: 260 g
Prep Basis: Dry Weight
Moisture(%): NA
Result Units: pCi/g
File Name: 041394D01A

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
10045-97-3	Cs-137	0.063 +/- 0.055	0.088	U,G

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 half-lives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

BDL - Below Detection Limit

Data Package ID: *GSS0404219-1*

Gamma Spectroscopy Results

PAI 713 Rev 8

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0404219
Client Name: ESH20_LANL
ClientProject ID: DARHT Surveillance Program, Soil Samples 7H02 CFDW D36

Field ID: SED1-E
Lab ID: 0404219-5

Library: USGS.LIB

Sample Matrix: SEDIMENT
Prep SOP: PAI 739 Rev 8
Date Collected: 20-Apr-04
Date Prepared: 28-May-04
Date Analyzed: 22-Jun-04

Prep Batch: GS040601-2
QCBatchID: GS040601-2-1
Run ID: GS040601-2A
Count Time: 60 minutes
Report Basis: Dry Weight

Final Aliquot: 356 g
Prep Basis: Dry Weight
Moisture(%): NA
Result Units: pCi/g
File Name: 041017D08A

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
10045-97-3	Cs-137	0.343 +/- 0.089	0.092	G

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

BDL - Below Detection Limit

Data Package ID: *GSS0404219-1*

Gamma Spectroscopy Results

PAI 713 Rev 8

Sample Duplicate Results

Lab Name: Paragon Analytics
Work Order Number: 0404219
Client Name: ESH20_LANL
ClientProject ID: DARHT Surveillance Program, Soil Samples 7H02 CFDW D36

Field ID: SED1-E
Lab ID: 0404219-SDUP

Sample Matrix: SEDIMENT
Prep SOP: PAI 739 Rev 8
Date Collected: 20-Apr-04
Date Prepared: 28-May-04
Date Analyzed: 22-Jun-04

Prep Batch: GS040601-2
QCBatchID: GS040601-2-1
Run ID: GS040601-2A
Count Time: 60 minutes
Report Basis: Dry Weight

Final Aliquot: 356 g
Prep Basis: Dry Weight
Moisture(%): NA
Result Units: pCi/g
File Name: 041028D02A

Library: USGS.LIB

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
10045-97-3	Cs-137	0.256 +/- 0.084	0.105	M3,G

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU
Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.
Y2 - Chemical Yield outside default limits.
LT - Result is less than Requested MDC, greater than sample specific MDC.
M - The requested MDC was not met.
M3 - The requested MDC was not met, but thereported activity is greater than the reported MDC.
W - DER is greater than Warning Limit of 1.42
D - DER is greater than Control Limit of 2.13

SQ - Spectral quality prevents accurate quantitation.
SI - Nuclide identification and/or quantitation is tentative.
TI - Nuclide identification is tentative.
R - Nuclide has exceeded 8 halflives.
G - Sample density differs by more than 15% of LCS density.

Abbreviations:
TPU - Total Propagated Uncertainty (see PAI SOP 743)
MDC - Minimum Detectable Concentration (see PAI SOP 709)
BDL - Below Detection Limit

Data Package ID: *GSS0404219-1*

Date Printed: Thursday, July 01, 2004

Paragon Analytics
LIMS Version: 5.038A

Gamma Spectroscopy Results

PAI 713 Rev 8

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0404219
Client Name: ESH20_LANL
ClientProject ID: DARHT Surveillance Program, Soil Samples 7H02 CFDW D36

Field ID: SEDI-S
Lab ID: 0404219-6

Library: USGS.Lib

Sample Matrix: SEDIMENT
Prep SOP: PAI 739 Rev 8
Date Collected: 20-Apr-04
Date Prepared: 28-May-04
Date Analyzed: 22-Jun-04

Prep Batch: GS040601-2
QCBatchID: GS040601-2-1
Run ID: GS040601-2A
Count Time: 60 minutes
Report Basis: Dry Weight

Final Aliquot: 244 g
Prep Basis: Dry Weight
Moisture(%): NA
Result Units: pCi/g
File Name: 040948D07A

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
10045-97-3	Cs-137	0.19 +/- 0.11	0.17	M3,G

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU
Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed
Y2 - Chemical Yield outside default limits.
LT - Result is less than Requested MDC, greater than sample specific MDC.
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.
M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.
SI - Nuclide identification, and/or quantitation is tentative.
TI - Nuclide identification is tentative.
R - Nuclide has exceeded 8 halflives.
G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)
MDC - Minimum Detectable Concentration (see PAI SOP 709)
BDL - Below Detection Limit

Data Package ID: *GSS0404219-1*

Gamma Spectroscopy Results

PAI 713 Rev 8

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0404219
Client Name: ESH20_LANL
ClientProject ID: DARHT Surveillance Program, Soil Samples 7H02 CFDW D36

Field ID: SEDI-W
Lab ID: 0404219-7

Library: USGS.LIB

Sample Matrix: SEDIMENT
Prep SOP: PAI 739 Rev 8
Date Collected: 20-Apr-04
Date Prepared: 28-May-04
Date Analyzed: 22-Jun-04

Prep Batch: GS040601-2
QCBatchID: GS040601-2-1
Run ID: GS040601-2A
Count Time: 60 minutes
Report Basis: Dry Weight

Final Aliquot: 289 g
Prep Basis: Dry Weight
Moisture(%): NA
Result Units: pCi/g
File Name: 041018D08A

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
10045-97-3	Cs-137	0.075 +/- 0.058	0.089	U,G

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU
Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.
Y2 - Chemical Yield outside default limits.
LT - Result is less than Requested MDC, greater than sample specific MDC.
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.
M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.
SI - Nuclide identification and/or quantitation is tentative.
TI - Nuclide identification is tentative.
R - Nuclide has exceeded 8 half-lives.
G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)
MDC - Minimum Detectable Concentration (see PAI SOP 709)
BDL - Below Detection Limit

Data Package ID: *GSS0404219-1*

Gamma Spectroscopy Results

PAI 713 Rev 8

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0404219
Client Name: ESH20_LANL
ClientProject ID: DARHT Surveillance Program, Soil Samples 7H02 CFDW D36

Field ID: SEDI-N	**Sample Matrix:** SEDIMENT	**Prep Batch:** GS040601-2	**Final Aliquot:** 273 g
Lab ID: 0404219-8	**Prep SOP:** PAI 739 Rev 8	**QCBatchID:** GS040601-2-1	**Prep Basis:** Dry Weight
	Date Collected: 20-Apr-04	**Run ID:** GS040601-2A	**Moisture(%):** NA
	Date Prepared: 28-May-04	**Count Time:** 60 minutes	**Result Units:** pCi/g
Library: USGS.LIB	**Date Analyzed:** 22-Jun-04	**Report Basis:** Dry Weight	**File Name:** 041029D02A

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
10045-97-3	Cs-137	< 0.144 +/- 0.067	0.088	G

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification, and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 740)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

BDL - Below Detection Limit

Data Package ID: *GSS0404219-1*

Isotopic Uranium By Alpha Spectroscopy Sample Results Summary

Client Name: ESH20_LANL
Client Project Name: DARHT Surveillance Program, Soil Samples
Client Project Number: 7H02 CFDW D361 1000

Laboratory Name: Paragon Analytics
PAI Work Order: 0404219

Reported on: Thursday, June 24, 2004
12:57:38 PM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0404219-1	EAST	Sample	U-234	2.37 +/- 0.43	0.02	pCi/g	SOIL	AS040601-4	6/7/2004	
0404219-1	EAST	Sample	U-235	0.132 +/- 0.053	0.030	pCi/g	SOIL	AS040601-4	6/7/2004	
0404219-1	EAST	Sample	U-238	3.35 +/- 0.59	0.02	pCi/g	SOIL	AS040601-4	6/7/2004	
0404219-2	SOUTH	Sample	U-234	1.48 +/- 0.28	0.02	pCi/g	SOIL	AS040601-4	6/7/2004	
0404219-2	SOUTH	Sample	U-235	0.104 +/- 0.044	0.011	pCi/g	SOIL	AS040601-4	6/7/2004	
0404219-2	SOUTH	Sample	U-238	1.77 +/- 0.32	0.01	pCi/g	SOIL	AS040601-4	6/7/2004	
0404219-3	WEST	Sample	U-234	2.00 +/- 0.36	0.03	pCi/g	SOIL	AS040601-4	6/7/2004	
0404219-3	WEST	Sample	U-235	0.065 +/- 0.034	0.019	pCi/g	SOIL	AS040601-4	6/7/2004	LT
0404219-3	WEST	Sample	U-238	2.35 +/- 0.42	0.02	pCi/g	SOIL	AS040601-4	6/7/2004	

Comments:

Data Package ID: *u0404219-1*

Qualifiers/Flags:

U - Result is less than the sample specific MDC.
LT - Result is less than Requested MDC, greater than sample specific MDC.
Y1 - Chemical Yield is in control at 90-110%. Quantitative Yield is assured.
Y2 - Chemical Yield outside default limits.
M - The requested MDC was not met.
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

Abbreviations:
TPU - Total Propagated Uncertainty (see PAI SOP 743)
MDC - Minimum Detectable Concentration (see PAI SOP 709)

BDL - Below Detection Limit

Isotopic Uranium By Alpha Spectroscopy Sample Results Summary

Client Name: ESH20_LANL
Client Project Name: DARHT Surveillance Program, Soil Samples
Client Project Number: 7H02 CFDW D361 1000

Laboratory Name: Paragon Analytics
PAI Work Order: 0404219

Page: 2 of 3
Reported on: Thursday, June 24, 2004 12:57:38 PM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0404219-4	NORTH	Sample	U-234	1.69 +/- 0.31	0.02	pCi/g	SOIL	AS040601-4	6/7/2004	
0404219-4	NORTH	Sample	U-235	0.098 +/- 0.043	0.011	pCi/g	SOIL	AS040601-4	6/7/2004	LT
0404219-4	NORTH	Sample	U-238	3.24 +/- 0.57	0.02	pCi/g	SOIL	AS040601-4	6/7/2004	
0404219-5	SEDI-E	Sample	U-234	2.50 +/- 0.45	0.03	pCi/g	SEDIMENT	AS040601-4	6/7/2004	
0404219-5	SEDI-E	Sample	U-235	0.143 +/- 0.055	0.012	pCi/g	SEDIMENT	AS040601-4	6/7/2004	
0404219-5	SEDI-E	Sample	U-238	2.83 +/- 0.50	0.02	pCi/g	SEDIMENT	AS040601-4	6/7/2004	
0404219-6	SEDI-S	Sample	U-234	1.32 +/- 0.25	0.02	pCi/g	SEDIMENT	AS040601-4	6/7/2004	
0404219-6	SEDI-S	Sample	U-235	0.081 +/- 0.038	0.018	pCi/g	SEDIMENT	AS040601-4	6/7/2004	LT
0404219-6	SEDI-S	Sample	U-238	1.81 +/- 0.33	0.02	pCi/g	SEDIMENT	AS040601-4	6/7/2004	

Comments:

Data Package ID: *u0404219-1*

Qualifiers/Flags:

U - Result is less than the sample specific MDC.
LT - Result is less than Requested MDC, greater than sample specific MDC.
Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.
Y2 - Chemical Yield outside default limits.
M - The requested MDC was not met.
MQ - The requested MDC was not met, but the reported activity is greater than the reported MDC.

Abbreviations:
TPU - Total Propagated Uncertainty (see PAI SOP 743)
MDC - Minimum Detectable Concentration (see PAI SOP 709)
BDL - Below Detection Limit

Isotopic Uranium By Alpha Spectroscopy Sample Results Summary

Client Name: ESH20_LANL
Client Project Name: DARHT Surveillance Program, Soil Samples
Client Project Number: 7H02 CFOW D381 1000

Laboratory Name: Paragon Analytics
PAI Work Order: 0404219

Reported on: Thursday, June 24, 2004 12:57:38 PM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0404219-7	SEDI-W	Sample	U-234	0.89 +/- 0.18	0.02	pCi/g	SEDIMENT	AS040601-4	6/7/2004	
0404219-7	SEDI-W	Sample	U-235	0.067 +/- 0.035	0.022	pCi/g	SEDIMENT	AS040601-4	6/7/2004	LT
0404219-7	SEDI-W	Sample	U-238	1.38 +/- 0.26	0.02	pCi/g	SEDIMENT	AS040601-4	6/7/2004	
0404219-8	SEDI-N	Sample	U-234	1.53 +/- 0.28	0.02	pCi/g	SEDIMENT	AS040601-4	6/7/2004	
0404219-8	SEDI-N	Sample	U-235	0.073 +/- 0.035	0.020	pCi/g	SEDIMENT	AS040601-4	6/7/2004	LT
0404219-8	SEDI-N	Sample	U-238	2.14 +/- 0.38	0.02	pCi/g	SEDIMENT	AS040601-4	6/7/2004	

Comments:

Data Package ID: *u0404219-1*

Qualifiers/Flags:
U - Result is less than the sample specific MDC
LT - Result is less than Requested MDC, greater than sample specific MDC
Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.
Y2 - Chemical Yield outside default limits.
M - The requested MDC was not met.
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

Abbreviations:
TPU - Total Propagated Uncertainty (see PAI SOP 745)
MDC - Minimum Detectable Concentration (see PAI SOP 709)

BDL - Below Detection Limit

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JUN 29 2004

Isotopic Uranium By Alpha Spectroscopy Sample Results Summary

Client Name: ESH20_LANL
Client Project Name: DARHT Surveillance Program, Soil Samples
Client Project Number: 7H02 CFDW D361 1000

Laboratory Name: Paragon Analytics
PAI Work Order: 0404219

Reported on: Thursday, June 24, 2004 1:01:14 PM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0404219-1	EAST	Sample	U-234	3.79E-04 +/- 6.8E-05	3E-06	ug/g	SOIL	AS040601-4	6/7/2004	
0404219-1	EAST	Sample	U-235	6.1E-02 +/- 2.4E-02	1.4E-02	ug/g	SOIL	AS040601-4	6/7/2004	
0404219-1	EAST	Sample	U-238	1E+01 +/- 1.7E+00	1E-01	ug/g	SOIL	AS040601-4	6/7/2004	
0404219-1	EAST	Sample	URANIUM, TOTAL	1E+01 +/- 1.7E+00	NA	ug/g	SOIL	AS040601-4	6/7/2004	
0404219-2	SOUTH	Sample	U-234	2.37E-04 +/- 4.5E-05	3E-06	ug/g	SOIL	AS040601-4	6/7/2004	
0404219-2	SOUTH	Sample	U-235	4.8E-02 +/- 2E-02	5E-03	ug/g	SOIL	AS040601-4	6/7/2004	
0404219-2	SOUTH	Sample	U-238	5.26E+00 +/- 9.7E-01	3E-02	ug/g	SOIL	AS040601-4	6/7/2004	
0404219-2	SOUTH	Sample	URANIUM, TOTAL	5.3E+00 +/- 9.7E-01	NA	ug/g	SOIL	AS040601-4	6/7/2004	
0404219-3	WEST	Sample	U-234	3.2E-04 +/- 5.8E-05	4E-06	ug/g	SOIL	AS040601-4	6/7/2004	

Comments:

Data Package ID: *ut0404219-1*

Qualifiers/Flags:

U - Result is less than the sample specific MDC
L1 - Result is less than Requested MDC, greater than sample specific MDC.
Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed
Y2 - Chemical Yield outside default limits.
M - The requested MDC was not met.
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC

Abbreviations
TPU - Total Propagated Uncertainty (see PAI SOP 743)
MDC - Minimum Detectable Concentration (see PAI SOP 708)

BDL - Below Detection Limit

Isotopic Uranium By Alpha Spectroscopy Sample Results Summary

Client Name: ESH20_LANL
Client Project Name: DARHT Surveillance Program, Soil Samples
Client Project Number: 7H02 CFDW D361 1000

Laboratory Name: Paragon Analytics
PAI Work Order: 0404219

Reported on: Thursday, June 24, 2004 1:01:14 PM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0404219-3	WEST	Sample	U-235	3E-02 +/- 1.6E-02	9E-03	ug/g	SOIL	AS040601-4	6/7/2004	
0404219-3	WEST	Sample	U-238	7E+00 +/- 1.3E+00	1E-01	ug/g	SOIL	AS040601-4	6/7/2004	
0404219-3	WEST	Sample	URANIUM, TOTAL	7E+00 +/- 1.3E+00	NA	ug/g	SOIL	AS040601-4	6/7/2004	
0404219-4	NORTH	Sample	U-234	2.7E-04 +/- 5E-05	3E-06	ug/g	SOIL	AS040601-4	6/7/2004	
0404219-4	NORTH	Sample	U-235	4.6E-02 +/- 2E-02	5E-03	ug/g	SOIL	AS040601-4	6/7/2004	
0404219-4	NORTH	Sample	U-238	9.6E+00 +/- 1.7E+00	8E+00	ug/g	SOIL	AS040601-4	6/7/2004	
0404219-4	NORTH	Sample	URANIUM, TOTAL	9.7E+00 +/- 1.7E+00	NA	ug/g	SOIL	AS040601-4	6/7/2004	
0404219-5	SEDI-E	Sample	U-234	4.01E-04 +/- 7.2E-05	4E-06	ug/g	SEDIMENT	AS040601-4	6/7/2004	
0404219-5	SEDI-E	Sample	U-235	6.6E-02 +/- 2.5E-02	5E-03	ug/g	SEDIMENT	AS040601-4	6/7/2004	

Comments:

Data Package ID: *ut0404219-1*

Qualifiers/Flags:

U - Result is less than the sample specific MDC.
L1 - Result is less than Requested MDC, greater than sample specific MDC.
Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.
Y2 - Chemical Yield outside default limits.
M - The requested MDC was not met.
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

Abbreviations:
TPU - Total Propagated Uncertainty (see PAI SOP 743)
MDC - Minimum Detectable Concentration (see PAI SOP 109)

BDL - Below Detection Limit

Isotopic Uranium By Alpha Spectroscopy Sample Results Summary

Client Name: ESH20_LANL
Client Project Name: DARHT Surveillance Program, Soil Samples
Client Project Number: 7H02 CFDW D361 1000

Laboratory Name: Paragon Analytics
PAI Work Order: 0404219

Reported on: Thursday, June 24, 2004 1:01:14 PM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0404219-5	SEDI-E	Sample	U-238	8.4E+00 +/- 1.5E+00	1E-01	ug/g	SEDIMENT	AS040601-4	6/7/2004	
0404219-5	SEDI-E	Sample	URANIUM, TOTAL	8.5E+00 +/- 1.5E+00	NA	ug/g	SEDIMENT	AS040601-4	6/7/2004	
0404219-6	SEDI-S	Sample	U-234	2.12E-04 +/- 4E-05	2E-06	ug/g	SEDIMENT	AS040601-4	6/7/2004	
0404219-6	SEDI-S	Sample	U-235	3.7E-02 +/- 1.7E-02	8E-03	ug/g	SEDIMENT	AS040601-4	6/7/2004	
0404219-6	SEDI-S	Sample	U-238	5.37E+00 +/- 9.8E-01	5E-02	ug/g	SEDIMENT	AS040601-4	6/7/2004	
0404219-6	SEDI-S	Sample	URANIUM, TOTAL	5.41E+00 +/- 9.8E-01	NA	ug/g	SEDIMENT	AS040601-4	6/7/2004	
0404219-7	SEDI-W	Sample	U-234	1.43E-04 +/- 2.9E-05	4E-06	ug/g	SEDIMENT	AS040601-4	6/7/2004	
0404219-7	SEDI-W	Sample	U-235	3.1E-02 +/- 1.6E-02	1E-02	ug/g	SEDIMENT	AS040601-4	6/7/2004	
0404219-7	SEDI-W	Sample	U-238	4.1E+00 +/- 7.8E-01	7E-02	ug/g	SEDIMENT	AS040601-4	6/7/2004	

Comments:

Data Package ID: *ut0404219-1*

Qualifiers/Flags:
U - Result is less than the sample specific MDC
LT - Result is less than Requested MDC, greater than sample specific MDC
Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.
Y2 - Chemical Yield outside default limits
M - The requested MDC was not met
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC

Abbreviations:
TPU - Total Propagated Uncertainty (see PAI SOP 748)
MDC - Minimum Detectable Concentration (see PAI SOP 709)
BDL - Below Detection Limit

000077

Isotopic Uranium By Alpha Spectroscopy Sample Results Summary

Client Name: ESH20_LANL
Client Project Name: DARHT Surveillance Program, Soil Samples
Client Project Number: 7H02 CFDW D361 1000

Laboratory Name: Paragon Analytics
PAI Work Order: 0404219

Reported on: Thursday, June 24, 2004 1:01:14 PM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0404219-7	SEDI-W	Sample	URANIUM, TOTAL	4.14E+00 +/- 7.8E-01	NA	ug/g	SEDIMENT	AS040601-4	6/7/2004	
0404219-8	SEDI-N	Sample	U-234	2.45E-04 +/- 4.5E-05	4E-06	ug/g	SEDIMENT	AS040601-4	6/7/2004	
0404219-8	SEDI-N	Sample	U-235	3.4E-02 +/- 1.6E-02	9E-03	ug/g	SEDIMENT	AS040601-4	6/7/2004	
0404219-8	SEDI-N	Sample	U-238	6.4E+00 +/- 1.1E+00	1E-01	ug/g	SEDIMENT	AS040601-4	6/7/2004	
0404219-8	SEDI-N	Sample	URANIUM, TOTAL	6.4E+00 +/- 1.1E+00	NA	ug/g	SEDIMENT	AS040601-4	6/7/2004	

Comments:

Data Package ID: *ut0404219-1*

Qualifiers/Flags:

U - Result is less than the sample specific MDC.
LT - Result is less than Requested MDC, greater than sample specific MDC.
Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.
Y2 - Chemical Yield outside default limits.
M - The requested MDC was not met.
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

Abbreviations:
TPU - Total Propagated Uncertainty (see PAI SOP 743)
MDC - Minimum Detectable Concentration (see PAI SOP 709)
BDL - Below Detection Limit

000078

APPENDIX B

ANALYTICAL DATA REPORTS OF TRACE ELEMENT CONCENTRATIONS IN SOILS AND SEDIMENTS COLLECTED AROUND THE DARHT FACILITY DURING 2004

Total ICP Metals

Method SW6010

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0404219
Client Name: ESH20_LANL
ClientProject ID: DARHT Surveillance Program, Soil Samples 7H02 CFDW D36

Field ID: NORTH
Lab ID: 0404219-4

Sample Matrix: SOIL
% Moisture: 11.7
Date Collected: 21-Apr-04
Date Extracted: 25-May-04
Date Analyzed: 26-May-04

Prep Batch: IP040525-3
QCBatchID: IP040525-3-1
Run ID: IT040526-1A3
Cleanup: NONE
Basis: Dry Weight

Sample Aliquot: 1 g
Final Volume: 50 ml
Result Units: mg/kg
Clean DF: 1
File Name: TS40526

CASNO	Target Analyte	Dilution Factor	Result	Reporting Limit	IDL	Result Qualifier	EPA Qualifier
7440-36-0	ANTIMONY	1	0.38	0.45	0.17	B	
7440-38-2	ARSENIC	1	2.4	0.57	0.17		
7440-39-3	BARIUM	1	110	0.23	0.0036		
7440-41-7	BERYLLIUM	1	1.2	0.23	0.0023		
7440-43-9	CADMIUM	1	0.28	0.28	0.0096	U	
7440-47-3	CHROMIUM	1	6.7	0.57	0.033		
7440-50-8	COPPER	1	5.8	0.57	0.029		
7439-92-1	LEAD	1	8.8	0.17	0.08		
7440-02-0	NICKEL	1	5.9	1.1	0.036		
7782-49-2	SELENIUM	1	0.8	0.28	0.12		
7440-22-4	SILVER	1	0.57	0.57	0.034	U	
7440-28-0	THALLIUM	1	0.76	0.45	0.16		

Data Package ID: *IT0404219-1*

Total ICP Metals

Method SW6010

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0404219
Client Name: ESH20_LANL
ClientProject ID: DARHT Surveillance Program, Soil Samples 7H02 CFDW D36

Field ID: EAST
Lab ID: 0404219-1

Sample Matrix: SOIL
% Moisture: 13.3
Date Collected: 20-Apr-04
Date Extracted: 25-May-04
Date Analyzed: 26-May-04

Prep Batch: IP040525-3
QCBatchID: IP040525-3-1
Run ID: IT040526-1A3
Cleanup: NONE
Basis: Dry Weight

Sample Aliquot: 1 g
Final Volume: 50 ml
Result Units: mg/kg
Clean DF: 1
File Name: TS40526

CASNO	Target Analyte	Dilution Factor	Result	Reporting Limit	IDL	Result Qualifier	EPA Qualifier
7440-36-0	ANTIMONY	1	0.46	0.46	0.18	U	N
7440-38-2	ARSENIC	1	2.4	0.58	0.17		
7440-39-3	BARIUM	1	83	0.23	0.0037		
7440-41-7	BERYLLIUM	1	0.68	0.23	0.0023		
7440-43-9	CADMIUM	2	0.58	0.58	0.02	U	
7440-47-3	CHROMIUM	1	6.7	0.58	0.033		
7440-50-8	COPPER	1	5.5	0.58	0.029		
7439-92-1	LEAD	2	9.8	0.35	0.16		
7440-02-0	NICKEL	1	5	1.2	0.037		
7782-49-2	SELENIUM	2	0.58	0.58	0.25	U	
7440-22-4	SILVER	1	0.58	0.58	0.035	U	
7440-28-0	THALLIUM	2	0.92	0.92	0.36	U	

Data Package ID: *IT0404219-1*

Total ICP Metals

Method SW6010

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0404219
Client Name: ESH20_LANL
ClientProject ID: DARHT Surveillance Program, Soil Samples 7H02 CFDW D36

Field ID: SOUTH
Lab ID: 0404219-2

Sample Matrix: SOIL
% Moisture: 18.9
Date Collected: 20-Apr-04
Date Extracted: 25-May-04
Date Analyzed: 26-May-04

Prep Batch: IP040525-3
QCBatchID: IP040525-3-1
Run ID: IT040526-1A3
Cleanup: NONE
Basis: Dry Weight

Sample Aliquot: 1 g
Final Volume: 50 ml
Result Units: mg/kg
Clean DF: 1
File Name: TS40526

CASNO	Target Analyte	Dilution Factor	Result	Reporting Limit	IDL	Result Qualifier	EPA Qualifier
7440-36-0	ANTIMONY	1	0.49	0.49	0.19	U	
7440-38-2	ARSENIC	1	2.5	0.62	0.18		
7440-39-3	BARIUM	1	95	0.25	0.0039		
7440-41-7	BERYLLIUM	1	0.79	0.25	0.0025		
7440-43-9	CADMIUM	1	0.31	0.31	0.01	U	
7440-47-3	CHROMIUM	1	6.6	0.62	0.036		
7440-50-8	COPPER	1	4.7	0.62	0.031		
7439-92-1	LEAD	1	11	0.18	0.088		
7440-02-0	NICKEL	1	4.8	1.2	0.04		
7782-49-2	SELENIUM	1	0.65	0.31	0.13		
7440-22-4	SILVER	1	0.62	0.62	0.037	U	
7440-28-0	THALLIUM	1	0.64	0.49	0.19		

Data Package ID: *IT0404219-1*

Total ICP Metals

Method SW6010

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0404219
Client Name: ESH20_LANL
ClientProject ID: DARHT Surveillance Program, Soil Samples 7H02 CFDW D36

Field ID: WEST
Lab ID: 0404219-3

Sample Matrix: SOIL
% Moisture: 23.7
Date Collected: 20-Apr-04
Date Extracted: 25-May-04
Date Analyzed: 26-May-04

Prep Batch: IP040525-3
QCBatchID: IP040525-3-1
Run ID: IT040526-1A3
Cleanup: NONE
Basis: Dry Weight

Sample Aliquot: 1 g
Final Volume: 50 ml
Result Units: mg/kg
Clean DF: 1
File Name: TS40526

CASNO	Target Analyte	Dilution Factor	Result	Reporting Limit	IDL	Result Qualifier	EPA Qualifier
7440-36-0	ANTIMONY	1	0.34	0.52	0.2	B	
7440-38-2	ARSENIC	1	2.4	0.66	0.2		
7440-39-3	BARIUM	1	130	0.26	0.0042		
7440-41-7	BERYLLIUM	1	1.1	0.26	0.0026		
7440-43-9	CADMIUM	1	0.33	0.33	0.011	U	
7440-47-3	CHROMIUM	1	7.7	0.66	0.038		
7440-50-8	COPPER	1	0.4	0.66	0.033		
7439-92-1	LEAD	1	11	0.2	0.093		
7440-02-0	NICKEL	1	5.9	1.3	0.042		
7782-49-2	SELENIUM	1	0.69	0.33	0.14		
7440-22-4	SILVER	1	0.66	0.66	0.039	U	
7440-28-0	THALLIUM	1	0.52	0.52	0.21	B	

Data Package ID: *IT0404219-1*

Total ICP Metals

Method SW6010
Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0404219
Client Name: ESH20_LANL
ClientProject ID: DARHT Surveillance Program, Soil Samples 7H02 CFDW D36

Field ID: SEDI-N
Lab ID: 0404219-6

Sample Matrix: SEDIMENT
% Moisture: 16.6
Date Collected: 20-Apr-04
Date Extracted: 25-May-04
Date Analyzed: 26-May-04

Prep Batch: IP040525-3
QCBatchID: IP040525-3-1
Run ID: IT040526-1A3
Cleanup: NONE
Basis: Dry Weight

Sample Aliquot: 1 g
Final Volume: 50 ml
Result Units: mg/kg
Clean DF: 1
File Name: TS40526

CASNO	Target Analyte	Dilution Factor	Result	Reporting Limit	IDL	Result Qualifier	EPA Qualifier
7440-36-0	ANTIMONY	1	0.32	0.48	0.19	B	
7440-38-2	ARSENIC	1	2.4	0.6	0.18		
7440-39-3	BARIUM	1	98	0.24	0.0038		
7440-41-7	BERYLLIUM	1	0.76	0.24	0.0024		
7440-43-9	CADMIUM	1	0.3	0.3	0.01	U	
7440-47-3	CHROMIUM	1	6.6	0.6	0.035		
7440-50-8	COPPER	1	5.5	0.6	0.031		
7439-92-1	LEAD	1	9.1	0.18	0.085		
7440-02-0	NICKEL	1	5.8	1.2	0.038		
7782-49-2	SELENIUM	1	0.52	0.3	0.13		
7440-22-4	SILVER	1	0.6	0.6	0.036	U	
7440-28-0	THALLIUM	1	0.58	0.46	0.19		

Data Package ID: *IT0404219-1*

Total ICP Metals

Method SW6010

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0404219
Client Name: ESH20_LANL
ClientProject ID: DARHT Surveillance Program, Soil Samples 7H02 CFDW D36

Field ID: SEDI-E
Lab ID: 0404219-5

Sample Matrix: SEDIMENT
% Moisture: 6.9
Date Collected: 20-Apr-04
Date Extracted: 25-May-04
Date Analyzed: 26-May-04

Prep Batch: IP040525-3
QCBatchID: IP040525-3-1
Run ID: IT040526-1A3
Cleanup: NONE
Basis: Dry Weight

Sample Aliquot: 1 g
Final Volume: 50 ml
Result Units: mg/kg
Clean DF: 1
File Name: TS40526

CASNO	Target Analyte	Dilution Factor	Result	Reporting Limit	IDL	Result Qualifier	EPA Qualifier
7440-36-0	ANTIMONY	1	0.36	0.43	0.17	B	
7440-38-2	ARSENIC	1	1.8	0.54	0.16		
7440-39-3	BARIUM	1	53	0.21	0.0034		
7440-41-7	BERYLLIUM	1	0.47	0.21	0.0022		
7440-43-9	CADMIUM	2	0.54	0.54	0.018	U	
7440-47-3	CHROMIUM	1	6.7	0.54	0.031		
7440-50-8	COPPER	1	3.9	0.54	0.027		
7439-92-1	LEAD	2	7.6	0.32	0.15		
7440-02-0	NICKEL	1	4.2	1.1	0.034		
7782-49-2	SELENIUM	2	0.54	0.54	0.23		
7440-22-4	SILVER	1	0.54	0.54	0.032	U	
7440-28-0	THALLIUM	2	0.86	0.86	0.34	U	

Data Package ID: *IT0404219-1*

Total ICP Metals

Method SW6010

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0404219
Client Name: ESH20_LANL
ClientProject ID: DARHT Surveillance Program, Soil Samples 7H02 CFDW D36

Field ID: SEDI-S
Lab ID: 0404219-6

Sample Matrix: SEDIMENT
% Moisture: 23.7
Date Collected: 20-Apr-04
Date Extracted: 25-May-04
Date Analyzed: 26-May-04

Prep Batch: IP040525-3
QCBatchID: IP040525-3-1
Run ID: IT040526-1A3
Cleanup: NONE
Basis: Dry Weight

Sample Aliquot: 1 g
Final Volume: 50 ml
Result Units: mg/kg
Clean DF: 1
File Name: TS40526

CASNO	Target Analyte	Dilution Factor	Result	Reporting Limit	IDL	Result Qualifier	EPA Qualifier
7440-36-0	ANTIMONY	1	0.52	0.52	0.2	U	
7440-38-2	ARSENIC	1	1.9	0.66	0.2		
7440-39-3	BARIUM	1	92	0.26	0.0042		
7440-41-7	BERYLLIUM	1	0.77	0.26	0.0026		
7440-43-9	CADMIUM	1	0.33	0.33	0.011	U	
7440-47-3	CHROMIUM	1	5.7	0.66	0.038		
7440-50-8	COPPER	1	5	0.66	0.033		
7439-92-1	LEAD	1	9.3	0.2	0.093		
7440-02-0	NICKEL	1	4.4	1.3	0.042		
7782-49-2	SELENIUM	1	0.33	0.33	0.14	U	
7440-22-4	SILVER	1	0.66	0.66	0.039	U	
7440-28-0	THALLIUM	1	0.32	0.52	0.21	B	

Data Package ID: *IT0404219-1*

Total ICP Metals

Method SW6010

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0404219
Client Name: ESH20_LANL
ClientProject ID: DARHT Surveillance Program, Soil Samples 7H02 CFDW D36

Field ID: SED-W
Lab ID: 0404219-7

Sample Matrix: SEDIMENT
% Moisture: 7.7
Date Collected: 20-Apr-04
Date Extracted: 25-May-04
Date Analyzed: 26-May-04

Prep Batch: IP040525-3
QCBatchID: IP040525-3-1
Run ID: IT040526-1A3
Cleanup: NONE
Basis: Dry Weight

Sample Aliquot: 1 g
Final Volume: 50 ml
Result Units: mg/kg
Clean DF: 1
File Name: TS40526

CASNO	Target Analyte	Dilution Factor	Result	Reporting Limit	IDL	Result Qualifier	EPA Qualifier
7440-36-0	ANTIMONY	1	0.43	0.43	0.17	U	
7440-38-2	ARSENIC	1	1.7	0.54	0.16		
7440-39-3	BARIUM	1	66	0.22	0.0035		
7440-41-7	BERYLLIUM	1	0.62	0.22	0.0022		
7440-43-9	CADMIUM	1	0.27	0.27	0.0092	U	
7440-47-3	CHROMIUM	1	5	0.54	0.031		
7440-50-8	COPPER	1	4.6	0.54	0.026		
7439-92-1	LEAD	1	7.1	0.16	0.077		
7440-02-0	NICKEL	1	4.5	1.1	0.035		
7782-49-2	SELENIUM	1	0.49	0.27	0.12		
7440-22-4	SILVER	1	0.54	0.54	0.032	U	
7440-28-0	THALLIUM	1	0.34	0.43	0.17	B	

Data Package ID: *IT0404219-1*

Total MERCURY

Method SW7471

Sample Results

Lab Name: Paragon Analytics
Client Name: ESH20_LANL
Client Project ID: DARHT Surveillance Program, Soil Samples 7H02 CFDW D361 100
Work Order Number: 0404219 **Final Volume:** 100 ml
Reporting Basis: Dry Weight **Matrix:** SOIL
Result Units: mg/kg

Client Sample ID	Lab ID	Date Collected	Date Prepared	Date Analyzed	Percent Moisture	Dilution Factor	Result	Reporting Limit	IDL	Flag	Sample Aliquot
EAST	0404219-1	4/20/2004	5/13/2004	05/13/2004	13.3	1	0.013	0.012	0.00059		0.6 g
SOUTH	0404219-2	4/20/2004	5/13/2004	05/13/2004	18.9	1	0.012	0.012	0.00064		0.6 g
WEST	0404219-3	4/20/2004	5/13/2004	05/13/2004	23.7	1	0.02	0.013	0.00067		0.6 g
NORTH	0404219-4	4/21/2004	5/13/2004	05/13/2004	11.7	1	0.014	0.011	0.00056		0.6 g

Comments:

1. ND or U = Not Detected at or above the client requested detection limit.

Data Package ID: *HG0404219-1*

Total MERCURY

Method SW7471

Sample Results

Lab Name: Paragon Analytics
Client Name: ESH20_LANL
Client Project ID: DARHT Surveillance Program, Soil Samples 7H02 CFDW D361 100
Work Order Number: 0404219 **Final Volume:** 100 ml
Reporting Basis: Dry Weight **Matrix:** SEDIMENT
Result Units: mg/kg

Client Sample ID	Lab ID	Date Collected	Date Prepared	Date Analyzed	Percent Moisture	Dilution Factor	Result	Reporting Limit	IDL	Flag	Sample Aliquot
SEDI-E	0404219-5	4/20/2004	5/13/2004	05/13/2004	6.9	1	0.0068	0.011	0.00055	B	0.6 g
SEDI-S	0404219-6	4/20/2004	5/13/2004	05/13/2004	23.7	1	0.0076	0.013	0.00067	B	0.6 g
SEDI-W	0404219-7	4/20/2004	5/13/2004	05/13/2004	7.7	1	0.0055	0.011	0.00056	B	0.6 g
SEDI-N	0404219-8	4/20/2004	5/13/2004	05/13/2004	16.6	1	0.0099	0.012	0.00062	B	0.6 g

Comments:

1. ND or U = Not Detected at or above the client requested detection limit.

Data Package ID: *HG0404219-1*

APPENDIX C

ANALYTICAL DATA REPORTS OF RADIONUCLIDE CONCENTRATIONS IN UNDERSTORY AND OVERSTORY VEGETATION COLLECTED AROUND THE DARHT FACILITY DURING 2004

Tritium Analysis By Liquid Scintillation Sample Results Summary

Client Name: ESH20_LANL
Client Project Name: DARHT OS Vegetation
Client Project Number: 7H02 CFDW D361 1000

Laboratory Name: Paragon Analytics
PAI Work Order: 0407008

Page: 1 of 1
Reported on: Monday, July 19, 2004 10:00:35 AM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0407008-1	EAST-OS	Sample	H-3	0.65 +/- 0.27	0.39	pCi/ml	LIQUID	3H040709-1	7/16/2004	
0407008-2	SOUTH-OS	Sample	H-3	0.47 +/- 0.26	0.39	pCi/ml	LIQUID	3H040709-1	7/16/2004	LT
0407008-3	WEST-OS	Sample	H-3	0.49 +/- 0.26	0.39	pCi/ml	LIQUID	3H040709-1	7/16/2004	LT
0407008-4	NORTH-OS	Sample	H-3	0.33 +/- 0.25	0.39	pCi/ml	LIQUID	3H040709-1	7/16/2004	U

Comments:

Data Package ID: *h3w0407008-1*

Qualifiers/Flags:

U - Result is less than the sample specific MDC.
LT - Result is less than Requested MDC, greater than sample specific MDC.
Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.
Y2 - Chemical Yield outside default limits.
M - The requested MDC was not met.
M2 - The requested MDC was not met, but the reported activity is greater than the reported MDC

Abbreviations
TPU - Total Propagated Uncertainty (see PAI SOP 740)
MDC - Minimum Detectable Concentration (see PAI SOP 708)

BRL - Below Detection Limit

Strontium-90 Analysis by GFPC Sample Results Summary

Client Name: ESH20_LANL
Client Project Name: DARHT OS Vegetation
Client Project Number: 7H02 CDFW D361 1000

Laboratory Name: Paragon Analytics
PAI Work Order: 0407009

Reported on: Thursday, August 19, 2004 2:57:34 PM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0407009-1	EAST-OS	Sample	Sr-90	6.9 +/- 1.6	0.1	pCi/g	ASH	SR040802-1	8/18/04	M3
0407009-2	SOUTH-OS	Sample	Sr-90	4.4 +/- 1.0	0.1	pCi/g	ASH	SR040802-1	8/18/04	
0407009-3	WEST-OS	Sample	Sr-90	7.1 +/- 1.7	0.1	pCi/g	ASH	SR040802-1	8/18/04	M3
0407009-4	NORTH-OS	Sample	Sr-90	1.06 +/- 0.25	0.04	pCi/g	ASH	SR040728-1	8/17/04	Y2

Comments:

Data Package ID: *SR0407009-1*

Qualifiers/Flags:

U - Result is less than the sample specific MDC.
LT - Result is less than Requested MDC, greater than sample specific MDC.
Y1 - Chemical Yield is in control at 109-110%. Quantitative Yield is assumed.
Y2 - Chemical Yield outside default limits.
M - The requested MDC was not met.
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

Abbreviations:
TPU - Total Propagated Uncertainty (see PAI SOP 743)
MDC - Minimum Detectable Concentration (see PAI SOP 709)

BDL - Below Detection Limit

Isotopic Plutonium By Alpha Spectroscopy Sample Results Summary

Client Name: ESH20_LANL
Client Project Name: DARHT OS Vegetation
Client Project Number: 7H02 CDFW D361 1000

Laboratory Name: Paragon Analytics
PAI Work Order: 0407009

Page: 1 of 1
Reported on: Thursday, August 19, 2004
9:52:19 AM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0407009-1	EAST-OS	Sample	Pu-238	-0.0005 +/- 0.0031	0.0048	pCi/g	ASH	AS040802-4	8/8/2004	U
0407009-1	EAST-OS	Sample	Pu-239	0.0031 +/- 0.0031	0.0021	pCi/g	ASH	AS040802-4	8/8/2004	LT
0407009-2	SOUTH-OS	Sample	Pu-238	-0.0002 +/- 0.0034	0.0065	pCi/g	ASH	AS040802-4	8/8/2004	U
0407009-2	SOUTH-OS	Sample	Pu-239	0.0033 +/- 0.0034	0.0023	pCi/g	ASH	AS040802-4	8/8/2004	LT
0407009-3	WEST-OS	Sample	Pu-238	-0.0018 +/- 0.0030	0.0072	pCi/g	ASH	AS040802-4	8/8/2004	U
0407009-3	WEST-OS	Sample	Pu-239	0.0025 +/- 0.0031	0.0046	pCi/g	ASH	AS040802-4	8/8/2004	U

Comments:

Data Package ID: *pu0407009-1*

Qualifiers/Flags:

U - Result is less than the sample specific MDC.
LT - Result is less than Requested MDC, greater than sample specific MDC.
Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.
Y2 - Chemical Yield outside default limits.
M - The requested MDC was not met.
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

Abbreviations:
TPU - Total Propagated Uncertainty (see PAI SOP 743)
MDC - Minimum Detectable Concentration (see PAI SOP 709)

BDL - Below Detection Limit

Isotopic Americium By Alpha Spectroscopy Sample Results Summary

Client Name: ESH20_LANL
Client Project Name: DARHT OS Vegetation
Client Project Number: 7H02 CDFW D361 1000

Laboratory Name: Paragon Analytics
PAI Work Order: 0407009

Reported on: Thursday, August 19, 2004 9:42:06 AM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0407009-1	EAST-OS	Sample	Am-241	0.0014 +/- 0.0052	0.0038	pCi/g	ASH	AS040802-4	8/10/2004	U
0407009-2	SOUTH-OS	Sample	Am-241	0.0014 +/- 0.0053	0.0039	pCi/g	ASH	AS040802-4	8/10/2004	U
0407009-3	WEST-OS	Sample	Am-241	0 +/- 0.0040	0.0029	pCi/g	ASH	AS040802-4	8/10/2004	U
0407009-4	NORTH-OS	Sample	Am-241	0.0016 +/- 0.0014	0.0007	pCi/g	ASH	AS040728-3	8/10/2004	LT

Comments:

Data Package ID: *am0407009-1*

Qualifiers/Flags:

U - Result is less than the sample specific MDC.
LT - Result is less than Requested MDC, greater than sample specific MDC.
Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed
Y2 - Chemical Yield outside default limits.
M - The requested MDC was not met.
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

Abbreviations:
TPU - Total Propagated Uncertainty (see PAI SOP 743)
MDC - Minimum Detectable Concentration (see PAI SOP 709)

BDL - Below Detection Limit

Gamma Spectroscopy Results

PAI 713 Rev 8

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0407009
Client Name: ESHZC_LANL
ClientProject ID: DARHT OS Vegetation 7H02 CDFW D361 1000

Field ID: EAST-OS
Lab ID: 0407009-1

Library: USGS

Sample Matrix: ASH
Prep SOP: PAI 739 Rev 8
Date Collected: 18-Jun-04
Date Prepared: 13-Jul-04
Date Analyzed: 23-Jul-04

Prep Batch: GS040713-3
QCBatchID: GS040713-3-1
Run ID: GS040713-3A
Count Time: 180 minutes
Report Basis: As Received

Final Aliquot: 10.0 g
Prep Basis: As Received
Moisture(%): NA
Result Units: pCi/g
File Name: 041284D02A

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
10045-97-3	Cs-137	0.30 +/- 0.55	0.92	U

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.
Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.
Y2 - Chemical Yield outside default limits.
LT - Result is less than Requested MDC, greater than sample specific MDC.
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.
M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)
MDC - Minimum Detectable Concentration (see PAI SOP 739)
BDL - Below Detection Limit

SC - Spectral quality prevents accurate quantitation.
SI - Nuclide identification and/or quantitation is tentative.
TI - Nuclide identification is tentative.
R - Nuclide has exceeded 5 halflives.
G - Sample density differs by more than 15% of LCS density.

Data Package ID: *GSA0407009-1*

Date Printed: Thursday, August 19, 2004

Paragon Analytics
LIMS Version: 5.052A

000003

Gamma Spectroscopy Results

PAI 713 Rev 8

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0407009
Client Name: ESH20_LANL
ClientProject ID: DARHT OS Vegetation 7H02 CDFW D361 1000

Field ID: SOUTH-OS
Lab ID: 0407009-2

Library: USGS

Sample Matrix: ASH
Prep SOP: PAI 739 Rev 8
Date Collected: 18-Jun-04
Date Prepared: 13-Jul-04
Date Analyzed: 23-Jul-04

Prep Batch: GS040713-3
QCBatchID: GS040713-3-1
Run ID: GS040713-3A
Count Time: 150 minutes
Report Basis: As Received

Final Aliquot: 8.41 g
Prep Basis: As Received
Moisture(%): NA
Result Units: pCi/g
File Name: 0407009-2A

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
10045-97-3	Cs-137	-0.36 +/- 0.52	0.90	U

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

BDL - Below Detection Limit

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 nativives

G - Sample density differs by more than 15% of LCS density.

Data Package ID: *GSA0407009-1*

Gamma Spectroscopy Results

PAI 713 Rev 8

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0407009
Client Name: ESH20_LANL
ClientProject ID: DARHT OS Vegetation 7H02 CDFW D361 1000

Field ID: WEST-OS
Lab ID: 0407009-3

Library: USGS

Sample Matrix: ASH
Prep SOP: PAI 739 Rev 8
Date Collected: 18-Jun-04
Date Prepared: 13-Jul-04
Date Analyzed: 23-Jul-04

Prep Batch: GS040713-3
QCBatchID: GS040713-3-1
Run ID: GS040713-3X
Count Time: 180 minutes
Report Basis: As Received

Final Aliquot: 10.1 g
Prep Basis: As Received
Moisture(%): NA
Result Units: pCi/g
File Name: 041285D02A

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
10045-97-3	Cs-137	0.17 +/- 0.58	1.00	U

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M5 - The requested MDC was not met, but the reported activity is greater than the reported MDC

M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation

SI - Nuclide identification, and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 5 half-lives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 739)

BDL - Below Detection Limit

Data Package ID: *GSA0407009-1*

Date Printed: Monday, August 23, 2004

Paragon Analytics
LIMS Version: 5.053A

Gamma Spectroscopy Results

PAI 713 Rev 8

Sample Duplicate Results

Lab Name: Paragon Analytics
Work Order Number: 0407009
Client Name: ESH20_LANL
ClientProject ID: DARHT OS Vegetation 7H02 CDFW D361 1000

Field ID: WEST-OS
Lab ID: 0407009-3DUP

Library: USGS

Sample Matrix: ASH
Prep SOP: PAI 739 Rev 8
Date Collected: 18-Jun-04
Date Prepared: 13-Jul-04
Date Analyzed: 24-Jul-04

Prep Batch: GS040713-3
QCBatchID: GS040713-3-1
Run ID: GS040713-3X
Count Time: 300.2833 minutes
Report Basis: As Received

Final Aliquot: 10.1 g
Prep Basis: As Received
Moisture(%): NA
Result Units: pCi/g
File Name: 041248D07B

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
10045-97-3	Cs-137	-0.22 +/- 0.50	0.90	U

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.
Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.
Y2 - Chemical Yield outside default limits.
LT - Result is less than Requested MDC, greater than sample specific MDC.
M - The requested MDC was not met.
M3 - The requested MDC was not met, but thereported activity is greater than the reported MDC.
W - DER is greater than Warning Limit of 1.42
D - DER is greater than Control Limit of 2.13
SQ - Spectral quality prevents accurate quantitation.
SI - Nuclide identification and/or quantitation is tentative.
TI - Nuclide identification is tentative.
R - Nuclide has exceeded 8 half-lives.
G - Sample density differs by more than 15% of LCS density.

Abbreviations:
TPU - Total Propagated Uncertainty (see PAI SOP 743)
MDC - Minimum Detectable Concentration (see PAI SOP 709)
BDL - Below Detection Limit

Data Package ID: *GSA0407009-1*

Date Printed: Monday, August 23, 2004

Paragon Analytics
LIMS Version: 5.653A

Gamma Spectroscopy Results

PAI 713 Rev 8

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0407009
Client Name: ESH20_LANL
ClientProject ID: DARHT OS Vegetation 7H02 CDFW D361 1000

Field ID: NORTH-OS
Lab ID: 0407009-4

Library: USGS

Sample Matrix: ASH
Prep SOP: PAI 739 Rev 8
Date Collected: 21-Jun-04
Date Prepared: 13-Jul-04
Date Analyzed: 24-Jul-04

Prep Batch: GS040713-3
QCBatchID: GS040713-3-1
Run ID: GS040713-3A
Count Time: 400 minutes
Report Basis: As Received

Final Aliquot: 7.04 g
Prep Basis: As Received
Moisture(%): NA
Result Units: pCi/g
File Name: 041461D04A

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
10045-97-3	Cs-137	-0.01 +/- 0.55	0.98	U

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC

M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 769)

BDL - Below Detection Limit

Data Package ID: *GSA0407009-1*

Isotopic Uranium By Alpha Spectroscopy Sample Results Summary

Client Name: ESH20_LANL
Client Project Name: DARHT OS Vegetation
Client Project Number: 7H02 CDFW D361 1000

Laboratory Name: Paragon Analytics
PAI Work Order: 0407009

Reported on: Thursday, August 19, 2004 10:42:38 AM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0407009-1	EAST-OS	Sample	U-234	0.531 +/- 0.089	0.010	pCi/g	ASH	AS040802-4	8/5/2004	M3
0407009-1	EAST-OS	Sample	U-235	0.054 +/- 0.014	0.005	pCi/g	ASH	AS040802-4	8/5/2004	
0407009-1	EAST-OS	Sample	U-238	3.61 +/- 0.57	0.01	pCi/g	ASH	AS040802-4	8/5/2004	
0407009-2	SOUTH-OS	Sample	U-234	0.238 +/- 0.043	0.006	pCi/g	ASH	AS040802-4	8/5/2004	
0407009-2	SOUTH-OS	Sample	U-235	0.0125 +/- 0.0058	0.0040	pCi/g	ASH	AS040802-4	8/5/2004	
0407009-2	SOUTH-OS	Sample	U-238	0.81 +/- 0.13	0	pCi/g	ASH	AS040802-4	8/5/2004	
0407009-3	WEST-OS	Sample	U-234	0.221 +/- 0.040	0.004	pCi/g	ASH	AS040802-4	8/5/2004	
0407009-3	WEST-OS	Sample	U-235	0.0197 +/- 0.0073	0.0039	pCi/g	ASH	AS040802-4	8/5/2004	
0407009-3	WEST-OS	Sample	U-238	0.80 +/- 0.13	0	pCi/g	ASH	AS040802-4	8/5/2004	

Comments:

Data Package ID: *ur0407009-1*

Qualifiers/Flags:

U - Result is less than the sample specific MDC.
LT - Result is less than Requested MDC, greater than sample specific MDC.
Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.
Y2 - Chemical Yield outside default limits.
M - The requested MDC was not met.
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

Abbreviations:
TPU - Total Propagated Uncertainty (see PAI SOP 749)
MDC - Minimum Detectable Concentration (see PAI SOP 759)

BDL - Below Detection Limit

Isotopic Uranium By Alpha Spectroscopy Sample Results Summary

Client Name: ESH20_LANL
Client Project Name: DARHT OS Vegetation
Client Project Number: 7H02 CDFW D361 1000

Laboratory Name: Paragon Analytics
PAI Work Order: 0407009

Reported on: Thursday, August 19, 2004 10:42:38 AM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0407009-4	NORTH-OS	Sample	U-234	0.435 +/- 0.073	0.003	pCi/g	ASH	AS040728-3	8/6/2004	
0407009-4	NORTH-OS	Sample	U-235	0.0305 +/- 0.0082	0.0010	pCi/g	ASH	AS040728-3	8/6/2004	
0407009-4	NORTH-OS	Sample	U-238	1.99 +/- 0.32	0	pCi/g	ASH	AS040728-3	8/6/2004	

Comments:

Data Package ID: *ur0407009-1*

Qualifiers/Flags:

U - Result is less than the sample specific MDC.
LT - Result is less than Requested MDC, greater than sample specific MDC
Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.
Y2 - Chemical Yield outside default limits.
M - The requested MDC was not met.
M9 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

Abbreviations:
TPU - Total Propagated Uncertainty (see PAI SOP 743)
MDC - Minimum Detectable Concentration (see PAI SOP 709)

BDL - Below Detection Limit

Isotopic Uranium By Alpha Spectroscopy Sample Results Summary

Client Name: ESH20_LANL
Client Project Name: DARHT OS Vegetation
Client Project Number: 7H02 CDFW D351 1000

Laboratory Name: Paragon Analytics
PAI Work Order: 0407009

Page: 1 of 2
Reported on: Thursday, August 19, 2004 10:44:20 AM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0407009-1	EAST-OS	Sample	U-234	8.6E-05 +/- 1.4E-05	2E-06	ug/g	ASH	AS040802-4	8/5/2004	M3
0407009-1	EAST-OS	Sample	U-235	2.52E-02 +/- 6.4E-03	2.2E-03	ug/g	ASH	AS040802-4	8/5/2004	
0407009-1	EAST-OS	Sample	U-238	1.07E+01 +/- 1.7E+00	0E+00	ug/g	ASH	AS040802-4	8/5/2004	
0407009-1	EAST-OS	Sample	URANIUM, TOTAL	1.08E+01 +/- 1.7E+00	NA	ug/g	ASH	AS040802-4	8/5/2004	
0407009-2	SOUTH-OS	Sample	U-234	3.82E-05 +/- 6.9E-06	9E-07	ug/g	ASH	AS040802-4	8/5/2004	
0407009-2	SOUTH-OS	Sample	U-235	5.8E-03 +/- 2.7E-03	1.9E-03	ug/g	ASH	AS040802-4	8/5/2004	
0407009-2	SOUTH-OS	Sample	U-238	2.41E+00 +/- 4E-01	1E-02	ug/g	ASH	AS040802-4	8/5/2004	
0407009-2	SOUTH-OS	Sample	URANIUM, TOTAL	2.42E+00 +/- 4E-01	NA	ug/g	ASH	AS040802-4	8/5/2004	
0407009-3	WEST-OS	Sample	U-234	3.53E-05 +/- 6.4E-06	7E-07	ug/g	ASH	AS040802-4	8/5/2004	

Comments:

Data Package ID: *utot0407009-1*

Qualifiers/Flags:

U - Result is less than the sample specific MDC.
LT - Result is less than Requested MDC, greater than sample specific MDC
Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed
Y2 - Chemical Yield outside default limits.
M - The requested MDC was not met.
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)
MDC - Minimum Detectable Concentration (see PAI SOP 709)

BDL - Below Detection Limit

Isotopic Uranium By Alpha Spectroscopy Sample Results Summary

Client Name: ESH20_LANL
Client Project Name: DARHT OS Vegetation
Client Project Number: 7H02 CDFW D361 1000

Laboratory Name: Paragon Analytics
PAI Work Order: 0407009

Reported on: Thursday, August 19, 2004 10:44:20 AM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0407009-3	WEST-OS	Sample	U-235	9.1E-03 +/- 3.4E-03	1.8E-03	ug/g	ASH	AS040802-4	8/5/2004	
0407009-3	WEST-OS	Sample	U-238	2.39E+00 +/- 3.9E-01	1E-02	ug/g	ASH	AS040802-4	8/5/2004	
0407009-3	WEST-OS	Sample	URANIUM, TOTAL	2.4E+00 +/- 3.9E-01	NA	ug/g	ASH	AS040802-4	8/5/2004	
0407009-4	NORTH-OS	Sample	U-234	7E-05 +/- 1.2E-05	0E+00	ug/g	ASH	AS040728-3	8/6/2004	
0407009-4	NORTH-OS	Sample	U-235	1.41E-02 +/- 3.8E-03	4E-04	ug/g	ASH	AS040728-3	8/6/2004	
0407009-4	NORTH-OS	Sample	U-238	5.93E+00 +/- 9.5E-01	1E-02	ug/g	ASH	AS040728-3	8/6/2004	
0407009-4	NORTH-OS	Sample	URANIUM, TOTAL	5.95E+00 +/- 9.5E-01	NA	ug/g	ASH	AS040728-3	8/6/2004	

Comments:

Data Package ID: *utot0407009-1*

Qualifiers/Flags:

U - Result is less than the sample specific MDC.
LT - Result is less than Requested MDC, greater than sample specific MDC
Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.
Y2 - Chemical Yield outside default limits.
M - The requested MDC was not met
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC

Abbreviations:
TPU - Total Propagated Uncertainty (see PALSOP 743)
MDC - Minimum Detectable Concentration (see PALSOP 709)

BDL - Below Detection Limit

Tritium Analysis By Liquid Scintillation Sample Results Summary

Client Name: ESH20_LANL
Client Project Name: DARHT US Vegetation
Client Project Number: 7H02 CFDW D361 1000

Laboratory Name: Paragon Analytics
PAI Work Order: 0407007

Page: 1 of 1
Reported on: Monday, July 19, 2004 10:00:10 AM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0407007-1	EAST-US	Sample	H-3	0.27 +/- 0.25	0.39	pCi/ml	LIQUID	3H040709-1	7/16/2004	U
0407007-2	SOUTH-US	Sample	H-3	0.25 +/- 0.24	0.39	pCi/ml	LIQUID	3H040709-1	7/16/2004	U
0407007-3	WEST-US	Sample	H-3	0.24 +/- 0.24	0.39	pCi/ml	LIQUID	3H040709-1	7/16/2004	U
0407007-4	NORTH-US	Sample	H-3	0.25 +/- 0.24	0.39	pCi/ml	LIQUID	3H040709-1	7/16/2004	U

Comments:

Data Package ID: *h3w0407007-1*

Qualifiers/Flags:

U - Result is less than the sample specific MDC.
LT - Result is less than Requested MDC, greater than sample specific MDC.
Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.
Y2 - Chemical Yield outside default limits.
M - The requested MDC was not met.
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

Abbreviations:
TPU - Total Propagated Uncertainty (see PAI SOP 743)
MDC - Minimum Detectable Concentration (see PAI SOP 209)

BDL - Below Detection Limit

Isotopic Plutonium By Alpha Spectroscopy Sample Results Summary

Client Name: ESH20_LANL
Client Project Name: DARHT US Vegetation
Client Project Number: 7H02 CDFW 0361 1000

Laboratory Name: Paragon Analytics
PAI Work Order: 0407010

Page: 1 of 1
Reported on: Thursday, August 19, 2004
12:28:49 PM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0407010-1	EAST-US	Sample	Pu-238	0.0020 +/- 0.0034	0.0052	pCi/g	ASH	AS040802-4	8/8/2004	U
0407010-1	EAST-US	Sample	Pu-239	-0.0010 +/- 0.0033	0.0065	pCi/g	ASH	AS040802-4	8/8/2004	U
0407010-2	SOUTH-US	Sample	Pu-238	0.0002 +/- 0.0031	0.0058	pCi/g	ASH	AS040802-4	8/8/2004	U
0407010-2	SOUTH-US	Sample	Pu-239	0.0026 +/- 0.0032	0.0048	pCi/g	ASH	AS040802-4	8/8/2004	U
0407010-3	WEST-US	Sample	Pu-238	-0.0007 +/- 0.0033	0.0073	pCi/g	ASH	AS040802-4	8/8/2004	U
0407010-3	WEST-US	Sample	Pu-239	-0.0005 +/- 0.0033	0.0052	pCi/g	ASH	AS040802-4	8/8/2004	U
0407010-4	NORTH-US	Sample	Pu-238	0.0003 +/- 0.0033	0.0051	pCi/g	ASH	AS040802-4	8/8/2004	U
0407010-4	NORTH-US	Sample	Pu-239	0.0037 +/- 0.0047	0.0060	pCi/g	ASH	AS040802-4	8/8/2004	U

Comments:

Data Package ID: *pu0407010-1*

Qualifiers/Flags:

U - Result is less than the sample specific MDC.
LT - Result is less than Requested MDC, greater than sample specific MDC.
Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.
Y2 - Chemical Yield outside default limits
M - The requested MDC was not met.
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

Abbreviations:
TPU - Total Propagated Uncertainty (see PAI SOP 743)
MDC - Minimum Detectable Concentration (see PAI SOP 709)
BDL - Below Detection Limit

Isotopic Americium By Alpha Spectroscopy Sample Results Summary

Client Name: ESH20_LANL
Client Project Name: DARHT US Vegetation
Client Project Number: 7H02 CDFW D361 1000

Laboratory Name: Paragon Analytics
PAI Work Order: 0407010

Reported on: Thursday, August 19, 2004 12:18:52 PM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0407010-1	EAST-US	Sample	Am-241	0 +/- 0.0047	0.0034	pCi/g	ASH	AS040802-4	8/10/2004	U
0407010-2	SOUTH-US	Sample	Am-241	0.0005 +/- 0.0048	0.0073	pCi/g	ASH	AS040802-4	8/10/2004	U
0407010-3	WEST-US	Sample	Am-241	0.0046 +/- 0.0047	0.0031	pCi/g	ASH	AS040802-4	8/10/2004	LT
0407010-4	NORTH-US	Sample	Am-241	0.0007 +/- 0.0044	0.0067	pCi/g	ASH	AS040802-4	8/10/2004	U

Comments:

Data Package ID: *am0407010-1*

Qualifiers/Flags:

U - Result is less than the sample specific MDC.
LT - Result is less than Requested MDC, greater than sample specific MDC.
Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.
Y2 - Chemical Yield outside default limits.
M - The requested MDC was not met.
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

Abbreviations:
TPU - Total Propagated Uncertainty (see PAI SOP 743)
MDC - Minimum Detectable Concentration (see PAI SOP 709)

BDL - Below Detection Limit

Gamma Spectroscopy Results

PAI 713 Rev 8

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0407010
Client Name: ESH20_LANL
ClientProject ID: DARHT US Vegetation 7H02 CDFW D361 1000

Field ID: EAST-US **Lab ID:** 0407010-1	**Sample Matrix:** ASH **Prep SOP:** PAI 739 Rev 8 **Date Collected:** 18-Jun-04 **Date Prepared:** 13-Jul-04 **Date Analyzed:** 24-Jul-04	**Prep Batch:** GS040713-4 **QCBatchID:** GS040713-4-1 **Run ID:** GS040713-4A **Count Time:** 400 minutes **Report Basis:** As Received	**Final Aliquot:** 10.0 g **Prep Basis:** As Received **Moisture(%):** NA **Result Units:** pCi/g **File Name:** 041337D03A
Library: USGS			

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
10045-97-3	Cs-137	-0.50 +/- 0.42	0.76	U

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M2 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

SO - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

BDL - Below Detection Limit

Data Package ID: *GSA0407010-1*

Gamma Spectroscopy Results

PAI 713 Rev 8

Sample Duplicate Results

Lab Name: Paragon Analytics
Work Order Number: 0407010
Client Name: ESH20_LANL
ClientProject ID: DARHT US Vegetation 7H02 CDFW D361 1000

Field ID: EAST-US
Lab ID: 0407010-1DUP

Library: USGS

Sample Matrix: ASH
Prep SOP: PAI 739 Rev 8
Date Collected: 18-Jun-04
Date Prepared: 13-Jul-04
Date Analyzed: 24-Jul-04

Prep Batch: GS040713-4
QCBatchID: GS040713-4-1
Run ID: GS040713-4A
Count Time: 400 minutes
Report Basis: As Received

Final Aliquot: 10.1 g
Prep Basis: As Received
Moisture(%): NA
Result Units: pCi/g
File Name: 041462D04A

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
10045-97-3	Cs-137	0.19 +/- 0.41	0.70	U

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.
Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.
Y2 - Chemical Yield outside default limits.
LT - Result is less than Requested MDC, greater than sample specific MDC.
M - The requested MDC was not met.
M3 - The requested MDC was not met, but transported activity is greater than the reported MDC.
W - DER is greater than Warning Limit of 1.42
D - DER is greater than Control Limit of 2.13
SQ - Spectral quality prevents accurate quantitation.
SI - Nuclide identification and/or quantitation is tentative.
TI - Nuclide identification is tentative
R - Nuclide has exceeded 5 half lives.
G - Sample density differs by more than 15% of LCS density.

Abbreviations:
TPU - Total Propagated Uncertainty (see PAI SOP 743)
MDC - Minimum Detectable Concentration (see PAI SOP 708)
BDL - Below Detection Limit

Data Package ID: *GSA0407010-1*

Date Printed: Friday, August 13, 2004

Paragon Analytics
LIMS Version: 5.052A

Gamma Spectroscopy Results

PAI 713 Rev 8

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0407010
Client Name: ESH20_LANL
ClientProject ID: DARHT US Vegetation 7H02 CDFW D361 1000

Field ID: SOUTH-US **Lab ID:** 0407010-2	**Sample Matrix:** ASH **Prep SOP:** PAI 739 Rev 8 **Date Collected:** 18-Jun-04 **Date Prepared:** 13-Jul-04 **Date Analyzed:** 25-Jul-04	**Prep Batch:** GS040713-4 **QCBatchID:** GS040713-4-1 **Run ID:** GS040713-4A **Count Time:** 400 minutes **Report Basis:** As Received	**Final Aliquot:** 10.1 g **Prep Basis:** As Received **Moisture(%):** NA **Result Units:** pCi/g **File Name:** 041294D05A

Library: USGS

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
10045-97-3	Cs-137	0.16 +/- 0.37	0.63	U

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M5 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

SC - Spectral quality prevents accurate quantitation.

SI - Nuclide identification, and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

BDL - Below Detection Limit

Data Package ID: *GSA0407010-1*

Gamma Spectroscopy Results

PAI 713 Rev 8

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0407010
Client Name: ESH20_LANL
ClientProject ID: DARHT US Vegetation 7H02 CDFW D361 1000

Field ID: WEST-US
Lab ID: 0407010-3

Library: USGS

Sample Matrix: ASH
Prep SOP: PAI 739 Rev 6
Date Collected: 16-Jun-04
Date Prepared: 13-Jul-04
Date Analyzed: 25-Jul-04

Prep Batch: GS040713-4
QCBatchID: GS040713-4-1
Run ID: GS040713-4A
Count Time: 400 minutes
Report Basis: As Received

Final Aliquot: 10.2 g
Prep Basis: As Received
Moisture(%): NA
Result Units: pCi/g
File Name: 041339D03A

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
10045-97-3	Cs-137	0.15 +/- 0.45	0.75	U

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU
Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.
Y2 - Chemical Yield outside default limits.
LT - Result is less than Requested MDC, greater than sample specific MDC.
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.
M - The requested MDC was not met.
SQ - Spectral quality prevents accurate quantitation.
SI - Nuclide identification and/or quantitation is tentative.
TI - Nuclide identification is tentative.
R - Nuclide has exceeded 8 halflives.
G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)
MDC - Minimum Detectable Concentration (see PAI SOP 709)
BDL - Below Detection Limit

Data Package ID: *GSA0407010-1*

Gamma Spectroscopy Results

PAI 713 Rev 8

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0407010
Client Name: ESH20_LANL
ClientProject ID: DARHT US Vegetation 7H02 CDFW D361 1000

Field ID: NORTH-US **Lab ID:** 0407010-4	**Sample Matrix:** ASH **Prep SOP:** PAI 739 Rev 8 **Date Collected:** 21-Jun-04 **Date Prepared:** 13-Jul-04 **Date Analyzed:** 25-Jul-04	**Prep Batch:** GS040713-4 **QCBatchID:** GS040713-4-1 **Run ID:** GS040713-4A **Count Time:** 400 minutes **Report Basis:** As Received	**Final Aliquot:** 10.0 g **Prep Basis:** As Received **Moisture(%):** NA **Result Units:** pCi/g **File Name:** 041464D04B
Library: USGS			

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
10045-97-3	Cs-137	-0.20 +/- 0.44	0.78	U

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantation.

S1 - Nuclide identification and/or quantitation is tentative.

T1 - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

BDL - Below Detection Limit

Data Package ID: *GSA0407010-1*

Isotopic Uranium By Alpha Spectroscopy Sample Results Summary

Client Name: ESH20_LANL
Client Project Name: DARHT US Vegetation
Client Project Number: 7H02 CDFW D361 1000

Laboratory Name: Paragon Analytics
PAI Work Order: 0407010

Reported on: Thursday, August 19, 2004
12:03:55 PM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0407010-1	EAST-US	Sample	U-234	0.076 +/- 0.017	0.008	pCi/g	ASH	AS040802-4	8/5/2004	
0407010-1	EAST-US	Sample	U-235	0.0100 +/- 0.0055	0.0090	pCi/g	ASH	AS040802-4	8/5/2004	
0407010-1	EAST-US	Sample	U-238	0.351 +/- 0.060	0.003	pCi/g	ASH	AS040802-4	8/5/2004	
0407010-2	SOUTH-US	Sample	U-234	0.0258 +/- 0.0083	0.0060	pCi/g	ASH	AS040802-4	8/5/2004	
0407010-2	SOUTH-US	Sample	U-235	0.0005 +/- 0.0026	0.0054	pCi/g	ASH	AS040802-4	8/5/2004	U
0407010-2	SOUTH-US	Sample	U-238	0.0360 +/- 0.0100	0.0060	pCi/g	ASH	AS040802-4	8/5/2004	
0407010-3	WEST-US	Sample	U-234	0.040 +/- 0.011	0.006	pCi/g	ASH	AS040802-4	8/5/2004	
0407010-3	WEST-US	Sample	U-235	0.0049 +/- 0.0037	0.0045	pCi/g	ASH	AS040802-4	8/5/2004	LT
0407010-3	WEST-US	Sample	U-238	0.053 +/- 0.013	0.004	pCi/g	ASH	AS040802-4	8/5/2004	

Comments:

Data Package ID: *ur0407010-1*

Qualifiers/Flags:
U - Result is less than the sample specific MDC.
LT - Result is less than Requested MDC, greater than sample specific MDC.
Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.
Y2 - Chemical Yield outside default limits.
M - The requested MDC was not met.
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

Abbreviations:
TPU - Total Propagated Uncertainty (see PAI SOP 743)
MDC - Minimum Detectable Concentration (see PAI SOP 709)

BDL - Below Detection Limit

Isotopic Uranium By Alpha Spectroscopy Sample Results Summary

Client Name: ESH20_LANL
Client Project Name: DARHT US Vegetation
Client Project Number: 7H02 CDFW D361 1000

Laboratory Name: Paragon Analytics
PAI Work Order: 0407010

Reported on: Thursday, August 19, 2004 12:03:55 PM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0407010-4	NORTH-US	Sample	U-234	0.188 +/- 0.035	0.006	pCi/g	ASH	AS040802-4	8/5/2004	
0407010-4	NORTH-US	Sample	U-235	0.0105 +/- 0.0051	0.0015	pCi/g	ASH	AS040802-4	8/5/2004	
0407010-4	NORTH-US	Sample	U-238	0.382 +/- 0.066	0.006	pCi/g	ASH	AS040802-4	8/5/2004	

Comments:

Data Package ID: *ur0407010-1*

Qualifiers/Flags:

U - Result is less than the sample specific MDC.
LT - Result is less than Requested MDC, greater than sample specific MDC.
Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.
Y2 - Chemical Yield outside default limits.
M - The requested MDC was not met.
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)
MDC - Minimum Detectable Concentration (see PAI SOP 709)

BDL - Below Detection Limit

Isotopic Uranium By Alpha Spectroscopy Sample Results Summary

Client Name: ESH20_LANL
Client Project Name: DARHT US Vegetation
Client Project Number: 7H02 CDFW D361 1000

Laboratory Name: Paragon Analytics
PAI Work Order: 0407010

Reported on: Thursday, August 19, 2004 12:03:09 PM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0407010-1	EAST-US	Sample	U-234	1.22E-05 +/- 2.7E-06	1.3E-06	ug/g	ASH	AS040802-4	8/5/2004	
0407010-1	EAST-US	Sample	U-235	4.8E-03 +/- 2.6E-03	2.8E-03	ug/g	ASH	AS040802-4	8/5/2004	
0407010-1	EAST-US	Sample	U-238	1.04E+00 +/- 1.8E-01	1E-02	ug/g	ASH	AS040802-4	8/5/2004	
0407010-1	EAST-US	Sample	URANIUM, TOTAL	1.05E+00 +/- 1.8E-01	NA	ug/g	ASH	AS040802-4	8/5/2004	
0407010-2	SOUTH-US	Sample	U-234	4.1E-06 +/- 1.3E-06	1E-06	ug/g	ASH	AS040802-4	8/5/2004	
0407010-2	SOUTH-US	Sample	U-235	2E-04 +/- 1.2E-03	2.5E-03	ug/g	ASH	AS040802-4	8/5/2004	U
0407010-2	SOUTH-US	Sample	U-238	1.07E-01 +/- 3E-02	1.8E-02	ug/g	ASH	AS040802-4	8/5/2004	
0407010-2	SOUTH-US	Sample	URANIUM, TOTAL	1.07E-01 +/- 3E-02	NA	ug/g	ASH	AS040802-4	8/5/2004	
0407010-3	WEST-US	Sample	U-234	6.3E-06 +/- 1.7E-06	1E-06	ug/g	ASH	AS040802-4	8/5/2004	

Comments:

Data Package ID: *utot0407010-1*

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

LT - Result is less than Requested MDC, greater than sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

M - The requested MDC was not met.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

BDL - Below Detection Limit

07010

Isotopic Uranium By Alpha Spectroscopy Sample Results Summary

Client Name: ESH20_LANL
Client Project Name: DARHT US Vegetation
Client Project Number: 7H02 CDFW D361 1000

Laboratory Name: Paragon Analytics
PAI Work Order: 0407010

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Reported on: Thursday, August 19, 2004 12:03:09 PM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0407010-3	WEST-US	Sample	U-235	2.3E-03 +/- 1.7E-03	2.1E-03	ug/g	ASH	AS040802-4	8/5/2004	LT
0407010-3	WEST-US	Sample	U-238	1.57E-01 +/- 3.8E-02	1.2E-02	ug/g	ASH	AS040802-4	8/5/2004	
0407010-3	WEST-US	Sample	URANIUM, TOTAL	1.6E-01 +/- 3.8E-02	NA	ug/g	ASH	AS040802-4	8/5/2004	
0407010-4	NORTH-US	Sample	U-234	3.02E-05 +/- 5.7E-06	9E-07	ug/g	ASH	AS040802-4	8/5/2004	
0407010-4	NORTH-US	Sample	U-235	4.9E-03 +/- 2.4E-03	7E-04	ug/g	ASH	AS040802-4	8/5/2004	
0407010-4	NORTH-US	Sample	U-238	1.14E+00 +/- 2E-01	2E-02	ug/g	ASH	AS040802-4	8/5/2004	
0407010-4	NORTH-US	Sample	URANIUM, TOTAL	1.14E+00 +/- 2E-01	NA	ug/g	ASH	AS040802-4	8/5/2004	

Comments:

Data Package ID: *utol0407010-1*

Qualifiers/Flags:

U - Result is less than the sample specific MDC.
LT - Result is less than Requested MDC, greater than sample specific MDC.
Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.
Y2 - Chemical Yield outside default limits.
M - The requested MDC was not met.
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

Abbreviations:
TPU - Total Propagated Uncertainty (see PAI SOP 743)
MDC - Minimum Detectable Concentration (see PAI SOP 709)

BDL - Below Detection Limit

Strontium-90 Analysis by GFPC Sample Results Summary

Client Name: ESH20_LANL
Client Project Name: DARHT US Vegetation
Client Project Number: 7H02 CDFW D361 1000

Laboratory Name: Paragon Analytics
PAI Work Order: 0407010

Page: 1 of 1
Reported on: Thursday, August 19, 2004
3:00:28 PM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0407010-1	EAST-US	Sample	Sr-90	0.71 +/- 0.17	0.04	pCi/g	ASH	SR040802-1	8/18/04	
0407010-2	SOUTH-US	Sample	Sr-90	1.21 +/- 0.29	0.04	pCi/g	ASH	SR040802-1	8/18/04	
0407010-3	WEST-US	Sample	Sr-90	0.65 +/- 0.16	0.04	pCi/g	ASH	SR040802-1	8/18/04	
0407010-4	NORTH-US	Sample	Sr-90	0.61 +/- 0.15	0.05	pCi/g	ASH	SR040802-1	8/18/04	

Comments:

Data Package ID: *SR0407010-1*

Qualifiers/Flags:

U - Result is less than the sample specific MDC.
LT - Result is less than Requested MDC, greater than sample specific MDC.
Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.
Y2 - Chemical Yield outside default limits.
M - The requested MDC was not met.
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

Abbreviations:
TPU - Total Propagated Uncertainty (see PAI SOP 743)
MDC - Minimum Detectable Concentration (see PAI SOP 709)

BDL - Below Detection Limit

APPENDIX D

ANALYTICAL DATA REPORTS OF TRACE ELEMENT CONCENTRATIONS IN UNDERSTORY AND OVERSTORY VEGETATION COLLECTED AROUND THE DARHT FACILITY DURING 2004

Total ICP Metals

Method SW6010B

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0407011
Client Name: ESH20_LANL
ClientProject ID: DARHT OS Vegetation 7H02 CFDW D361 1000

Field ID: EAST-OS
Lab ID: 0407011-1

Sample Matrix: TISSUE
% Moisture: N/A
Date Collected: 16-Jun-04
Date Extracted: 02-Aug-04
Date Analyzed: 09-Aug-04
Prep Method: SW3050B

Prep Batch: IP040802-3
QCBatchID: IP040802-3-1
Run ID: IT040809-1A3
Cleanup: NONE
Basis: As Received

Sample Aliquot: 1 g
Final Volume: 50 ml
Result Units: mg/kg
Clean DF: 1
File Name: TS40809

CASNO	Target Analyte	Dilution Factor	Result	Reporting Limit	Result Qualifier	EPA Qualifier
7440-36-0	ANTIMONY	1	0.4	0.4	U	
7440-38-2	ARSENIC	1	0.5	0.5	U	
7440-39-3	BARIUM	1	24	0.2		
7440-41-7	BERYLLIUM	1	0.2	0.2	U	
7440-43-9	CADMIUM	1	0.25	0.25	U	
7440-47-3	CHROMIUM	1	0.5	0.5	U	
7440-50-8	COPPER	1	6	0.5		
7439-92-1	LEAD	1	3.6	0.15		
7440-02-0	NICKEL	1	1	1	U	
7782-49-2	SELENIUM	1	0.36	0.25		
7440-22-4	SILVER	1	0.5	0.5	U	
7440-28-0	THALLIUM	1	0.4	0.4	U	

Data Package ID: *IT0407011-1*

Total ICP Metals

Method SW6010B

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0407011
Client Name: ESH20_LANL
ClientProject ID: DARHT OS Vegetation 7H02 CFDW D361 1000

Field ID: SOUTH-OS
Lab ID: 0407011-2

Sample Matrix: TISSUE
% Moisture: N/A
Date Collected: 16-Jun-04
Date Extracted: 02-Aug-04
Date Analyzed: 09-Aug-04
Prep Method: SW3050B

Prep Batch: IP040802-3
QCBatchID: IP040802-3-1
Run ID: IT040809-1A3
Cleanup: NONE
Basis: As Received

Sample Aliquot: 1 g
Final Volume: 50 ml
Result Units: mg/kg
Clean DF: 1
File Name: TS40809

CASNO	Target Analyte	Dilution Factor	Result	Reporting Limit	Result Qualifier	EPA Qualifier
7440-36-0	ANTIMONY	1	0.4	0.4	U	
7440-38-2	ARSENIC	1	0.5	0.5	U	
7440-39-3	BARIUM	1	32	0.2		
7440-41-7	BERYLLIUM	1	0.2	0.2	U	
7440-43-9	CADMIUM	1	0.25	0.25	U	
7440-47-3	CHROMIUM	1	0.5	0.5	U	
7440-50-8	COPPER	1	5.4	0.5		E
7439-92-1	LEAD	1	2.8	0.15		
7440-02-0	NICKEL	1	1	1	U	
7782-49-2	SELENIUM	1	0.51	0.25		
7440-22-4	SILVER	1	0.5	0.5	U	
7440-28-0	THALLIUM	1	0.4	0.4	U	

Data Package ID: *IT0407011-1*

Total ICP Metals

Method SW6010B

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0407011
Client Name: ESH20_LANL
ClientProject ID: DARHT OS Vegetation 7H02 CFDW D361 1000

Field ID: WEST-OS
Lab ID: 0407011-3

Sample Matrix: TISSUE
% Moisture: N/A
Date Collected: 18-Jun-04
Date Extracted: 02-Aug-04
Date Analyzed: 09-Aug-04
Prep Method: SW3050B

Prep Batch: IP040802-3
QCBatchID: IP040802-3-1
Run ID: IT040809-1A3
Cleanup: NONE
Basis: As Received

Sample Aliquot: 1 g
Final Volume: 50 ml
Result Units: mg/kg
Clean DF: 1
File Name: TS40809

CASNO	Target Analyte	Dilution Factor	Result	Reporting Limit	Result Qualifier	EPA Qualifier
7440-36-0	ANTIMONY	1	0.4	0.4	U	
7440-38-2	ARSENIC	1	0.5	0.5	U	
7440-39-3	BARIUM	1	44	0.2		
7440-41-7	BERYLLIUM	1	0.2	0.2	U	
7440-43-9	CADMIUM	1	0.25	0.25	U	
7440-47-3	CHROMIUM	1	0.5	0.5	U	
7440-50-8	COPPER	1	7.2	0.5		
7439-92-1	LEAD	1	4.9	0.15		
7440-02-0	NICKEL	1	1	1	U	
7782-49-2	SELENIUM	1	0.57	0.25		
7440-22-4	SILVER	1	0.5	0.5	U	
7440-28-0	THALLIUM	1	0.4	0.4	U	

Data Package ID: *IT0407011-1*

Total ICP Metals

Method SW6010B

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0407011
Client Name: ESH20_LANL
ClientProject ID: DARHT OS Vegetation 7H02 CFDW D361 1000

Field ID: NORTH-OS
Lab ID: 0407011-4

Sample Matrix: TISSUE
% Moisture: N/A
Date Collected: 21-Jun-04
Date Extracted: 02-Aug-04
Date Analyzed: 09-Aug-04
Prep Method: SW3050B

Prep Batch: IP040802-3
QCBatchID: IP040802-3-1
Run ID: IT040809-1A3
Cleanup: NONE
Basis: As Received
QA to follow

Sample Aliquot: 1 g
Final Volume: 50 ml
Result Units: mg/kg
Clean DF: 1
File Name: TS40809

CASNO	Target Analyte	Dilution Factor	Result	Reporting Limit	Result Qualifier	EPA Qualifier
7440-36-0	ANTIMONY	1	0.4	0.4	U	
7440-38-2	ARSENIC	1	0.5	0.5	U	
7440-39-3	BARIUM	1	11	0.2		
7440-41-7	BERYLLIUM	1	0.2	0.2	U	
7440-43-9	CADMIUM	1	0.25	0.25	U	
7440-47-3	CHROMIUM	1	0.5	0.5	U	
7440-50-8	COPPER	1	6.8	0.5		
7439-92-1	LEAD	1	1	0.15		
7440-02-0	NICKEL	1	1.2	1		
7782-49-2	SELENIUM	1	0.59	0.25		
7440-22-4	SILVER	1	0.5	0.5	U	
7440-28-0	THALLIUM	1	0.4	0.4	U	

Data Package ID: *IT0407011-1*

Total MERCURY

Method SW7471

Sample Results

Lab Name: Paragon Analytics
Client Name: ESH20_LANL
Client Project ID: DARHT OS Vegetation 7H02 CFDW D351 1000
Work Order Number: 0407011 **Final Volume:** 100 ml
Reporting Basis: As Received **Matrix:** TISSUE
Result Units: mg/kg

Client Sample ID	Lab ID	Date Collected	Date Prepared	Date Analyzed	Percent Moisture	Dilution Factor	Result	Reporting Limit	Flag	Sample Aliquot
EAST-OS	0407011-1	06/18/2004	07/09/2004	07/12/2004	N/A	1	0.01	0.01	UN	0.6 g
SOUTH-OS	0407011-2	06/18/2004	07/09/2004	07/12/2004	N/A	1	0.01	0.01	U	0.6 g
WEST-OS	0407011-3	06/18/2004	07/09/2004	07/12/2004	N/A	1	0.011	0.01		0.6 g
NORTH-OS	0407011-4	06/21/2004	07/09/2004	07/12/2004	N/A	1	0.01	0.01		0.6 g

Comments:

1. ND or U = Not Detected at or above the client requested detection limit.

Data Package ID: *HG0407011-1*

Total ICP Metals

Method SW6010B

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0407012
Client Name: ESH20_LANL
ClientProject ID: DARHT US Vegetation 7H02 CFDW D361 1000

GA 8/20/04

Field ID: EAST-US	**Sample Matrix:** TISSUE	**Prep Batch:** IP040802-3	**Sample Aliquot:** 1 g
Lab ID: 0407012-1	**% Moisture:** N/A	**QCBatchID:** IP040802-3-1	**Final Volume:** 50 ml
	Date Collected: 18-Jun-04	**Run ID:** IT040809-1A3	**Result Units:** mg/kg
	Date Extracted: 02-Aug-04	**Cleanup:** NONE	**Clean DF:** 1
	Date Analyzed: 09-Aug-04	**Basis:** As Received	**File Name:** TS40809
	Prep Method: SW3050B		

CASNO	Target Analyte	Dilution Factor	Result	Reporting Limit	Result Qualifier	EPA Qualifier
7440-36-0	ANTIMONY	1	0.4	0.4	U	
7440-38-2	ARSENIC	1	0.5	0.5	U	
7440-39-3	BARIUM	1	23	0.2		
7440-41-7	BERYLLIUM	1	0.2	0.2	U	
7440-43-9	CADMIUM	1	0.25	0.25	U	
7440-47-3	CHROMIUM	1	0.5	0.5	U	
7440-50-8	COPPER	1	6.5	0.5		
7439-92-1	LEAD	1	0.78	0.15		
7440-02-0	NICKEL	1	1	1	U	
7782-49-2	SELENIUM	1	0.57	0.25		
7440-22-4	SILVER	1	0.5	0.5	U	
7440-28-0	THALLIUM	1	0.4	0.4	U	

Data Package ID: *IT0407012-1*

Total ICP Metals

Method SW6010B

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0407012
Client Name: ESH20_LANL
ClientProject ID: DARHT US Vegetation 7H02 CFDW D361 1000

Field ID: SOUTH-US	**Sample Matrix:** TISSUE	**Prep Batch:** IP040802-3	**Sample Aliquot:** 1 g
Lab ID: 0407012-2	**% Moisture:** N/A	**QCBatchID:** IP040802-3-1	**Final Volume:** 50 ml
	Date Collected: 16-Jun-04	**Run ID:** IT040809-1A3	**Result Units:** mg/kg
	Date Extracted: 02-Aug-04	**Cleanup:** NONE	**Clean DF:** 1
	Date Analyzed: 09-Aug-04	**Basis:** As Received	**File Name:** TS40809
	Prep Method: SW3050B		

CASNO	Target Analyte	Dilution Factor	Result	Reporting Limit	Result Qualifier	EPA Qualifier
7440-36-0	ANTIMONY	1	<0.4	0.4	U	
7440-38-2	ARSENIC	1	<0.5	0.5	U	
7440-39-3	BARIUM	1	20	0.2		
7440-41-7	BERYLLIUM	1	<0.2	0.2	U	
7440-43-9	CADMIUM	1	<0.25	0.25	U	
7440-47-3	CHROMIUM	1	<0.5	0.5	U	
7440-50-8	COPPER	1	6.5	0.5		
7439-92-1	LEAD	1	<0.4	0.15		
7440-02-0	NICKEL	1	1.4	1		
7782-49-2	SELENIUM	1	0.65	0.25		
7440-22-4	SILVER	1	0.5	0.5	U	
7440-28-0	THALLIUM	1	0.4	0.4	U	

Data Package ID: *IT0407012-1*

Total ICP Metals

Method SW6010B

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0407012
Client Name: ESH20_LANL
ClientProject ID: DARHT US Vegetation 7H02 CFDW D361 1000

Field ID: WEST-US
Lab ID: 0407012-3

Sample Matrix: TISSUE
% Moisture: N/A
Date Collected: 18-Jun-04
Date Extracted: 02-Aug-04
Date Analyzed: 09-Aug-04
Prep Method: SW3050B

Prep Batch: IP040802-3
QCBatchID: IP040802-3-1
Run ID: IT040809-1A3
Cleanup: NONE
Basis: As Received

Sample Aliquot: 1 g
Final Volume: 50 ml
Result Units: mg/kg
Clean DF: 1
File Name: TS40809

CASNO	Target Analyte	Dilution Factor	Result	Reporting Limit	Result Qualifier	EPA Qualifier
7440-36-0	ANTIMONY	1	0.4	0.4	U	
7440-38-2	ARSENIC	1	0.5	0.5	U	
7440-39-3	BARIUM	1	19	0.2		
7440-41-7	BERYLLIUM	1	0.2	0.2	U	
7440-43-9	CADMIUM	1	0.25	0.25	U	
7440-47-3	CHROMIUM	1	0.5	0.5	U	
7440-50-8	COPPER	1	7.3	0.5		
7439-92-1	LEAD	1	1.1	0.15		
7440-02-0	NICKEL	1	1	1	U	
7782-49-2	SELENIUM	1	0.62	0.25		
7440-22-4	SILVER	1	0.5	0.5	U	
7440-28-0	THALLIUM	1	0.4	0.4	U	

Data Package ID: *IT0407012-1*

Total ICP Metals

Method SW6010B

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0407012
Client Name: ESH20_LANL
ClientProject ID: DARHT US Vegetation 7H02 CFDW D361 1000

Field ID: NORTH-US
Lab ID: 0407012-4

Sample Matrix: TISSUE
% Moisture: N/A
Date Collected: 21-Jun-04
Date Extracted: 02-Aug-04
Date Analyzed: 09-Aug-04
Prep Method: SW3050B

Prep Batch: IP040802-3
QCBatchID: IP040802-3-1
Run ID: IT040809-1A3
Cleanup: NONE
Basis: As Received

Sample Aliquot: 1 g
Final Volume: 50 ml
Result Units: mg/kg
Clean DF: 1
File Name: TS40809

CASNO	Target Analyte	Dilution Factor	Result	Reporting Limit	Result Qualifier	EPA Qualifier
7440-36-0	ANTIMONY	1	0.4	0.4	U	
7440-38-2	ARSENIC	1	0.5	0.5	U	
7440-39-3	BARIUM	1	28	0.2		
7440-41-7	BERYLLIUM	1	0.2	0.2	U	
7440-43-9	CADMIUM	1	0.25	0.25	U	
7440-47-3	CHROMIUM	1	0.5	0.5	U	
7440-50-8	COPPER	1	10	0.5		
7439-92-1	LEAD	1	0.77	0.15		
7440-02-0	NICKEL	1	1	1	U	
7782-49-2	SELENIUM	1	0.47	0.25		
7440-22-4	SILVER	1	0.5	0.5	U	
7440-28-0	THALLIUM	1	0.4	0.4	U	

Data Package ID: *IT0407012-1*

Total MERCURY

Method SW7471

Sample Results

Lab Name: Paragon Analytics
Client Name: ESH20_LANL
Client Project ID: DARHT US Vegetation 7H02 CFDW D381 1000
Work Order Number: 0407012 **Final Volume:** 100 ml
Reporting Basis: As Received **Matrix:** TISSUE
Result Units: mg/kg

Client Sample ID	Lab ID	Date Collected	Date Prepared	Date Analyzed	Percent Moisture	Dilution Factor	Result	Reporting Limit	Flag	Sample Aliquot
EAST-US	0407012-1	06/18/2004	07/09/2004	07/12/2004	N/A	1	0.01	0.01	U	0.6 g
SOUTH-US	0407012-2	06/18/2004	07/09/2004	07/12/2004	N/A	1	0.01	0.01	U	0.6 g
WEST-US	0407012-3	06/18/2004	07/09/2004	07/12/2004	N/A	1	0.01	0.01	U	0.6 g
NORTH-US	0407012-4	06/21/2004	07/09/2004	07/12/2004	N/A	1	0.01	0.01	U	0.6 g

Comments:

1. ND or U = Not Detected at or above the client requested detection limit.

Data Package ID: *HG0407012-1*

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