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Radionuclides in Small Mammals Collected at the Dual-Axis Radiographic Hydrodynamic Test (DARHT) Facility during 2001–2003

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Edited by Hector Hinojosa, Group IM-1
Photocomposition by Deidre´ A. Plumlee, Group IM-1
Prepared by Teresa Hiteman, Group ENV-ECO

Figure caption from front cover:
Baiting a rodent trap at the DARHT facility with peanut butter and grains.

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P. R. Fresquez

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RADIONUCLIDES IN SMALL MAMMALS COLLECTED AT THE DUAL-AXIS RADIOGRAPHIC HYDRODYNAMIC TEST (DARHT) FACILITY DURING 2001–2003

by

P.R. Fresquez

ABSTRACT

Rodents are effective indicators of environmental contamination and the Dual-Axis Radiographic Hydrodynamic Test (DARHT) Facility Mitigation Action Plan specifies the (radionuclide) comparison of small mammals to baseline levels to determine if there are any impacts as a result of operations. Consequently, samples of (whole body) field mice (*Peromyscus* spp.) were collected from within the grounds of the DARHT facility at Los Alamos National Laboratory, Technical Area 15, from 2001 through 2003. Samples were analyzed for ^{3}H, ^{137}Cs, ^{90}Sr, ^{241}Am, ^{238}Pu, $^{239,240}Pu$, ^{234}U, ^{235}U, and ^{238}U. Results, which represent three years since the start of operations in 2000, were compared with baseline statistical reference level (BSRL) data established over a four-year-long preoperational period. Most radionuclides in mice were either at nondetectable levels or within BSRLs. The few radionuclides that were above BSRLs included U isotopes; and the ratios of some samples indicated depleted U sources. Although the amounts of U in some samples were just above BSRLs, and since depleted U is less soluble and less toxic (chemical and radioactive) than naturally occurring U, the very small levels in the mice collected around the DARHT facility grounds are unlikely to pose a threat to predators that feed upon them.

1. 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, and 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., 2001). The BSRL is defined as the mean plus two standard deviations of the data (a 95% confidence level). One portion of this report dealt specifically with BSRL values in small mammal (rodent) populations (Bennett et al., 2001). Rodents are effective indicators of contaminant presence due to their feeding and activity habits (i.e., burrowing).

The objective of this ongoing monitoring study is to compare concentrations of radionuclides in small mammals around the DARHT facility collected from 2001 through 2003 with BSRLs. These data reflect three years of monitoring since the beginning of operations in 2000.

2. METHODOLOGY

Rodent sampling took place in August of 2001, 2002, and 2003. Three trapping grids were placed immediately north of the DARHT facility firing point: two grids south of the main paved road and the third grid north of the road (Figure 1). Each grid consisted of 100 snap traps placed approximately 10 m apart in a 10 by 10 design. Snap traps were baited and set in late afternoon and checked in the early morning. The rodents captured were mostly deer mice of the genus *Peromyscus* and a sample consisted of about five to ten mice. Procedures for handling and field processing of small mammals with respect to potential infection of hantavirus are given in Mills, et al. (1995) and Biggs and Bennett (1995).

At the laboratory, the samples were placed into 1-L glass beakers and heated to collect distillated water for ^{3}H analysis (Salazar 1987). After the collection of sufficient

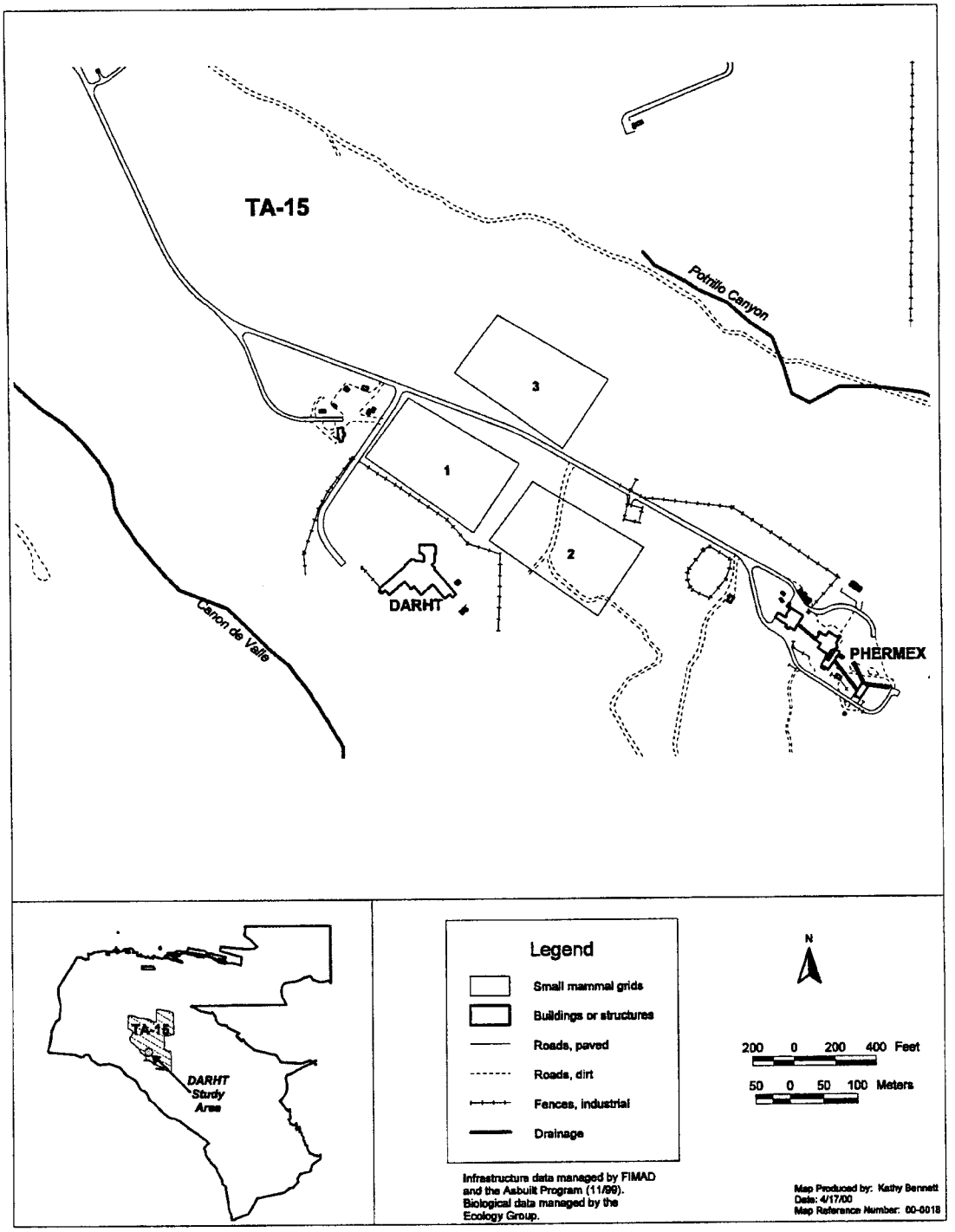

Figure 1: Small mammal trapping areas on both sides of the main road to the DARHT facility.

sample, the beaker contents were ashed incrementally to 500°C. The sample ash was pulverized and homogenized, placed into 500-mL poly bottles, and submitted under full chain-of-custody procedures to Paragon Analytics, Inc., for the analysis of ^{3}H, ^{137}Cs, ^{90}Sr, ^{241}Am, ^{238}Pu, $^{239,240}Pu$, ^{234}U, ^{235}U, and ^{238}U. All methods of radiochemical analysis have been described previously (Bennett et al., 2001). Results for ^{3}H are reported in pCi/mL and the other radionuclides are reported on a pCi per gram ash weight basis (pCi/g ash).

To determine the source of U in mice 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.

3. RESULTS

Radionuclide concentrations found in small mammal carcasses collected from DARHT facility grounds by year can be found in Table 1. The analytical data reports from Paragon Analytics, Inc., are included in Appendices A, B, and C by year. Most radionuclides in whole body tissue of mice collected from 2001 through 2003 were either at nondetectable levels (where the result is smaller than the total propagated uncertainty [TPU]) or within BSRLs. The few radionuclides that were above BSRLs included U isotopes, and the ratios of ^{234}U to ^{238}U in nearly 60% of the samples were consistent with depleted U. Depleted U, a metal used as a substitute for the enriched U component of atomic weapons tested at LANL firing sites, was also detected in soil and vegetation samples from around the DARHT grounds (Fresquez 2004). Although the amounts of U in some samples were just above BSRLs, and since depleted U is less soluble and less toxic (chemical and radioactive) than naturally occurring U (Hanson 1974), the very small levels in the mice collected around the DARHT grounds are unlikely to pose a threat to predators that feed upon them.

Table 1. Radionuclide concentrations (three times TPU) in mice (whole body) collected from within and around DARHT at Technical Area 15 from 2001 through 2003. (Bold values are greater than the TPU and BSRL).

Grid/Year	^{3}H (pCi/mL)	^{137}Cs (pCi/g ash)	^{90}Sr (pCi/g ash)	^{241}Am (pCi/g ash)	^{238}Pu (pCi/g ash)	$^{239,240}Pu$ (pCi/g ash)	^{234}U (pCi/g ash)	^{235}U (pCi/g ash)	^{238}U (pCi/g ash)
DARHT 2001									
G-1, G-2, G-3[a]	0.06	0.03	1.3	0.0026	0.0036	0.0045	**0.70**	**0.061**	**2.9**[b]
	(0.41)	(0.47)	(0.42)	(0.0047)	(0.011)	(0.011)	**(0.17)**	**(0.026)**	**(0.63)**
DARHT 2002									
G-1	0.62	-0.28	1.2	0.0017	0.0020	0.0011	**0.25**	0.010	0.33
	(0.51)	(0.68)	(0.66)	(0.0060)	(0.0053)	(0.0044)	**(0.059)**	(0.0084)	(0.074)
G-2	**0.79**	0.20	1.2	0.0024	0.00070	0.00020	0.17	0.0093	0.25[b]
	(0.44)	(0.59)	(0.63)	(0.0057)	(0.0045)	(0.0045)	(0.048)	(0.0092)	(0.066)
G-3	0.28	-0.12	1.1	0.0054	0.0000	0.0028	**0.50**	**0.028**	**0.74**[b]
	(0.47)	(0.72)	(0.71)	(0.0066)	(0.0087)	(0.0087)	**(0.11)**	**(0.018)**	**(0.17)**
DARHT 2003									
G-1	**0.64**	0.61	1.2	0.0021	-0.00050	0.0016	**0.34**	**0.014**	0.48
	(0.45)	(0.98)	(0.45)	(0.0039)	(0.0048)	(0.0039)	**(0.090)**	**(0.011)**	(0.12)
G-2	**0.64**	0.00	1.6	0.00080	0.0022	0.0066	**0.67**	**0.033**	**0.83**
	(0.45)	(0.77)	(0.56)	(0.0057)	(0.0054)	(0.0075)	**(0.17)**	**(0.017)**	**(0.21)**
G-3	0.55	-0.020	2.0	0.0014	0.0065	0.0030	**0.85**	**0.047**	**2.0**[b]
	(0.44)	(0.84)	(0.71)	(0.0033)	(0.0053)	(0.0036)	**(0.21)**	**(0.017)**	**(0.48)**
BSRL[c]	0.63	1.6	11	0.77[d]	0.046[d]	0.61[d]	0.22	0.011	0.58

[a] Areas 1, 2, and 3, respectively, in Figure 1.
[b] Depleted U.
[c] BSRL is from Bennett et al. (2001) and is based on carcass only (i.e., not whole body which is carcass plus pelt); therefore, these data may be an underestimation of a BSRL for whole body.
[d] These BSRL numbers were changed to reflect an outlier sample in the data; thereby reducing these numbers substantially from the original data.

ACKNOWLEDGMENTS

Thanks to Rhonda Robinson and her field crews in the Ecology Group for collecting small mammals from 2001 to 2003. Rick Velasquez and Louie Naranjo processed the animals in the laboratory, and Brian Spall tabulated the data. Hector Hinojosa edited this manuscript and Teresa Hiteman compiled the document.

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APPENDIX A

ANALYTICAL DATA REPORTS OF RADIONUCLIDE CONCENTRATIONS IN MICE COLLECTED AROUND THE DARHT FACILITY DURING 2001

CHAIN-OF-CUSTODY RECORD

0201043

Los Alamos

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Soils and Foo[illegible]uffs (~~[illegible]~~) 45371
[illegible]7-0815
[illegible]MS M887

Project Name: Parks small Mammals	Request the following analysis: ^3H	number of containers	Sample Location/Remarks
Samplers (signatures): [signature]			

	Date	Time	Sample Name/Number	number of containers	Sample Location/Remarks
4	8/28/01	10:00	DSM01		Parks small mammal 2001 Mice combination of D-1C, D-2 and D-3

Relinquished by: (signature)	Date/Time	Received by: (signature)	Relinquished by: (signature)	Date/Time	Received by: (signature)
[signature]	1/08/02	FedEx	FedEx	1/11/02 0940	[signature]
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:	

Sample Results Summary

Client Name: ESH20_LANL
Client Project Name: Game, DARHT & Area G Biota H-3
Client Project Number:

Laboratory Name: Paragon Analytics, Inc.
PAI Work Order: 0201043

Reported on: Tuesday, January 22, 2002
15:37:22

2/03/04

Lab Sample ID	Client Sample ID	Test	Nuclide	Result +/- 2 s TPU 3σ	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0201043-1	G-1	TRITIUM	H-3	559 +/- 71	1.7	pCi/ml	Water	LS01075	1/19/2002	
0201043-2	G-2	TRITIUM	H-3	1100 +/- 140	2.2	pCi/ml	Water	LS01075	1/19/2002	
0201043-3	BGB01	TRITIUM	H-3	-0.05 +/- 0.27	0.46	pCi/ml	Water	LS01075	1/19/2002	U
0201043-4	DSM01	TRITIUM	H-3	0.06 +/- 0.27 0.41	0.46	pCi/ml	Water	LS01075	1/19/2002	U
0201043-5	BG-CM-01	TRITIUM	H-3	0.08 +/- 0.28	0.47	pCi/ml	Water	LS01075	1/19/2002	U
0201043-6	BG-CB-01	TRITIUM	H-3	-0.29 +/- 0.27	0.47	pCi/ml	Water	LS01075	1/19/2002	U
0201043-7	LA-DM-01	TRITIUM	H-3	0.76 +/- 0.31	0.46	pCi/ml	Water	LS01075	1/19/2002	
0201043-8	LA-DB-01	TRITIUM	H-3	0.57 +/- 0.30	0.46	pCi/ml	Water	LS01075	1/19/2002	LT
0201043-9	G-157	TRITIUM	H-3	1000 +/- 130	1.9	pCi/ml	Water	LS01075	1/19/2002	
0201043-10	G-PERM	TRITIUM	H-3	195 +/- 25	0.95	pCi/ml	Water	LS01075	1/19/2002	
0201043-11	G-3-1	TRITIUM	H-3	183 +/- 23	0.92	pCi/ml	Water	LS01075	1/19/2002	

Comments:

Data Package ID: *H3W0201043-1*

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.

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

CHAIN-OF-CUSTODY RECORD

Los Alamos

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Soils and Foodstuffs (~~7C20 WE6G~~ 45371)
P.I.# (505) 667-0815
ESH-20 MS M887

0201042

Project Name	Request the following analysis:	number of containers	Sample Location/Remarks
DarHT - Small Mammals	Am 241 Iso Pu Iso U Sr90 Cs137		
Samplers (signatures)			
[signature]			

	Date	Time	Sample Name/Number	number of containers	Sample Location/Remarks
4	8/28/01	10:00	DSM01		Darht Small mammal 2001 mice. Combination of D-1C, D-2 and D-3.

Relinquished by: (signature)	Date/Time	Received by: (signature)	Relinquished by: (signature)	Date/Time	Received by: (signature)
[signature]	1/09/02	FedEx	FedEx	1/11/02 0940	[signature]
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:	

Gamma Spectroscopy Results

Method PAI SOP 713R6

Sample Results

Reported on: Thursday, January 24, 2002 16:23:58

Client Name: ESH20_LANL

Client Project Name: Game, DARHT & Area G Biota Samples

Client Project Number:

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order: 0201042

Field ID: DSM01

Lab ID: 0201042-4

Sample Matrix: Ash

Date Prepared: 16-Jan-02

Prep SOP: PAI 739R4

Prep Batch: GS01322

Date Collected: 28-Aug-01

Date Analyzed: 21-Jan-02

Analytical SOP: PAI 713R6

Spectrum Code: 020038D08A

Final Aliquot: 7.730

Aliquot Units: g

Report Basis: As Received

Count Time (min.): 1000

Target Nuclide	Result +/- 2 s TPU	MDC	Reporting Units	Lab Qualifier
Cs-137	0.03 +/- 0.31 (0.47) 2σ	0.52	pCi/g	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.

BQ - Spectral quality prevents accurate quantitation.

BI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 half-lives.

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743).

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Data Package ID: *GSW0201042-1*

Sample Results Summary

Client Name: ESH20_LANL
Client Project Name: Game, DARHT & Area G Biota Samples
Client Project Number:

Laboratory Name: Paragon Analytics, Inc.
PAI Work Order: 0201042

Reported on: Thursday, February 28, 2002
11:56:55

Reviewed by [illegible] 2/03/04

Lab Sample ID	Client Sample ID	Test	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0201042-4	DSM01	SR_90	Sr-90	1.34 +/- 0.28 3σ 0.42	0.20	pCi/g	Ash	SR00133	2/27/02	
0201042-5	BG-CM-01	SR_90	Sr-90	0.107 +/- 0.033	0.042	pCi/g	Ash	SR00133	2/27/02	
0201042-6	BG-CB-01	SR_90	Sr-90	0.67 +/- 0.13	0.061	pCi/g	Ash	SR00133	2/27/02	
0201042-7	LA-DM-01	SR_90	Sr-90	0.066 +/- 0.028	0.042	pCi/g	Ash	SR00133	2/27/02	
0201042-8	LA-DB-01	SR_90	Sr-90	2.18 +/- 0.40	0.064	pCi/g	Ash	SR00133	2/27/02	
0201042-9	G-157	SR_90	Sr-90	0.91 +/- 0.22 0.33	0.21	pCi/g	Ash	SR00133	2/27/02	LT
0201042-10	G-PERM	SR_90	Sr-90	2.10 +/- 0.41 0.615	0.20	pCi/g	Ash	SR00133	2/27/02	
0201042-11	G-3-1	SR_90	Sr-90	1.52 +/- 0.31 0.469	0.20	pCi/g	Ash	SR00133	2/27/02	
0201042-12	DB01	SR_90	Sr-90	0.28 +/- 0.13	0.20	pCi/g	Ash	SR00133	2/27/02	LT

Comments:

Data Package ID: *SRA0201042-1*

Qualifiers/Flags:
U - Result is less than the sample specific MDC.
LT - Result is less than Requested MDC, greater than sample specific MDC.
CY1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.
CY2 - Chemical Yield outside default limits.

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

Sample Results Summary

Client Name: ESH20_LANL
Client Project Name: Game, DARHT & Area G Biota Samples
Client Project Number:

Laboratory Name: Paragon Analytics, Inc.
PAI Work Order: 0201042

Reported on: Thursday, March 07, 2002
15:07:55

Entered by 2/7/04

Lab Sample ID	Client Sample ID	Test	Nuclide	Result +/- 2 s TPU 3σ	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0201042-1	G-1	PU-ISO	Pu-238	0.0039 +/- 0.0076	0.014	pCi/g	Ash	AS05337	2/12/02	U
0201042-1	G-1	PU-ISO	Pu-239	0.072 +/- 0.021	0.0098	pCi/g	Ash	AS05337	2/12/02	
0201042-2	G-2	PU-ISO	Pu-238	0.0024 +/- 0.0058	0.0092	pCi/g	Ash	AS05337	2/12/02	U
0201042-2	G-2	PU-ISO	Pu-239	0.071 +/- 0.021	0.013	pCi/g	Ash	AS05337	2/12/02	
0201042-3	BGB01	PU-ISO	Pu-238	0.0000 +/- 0.0065	0.0041	pCi/g	Ash	AS05337	2/12/02	U
0201042-3	BGB01	PU-ISO	Pu-239	0.0000 +/- 0.0065	0.013	pCi/g	Ash	AS05337	2/12/02	U
0201042-4	DSM01	PU-ISO	Pu-238	0.0036 +/- 0.0076 (0.011)	0.012	pCi/g	Ash	AS05337	2/13/02	U
0201042-4	DSM01	PU-ISO	Pu-239	0.0045 +/- 0.0076 (0.011)	0.016	pCi/g	Ash	AS05337	2/13/02	U
0201042-5	BG-CM-01	PU-ISO	Pu-238	-0.0043 +/- 0.0064	0.018	pCi/g	Ash	AS05337	2/13/02	U
0201042-5	BG-CM-01	PU-ISO	Pu-239	0.0002 +/- 0.0063	0.013	pCi/g	Ash	AS05337	2/13/02	U
0201042-6	BG-CB-01	PU-ISO	Pu-238	0.0028 +/- 0.0059	0.0092	pCi/g	Ash	AS05337	2/16/02	U

Comments:

Data Package ID: *PU0201042-1*

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.

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

Sample Results Summary

Client Name: ESH20_LANL
Client Project Name: Game, DARHT & Area G Biota Samples
Client Project Number:

Laboratory Name: Paragon Analytics, Inc.
PAI Work Order: 0201042

Page: 1 of 2
Reported on: Thursday, March 07, 2002 15:21:02

Lab Sample ID	Client Sample ID	Test	Nuclide	Result +/- 2 s TPU 3σ	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0201042-1	G-1	AM-241	Am-241	0.0066 +/- 0.0060	0.011	pCi/g	Ash	AS05337	2/15/02	U
0201042-2	G-2	AM-241	Am-241	0.009 +/- 0.011	0.018	pCi/g	Ash	AS05337	2/15/02	U
0201042-3	BGB01	AM-241	Am-241	0.0031 +/- 0.0075	0.0047	pCi/g	Ash	AS05337	2/15/02	U
0201042-4	DSM01	AM-241	Am-241	0.0026 +/- 0.0031 (0.0047)	0.0019	pCi/g	Ash	AS05337	2/15/02	LT
0201042-5	BG-CM-01	AM-241	Am-241	0.0000 +/- 0.0024	0.0048	pCi/g	Ash	AS05337	2/15/02	U
0201042-6	BG-CB-01	AM-241	Am-241	0.0027 +/- 0.0044	0.0027	pCi/g	Ash	AS05337	2/15/02	LT
0201042-7	LA-DM-01	AM-241	Am-241	0.0030 +/- 0.0029	0.0018	pCi/g	Ash	AS05337	2/15/02	LT
0201042-8	LA-DB-01	AM-241	Am-241	0.0010 +/- 0.0061	0.013	pCi/g	Ash	AS05337	2/15/02	U
0201042-9	G-157	AM-241	Am-241	0.0094 +/- 0.0065 0.0098	0.0072	pCi/g	Ash	AS05337	2/15/02	LT
0201042-10	G-PERM	AM-241	Am-241	0.067 +/- 0.019 0.029	0.0032	pCi/g	Ash	AS05337	2/15/02	
0201042-11	G-3-1	AM-241	Am-241	0.0101 +/- 0.0076 0.011	0.0097	pCi/g	Ash	AS05337	2/15/02	LT

Comments:

Data Package ID: *AM0201042-1*

Qualifiers/Flags:
U - Result is less than the sample specific MDC.
LT - Result is less than Requested MDC, greater than sample specific MDC.
Q1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.
Q2 - Chemical Yield outside default limits.

Abbreviations:
TPU - Total Propagated Uncertainty (see PAI SOP 742)
MDC - Minimum Detectable Concentration (see PAI SOP 709)

Sample Results Summary

Client Name: ESH20_LANL
Client Project Name: Game, DARHT & Area G Biota Samples
Client Project Number:

Laboratory Name: Paragon Analytics, Inc.
PAI Work Order: 0201042

Reported on: Thursday, March 07, 2002
15:07:55

Entered by RY 2/03/04

Lab Sample ID	Client Sample ID	Test	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0201042-1	G-1	U-ISO	U-234	0.100 +/- 0.031	0.021	pCi/g	Ash	AS05337	2/10/02	
0201042-1	G-1	U-ISO	U-235	0.0010 +/- 0.0073	0.017	pCi/g	Ash	AS05337	2/10/02	U
0201042-1	G-1	U-ISO	U-238	0.113 +/- 0.032	0.015	pCi/g	Ash	AS05337	2/10/02	
0201042-2	G-2	U-ISO	U-234	0.114 +/- 0.035	0.026	pCi/g	Ash	AS05337	2/10/02	
0201042-2	G-2	U-ISO	U-235	0.018 +/- 0.015	0.021	pCi/g	Ash	AS05337	2/10/02	U
0201042-2	G-2	U-ISO	U-238	0.185 +/- 0.046	0.017	pCi/g	Ash	AS05337	2/10/02	
0201042-3	BGB01	U-ISO	U-234	0.025 +/- 0.015	0.018	pCi/g	Ash	AS05337	2/12/02	LT
0201042-3	BGB01	U-ISO	U-235	0.005 +/- 0.011	0.022	pCi/g	Ash	AS05337	2/12/02	U
0201042-3	BGB01	U-ISO	U-238	0.008 +/- 0.014	0.027	pCi/g	Ash	AS05337	2/12/02	U
0201042-4	DSM01	U-ISO	U-234	0.70 +/- 0.17 (0.17)	0.012	pCi/g	Ash	AS05337	2/12/02	
0201042-4	DSM01	U-ISO	U-235	0.061 +/- 0.017 (0.026)	0.0099	pCi/g	Ash	AS05337	2/12/02	LT

Comments:

Data Package ID: *U0201042-1*

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.

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

Paragon Analytics Inc.

Sample Results Summary

Client Name: ESH20_LANL
Client Project Name: Game, DARHT & Area G Biota Samples
Client Project Number:

Laboratory Name: Paragon Analytics, Inc.
PAI Work Order: 0201042

Reported on: Thursday, March 07, 2002 15:07:56

Retained by [illegible] 2/03/04

Lab Sample ID	Client Sample ID	Test	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0201042-4	DSM01	U-ISO	U-238	√2.90 +/- 0.42 (0.63) 3Q 4.62	0.0099	pCi/g	Ash	AS05337	2/12/02	
0201042-5	BG-CM-01	U-ISO	U-234	0.0059 +/- 0.0071	0.012	pCi/g	Ash	AS05337	2/12/02	U
0201042-5	BG-CM-01	U-ISO	U-235	0.0010 +/- 0.0047	0.0099	pCi/g	Ash	AS05337	2/12/02	U
0201042-5	BG-CM-01	U-ISO	U-238	0.0055 +/- 0.0052	0.0080	pCi/g	Ash	AS05337	2/12/02	U
0201042-6	BG-CB-01	U-ISO	U-234	0.0100 +/- 0.0056	0.0058	pCi/g	Ash	AS05337	2/12/02	LT
0201042-6	BG-CB-01	U-ISO	U-235	0.0022 +/- 0.0032	0.0058	pCi/g	Ash	AS05337	2/12/02	U
0201042-6	BG-CB-01	U-ISO	U-238	0.0055 +/- 0.0044	0.0058	pCi/g	Ash	AS05337	2/12/02	U
0201042-7	LA-DM-01	U-ISO	U-234	0.0021 +/- 0.0059	0.012	pCi/g	Ash	AS05337	2/12/02	U
0201042-7	LA-DM-01	U-ISO	U-235	-0.0018 +/- 0.0035	0.0090	pCi/g	Ash	AS05337	2/12/02	U
0201042-7	LA-DM-01	U-ISO	U-238	0.0032 +/- 0.0052	0.0098	pCi/g	Ash	AS05337	2/12/02	U
0201042-8	LA-DB-01	U-ISO	U-234	-0.0028 +/- 0.0033	0.0093	pCi/g	Ash	AS05337	2/12/02	U

Comments:

Data Package ID: *U0201042-1*

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.

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

Paragon Analytics Inc.

APPENDIX B

ANALYTICAL DATA REPORTS OF RADIONUCLIDE CONCENTRATIONS IN MICE COLLECTED AROUND THE DARHT FACILITY DURING 2002

Los Alamos
Los Alamos National Laboratory
Los Alamos, New Mexico 87545

CHAIN-OF-CUSTODY RECORD

Soils and Foodstuffs (~~7H05-WE6G~~) 45373
P.I.# (505) 667-0815 DARHT
RRES-ECO MS M887

0301 ~~067~~ 167 [illegible] 1/31/03

Project Name	Request the following analysis:	number of containers	Sample Location/Remarks
DARHT	H_3		
Samplers (signatures) [illegible] [illegible] Kathryn Bennett			

	Date	Time	Sample Name/Number	number of containers	Sample Location/Remarks
					~~[illegible]~~ Mice
5	8/8/02	11:00	Sample 5 Site 1		Composite Whole Body Animals
6	8/8/02	11:00	Sample 6 Site 2		" " " "
7	8/8/02	11:00	Sample 7 Site 3		" " " "

Relinquished by: (signature)	Date/Time	Received by: (signature)	Relinquished by: (signature)	Date/Time	Received by: (signature)
[illegible]	8/8/02 11:00 AM	[illegible]	[illegible]	1/30/03 9:30	FedEx
FedEx	1/31/03 0955	[illegible]			

Relinquished by: (signature)	Date/Time	Received for Lab. by: (signature)	Date/Time	Remarks:

Sample Results Summary

Client Name: ESH20_LANL
Client Project Name: Mice Project
Client Project Number: 7H05 WE6G

Laboratory Name: Paragon Analytics, Inc.
PAI Work Order: 0301167

Reported on: Friday, February 14, 2003
13:58:15

Lab Sample ID	Client Sample ID	Test	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0301167-1	Sample 1 (Area G, site 7c)	TRITIUM	H-3	8.6 +/- 1.4	0.43	pCi/mL	Water	LS01560	2/9/03	
0301167-2	Sample 2 (Area G, site 1,2, 7a	TRITIUM	H-3	1580 +/- 240	2.5	pCi/mL	Water	LS01560	2/9/03	
0301167-3	Sample 3 (Area G, site 8)	TRITIUM	H-3	2.12 +/- 0.40	0.33	pCi/mL	Water	LS01560	2/9/03	
0301167-4	Sample 4 (Area G, site 3a,3b)	TRITIUM	H-3	150 +/- 23	0.85	pCi/mL	Water	LS01560	2/9/03	
0301167-5	Sample 5 (Site 1)	TRITIUM	H-3	0.82 +/- 0.34	0.53	pCi/mL	Water	LS01560	2/9/03	
0301167-6	Sample 6 (Site 2)	TRITIUM	H-3	0.79 +/- 0.29	0.41	pCi/mL	Water	LS01560	2/9/03	
0301167-7	Sample 7 (Site 3)	TRITIUM	H-3	0.28 +/- 0.31	0.51	pCi/mL	Water	LS01560	2/10/03	U

Comments:

Data Package ID: *H3L0301167-1*

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.

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

Los Alamos 0211062

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

CHAIN-OF-CUSTODY RECORD

Soils and Foodstuffs (~~7H05-WB6C~~) 45373
P.I.# (505) 667-0815 DARHT
RRES-ECO MS M887

Project Name: DARHT

Samplers (signatures): [signatures]

Request the following analysis: Cs-137, Sr-90, Am 241, Pu-150 - U150, Total-U

Date	Time	Sample Name/Number	Number of Containers	Sample Location/Remarks
8/8/02	11:00 (5)	Sample 5 Site 1		Composite Whole Body Animals
8/8/02	11:00 (6)	Sample 6 Site 2		" " " "
8/8/02	11:00 (7)	Sample 7 Site 3		" " " "

Relinquished by: (signature)	Date/Time	Received by: (signature)	Relinquished by: (signature)	Date/Time	Received by: (signature)
[signature]	8/8/02 11:00 AM	[signature]	[signature]	11/07/02 / 4:00	Steven Fry PBI
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:	

Gamma Spectroscopy Results

Method PAI 713R7

Sample Results

Reported on: Thursday, December 19, 2002 11:52:23

Client Name: ESH20_LANL
Client Project Name: Mice Project
Client Project Number: 7H05 WE6G

Laboratory Name: Paragon Analytics, Inc.
PAI Work Order: 0211062

File ID: Sample 5 Site 1
Lab ID: 0211062-5

Sample Matrix: Ash
Date Prepared: 13-Nov-02
Prep SOP: PAI 739R5
Prep Batch: GS01778

Date Collected: 08-Aug-02
Date Analyzed: 27-Nov-02
Analytical SOP: PAI 713R7
Spectrum Code: 021263D07A

Final Aliquot: 5.648 g
Report Basis: As Received
Count Time (min.): 1000
Library: FANP.LIB

Target Nuclide	Result +/- 2 s TPU	MDC	Reporting Units	Lab Qualifier
Ac-228	1.0 +/- 1.5	2.7	pCi/g	U
Ag-110m	0.06 +/- 0.56	0.95	pCi/g	U
Al-26	0.07 +/- 0.54	0.93	pCi/g	U
Am-241	0.61 +/- 0.50	0.79	pCi/g	U
Be-7	0 +/- 13	21	pCi/g	U
Bi-212	-2.5 +/- 7.7	13	pCi/g	U
Bi-214	0.5 +/- 2.2	3.7	pCi/g	U
Cd-109	-0.4 +/- 5.9	9.9	pCi/g	U
Ce-139	-0.07 +/- 0.42	0.70	pCi/g	U
Ce-144	1.3 +/- 2.1	3.5	pCi/g	U
Co-56	0.0 +/- 2.3	3.9	pCi/g	U
Co-57	-0.15 +/- 0.27	0.47	pCi/g	U
Co-58	-0.4 +/- 1.4	2.4	pCi/g	U
Co-60	0.61 +/- 0.55	0.87	pCi/g	U
Cr-51	-35 +/- 46	79	pCi/g	U
Cs-134	-0.11 +/- 0.48	0.82	pCi/g	U
Cs-137	-0.28 +/- 0.45	0.78	pCi/g	U
Eu-152	-1.4 +/- 2.7	4.8	pCi/g	U
Eu-154	0.7 +/- 2.9	4.9	pCi/g	U
Eu-155	0.15 +/- 0.85	1.4	pCi/g	U
Fe-59	-1.1 +/- 5.1	8.9	pCi/g	U
I-131	3300 +/- 5700	9500	pCi/g	U
K-40	48 +/- 17	23	pCi/g	
Mn-54	-0.20 +/- 0.60	1.0	pCi/g	U
Na-22	-0.03 +/- 0.60	1.0	pCi/g	U
Nb-94	-0.04 +/- 0.43	0.74	pCi/g	U

Data Package ID: *GSS0211062-1*

Gamma Spectroscopy Results

Method PAI 713R7

Sample Results

Reported on: Thursday, December 19, 2002 11:52:24

Client Name: ESH20_LANL
Client Project Name: Mice Project
Client Project Number: 7H05 WE6G

Laboratory Name: Paragon Analytics, Inc.
PAI Work Order: 0211062

Field ID: Sample 5 Site 1
Lab ID: 0211062-5

Sample Matrix: Ash
Date Prepared: 13-Nov-02
Prep SOP: PAI 739R5
Prep Batch: GS01778

Date Collected: 08-Aug-02
Date Analyzed: 27-Nov-02
Analytical SOP: PAI 713R7
Spectrum Code: 021263D07A

Final Aliquot: 5.646 g
Report Basis: As Received
Count Time (min.): 1000
Library: FANP.LIB

Target Nuclide	Result +/- 2 s TPU	MDC	Reporting Units	Lab Qualifier
Nb-95	-0.6 +/- 1.5	2.6	pCi/g	U
Pa-234m	31 +/- 85	140	pCi/g	U
Pb-212	0.5 +/- 1.3	2.2	pCi/g	U
Pb-214	0.6 +/- 1.7	2.8	pCi/g	U
Ru-106	1.1 +/- 5.2	8.7	pCi/g	U
Sb-124	0.7 +/- 1.6	2.6	pCi/g	U
Sb-125	-0.5 +/- 1.2	2.0	pCi/g	U
Sc-46	0.7 +/- 1.1	1.7	pCi/g	U
Th-227	-0.1 +/- 2.1	3.5	pCi/g	U
Th-234	-1.8 +/- 8.7	14	pCi/g	U
Tl-208	0.76 +/- 0.49	0.75	pCi/g	Tl
U-235	2.2 +/- 1.6	2.7	pCi/g	U
Zn-65	1.3 +/- 1.4	2.2	pCi/g	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.
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.

Abbreviations:

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

Data Package ID: *GSS0211062-1*

000025

Gamma Spectroscopy Results

Method PAI 713R7

Sample Results

Reported on: Thursday, December 19, 2002 11:52:24

Client Name: ESH20_LANL
Client Project Name: Mice Project
Client Project Number: 7H05 WE6G

Laboratory Name: Paragon Analytics, Inc.
PAI Work Order: 0211062

Field ID: Sample 6 Site 2
Lab ID: 0211062-6

Sample Matrix: Ash
Date Prepared: 13-Nov-02
Prep SOP: PAI 739R5
Prep Batch: GS01778

Date Collected: 08-Aug-02
Date Analyzed: 27-Nov-02
Analytical SOP: PAI 713R7
Spectrum Code: 021175D08A

Final Aliquot: 5.419 g
Report Basis: As Received
Count Time (min.): 1000
Library: FANP.LIB

Target Nuclide	Result +/- 2 s TPU	MDC	Reporting Units	Lab Qualifier
Ac-228	0.4 +/- 3.6	6.1	pCi/g	U
Ag-110m	0.18 +/- 0.48	0.81	pCi/g	U
Al-26	0.38 +/- 0.46	0.75	pCi/g	U
Am-241	0.26 +/- 0.53	0.88	pCi/g	U
Be-7	4 +/- 11	18	pCi/g	U
Bi-212	2.8 +/- 6.6	11	pCi/g	U
Bi-214	-0.1 +/- 1.9	3.2	pCi/g	U
Cd-109	-2.2 +/- 5.6	9.5	pCi/g	U
Ce-139	0.17 +/- 0.43	0.71	pCi/g	U
Ce-144	-0.6 +/- 2.2	3.7	pCi/g	U
Co-56	1.4 +/- 1.9	3.2	pCi/g	U
Co-57	0.05 +/- 0.25	0.42	pCi/g	U
Co-58	-0.5 +/- 1.1	1.9	pCi/g	U
Co-60	0.26 +/- 0.45	0.74	pCi/g	U
Cr-51	18 +/- 45	75	pCi/g	U
Cs-134	-0.43 +/- 0.44	0.76	pCi/g	U
Cs-137	0.20 +/- 0.39	0.64	pCi/g	U
Eu-152	1.6 +/- 2.2	3.6	pCi/g	U
Eu-154	-0.5 +/- 2.4	4.2	pCi/g	U
Eu-155	0.58 +/- 0.80	1.3	pCi/g	U
Fe-59	1.7 +/- 3.4	7.1	pCi/g	U
I-131	2000 +/- 5100	8500	pCi/g	U
K-40	63 +/- 16	19	pCi/g	
Mn-54	-0.03 +/- 0.48	0.83	pCi/g	U
Na-22	0.19 +/- 0.51	0.86	pCi/g	U
Nb-94	0.02 +/- 0.42	0.71	pCi/g	U

Data Package ID: *GSS0211062-1*

Paragon Analytics Inc.

Gamma Spectroscopy Results

Method PAI 713R7

Sample Results

Reported on: Thursday, December 19, 2002 11:52:24

Client Name: ESH20_LANL
Client Project Name: Mice Project
Client Project Number: 7H05 WE6G

Laboratory Name: Paragon Analytics, Inc.
PAI Work Order: 0211062

Field ID: Sample 6 Site 2
Lab ID: 0211062-6

Sample Matrix: Ash
Date Prepared: 13-Nov-02
Prep SOP: PAI 739R5
Prep Batch: GS01778

Date Collected: 08-Aug-02
Date Analyzed: 27-Nov-02
Analytical SOP: PAI 713R7
Spectrum Code: 021175D08A

Final Aliquot: 5.419 g
Report Basis: As Received
Count Time (min.): 1000
Library: FANP.LIB

Target Nuclide	Result +/- 2 s TPU	MDC	Reporting Units	Lab Qualifier
Nb-95	1.0 +/- 1.3	2.1	pCi/g	U
Pa-234m	22 +/- 71	120	pCi/g	U
Pb-212	0.7 +/- 1.1	1.8	pCi/g	U
Pb-214	0.58 +/- 0.70	1.3	pCi/g	U
Ru-106	0.3 +/- 4.2	7.2	pCi/g	U
Sb-124	-0.1 +/- 1.4	2.4	pCi/g	U
Sb-125	-0.13 +/- 0.88	1.7	pCi/g	U
Sc-46	1.42 +/- 0.95	1.5	pCi/g	U
Th-227	1.2 +/- 1.9	3.1	pCi/g	U
Th-234	-2.2 +/- 8.4	14	pCi/g	U
Tl-208	0.31 +/- 0.81	1.4	pCi/g	U
U-235	2.7 +/- 1.5	2.9	pCi/g	U
Zn-65	-0.7 +/- 1.2	2.1	pCi/g	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.
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.

Abbreviations:

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

Data Package ID: *GSS0211062-1*

Gamma Spectroscopy Results

Method PAI 713R7

Sample Results

Reported on: Thursday, December 19, 2002 11:52:24

Client Name: ESH20_LANL
Client Project Name: Mice Project
Client Project Number: 7H05 WE6G

Laboratory Name: Paragon Analytics, Inc.
PAI Work Order: 0211062

Field ID: Sample 7 Site 3
Lab ID: 0211062-7

Sample Matrix: Ash
Date Prepared: 13-Nov-02
Prep SOP: PAI 739R5
Prep Batch: GS01778

Date Collected: 08-Aug-02
Date Analyzed: 27-Nov-02
Analytical SOP: PAI 713R7
Spectrum Code: 020760D10B

Final Aliquot: 2.736 g
Report Basis: As Received
Count Time (min.): 1000
Library: FANP.LIB.

Target Nuclide	Result +/- 2 s TPU	MDC	Reporting Units	Lab Qualifier
Ac-228	1.2 +/- 3.8	6.3	pCi/g	U
Ag-110m	-0.54 +/- 0.59	0.99	pCi/g	U
Al-26	0.01 +/- 0.56	0.95	pCi/g	U
Am-241	-1.4 +/- 3.1	5.2	pCi/g	U
Be-7	4 +/- 14	23	pCi/g	U
Bi-212	-5 +/- 19	31	pCi/g	U
Bi-214	0.1 +/- 3.1	5.2	pCi/g	U
Cd-109	20 +/- 11	17	pCi/g	SI
Ce-139	0.15 +/- 0.57	0.95	pCi/g	U
Ce-144	-1.2 +/- 3.4	5.7	pCi/g	U
Co-56	0.7 +/- 4.4	7.3	pCi/g	U
Co-57	0.24 +/- 0.46	0.77	pCi/g	U
Co-58	-0.4 +/- 1.9	3.2	pCi/g	U
Co-60	-0.25 +/- 0.57	0.96	pCi/g	U
Cr-51	-26 +/- 53	90	pCi/g	U
Cs-134	0.05 +/- 0.85	1.4	pCi/g	U
Cs-137	-0.12 +/- 0.48	0.80	pCi/g	U
Eu-152	0.2 +/- 2.7	4.5	pCi/g	U
Eu-154	1.9 +/- 2.8	4.6	pCi/g	U
Eu-155	1.5 +/- 2.8	4.6	pCi/g	U
Fe-59	4.8 +/- 5.1	8.3	pCi/g	U
I-131	-3100 +/- 6100	10000	pCi/g	U
K-40	77 +/- 20	25	pCi/g	
Mn-54	-0.33 +/- 0.59	0.99	pCi/g	U
Na-22	-0.17 +/- 0.58	0.98	pCi/g	U
Nb-94	-0.19 +/- 0.46	0.78	pCi/g	U

Data Package ID: *GSS0211062-1*

000028

Gamma Spectroscopy Results

Method PAI 713R7

Sample Results

Reported on: Thursday, December 19, 2002 11:52:24

Client Name: ESH20_LANL
Client Project Name: Mice Project
Client Project Number: 7H05 WE6G

Laboratory Name: Paragon Analytics, Inc.
PAI Work Order: 0211062

Field ID: Sample 7 Site 3
Lab ID: 0211062-7

Sample Matrix: Ash
Date Prepared: 13-Nov-02
Prep SOP: PAI 739R5
Prep Batch: GS01778

Date Collected: 08-Aug-02
Date Analyzed: 27-Nov-02
Analytical SOP: PAI 713R7
Spectrum Code: 020760D10B

Final Aliquot: 2.736 g
Report Basis: As Received
Count Time (min.): 1000
Library: FANP.LIB

Target Nuclide	Result +/- 2 s TPU	MDC	Reporting Units	Lab Qualifier
Nb-95	-4.0 +/- 2.3	3.8	pCi/g	U
Pa-234m	11 +/- 84	140	pCi/g	U
Pb-212	-0.8 +/- 1.8	3.0	pCi/g	U
Pb-214	-0.8 +/- 2.7	4.5	pCi/g	U
Ru-106	1.6 +/- 5.1	8.5	pCi/g	U
Sb-124	8.7 +/- 2.2	2.4	pCi/g	TI
Sb-125	0.5 +/- 1.1	2.0	pCi/g	U
Sc-46	-1.0 +/- 1.2	2.0	pCi/g	U
Th-227	1.6 +/- 3.5	5.7	pCi/g	U
Th-234	8 +/- 16	27	pCi/g	U
Tl-208	0.10 +/- 0.97	1.6	pCi/g	U
U-235	4.3 +/- 2.6	4.0	pCi/g	TI
Zn-65	-2.3 +/- 2.1	3.5	pCi/g	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.
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.

Abbreviations:

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

Data Package ID: *GSS0211062-1*

000029

Sample Results Summary

Client Name: ESH20_LANL
Client Project Name: Mice Project
Client Project Number: 7H05 WE6G

Laboratory Name: Paragon Analytics, Inc.
PAI Work Order: 0211062

Reported on: Friday, January 03, 2003 16:06:00

Lab Sample ID	Client Sample ID	Test	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0211062-1	Sample 1 (Area G Site 7c)	SR_90	Sr-90	1.46 +/- 0.46	0.47	pCi/g	Ash	SR00265	12/12/02	
0211062-2	Sample 2 (Area G Site 1,2,7a,6	SR_90	Sr-90	1.70 +/- 0.54	0.55	pCi/g	Ash	SR00265	12/12/02	
0211062-3	Sample 3 (Area G Site 8)	SR_90	Sr-90	1.39 +/- 0.45	0.47	pCi/g	Ash	SR00265	12/12/02	
0211062-4	Sample 4 (Area G Site 3a,3b)	SR_90	Sr-90	0.95 +/- 0.38	0.46	pCi/g	Ash	SR00265	12/12/02	LT
0211062-5	Sample 5 Site 1	SR_90	Sr-90	1.20 +/- 0.44	0.52	pCi/g	Ash	SR00265	12/12/02	
0211062-6	Sample 6 Site 2	SR_90	Sr-90	1.23 +/- 0.42	0.46	pCi/g	Ash	SR00265	12/12/02	
0211062-7	Sample 7 Site 3	SR_90	Sr-90	1.06 +/- 0.47	0.66	pCi/g	Ash	SR00265	1/2/03	

Comments:

Data Package ID: *SRA0211062-1*

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

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

2 - Chemical Yield outside default limits.

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Sample Results Summary

Client Name: ESH20_LANL
Client Project Name: Mice Project
Client Project Number: 7H05 WE6G

Laboratory Name: Paragon Analytics, Inc.
PAI Work Order: 0211062

Reported on: Monday, January 06, 2003
08:59:18

Lab Sample ID	Client Sample ID	Test	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0211062-1	Sample 1 (Area G Site 7c)	PU-ISO	Pu-238	0.119 +/- 0.021	0.0026	pCi/g	Ash	AS05973	12/20/02	
0211062-1	Sample 1 (Area G Site 7c)	PU-ISO	Pu-239	0.066 +/- 0.013	0.0011	pCi/g	Ash	AS05973	12/20/02	
0211062-2	Sample 2 (Area G Site 1,2,7a,6	PU-ISO	Pu-238	0.052 +/- 0.011	0.0011	pCi/g	Ash	AS05973	12/20/02	
0211062-2	Sample 2 (Area G Site 1,2,7a,6	PU-ISO	Pu-239	0.060 +/- 0.012	0.0035	pCi/g	Ash	AS05973	12/20/02	
0211062-3	Sample 3 (Area G Site 8)	PU-ISO	Pu-238	0.0008 +/- 0.0030	0.0065	pCi/g	Ash	AS05973	12/20/02	U
0211062-3	Sample 3 (Area G Site 8)	PU-ISO	Pu-239	0.0177 +/- 0.0067	0.0038	pCi/g	Ash	AS05973	12/20/02	LT
0211062-4	Sample 4 (Area G Site 3a,3b)	PU-ISO	Pu-238	0.0114 +/- 0.0039	0.00088	pCi/g	Ash	AS05973	12/21/02	LT
0211062-4	Sample 4 (Area G Site 3a,3b)	PU-ISO	Pu-239	0.172 +/- 0.027	0.0020	pCi/g	Ash	AS05973	12/21/02	
0211062-5	Sample 5 Site 1	PU-ISO	Pu-238	0.0020 +/- 0.0035	0.0068	pCi/g	Ash	AS05973	12/21/02	U
0211062-5	Sample 5 Site 1	PU-ISO	Pu-239	0.0011 +/- 0.0029	0.0059	pCi/g	Ash	AS05973	12/21/02	U
0211062-6	Sample 6 Site 2	PU-ISO	Pu-238	0.0007 +/- 0.0030	0.0022	pCi/g	Ash	AS05973	12/21/02	U

Comments:

Data Package ID: *PU0211062-1*

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.

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Paragon Analytics Inc.

Sample Results Summary

Client Name: ESH20_LANL
Client Project Name: Mice Project
Client Project Number: 7H05 WE6G

Laboratory Name: Paragon Analytics, Inc.
PAI Work Order: 0211062

Reported on: Monday, January 06, 2003 08:59:18

Lab Sample ID	Client Sample ID	Test	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0211062-6	Sample 6 Site 2	PU-ISO	Pu-239	0.0002 +/- 0.0030	0.0050	pCi/g	Ash	AS05973	12/21/02	U
0211062-7	Sample 7 Site 3	PU-ISO	Pu-238	0.0000 +/- 0.0058	0.0042	pCi/g	Ash	AS05973	12/21/02	U
0211062-7	Sample 7 Site 3	PU-ISO	Pu-239	0.0028 +/- 0.0058	0.0042	pCi/g	Ash	AS05973	12/21/02	U

Comments:

Data Package ID: *PU0211062-1*

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.

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

Paragon Analytics Inc.

Sample Results Summary

Client Name: ESH20_LANL
Client Project Name: Mice Project
Client Project Number: 7H05 WE6G

Laboratory Name: Paragon Analytics, Inc.
PAI Work Order: 0211062

Reported on: Monday, January 06, 2003
06:59:16

Lab Sample ID	Client Sample ID	Test	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0211062-1	Sample 1 (Area G Site 7c)	AM-241	Am-241	0.0156 +/- 0.0040	0.0015	pCi/g	Ash	AS05973	12/28/02	LT u
0211062-2	Sample 2 (Area G Site 1,2,7a,6	AM-241	Am-241	0.0343 +/- 0.0096	0.0015	pCi/g	Ash	AS05973	12/28/02	u
0211062-3	Sample 3 (Area G Site 8)	AM-241	Am-241	0.0062 +/- 0.0053	0.0074	pCi/g	Ash	AS05973	12/28/02	U
0211062-4	Sample 4 (Area G Site 3a,3b)	AM-241	Am-241	0.099 +/- 0.016	0.0023	pCi/g	Ash	AS05973	12/28/02	
0211062-5	Sample 5 Site 1	AM-241	Am-241	0.0017 +/- 0.0040	0.0025	pCi/g	Ash	AS05973	12/28/02	U
0211062-6	Sample 6 Site 2	AM-241	Am-241	0.0024 +/- 0.0038	0.0061	pCi/g	Ash	AS05973	12/28/02	U
0211062-7	Sample 7 Site 3	AM-241	Am-241	0.0054 +/- 0.0044	0.0027	pCi/g	Ash	AS05973	12/28/02	LT u

Comments:

Data Package ID: *AM0211062-1*

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.

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

Sample Results Summary

Client Name: ESH20_LANL
Client Project Name: Mice Project
Client Project Number: 7H05 WE6G

Laboratory Name: Paragon Analytics, Inc.
PAI Work Order: 0211062

Reported on: Monday, January 06, 2003 08:59:18

Lab Sample ID	Client Sample ID	Test	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0211062-4	Sample 4 (Area G Site 3a,3b)	U-ISO	U-238	0.133 +/- 0.022	0.0027	pCi/g	Ash	AS05973	12/21/02	
0211062-5	Sample 5 Site 1	U-ISO	U-234	0.248 +/- 0.039	0.0048	pCi/g	Ash	AS05973	12/21/02	
0211062-5	Sample 5 Site 1	U-ISO	U-235	0.0101 +/- 0.0056	0.0068	pCi/g	Ash	AS05973	12/21/02	
0211062-5	Sample 5 Site 1	U-ISO	U-238	0.329 +/- 0.049	0.0033	pCi/g	Ash	AS05973	12/21/02	
0211062-6	Sample 6 Site 2	U-ISO	U-234	0.166 +/- 0.032	0.0051	pCi/g	Ash	AS05973	12/23/02	
0211062-6	Sample 6 Site 2	U-ISO	U-235	0.0093 +/- 0.0061	0.0059	pCi/g	Ash	AS05973	12/23/02	LT
0211062-6	Sample 6 Site 2	U-ISO	U-238	0.249 +/- 0.044	0.0023	pCi/g	Ash	AS05973	12/23/02	
0211062-7	Sample 7 Site 3	U-ISO	U-234	0.491 +/- 0.076	0.0098	pCi/g	Ash	AS05973	12/31/02	
0211062-7	Sample 7 Site 3	U-ISO	U-235	0.028 +/- 0.012	0.010	pCi/g	Ash	AS05973	12/31/02	
0211062-7	Sample 7 Site 3	U-ISO	U-238	0.74 +/- 0.11	0.0076	pCi/g	Ash	AS05973	12/31/02	

Comments:

Data Package ID: *U0211062-1*

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.

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

APPENDIX C

ANALYTICAL DATA REPORTS OF RADIONUCLIDE CONCENTRATIONS IN MICE COLLECTED AROUND THE DARHT FACILITY DURING 2003

CHAIN-OF-CUSTODY RECORD

0404185

Los Alamos
Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Soils and Foodstuffs (7H05 WE6G)
P.I. # (505) 667- 0815
RRES-ECO MS M887

Project Name	Request the following analysis:	Number of containers	Sample Location/Remarks
Small Mammals	Am 241, Sr 90, Iso Pu, Cs 137, Iso U, tot U (calcuted)		Darht / Frijoles (background) Mice All mice whole body
Samplers (signatures): [signature]			

Date	Time	Sample Name/Number	Number of containers	Sample Location/Remarks
				DARHT mice (DM) (see map).
8/12/03	8:00 AM	(1) ✓ DM Grid ~~1a~~ 2a DAR 10/2/03		Darht Area III NE of DARHT firing pot. (5 mice)
8/12/03	8:00 AM	(2) ✓ DM Grid ~~2~~ 1 DSR 10/2/03		Darht AREA III N of DARHT " " (8 mice)
8/12/03	8:00 AM	(3) ✓ DM Grid 3		Darht AREA III N of DARHT " " (9 mice)
				M N side of Rd 340
8/27/03	8:00 AM	(4) BKg Grid 1		Frijoles Mesa (Background) BKg (8 mice)
8/27/03	8:00 AM	(5) BKg Grid 2		Frijoles Mesa (Background) (7 mice)
8/27/03	8:00 AM	~~BKg Grid 3~~ 10/02/03 [illegible] Combined		Frijoles Mesa (Background) (5 mice) (10 mice total)
8/27/03	8:00 AM	✓ ~~BKg Grid 3a~~ (6) BKg GRID3		Frijoles Mesa (Background) (5 mice)
				Detection Levels MDC
				Am 241 = 0.02 pCi/mL Cs 137 = 1
				Iso Pu = 0.02 pCi/mL
				Iso U = 0.01 pCi/mL
				Sr 90 = 0.06 pCi/mL

Relinquished by: (signature)	Date/Time	Received by: (signature)	Relinquished by: (signature)	Date/Time	Received by: (signature)
[signature]	9/8/03 2:00	[signature]	[signature]	4/19/04 10:33	FEDEX
FEDEX	4/20/04 0940	[signature] for AW			
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: Small Mammals
Client Project Number: 7H02 CDFW D361 1000

Laboratory Name: Paragon Analytics
PAI Work Order: 0404186

Page: 1 of 1
Reported on: Tuesday, June 01, 2004
8:19:51 AM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0404186-1	DM GRID 2	Sample	H-3	0.64 +/- 0.30	0.44	pCi/ml	LIQUID	3H040527-1	5/31/2004	
0404186-2	DM GRID 1	Sample	H-3	0.64 +/- 0.30	0.44	pCi/ml	LIQUID	3H040527-1	5/31/2004	
0404186-3	DM GRID 3	Sample	H-3	0.55 +/- 0.29	0.44	pCi/ml	LIQUID	3H040527-1	5/31/2004	LT
0404186-4	BKG GRID 1	Sample	H-3	0 +/- 0.26	0.44	pCi/ml	LIQUID	3H040527-1	5/31/2004	U
0404186-5	BKG GRID 2	Sample	H-3	0.19 +/- 0.27	0.44	pCi/ml	LIQUID	3H040527-1	5/31/2004	U
0404186-6	BKG GRID 3	Sample	H-3	-0.15 +/- 0.26	0.44	pCi/ml	LIQUID	3H040527-1	5/31/2004	U

Comments: -

Data Package ID: *h3w0404186-1*

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: 0404185
Client Name: ESH20_LANL
ClientProject ID: Small Mammals 7H02 CDFW D361 1000

QA 8/4/04

Field ID: DM GRID 1
Lab ID: 0404185-2

Library: USGS

Sample Matrix: ASH
Prep SOP: PAI 739 Rev 8
Date Collected: 12-Aug-03
Date Prepared: 07-May-04
Date Analyzed: 15-May-04

Prep Batch: GS040507-1
QCBatchID: GS040507-1-1
Run ID: GS040507-1A
Count Time: 1000 minutes
Report Basis: As Received

Final Aliquot: 3.74 g
Prep Basis: As Received
Moisture(%): NA
Result Units: pCi/g
File Name: 040753D04A

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
10045-97-3	Cs-137	0.61 +/- 0.65	1.05	U,M

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: *GSA0404185-1*

Gamma Spectroscopy Results

PAI 713 Rev 8

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0404185
Client Name: ESH20_LANL
ClientProject ID: Small Mammals 7H02 CDFW D381 1000

Field ID: DM GRID 2
Lab ID: 0404185-1

Library: USGS

Sample Matrix: ASH
Prep SOP: PAI 739 Rev 8
Date Collected: 12-Aug-03
Date Prepared: 07-May-04
Date Analyzed: 15-May-04

Prep Batch: GS040507-1
QCBatchID: GS040507-1-1
Run ID: GS040507-1A
Count Time: 1000 minutes
Report Basis: As Received

Final Aliquot: 2.94 g
Prep Basis: As Received
Moisture(%): NA
Result Units: pCi/g
File Name: 040888D01A

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
10045-97-3	Cs-137	0 +/- 0.51	0.85	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: *GSA0404185-1*

Gamma Spectroscopy Results

PAI 713 Rev 8

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0404185
Client Name: ESH20_LANL
ClientProject ID: Small Mammals 7H02 CDFW D361 1000

8/4/04

Field ID: DM GRID 3
Lab ID: 0404185-3

Library: USGS

Sample Matrix: ASH
Prep SOP: PAI 739 Rev 8
Date Collected: 12-Aug-03
Date Prepared: 07-May-04
Date Analyzed: 15-May-04

Prep Batch: GS040507-1
QCBatchID: GS040507-1-1
Run ID: GS040507-1A
Count Time: 1000 minutes
Report Basis: As Received

Final Aliquot: 5.45 g
Prep Basis: As Received
Moisture(%): NA
Result Units: pCi/g
File Name: 040677D07A

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
10045-97-3	Cs-137	-0.02 +/- 0.56	0.96	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: *GSA0404185-1*

Strontium-90 Analysis by GFPC Sample Results Summary

Client Name: ESH20_LANL
Client Project Name: Small Mammals
Client Project Number: 7H02 CDFW D361 1000

Laboratory Name: Paragon Analytics
PAI Work Order: 0404185
QC Valid

Page: 1 of 1
Reported on: Thursday, June 24, 2004
4:56:53 PM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0404185-1	DM GRID 2	Sample	Sr-90	1.57 +/- 0.37	0.06	pCi/g	ASH	SR040602-1	6/14/2004	
0404185-2	DM GRID 1	Sample	Sr-90	1.24 +/- 0.30	0.06	pCi/g	ASH	SR040602-1	6/14/2004	
0404185-3	DM GRID 3	Sample	Sr-90	1.96 +/- 0.47	0.07	pCi/g	ASH	SR040602-1	6/17/2004	Y2,M3
0404185-4	BKG GRID 1	Sample	Sr-90	1.34 +/- 0.32	0.07	pCi/g	ASH	SR040602-1	6/17/2004	Y2,M3
0404185-5	BKG GRID 2	Sample	Sr-90	1.54 +/- 0.37	0.06	pCi/g	ASH	SR040602-1	6/17/2004	
0404185-6	BKG GRID 3	Sample	Sr-90	1.68 +/- 0.40	0.06	pCi/g	ASH	SR040602-1	6/17/2004	Y2,M3

Comments:

Data Package ID: *SR0404185-1*

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: Small Mammals
Client Project Number: 7H02 CDFW D361 1000

Laboratory Name: Paragon Analytics
PAI Work Order: 0404185

Reported on: Friday, June 18, 2004
6:33:17 AM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0404185-1	DM GRID 2	Sample	Pu-238	0.0022 +/- 0.0036	0.0054	pCi/g	ASH	AS040602-1	6/13/2004	U
0404185-1	DM GRID 2	Sample	Pu-239	0.0066 +/- 0.0050	0.0054	pCi/g	ASH	AS040602-1	6/13/2004	LT
0404185-2	DM GRID 1	Sample	Pu-238	-0.0005 +/- 0.0032	0.0069	pCi/g	ASH	AS040602-1	6/13/2004	U
0404185-2	DM GRID 1	Sample	Pu-239	0.0016 +/- 0.0026	0.0038	pCi/g	ASH	AS040602-1	6/13/2004	U
0404185-3	DM GRID 3	Sample	Pu-238	0.0065 +/- 0.0035	0.0028	pCi/g	ASH	AS040602-1	6/13/2004	LT
0404185-3	DM GRID 3	Sample	Pu-239	0.0030 +/- 0.0024	0.0028	pCi/g	ASH	AS040602-1	6/13/2004	LT
0404185-4	BKG GRID 1	Sample	Pu-238	0.0010 +/- 0.0017	0.0009	pCi/g	ASH	AS040602-1	6/13/2004	LT
0404185-4	BKG GRID 1	Sample	Pu-239	0.0030 +/- 0.0021	0.0009	pCi/g	ASH	AS040602-1	6/13/2004	LT
0404185-5	BKG GRID 2	Sample	Pu-238	0.0008 +/- 0.0019	0.0011	pCi/g	ASH	AS040602-1	6/13/2004	U

Comments:

Data Package ID: *Pu0404185-1*

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: Small Mammals
Client Project Number: 7H02 CDFW D361 1000

Laboratory Name: Paragon Analytics
PAI Work Order: 0404185

Page: 1 of 1
Reported on: Friday, June 18, 2004
6:34:41 AM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0404185-1	DM GRID 2	Sample	Am-241	0.0008 +/- 0.0038	0.0057	pCi/g	ASH	AS040602-1	6/13/2004	U
0404185-2	DM GRID 1	Sample	Am-241	0.0021 +/- 0.0026	0.0038	pCi/g	ASH	AS040602-1	6/13/2004	U
0404185-3	DM GRID 3	Sample	Am-241	0.0014 +/- 0.0022	0.0037	pCi/g	ASH	AS040602-1	6/13/2004	U
0404185-4	BKG GRID 1	Sample	Am-241	0.0014 +/- 0.0022	0.0037	pCi/g	ASH	AS040602-1	6/13/2004	U
0404185-5	BKG GRID 2	Sample	Am-241	0.0008 +/- 0.0020	0.0038	pCi/g	ASH	AS040602-1	6/13/2004	U
0404185-6	BKG GRID 3	Sample	Am-241	0.0007 +/- 0.0017	0.0033	pCi/g	ASH	AS040602-1	6/13/2004	U

Comments:

Data Package ID: *Am0404185-1*

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: Small Mammals
Client Project Number: 7H02 CDFW D361 1000

Laboratory Name: Paragon Analytics
PAI Work Order: 0404185

Reported on: Friday, June 18, 2004
6:36:02 AM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0404185-1	DM GRID 2	Sample	U-234	0.67 +/- 0.11	0	pCi/g	ASH	AS040602-1	6/14/2004	
0404185-1	DM GRID 2	Sample	U-235	0.033 +/- 0.011	0.005	pCi/g	ASH	AS040602-1	6/14/2004	
0404185-1	DM GRID 2	Sample	U-238	0.83 +/- 0.14	0	pCi/g	ASH	AS040602-1	6/14/2004	
0404185-2	DM GRID 1	Sample	U-234	0.342 +/- 0.060	0.005	pCi/g	ASH	AS040602-1	6/14/2004	
0404185-2	DM GRID 1	Sample	U-235	0.0139 +/- 0.0074	0.0084	pCi/g	ASH	AS040602-1	6/14/2004	
0404185-2	DM GRID 1	Sample	U-238	0.476 +/- 0.082	0.006	pCi/g	ASH	AS040602-1	6/14/2004	
0404185-3	DM GRID 3	Sample	U-234	0.85 +/- 0.14	0	pCi/g	ASH	AS040602-1	6/14/2004	
0404185-3	DM GRID 3	Sample	U-235	0.047 +/- 0.011	0.004	pCi/g	ASH	AS040602-1	6/14/2004	
0404185-3	DM GRID 3	Sample	U-238	2.00 +/- 0.32	0.01	pCi/g	ASH	AS040602-1	6/14/2004	

Comments:

Data Package ID: *U0404185-1*

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

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