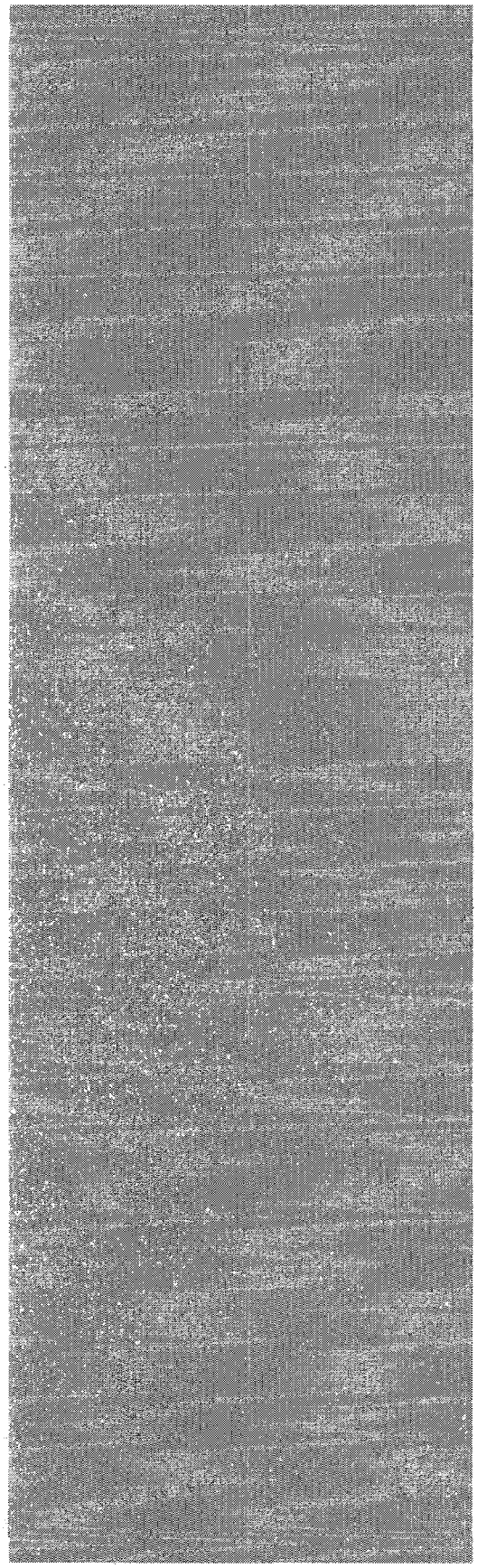
LA-13733-PR
Progress Report





# *Radionuclide Concentrations in Honey Bees from Area G at TA-54 during 1999*



**Los Alamos**
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*Edited by Hector Hinojosa, Group CIC-1*
*Prepared by Teresa Hiteman, Group ESH-20*

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*LA-13733-PR*
*Progress Report*

*Issued: June 2000*

# *Radionuclide Concentrations in Honey Bees from Area G at TA-54 during 1999*

*T.K. Haarmann*
*P.R. Fresquez*

**Los Alamos**
NATIONAL LABORATORY
Los Alamos, New Mexico 87545

# RADIONUCLIDE CONCENTRATIONS IN HONEY BEES FROM AREA G AT TA-54 DURING 1999

**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 $^{3}H$. Sample results from one colony were higher than the upper (95%) level background concentration for total uranium, while sample results from the other colony were higher than the upper (95%) level background concentration for $^{90}Sr$.**

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## 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 fall of 1999. 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 that 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,

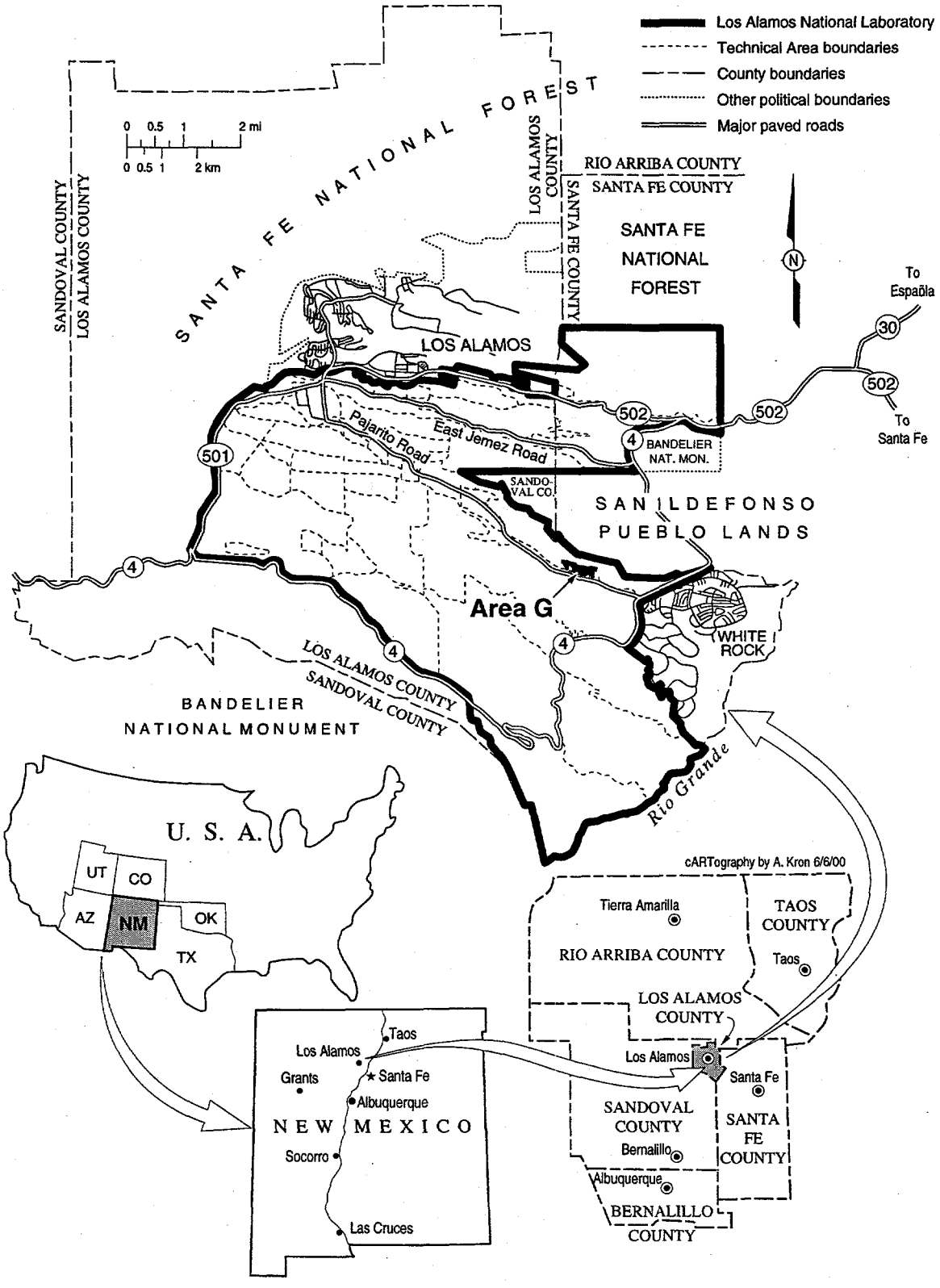


Figure 1. The location of Area G at Los Alamos National Laboratory.

some of which are brought back to the 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 1999, 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

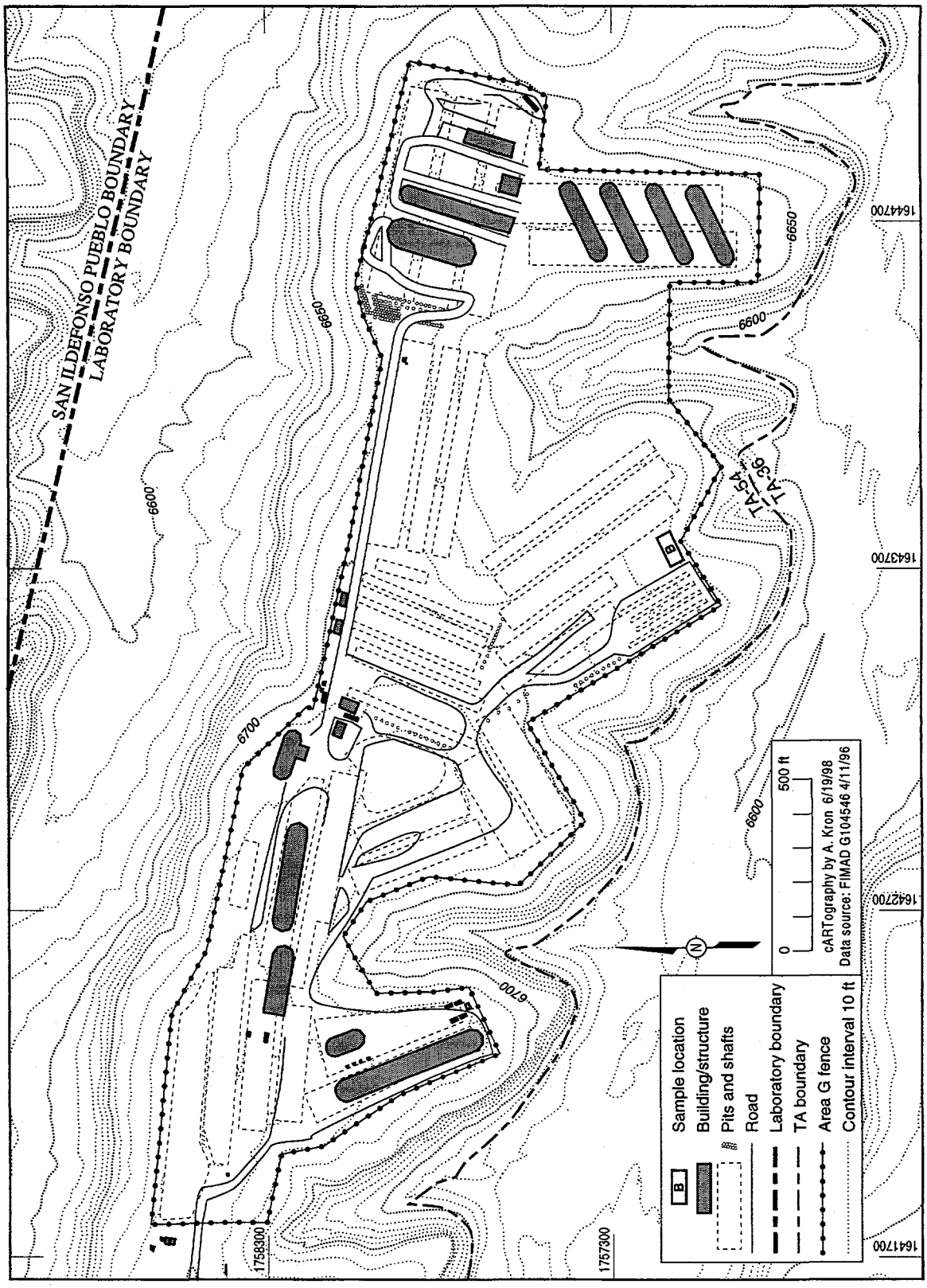


Figure 2. Site/sample location of bee hives at Area G.

consisted of approximately 1,000 bees. 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 $^{3}H$, $^{137}Cs$, $^{241}Am$, $^{238}Pu$, $^{239,240}Pu$, $^{90}Sr$, and total uranium. Analytical methods have been previously described in Fresquez *et al.* (1997c). The bee $^{3}H$ 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 1999 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 $^{3}H$, $^{90}Sr$, 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, 1998, and 1999 control data

(Haarmann 1997; Haarmann and Fresquez 1998, 1999). Similar to our results from 1997 and 1998, the largest concentration difference between Area G and the RSRL was seen in the $^{3}H$ levels. Tritium levels in the Area G bees, for example, were at 146.9 and 122.0 pCi $mL^{-1}$; the control colony contained –0.10 pCi $mL^{-1}$, with a RSRL of 5.47 pCi $mL^{-1}$.

Concentrations of $^{90}Sr$ were higher in one Area G colony than the RSRL. Additionally, concentrations of total uranium were higher than the RSRL in the other Area G colony.


## ACKNOWLEDGMENT

Thanks to Rebecca J. Wechsler, for technical assistance at Area G.


**Table 1. Radionuclide Analytical Results from Honey Bee Samples Collected from Colonies at Area G and a Control Site in 1999.**

| Element | Units | Area G G-1 | AU[a] | Area G G-2 | AU | Control | AU | RSRL |
|---|---|---|---|---|---|---|---|---|
| $^{238}Pu$ | pCi/g[b] | -0.0160 | 0.0081 | -0.0107 | 0.0122 | -0.0063 | 0.0034 | 0.0063[c] |
| $^{239,240}Pu$ | pCi/g[b] | -0.0117 | 0.0106 | 0.0060 | 0.0128 | -0.0014 | 0.0025 | 0.0222[c] |
| total U | µg/g[b] | 0.46 | 0.05 | 0.39 | 0.04 | 0.31 | 0.03 | 0.41[c] |
| $^{137}Cs$ | pCi/g[b] | -0.38 | 6.39 | 0.00 | 6.00 | -1.01 | 3.98 | 0.101[c] |
| $^{241}Am$ | pCi/g[b] | -0.0048 | 0.0032 | -0.0118 | 0.0134 | -0.0064 | 0.0052 | 0.0304[c] |
| $^{90}Sr$ | pCi/g[b] | 0.61 | 1.06 | 4.22 | 1.22 | 1.63 | 0.69 | 3.01[d] |
| $^{3}H$ | pCi/mL[e] | 146.90 | 5.40 | 122.00 | 4.70 | -0.10 | 0.61 | 5.47[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, 1998, and 1999 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.

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# APPENDIX

## CST ANALYTICAL REPORTS OF RADIONUCLIDES IN BEES

004

**Los Alamos**
NATIONAL LABORATORY
**Memorandum**
***Chemical Science and Technology***
*Responsible Chemistry for America*
CST-9/Analytical Chemistry Sciences
Los Alamos, New Mexico 87545

*To/MS:* Phil Fresquez ESH-20/M887
*From/MS:* Claudine Armenta/K484
*Phone/FAX:* 5-7358/5-5982
*Symbol:* CST-9/00
*Date:* March 28, 2000

This is a Case Narrative for the following:

***Submission ID*** ***: 100040337***
***Analysis*** ***: Am analysis on Biological Samples***

**I. Introduction**
On September 20, 1999 four biological samples were delivered to the CST-9 radiochemistry section for the requested analysis.

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

The analysis requested is: Americium-241 in Environmental Matrices, (Water, Air Filter & Biological Samples) - Alpha Spectroscopy. The specific procedure can be found either on line @ **http://cst.lanl.gov/docs**, or in hardcopy form within the document entitled LA-10300-M, Vol. III, Method ANC 327-R.0.

**III. Quality Control**
The appropriate quality control samples were analyzed with the samples.

**IV. Comments**

Four samples were analyzed for Americium-241. These samples are spiked with Americium-243.

All Quality Control parameters are within appropriate limits and as such meet CST-9's quality assurance program objectives. This data was added to batch B-16-00Am with other submissions (100040524, 100040881 and 100040882). The Replicate information is with submission 100040882.

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

Claudine F. Armenta 3/28/00

005



# LOS ALAMOS NATIONAL LABORATORY
## CST Analytical Chemistry
## Analytical Results Report



**Method:** AM RAS ENV **Method Area:** EH-ALPHA **Submission Id :** 100040337

| | | | | | |
|---|---|---|---|---|---|
| **Requester Name:** | TIM HAARMANN | **Customer Cost Code:** | FT00C34A05FF400000 | **Due Date:** | 22-NOV-99 |
| **Requester Group:** | ESH-20 | **Logged Date:** | 20-SEP-1999 | **Screening Data:** | NO SCREENING DATA REQUIRED |
| **Mail Stop:** | M887 | **Study:** | ESH20 BIOLOGICALS | | |
| **Requester Phone:** | 667-0815 | | | **Logged by:** | APODACA |
| **Requester Fax #:** | 667-0731 | **Analytical Service Agreement #:** | | | |

## CUSTOMER SAMPLES

| Sample Id | Task Id | Customer Id | Component | Result Value | Uncertainty | Units | Qualifier |
|---|---|---|---|---|---|---|---|
| 200109136 | 300235206 | G-1 | Am-241 | -0.0048 | 0.0032 | pCi/g | |
| | | | Am-241 DL | 0.0196 | | pCi/g | |
| | | | Am-243T Recovery | 99.40 | | % | |
| | | | Analysis Date | 12-MAR-2000 | | DD-MON-YYYY | |
| | | | Instrument | 32 ALPHA | | NONE | |
| | | | Problem Code | OK | | NONE | |
| | | | Count Time | 3000.00 | | min | |
| | | | Efficiency | 31.62 | | % | |
| 200109137 | 300235211 | G-2 | Am-241 | -0.0118 | 0.0134 | pCi/g | |
| | | | Am-241 DL | 0.0114 | | pCi/g | |
| | | | Am-243T Recovery | 101.78 | | % | |
| | | | Analysis Date | 12-MAR-2000 | | DD-MON-YYYY | |
| | | | Instrument | 32 ALPHA | | NONE | |
| | | | Problem Code | OK | | NONE | |
| | | | Count Time | 3000.00 | | min | |
| | | | Efficiency | 28.76 | | % | |
| 200109138 | 300235216 | C-1 | Am-241 | -0.0064 | 0.0052 | pCi/g | |
| | | | Am-241 DL | 0.0082 | | pCi/g | |

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

006



Method: AM RAS ENV Method Area: EH-ALPHA Submission Id : 100040337

| Sample Id | Task Id | Customer Id | Component | Result Value | Uncertainty | Units | Qualifier |
|---|---|---|---|---|---|---|---|
| 200109138 | 300235216 | C-1 | Am-243T Recovery | 103.62 | | % | |
| | | | Analysis Date | 12-MAR-2000 | | DD-MON-YYYY | |
| | | | Instrument | 32 ALPHA | | NONE | |
| | | | Problem Code | OK | | NONE | |
| | | | Count Time | 3000.00 | | min | |
| | | | Efficiency | 29.76 | | % | |

**** FINAL REPORT ****

Method: AM RAS ENV Method Area: EH-ALPHA Submission Id : 100040337

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

### BLIND QC

| Customer Id | Task Id | Component | Result Value | Uncertainty | Units | QC Value | QC Uncertainty | QC units | QC Evaluation |
|---|---|---|---|---|---|---|---|---|---|
| 200109140 | 300235219 | Am-241 | 6.0252 | 0.1221 | pCi/g | 5.8 | 0.26 | pCi/g | IN CONTROL |

### OPEN QC

| Customer Id | Task Id | Component | Result Value | Uncertainty | Units | QC Value | QC Uncertainty | QC units | QC Evaluation |
|---|---|---|---|---|---|---|---|---|---|
| 00.41404 | 300261403 | Am-241 | 0.0025 | 0.0006 | 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 | 300261402 | Am-241 | -0.0049 | 0.0044 | pCi/g | 0 | 0 | pCi/g | IN CONTROL |

**** FINAL REPORT ****

Method: AM RAS ENV Method Area: EH-ALPHA Submission Id : 100040337

| Analyst | Review | Team Leader | QA Officer |
|---|---|---|---|
| 3/28/00 | 3/28/00 | 3/28/00 | 3/30/2000 |
| 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 and Technology***
*Responsible Chemistry for America*
CST-9/Analytical Chemistry Sciences
Los Alamos, New Mexico 87545

*To/MS:* Tim Haarmann ESH-20/M887
*From/MS:* Claudine Armenta/K484
*Phone/FAX:* 5-7358/5-5982
*Symbol:* CST-9/00
*Date:* March 25, 2000

This is a Case Narrative for the following:

***Submission ID*** ***: 100040337***
***Analysis*** ***: Pu analysis on Biological Samples***

**I. Introduction**
On September 20, 1999 three biological samples were delivered to the CST-9 radiochemistry section for the requested analysis.

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

The analysis requested is: Actinides In Environmental Matrices, (Biological A& Filters) - Alpha Spectroscopy. The specific procedure can be found either on line @ **http://cst.lanl.gov/docs**, or in hardcopy form within the document entitled LA-10300-M, Vol. III, Method ANC 372 R.0.

**III. Quality Control**
The appropriate quality control samples were analyzed with the samples.

**IV. Comments**

Three samples were analyzed for Plutonium-238 and Plutonium-239. These samples are spiked with Plutonium-242.

All Quality Control parameters are within appropriate limits and as such meet CST-9's quality assurance program objectives. This set was put into a batch with other submissions 100040524, 100040881 and 100040882 batch name is B-15-00Pu. The replicate information is with submission 100040882.

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

Claudine E. Armenta 3/25/00

005



# LOS ALAMOS NATIONAL LABORATORY
## CST Analytical Chemistry
## Analytical Results Report

**Method:** PU RAS ENV **Method Area:** EH-ALPHA **Submission Id :** 100040337

| | | | | | |
|---|---|---|---|---|---|
| **Requester Name:** | TIM HAARMANN | **Customer Cost Code:** | FT00C34A05FF400000 | **Due Date:** | 22-NOV-99 |
| **Requester Group:** | ESH-20 | **Logged Date:** | 20-SEP-1999 | **Screening Data:** | NO SCREENING DATA REQUIRED |
| **Mail Stop:** | M887 | **Study:** | ESH20 BIOLOGICALS | | |
| **Requester Phone:** | 667-0815 | | | **Logged by:** | APODACA |
| **Requester Fax #:** | 667-0731 | **Analytical Service Agreement #:** | | | |

## CUSTOMER SAMPLES

| Sample Id | Task Id | Customer Id | Component | Result Value | Uncertainty | Units | Qualifier |
|---|---|---|---|---|---|---|---|
| 200109136 | 300235203 | G-1 | Pu-238 | -0.0160 | 0.0081 | pCi/g | |
| | | | Pu-238 DL | 0.0342 | | pCi/g | |
| | | | Pu-239 | -0.0117 | 0.0106 | pCi/g | |
| | | | Pu-239 DL | 0.0442 | | pCi/g | |
| | | | Pu-242T Recovery | 98.13 | | % | |
| | | | Analysis Date | 20-MAR-2000 | | DD-MON-YYYY | |
| | | | Instrument | 96 ALPHA | | NONE | |
| | | | Problem Code | OK | | NONE | |
| | | | Count Time | 3000.00 | | min | |
| | | | Efficiency | 24.48 | | % | |
| 200109137 | 300235208 | G-2 | Pu-238 | -0.0107 | 0.0122 | pCi/g | |
| | | | Pu-238 DL | 0.0542 | | pCi/g | |
| | | | Pu-239 | 0.0060 | 0.0128 | pCi/g | |
| | | | Pu-239 DL | 0.0509 | | pCi/g | |
| | | | Pu-242T Recovery | 94.15 | | % | |
| | | | Analysis Date | 20-MAR-2000 | | DD-MON-YYYY | |
| | | | Instrument | 96 ALPHA | | NONE | |
| | | | Problem Code | OK | | NONE | |

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

006



**Method: PU RAS ENV Method Area: EH-ALPHA Submission Id : 100040337**

| Sample Id | Task Id | Customer Id | Component | Result Value | Uncertainty | Units | Qualifier |
|---|---|---|---|---|---|---|---|
| 200109137 | 300235208 | G-2 | Count Time | 3000.00 | | min | |
| | | | Efficiency | 24.24 | | % | |
| 200109138 | 300235213 | C-1 | Pu-238 | -0.0063 | 0.0034 | pCi/g | |
| | | | Pu-238 DL | 0.0160 | | pCi/g | |
| | | | Pu-239 | -0.0014 | 0.0025 | pCi/g | |
| | | | Pu-239 DL | 0.0082 | | pCi/g | |
| | | | Pu-242T Recovery | 94.82 | | % | |
| | | | Analysis Date | 20-MAR-2000 | | DD-MON-YYYY | |
| | | | Instrument | 96 ALPHA | | NONE | |
| | | | Problem Code | OK | | NONE | |
| | | | Count Time | 3000.00 | | min | |
| | | | Efficiency | 26.51 | | % | |

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

007



Method: PU RAS ENV Method Area: EH-ALPHA Submission Id : 100040337

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

### BLIND QC

| Customer Id | Task Id | Component | Result Value | Uncertainty | Units | QC Value | QC Uncertainty | QC units | QC Evaluation |
|---|---|---|---|---|---|---|---|---|---|
| 200109140 | 300235218 | Pu-238 | 7.7189 | 0.2531 | pCi/g | 7.4 | 0.26 | pCi/g | IN CONTROL |
| | | Pu-239 | 2.4370 | 0.0859 | pCi/g | 2.34 | 0.075 | pCi/g | IN CONTROL |

### OPEN QC

| Customer Id | Task Id | Component | Result Value | Uncertainty | Units | QC Value | QC Uncertainty | QC units | QC Evaluation |
|---|---|---|---|---|---|---|---|---|---|
| 00.39798 | 300262903 | Pu-238 | 4256 | 147 | 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 | 300262902 | Pu-238 | 0.0027 | 0.0026 | pCi/g | 0 | 0 | pCi/g | IN CONTROL |
| | | Pu-239 | -0.0056 | 0.0025 | pCi/g | 0 | 0 | pCi/g | WARNING 2-3SIG |

**** FINAL REPORT ****

008



Method: PU RAS ENV Method Area: EH-ALPHA Submission Id : 100040337

| Analyst | Review | Team Leader | QA Officer |
|---|---|---|---|
| 3/25/00 | 3/27/00 | 3/27/00 | 3/28/2000 |
| 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**
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***Chemical Science and Technology***
*Responsible Chemistry for America*
CST-9/Analytical Chemistry and Science
Los Alamos, New Mexico 87545

*To/MS:* Files
*From/MS:* Edward Gonzales/ MS K484
*Phone/FAX:* 7-7094/5-5982
*Symbol:* CST-9/99
*Date:* April 13, 2000

This is a Case Narrative for the following:

***Submission ID: 100040337***
***Analysis: Sr-90 in ash***

**I. Introduction**
In September 1999, a set of samples was delivered to the CST-9 radiochemistry section for the requested analysis.

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

The analysis requested is: Strontium In Water – Liquid Scintillation Counting. The specific procedure can be found either on line @ **http://cst.lanl.gov/docs**, or in hardcopy form within the document entitled LA-10300-M, Vol. III, Method ANC367, R.1.

**III. Quality Control**
The appropriate quality control samples were analyzed with the samples.

IV. Comments
This case narrative was generated to document the circumstances that were involved with the development if this data package. All QA perimeters were in control. There are also no replicate analyses due to insufficient sample.

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

Edward R. Gonzales

# LOS ALAMOS NATIONAL LABORATORY
## CST Analytical Chemistry
## Analytical Results Report



**Method: SR-90 LS ENV** **Method Area: EH-ALPHA** **Submission Id : 100040337**

| | | | | | |
|---|---|---|---|---|---|
| **Requester Name:** | TIM HAARMANN | **Customer Cost Code:** | FT00C34A05FF400000 | **Due Date:** | 22-NOV-99 |
| **Requester Group:** | ESH-20 | **Logged Date:** | 20-SEP-1999 | **Screening Data:** | NO SCREENING DATA REQUIRED |
| **Mail Stop:** | M887 | **Study:** | ESH20 BIOLOGICALS | | |
| **Requester Phone:** | 667-0815 | | | **Logged by:** | APODACA |
| **Requester Fax #:** | 667-0731 | **Analytical Service Agreement #:** | | | |

## CUSTOMER SAMPLES

| Sample Id | Task Id | Customer Id | Component | Result Value | Uncertainty | Units | Qualifier |
|---|---|---|---|---|---|---|---|
| 200109136 | 300235205 | G-1 | Sr-90 | 0.61 | 1.06 | pCi/g | |
| | | | Sr-90 MDA | 2.38 | | pCi/g | |
| | | | Analysis Date | 22-FEB-2000 | | DD-MON-YYYY | |
| | | | Comments | NA | | NONE | |
| 200109137 | 300235210 | G-2 | Sr-90 | 4.22 | 1.22 | pCi/g | |
| | | | Sr-90 MDA | 2.28 | | pCi/g | |
| | | | Analysis Date | 22-FEB-2000 | | DD-MON-YYYY | |
| | | | Comments | NA | | NONE | |
| 200109138 | 300235215 | C-1 | Sr-90 | 1.63 | 0.69 | pCi/g | |
| | | | Sr-90 MDA | 1.38 | | pCi/g | |
| | | | Analysis Date | 22-FEB-2000 | | DD-MON-YYYY | |
| | | | Comments | NA | | NONE | |

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

**Method: SR-90 LS ENV Method Area: EH-ALPHA Submission Id : 100040337**

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

### BLIND QC

| Customer Id | Task Id | Component | Result Value | Uncertainty | Units | QC Value | QC Uncertainty | QC units | QC Evaluation |
|---|---|---|---|---|---|---|---|---|---|
| 200109144 | 300235220 | Sr-90 | 2.53 | 0.61 | pCi/g | 1.83 | 0.058 | pCi/g | IN CONTROL |

### OPEN QC

| Customer Id | Task Id | Component | Result Value | Uncertainty | Units | QC Value | QC Uncertainty | QC units | QC Evaluation |
|---|---|---|---|---|---|---|---|---|---|
| 00.36592 | 300265836 | Sr-90 | 503.72 | 31.14 | pCi/L | 499.5 | 15.98 | 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 | 300265835 | Sr-90 | -0.43 | 0.23 | pCi/g | 0 | 0 | pCi/g | IN CONTROL |

**** FINAL REPORT ****

**Method: SR-90 LS ENV Method Area: EH-ALPHA Submission Id : 100040337**

| Analyst | Review | Team Leader | QA Officer |
|---|---|---|---|
| 4-14-00 | 4/14/00 | 4/15/00 | 4/14/00 |
| 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 and Technology***
*Responsible Chemistry for America*
CST-9/Inorganic Trace Analysis
Los Alamos, New Mexico 87545

*To/MS: Phil Fresquez* / MS M887
*From/MS:* Anthony Sanchez/MSK484
*Phone/FAX:* 7-5998/5-5982
*Symbol:* CST-9/99
*Date:* October 14,1999

This is a Case Narrative for the following:

***Submission ID: 100040342***
***Analysis: Tritium Analysis in Water***

## I. Introduction

On September 20, 1999, a set of water samples was delivered to the CST-9 radiochemistry section for the requested analysis.

## II. Analytical Results/Methodology

The analytical results are presented as indicated by the terms on the Analytical Service Agreement. Each set of data will include sample identification information, the analytical results, and other information as required by the customer.

The analysis requested is Tritium in Environmental Matrices – Distillation and Liquid Scintillation Counting. The specific procedure can be found either on line @ **http://cst.lanl.gov/docs**, or in hardcopy form within the document entitled LA-10300-M, Vol. III, Method ANC335, R.1.

## III. Quality Control

The appropriate quality control samples were analyzed with the submitted samples.

## IV. Comments

This case narrative was generated to document the circumstances that were involved with the development of this data package. This submission was batched with other submission's for QA and QC. I verify, to the best of my knowledge, that the listed results are both complete and technically correct.

Anthony Sanchez 10/14/99
Anthony Sanchez

# LOS ALAMOS NATIONAL LABORATORY
## CST Analytical Chemistry
## Analytical Results Report



**Method:** H-3 LS ENV **Method Area:** EH-ALPHA **Submission Id :** 100040342

| | | | | | |
|---|---|---|---|---|---|
| **Requester Name:** | PHIL FRESQUEZ | **Customer Cost Code:** | FT0000C34A05FF4000 | **Due Date:** | 22-OCT-99 |
| **Requester Group:** | ESH-20 | **Logged Date:** | 20-SEP-1999 | **Screening Data:** | NO SCREENING DATA REQUIRED |
| **Mail Stop:** | M887 | **Study:** | ESH20 BIOLOGICALS | | |
| **Requester Phone:** | 667-0815 | | | **Logged by:** | APODACA |
| **Requester Fax #:** | 667-0731 | **Analytical Service Agreement #:** | | | |

## CUSTOMER SAMPLES

| Sample Id | Task Id | Customer Id | Component | Result Value | Uncertainty | Units | Qualifier |
|---|---|---|---|---|---|---|---|
| 200109152 | 300235228 | G-1 | H-3 | 146900 | 5400 | pCi/L | |
| | | | H-3 MDA | 400 | | pCi/L | |
| 200109153 | 300235229 | G-2 | H-3 | 122000 | 4700 | pCi/L | |
| | | | H-3 MDA | 400 | | pCi/L | |
| 200109154 | 300235230 | C-1 | H-3 | -100 | 610 | pCi/L | |
| | | | H-3 MDA | 440 | | pCi/L | |

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

Method: H-3 LS ENV Method Area: EH-ALPHA Submission Id : 100040342

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

**BLIND QC**

| Customer Id | Task Id | Component | Result Value | Uncertainty | Units | QC Value | QC Uncertainty | QC units | QC Evaluation |
|---|---|---|---|---|---|---|---|---|---|
| 200109155 | 300235231 | H-3 | 14500 | 1400 | pCi/L | 16130 | 600 | pCi/L | IN CONTROL |

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**** FINAL REPORT ****

Method: H-3 LS ENV Method Area: EH-ALPHA Submission Id : 100040342

| Analyst | Review | Team Leader | QA Officer |
|---|---|---|---|
| 10/14/99 | 10/19/99 | 10/19/99 | 10/19/99 |
| Date | Date | Date | Date |

100007

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

*To/MS:* Phil Fresquez/ MS M887
*From/MS:* S. R. Garcia/ MS K484
*Phone/FAX:* 5-0270/5-5982
*Symbol:* CST2000-PRF-5
*Date:* February 16, 2000

This is a Case Narrative for the following:

***Submission ID*** ***: 1000400337***
***Analysis*** ***: CS-137 ASSAY OF ASHED BEES.***

**I. Introduction**
On September 20, 1999 a set of ashed bee samples were delivered to the CST-9 radiochemistry section for the $^{137}Cs$ analysis.

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

The analysis requested is: Gamma-Ray-Emitting Nuclides in Environmental Matrices - Gamma Spectroscopy, an Instrumental Method. The specific procedure can be found on line @ **http://cst.lanl.gov/docs**, Method ANC328, R.0.

**III. Quality Control**
The appropriate quality control samples were analyzed with the samples.

**IV. Comments**
This case narrative was generated to document the circumstances that were involved with the development if this data package.

The ashed bee samples were picked up at Cage 7, Bldg. 1, TA-59.

All Laboratory Control Samples and blind QC are within CST-9's statistical acceptance criteria. No replicate samples were available for these samples.

**This submission was batched with 100041459 for QA/QC purposes.**

Please feel free to call or email me if you have any questions concerning this submission.

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

Sammy R. Garcia
**Email: garcia_s@lanl.gov**

# LOS ALAMOS NATIONAL LABORATORY
## CST Analytical Chemistry
## Analytical Results Report



**Method:** GENERIC GAMMA **Method Area:** EH-GAMMA **Submission Id :** 100040337

| | | | | | |
|---|---|---|---|---|---|
| **Requester Name:** | PHIL FRESQUEZ | **Customer Cost Code:** | FT00C34A05FF400000 | **Due Date:** | 22-NOV-99 |
| **Requester Group:** | ESH-20 | **Logged Date:** | 20-SEP-1999 | **Screening Data:** | NO SCREENING DATA REQUIRED |
| **Mail Stop:** | M887 | **Study:** | ESH20 BIOLOGICALS | | |
| **Requester Phone:** | 667-0815 | | | **Logged by:** | APODACA |
| **Requester Fax #:** | 667-0731 | **Analytical Service Agreement #:** | | | |

### CUSTOMER SAMPLES

| Sample Id | Task Id | Customer Id | Component | Result Value | Uncertainty | Units | Qualifier |
|---|---|---|---|---|---|---|---|
| 200109136 | 300235207 | G-1 | CS-137 | -0.38 | 6.39 | pCi/g | |
| | | | CS-137 MDA | 3.20 | | pCi/g | |
| 200109137 | 300235212 | G-2 | CS-137 | 0.000 | 6.00 | pCi/g | |
| | | | CS-137 MDA | 3.00 | | pCi/g | |
| 200109138 | 300235217 | C-1 | CS-137 | -1.01 | 3.98 | pCi/g | |
| | | | CS-137 MDA | 1.99 | | pCi/g | |

**** FINAL REPORT ****

Method: GENERIC GAMMA Method Area: EH-GAMMA Submission Id : 100040337

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

### BLIND QC

| Customer Id | Task Id | Component | Result Value | Uncertainty | Units | QC Value | QC Uncertainty | QC units | QC Evaluation |
|---|---|---|---|---|---|---|---|---|---|
| 200109145 | 300235221 | CS-137 | 53.1 | 5.9 | pCi/g | 54.7 | 1.75 | pCi/g | IN CONTROL |

### OPEN QC

| Customer Id | Task Id | Component | Result Value | Uncertainty | Units | QC Value | QC Uncertainty | QC units | QC Evaluation |
|---|---|---|---|---|---|---|---|---|---|
| 00.33376 | 300256922 | CS-137 | 4.94 | 0.55 | pCi/g | 5.0400 | 0.1700 | pCi/g | IN CONTROL |
| 00.33381 | 300256923 | CS-137 | 4.37 | 0.57 | pCi/g | 4.8500 | 0.1600 | pCi/g | IN CONTROL |

### METHOD BLANK

| Customer Id | Task Id | Component | Result Value | Uncertainty | Units | QC Value | QC Uncertainty | QC units | QC Evaluation |
|---|---|---|---|---|---|---|---|---|---|
| 00.22785 | 300256921 | CS-137 | 0.000 | 0.131 | pCi/g | 0.0 | 0.0 | pCi/g | IN CONTROL |

**** FINAL REPORT ****

Method: GENERIC GAMMA Method Area: EH-GAMMA Submission Id : 100040337

| Analyst | Review | Team Leader | QA Officer |
|---|---|---|---|
| 2/16/2000 | 2/17/00 | 2/18/00 | 02/18/00 |
| 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 and Technology*
*Responsible Chemistry for America*
CST-9/Analytical Chemistry Sciences
Los Alamos, New Mexico 87545

*To/MS:* ESH-20/M887
*From/MS: Nancy Lujan/* MS K484
*Phone/FAX: 5-6010/5-5982*
*Symbol:* CST-9/00
*Date:* February 25, 2000

This is a Case Narrative for the following:

***Submission ID*** ***: 100040337***
***Analysis*** ***: U (KPA) in Ashed Bees***

**I. Introduction**
On September 20, 1999, a set of Ashed Bee samples was delivered to the CST-9 radiochemistry section for the requested analysis.

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

The analysis requested is: Uranium in Environmental Matrices – KPA. The specific procedure can be found either on line @ **http://cst.lanl.gov/docs**, or in hardcopy form within the document entitled LA-10300-M, Vol. III, Method ANC337, R.0.

**III. Quality Control**
The appropriate quality control samples were analyzed with the samples.

**IV. Comments**
This case narrative was generated to document the circumstances that were involved with the development if this data package. As part of the process to inform our customers of potential problems associated with specific methods, the KPA method has been found to be unreliable in some matrices due to the strong susceptibility of interference's from constituents commonly found in environmental samples. Alternate techniques available for the analysis of U would be either ICP-MS or Isotopic Uranium analysis.

Samples were analyzed and reported. All Quality Control samples were In Control and reportable. I verify, to the best of my knowledge, that the listed results are both complete and technically correct.

Nancy Lujan
Nancy Lujan

# LOS ALAMOS NATIONAL LABORATORY
## CST Analytical Chemistry
## Analytical Results Report



**Method:** GENERIC KPA **Method Area:** EH-ALPHA **Submission Id :** 100040337

| | | | | | |
|---|---|---|---|---|---|
| **Requester Name:** | PHIL FRESQUEZ | **Customer Cost Code:** | FT00C34A05FF400000 | **Due Date:** | 22-NOV-99 |
| **Requester Group:** | ESH-20 | **Logged Date:** | 20-SEP-1999 | **Screening Data:** | NO SCREENING DATA REQUIRED |
| **Mail Stop:** | M887 | **Study:** | ESH20 BIOLOGICALS | | |
| **Requester Phone:** | 667-0815 | | | **Logged by:** | APODACA |
| **Requester Fax #:** | 667-0731 | **Analytical Service Agreement #:** | | | |

## CUSTOMER SAMPLES

| Sample Id | Task Id | Customer Id | Component | Result Value | Uncertainty | Units | Qualifier |
|---|---|---|---|---|---|---|---|
| 200109136 | 300235204 | G-1 | U | 0.46 | 0.05 | ug/g | |
| | | | Analysis Date | 25-FEB-2000 | | DD-MON-YYYY | |
| 200109137 | 300235209 | G-2 | U | 0.39 | 0.04 | ug/g | |
| | | | Analysis Date | 25-FEB-2000 | | DD-MON-YYYY | |
| 200109138 | 300235214 | C-1 | U | 0.31 | 0.03 | ug/g | |
| | | | Analysis Date | 25-FEB-2000 | | DD-MON-YYYY | |

## DUPLICATE TASKS

| Sample Id | Task Id | Original Task | Component | Result Value | Uncertainty | Units | Qualifier |
|---|---|---|---|---|---|---|---|
| 200109136 | 300235204 | | U | 0.46 | 0.05 | ug/g | |
| | | | Analysis Date | 25-FEB-2000 | | DD-MON-YYYY | |
| 200123221 | 300258941 | 300235204 | U | 0.43 | 0.04 | ug/g | |
| | | | Analysis Date | 25-FEB-2000 | | DD-MON-YYYY | |

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

Method: GENERIC KPA Method Area: EH-ALPHA Submission Id : 100040337

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

### BLIND QC

| Customer Id | Task Id | Component | Result Value | Uncertainty | Units | QC Value | QC Uncertainty | QC units | QC Evaluation |
|---|---|---|---|---|---|---|---|---|---|
| 200109146 | 300235222 | U | 0.38 | 0.04 | ug/g | 0.38 | 0.038 | ug/g | IN CONTROL |

### OPEN QC

| Customer Id | Task Id | Component | Result Value | Uncertainty | Units | QC Value | QC Uncertainty | QC units | QC Evaluation |
|---|---|---|---|---|---|---|---|---|---|
| 00.38058 | 300258939 | U | 10.74 | 1.07 | ug/L | 10.1 | 1.0 | ug/L | IN CONTROL |

### METHOD BLANK

| Customer Id | Task Id | Component | Result Value | Uncertainty | Units | QC Value | QC Uncertainty | QC units | QC Evaluation |
|---|---|---|---|---|---|---|---|---|---|
| 00.22776 | 300258940 | U | 0.00 | 0.01 | ug/g | 0 | 0 | ug/g | IN CONTROL |

**** FINAL REPORT ****

Method: GENERIC KPA Method Area: EH-ALPHA Submission Id : 100040337

| Analyst | Review | Team Leader | QA Officer |
|---|---|---|---|
| | for SC | | |
| 2/25/00 | 2/25/00 | 2/25/00 | 2/26/2000 |
| 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 ****