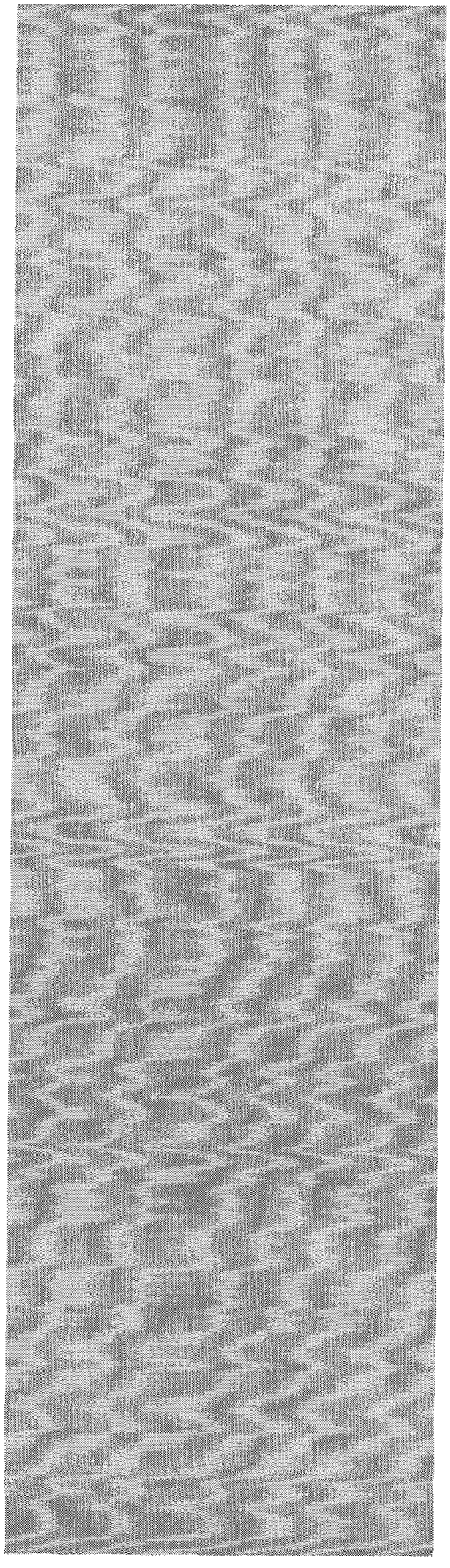
LA-13613-PR
Progress Report



Radionuclide Concentrations in Honey Bees from Area G at TA-54 during 1998

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LA-13613-PR
Progress Report

Issued: June 1999

Radionuclide Concentrations in Honey Bees from Area G at TA-54 during 1998

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Los Alamos, New Mexico 87545

RADIONUCLIDE CONCENTRATIONS IN HONEY BEES FROM AREA G AT TA-54 DURING 1998

T.K. Haarmann and P.R. Fresquez

ABSTRACT

Honey bees were collected from two colonies located at Los Alamos National Laboratory's Area G, Technical Area 54, and from one control (background) colony located near Jemez Springs, NM. Samples were analyzed for various radionuclides. Area G sample results from both colonies were higher than the upper (95%) level background concentration for ^{239,240}Pu, ^{3}H, and total uranium. Sample results from one colony were higher than the upper (95%) level background concentration for ^{238}Pu.

INTRODUCTION

As part of the ongoing environmental surveillance program at Area G (Fresquez *et al.* 1997a)—a 25.5-ha (63-ac) low-level radioactive waste management and disposal area located on the east end of Mesa del Buey at Technical Area 54 at Los Alamos National Laboratory (LANL) (Figure 1)—samples of honey bees were collected from beehives during the summer of 1998. Honey bees can be thought of as mobile samplers that efficiently cover a large sample area and then return to a central location (Bromenshenk 1992). Honey bees forage in an area with a radius as large as 6 km (3.7 mi) and often cover a total area up to 100 square km (39 square mi) (Leita *et al.* 1996, Visscher and Seeley 1982). Each hive contains literally thousands of bees, most of whom will forage for nectar, water, pollen, and plant resins, which are all brought back into the hive. During these foraging flights, bees inadvertently contact and accumulate a wide array of pollutants, some of which are brought back to the

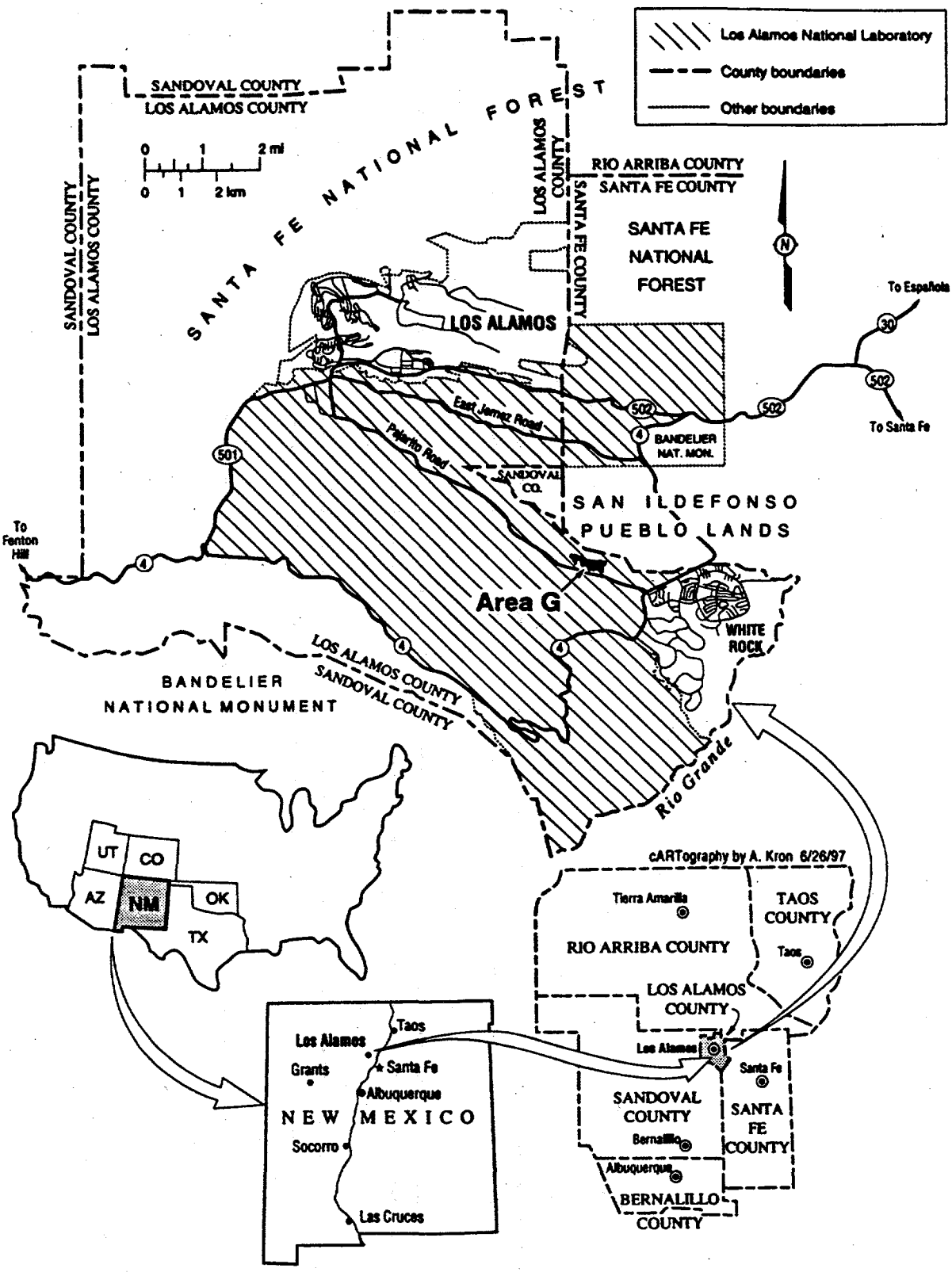

Figure 1. The location of Area G at Los Alamos National Laboratory.

colony (Bromenshenk *et al.* 1985). These contaminants often become incorporated into the bee tissue, the wax, the honey, or the hive itself (Wallwork-Barber *et al.* 1982).

Honey bee studies have been conducted on many different types of pollutants including fluoride (Bromenshenk *et al.* 1988a, Mayer *et al.* 1988), lead (Migula *et al.* 1989), zinc (Bromenshenk *et al.* 1988b), nickel (Balestra *et al.* 1992), potassium (Barbattini *et al.* 1991), cesium (Bettoli *et al.* 1987, Tonelli *et al.* 1990), tritium (White *et al.* 1983, Fresquez *et al.* 1997b), and plutonium (Hakonson and Bostick 1976). Honey bee sampling is an inexpensive form of monitoring, especially considering the many different sampling points the foraging bees visit. Collection of bees at one location (the hive) can provide a plethora of information from numerous points concerning the distribution and bioavailability of contaminants. Comparing the amounts of contaminants in honey bees with the known amounts of contaminants in the surrounding area could be useful for modeling the redistribution of contaminants through ecosystems. The very nature of honey bee ecology makes them an excellent living system from which to monitor the presence of contaminants.

The objective of this study was to compare various radionuclide concentrations in honey bees from Area G with honey bees collected from a background location.

METHODS

We monitored Area G using beehives consisting of a standard Langstroth hive stocked with Italian honey bees (*Apis mellifera ligustica*). During 1997, two colonies were established on the south end of Area G near the ^{3}H shafts (Figure 2). These colonies were brought into the study site from an uncontaminated area. In addition, a control (background) site with one colony was established 10 km (6 mi) south of Jemez Springs, NM.

In the early Fall of 1998, bee tissue samples were collected from all of the colonies. Three separate samples (one from each colony), each containing approximately 100 g of bees, were collected. Each individual 100-g sample consisted of approximately 1,000 bees.

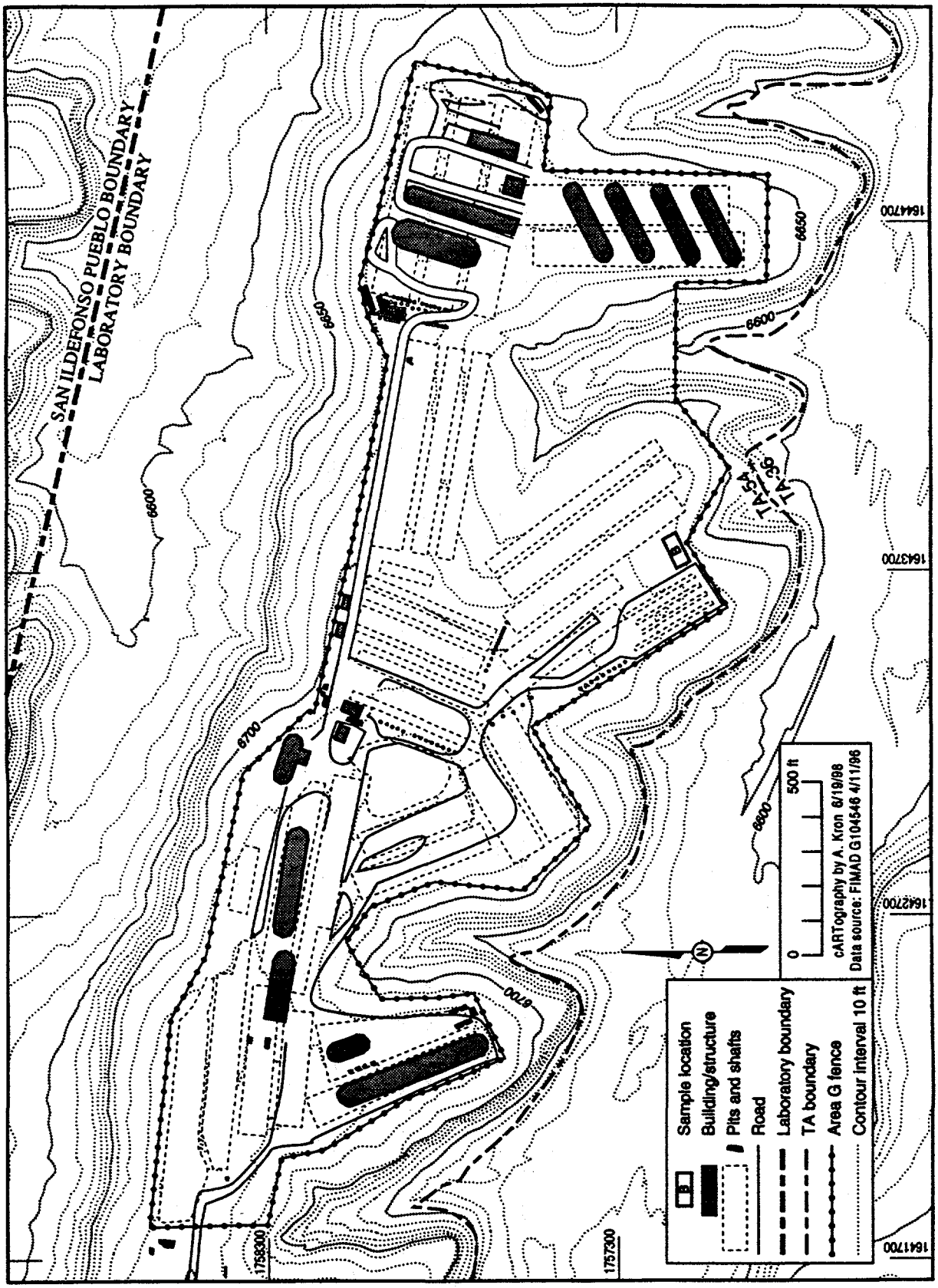

Figure 2. Site/sample location of bee hives at Area G.

Bee samples were collected using a small, rechargeable vacuum. Bees were vacuumed off frames that were removed from the honey supers, transferred to a plastic resealable bag, weighed, and double bagged into plastic resealable bags. All samples were kept in a cooler and frozen upon returning to the laboratory. With each sample collected, the vacuum collection area was thoroughly cleaned to avoid cross-contamination of samples.

All samples were analyzed by LANL's Environmental Chemistry Group for ^{3}H, ^{137}Cs, ^{241}Am, ^{228}Ac, ^{7}Be, ^{241}Bi, ^{57}Co, ^{60}Co, ^{40}K, ^{54}Mn, ^{22}Na, ^{212}Pb, ^{214}Pb, ^{208}Tl, ^{238}Pu, $^{239,240}Pu$, total uranium, and gamma activity. Analytical methods have been previously described in Fresquez *et al.* (1997c). The bee tritium samples were analyzed by liquid scintillation counting in the following manner: 5 ml of moisture were distilled from each sample, mixed with 15 ml of a scintillation solution, and counted on a scintillation counter for 50 minutes. The gamma-emitting radionuclide concentrations were determined using high-resolution germanium detector gamma-ray spectrometry. However, for a more accurate analysis of ^{241}Am, alpha spectrometry was used. Am and Pu samples were dissolved in nitric acid, isolated by anion exchange, electroplated onto stainless steel disks, and counted using an alpha spectrometer. Total uranium was determined by kinetic phosphorescence analysis.

RESULTS

Table 1 contains a summary of the 1998 analytical results from samples collected near Area G and the control site. The original analytical reports are included in the Appendix for future reference. For the purpose of this report, only concentrations that were at detectable levels—where the analytical result was higher than two times the counting uncertainty—are discussed in further detail.

In general, most radionuclides, with the exception of $^{239,240}Pu$, ^{3}H, and total uranium were within the regional statistical reference level (RSRL). The RSRL is the upper (95%) level background concentration (mean + two std dev) derived from the combined 1997 and 1998 control data (Haarmann

Table 1. Radionuclide Analytical Results from Honey Bee Samples Collected from Colonies at Area G and a Control Site in 1998.

Element/ Activity	Units	Area G G-1	AU[a]	Area G G-2	AU	Control	AU	RSRL
^{238}Pu	pCi/g[b]	0.0130	0.0023	0.0084	0.0022	0.0015	0.0011	0.0110[c]
^{239,240}Pu	pCi/g[b]	0.0279	0.0040	0.0394	0.0046	0.0131	0.0028	0.0164[c]
U-total	µg/g[b]	0.47	0.05	0.45	0.05	0.24	0.02	0.34[c]
^{137}Cs	pCi/g[b]	2.47	3.622	0.71	1.07	-0.49	1.30	-0.18[c]
^{241}Am	pCi/g[b]	0.0046	0.0053	0.0308	0.0091	0.0102	0.0049	0.0223[c]
^{228}Ac	pCi/g[b]	-2.17	11.86	-9.05	11.64	12.51	18.76	50.03[d]
^{7}Be	pCi/g[b]	118.57	177.85	1.55	2.33	7.64	11.47	30.58[d]
^{214}Bi	pCi/g[b]	-1.32	1.65	4.36	6.46	9.03	13.55	36.13[d]
^{57}Co	pCi/g[b]	2.14	0.49	0.47	0.69	0.45	0.66	1.77[d]
^{60}Co	pCi/g[b]	4.45	6.59	0.52	0.79	14.07	2.78	19.61[d]
^{40}K	pCi/g[b]	276.66	47.76	168.07	32.32	437.80	67.76	573.32[d]
^{54}Mn	pCi/g[b]	-1.98	2.14	3.07	4.69	-2.08	2.26	2.44[d]
^{22}Na	pCi/g[b]	0.79	1.19	-0.71	3.10	-0.69	3.30	5.91[d]
^{212}Pb	pCi/g[b]	5.11	7.58	14.06	2.42	8.34	12.51	33.36[d]
^{214}Pb	pCi/g[b]	1.65	2.63	1.55	2.33	-0.54	0.63	0.72[d]
^{208}Tl	pCi/g[b]	0.35	0.53	2.10	3.23	-2.43	2.78	3.13[d]
^{3}H	pCi/mL[e]	147.9	5.40	566.0	17	3.72	0.87	6.18[c]
Gamma	pCi/g[b]	20.73	8.45	34.68	8.39	41.96	9.03	64.87[c]

[a]Analytical Uncertainty; values are the uncertainty in the analytical results at the 65% confidence level (one sigma).
[b]Units are in g per ash.
[c]Regional Statistical Reference Level; the upper (95%) level background concentration (mean + two sigma) from 1997 and 1998 control data.
[d]Regional Statistical Reference Level; the upper (95%) level background concentration (mean + two sigma) from present control data.
[e]Units are in mL tissue moisture.

and Fresquez 1998). The largest concentration difference between Area G and the RSRL was seen in the tritium levels. Tritium levels in the Area G bees, for example, were at 147.9 and 566.0 pCi mL^{-1}; the control colony contained only 3.72 pCi mL^{-1}, with a RSRL of 6.18 pCi mL^{-1}.

Overall, the small increase in the concentration levels of the 1998 results when compared to the 1997 results (Haarmann and Fresquez 1998) does not necessarily reflect increasing levels of contaminants on site at Area G. Haarmann (1997) demonstrated an increase in contaminant levels within

colonies located at the same site, year after year. Likely, there was a slight build up of contaminants within the Area G colonies from 1997 to 1998. This, in turn, may be the cause of the higher concentrations in 1998 data when compared to 1997 data.

ACKNOWLEDGMENT

Thanks to Rebecca J. Wechsler, Environmental Coordinator, EM-SWO, for technical assistance at Area G.

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APPENDIX

CST ANALYTICAL REPORTS OF RADIONUCLIDES IN BEES

Los Alamos
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memorandum
Chemical Science and Technology
Responsible Chemistry for America
CST-9/Inorganic Trace Analysis
Los Alamos, New Mexico 87545

To/MS: Tim Haarmann/MS 887
From/MS: Claudine Armenta, CST-9/K484
Phone/FAX: 7-3269/5-5982
Symbol: CST-9/99
Date: March 31, 1999

This is a Case Narrative for the following:

Submission Number : 100032407
Analysis : Plutonium in Biological Samples

I. Introduction
On September 28, 1998 (3) samples were received for analysis.

II. Analytical Results/Methodology
The analytical results are presented as indicated by the terms on the CST-9 Analytical Service Agreement. Each set of data will include sample identification information, the analytical results, and other information as required by ESH-20.

The analysis requested is: Isotopic Plutonium LA-10300-M, Vol. III, Plutonium in Environmental Matrices-Alpha Spectrometry, Method ER-160.

III. Quality Control
Laboratory control samples are prepared and analyzed with each sample request.

IV. Comments
As per instructions from ESH-20 three samples were analyzed for Pu-238 and Pu-239. Samples are spiked with Pu-242 to determine percent recovery. In this batch all samples met the 30% recovery. These samples were batched with a Q.C. from submission number 100034765. Q.C. number 200084520 fell Out of Control, there is no explanation why this occurred. The tracer recovery is 87.41%, we checked all parameters still no explanation. I generally run a bench Q.C. and it fell In Control, Q.C value 4180 uncertainty 418 result value 4126 uncertainty 129, tracer recovery 88.61%. The method blank also fell In Control with 88.15% tracer recovery.

I verify, to the best of my knowledge, that the listed results are and both complete and technically correct, with the exception of the item detailed above.

Claudine E Armenta

Claudine E. Armenta 3/31/99

LOS ALAMOS NATIONAL LABORATORY
CST Analytical Chemistry
Analytical Results Report

Method: PU RAS ENV Method Area: EH-ALPHA Submission Id : 100032407

Requester Name:	TIM HAARMANN	**Customer Cost Code:**	7C2000M34A02106CA3	**Due Date:**	30-NOV-98
Requester Group:	ESH-20	**Logged Date:**	28-SEP-1998	**Screening Data:**	NO SCREENING DATA REQUIRED
Mail Stop:	M887	**Study:**	ESH20 BIOLOGICALS		
Requester Phone:	667-5019			**Logged by:**	LJACOBSON
Requester Fax #:		**Analytical Service Agreement #:**			

CUSTOMER SAMPLES

Sample Id	Task Id	Customer Id	Component	Result Value	Uncertainty	Units	Qualifier
200074895	300177508	G1/98	Pu-238	0.0130	0.0023	pCi/g	
			Pu-239	0.0279	0.0040	pCi/g	
			Pu-242T Recovery	91.95		%	
			Analysis Date	03/25/99		MM/DD/YY	
			Instrument	96 ALPHA		NONE	
			Count Time	3000.00		min	
			Efficiency	35.51		%	
			Pu-242T Spike	2.05		pCi	
			Pu-238 Gross Counts	44.		counts	
			Pu-238 Background Counts	4.8		counts	
			Pu-239 Gross Counts	95.		counts	
			Pu-239 Background Counts	10.6		counts	
200074898	300177519	G2/98	Pu-238	0.0084	0.0022	pCi/g	
			Pu-239	0.0394	0.0046	pCi/g	
			Pu-242T Recovery	84.28		%	
			Analysis Date	03/25/99		MM/DD/YY	
			Instrument	96 ALPHA		NONE	
			Count Time	3000.00		min	

****** FINAL REPORT ******

Method: PU RAS ENV Method Area: EH-ALPHA Submission Id : 100032407

Sample Id	Task Id	Customer Id	Component	Result Value	Uncertainty	Units	Qualifier
200074898	300177519	G2/98	Efficiency	36.66		%	
			Pu-242T Spike	2.05		pCi	
			Pu-238 Gross Counts	34.		counts	
			Pu-238 Background Counts	10.4		counts	
			Pu-239 Gross Counts	120.		counts	
			Pu-239 Background Counts	9.8		counts	
200074899	300177530	C/98	Pu-238	0.0015	0.0011	pCi/g	
			Pu-239	0.0131	0.0028	pCi/g	
			Pu-242T Recovery	95.44		%	
			Analysis Date	03/25/99		MM/DD/YY	
			Instrument	96 ALPHA		NONE	
			Count Time	3000.00		min	
			Efficiency	37.71		%	
			Pu-242T Spike	2.05		pCi	
			Pu-238 Gross Counts	9.		counts	
			Pu-238 Background Counts	4.2		counts	
			Pu-239 Gross Counts	49.		counts	
			Pu-239 Background Counts	8.4		counts	

**** FINAL REPORT ****

Method: PU RAS ENV Method Area: EH-ALPHA Submission Id : 100032407

********** CST QUALITY ASSURANCE REPORT **********

OPEN QC

Customer Id	Task Id	Component	Result Value	Uncertainty	Units	QC Value	QC Uncertainty	QC units	QC Evaluation
00.39798	300207189	Pu-238	4126	1290	pCi/L	4180	418	pCi/L	IN CONTROL

METHOD BLANK

Customer Id	Task Id	Component	Result Value	Uncertainty	Units	QC Value	QC Uncertainty	QC units	QC Evaluation
00.22784	300207188	Pu-238	-0.0033	0.0029	pCi/g	0	0	pCi/g	IN CONTROL
		Pu-239	0.0012	0.0026	pCi/g	0	0	pCi/g	IN CONTROL

**** FINAL REPORT ****

Method: PU RAS ENV Method Area: EH-ALPHA Submission Id : 100032407

Analyst	Review	Team Leader	QA Officer
EEA			NK for PCL
3/31/99	4-2-99	4/2/99	04/02/99
Date	Date	Date	Date

The control status of the preceeding data was evaluated using the standard statistical criteria set forth in Quality Assurance for Health and Environmental Chemistry: 1992, LA-12790-MS, Vol I, pp. 19-29.

"The reported uncertainties are at the 1 sigma confidence level unless otherwise stated."

****** FINAL REPORT ******

Los Alamos
NATIONAL LABORATORY

memorandum

Chemical Science & Technology
Inorganic Trace Analysis, CST-9
MS K484
Los Alamos, New Mexico 87545
(505) 667-3269
FAX (505) 665-5982

To/MS: Tim Haarmann, MS M887
From/MS: S. R. Garcia, CST-9, MS K484
Phone/FAX: 5-0270/**5-5982**
Symbol: CST-9-TH-99-1
Date: March 24, 1999

SUBJECT: SUBMISSION 100032407 GENERIC GAMMA GSCAN RESULTS IN HONEY BEES.

Please be advised that GENERIC GAMMA GSCAN results for submission id 100032407 have been reported and entered into the SQL*LIMS database. All open QC's were ***IN CONTROL***. A blind QC was not submitted with this set.

The reported results for each sample are in pCi/L of digested honey bees. The volume used was 250 ml.

Should you have any questions concerning this submission, please feel free to call or send an e-mail message to me at....**garcia_s@lanl.gov**.

LOS ALAMOS NATIONAL LABORATORY
CST Analytical Chemistry
Analytical Results Report

Method: GENERIC GAMMA **Method Area:** EH-GAMMA **Submission Id :** 100032407

Requester Name:	TIM HAARMANN	**Customer Cost Code:**	7C2000M34A02106CA3	**Due Date:**	30-NOV-98
Requester Group:	ESH-20	**Logged Date:**	28-SEP-1998	**Screening Data:**	NO SCREENING DATA REQUIRED
Mail Stop:	M887	**Study:**	ESH20 BIOLOGICALS		
Requester Phone:	667-5019			**Logged by:**	LJACOBSON
Requester Fax #:		**Analytical Service Agreement #:**			

CUSTOMER SAMPLES

Sample Id	Task Id	Customer Id	Component	Result Value	Uncertainty	Units	Qualifier
200074895	300177509	G1/98	AC-228	-13.2	72	pCi/L	
			AC-228 MDA	48		pCi/L	
			AM-241	14	22	pCi/L	
			AM-241 MDA	12		pCi/L	
			BE-7	720	1080	pCi/L	
			BE-7 MDA	120		pCi/L	
			BI-214	-8	10	pCi/L	
			BI-214 MDA	7		pCi/L	
			CO-57	13	3	pCi/L	
			CO-57 MDA	3.1		pCi/L	
			CO-60	27	40	pCi/L	
			CO-60 MDA	20		pCi/L	
			CS-137	15	22	pCi/L	
			CS-137 MDA	4.9		pCi/L	
			K-40	1680	290	pCi/L	
			K-40 MDA	23		pCi/L	
			MN-54	-12	13	pCi/L	
			MN-54 MDA	8.7		pCi/L	

****** FINAL REPORT ******

Method: GENERIC GAMMA Method Area: EH-GAMMA Submission Id : 100032407

Sample Id	Task Id	Customer Id	Component	Result Value	Uncertainty	Units	Qualifier
200074895	300177509	G1/98	NA-22	4.8	7.2	pCi/L	
			NA-22 MDA	13		pCi/L	
			PB-212	31	46	pCi/L	
			PB-212 MDA	2.3		pCi/L	
			PB-214	10	16	pCi/L	
			PB-214 MDA	2.4		pCi/L	
			TL-208	2.1	3.2	pCi/L	
			TL-208 MDA	4.7		pCi/L	
200074898	300177520	G2/98	AC-228	-56	72	pCi/L	
			AC-228 MDA	48		pCi/L	
			AM-241	120	180	pCi/L	
			AM-241 MDA	12		pCi/L	
			BE-7	9.6	14.4	pCi/L	
			BE-7 MDA	120		pCi/L	
			BI-214	27	40	pCi/L	
			BI-214 MDA	7		pCi/L	
			CO-57	2.9	4.3	pCi/L	
			CO-57 MDA	3.1		pCi/L	
			CO-60	3.2	4.9	pCi/L	
			CO-60 MDA	20		pCi/L	
			CS-137	4.4	6.6	pCi/L	
			CS-137 MDA	4.9		pCi/L	
			K-40	1040	200	pCi/L	
			K-40 MDA	23		pCi/L	
			MN-54	19	29	pCi/L	
			MN-54 MDA	8.7		pCi/L	
			NA-22	-4.4	19.2	pCi/L	
			NA-22 MDA	13		pCi/L	
			PB-212	87	15	pCi/L	
			PB-212 MDA	2.3		pCi/L	
			PB-214	9.6	14.4	pCi/L	

**** FINAL REPORT ****

Method: GENERIC GAMMA Method Area: EH-GAMMA Submission Id : 100032407

Sample Id	Task Id	Customer Id	Component	Result Value	Uncertainty	Units	Qualifier
200074898	300177520	G2/98	PB-214 MDA	2.4		pCi/L	
			TL-208	13	20	pCi/L	
			TL-208 MDA	4.7		pCi/L	
200074899	300177531	C/98	AC-228	72	108	pCi/L	
			AC-228 MDA	48		pCi/L	
			AM-241	116	174	pCi/L	
			AM-241 MDA	12		pCi/L	
			BE-7	44	66	pCi/L	
			BE-7 MDA	120		pCi/L	
			BI-214	52	78	pCi/L	
			BI-214 MDA	7		pCi/L	
			CO-57	2.6	3.8	pCi/L	
			CO-57 MDA	3.1		pCi/L	
			CO-60	81	16	pCi/L	
			CO-60 MDA	20		pCi/L	
			CS-137	-2.8	7.5	pCi/L	
			CS-137 MDA	4.9		pCi/L	
			K-40	2520	390	pCi/L	
			K-40 MDA	23		pCi/L	
			MN-54	-12	13	pCi/L	
			MN-54 MDA	8.7		pCi/L	
			NA-22	-4	19	pCi/L	
			NA-22 MDA	13		pCi/L	
			PB-212	48	72	pCi/L	
			PB-212 MDA	2.3		pCi/L	
			PB-214	-3.1	3.6	pCi/L	
			PB-214 MDA	2.4		pCi/L	
			TL-208	-14	16	pCi/L	
			TL-208 MDA	4.7		pCi/L	

**** FINAL REPORT ****

8

Method: GENERIC GAMMA Method Area: EH-GAMMA Submission Id : 100032407

********** CST QUALITY ASSURANCE REPORT **********

OPEN QC

Customer Id	Task Id	Component	Result Value	Uncertainty	Units	QC Value	QC Uncertainty	QC units	QC Evaluation
00.33898	300206372	CS-137	645	71	pCi/L	752	25	pCi/L	IN CONTROL

METHOD BLANK

Customer Id	Task Id	Component	Result Value	Uncertainty	Units	QC Value	QC Uncertainty	QC units	QC Evaluation
00.22781	300206371	AM-241	16	23	pCi/L	0.0	0.0	pCi/L	IN CONTROL
		CO-57	-2.2	4.7	pCi/L	0.0	0.0	pCi/L	IN CONTROL
		CO-60	-1.6	30	pCi/L	0.0	0.0	pCi/L	IN CONTROL
		CS-137	12	18	pCi/L	0.0	0.0	pCi/L	IN CONTROL
		K-40	900	1350	pCi/L	0.0	0.0	pCi/L	IN CONTROL
		MN-54	9	13	pCi/L	0.0	0.0	pCi/L	IN CONTROL
		NA-22	-4	19	pCi/L	0.0	0.0	pCi/L	IN CONTROL

**** FINAL REPORT ****

Method: GENERIC GAMMA Method Area: EH-GAMMA Submission Id : 100032407

Analyst	Review	Team Leader	QA Officer
3/24/99	3/25/99	3/25/99	3/26/99
Date	Date	Date	Date

The control status of the preceeding data was evaluated using the standard statistical criteria set forth in Quality Assurance for Health and Environmental Chemistry: 1992, LA-12790-MS, Vol I, pp. 19-29.

"The reported uncertainties are at the 1 sigma confidence level unless otherwise stated."

**** FINAL REPORT ****

LOS ALAMOS NATIONAL LABORATORY
CST Analytical Chemistry
Analytical Results Report

Method: H-3 LS ENV **Method Area:** EH-ALPHA **Submission Id :** 100032407

Requester Name:	TIM HAARMANN	**Customer Cost Code:**	7C2000M34A02106CA3	**Due Date:**	30-NOV-98
Requester Group:	ESH-20	**Logged Date:**	28-SEP-1998	**Screening Data:**	NO SCREENING DATA REQUIRED
Mail Stop:	M887	**Study:**	ESH20 BIOLOGICALS		
Requester Phone:	667-5019			**Logged by:**	LJACOBSON
Requester Fax #:		**Analytical Service Agreement #:**			

CUSTOMER SAMPLES

Sample Id	Task Id	Customer Id	Component	Result Value	Uncertainty	Units	Qualifier
200074895	300177499	G1/98	H-3	147900	5400	pCi/L	
			H-3 MDA	400		pCi/L	
200074898	300177510	G2/98	H-3	566000	17000	pCi/L	
			H-3 MDA	400		pCi/L	
200074899	300177521	C/98	H-3	3720	870	pCi/L	
			H-3 MDA	450		pCi/L	

004

**** FINAL REPORT ****

Method: H-3 LS ENV Method Area: EH-ALPHA Submission Id : 100032407

********** CST QUALITY ASSURANCE REPORT **********

OPEN QC

Customer Id	Task Id	Component	Result Value	Uncertainty	Units	QC Value	QC Uncertainty	QC units	QC Evaluation
00.38287	300195897	H-3	0.00012	0.00065	uCi/L	0	0	uCi/L	IN CONTROL
00.39929	300195898	H-3	0.0116	0.0012	uCi/L	0.01427	0.00143	uCi/L	IN CONTROL

005

**** FINAL REPORT ****

Method: H-3 LS ENV Method Area: EH-ALPHA Submission Id : 100032407

Analyst	Review	Team Leader	QA Officer
1/13/99	1/14/99	1/14/99	1/15/99
Date	Date	Date	Date

006

The control status of the preceeding data was evaluated using the standard statistical criteria set forth in Quality Assurance for Health and Environmental Chemistry: 1992, LA-12790-MS, Vol I, pp. 19-29.

"The reported uncertainties are at the 1 sigma confidence level unless otherwise stated."

**** FINAL REPORT ****

LOS ALAMOS NATIONAL LABORATORY
CST Analytical Chemistry
Analytical Results Report

Method: GENERIC KPA **Method Area:** EH-ALPHA **Submission Id :** 100032407

Requester Name:	TIM HAARMANN	**Customer Cost Code:**	7C2000M34A02106CA3	**Due Date:**	30-NOV-98
Requester Group:	ESH-20	**Logged Date:**	28-SEP-1998	**Screening Data:**	NO SCREENING DATA REQUIRED
Mail Stop:	M887	**Study:**	ESH20 BIOLOGICALS		
Requester Phone:	667-5019			**Logged by:**	LJACOBSON
Requester Fax #:		**Analytical Service Agreement #:**			

CUSTOMER SAMPLES

Sample Id	Task Id	Customer Id	Component	Result Value	Uncertainty	Units	Qualifier
200074895	300177505	G1/98	U-total	0.47	0.05	ug/g	
200074898	300177516	G2/98	U	0.45	0.05	ug/g	
200074899	300177527	C/98	U	0.24	0.02	ug/g	

**** FINAL REPORT ****

Method: GENERIC KPA Method Area: EH-ALPHA Submission Id : 100032407

********** CST QUALITY ASSURANCE REPORT **********

OPEN QC

Customer Id	Task Id	Component	Result Value	Uncertainty	Units	QC Value	QC Uncertainty	QC units	QC Evaluation
00.38058	300203091	U	10.31	1.03	ug/L	10.1	1.0	ug/L	IN CONTROL

**** FINAL REPORT ****

Method: GENERIC KPA Method Area: EH-ALPHA Submission Id : 100032407

Analyst	Review	Team Leader	QA Officer
3/2/99	3/4/99	3/4/99	3/4/99
Date	Date	Date	Date

The control status of the preceeding data was evaluated using the standard statistical criteria set forth in Quality Assurance for Health and Environmental Chemistry: 1992, LA-12790-MS, Vol I, pp. 19-29.

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**** FINAL REPORT ****

Los Alamos
NATIONAL LABORATORY
memorandum
Chemical Science and Technology
Responsible Chemistry for America

CST-9/Inorganic Trace Analysis
Los Alamos, New Mexico 87545

To/MS: Tim Haarmann, ESH-20/MS M887
From/MS: Claudine Armenta, CST-9/K484
Phone/FAX: 7-3269/5-5982
Symbol: CST-9/99
Date: March 31, 1999

This is a Case Narrative for the following:

Submission Number : 100032407
Analysis : Americium in Biological Samples

I. Introduction
On September 28, 1998 (3) samples were received for analysis.

II. Analytical Results/Methodology
The analytical results are presented as indicated by the terms on the CST-9 Analytical Service Agreement. Each set of data will include sample identification information, the analytical results, and other information as required by ESH-20.

The analysis requested is: Isotopic Americium LA-10300-M, Vol. III, Americium in Environmental Matrices-Alpha Spectrometry, Method ER-121.

III. Quality Control
Laboratory control samples are prepared and analyzed with each sample request.

IV. Comments
Three samples were analyzed for Americium-241. These samples are spiked with Americium-243. CST-9 tries to maintain a standard percent recovery of 30%. All samples met the 30% and above criteria. This submission was batched with submission 100034765 set B-15-99Am. All Quality Control samples fell In Control and this set was reportable.

I verify, to the best of my knowledge, that the listed results are and both complete and technically correct, with the exception of the items detailed above.

Claudine E. Armenta 3/31/99

LOS ALAMOS NATIONAL LABORATORY
CST Analytical Chemistry
Analytical Results Report

Method: AM RAS ENV **Method Area:** EH-ALPHA **Submission Id :** 100032407

Requester Name:	TIM HAARMANN	**Customer Cost Code:**	7C2000M34A02106CA3	**Due Date:**	30-NOV-98
Requester Group:	ESH-20	**Logged Date:**	28-SEP-1998	**Screening Data:**	NO SCREENING DATA REQUIRED
Mail Stop:	M887	**Study:**	ESH20 BIOLOGICALS		
Requester Phone:	667-5019			**Logged by:**	LJACOBSON
Requester Fax #:		**Analytical Service Agreement #:**			

CUSTOMER SAMPLES

Sample Id	Task Id	Customer Id	Component	Result Value	Uncertainty	Units	Qualifier
200074895	300177506	G1/98	Am-241	0.0046	0.0053	pCi/g	
			Am-243T Recovery	31.44		%	
			Analysis Date	03/25/99		MM/DD/YY	
			Instrument	32 ALPHA		NONE	
			Count Time	3000.00		min	
			Efficiency	31.59		%	
			Am-243T Spike	2.05		pCi	
			Am-241 Gross Counts	14.		counts	
			Am-241 Background Counts	9.8		counts	
200074898	300177517	G2/98	Am-241	0.0308	0.0091	pCi/g	
			Am-243T Recovery	42.00		%	
			Analysis Date	03/25/99		MM/DD/YY	
			Instrument	32 ALPHA		NONE	
			Count Time	3000.00		min	
			Efficiency	28.80		%	
			Am-243T Spike	2.05		pCi	
			Am-241 Gross Counts	47.		counts	
			Am-241 Background Counts	13.2		counts	

****** FINAL REPORT ******

Method: AM RAS ENV Method Area: EH-ALPHA Submission Id : 100032407

Sample Id	Task Id	Customer Id	Component	Result Value	Uncertainty	Units	Qualifier
200074899	300177528	C/98	Am-241	0.0102	0.0049	pCi/g	
			Am-243T Recovery	53.87		%	
			Analysis Date	03/25/99		MM/DD/YY	
			Instrument	32 ALPHA		NONE	
			Count Time	3000.00		min	
			Efficiency	30.04		%	
			Am-243T Spike	2.05		pCi	
			Am-241 Gross Counts	24.		counts	
			Am-241 Background Counts	9.8		counts	

**** FINAL REPORT ****

Method: AM RAS ENV Method Area: EH-ALPHA Submission Id : 100032407

********** CST QUALITY ASSURANCE REPORT **********

OPEN QC

Customer Id	Task Id	Component	Result Value	Uncertainty	Units	QC Value	QC Uncertainty	QC units	QC Evaluation
00.41404	300207545	Am-241	0.0024	0.0001	pCi/L	0.0023	0.00023	pCi/L	IN CONTROL

METHOD BLANK

Customer Id	Task Id	Component	Result Value	Uncertainty	Units	QC Value	QC Uncertainty	QC units	QC Evaluation
00.22784	300207451	Am-241	-0.0022	0.0020	pCi/g	0	0	pCi/g	IN CONTROL

**** FINAL REPORT ****

Method: AM RAS ENV Method Area: EH-ALPHA Submission Id : 100032407

Analyst	Review	Team Leader	QA Officer
3/31/99	4/5/99	4/5/99	4/7/99
Date	Date	Date	Date

The control status of the preceeding data was evaluated using the standard statistical criteria set forth in Quality Assurance for Health and Environmental Chemistry: 1992, LA-12790-MS, Vol I, pp. 19-29.

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****** FINAL REPORT ******

LOS ALAMOS NATIONAL LABORATORY
CST Analytical Chemistry
Analytical Results Report

Method: GROSS GAMMA **Method Area:** EH-GAMMA **Submission Id :** 100032407

Requester Name:	TIM HAARMANN	**Customer Cost Code:**	7C2000M34A02106CA3	**Due Date:**	30-NOV-98
Requester Group:	ESH-20	**Logged Date:**	28-SEP-1998	**Screening Data:**	NO SCREENING DATA REQUIRED
Mail Stop:	M887	**Study:**	ESH20 BIOLOGICALS		
Requester Phone:	667-5019			**Logged by:**	LJACOBSON
Requester Fax #:		**Analytical Service Agreement #:**			

CUSTOMER SAMPLES

Sample Id	Task Id	Customer Id	Component	Result Value	Uncertainty	Units	Qualifier
200074895	300177507	G1/98	Gamma	125.9	51.3	pCi/L	
			Gamma MDA	80.0		pCi/L	
200074898	300177518	G2/98	Gamma	214.6	51.9	pCi/L	
			Gamma MDA	80.0		pCi/L	
200074899	300177529	C/98	Gamma	241.5	52.0	pCi/L	
			Gamma MDA	80.0		pCi/L	

Method: GROSS GAMMA Method Area: EH-GAMMA Submission Id : 100032407

********** CST QUALITY ASSURANCE REPORT **********

OPEN QC

Customer Id	Task Id	Component	Result Value	Uncertainty	Units	QC Value	QC Uncertainty	QC units	QC Evaluation
00.31810	300202906	Gamma	6042.4	604.2	pCi/L	5776.23	190.6200	pCi/L	IN CONTROL

METHOD BLANK

Customer Id	Task Id	Component	Result Value	Uncertainty	Units	QC Value	QC Uncertainty	QC units	QC Evaluation
00.22781	300202905	Gamma	-123.1	49.6	pCi/L	0.0	0.0	pCi/L	WARNING 2-3SIG

**** FINAL REPORT ****

Method: GROSS GAMMA Method Area: EH-GAMMA Submission Id : 100032407

Analyst	Review	Team Leader	QA Officer
3/1/99	3/2/99	3/2/99	03/02/99
Date	Date	Date	Date

The control status of the preceeding data was evaluated using the standard statistical criteria set forth in Quality Assurance for Health and Environmental Chemistry: 1992, LA-12790-MS, Vol I, pp. 19-29.

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**** FINAL REPORT ****