Los Alamos
NATIONAL LABORATORY

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

Date: October 5, 1999
In Reply Refer To: ESH-18/WQ&H:99-0395
Mail Stop: K497
Telephone: (505) 667-7969

5/1154/57

HWA LANL

Mr. Roger C. Anderson
Environmental Bureau Chief
Oil Conservation Division
New Mexico Energy, Minerals & Natural Resources Department
2040 South Pacheco Street
Santa Fe, New Mexico 87505

ENTERED

**SUBJECT: MILAGRO PROJECT LAND APPLICATION SITE, POST-APPLICATION SOIL SAMPLING FOR 1999**

Dear Mr. Anderson:

On April 10, 1995, your Division conditionally approved Los Alamos National Laboratory's Notice of Intent to Discharge (NOI) for the land application of water from the Milagro Project's five - million-gallon pond at Fenton Hill. Approval of the NOI was conditioned upon the Laboratory collecting down-gradient soil samples annually for five years following land application activities. The Laboratory has conducted five rounds of soil sampling at the Fenton Hill land application site and down-gradient locations during the following years: (1) 1995, (2) 1996, (3) 1997, (4) 1998, and (5) 1999.

On November 26, 1998, the Laboratory requested a waiver from future sampling for the eleven metals (Ag, Ba, Be, Cd, Cr, Ni, Pb, Sb, Se, Tl, and Hg) which post-application monitoring demonstrated were not contaminants of concern. Arsenic, however, was excluded from the waiver list due to its presence at concentrations greater than background. On April 23, 1998, your Division approved the Laboratory's waiver request. As a result, the post-application samples collected in 1999 was analyzed for arsenic only (See the enclosed map).

Enclosed please find a copy of the analytical report for post-application sampling in 1999. In addition, I have enclosed a table (Table 1.0) which summarizes all analytical results for arsenic since 1995. In 1999, all of the down-gradient surface and sub-surface sampling locations (SS-1, SBS-1, SS-2, SBS-2, SS-3, and SBS-3) continued to show arsenic concentrations equivalent to pre-application or background conditions (See map and Table 1.0). These stable arsenic concentrations indicate that the arsenic is remaining within the application site and is not migrating down-gradient into the watercourse.

In 1999, SS-5, a surface sampling location within the application site, showed a reduction in arsenic concentrations from the 1998 results. SS-4, the other surface sampling location within the application site, showed a slight increase over the 1998 concentration but was below the 1997 concentration. The sub-surface sampling locations within the application site (SBS-4, SBS-5) did not show any change from the four previous sampling rounds.

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The enclosed sample results represent the fifth and final round of monitoring required under the 1995 NOI and completes the Laboratory's current commitment. No additional monitoring at the Fenton Hill land application site is planned by the Laboratory under the 1995 NOI.

If you have any questions regarding the enclosed analytical results, please contact me at 667-7969.

1999
RECEIVED

Sincerely,

Bob Beers
Water Quality and Hydrology Group

BB/rm

Enclosures: a/s

Cy: D. Duffy, Pueblo of Jemez, Jemez, New Mexico, w/enc.
J. Peterson, District Ranger, Santa Fe National Forest, Jemez Springs, New Mexico, w/enc.
J. Davis, NMED SWQB, Santa Fe, New Mexico, w/enc.
J. Bearzi, NMED HRMB, Santa Fe, New Mexico, w/enc.
T. Gunderson, DLD-OPS, w/enc., MS A100
D. Erickson, ESH-DO, w/enc., MS K491
S. Rae, ESH-18, w/enc., MS K497
M. Saladen, ESH-18, w/enc., MS K497
R. Enz, DOE/LAAO, w/enc., MS A316
D. Thomas, P-FM, w/enc., MS D459
C. Hoffman, P-23, w/enc., MS H803
G. Sinnis, P-23, w/enc., MS H803
WQ&H File, w/enc., MS K497
CIC-10, w/enc., MS A150

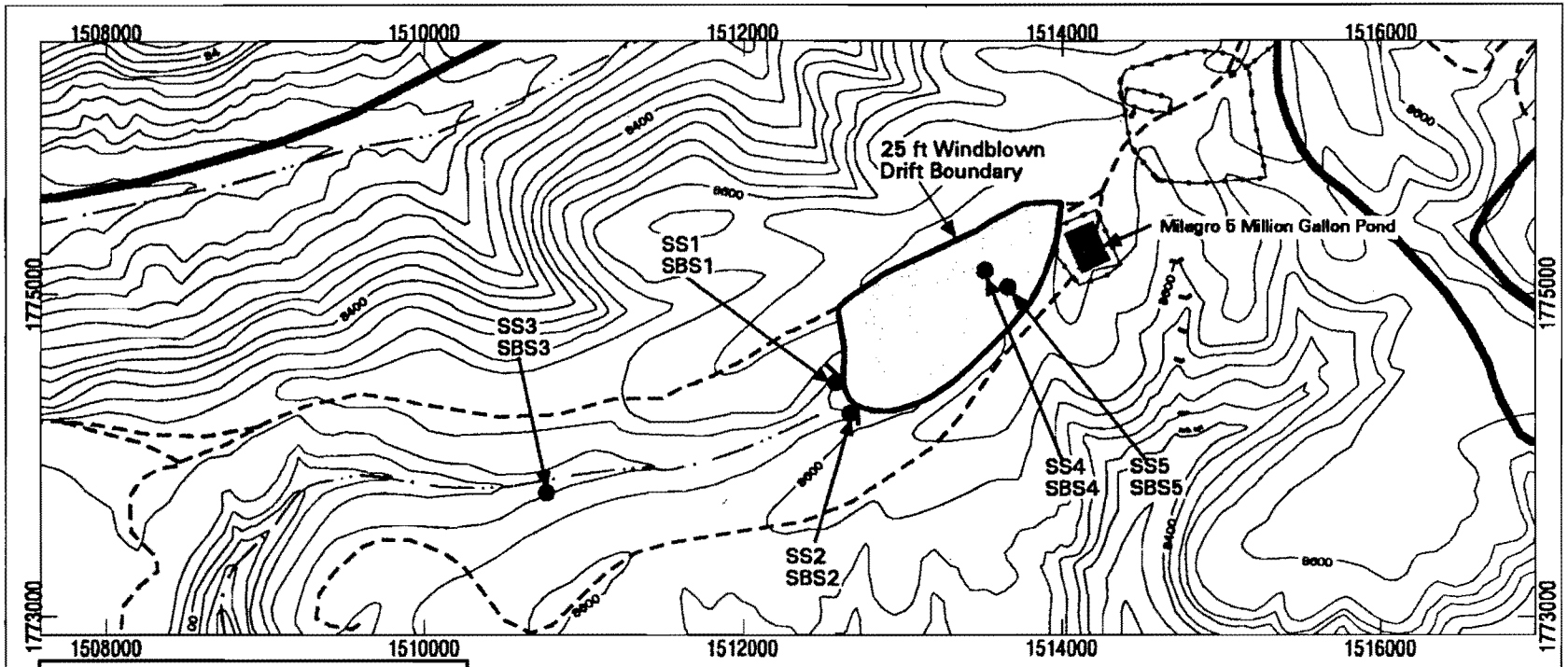
K

Pre- and Post-Land Application Monitoring
Arsenic Concentrations in Soil (ppm)

TABLE 1.

| Sample Location | Pre-Application 5/17/95 | Post-Application 10/24/95 | Post-Application 10/18/96 | Post-Application 10/09/97 | Application 10/14/98 | Application 09/14/99 |
|---|---|---|---|---|---|---|
| SS-1: soil, surface | 3. | 3. | <3. | <3. | <3.0 | <3.0 |
| SBS-1: soil, sub-surface | 1. | 2. | <3. | <3. | <3.0 | <3.0 |
| SS-2: soil, surface | 3. | 3. | <3. | <3. | <3.0 | <3.0 |
| SBS-2: soil, sub-surface | 2. | 3. | <3. | <3. | <3.0 | <3.0 |
| SS-3: soil, surface | 2. | 3. | <3. | <3. | <3.0 | <3.0 |
| SBS-3: soil, sub-surface | 2. | 4. | <3. | <3. | <3.0 | <3.0 |
| SS-4: soil, surface | 3. | 24. | 3.9 | 8.6 | 3.4 | 4.2 |
| SBS-4: soil, sub-surface | 4. | 4. | <3. | <3. | <3.0 | <3.0 |
| SS-5: soil, surface | 2. | 18. | <3. | 10.7* | 4.3 | <3.0 |
| SBS-5: soil, sub-surface | 2. | 3. | <3. | <3. | <3.0 | <3.0 |

* A duplicate sample at this location showed an arsenic concentration of 8.7 ppm.




Fenton Hill (TA-57)
Milagro Project Sampling Plan

- Application Area (22.327 acres)
- Application Area Buffer (25 ft)
- Drainage
- Fence, Industrial
- Road, Dirt
- Road, Paved
- Silt Fence
- Sample Location

Contour Interval: 40 ft

0 500 1000 1500
FEET

## MILAGRO PROJECT SAMPLING PLAN

ANALYTE: Arsenic

| OBJECTIVE | TYPE | LOCATION |
|---|---|---|
| **Post-Application Sampling** | | |
| soil-application area | soil: surface | SS4, SS5 |
| soil-application area | soil: sub-surface | SBS4, SBS5 |
| soil-adjacent down gradient | soil: surface | SS2, SS1 |
| soil-adjacent down gradient | soil: sub-surface | SBS2, SBS1 |
| soil-distant down gradient | soil: surface | SS3 |
| soil-distant down gradient | soil: sub-surface | SBS3 |

EES-5 GIS Team
Los Alamos National Laboratory
Los Alamos, New Mexico

1983 North American Datum
Projection and Grid Ticks:
New Mexico State Plane Coordinate System, Central Zone (Transverse Mercator)

Notice: Information on this map is provisional and has not been checked for accuracy.

Produced by Marcia Jones

FIMAD G107274 17 Dec 98

ASSAIGAI
ANALYTICAL
LABORATORIES, INC.
7300 Jefferson, NE • Albuquerque, New Mexico 87109 • (505) 345-8964 • FAX (505) 345-7259
3332 Wedgewood Dr., Suite N • El Paso, Texas 79925 • (915) 593-6000 • FAX (915) 593-7820
127 Eastgate Drive, 212-C • Los Alamos, New Mexico 87544 • (505) 662-2558

**Explanation of codes**

| | |
|---|---|
| B | *analyte detected in Method Blank* |
| E | *result is estimated* |
| H | *analyzed out of hold time* |
| N | *tentatively identified compound* |
| S | *subcontracted* |
| 1-9 | *see footnote* |

**LOS ALAMOS NATIONAL LABS**
attn: **BOB BEERS**
**PO BOX 1663-MSK497**
**LOS ALAMOS, NM 87545**

***Assaigai Analytical Laboratories, Inc.***

# *Certificate of Analysis*

Client: **LOS ALAMOS NATIONAL LABS**
Project: **9909184 MILAGRO APP 8K23E30300030000**

*William P. Biava: President of Assaigai Analytical Laboratories, Inc.*

Client Sample ID ***SS-5.99*** Sample Matrix ***SOIL*** Sample Collected ***09/14/99 11:30:00***

| QC Group | Run Sequence | CAS # | Analyte | Result | Units | Dilution Factor | Detection Limit | Code | Run Date |
|---|---|---|---|---|---|---|---|---|---|
| **9909184-01A** | | **SW846 3050A/6010A ICP** | | | | | | | |
| M991060 | MW.1999.1109-40 | 7440-38-2 | Arsenic | ND | mg / Kg | 1 | 3 | | 09/23/99 |

Client Sample ID ***SBS-5.99*** Sample Matrix ***SOIL*** Sample Collected ***09/14/99 11:30:00***

| QC Group | Run Sequence | CAS # | Analyte | Result | Units | Dilution Factor | Detection Limit | Code | Run Date |
|---|---|---|---|---|---|---|---|---|---|
| **9909184-02A** | | **SW846 3050A/6010A ICP** | | | | | | | |
| M991060 | MW.1999.1109-43 | 7440-38-2 | Arsenic | ND | mg / Kg | 1 | 3 | | 09/23/99 |

Client Sample ID ***SS-4.99*** Sample Matrix ***SOIL*** Sample Collected ***09/14/99 11:50:00***

| QC Group | Run Sequence | CAS # | Analyte | Result | Units | Dilution Factor | Detection Limit | Code | Run Date |
|---|---|---|---|---|---|---|---|---|---|
| **9909184-03A** | | **SW846 3050A/6010A ICP** | | | | | | | |
| M991060 | MW.1999.1109-44 | 7440-38-2 | Arsenic | 4.2 | mg / Kg | 1 | 3 | | 09/23/99 |



Member:
American Council of
Independent Laboratories, Inc.

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PRODUCT ENDORSEMENT BY ANY ACCREDITATION PROGRAM.

# *Certificate of Analysis*

Client: **LOS ALAMOS NATIONAL LABS**

Project: **9909184 MILAGRO APP 8K23E30300030000**

Client Sample ID ***SBS-4.99*** Sample Matrix ***SOIL*** Sample Collected ***09/14/99 11:50:00***

| QC Group | Run Sequence | CAS # | Analyte | Result | Units | Dilution Factor | Detection Limit | Code | Run Date |
|---|---|---|---|---|---|---|---|---|---|
| **9909184-04A** | | **SW846 3050A/6010A ICP** | | | | | | | |
| M991060 | MW.1999.1109-45 | 7440-38-2 | Arsenic | ND | mg / Kg | 1 | 3 | | 09/23/99 |

Client Sample ID ***SS-2.99*** Sample Matrix ***SOIL*** Sample Collected ***09/14/99 12:23:00***

| QC Group | Run Sequence | CAS # | Analyte | Result | Units | Dilution Factor | Detection Limit | Code | Run Date |
|---|---|---|---|---|---|---|---|---|---|
| **9909184-05A** | | **SW846 3050A/6010A ICP** | | | | | | | |
| M991060 | MW.1999.1109-46 | 7440-38-2 | Arsenic | ND | mg / Kg | 1 | 3 | | 09/23/99 |

Client Sample ID ***SBS-2.99*** Sample Matrix ***SOIL*** Sample Collected ***09/14/99 12:23:00***

| QC Group | Run Sequence | CAS # | Analyte | Result | Units | Dilution Factor | Detection Limit | Code | Run Date |
|---|---|---|---|---|---|---|---|---|---|
| **9909184-06A** | | **SW846 3050A/6010A ICP** | | | | | | | |
| M991060 | MW.1999.1109-49 | 7440-38-2 | Arsenic | ND | mg / Kg | 1 | 3 | | 09/23/99 |

Client Sample ID ***SS-1.99*** Sample Matrix ***SOIL*** Sample Collected ***09/14/99 12:55:00***

| QC Group | Run Sequence | CAS # | Analyte | Result | Units | Dilution Factor | Detection Limit | Code | Run Date |
|---|---|---|---|---|---|---|---|---|---|
| **9909184-07A** | | **SW846 3050A/6010A ICP** | | | | | | | |
| M991060 | MW.1999.1109-50 | 7440-38-2 | Arsenic | ND | mg / Kg | 1 | 3 | | 09/23/99 |

Client Sample ID ***SBS-1.99*** Sample Matrix ***SOIL*** Sample Collected ***09/14/99 12:55:00***

| QC Group | Run Sequence | CAS # | Analyte | Result | Units | Dilution Factor | Detection Limit | Code | Run Date |
|---|---|---|---|---|---|---|---|---|---|
| **9909184-08A** | | **SW846 3050A/6010A ICP** | | | | | | | |
| M991060 | MW.1999.1109-51 | 7440-38-2 | Arsenic | ND | mg / Kg | 1 | 3 | | 09/24/99 |

*Assaigai Analytical Laboratories, Inc.*

# *Certificate of Analysis*

Client: **LOS ALAMOS NATIONAL LABS**

Project: **9909184 MILAGRO APP 8K23E30300030000**

Client Sample ID ***SS-3.99*** Sample Matrix ***SOIL*** Sample Collected ***09/14/99 13:35:00***

| QC Group | Run Sequence | CAS # | Analyte | Result | Units | Dilution Factor | Detection Limit | Code | Run Date |
|---|---|---|---|---|---|---|---|---|---|
| **9909184-09A** | | **SW846 3050A/6010A ICP** | | | | | | | |
| M991060 | MW.1999.1109-52 | 7440-38-2 | Arsenic | ND | mg / Kg | 1 | 3 | | 09/24/99 |

Client Sample ID ***SBS-3.99*** Sample Matrix ***SOIL*** Sample Collected ***09/14/99 13:35:00***

| QC Group | Run Sequence | CAS # | Analyte | Result | Units | Dilution Factor | Detection Limit | Code | Run Date |
|---|---|---|---|---|---|---|---|---|---|
| **9909184-10A** | | **SW846 3050A/6010A ICP** | | | | | | | |
| M991060 | MW.1999.1109-53 | 7440-38-2 | Arsenic | ND | mg / Kg | 1 | 3 | | 09/24/99 |

Client Sample ID ***SS-3.99 DUP*** Sample Matrix ***SOIL*** Sample Collected ***09/14/99 13:35:00***

| QC Group | Run Sequence | CAS # | Analyte | Result | Units | Dilution Factor | Detection Limit | Code | Run Date |
|---|---|---|---|---|---|---|---|---|---|
| **9909184-11A** | | **SW846 3050A/6010A ICP** | | | | | | | |
| M991060 | MW.1999.1109-54 | 7440-38-2 | Arsenic | ND | mg / Kg | 1 | 3 | | 09/24/99 |

Client Sample ID ***SBS-3.99 DUP*** Sample Matrix ***SOIL*** Sample Collected ***09/14/99 13:35:00***

| QC Group | Run Sequence | CAS # | Analyte | Result | Units | Dilution Factor | Detection Limit | Code | Run Date |
|---|---|---|---|---|---|---|---|---|---|
| **9909184-12A** | | **SW846 3050A/6010A ICP** | | | | | | | |
| M991060 | MW.1999.1109-55 | 7440-38-2 | Arsenic | ND | mg / Kg | 1 | 3 | | 09/24/99 |

**** Sample specific Detection Limit is determined by multiplying the sample Dilution Factor by the listed Reporting Detection Limit. ****

**** ND = Not detected: less than the sample specific Detection Limit. Results relate only to the items tested. ****

*Assaigai Analytical Laboratories, Inc.*

# *Quality Control Summary*

| Explanation of codes | |
|---|---|
| D | *Not applicable due to sample dilution* |
| L | *Not applicable due to MDL proximity* |

Client: **LOS ALAMOS NATIONAL LABS**

Project: **9909184** **MILAGRO APP 8K23E30300030000**

QC Type **LCS: Lab Control Spike** QC Matrix **SOLID**

| QC Group | Run Sequence | CAS # | Analyte | Result | Units | Dilution Factor | Detection Limit | Code | Run Date |
|---|---|---|---|---|---|---|---|---|---|
| **M991060-002** | | **SW846 3050A/6010A ICP** | | | | | | | |
| M991060 | MW.1999.1109-38 | 7440-38-2 | Arsenic | 98 | (%) Recov | 1 | NA | | 09/23/99 |

QC Type **LCSD: Lab Control Spike Duplicate Accuracy** QC Matrix **SOLID**

| QC Group | Run Sequence | CAS # | Analyte | Result | Units | Dilution Factor | Detection Limit | Code | Run Date |
|---|---|---|---|---|---|---|---|---|---|
| **M991060-003** | | **SW846 3050A/6010A ICP** | | | | | | | |
| M991060 | MW.1999.1109-39 | 7440-38-2 | Arsenic | 95 | (%) Recov | 1 | NA | | 09/23/99 |

QC Type **LCSD: Lab Control Spike Duplicate Precision** QC Matrix **SOLID**

| QC Group | Run Sequence | CAS # | Analyte | Result | Units | Dilution Factor | Detection Limit | Code | Run Date |
|---|---|---|---|---|---|---|---|---|---|
| **M991060-003** | | **SW846 3050A/6010A ICP** | | | | | | | |
| M991060 | MW.1999.1109-39 | 7440-38-2 | Arsenic | 3 | (%) RPD | 1 | NA | | 09/23/99 |

QC Type **MB: Method Blank** QC Matrix **SOLID**

| QC Group | Run Sequence | CAS # | Analyte | Result | Units | Dilution Factor | Detection Limit | Code | Run Date |
|---|---|---|---|---|---|---|---|---|---|
| **M991060-001** | | **SW846 3050A/6010A ICP** | | | | | | | |
| M991060 | MW.1999.1109-37 | 7440-38-2 | Arsenic | ND | mg / Kg | 1 | 3 | | 09/23/99 |

QC Type **MS: Matrix Spike** QC Matrix **SOLID**

| QC Group | Run Sequence | CAS # | Analyte | Result | Units | Dilution Factor | Detection Limit | Code | Run Date |
|---|---|---|---|---|---|---|---|---|---|
| **M991060-005** | | **SW846 3050A/6010A ICP** | | | | | | | |
| M991060 | MW.1999.1109-41 | 7440-38-2 | Arsenic | 86 | (%) Recov | 1 | NA | | 09/23/99 |

# *Quality Control Summary*

Client: **LOS ALAMOS NATIONAL LABS**

Project: **9909184** **MILAGRO APP 8K23E30300030000**

| Explanation of codes | |
|---|---|
| D | *Not applicable due to sample dilution* |
| L | *Not applicable due to MDL proximity* |

QC Type **MSD: Matrix Spike Duplicate Accuracy** QC Matrix **SOLID**

| QC Group | Run Sequence | CAS # | Analyte | Result | Units | Dilution Factor | Detection Limit | Code | Run Date |
|---|---|---|---|---|---|---|---|---|---|
| **M991060-006** | | **SW846 3050A/6010A ICP** | | | | | | | |
| M991060 | MW.1999.1109-42 | 7440-38-2 | Arsenic | 81 | (%) Recov | 1 | NA | | 09/23/99 |

QC Type **MSD: Matrix Spike Duplicate Precision** QC Matrix **SOLID**

| QC Group | Run Sequence | CAS # | Analyte | Result | Units | Dilution Factor | Detection Limit | Code | Run Date |
|---|---|---|---|---|---|---|---|---|---|
| **M991060-006** | | **SW846 3050A/6010A ICP** | | | | | | | |
| M991060 | MW.1999.1109-42 | 7440-38-2 | Arsenic | 6 | (%) RPD | 1 | NA | | 09/23/99 |

ASSAIGAI ANALYTICAL LABORATORIES, INC.

# Chain of Custody Record

Lab job no.: 9184 Date: 9/14/99

Page 1 of 1

7300 JEFFERSON, N.E.
ALBUQUERQUE, NEW MEXICO 87109
(505) 345-8964

3332 WEDGEWOOD
EL PASO, TEXAS 79925
(915) 593-6000

Client: LANL

Address:

City / State / Zip: Los Alamos, NM

Project Name / Number: Milvero Application Site

Contract / Purchase Order / Quote:

Project Manager / Contact: Bob Beers

Telephone No.: 667-7969

Fax No.: 665-4344

Samplers: (Signature)

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1A | SS-5.99 | 9/14/99 | 11:30 | Soil | 250 mL Plas | | NA | 1 | X | | | | | | | | | |
| 2A | SBS-5.99 | 9/14/99 | 11:30 | Soil | 250 mL Plas | | NA | 1 | X | | | | | | | | | |
| 3A | SS-4.99 | 9/14/99 | 11:50 | Soil | 250 mL Plas | | NA | 1 | X | | | | | | | | | |
| 4A | SBS-4.99 | 9/14/99 | 11:50 | Soil | 250 mL Plas | | NA | 1 | X | | | | | | | | | |
| 5A | SS-2.99 | 9/14/99 | 12:23 | Soil | 250 mL Plas | | NA | 1 | X | | | | | | | | | |
| 6A | SBS-2.99 | 9/14/99 | 12:23 | Soil | 250 mL Plas | | NA | 1 | X | | | | | | | | | |
| 7A | SS-1.99 | 9/14/99 | 12:55 | Soil | 250 mL Plas | | NA | 1 | X | | | | | | | | | |
| 8A | SBS-1.99 | 9/14/99 | 12:55 | Soil | 250 mL Plas | | NA | 1 | X | | | | | | | | | |
| 9A | SS-3.99 | 9/14/99 | 13:35 | Soil | 250 mL Plas | | NA | 1 | X | | | | | | | | | |
| 10A | SBS-3.99 | 9/14/99 | 13:35 | Soil | 250 mL Plas | | NA | 1 | X | | | | | | | | | |
| 11A | SS-3.99 DUP | 9/14/99 | 13:35 | Soil | 250 mL Plas | | NA | 1 | X | | | | | | | | | |
| 12A | SBS-3.99 DUP | 9/14/99 | 13:35 | Soil | 250 mL Plas | | NA | 1 | X | | | | | | | | | |

| Relinquished by: | Date | Received by: | Relinquished by: | Date | Received by: |
|---|---|---|---|---|---|
| Signature: [signature] | 9/15/99 | Signature: [signature] | Signature: [signature] | 9/16/99 | Signature: [signature] |
| Printed: Robert Beers | Time: 1300 | Printed: Elvin J. Chavez | Printed: Elvin J. Chavez | Time: 8:00 am | Printed: [illegible] |
| Company: LANL | | Company: AAA | Company: | | Company: [illegible] |
| Reason: | | Reason: | Reason: | | Reason: [illegible] |

Method of Shipment:

Shipment No.:

Special Instructions:

Comments:

After analysis, samples are to be:

- ☐ Disposed of (additional fee)
- ☐ Stored (30 days max)
- ☐ Stored over 30 days (additional fee)
- ☐ Returned to customer

COURIER