

TA-27

**ENVIRONMENTAL  
RESTORATION  
PROJECT**

*Los Alamos National Laboratory/University of California*  
Risk Reduction & Environmental Stewardship (RRES)  
Environmental Restoration (ER) Project, MS M992  
Los Alamos, New Mexico 87545  
(505) 667-0808/FAX (505) 665-4747



*U.S. Department of Energy*  
Office of Los Alamos Site Operations, MS A316  
Environmental Restoration Program  
Los Alamos, New Mexico 87544  
(505) 667-7203/FAX (505) 665-4504

*Date:* August 8, 2002  
*Refer to:* ER2002-0543

Mr. John Young, Corrective Action Project Leader  
Permits Management Program  
NMED – Hazardous Waste Bureau  
2905 Rodeo Park Drive East  
Building 1  
Santa Fe, NM 87505-6303

**SUBJECT: SUBMITTAL OF ADDITIONAL SUPPLEMENTAL INFORMATION IN  
SUPPORT OF NO FURTHER ACTION (NFA) FOR SOLID WASTE  
MANAGEMENT UNIT (SWMU) 27-003**

Dear Mr. Young:

Enclosed please find two copies of the Risk Reduction and Environmental Stewardship – Environmental Restoration report entitled “Additional Supplemental Information in Support of NFA for SWMU 27-003” (LA-UR-02-5049). This material may be of assistance in supporting the proposal for the removal of SWMU 27-003 from the Laboratory’s Hazardous Waste Facility Permit as made by the Laboratory in its September 1996 Request for Permit Modification (LA-UR-96-3357). Because your staff has inquired about radioactive constituents, which are under Department of Energy regulatory authority, this material is being provided to you as a courtesy for informational purposes.

The information within the enclosed report is an adjunct to the supplemental information for this SWMU provided to your bureau in “Documentation Supporting No Further Action for 18 Solid Waste Management Units” (LA-UR-01-5437), September 2001, and documents

- the history of the request for permit modification for this SWMU;
- 2002 sampling activities for this SWMU; and
- 2002 sample screening results compared with additional samples collected to establish localized-area background radiation levels.

SWMU 27-003 meets the requirements of no further action under NFA Criterion 5 (the site was characterized in accordance with applicable state and/or federal



2158



An Equal Opportunity Employer/Operated by the University of California

regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use).

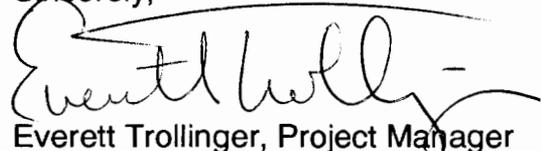
Please call Linda Nonno at (505) 665-0725 should you have any questions.

Sincerely,



David McInroy, Acting Program Manager  
Environmental Restoration Project  
Los Alamos National Laboratory

Sincerely,



Everett Trollinger, Project Manager  
Department of Energy  
Office of Los Alamos Site Operations

DM/ET/LN/vn

Enclosure: Additional Supplemental Information in Support of NFA for SWMU 27-003

Cy (w/enc.):

M. Boettner, RRES-R, MS M992  
J. Brown, S-7, MS F674  
M. Kirsch, RRES-R, MS M992  
D. McInroy, RRES-R, MS M992  
S. Martinez, RRES-R, MS M707 (6 copies)  
L. Nonno, RRES-R, MS M992  
D. Gregory, OLASO, MS A316  
E. Trollinger, OLASO, MS A316  
G. Turner, OLASO, MS A316  
T. Trujillo, DOE-AL, MS A906  
J. Davis, NMED-SWQB, MS J993  
L. King, US EPA  
T. Longo, DOE-HQ,  
J. White, ESH-19, MS K498  
S. Yanicak, NMED-DOE OB, MS J993  
RPF, , MS M707

Cy (w/o enc.):

S. Boliver, RRES-R MS M992  
A. Dorries, RRES-R MS M992  
D. Hickmott, RRES-R MS M992  
J. Hopkins, RRES-R MS M992  
J. McCann, RRES-R MS M992  
J. Parker, NMED-AIP, MS J993  
A. Pratt, RRES-R MS M992  
B. Ramsey, RRES-DO, MS J591  
K. West, RRES-R MS M992  
J. Bearzi, NMED-HRMB  
RRES-R File, MS M992

## **ADDITIONAL SUPPLEMENTAL INFORMATION IN SUPPORT OF NFA FOR SWMU 27-003**

**NOTE:** This document contains data on radioactive wastes, the management of which is regulated under the Atomic Energy Act and is specifically excluded from regulation under the Resource Conservation and Recovery Act (RCRA). These data are provided to the New Mexico Environment Department (NMED) for informational purposes only.

### **SWMU 27-003 BACKGROUND INFORMATION**

In the September 1996 request for permit modification (Environmental Restoration Project 1996, 55036), the Environmental Restoration (ER) Project proposed Solid Waste Management Unit (SWMU) 27-003 for removal from Module VIII of the Laboratory's Hazardous Waste Facility Permit. This SWMU is a former target practice area used by the U.S. Army in 1947. The site is located at the base of the cliffs north of Pajarito Road and along the northern edge of the main Pajarito Canyon drainage channel. The majority of the former target area lies on the steep slope of the north canyon wall, below the rim. The ordnance fired at the cliff face consisted of 2.36-in. rocket-propelled bazooka rounds. Before 1993, the nature of the hazard was potential unexploded ordnance and fuses buried in the soil or talus. In 1993, in accordance with an approved RCRA Facility Investigation (RFI) work plan, an RFI was conducted at this site to remove all unexploded bazooka rounds and to recover all ordnance debris from the SWMU. Visual surveys, augmented with metal detectors, were used to identify firing debris. Approximately 3200 pieces of ordnance were removed during the RFI. Following ordnance removal, six confirmation samples were taken near the base of the point of impact. The confirmation samples were taken in addition to the work specified in the approved RFI work plan for this site. However, results were reported for only five samples. The whereabouts of the sixth sample and its analytical results are unknown. The samples were analyzed for total metals and for barium, copper, and lead. Barium is a common component of explosives, and copper and lead are components of projectiles. High explosives (HE) were not detected in any of the samples. Barium and lead were detected below their background values (BVs) in all five samples; copper was detected below its BV in four samples, but above its BV of 14.7 ppm in one sample at a concentration of 17.5 ppm. Due to the lost sample and the single copper detect, additional samples were required to support a no further action (NFA) determination under NFA Criterion 5 (the site was characterized in accordance with applicable state and/or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use).

In 1999, NMED and ER Project personnel determined that a few additional samples would be taken to confirm the nature and extent of any residual inorganic chemicals (metals) or HE contamination. Four soil and two sediment samples were collected during the summer of 2001 and the results were submitted to NMED in the September 2001 petition for permit modification (Environmental Restoration Project 2001, 71522). Samples were biased on the downhill side of the SWMU and in drainage channels that had the potential to transport contaminants from the site. Analytical results yielded non-detects for all HE. Inorganic chemical analyses yielded zinc concentrations in soil above the BV for zinc (48.8 mg/kg) in three of the six samples. However, all three concentrations were within the range of background concentrations (14 mg/kg to 75.5 mg/kg). All other inorganic concentrations were below their BVs. In order to meet Department of Transportation (DOT) shipping requirements, which require the radiological screening of all samples before they can be shipped to an analytical laboratory, the six samples were analyzed for gross alpha, beta, and gamma levels by the American Radiation Services (ARS) of New Mexico. The analytical results for these samples are included as Attachment 1. Because these samples were collected for DOT requirements rather than for characterization purposes, no background samples were collected in 2001 and no laboratory method information such as count time was recorded for these samples. As a result, there is no basis on which to determine whether the gross radiation levels that were measured in these samples are representative of localized-area background radiation levels or are related to SWMU activities.

### **NEED FOR ADDITIONAL INFORMATION**

Because no gross radiation comparisons of any kind could be made using the heretofore-existing data at SWMU 27-003, personnel from the Risk Reduction and Environmental Stewardship Division's Remediation Group (RRES-R) (formerly the ER Project) made the decision to collect sufficient samples in order to determine localized-area background radiation levels and to provide a context for determining if SWMU 27-003 is a source of potential elevated radioactivity. In order to achieve these two goals, it

was determined that samples from outside the influence of the drainage areas were needed. In addition, it would be necessary to resample the six sampling points that had been sampled in 2001 for gross radiation levels for the sole purpose of fulfilling DOT requirements. Resampling (sample locations 1–6) was necessary in order to ensure that laboratory method consistency would establish a valid basis on which to make the comparison. To achieve laboratory-method consistency, analyses of the samples from the toe of the SWMU would have to be performed under the same laboratory conditions as the samples collected for localized-area background radiation levels. That conditions can greatly differ between two analytical events is demonstrated by the fact that detection limits were lower in 2001 than in 2002. All six 2001 sampling locations were found easily because each location had been surveyed and also had retained its orange flag which had been placed in 2001 as a sample marker.

On July 10, 2002, RRES-R personnel collected a total of 18 additional samples at SWMU 27-003 (see sampling map, Attachment 2). Six samples were collected from six locations east of the eastern drainage bounding the SWMU (sample locations 1E–6E) and six samples were collected from six locations west of the western drainage bounding the SWMU (sample locations 1W–6W). These 12 sample locations are outside the influence of the drainage from the SWMU and were selected to provide an indication of localized-area background radiation levels and to provide a context to determine if SWMU 27-003 is contributing to potential elevated radiation. In addition, one sample was collected from each of the six 2001 sample locations. All eighteen 2002 samples were submitted to ARS for gross alpha, beta, and gamma analyses. Analytical results are included in Attachment 2.

## CONCLUSIONS

Analytical results are summarized in Table 1. For alpha and beta radiation, activities found in 2002 samples 1 through 6 were within the range found at the 12 localized-area background sample locations. For gamma activity, only one of the six SWMU-related samples lay outside the range found at the 12 background sample locations.

**Table 1**  
**2002 Gross Alpha, Gross Beta, and Gross Gamma Results for PRS 27-003**

Sample Location	Alpha Result (pCi/g)	Error (+/- 2s)	Detection Limit (pCi/g)	Beta Result (pCi/g)	Error (+/- 2s)	Detection Limit (pCi/g)	Gamma Result (pCi/g)	Error (+/- 2s)	Detection Limit (pCi/g)
1	34.65	12.26	12.35	67.11	11.41	17.05	7.61	1.33	2.89
2	22.58	10.30	12.55	57.63	11.17	17.68	6.12	1.16	2.53
3	28.21	11.49	12.90	51.09	11.32	18.86	5.19	1.03	2.89
4	28.72	11.47	12.69	62.69	11.54	17.87	6.06	1.41	3.11
5	37.03	12.71	12.50	51.63	10.78	17.56	4.84	1.14	2.53
6	38.23	12.76	12.27	70.65	11.48	16.81	5.43	1.03	2.25
1E	30.52	11.74	12.62	57.59	11.12	17.57	5.41	0.98	2.13
2E	20.04	9.64	12.19	61.52	11.05	16.93	4.07	1.29	2.89
3E	25.97	10.58	11.88	61.89	10.65	16.01	5.84	1.31	2.89
4E	12.72	8.18	12.43	61.45	11.11	17.08	5.80	1.23	2.70
5E	13.09	8.41	12.79	54.88	11.21	18.12	6.32	1.16	2.53
6E	29.26	11.47	12.50	70.03	11.62	17.17	5.26	1.08	2.38
1W	27.73	11.08	12.25	65.86	11.41	17.20	4.97	1.08	2.38
2W	23.92	10.65	12.75	63.24	11.52	17.75	4.21	1.07	2.38
3W	19.51	9.66	12.46	69.57	11.72	17.44	4.42	1.21	2.70
4W	35.33	12.31	12.25	77.17	12.00	17.20	3.06	1.19	2.70
5W	32.02	11.69	12.08	65.59	11.11	16.59	5.33	1.15	2.53
6W	58.28	15.47	12.28	88.84	12.56	17.15	5.81	1.15	2.53

Table 2 presents the results of statistical comparisons for each type of radiation and of the samples collected from the toe of SWMU 27-003 with those collected east and west of the SWMU influence. The statistical comparison used on these two data sets consisted of a t-test, which is used for comparing

data sets with unequal variances. Based on the value of t and the sample sizes for both data sets, the t-test determines the probability (p) of whether the two data sets come from the same data population. The standard statistical test criterion for this test is  $p = 0.05$  (5%). If the probability determined by application of the t-test is greater than 0.05, the two data sets are not statistically different from each other while a probability of less than 0.05 indicates a statistical difference. For the 27-003 data sets, the probabilities (p-values) are 0.12 for gamma radiation, 0.16 for beta radiation, and 0.34 for alpha radiation, which are all greater than 0.05. Thus the data set from SWMU 27-003 and the data sets from the areas outside of the SWMU exhibit no statistical differences for any type of radiation at the standard statistical test criterion of  $p = 0.05$ .

Based upon the results of this comparison and the fact that no radioactive material is known to have been used in the bazooka impact operations, SWMU 27-003 is not a source of elevated radioactivity.

**Table 2**  
**Statistical Comparison of Gross Alpha, Gross Beta, and Gross Gamma Activity at the Toe of SWMU 27-003 and Off-Site Concentrations**

Statistics for Comparison	SWMU Concentration (pCi/g)	Off-site Concentration (pCi/g)
<b>Gross Alpha Activity</b>		
Mean	31.57	27.37
Variance	36.78	145.63
Observations	6.00	12.00
t Stat* = 0.98 p-Value (two-tailed**) = 0.34		
<b>Gross Beta Activity</b>		
Mean	60.13	66.47
Variance	65.23	84.78
Observations	6.00	12.00
t Stat = -1.50 p-Value (two-tailed) = 0.16		
<b>Gross Gamma Activity</b>		
Mean	5.88	5.04
Variance	0.97	0.88
Observations	6.00	12.00
t Stat = 1.72 p-Value (two-tailed) = 0.12		

\* The term t-stat denotes the calculated value that tests the size of the difference between the mean (average) of two data sets against the variability within the data sets.

\*\* The term two-tailed denotes that two data sets differ in the data distribution, i.e., one set may be higher or lower in relation to the other data set.

In conclusion, the 1993 RFI activities for SWMU 27-003 supplemented with the results of the 2001 sampling (HE not detected; all inorganic chemicals either not detected or detected within the appropriate range of BVs) and the screening results of the 2002 sampling (no elevated radioactivity) demonstrate that SWMU 27-003 meets the requirements for NFA under NFA Criterion 5 (the site was characterized in accordance with applicable state and/or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use).

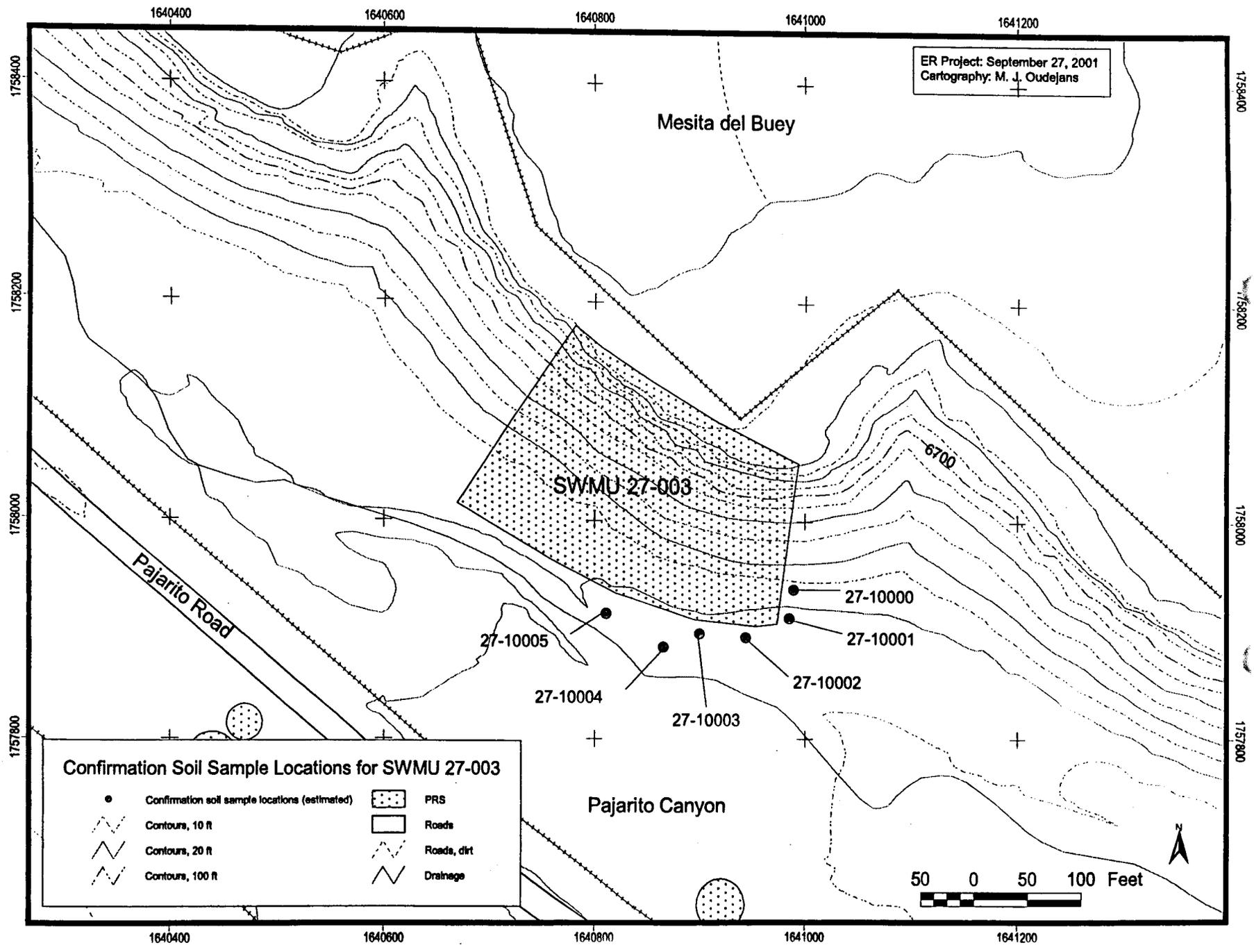
## **REFERENCES**

Environmental Restoration Project, September 1996. "Request for Permit Modification, Units Proposed for NFA," Volume II, Los Alamos National Laboratory report LA-UR-96-3357, Los Alamos, New Mexico. (Environmental Restoration Project 1996, 55036)

Environmental Restoration Project, September 2001. "Documentation Supporting No Further Action for 18 Solid Waste Management Units," Los Alamos National Laboratory report LA-UR-01-5437, Los Alamos, New Mexico. (Environmental Restoration Project 2001, 71522)

**ATTACHMENT 1:** 2001 Sample Collection Map and 2001 ARS DATA

**ATTACHMENT 2:** 2002 Sample Collection Map and 2002 ARS DATA





1903 Central Ave. • Los Alamos, New Mexico 87544

(505) 663-0363 • Fax (505) 663-0365

## NEW MEXICO

ARSNM Tracking Number: ARSNM-01-0093      COC Number: 1093-01-0002  
 Client I.D.: RC27-01-0001      ARSNM Sample I.D.: ARSNM-01-0539  
 Date Sampled: 07/23/01      Date Received: 07/23/01  
 Time Sampled: 1350      Time Received: 1550  
 Type of Sample: solid      Date of Report: 7/24/01  
 Contact Person: R.Bohn      Charge Code: MR0R0001E000

Analysis Description	Analysis Result	Analysis Error ± 2 Sigma	Detection Limit	Analysis Units	Analysis Test Method	Analysis Date & Time	Analysis Technician
Gross Alpha	17.78	9.07	11.94	pCi/gm	EPA 900M	07/24/01 0924	bz
Gross Beta	57.00	10.34	15.93	pCi/gm	EPA 900M	07/24/01 0924	bz
Gross Gamma	12.73	0.78	1.25	pCi/gm	EPA 901.1M	07/23/01 1610	bz

Notes:

*B. Zelenay*  
Barbara Zelenay

Cost Per Sample: 124.09

Notes: American Radiation Services of New Mexico, Inc. assumes no liability for the use or interpretation of any analytical results provided other than the cost of the performed analysis itself. Reproduction of this report in less than full requires the written consent of the client.



1903 Central Ave. • Los Alamos, New Mexico 87544

(505) 883-0383 • Fax (505) 663-0365

**NEW MEXICO**  
 ARSNM Tracking Number: ARSNM-01-0093      COC Number: 1093-01-0002  
 Client I.D.: RC27-01-0002      ARSNM Sample I.D.: ARSNM-01-0540  
 Date Sampled: 07/23/01      Date Received: 07/23/01  
 Time Sampled: 1359      Time Received: 1550  
 Type of Sample: solid      Date of Report: 7/24/01  
 Contact Person: R.Bohn      Charge Code: MR0R0001E000

Analysis Description	Analysis Result	Analysis Error ± 2 Sigma	Detection Limit	Analysis Units	Analysis Test Method	Analysis Date & Time	Analysis Technician
Gross Alpha	15.89	8.66	11.91	pCi/gm	EPA 900M	07/24/01 0924	bz
Gross Beta	52.56	10.30	16.39	pCi/gm	EPA 900M	07/24/01 0924	bz
Gross Gamma	10.50	0.64	1.02	pCi/gm	EPA 901.1M	07/23/01 1625	bz

Notes:

Cost Per Sample: 124.09

*B. Zelenay*  
Barbara Zelenay

Notes: American Radiation Services of New Mexico, Inc. assumes no liability for the use or interpretation of any analytical results provided other than the cost of the performed analysis itself. Reproduction of this report in less than full requires the written consent of the client.



1903 Central Ave. • Los Alamos, New Mexico 87544

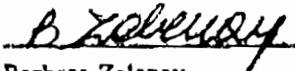
(505) 663-0363 • Fax (505) 663-0365

## NEW MEXICO

ARSNM Tracking Number: ARSNM-01-0093      COC Number: 1093-01-0004  
 Client I.D.: RC27-01-0003      ARSNM Sample I.D.: ARSNM-01-0541  
 Date Sampled: 07/23/01      Date Received: 07/23/01  
 Time Sampled: 1400      Time Received: 1550  
 Type of Sample: solid      Date of Report: 7/24/01  
 Contact Person: R.Bohn      Charge Code: MR0R0001E000

Analysis Description	Analysis Result	Analysis Error + 2 Sigma	Detection Limit	Analysis Units	Analysis Test Method	Analysis Date & Time	Analysis Technician
Gross Alpha	20.11	9.41	11.68	pCi/gm	EPA 900M	07/24/01 0924	bz
Gross Beta	49.69	9.94	15.94	pCi/gm	EPA 900M	07/24/01 0924	bz
Gross Gamma	9.69	0.94	1.74	pCi/gm	EPA 901.1M	07/23/01 1637	bz

Notes:

  
 Barbara Zelenay

Cost Per Sample: 124.09

Notes: American Radiation Services of New Mexico, Inc. assumes no liability for the use or interpretation of any analytical results provided other than the cost of the performed analysis itself. Reproduction of this report in less than full requires the written consent of the client.



1903 Central Ave. • Los Alamos, New Mexico 87544  
(505) 663-0363 • Fax (505) 663-0365

NEW MEXICO

ARSNM Tracking Number:	ARSNM-01-0093	COC Number:	1093-01-0004
Client I.D.:	RC27-01-0004	ARSNM Sample I.D.:	ARSNM-01-0542
Date Sampled:	07/23/01	Date Received:	07/23/01
Time Sampled:	1405	Time Received:	1550
Type of Sample:	solid	Date of Report:	7/24/01
Contact Person:	R.Bohn	Charge Code:	MR0R0001E000

Analysis Description	Analysis Result	Analysis Error ± 2 Sigma	Detection Limit	Analysis Units	Analysis Test Method	Analysis Date & Time	Analysis Technician
Gross Alpha	18.45	9.42	12.39	pCi/gm	EPA 900M	07/24/01 0924	bz
Gross Beta	55.37	10.94	17.46	pCi/gm	EPA 900M	07/24/01 0924	bz
Gross Gamma	11.78	1.03	1.84	pCi/gm	EPA 901.1M	07/23/01 1648	bz

Notes:

*B. Zelenay*  
Barbara Zelenay

Cost Per Sample: 124.09

Notes: American Radiation Services of New Mexico, Inc. assumes no liability for the use or interpretation of any analytical results provided other than the cost of the performed analysis itself. Reproduction of this report in less than full requires the written consent of the client.



1903 Central Ave. • Los Alamos, New Mexico 87544

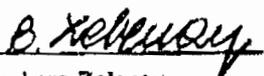
(505) 663-0363 • Fax (505) 663-0365

## NEW MEXICO

ARSNM Tracking Number: ARSNM-01-0093      COC Number: 1093-01-0006  
 Client I.D.: RC27-01-0005      ARSNM Sample I.D.: ARSNM-01-0543  
 Date Sampled: 07/23/01      Date Received: 07/23/01  
 Time Sampled: 1410      Time Received: 1550  
 Type of Sample: solid      Date of Report: 7/24/01  
 Contact Person: R.Bohn      Charge Code: MR0R0001E000

Analysis Description	Analysis Result	Analysis Error + 2 Sigma	Detection Limit	Analysis Units	Analysis Test Method	Analysis Date & Time	Analysis Technician
Gross Alpha	25.07	10.90	12.83	pCi/gm	EPA 900M	07/24/01 1026	bz
Gross Beta	60.95	11.29	17.55	pCi/gm	EPA 900M	07/24/01 1026	bz
Gross Gamma	9.86	0.83	1.47	pCi/gm	EPA 901.1M	07/24/01 0805	bz

Notes:

  
 Barbara Zelenay

Cost Per Sample: 124.09

Notes: American Radiation Services of New Mexico, Inc. assumes no liability for the use or interpretation of any analytical results provided other than the cost of the performed analysis itself. Reproduction of this report in less than full requires the written consent of the client.



1903 Central Ave. • Los Alamos, New Mexico 87544

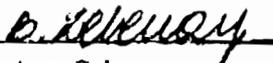
(505) 663-0363 • Fax (505) 663-0365

## NEW MEXICO

ARSNM Tracking Number: ARSNM-01-0093      COC Number: 1093-01-0006  
 Client I.D.: RC27-01-0006      ARSNM Sample I.D.: ARSNM-01-0544  
 Date Sampled: 07/23/01      Date Received: 07/23/01  
 Time Sampled: 1415      Time Received: 1550  
 Type of Sample: solid      Date of Report: 7/24/01  
 Contact Person: R. Bohn      Charge Code: MR0R0001E000

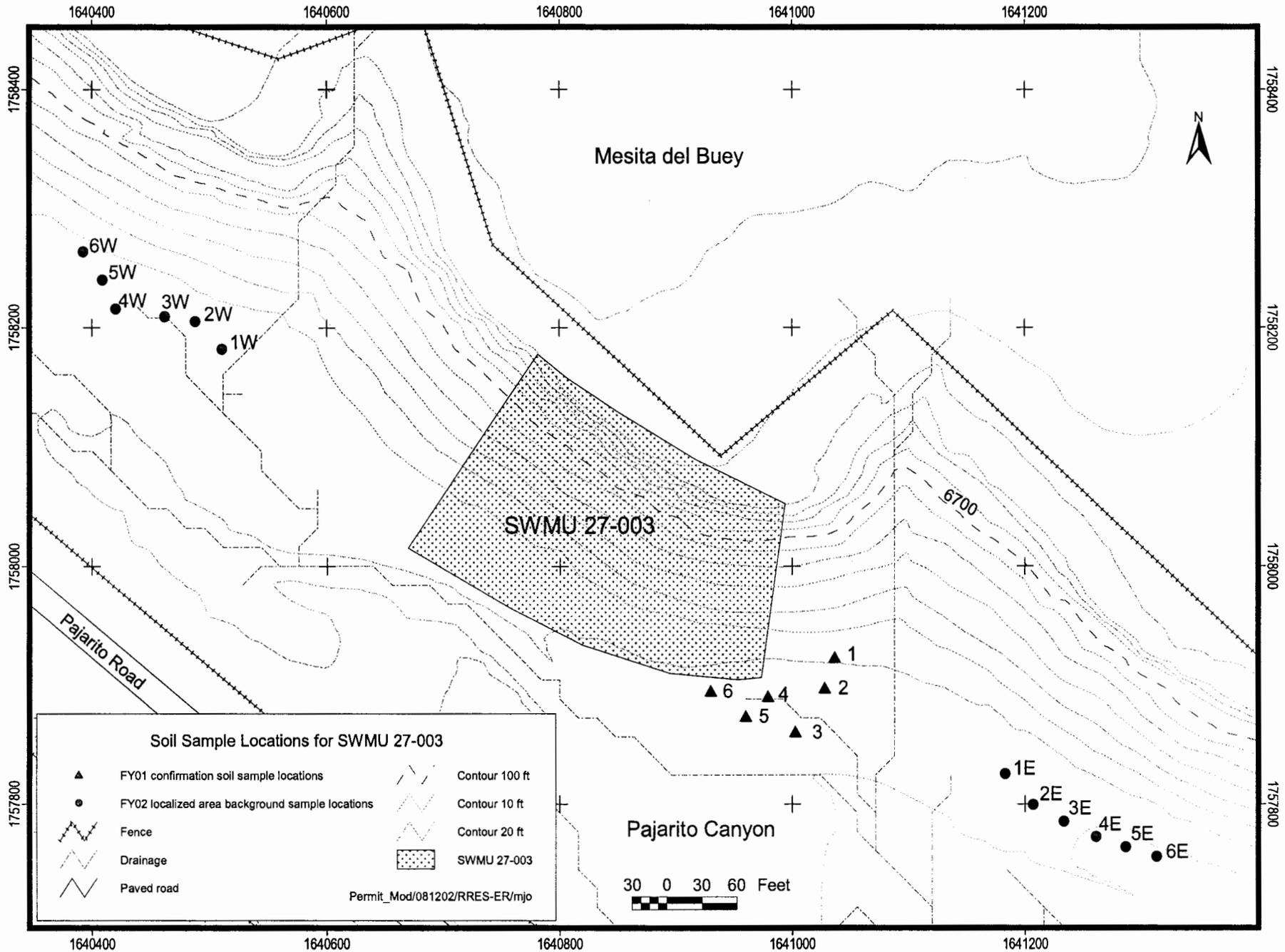
Analysis Description	Analysis Result	Analysis Error ± 2 Sigma	Detection Limit	Analysis Units	Analysis Test Method	Analysis Date & Time	Analysis Technician
Gross Alpha	35.09	12.41	12.50	pCi/gm	EPA 900M	07/24/01 1029	bz
Gross Beta	60.41	10.96	16.88	pCi/gm	EPA 900M	07/24/01 1029	bz
Gross Gamma	12.35	0.98	1.70	pCi/gm	EPA 901.1M	07/24/01 0820	bz

Notes:

  
 Barbara Zelenay

Cost Per Sample: 124.09

Notes: American Radiation Services of New Mexico, Inc. assumes no liability for the use or interpretation of any analytical results provided other than the cost of the performed analysis itself. Reproduction of this report in less than full requires the written consent of the client.





1903 Central Ave. • Los Alamos, New Mexico 87544

(505) 663-0363 • Fax (505) 663-0365

## American Radiation Services of New Mexico

### Laboratory Analysis Report

#### Prepared For:

University of California  
Los Alamos National Laboratory  
Attn: Stephen Bolivar, EES-13, H865  
REF: 126310031  
PO Box 1663  
Los Alamos, NM 87545  
Phone: 667-1868  
Fax: 665-9972

*Barbara Zelenay*  
Barbara Zelenay  
Laboratory Supervisor

**Note:** American Radiation Services of New Mexico assumes no liability for the use or interpretation of any analytical results provided other than the cost of the performed analysis itself. Reproduction of this report in less than full requires the written consent of the client.



1903 Central Ave. • Los Alamos, New Mexico 87544

(505) 663-0363 • Fax (505) 663-0365

ARSNM Tracking Number: ARSNM-02-0060  
 Client I.D.: 1  
 Date Sampled: 07/10/02  
 Time Sampled: AM  
 Type of Sample: solid  
 Contact Person: R.Bohn

COC Number:  
 ARSNM Sample I.D.: ARSNM-02-0396  
 Date Received: 07/10/02  
 Time Received: 1025  
 Date of Report: 07/11/02  
 Charge Code: MR0R0001E000

Analysis Description	Analysis Result	Analysis Error $\pm 2 \sigma$	Detection Limit	Analysis Units	Analysis Test Method	Analysis Date & Time	Analysis Technician
Gross Alpha	34.65	12.26	12.35	pCi/g	EPA 900M	07/10/02 1431	bz
Gross Beta	67.11	11.41	17.05	pCi/g	EPA 900M	07/10/02 1431	bz
Gross Gamma	7.61	1.33	2.89	pCi/g	EPA 901.1M	07/10/02 1130	bz

*B. Zelenay*  
 Barbara Zelenay

Cost per sample: 124.09

Notes: American Radiation Services of New Mexico assumes no liability for the use or interpretation of any analytical results provided other than the cost of the performed analysis itself. Reproduction of this report in less than full requires the written consent of the client.



1903 Central Ave. • Los Alamos, New Mexico 87544  
 (505) 663-0363 • Fax (505) 663-0365

ARSNM Tracking Number: ARSNM-02-0060  
 Client I.D.: 2  
 Date Sampled: 07/10/02  
 Time Sampled: AM  
 Type of Sample: solid  
 Contact Person: R.Bohn

COC Number:  
 ARSNM Sample I.D.: ARSNM-02-0397  
 Date Received: 07/10/02  
 Time Received: 1025  
 Date of Report: 07/11/02  
 Charge Code: MR0R0001E000

Analysis Description	Analysis Result	Analysis Error $\pm 2 \sigma$	Detection Limit	Analysis Units	Analysis Test Method	Analysis Date & Time	Analysis Technician
Gross Alpha	22.58	10.30	12.55	pCi/g	EPA 900M	07/10/02 1431	bz
Gross Beta	57.63	11.17	17.68	pCi/g	EPA 900M	07/10/02 1431	bz
Gross Gamma	6.12	1.16	2.53	pCi/g	EPA 901.1M	07/10/02 1200	bz

*B. Zelenay*  
 Barbara Zelenay

Cost per sample: 124.09

Notes: American Radiation Services of New Mexico assumes no liability for the use or interpretation of any analytical results provided other than the cost of the performed analysis itself. Reproduction of this report in less than full requires the written consent of the client.



1903 Central Ave. • Los Alamos, New Mexico 87544

(505) 663-0363 • Fax (505) 663-0365

ARSNM Tracking Number: ARSNM-02-0060  
 Client I.D.: 3  
 Date Sampled: 07/10/02  
 Time Sampled: AM  
 Type of Sample: solid  
 Contact Person: R.Bohn

COC Number:  
 ARSNM Sample I.D.: ARSNM-02-0398  
 Date Received: 07/10/02  
 Time Received: 1025  
 Date of Report: 07/11/02  
 Charge Code: MR0R0001E000

Analysis Description	Analysis Result	Analysis Error $\pm 2 \sigma$	Detection Limit	Analysis Units	Analysis Test Method	Analysis Date & Time	Analysis Technician
Gross Alpha	28.21	11.49	12.90	pCi/g	EPA 900M	07/10/02 1431	bz
Gross Beta	51.09	11.32	18.86	pCi/g	EPA 900M	07/10/02 1431	bz
Gross Gamma	5.19	1.30	2.89	pCi/g	EPA 901.1M	07/10/02 1315	bz

*B Zelenay*  
 Barbara Zelenay

Cost per sample: 124.09

Notes: American Radiation Services of New Mexico assumes no liability for the use or interpretation of any analytical results provided other than the cost of the performed analysis itself. Reproduction of this report in less than full requires the written consent of the client.



1903 Central Ave. • Los Alamos, New Mexico 87544

(505) 663-0363 • Fax (505) 663-0365

ARSNM Tracking Number: ARSNM-02-0060  
 Client I.D.: 4  
 Date Sampled: 07/10/02  
 Time Sampled: AM  
 Type of Sample: solid  
 Contact Person: R.Bohn

COC Number:  
 ARSNM Sample I.D.: ARSNM-02-0399  
 Date Received: 07/10/02  
 Time Received: 1025  
 Date of Report: 07/11/02  
 Charge Code: MR0R0001E000

Analysis Description	Analysis Result	Analysis Error $\pm 2\sigma$	Detection Limit	Analysis Units	Analysis Test Method	Analysis Date & Time	Analysis Technician
Gross Alpha	28.72	11.47	12.69	pCi/g	EPA 900M	07/10/02 1431	bz
Gross Beta	62.69	11.54	17.87	pCi/g	EPA 900M	07/10/02 1431	bz
Gross Gamma	6.06	1.41	3.11	pCi/g	EPA 901.1M	07/10/02 1405	bz

*B. Zelenay*  
 Barbara Zelenay

Cost per sample: 124.09

Notes: American Radiation Services of New Mexico assumes no liability for the use or interpretation of any analytical results provided other than the cost of the performed analysis itself. Reproduction of this report in less than full requires the written consent of the client.



1903 Central Ave. • Los Alamos, New Mexico 87544

(505) 663-0363 • Fax (505) 663-0365

ARSNM Tracking Number: ARSNM-02-0060  
 Client I.D.: 5  
 Date Sampled: 07/10/02  
 Time Sampled: AM  
 Type of Sample: solid  
 Contact Person: R.Bohn

COC Number:  
 ARSNM Sample I.D.: ARSNM-02-0400  
 Date Received: 07/10/02  
 Time Received: 1025  
 Date of Report: 07/11/02  
 Charge Code: MR0R0001E000

Analysis Description	Analysis Result	Analysis Error $\pm 2 \sigma$	Detection Limit	Analysis Units	Analysis Test Method	Analysis Date & Time	Analysis Technician
Gross Alpha	37.03	12.71	12.50	pCi/g	EPA 900M	07/10/02 1533	bz
Gross Beta	51.63	10.78	17.56	pCi/g	EPA 900M	07/10/02 1533	bz
Gross Gamma	4.84	1.14	2.53	pCi/g	EPA 901.1M	07/10/02 1437	bz

*B. Zelenay*  
 Barbara Zelenay

Cost per sample: 124.09

Notes: American Radiation Services of New Mexico assumes no liability for the use or interpretation of any analytical results provided other than the cost of the performed analysis itself. Reproduction of this report in less than full requires the written consent of the client.



1903 Central Ave. • Los Alamos, New Mexico 87544

(505) 663-0383 • Fax (505) 663-0365

ARSNM Tracking Number: ARSNM-02-0060  
 Client I.D.: 6  
 Date Sampled: 07/10/02  
 Time Sampled: AM  
 Type of Sample: solid  
 Contact Person: R.Bohn

COC Number:  
 ARSNM Sample I.D.: ARSNM-02-0401  
 Date Received: 07/10/02  
 Time Received: 1025  
 Date of Report: 07/11/02  
 Charge Code: MR0R0001E000

Analysis Description	Analysis Result	Analysis Error $\pm 2 \sigma$	Detection Limit	Analysis Units	Analysis Test Method	Analysis Date & Time	Analysis Technician
Gross Alpha	38.23	12.76	12.27	pCi/g	EPA 900M	07/10/02 1533	bz
Gross Beta	70.65	11.48	16.81	pCi/g	EPA 900M	07/10/02 1533	bz
Gross Gamma	5.43	1.03	2.25	pCi/g	EPA 901.1M	07/10/02 1507	bz

*B. Zelenay*  
 Barbara Zelenay

Cost per sample: 124.09

Notes: American Radiation Services of New Mexico assumes no liability for the use or interpretation of any analytical results provided other than the cost of the performed analysis itself. Reproduction of this report in less than full requires the written consent of the client.



1903 Central Ave. • Los Alamos, New Mexico 87544

(505) 663-0363 • Fax (505) 663-0365

ARSNM Tracking Number: ARSNM-02-0060  
 Client I.D.: 1E  
 Date Sampled: 07/10/02  
 Time Sampled: AM  
 Type of Sample: solid  
 Contact Person: R.Bohn

COC Number:  
 ARSNM Sample I.D.: ARSNM-02-0402  
 Date Received: 07/10/02  
 Time Received: 1025  
 Date of Report: 07/11/02  
 Charge Code: MR0R0001E000

Analysis Description	Analysis Result	Analysis Error $\pm 2 \sigma$	Detection Limit	Analysis Units	Analysis Test Method	Analysis Date & Time	Analysis Technician
Gross Alpha	30.52	11.74	12.62	pCi/g	EPA 900M	07/10/02 1533	bz
Gross Beta	57.59	11.12	17.57	pCi/g	EPA 900M	07/10/02 1533	bz
Gross Gamma	5.41	0.98	2.13	pCi/g	EPA 901.1M	07/10/02 1540	bz

*B. Zelenay*  
 Barbara Zelenay

Cost per sample: 124.09

Notes: American Radiation Services of New Mexico assumes no liability for the use or interpretation of any analytical results provided other than the cost of the performed analysis itself. Reproduction of this report in less than full requires the written consent of the client.



1903 Central Ave. • Los Alamos, New Mexico 87544  
 (505) 683-0363 • Fax (505) 663-0365

ARSNM Tracking Number: ARSNM-02-0060  
 Client I.D.: 2E  
 Date Sampled: 07/10/02  
 Time Sampled: AM  
 Type of Sample: solid  
 Contact Person: R.Bohn

COC Number:  
 ARSNM Sample I.D.: ARSNM-02-0403  
 Date Received: 07/10/02  
 Time Received: 1025  
 Date of Report: 07/11/02  
 Charge Code: MR0R0001E000

Analysis Description	Analysis Result	Analysis Error $\pm 2 \sigma$	Detection Limit	Analysis Units	Analysis Test Method	Analysis Date & Time	Analysis Technician
Gross Alpha	20.04	9.64	12.19	pCi/g	EPA 900M	07/10/02 1533	bz
Gross Beta	61.52	11.05	16.93	pCi/g	EPA 900M	07/10/02 1533	bz
Gross Gamma	4.07	1.29	2.89	pCi/g	EPA 901.1M	07/10/02 1610	bz

*B. Zelenay*  
 Barbara Zelenay

Cost per sample: 124.09

Notes: American Radiation Services of New Mexico assumes no liability for the use or interpretation of any analytical results provided other than the cost of the performed analysis itself. Reproduction of this report in less than full requires the written consent of the client.



1903 Central Ave. • Los Alamos, New Mexico 87544

(505) 663-0363 • Fax (505) 663-0365

ARSNM Tracking Number: ARSNM-02-0060  
 Client I.D.: 3E  
 Date Sampled: 07/10/02  
 Time Sampled: AM  
 Type of Sample: solid  
 Contact Person: R.Bohn

COC Number:  
 ARSNM Sample I.D.: ARSNM-02-0404  
 Date Received: 07/10/02  
 Time Received: 1025  
 Date of Report: 07/11/02  
 Charge Code: MR0R0001E000

Analysis Description	Analysis Result	Analysis Error $\pm 2\sigma$	Detection Limit	Analysis Units	Analysis Test Method	Analysis Date & Time	Analysis Technician
Gross Alpha	25.97	10.58	11.88	pCi/g	EPA 900M	07/10/02 1646	bz
Gross Beta	61.89	10.65	16.01	pCi/g	EPA 900M	07/10/02 1646	bz
Gross Gamma	5.84	1.31	2.89	pCi/g	EPA 901.1M	07/10/02 1645	bz

*B. Zelenay*  
 Barbara Zelenay

Cost per sample: 124.09

Notes: American Radiation Services of New Mexico assumes no liability for the use or interpretation of any analytical results provided other than the cost of the performed analysis itself. Reproduction of this report in less than full requires the written consent of the client.



1903 Central Ave. • Los Alamos, New Mexico 87544

(505) 663-0363 • Fax (505) 663-0365

ARSNM Tracking Number: ARSNM-02-0060  
 Client I.D.: 4E  
 Date Sampled: 07/10/02  
 Time Sampled: AM  
 Type of Sample: solid  
 Contact Person: R.Bohn

COC Number:  
 ARSNM Sample I.D.: ARSNM-02-0405  
 Date Received: 07/10/02  
 Time Received: 1025  
 Date of Report: 07/11/02  
 Charge Code: MR0R0001E000

Analysis Description	Analysis Result	Analysis Error $\pm 2 \sigma$	Detection Limit	Analysis Units	Analysis Test Method	Analysis Date & Time	Analysis Technician
Gross Alpha	12.72	8.18	12.43	pCi/g	EPA 900M	07/10/02 1646	bz
Gross Beta	61.45	11.11	17.08	pCi/g	EPA 900M	07/10/02 1646	bz
Gross Gamma	5.80	1.23	2.70	pCi/g	EPA 901.1M	07/10/02 1725	bz

*B. Zelenay*  
 Barbara Zelenay

Cost per sample: 124.09

Notes: American Radiation Services of New Mexico assumes no liability for the use or interpretation of any analytical results provided other than the cost of the performed analysis itself. Reproduction of this report in less than full requires the written consent of the client.



1903 Central Ave. • Los Alamos, New Mexico 87544  
 (505) 663-0363 • Fax (505) 663-0365

ARSNM Tracking Number: ARSNM-02-0060  
 Client I.D.: 5E  
 Date Sampled: 07/10/02  
 Time Sampled: AM  
 Type of Sample: solid  
 Contact Person: R.Bohn

COC Number:  
 ARSNM Sample I.D.: ARSNM-02-0406  
 Date Received: 07/10/02  
 Time Received: 1025  
 Date of Report: 07/11/02  
 Charge Code: MR0R0001E000

Analysis Description	Analysis Result	Analysis Error $\pm 2 \sigma$	Detection Limit	Analysis Units	Analysis Test Method	Analysis Date & Time	Analysis Technician
Gross Alpha	13.09	8.41	12.79	pCi/g	EPA 900M	07/10/02 1646	bz
Gross Beta	54.88	11.21	18.12	pCi/g	EPA 900M	07/10/02 1646	bz
Gross Gamma	6.32	1.16	2.53	pCi/g	EPA 901.1M	07/11/02 0800	bz

*B. Zelenay*  
 Barbara Zelenay

Cost per sample: 124.09

Notes: American Radiation Services of New Mexico assumes no liability for the use or interpretation of any analytical results provided other than the cost of the performed analysis itself. Reproduction of this report in less than full requires the written consent of the client.



1903 Central Ave. • Los Alamos, New Mexico 87544

(505) 663-0363 • Fax (505) 663-0365

ARSNM Tracking Number: ARSNM-02-0060  
 Client I.D.: 6E  
 Date Sampled: 07/10/02  
 Time Sampled: AM  
 Type of Sample: solid  
 Contact Person: R.Bohn

COC Number:  
 ARSNM Sample I.D.: ARSNM-02-0407  
 Date Received: 07/10/02  
 Time Received: 1025  
 Date of Report: 07/11/02  
 Charge Code: MR0R0001E000

Analysis Description	Analysis Result	Analysis Error $\pm 2 \sigma$	Detection Limit	Analysis Units	Analysis Test Method	Analysis Date & Time	Analysis Technician
Gross Alpha	29.26	11.47	12.50	pCi/g	EPA 900M	07/11/02 0904	bz
Gross Beta	70.03	11.62	17.17	pCi/g	EPA 900M	07/11/02 0904	bz
Gross Gamma	5.26	1.08	2.38	pCi/g	EPA 901.1M	07/11/02 0833	bz

*B. Zelenay*  
 Barbara Zelenay

Cost per sample: 124.09

Notes: American Radiation Services of New Mexico assumes no liability for the use or interpretation of any analytical results provided other than the cost of the performed analysis itself. Reproduction of this report in less than full requires the written consent of the client.



1903 Central Ave. • Los Alamos, New Mexico 87544

(505) 663-0363 • Fax (505) 663-0365

ARSNM Tracking Number: ARSNM-02-0060  
 Client I.D.: 1W  
 Date Sampled: 07/10/02  
 Time Sampled: AM  
 Type of Sample: solid  
 Contact Person: R.Bohn

COC Number:  
 ARSNM Sample I.D.: ARSNM-02-0408  
 Date Received: 07/10/02  
 Time Received: 1025  
 Date of Report: 07/11/02  
 Charge Code: MR0R0001E000

Analysis Description	Analysis Result	Analysis Error $\pm 2 \sigma$	Detection Limit	Analysis Units	Analysis Test Method	Analysis Date & Time	Analysis Technician
Gross Alpha	27.73	11.08	12.25	pCi/g	EPA 900M	07/11/02 0904	bz
Gross Beta	65.86	11.41	17.20	pCi/g	EPA 900M	07/11/02 0904	bz
Gross Gamma	4.97	1.08	2.38	pCi/g	EPA 901.1M	07/11/02 0903	bz

*B. Zelenay*  
 Barbara Zelenay

Cost per sample: 124.09

Notes: American Radiation Services of New Mexico assumes no liability for the use or interpretation of any analytical results provided other than the cost of the performed analysis itself. Reproduction of this report in less than full requires the written consent of the client.



1903 Central Ave. • Los Alamos, New Mexico 87544

(505) 663-0363 • Fax (505) 663-0365

RSNM Tracking Number: ARSNM-02-0060  
 Client I.D.: 2W  
 Date Sampled: 07/10/02  
 Time Sampled: AM  
 Type of Sample: solid  
 Contact Person: R.Bohn

COC Number:  
 ARSNM Sample I.D.: ARSNM-02-0409  
 Date Received: 07/10/02  
 Time Received: 1025  
 Date of Report: 07/11/02  
 Charge Code: MR0R0001E000

Analysis Description	Analysis Result	Analysis Error $\pm 2 \sigma$	Detection Limit	Analysis Units	Analysis Test Method	Analysis Date & Time	Analysis Technician
Gross Alpha	23.92	10.65	12.75	pCi/g	EPA 900M	07/11/02 0904	bz
Gross Beta	63.24	11.52	17.75	pCi/g	EPA 900M	07/11/02 0904	bz
Gross Gamma	4.21	1.07	2.38	pCi/g	EPA 901.1M	07/11/02 0933	bz

*B. Zelenay*  
 Barbara Zelenay

Cost per sample: 124.09

Notes: American Radiation Services of New Mexico assumes no liability for the use or interpretation of any analytical results provided other than the cost of the performed analysis itself. Reproduction of this report in less than full requires the written consent of the client.



1903 Central Ave. • Los Alamos, New Mexico 87544  
 (505) 663-0363 • Fax (505) 663-0365

ARSNM Tracking Number: ARSNM-02-0060  
 Client I.D.: 3W  
 Date Sampled: 07/10/02  
 Time Sampled: AM  
 Type of Sample: solid  
 Contact Person: R.Bohn

COC Number:  
 ARSNM Sample I.D.: ARSNM-02-0410  
 Date Received: 07/10/02  
 Time Received: 1025  
 Date of Report: 07/11/02  
 Charge Code: MR0R0001E000

Analysis Description	Analysis Result	Analysis Error $\pm 2 \sigma$	Detection Limit	Analysis Units	Analysis Test Method	Analysis Date & Time	Analysis Technician
Gross Alpha	19.51	9.66	12.46	pCi/g	EPA 900M	07/11/02 0904	bz
Gross Beta	69.57	11.72	17.44	pCi/g	EPA 900M	07/11/02 0904	bz
Gross Gamma	4.42	1.21	2.70	pCi/g	EPA 901.1M	07/11/02 1003	bz

*B. Zelenay*  
 Barbara Zelenay

Cost per sample: 124.09

Notes: American Radiation Services of New Mexico assumes no liability for the use or interpretation of any analytical results provided other than the cost of the performed analysis itself. Reproduction of this report in less than full requires the written consent of the client.



1903 Central Ave. • Los Alamos, New Mexico 87544

(505) 863-0363 • Fax (505) 663-0365

ARSNM Tracking Number: ARSNM-02-0060  
 Client I.D.: 4W  
 Date Sampled: 07/10/02  
 Time Sampled: AM  
 Type of Sample: solid  
 Contact Person: R.Bohn

COC Number:  
 ARSNM Sample I.D.: ARSNM-02-0411  
 Date Received: 07/10/02  
 Time Received: 1025  
 Date of Report: 07/11/02  
 Charge Code: MR0R0001E000

Analysis Description	Analysis Result	Analysis Error $\pm 2 \sigma$	Detection Limit	Analysis Units	Analysis Test Method	Analysis Date & Time	Analysis Technician
Gross Alpha	35.33	12.31	12.25	pCi/g	EPA 900M	07/11/02 1005	bz
Gross Beta	77.17	12.00	17.20	pCi/g	EPA 900M	07/11/02 1005	bz
Gross Gamma	3.06	1.19	2.70	pCi/g	EPA 901.1M	07/11/02 1035	bz

*B. Zelenay*  
 Barbara Zelenay

Cost per sample: 124.09

Notes: American Radiation Services of New Mexico assumes no liability for the use or interpretation of any analytical results provided other than the cost of the performed analysis itself. Reproduction of this report in less than full requires the written consent of the client.



1903 Central Ave. • Los Alamos, New Mexico 87544

(505) 663-0363 • Fax (505) 663-0365

ARSNM Tracking Number: ARSNM-02-0060  
 Client I.D.: SW  
 Date Sampled: 07/10/02  
 Time Sampled: AM  
 Type of Sample: solid  
 Contact Person: R.Bohn

COC Number:  
 ARSNM Sample I.D.: ARSNM-02-0412  
 Date Received: 07/10/02  
 Time Received: 1025  
 Date of Report: 07/11/02  
 Charge Code: MR0R0001E000

Analysis Description	Analysis Result	Analysis Error $\pm 2 \sigma$	Detection Limit	Analysis Units	Analysis Test Method	Analysis Date & Time	Analysis Technician
Gross Alpha	32.02	11.69	12.08	pCi/g	EPA 900M	07/11/02 1005	bz
Gross Beta	65.59	11.11	16.59	pCi/g	EPA 900M	07/11/02 1005	bz
Gross Gamma	5.33	1.15	2.53	pCi/g	EPA 901.1M	07/11/02 1108	bz

*B. Zelenay*  
 Barbara Zelenay

Cost per sample: 124.09

Notes: American Radiation Services of New Mexico assumes no liability for the use or interpretation of any analytical results provided other than the cost of the performed analysis itself. Reproduction of this report in less than full requires the written consent of the client.



1903 Central Ave. • Los Alamos, New Mexico 87544  
 (505) 663-0363 • Fax (505) 663-0365

ARSNM Tracking Number: ARSNM-02-0060  
 Client I.D.: 6W  
 Date Sampled: 07/10/02  
 Time Sampled: AM  
 Type of Sample: solid  
 Contact Person: R.Bohn

COC Number:  
 ARSNM Sample I.D.: ARSNM-02-0413  
 Date Received: 07/10/02  
 Time Received: 1025  
 Date of Report: 07/11/02  
 Charge Code: MR0R0001E000

Analysis Description	Analysis Result	Analysis Error $\pm 2 \sigma$	Detection Limit	Analysis Units	Analysis Test Method	Analysis Date & Time	Analysis Technician
Gross Alpha	58.28	15.47	12.28	pCi/g	EPA 900M	07/11/02 1005	bz
Gross Beta	88.84	12.56	17.15	pCi/g	EPA 900M	07/11/02 1005	bz
Gross Gamma	5.81	1.15	2.53	pCi/g	EPA 901.1M	07/11/02 1143	bz

*B. Zelenay*  
 Barbara Zelenay

Cost per sample: 124.09

Notes: American Radiation Services of New Mexico assumes no liability for the use or interpretation of any analytical results provided other than the cost of the performed analysis itself. Reproduction of this report in less than full requires the written consent of the client.



1903 Central Ave. • Los Alamos, New Mexico 87544

(505) 663-0363 • Fax (505) 663-0365

### Notes:

#### Comments:

- 1.0) Soil and Sludge analysis are reported on a wet basis or an as received basis unless otherwise indicated.
- 2.0) The data in this report are within the limits of uncertainty specified in the reference method unless specified.
- 3.0) Modified analysis procedures are procedures that are modified to meet the certain specifications. An example may be the use of a water method to analyze a solid matrix due to the lack of an officially recognized procedure for the analysis of the solid matrix.
- 4.0) Derived Air Concentrations and Effluent Release Concentrations are obtained from 10 CFR 20 Appendix B.
- 5.0) Total activity is actually total gamma activity and is determined utilizing the prominent gamma emitters from the naturally occurring radioactive decay chains and other prominent radioactive nuclides. Total activity may be lower than actual total activity due to the extent of secular equilibrium achieved in the various decay chains at the time of analysis. The total activity is not representative of nuclides that emit solely alpha or beta particles.
- 6.0) Ra-228 is determined via secular equilibrium with its daughter, Actinium 228. (Gamma Spectroscopy only).
- 7.0) U-238 is determined via secular equilibrium with its daughter, Thorium 234. (Gamma Spectroscopy only).
- 8.0) All Gamma spectroscopy was performed utilizing high purity germanium detectors (HPGE).

#### Method References:

- 1.0) EPA 600/4-80-032, Prescribed Procedures for the Measurements of Radioactivity in Drinking Water, August 1980.
- 2.0) Standard Methods for the Examination of Water and Waste Water, 18th, 1992.
- 3.0) EPA SW-846, Test Methods for Evaluating Solid Waste, Third Edition, (9/86). (Updated through 1995).
- 4.0) EPA 600/4/79-020, Methods for Chemical Analysis of Water and Waste, March 1983.
- 5.0) HASL 300

#### Definitions:

- |       |                 |  |
|-------|-----------------|--|
| 1.0)  | BDL             | Analyte not detected because the value was below the detection limit.                  |
| 2.0)  | ND              | Not detected above the detection limit.  |
| 3.0)  | Detection Limit | The minimum amount of the analyte that ARS can detect utilizing the specific analysis. |
| 4.0)  | B               | Method Blank   |
| 5.0)  | D               | Method Duplicate   |
| 6.0)  | MS              | Matrix Spike   |
| 7.0)  | S               | Spike  |
| 8.0)  | RS              | Reference Spike  |
| 9.0)  | *SC             | Subcontracted out to another qualified laboratory                                      |
| 10.0) | NR              | Not Referenced   |