

1-1-2000

Statement of Basis Approval of No Further Action Volume 28 of 30 January 2000, Solid Waste Management Unit 85, Operable Unit 1335, Round 11

Sandia National Laboratories/NM

Follow this and additional works at: https://digitalrepository.unm.edu/snl_complete

Recommended Citation

Sandia National Laboratories/NM. "Statement of Basis Approval of No Further Action Volume 28 of 30 January 2000, Solid Waste Management Unit 85, Operable Unit 1335, Round 11." (2000). https://digitalrepository.unm.edu/snl_complete/52

This Technical Report is brought to you for free and open access by the Sandia National Labs/NM Technical Reports at UNM Digital Repository. It has been accepted for inclusion in Regulatorily Completed by an authorized administrator of UNM Digital Repository. For more information, please contact disc@unm.edu.



Sandia National Laboratories

**Statement of Basis
Approval of No Further Action
Volume 28 of 30**

January 2000

**Solid Waste Management Unit 85
Operable Unit 1335
Round 11**

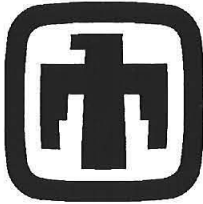
(RCRA Permit No. NM5890110518)

NFA Originally Submitted September 15, 1998 (Chapter 10)
RSI Originally Submitted September 1999

**Environmental
Restoration
Project**



**United States Department of Energy
Albuquerque Operations Office**



Sandia National Laboratories

**Statement of Basis
Approval of No Further Action
Volume 28 of 30**

January 2000

**Solid Waste Management Unit 85
Operable Unit 1335
Round 11**

(RCRA Permit No. NM5890110518)

NFA Originally Submitted September 15, 1998 (Chapter 10)
RSI Originally Submitted September 1999

**Environmental
Restoration
Project**



**United States Department of Energy
Albuquerque Operations Office**



**Statement of Basis
Approval of No Further Action**

January 2000

**Solid Waste Management Unit 85
Operable Unit 1335
Round 11**

NFA Originally Submitted September 15, 1998 (Chapter 10)

10.0 SOLID WASTE MANAGEMENT UNIT 85

10.1 Summary

Solid Waste Management Unit (SWMU) 85, Firing Site (Building 9920), is an active test site where both aboveground and subsurface firing tests and reactor meltdown tests were performed. Constituents of concern (COC) are high explosives (HE) and metals, particularly depleted uranium (DU) and beryllium. A radiological voluntary corrective measure (VCM) was performed on the site, and confirmation samples were collected. Review and analysis of all relevant data for SWMU 85 indicate that average concentrations of COCs at this SWMU are less than (1) Sandia National Laboratories/New Mexico (SNL/NM) or other applicable background limits; or (2) Proposed Subpart S or other action levels; or (3) applicable risk assessment action levels. Thus, SWMU 85 is being proposed for a no further action (NFA) decision based upon confirmatory sampling data demonstrating that COCs that may have been released from this SWMU into the environment pose an acceptable level of risk under current and projected future land uses, per NFA Criterion 5, which states, "The SWMU/AOC [area of concern] has been characterized or remediated in accordance with current applicable state or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use" (NMED March 1998).

10.2 Description and Operational History

Section 10.2 describes SWMU 85 and discusses its operational history.

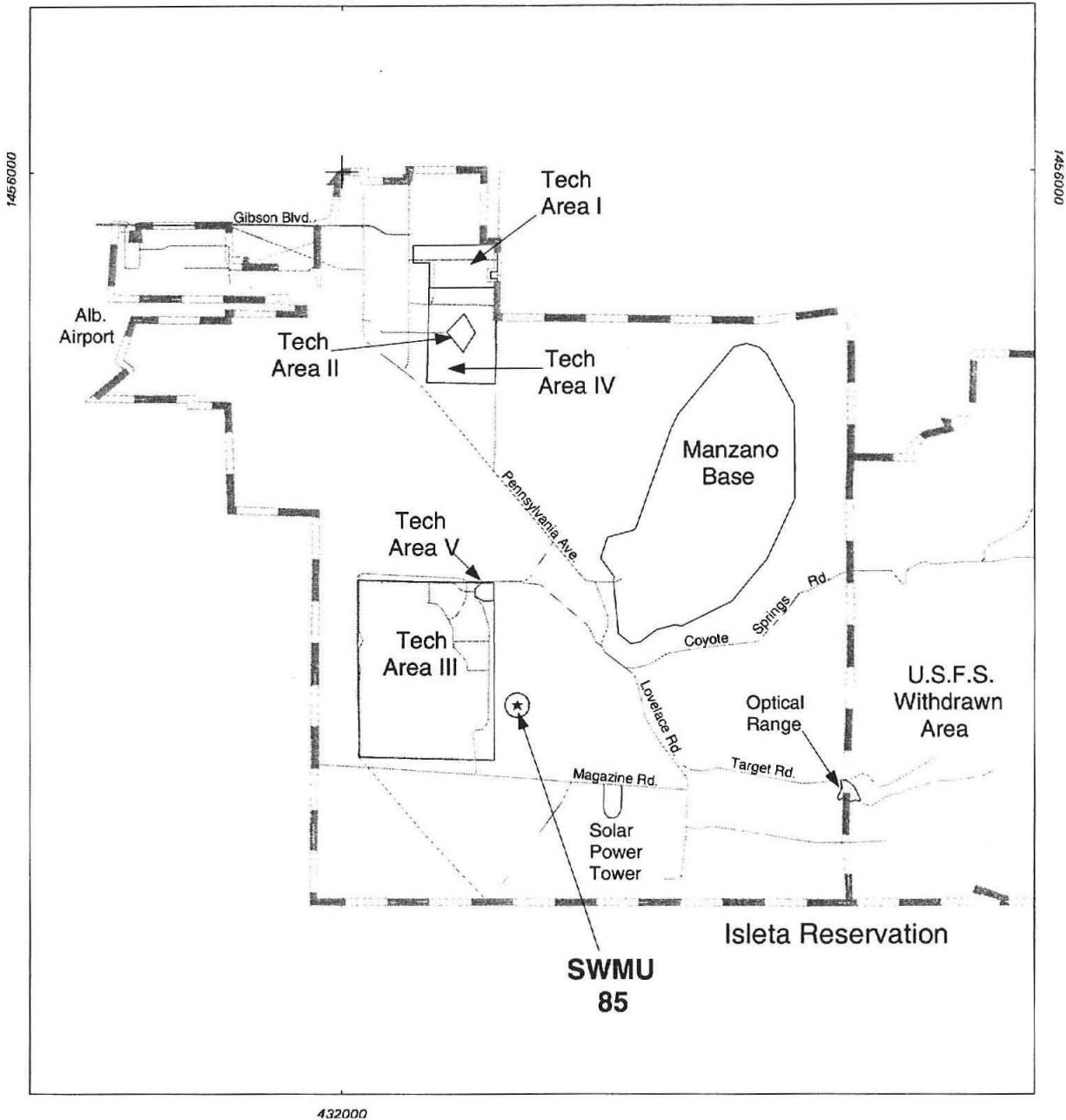
10.2.1 Site Description

SNL/NM Environmental Restoration (ER) SWMU 85, (Figure 10.2.1-1) is located in the Coyote Test Field Area, 1,500 feet east of Technical Area III. The site encompasses four areas in the vicinity of Building 9920. SWMU 85 is on land owned by the U.S. Air Force (USAF), permitted to the U.S. Department of Energy (DOE) and SNL/NM. It is comprised of four firing sites that cover approximately 14.3 acres. The mean elevation of the site is 5,454 feet above sea level (SNL/NM March 1996a). Current and projected land uses for SWMU 85 are industrial.

SWMU 85 lies on the western margin of the Sandia Fault Zone. The geologic material underlying the site consists of thick alluvial sediments that overlie deep bedrock. An alluvial fan and piedmont colluvium overlie the Santa Fe Group Strata. The Santa Fe deposits are estimated to be approximately 3,000 feet thick beneath SWMU 85. The Site-Wide Hydrogeologic Characterization Project (SWHCP) 1994 Annual Report (SNL/NM March 1995) describes the regional geology.

SWHCP soil surveys and surficial mapping provide general soil characteristics for the area around SWMU 85. The dominant soil groups in the area include the Tome very fine sandy loam, and the Tijeras gravely fine, sandy loam. The soils underlying the site are defined as the Tijeras gravely fine sandy loam. The estimated recharge rate for soils in the area range from between 0.002 and 0.071 centimeter (cm) year (yr), which yields downward seepage velocities ranging between 0.03 and 11.8 cm/yr (SNL/NM October 1995).

This page intentionally left blank.



Legend





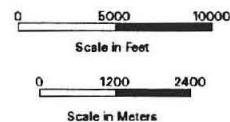
-  SWMU 85
-  Major Road
-  KAFB Boundary
-  Technical Area

Figure 10.2.1-1
Location Map for SWMU 85
Sandia National Laboratories
New Mexico



Sandia National Laboratories, New Mexico
Environmental Geographic Information System

No perennial surface-water bodies are present in the immediate vicinity of SWMU 85. The nearest surface drainage is the ephemeral water course of an unnamed arroyo located approximately 1,000 feet north of Building 9920. SWMU 85 is situated between two tributaries that form this arroyo. The arroyo flows into an internal drainage basin.

SWMU 85 lies in the HR-2 geohydrologic region described in the SWHCP 1994 annual report (SNL/NM March 1995). This region is an intermediate geohydrologic zone between the HR-1 zone to the west and the HR-3 zone to the east. It is comprised of a northeast/southwest-trending fault complex, which includes segments of the Sandia, the Tijeras, and the Hubbell Springs Faults.

The uppermost interval of groundwater saturation in HR-2 will be found as unconfined to semiconfined aquifers in the alluvial facies of the Santa Fe Group and Piedmont alluvium, and as semiconfined to confined aquifers in the local bedrock units. Examples of these two aquifer models are found in two wells located near the site. Monitoring well STW-1, which is 6,100 feet southeast of Building 9926, is screened in the Tertiary Conglomerates. Depth to groundwater in this well is 155 feet below ground surface (bgs). Monitoring well LMF-1 is 6,800 feet southeast of the site. Depth to groundwater in this well is 347 feet bgs. This well is screened in the Abo Sandstone (SNL/NM March 1996b).

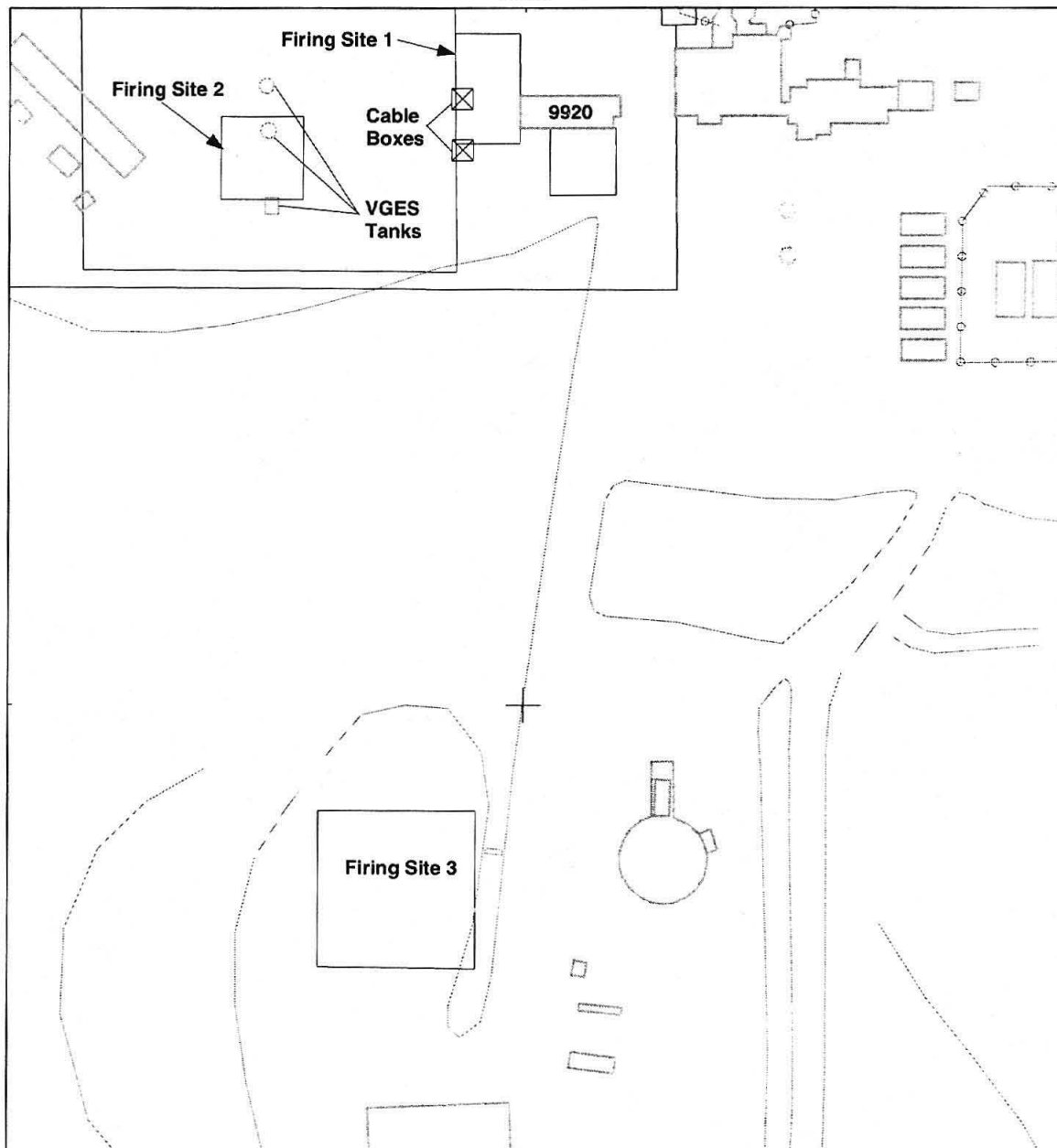
For a detailed discussion of the local setting at SWMU 85, refer to the "RCRA [Resource Conservation and Recovery Act] Facility Investigation [RFI] Work Plan for Operable Unit 1335, Foothills Test Area" (SNL/NM March 1996a).

10.2.2 Operational History

Four firing site/test areas are associated with SWMU 85 (Figures 10.2.2-1 and 10.2.2-2). Explosives were limited to 50 pounds or less during testing. Building 9920 was the control room for the firing sites (Gaither October 1991). Firing Site 1 is located directly west of Building 9920 and is defined by a 20- by 30-foot area adjacent to the building and a smaller 10- by 10-foot area northwest of the building. Firing Site 2 is a series of tanks and pressure vessels, known as the VGES (source of this acronym is unknown) tanks, located about 140 feet west of Building 9920. Firing Site 3 is the former location of an inflatable building. Site 3 was sampled in April 1997, and underwent a risk screening assessment in September 1997, which showed no significant risk (Fate June 1997). Firing Site 4 is the location of the Cable Suspension Facility, which is approximately 1,300 feet northwest of Building 9920.

Firing Site 1 is comprised of six small pits excavated to a depth of 6 to 8 feet (Author [unk] Date [unk], Perkins December 1984, Martz October 1985a). Beryllium disks (approximately 100 grams total) were placed in the pits. When an explosive charge was placed on top of the disks and detonated, the beryllium was propelled downward (Author [unk] Date [unk], Perkins December 1984). It is believed that the pit openings were plugged with concrete before the firing tests were conducted (Martz October 1985b). After each test, the pits were covered with approximately 6 inches of soil and ultimately backfilled (Perkins December 1984, SNL/NM and ITRI April 1988). Locations of these pits were believed to be either between Building 9920 and the two cable run boxes west of the building, or 30 to 50 feet west of the cable run boxes (Author [unk] Date [unk], Young January 1996).

This page intentionally left blank.



Legend







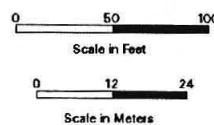
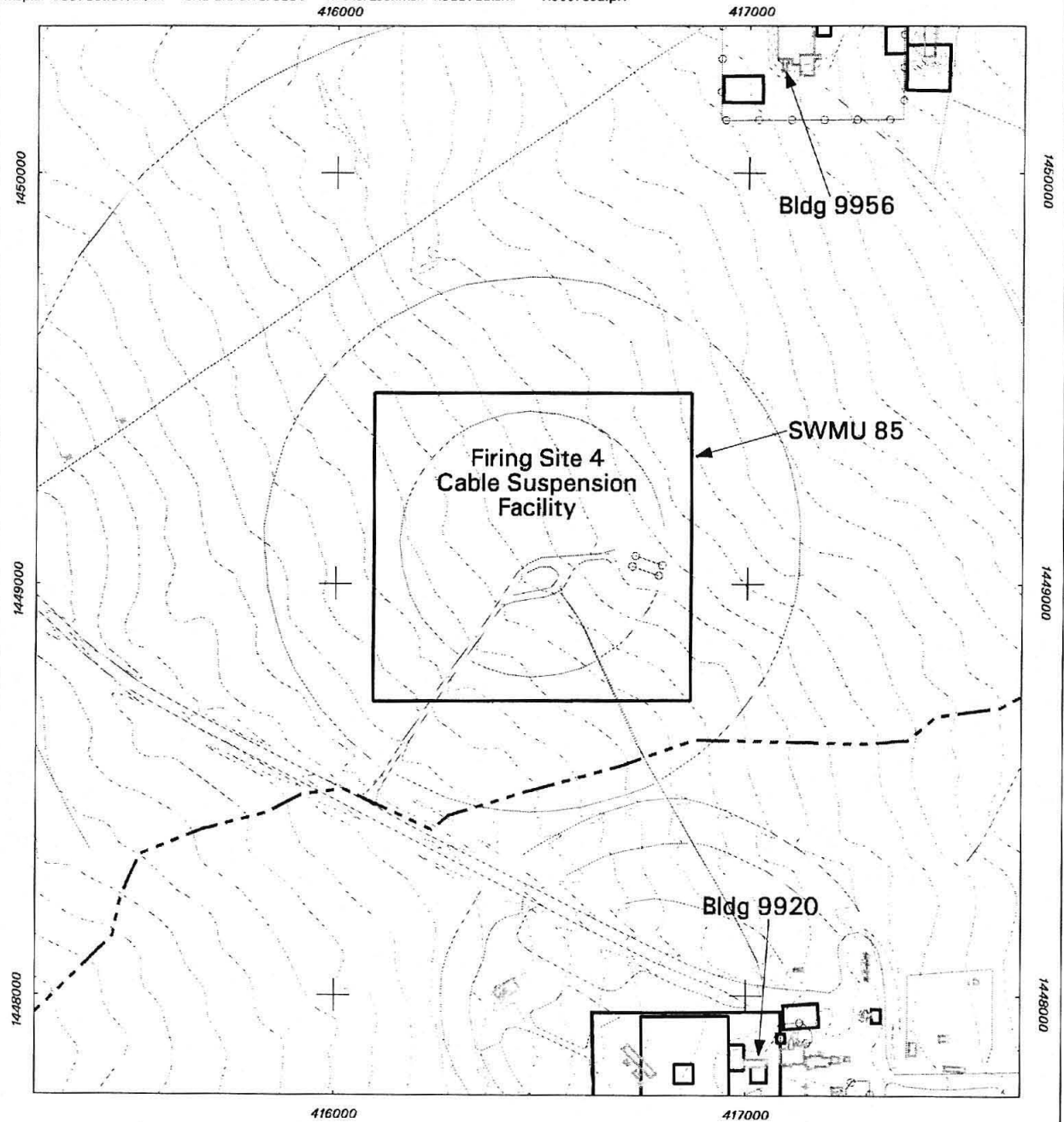
-  Cable Box
-  Road
-  Building/Structure
-  Fence
-  VGES Tank Location
-  SWMU

Figure 10.2.2-1
SWMU 85
Firing Site 1, 2 & 3



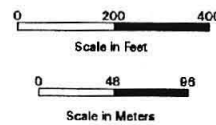
Sandia National Laboratories, New Mexico
Environmental Geographic Information System



Legend

- Road
- 2 Foot Contour
- Drainage
- Fence
- Building
- SWMU Site

Figure 10.2.2-2
SWMU 85
Firing Site 4



Sandia National Laboratories, New Mexico
Environmental Geographic Information System

Firing Site 2 is associated with tests conducted in the late 1970s that involved simulating reactor core meltdown scenarios by submerging molten core material in a large VGES tank containing water and observing the reaction (Perkins December 1984, Martz October 1985a, SNL/NM Date [unk]a, Marshall September 1993). The simulated core material, called corium thermite, was comprised of an alloy of zirconium, nickel oxide, chromium oxide, iron oxide, molybdenum oxide, and about 40 kilograms (kg) of DU (Perkins December 1984, Martz October 1985a, SNL/NM Date [unk]a, Marshall September 1993, Author [unk] Date [unk]). These tests contaminated the soil around the VGES tank with DU (Marshall September 1993). The core material was deposited in the area and the water was pumped onto the ground. The area was later graded.

An aerosol experiment using 100 grams of cesium iodide was also performed in a tank. This tank was vacuumed afterward, and approximately 90 percent of the cesium iodide was recovered (Perkins December 1984).

Dispersion tests were conducted on the surface at either Firing Site 1 or Firing Site 2. These involved blowing up small discs of cadmium sulfide (100 grams total) using 10,000 to 11,000 grams of manganese dioxide per shot. Also tests were performed using lithium hydride shots in an unspecified area (Martz September 1985, Young and Wrightson April 1995). Although the specific locations of these tests are not known, it is believed that they took place in the general areas of Firing Sites 1 and 2.

Firing Site 3 occupies the area known as the "old air building," which was an inflatable building. A series of eight dispersion tests were conducted within the building (Marshall September 1993). Each test involved a charge of 47 to 220 grams of DU powder and 0.5 pound of Composition 4 (0-4) HE. The charge was detonated to study the dispersion of DU while the building trapped the emissions. Plastic sheeting was placed on the unpaved floor of the building to capture the dispersed DU. After the test, aerosolized uranium was allowed to settle onto the plastic, which was then rolled up and disposed of in the Mixed Waste landfill (Marshall September 1993). The inflatable building has since been removed from the site.

The first test program conducted at the Cable Suspension Facility, Firing Site 4, was the SSAGE-2 tests series. This largest firing site at SWMU 85 covers an area of 13.2 acres. A sphere containing approximately 220 grams of DU was detonated using 0.5 pound of C-4 HE. The sphere fragmented into large pieces rather than aerosolizing as planned. Site personnel recovered about 100 of the 220 grams of DU from this test. This was the only DU experiment conducted at this facility (Marshall September 1993). Approximately 50 to 100 pounds of baratol, which contains barium nitrate, were used in some of the tests at this location. The barium oxide from the explosion was dispersed into the area and was deposited on the soil in the vicinity of the test area (Marshall September 1993).

Most recent testing primarily involved shock-wave experiments using air detonations of hydrogen. Methyl acetylene-propene-propadiene gas and bromofluoromethane were also used. These tests were performed in the structure (flame pad) directly west of Firing Site 2. Because the explosives were gases, no residual material remained in the environment. Therefore, the flame pad area was not investigated.

COCs at SWMU 85 include DU, HE, and metals, particularly beryllium.

10.3 Land Use

10.3.1 Current

SWMU 85 is on land owned by the USAF permitted to DOE and SNL/NM. Current land use is industrial, as a firing test site by SNL/NM Organization 6314.

10.3.2 Future/Proposed

SWMU 85 has been recommended for a future land use of industrial (DOE and USAF March 1996).

10.4 Investigatory Activities

SWMU 85 has been characterized and/or remediated in a series of three investigations. Section 10.4 discusses the investigatory activities.

10.4.1 Summary

SWMU 85 was initially investigated under the DOE Comprehensive Environmental Assessment and Response Program (CEARP) in the mid-1980s, which included nonsampling data collection (initial interviews, records search, literature survey, etc.) and a site inspection (Investigation #1). Beginning in 1994 preliminary investigations were conducted that included unexploded ordnance (UXO)/HE, radiological, cultural-resources, sensitive-species, and a geophysical survey (Investigation #2). RFI sampling was performed in 1997 (Investigation #3).

10.4.2 Investigation #1—Comprehensive Environmental Assessment and Response Program

10.4.2.1 Nonsampling Data Collection

SWMU 85 was originally reported in the 1985 CEARP interviews (DOE September 1987). Several firing tests were conducted at locations where approximately 6 kg of beryllium was placed in pits about 6 feet wide, and an explosive charge was detonated in these pits. The material was reportedly never removed but was covered with concrete and marked with stakes; however, the stakes could not be found during the CEARP investigation.

Other tests described in the CEARP include surface firing tests involving small discs containing cadmium sulfide (100 grams total). Other materials reportedly released at SWMU 85 include small quantities of toluene, methanol, isopropyl alcohol, acetone, and inorganic acids that were used for cleaning.

Subsequent to the CEARP inspection, the U.S. Environmental Protection Agency, (EPA) conducted a RCRA Facility Assessment (RFA) (EPA April 1987). SWMU 85 was identified as SWMU 125 in the resulting document, which reiterated the findings of the CEARP Investigation. Conclusions in the RFA were as follows:

- A high potential existed for release to the air, soil, and surface water
- A low potential existed for release to groundwater
- A low potential existed for subsurface gas generation.

10.4.2.2 *Sampling Data Collection*

No samples were collected as part of the CEARP Investigation.

10.4.2.3 *Data Gaps*

No data were available to confirm whether hazardous or radioactive materials or wastes were disposed of or released to the surrounding environment.

10.4.2.4 *Results and Conclusions*

The CEARP findings for SWMU 85 were positive for RCRA-regulated hazardous waste, and the site was assigned a Hazardous Ranking Score of 4.1.

10.4.3 Investigation #2—SNL/ER Preliminary Investigations

10.4.3.1 *Nonsampling Data Collection*

This section describes the nonsampling investigation data collected at SWMU 85.

10.4.3.1.1 *Background Review*

A background review was conducted in order to collect available and relevant information regarding SWMU 85. Background information sources included interviews with SNL/NM staff and contractors familiar with the site's operational history and existing historical site records and reports. The study was documented completely and has provided traceable references that sustain the integrity of the NFA proposal. The following lists the information sources that were used to assist in the evaluation of SWMU 85 and referenced in Section 10.2.2, Operational History of this chapter.

- Field notes from site inspections conducted at the site by SNL/NM ER staff (Gaither September 1991)
- SNL/NM Facilities Engineering building drawings (SNL/NM August 1982, SNL/NM Date [unk]b)
- Seven interviews with nine facility personnel (current and retired) (Young and Wrightson April 1995, Perkins December 1984, Martz September 1985, Martz October 1985a, Martz October 1985b, Author [unk] Date [unk], Young January 1996)

- Memos from personnel describing activities at the SWMU (Marshall September 1993)

10.4.3.1.2 UXO/HE Survey

In February 1994, SNL/NM ER personnel and Kirtland Air Force Base Explosive Ordnance Unit performed a 100-percent coverage UXO survey at SWMU 85 (and SWMU 14). The survey visually inspected for ordnance, HE, and ordnance debris. No ordnance material was found at SWMU 85. (SNL/NM September 1994).

10.4.3.1.3 Radiological Survey(s)

The Phase I survey at SWMU 85 (and SWMU 14) was conducted during March 1994, and encompassed a total of 1.4 acres of flat graded terrain (RUST Geotech Inc. December 1994). An additional survey, conducted at Firing Site 4 in March 1996, covered 13.2 acres (SNL/NM September 1997). A gamma scan survey was performed at 6-foot centers (100-percent coverage) over the surface of the sites. Only one source area of gamma activity at 30 percent or greater than the natural background was identified during this survey. The one area source at SWMU 85 (and SWMU 14) was remediated based upon gamma spectroscopy results from the precleanup samples that showed that the elevated radiation was related to anthropogenic material. Cleanup of the source was completed in July 1995. Two point sources were identified at Firing Site 4, the Cable Suspension Facility. These were removed in June 1996 (SNL/NM September 1997). After removal of radiological contaminated soils, postcleanup (verification) samples were collected from SWMU 85. The samples were collected from areas exhibiting the highest residual gamma readings. Figure 10.4.3-1 shows confirmatory sample locations for the postcleanup samples and Section 10.4.4 discusses results.

10.4.3.1.4 Cultural-Resources Survey

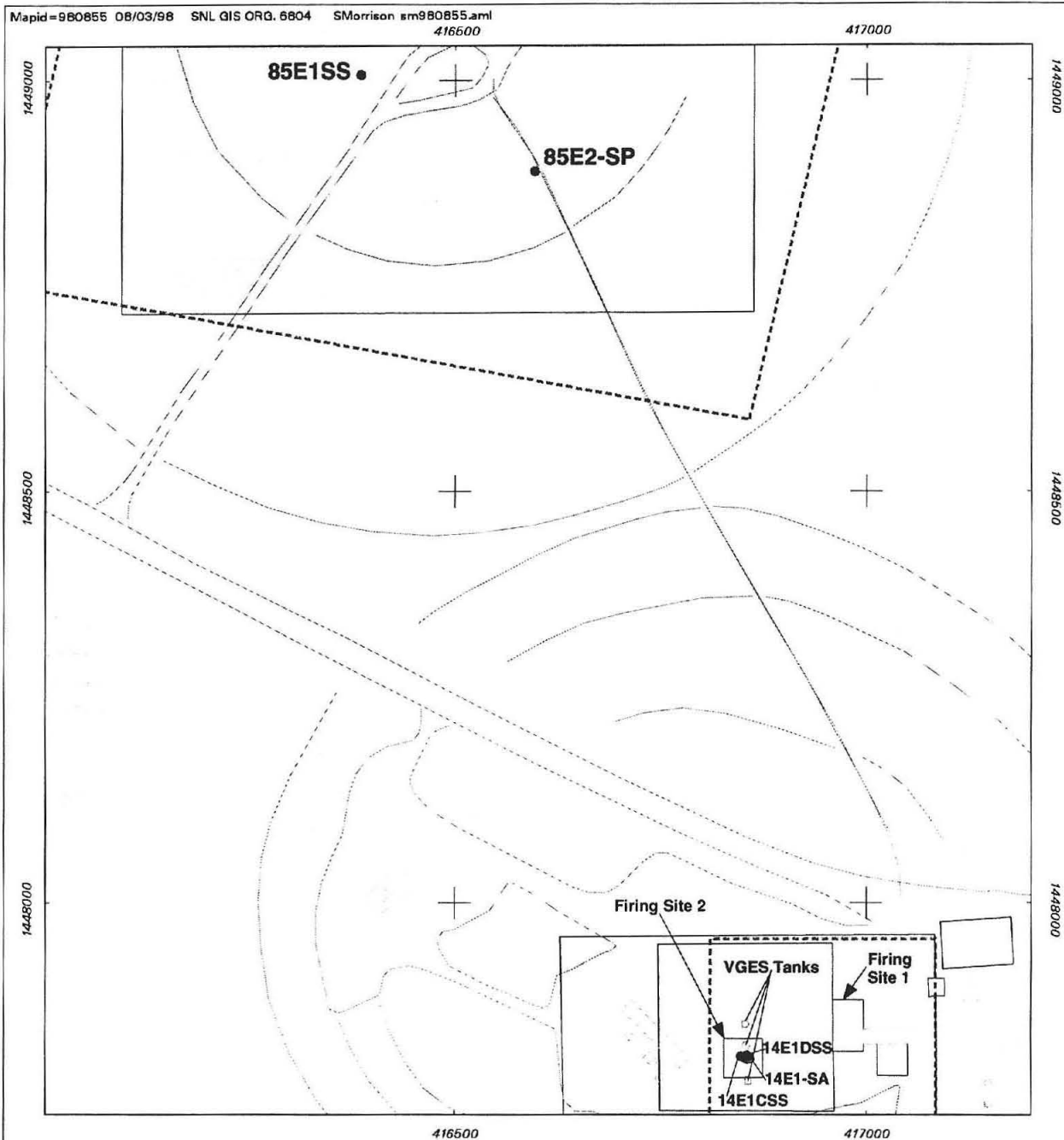
A cultural resources survey of SWMU 85 was conducted in 1994 in support of the environmental assessment of the SNL/NM ER Project (DOE March 1996). No cultural resources were present on the site (Hoagland and Dello-Russo February 1995).

10.4.3.1.5 Sensitive-Species Survey

A sensitive-species survey was performed at SWMU 85 in 1994. Findings from this survey indicate that no sensitive species are present on the site (DOE March 1996).

10.4.3.1.6 Geophysical Survey(s)

On March 5, 1997, MDM/Lamb Inc. conducted a geophysical investigation of SWMU 85 (Hyndman April 1997) at Firing Site 1, to locate potential subsurface test sites. The survey was



Legend

- Point Source Gamma Radiation Anomaly (Elevated relative to site specific background
SP = Soil Point)
- Post-cleanup (Verification) Soil Sample Location (SS = Soil Sample)
- Road
- Building
- Rad Survey Boundary



ER Site 14/85
Burial Site/Firing Site

Area Source Gamma Radiation
Anomaly (Elevated relative to
site specific background,
SA = Soil Area)

0 100 200
Scale in Feet

0 24 48
Scale in Meters
1:2400
1 in = 200'



Figure 10.4.3-1
VCM Radiation Anomalies and
Surface Soil Sampling Locations at SWMU 85

Sandia National Laboratories, New Mexico
Environmental Geographic Information System

conducted using a Geonics EM-61 high-precision locator for metal detection and a Geonics EM-38 ground conductivity meter to delineate changes in the soil characteristics that would indicate disturb soils (burial pits). Figures 10.4.3-2 and 10.4.3-3 show maps of the survey area and significant anomalies. Except for anomalies from underground utilities, no other anomalies were delineated indicating subsurface burial.

10.4.3.2 Sampling Data Collection

From July 28, 1995, through July 31, 1995, five boreholes in Firing Site 1 (BH-1, BH-2, BH-3, BH-4 and BH-5) were sampled at 5-foot intervals to a total depth of 17 feet. Figure 10.4.3-4 shows the locations at which the boreholes were sampled. A total of 20 samples were collected from the boreholes, excluding duplicates. The purpose of this screening sampling effort was to obtain preliminary analytical data to support the ER Project site ranking and prioritization. Other than duplicate samples for offsite laboratory analyses, no quality assurance (QA)/quality control (QC) samples were collected. The soils were analyzed for RCRA metals plus beryllium and nickel (see Table 10.4.3-1); gamma radiation (Table 10.4.3-2); and HE (Table 10.4.3-3). The samples were analyzed at SNL/NM's on-site laboratory, and 10 percent of the replicate samples were sent off site.

Based upon screening sample data there appears to be no gross metal contamination at SWMU 85. Concentrations of silver, nickel, barium, and lead exceeded the approved background levels. The maximum silver levels were detected at 13 milligrams (mg)/kg J (nonquantified background level is <1 mg/kg), arsenic was detected at 4.5 mg/kg (4.4 mg/kg is background level). The maximum nickel concentration was detected at 26 mg/kg (11.5 mg/kg is background), the maximum lead concentration was detected at 110 mg/kg (11.8 mg/kg background). All other metals were either below background levels or were not detected. On-site laboratory detection levels for silver, arsenic, cadmium, and selenium were above background limits or the nonquantified background levels (cadmium, selenium, and silver); however, these metals were not COCs at this site, but because of their detection limits greater than background, they are evaluated in the risk assessment (see Section 10.6).

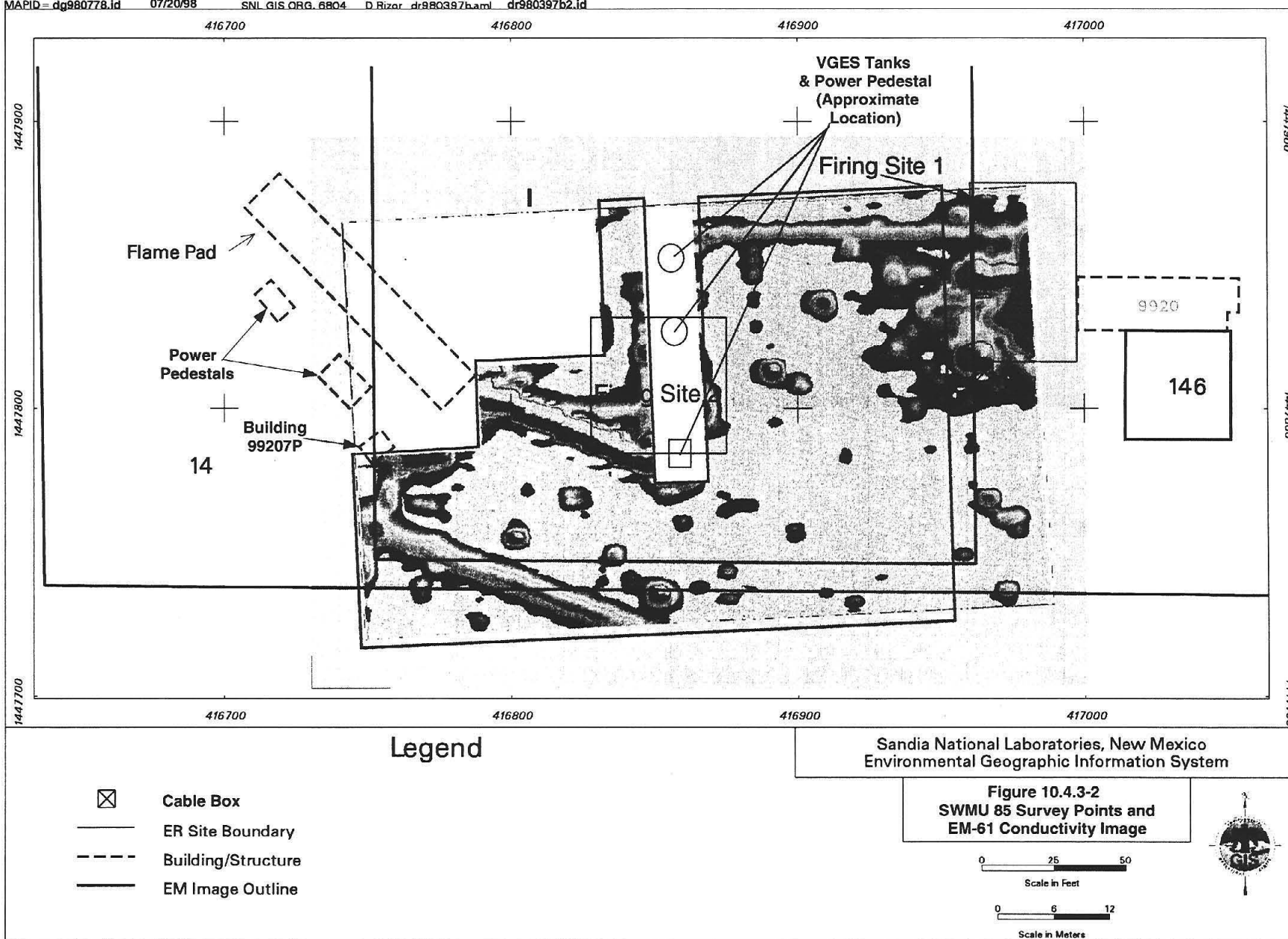
All HE were below detection limits. Because explosives are not naturally occurring, there are no background values for these constituents.

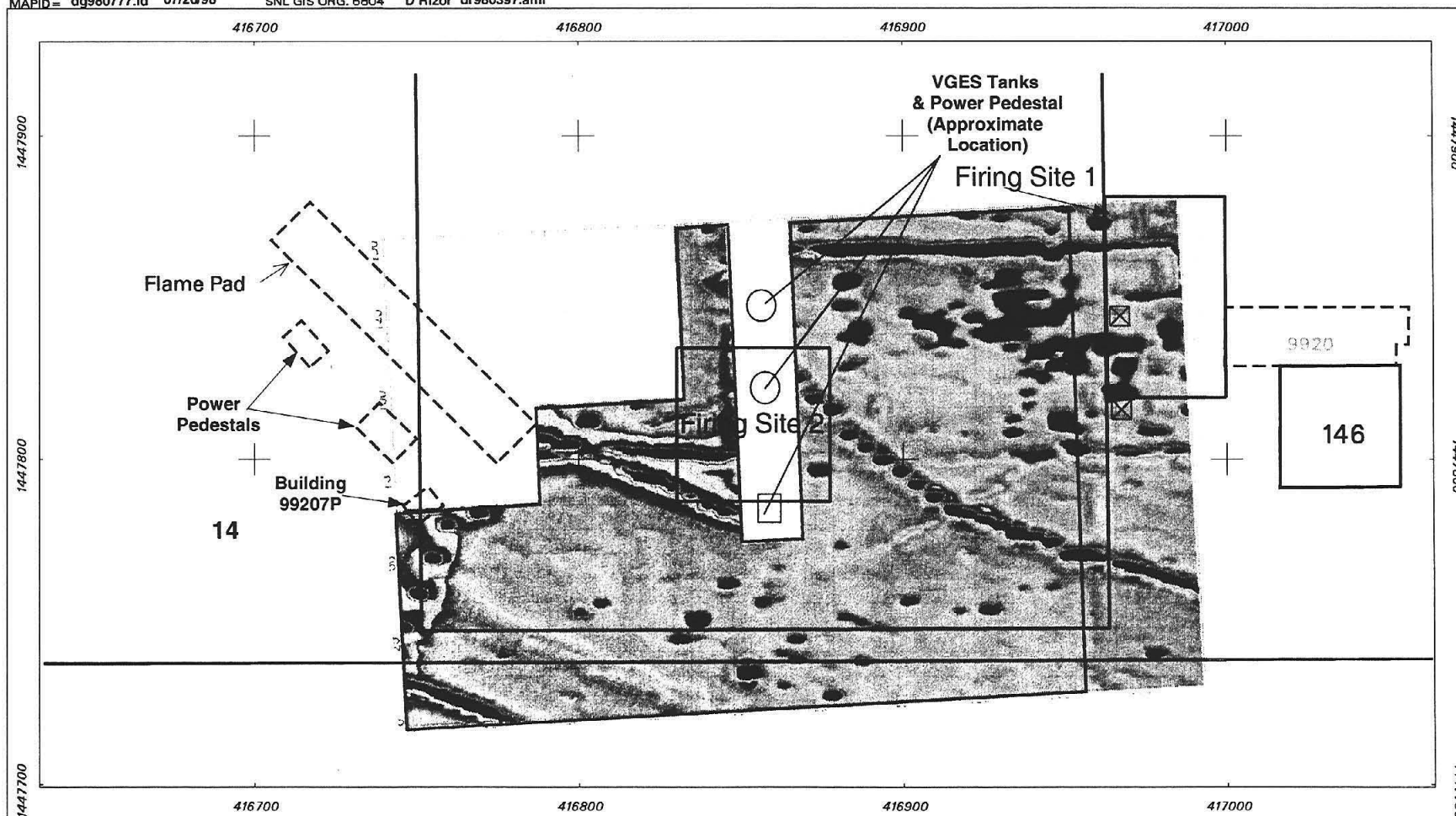
When gamma radiation activities were compared to background for the significant COCs (uranium-238, uranium-235, and cesium-137), all activities were either below background levels or below the minimum detection activities (MDA) for each radionuclide. The MDA for some analytes, however, were above background levels. For thorium-232, all results were either below background or were not detected (i.e., less than MDA) and the MDAs were less than background levels. It appears from these screening results that there is no significant radiological contamination at Firing Site 1 at SWMU 85.

10.4.3.3 Data Gaps





Although the screening samples did not reveal any significant contamination at Firing Site 1, due to budget and time constraints, Firing Sites 2, 3, and 4 were not investigated during this phase. Additional data were needed to determine whether these areas were contaminated or not. Also, the preliminary data collected to date were not of adequate quality to characterize the

This page intentionally left blank.



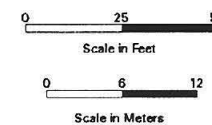


Legend

-  Cable Box
-  ER Site Boundary
-  Building/Structure
-  EM Image Outline

Sandia National Laboratories, New Mexico
Environmental Geographic Information System

Figure 10.4.3-3
SWMU 85 Survey Points and
EM-38 Conductivity Image



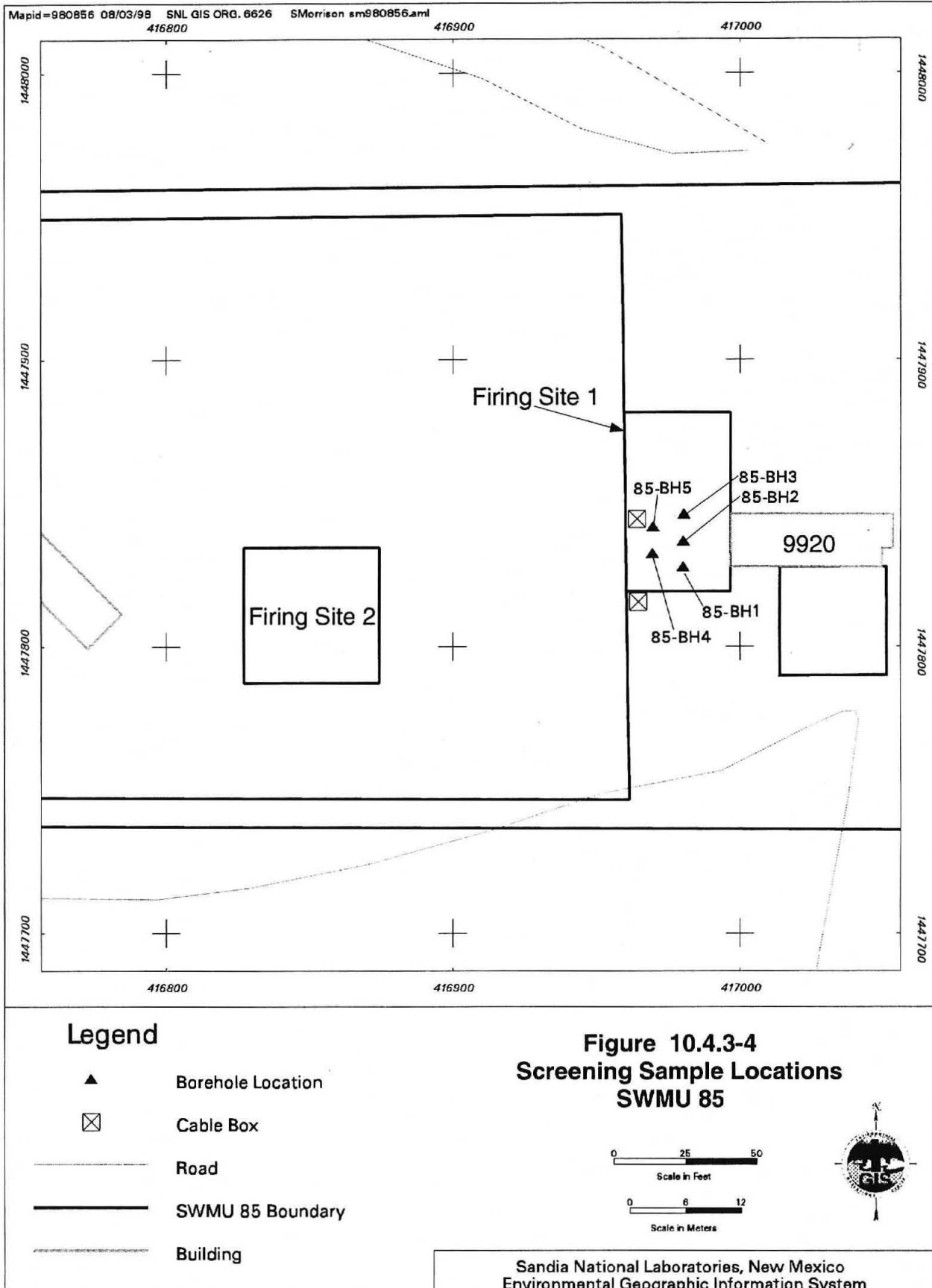


Table 10.4.3-1
Summary of SWMU 85 Screening Soil Sampling Metals Analytical Results, July 1995

Sample Attributes			Metals (EPA 6010/7000) ^a (mg/kg)									
Record Number ^b	ER Sample ID (Figure 10.4.3-4)	Sample Depth (ft)	Arsenic	Barium	Beryllium	Cadmium	Chromium	Lead	Mercury	Nickel	Selenium	Silver
Firing Site 1												
509436	85-BH1-0-S-2	0	ND (50)	67	0.19 J (0.53)	ND (10)	ND (10)	43	ND (0.06)	ND (4.0)	ND (50)	ND (10)
509436	85-BH1-05-S-2	5	ND (50)	110	ND (0.11)	ND (10)	ND (10)	ND (10)	ND (0.06)	ND (4.0)	ND (50)	ND (10)
509436	85-BH1-10-S-2	10	ND (50)	580 ^c	0.17 J (0.53)	ND (10)	ND (10)	ND (10)	ND (0.06)	ND (4.0)	ND (50)	ND (10)
509436	85-BH1-15-S-2	15	ND (50)	81	ND (0.11)	ND (10)	ND (10)	ND (10)	ND (0.06)	ND (4.0)	ND (50)	ND (10)
509442	85-BH2-0-S-2	0	ND (50)	76	ND (0.11)	ND (10)	ND (10)	ND (10)	ND (0.06)	ND (4.0)	ND (50)	ND (10)
3982	85-BH2-0-S-2	0	ND (2.0) ^d	170	ND (1.0) ^d	ND (1.0) ^d	6.6	110	ND (0.10) ^d	ND (8.1) ^d	ND (1.0) ^d	ND (2.0) ^d
509442	85-BH2-05-S-2	5	ND (50)	97	0.22 J (0.53)	ND (10)	ND (10)	ND (10)	ND (0.06)	ND (4.0)	ND (50)	ND (10)
509442	85-BH2-10-S-2	10	ND (50)	77	0.24 J (0.53)	ND (10)	ND (10)	ND (10)	ND (0.06)	ND (4.0)	ND (50)	ND (10)
509442	85-BH2-15-S-2	15	ND (50)	110	0.33 J (0.53)	ND (10)	ND (10)	ND (10)	ND (0.06)	ND (4.0)	ND (50)	ND (10)
509442	85-BH3-0-SD-2	0	ND (50)	74	0.18 J (0.53)	ND (10)	ND (10)	ND (10)	ND (0.06)	ND (4.0)	ND (50)	ND (10)
509442	85-BH3-05-S-2	5	ND (50)	140	ND (0.11)	ND (10)	ND (10)	26 J (38)	ND (0.06)	ND (4.0)	ND (50)	ND (10)
509442	85-BH3-05-SD-2	5	ND (50)	82	ND (0.11)	ND (10)	ND (10)	13 J (38)	ND (0.06)	ND (4.0)	ND (50)	ND (10)
3982	85-BH3-5-S-2	5	4.4	220	ND (1.1)	ND (1.1) ^d	11	25	ND (0.11) ^d	9.5	ND (1.1) ^d	ND (2.3) ^d
509442	85-BH3-10-S-2	10	ND (50)	64	ND (0.11)	ND (10)	ND (10)	ND (10)	ND (0.06)	ND (4.0)	ND (50)	ND (10)
509442	85-BH3-15-S-2	15	ND (50)	210	0.24 J (0.53)	ND (10)	ND (10)	ND (10)	ND (0.06)	ND (4.0)	ND (50)	ND (10)
509442	85-BH4-0-S-2	0	ND (50)	44	ND (0.11)	ND (10)	ND (10)	ND (10)	ND (0.06)	ND (4.0)	ND (50)	ND (10)
509442	85-BH4-05-S-2	5	ND (50)	57	ND (0.11)	ND (10)	ND (10)	ND (10)	ND (0.06)	ND (4.0)	ND (50)	ND (10)
509442	85-BH4-10-S-2	10	ND (50)	65	0.24 J (0.53)	ND (10)	ND (10)	ND (10)	ND (0.06)	ND (4.0)	ND (50)	ND (10)
3982	85-BH4-10-S-2	10	3.2	150	ND (1.1) ^d	ND (1.1) ^d	10	9.0	ND (0.11) ^d	26	ND (1.1) ^d	ND (2.2) ^d
509442	85-BH4-15-S-2	15	ND (50)	35 J (38)	ND (0.11)	ND (10)	ND (10)	ND (10)	ND (0.06)	ND (4.0)	ND (50)	ND (10)
509442	85-BH5-0-S-2	0	ND (50)	74	0.18 J (0.53)	ND (10)	ND (10)	78	ND (0.06)	ND (4.0)	ND (50)	13 J (38)
509442	85-BH5-05-S-2	5	ND (50)	120	ND (0.11)	ND (10)	ND (10)	ND (10)	ND (0.06)	ND (4.0)	ND (50)	ND (10)
509442	85-BH5-10-S-2	10	ND (50)	59	ND (0.11)	ND (10)	ND (10)	ND (10)	ND (0.06)	ND (4.0)	ND (50)	ND (10)
509442	85-BH5-15-S-2	15	ND (50)	110	ND (0.11)	ND (10)	ND (10)	15 J (38)	ND (0.06)	ND (4.0)	ND (50)	ND (10)
509442	85-BH5-15-SD-2	15	ND (50)	76	ND (0.11)	ND (10)	ND (10)	ND (10)	ND (0.06)	ND (4.0)	ND (50)	ND (10)
3982	85-BH5-15-S-2	15	4.5	93	ND (1.1) ^d	ND (1.1) ^d	12	6.6	ND (0.11) ^d	12	ND (1.1) ^d	ND (2.1) ^d
3982	85-BH5-15-SD-2	15	3.1	180	ND (1.1) ^d	ND (1.1) ^d	11	7.5	ND (0.10) ^d	12	ND (1.1) ^d	ND (2.1) ^d

Refer to footnotes at end of table.

Table 10.4.3-1 (Concluded)
Summary of SWMU 85 Screening Soil Sampling Metals Analytical Results, July 1995

Sample Attributes			Metals (EPA 6010/7000) ^a (mg/kg)									
Record Number ^b	ER Sample ID (Figure 10.4.3-4)	Sample Depth (ft)	Arsenic	Barium	Beryllium	Cadmium	Chromium	Lead	Mercury	Nickel	Selenium	Silver
Quality Assurance/Quality Control Sample (in mg/L)												
3982	85-BH5-15-EB-2 (equipment blank)	NA	ND (0.010) ^d	ND (0.20) ^d	ND (0.0050) ^d	ND (0.0050) ^d	ND (0.010) ^d	0.0037	ND (0.00020) ^d	ND (0.040) ^d	ND (0.0050) ^d	ND (0.010) ^d
3982	85-BH5-15-FB-2 (field blank)	NA	ND (0.010) ^d	ND (0.20) ^d	ND (0.0050) ^d	ND (0.0050) ^d	ND (0.010) ^d	ND (0.0030) ^d	ND (0.00020) ^d	ND (0.040) ^d	ND (0.0050) ^d	ND (0.010) ^d
509442	85-BH5-15-EB-2 (equipment blank)	NA	ND (0.50)	ND (0.10)	ND (0.034)	ND (0.10)	ND (0.10)	ND (0.10)	NT	ND (0.04)	ND (0.50)	ND (0.10)
509442	85-BH5-15-FB-2 (field blank)	NA	ND (0.50)	ND (0.10)	ND (0.034)	ND (0.10)	ND (0.10)	ND (0.10)	NT	ND (0.04)	ND (0.50)	ND (0.10)
Approved SNL/NM SWTA Surface/Subsurface Background Soil Concentrations ^e			5.6/4.4	130/214	0.65/0.65	<1/0.9	17.3/15.9	21.4/11.8	<0.25/<0.1	11.5/11.5	<1/<1	<1/<1

^aEPA November 1986.^bAnalysis request/chain of custody record.^cBold indicates those detected values are greater than NMED-approved quantified background values.^d() = not detected above the project reporting limit, shown in parenthesis.^eFrom Dinwiddie September 1997.

BH = Borehole.

EPA = U.S. Environmental Protection Agency.

ER = Environmental Restoration.

ft = Foot (feet).

GR = Grab sample.

ID = Identification.

J () = The reported value is greater than or equal to the MDL but is less than the practical quantitation limit for on-site laboratory analysis or the required detection limit for off-site laboratory analyses, shown in parenthesis.

MDL = Method detection limit.

mg/kg = Milligram(s) per kilogram.

mg/L = Milligram(s) per liter.

NA = Not applicable.

ND () = Not detected above the MDL, shown in parenthesis.

NT = Not tested.

SNL/NM = Sandia National Laboratories/New Mexico.

S = Soil sample.

SD = Soil sample duplicate.

SWTA = Southwest Test Area.

UTL = Upper tolerance limit.

Table 10.4.3-2
Summary of SWMU 85 Screening Soil Sampling Gamma Spectroscopy Analytical Results, July 1995

Sample Attributes			Gamma Spectroscopy Activity (pCi/g)							
Record Number ^a	ER Sample ID (Figure 10.4.3-4)	Sample Depth (ft)	Uranium-238		Thorium-232		Uranium-235		Cesium-137	
			Result	Error ^b	Result	Error ^b	Result	Error ^b	Result	Error ^b
Firing Site 1										
509-4	85-BH1-0-S-1	0	ND (2.51)	--	5.83E-01	2.87E-01	ND (4.75E-01)	--	ND (8.85E-02)	--
509-4	85-BH1-5-S-1	5	ND (2.12)	--	6.03E-01	2.39E-01	ND (4.11E-01)	--	ND (6.30E-02)	--
509-4	85-BH1-10-S-1	10	7.18E-01	1.74E-01	6.14E-01	2.20E-01	ND (4.12E-01)	--	ND (6.57E-02)	--
509-4	85-BH1-15-S-1	15	ND (2.00)	--	4.88E-01	2.01E-01	ND (3.57E-01)	--	ND (5.94E-02)	--
509408	85-BH2-0-S-1	0	ND (6.48)	--	6.07E-01	2.83E-01	ND (4.92E-01)	--	4.27E-02	3.17E-02
3941	85-BH2-0-S-1	0	ND (1.43)	--	5.22E-01	1.61E-01	ND (1.84E-01)	--	ND (3.91E-02)	--
509408	85-BH2-5-S-1	5	ND (4.59)	--	4.47E-01	1.82E-01	ND (3.51E-01)	--	ND (5.25E-02)	--
509408	85-BH2-10-S-1	10	ND (5.23)	--	5.61E-01	2.27E-01	ND (3.62E-01)	--	ND (5.35E-02)	--
509408	85-BH2-15-S-1	15	ND (6.27)	--	9.16E-01	3.54E-01	ND (4.35E-01)	--	ND (6.25E-02)	--
509408	85-BH3-0-S-1	0	ND (5.53)	--	4.36E-01	1.93E-01	ND (3.94E-01)	--	ND (5.93E-02)	--
509408	85-BH3-5-S-1	5	ND (6.24)	--	4.05E-01	2.60E-01	ND (4.35E-01)	--	ND (6.16E-02)	--
509408	85-BH3-5-SD-1	5	ND (6.41)	--	3.35E-01	2.39E-01	ND (4.42E-01)	--	2.21E-02	2.61E-02
3941	85-BH3-5-S-1	5	ND (1.44)	--	6.71E-01	1.69E-01	ND (1.79E-01)	--	2.25E-02	1.47E-02
509408	85-BH3-10-S-1	10	ND (5.55)	--	4.79E-01	2.04E-01	ND (3.98E-01)	--	ND (5.90E-02)	--
509408	85-BH3-15-S-1	15	ND (5.62)	--	7.89E-01	3.26E-01	ND (4.26E-01)	--	ND (5.93E-02)	--
509408	85-BH4-0-S-1	0	ND (5.14)	--	4.88E-01	1.99E-01	ND (3.66E-01)	--	4.67E-02	2.66E-02
509408	85-BH4-5-S-1	5	ND (5.37)	--	5.00E-01	2.11E-01	ND (3.66E-01)	--	ND (5.62E-02)	--
509408	85-BH4-10-S-1	10	ND (5.80)	--	4.97E-01	2.33E-01	ND (4.31E-01)	--	ND (6.58E-02)	--
3941	85-BH4-10-S-1	10	ND (1.55)	--	5.43E-01	1.73E-01	ND (1.92E-01)	--	ND (3.65E-02)	--
509408	85-BH4-15-S-1	15	ND (6.13)	--	6.96E-01	2.33E-01	ND (4.36E-01)	--	ND (6.29E-02)	--
509408	85-BH5-0-S-1	0	ND (6.18)	--	7.15E-01	2.26E-01	ND (4.23E-01)	--	ND (6.99E-02)	--
509408	85-BH5-5-S-1	5	ND (5.09)	--	4.33E-01	1.92E-01	ND (3.64E-01)	--	ND (5.74E-02)	--
509408	85-BH5-10-S-1	10	ND (5.28)	--	5.83E-01	2.87E-01	ND (3.85E-01)	--	ND (6.16E-02)	--
509408	85-BH5-15-S-1	15	ND (6.59)	--	8.45E-01	3.54E-01	ND (5.08E-01)	--	ND (7.84E-02)	--
509408	85-BH5-15-SD-1	15	ND (7.11)	--	6.93E-01	2.85E-01	ND (4.84E-01)	--	ND (7.19E-02)	--
3941	85-BH5-15-S-1	15	6.61E-01	5.72E-01	6.11E-01	1.71E-01	ND (2.17E-01)	--	ND (3.95E-02)	--
3941	85-BH5-15-SD-1	15	ND (1.53)	--	7.18E-01	1.92E-01	ND (1.86E-01)	--	ND (3.68E-02)	--
Quality Assurance/Quality Control Sample (pCi/L)										
3941	85-BH5-15-EB-1 (equipment blank)	NA	ND (6.51E-01)	--	ND (1.07E-01)	--	ND (8.59E-02)	--	ND (1.81E-02)	--
3941	85-BH5-15-FB-1 (field blank)	NA	ND (6.86E-01)	--	ND (1.08E-01)	--	ND (8.77E-02)	--	ND (2.04E-02)	--

Refer to footnotes at end of table.

Table 10.4.3-2 (Concluded)
Summary of SWMU 85 Screening Soil Sampling Gamma Spectroscopy Analytical Results, July 1995

Sample Attributes			Gamma Spectroscopy Activity (pCi/g)							
Record Number ^a	ER Sample ID (Figure 10.4.3-4)	Sample Depth (ft)	Uranium-238		Thorium-232		Uranium-235		Cesium-137	
			Result	Error ^b	Result	Error ^b	Result	Error ^b	Result	Error ^b
509408	85-BH5-15-FB-1 (field blank)	NA	ND (1.56)	--	ND (1.14E-01)	--	ND (1.46E-01)	--	ND (2.18E-02)	--
509408	85-BH5-15-EB-1 (equipment blank)	NA	ND (1.59)	--	ND (1.28E-01)	--	ND (1.48E-01)	--	ND (2.09E-02)	--
Approved SNL/NM SWTA Surface/Subsurface Background Soil Concentrations ^c			1.4/1.4	NA	1.01/1.01	NA	0.16/0.16	NA	0.664/0.079	NA

^aAnalysis request/chain of custody record.

^bTwo standard deviation about the mean detected activity.

^cFrom Dinwiddie September 1997.

BH = Borehole.

ER = Environmental Restoration.

ft = Foot (feet).

ID = Identification.

NA = Not applicable.

ND () = Not detected at or above the minimum detectable activity, shown in parenthesis.

NT = Not tested.

pCi/g = Picocurie(s) per gram.

pCi/L = Picocurie(s) per liter.

S = Soil sample.

SD = Soil sample duplicate.

SNL/NM = Sandia National Laboratories/New Mexico.

SWTA = Southwest Test Area.

UTL = Upper tolerance limit.

-- = Error not calculated for nondetected results.

Table 10.4.3-3
Summary of SWMU 85 Screening Soil Sampling HE Analytical Results, July 1995

Sample Attributes			Explosives, Methods (EPA 8330 ^a) (µg/kg)							
Record Number	ER Sample ID (Figure 10.4.3-4)	Sample Depth (ft)	2,4,6-Trinitrotoluene	2,4-Dinitrotoluene	2,6-Dinitrotoluene	2-Amino, 4,6-dinitrotoluene	4-Amino, 2,6-dinitrotoluene	o-Nitrotoluene (2)	m-Nitrotoluene (3)	p-Nitrotoluene (4)
Firing Site 1										
509439	85-BH1-0-S-3	0	ND (76)	NT	NT	NT	NT	NT	NT	NT
509439	85-BH1-5-S-3	5	ND (76)	NT	NT	NT	NT	NT	NT	NT
509439	85-BH1-10-S-3	10	ND (76)	NT	NT	NT	NT	NT	NT	NT
509439	85-BH1-15-S-3	15	ND (76)	NT	NT	NT	NT	NT	NT	NT
509441	85-BH2-0-S-3	0	ND (76)	NT	NT	NT	NT	NT	NT	NT
3982	85-BH2-0-S-3	0	ND (250) ^c	ND (260) ^c	ND (250) ^c	ND (250) ^c	ND (250) ^c	ND (250) ^c	ND (250) ^c	ND (250) ^c
509441	85-BH2-5-S-3	5	ND (76)	NT	NT	NT	NT	NT	NT	NT
509441	85-BH2-10-S-3	10	ND (76)	NT	NT	NT	NT	NT	NT	NT
509441	85-BH2-15-S-3	15	ND (76)	NT	NT	NT	NT	NT	NT	NT
509441	85-BH3-0-S-3	0	ND (76)	NT	NT	NT	NT	NT	NT	NT
3982	85-BH3-5-S-3	5	ND (280) ^c	ND (290) ^c	ND (280) ^c	ND (280) ^c	ND (280) ^c	ND (280) ^c	ND (280) ^c	ND (280) ^c
509441	85-BH3-5-S-3	5	ND (76)	NT	NT	NT	NT	NT	NT	NT
509441	85-BH3-5-SD-3	5	ND (76)	NT	NT	NT	NT	NT	NT	NT
509441	85-BH3-10-S-3	10	ND (76)	NT	NT	NT	NT	NT	NT	NT
509441	85-BH3-15-S-3	15	ND (76)	NT	NT	NT	NT	NT	NT	NT
509441	85-BH4-0-S-3	0	ND (76)	NT	NT	NT	NT	NT	NT	NT
509441	85-BH4-5-S-3	5	ND (76)	NT	NT	NT	NT	NT	NT	NT
509441	85-BH4-10-S-3	10	ND (76)	NT	NT	NT	NT	NT	NT	NT
3982	85-BH4-10-S-3	10	ND (280) ^c	ND (290) ^c	ND (280) ^c	ND (280) ^c	ND (280) ^c	ND (280) ^c	ND (280) ^c	ND (280) ^c
509441	85-BH4-15-S-3	15	ND (76)	NT	NT	NT	NT	NT	NT	NT
509441	85-BH5-0-S-3	0	ND (76)	NT	NT	NT	NT	NT	NT	NT
509441	85-BH5-5-S-3	5	ND (76)	NT	NT	NT	NT	NT	NT	NT
509441	85-BH5-10-S-3	10	ND (76)	NT	NT	NT	NT	NT	NT	NT
509441	85-BH5-15-S-3	15	ND (76)	NT	NT	NT	NT	NT	NT	NT
509441	85-BH5-15-SD-3	15	ND (76)	NT	NT	NT	NT	NT	NT	NT
3982	85-BH5-15-S-3	15	ND (280) ^c	ND (290) ^c	ND (280) ^c	ND (280) ^c	ND (280) ^c	ND (280) ^c	ND (280) ^c	ND (280) ^c
3982	85-BH5-15-SD-3	15	ND (280) ^c	ND (290) ^c	ND (280) ^c	ND (280) ^c	ND (280) ^c	ND (280) ^c	ND (280) ^c	ND (280) ^c
Quality Assurance/Quality Control Sample (µg/L (water))										
3982	BH5-15-EB-3 (equipment blank)	NA	ND (0.26) ^c H	ND (0.26) ^c H	ND (0.25) ^c H	ND (0.26) ^c H	ND (0.26) ^c H	ND (0.25) ^c H	ND (0.25) ^c H	ND (0.25) ^c H
3982	BH5-15-FB-3 (field blank)	NA	ND (0.26) ^c H	ND (0.26) ^c H	ND (0.25) ^c H	ND (0.26) ^c H	ND (0.26) ^c H	ND (0.25) ^c H	ND (0.25) ^c H	ND (0.25) ^c H
509441	85-BH5-15-EB-3 (equipment blank)	NA	ND (76)	NT	NT	NT	NT	NT	NT	NT
509441	85-BH5-15-FB-3 (field blank)	NA	ND (76)	NT	NT	NT	NT	NT	NT	NT

Refer to footnotes at end of table.

Table 10.4.3-3 (Concluded)
Summary of SWMU 85 Screening Soil Sampling HE Analytical Results, July 1995

Sample Attributes			Explosives, Methods (EPA 8330 ^a) (µg/kg)							
Record Number ^b	ER Sample ID (Figure 10.4.3-4)	Sample Depth (ft)	Nitrobenzene	1,3 Dinitrobenzene	1,3,5 Trinitrobenzene	PETN	NG	RDX	Tetryl	HMX
Firing Site 1										
509439	85-BH1-0-S-3	0	NT	NT	NT	ND (150)	ND (30)	ND (150)	NT	ND (100)
509439	85-BH1-5-S-3	5	NT	NT	NT	ND (150)	ND (30)	ND (150)	NT	ND (100)
509439	85-BH1-10-S-3	10	NT	NT	NT	ND (150)	ND (30)	ND (150)	NT	ND (100)
509439	85-BH1-15-S-3	15	NT	NT	NT	ND (150)	ND (30)	ND (150)	NT	ND (100)
509441	85-BH2-0-S-3	0	NT	NT	NT	ND (150)	ND (30)	ND (150)	NT	ND (100)
3982	85-BH2-0-S-3	0	ND (260) ^c	ND (250) ^c	ND (250) ^c	NT	NT	ND (1000) ^c	ND (650) ^c	ND (2200) ^c
509441	85-BH2-5-S-3	5	NT	NT	NT	ND (150)	ND (30)	ND (150)	NT	ND (100)
509441	85-BH2-10-S-3	10	NT	NT	NT	ND (150)	ND (30)	ND (150)	NT	ND (100)
509441	85-BH2-15-S-3	15	NT	NT	NT	ND (150)	ND (30)	ND (150)	NT	ND (100)
509441	85-BH3-0-S-3	0	NT	NT	NT	ND (150)	ND (30)	ND (150)	NT	ND (100)
3982	85-BH3-5-S-3	5	ND (290) ^c	ND (280) ^c	ND (280) ^c	NT	NT	ND (1100) ^c	ND (720) ^c	ND (2400) ^c
509441	85-BH3-5-S-3	5	NT	NT	NT	ND (150)	ND (30)	ND (150)	NT	ND (100)
509441	85-BH3-5-SD-3	5	NT	NT	NT	ND (150)	ND (30)	ND (150)	NT	ND (100)
509441	85-BH3-10-S-3	10	NT	NT	NT	ND (150)	ND (30)	ND (150)	NT	ND (100)
509441	85-BH3-15-S-3	15	NT	NT	NT	ND (150)	ND (30)	ND (150)	NT	ND (100)
509441	85-BH4-0-S-3	0	NT	NT	NT	ND (150)	ND (30)	ND (150)	NT	ND (100)
509441	85-BH4-5-S-3	5	NT	NT	NT	ND (150)	ND (30)	ND (150)	NT	ND (100)
509441	85-BH4-10-S-3	10	NT	NT	NT	ND (150)	ND (30)	ND (150)	NT	ND (100)
3982	85-BH4-10-S-3	10	ND (290) ^c	ND (280) ^c	ND (280) ^c	NT	NT	ND (1100) ^c	ND (720) ^c	ND (2,400) ^c
509441	85-BH4-15-S-3	15	NT	NT	NT	ND (150)	ND (30)	ND (150)	NT	ND (100)
509441	85-BH5-0-S-3	0	NT	NT	NT	ND (150)	ND (30)	ND (150)	NT	ND (100)
509441	85-BH5-5-S-3	5	NT	NT	NT	ND (150)	ND (30)	ND (150)	NT	ND (100)
509441	85-BH5-10-S-3	10	NT	NT	NT	ND (150)	ND (30)	ND (150)	NT	ND (100)
509441	85-BH5-15-S-3	15	NT	NT	NT	ND (150)	ND (30)	ND (150)	NT	ND (100)
509441	85-BH5-15-SD-3	15	NT	NT	NT	ND (150)	ND (30)	ND (150)	NT	ND (100)
3982	85-BH5-15-S-3	15	ND (290) ^c	ND (280) ^c	ND (280) ^c	NT	NT	ND (1100) ^c	ND (720) ^c	ND (2400) ^c
3982	85-BH5-15-SD-3	15	ND (290) ^c	ND (280) ^c	ND (280) ^c	NT	NT	ND (1100) ^c	ND (720) ^c	ND (2400) ^c
Quality Assurance/Quality Control Sample (µg/L [water])										
3982	BH5-15-EB-3 (equipment blank)	NA	ND (0.50) ^c H	ND (0.30) ^c H	ND (0.45) ^c H	NT	NT	ND (0.85) ^c H	ND (1.0) ^c H	ND (1.0) ^c H
3982	BH5-15-FB-3 (field blank)	NA	ND (0.50) ^c H	ND (0.30) ^c H	ND (0.45) ^c H	NT	NT	ND (0.85) ^c H	ND (1.0) ^c H	ND (1.0) ^c H
509441	85-BH5-15-EB-3 (equipment blank)	NA	NT	NT	NT	ND (150)	ND (30)	ND (150)	NT	ND (100)
509441	85-BH5-15-FB-3 (field blank)	NA	NT	NT	NT	ND (150)	ND (30)	ND (150)	NT	ND (100)

^aEPA November 1986.^bAnalysis request/chain of custody record.^cNot detected above the practical quantitation limit, shown in parenthesis.

BH = Borehole.

EPA = U.S. Environmental Protection Agency.

ER = Environmental Restoration.

ft = Foot (feet).

H = Holding time was exceeded.

HMX = 1,3,5,7-tetranitro-1,3,5,7-tetrazacyclooctane.

ID = Identification.

µg/kg = Microgram(s) per kilogram.

µg/L = Microgram(s) per liter.

NA = Not applicable.

ND () = Not detected above the method detection limit, shown in parenthesis.

NT = Not tested.

NG = Nitroglycerin.

PETN = 1,3-dinitrato-2,2-bis(nitratomethyl) propane.

RDX = 1,3,5-trinitro-1,3,5-triazacyclohexane.

S = Soil sample.

SD = Soil sample duplicate.

TETRYL = 2,4,6-trinitrophenylmethylnitramine.

site fully. In some cases, the detection limits exceeded background levels. For these reasons, additional sampling was required to characterize the site fully.

10.4.3.4 Results and Conclusions

Preliminary investigations at SWMU 85 revealed no geophysical anomalies other than buried utility lines, and no significant contamination was detected in the screening activities.

10.4.4 Investigation #3—SNL/NM SWMU RFI Sampling

Initially, the RFI sampling plan called for collecting 20 random surface samples and a total of 10 subsurface samples from five boreholes west of the cable run boxes, if geophysics indicated subsurface anomalies. Based upon subsequent discussions with the New Mexico Environment Department (NMED), it was agreed to install two boreholes (BH-6 and BH-7) west of the cable run boxes, and one borehole (BH-8) immediately to the north of Firing Site 1 (SNL/NM June 1997). Additionally, 25 surface soil samples were collected from Firing Sites 1, 2, and 4. The sampling procedures and results are discussed in detail in the following sections.

10.4.4.1 Nonsampling Data Collection

Except for the geophysical survey discussed above, no additional nonsampling activities were implemented. However, SNL/NM conducted a survey on May 15, 1997, and on June 16, 1997, to confirm the presence and location of underground utilities detected in the geophysical survey.

10.4.4.2 Sampling Data Collection

10.4.4.2.1 Voluntary Corrective Measure Activities

Except for the radiological VCM activities performed by RUST-Geotech Inc. (Section 10.4.3.1.3), no VCM activities were conducted at SWMU 85.

10.4.4.2.2 Confirmatory Sampling

To determine whether any contamination existed at Firing Sites 2, 3, and 4, and to further characterize Firing Site 1, twenty-five surface samples were collected from the 0- to 6-inch depth, and nine subsurface samples were collected from three boreholes using the Geoprobe sampler at depths of 5 to 7, 10 to 12, and 15 to 17 feet, from September through October 1997. The samples were collected according to the procedures described in the SWMU 85 sampling plan (SNL/NM February 1996) bullets of understanding, June 11, 1997. In addition to the sample locations described in the SAP, three more surface samples were collected at Firing Site 4 in an area of discolored soils (Samples 85-4-GR-026, 85-4-GR-027, and 85-4-GR-028, four surface samples collected around the VGES tank at Firing Site 2 (85-1-GR-029, 85-1-GR-030, 85-1-GR-031, and 85-1-GR-032). All samples were collected using an approved SNL/NM field operating procedure. SNL/NM Department 7713 (Radiation Protection Sample Diagnostics Laboratory) analyzed all samples on site for gamma-emitting radionuclides using gamma spectroscopy (Annex 10-A). Chemical analyses (HE and RCRA metals plus nickel and

beryllium) were performed by Lockheed Analytical Services of Las Vegas, Nevada, and General Engineering Laboratories of Charleston, South Carolina, at Level III data quality. Level III data are definitive data (including matrix spikes (MS), matrix spike duplicates (MSD), laboratory control samples (LCS), and laboratory control sample duplicates (LCSD) appropriate for site characterization. RCRA metals were analyzed using EPA Method 6010/7000 (EPA November 1986). HE were analyzed using EPA Method 8330 (EPA November 1986). Level III data were validated (Annex 10-B) as set forth by SNL/NM Technical Operating Procedure 94-03 (SNL/NM July 1994). Figures 10.4.4-1, 10.4.4-2, and 10.4.4-3 show sample locations. Tables 10.4.4-1, 10.4.4-2, 10.4.4-3, and 10.4.4-4 show results.

10.4.4.3 Data Gaps

Because no data were available to prove or refute unequivocally the presence of contamination at SWMU 85, the sampling plan was designed to determine whether the COCs were present, and if they were, the extent of the contamination.

10.4.4.4 Results and Conclusions

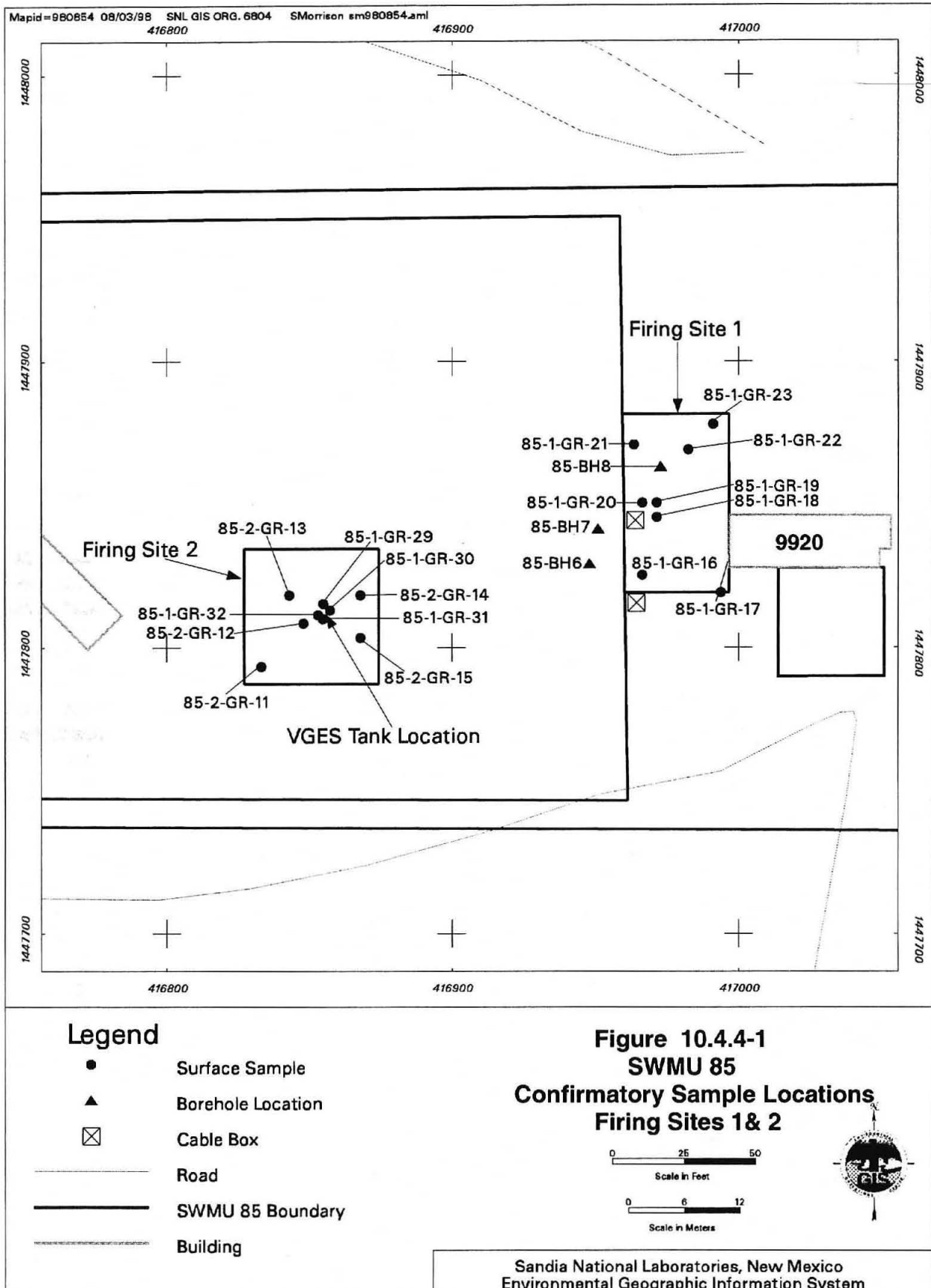
Metals

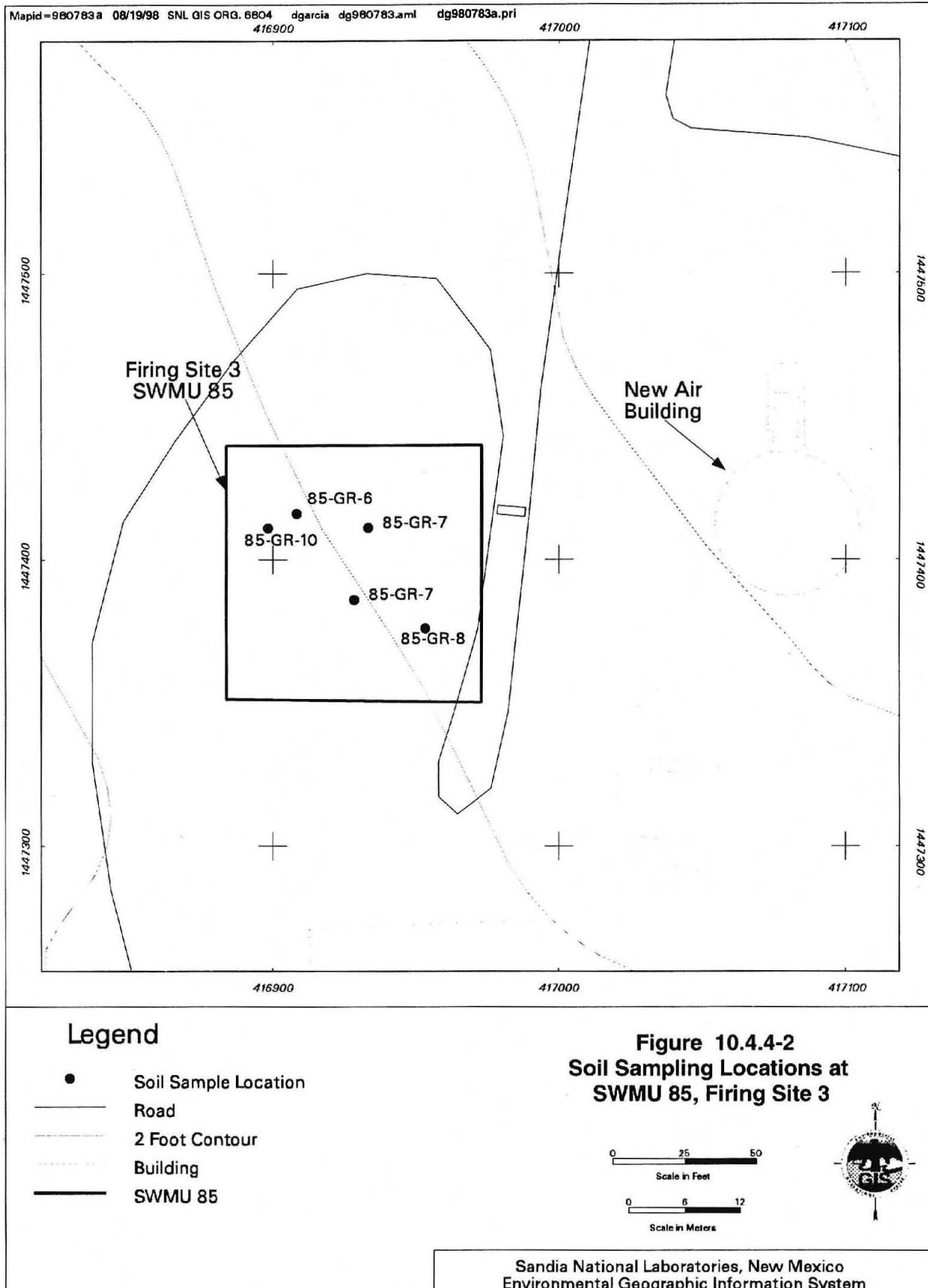
Five metals (beryllium, cadmium, selenium, mercury and silver) were below the approved background limits (beryllium) or the nonquantified background values (cadmium, selenium, mercury, and silver) established for the subsurface soils in the Southwest Test Area (SWTA). However, the maximum detection limit for mercury (0.11 mg/kg), slightly exceeded the unquantified background value of <0.1 mg/kg.

All subsurface concentrations for chromium and lead were either not detected or were below background. Some concentrations of chromium and lead in surface soils exceeded background. Only one chromium sample, at 23 mg/kg, exceeded the background level of 17.3 mg/kg. Eight surface samples exceeded the approved background value of 21.4 mg/kg for lead. The maximum concentration for lead detected in the confirmatory samples was 380 mg/kg.

Arsenic and nickel were both below approved background limits in surface soils. In subsurface soils, each COC exceeded background limits in only one sample. The arsenic concentration in the subsurface soils was 4.6 mg/kg (background is 4.4 mg/kg) and the maximum nickel concentration was 38 mg/kg (background is 11.5 mg/kg).

Barium was present above background limits in both surface and subsurface soils. Eight surface soil samples were above approved the approved background limits of 130 mg/kg. The maximum barium value in surface soils was 400 mg/kg. Seven of the samples were from Firing Site 1 and one sample was from Firing Site 4. The barium concentration for one subsurface sample (85-BH-008-5.0-S) was 370 mg/kg (background is 214 mg/kg).





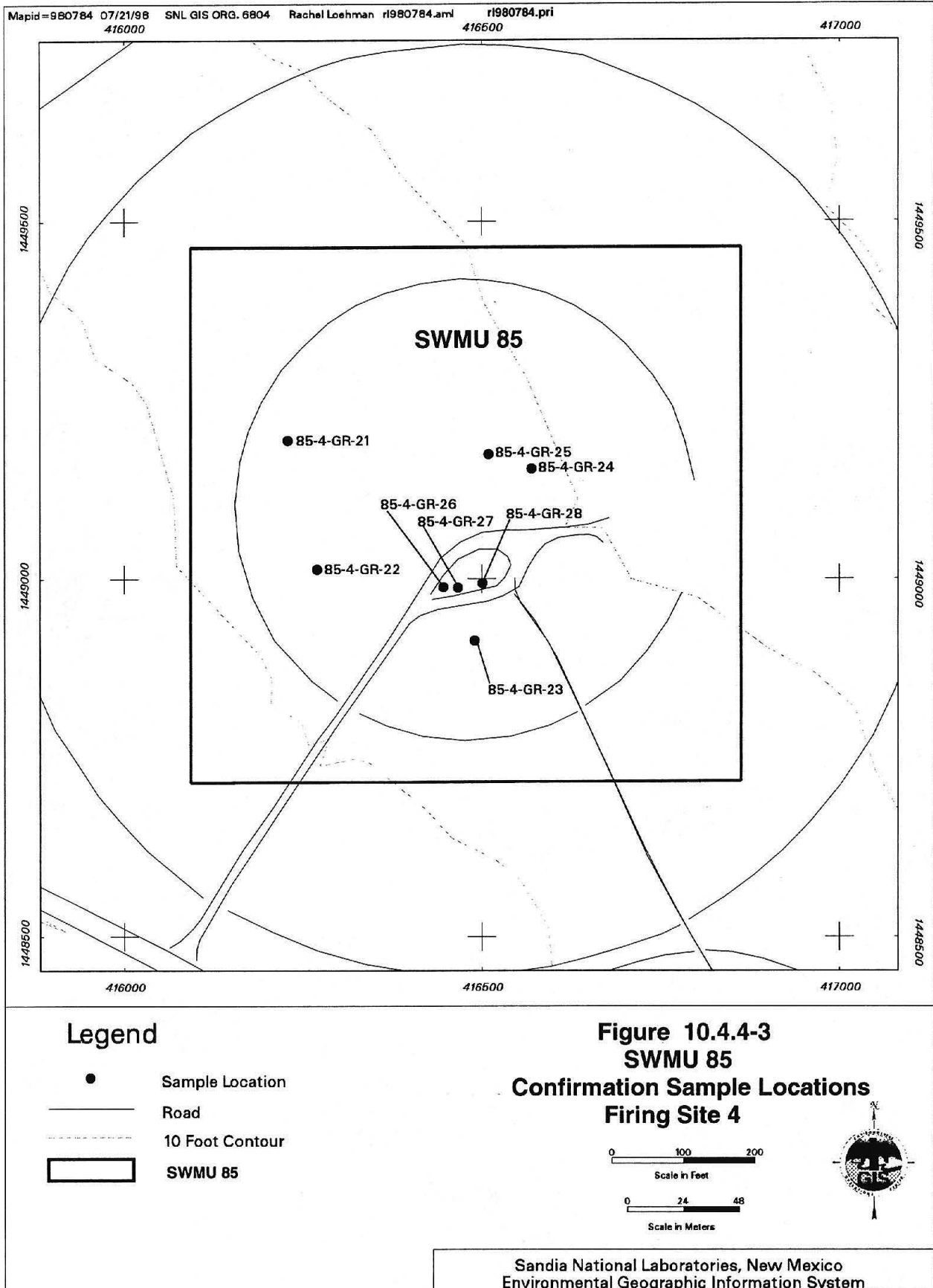


Table 10.4.4-1
Summary of SWMU 85 Confirmatory Soil Sampling Metals Analytical Results, April—October 1997

Sample Attributes			Metals (EPA 6010/7000) ^a (mg/kg)									
Record Number	ER Sample ID (Figures 10.4.4-1, 10.4.4-2, and 10.4.4-3)	Sample Depth (ft)	Arsenic	Barium	Beryllium	Cadmium	Chromium	Lead	Mercury	Nickel	Selenium	Silver
Firing Site 1												
6354	85-BH-006-0.0-S	0	2.7	260 ^c	0.43 J (0.52)	0.16 J (0.52)	7.4	51	ND (0.10)	7.2	0.47 J (0.52)	0.12 J (1.0)
6354	85-BH-006-0.0-SD	0	2.3	290	0.44 J (0.52)	0.16 J (0.52)	9.0	50	ND (0.099)	7.4	0.53	0.12 J (1.0)
6354	85-BH-006-5.0-S	5	2.6	120	0.35 J (0.52)	ND (0.11)	7.9	6.9	ND (0.11)	38	ND (0.32)	ND (0.11)
6354	85-BH-006-10.0-S	10	4.6	110	0.47 J (0.53)	ND (0.11)	9.2	6.0	ND (0.11)	7.9	ND (0.32)	ND (0.11)
6354	85-BH-006-15.0-S	15	3.5	200	0.51 J (0.54)	ND (0.11)	10	6.7	ND (0.11)	10	0.34 J (0.54)	ND (0.11)
6354	85-BH-007-0.0-S	0	2.5	230	0.45 J (0.52)	0.10 J (0.52)	9.4 J	16	ND (0.10)	6.8	0.41 J (0.54)	ND (0.10)
6354	85-BH-007-0.0-SD	0	1.8	160	0.33 J (0.52)	0.12 J (0.52)	6.2 J	12	ND (0.10)	6.6	ND (0.31)	ND (0.10)
6354	85-BH-007-5.0-S	5	2.7	120	0.40 J (0.53)	ND (0.11)	7.0 J	4.6	ND (0.10)	6.6	ND (0.32)	ND (0.11)
6354	85-BH-007-10.0-S	10	3.6	59	0.43 J (0.53)	ND (0.11)	9.6 J	6.2	ND (0.11)	7.8	ND (0.32)	ND (0.11)
6354	85-BH-007-15-S	15	3.2	170	0.45 J (0.54)	ND (0.11)	9.2 J	6.5	ND (0.11)	9.2	ND (0.32)	ND (0.11)
6354	85-BH-008-0.0-S	0	2.2	74	0.43 J (0.53)	ND (0.11)	23 J	9.3	ND (0.11)	7.3	0.51 J (0.53)	ND (0.11)
6354	85-BH-008-0.0-SD	0	2.6	79	0.42 J (0.53)	0.12 J (0.53)	8.3 J	8.8	ND (0.11)	6.7	ND (0.32)	ND (0.11)
6354	85-BH-008-5.0-S	5	3.5	370	0.47 J (0.53)	0.11 J (0.53)	12 J	6.0	ND (0.11)	8.7	ND (0.32)	ND (0.11)
6354	85-BH-008-10.0-S	10	4.1	200	0.53 J (0.53)	ND (0.11)	8.8 J	6.7	ND (0.10)	9.5	0.38 J (0.53)	ND (0.11)
6354	85-BH-008-15.0-S	15	3.1	110	0.47 J (0.53)	ND (0.11)	10 J	6.0	ND (0.11)	8.5	0.34 J (0.53)	ND (0.11)
6615	85-1-GR-016-00-SSO	0	2.5	400	NT	ND (0.21)	10	95 PJ	ND (0.11)	NT	ND (0.63)	ND (0.21)
6615	85-1-GR-017-00-SSO	0	2.2	170	NT	0.35 J (1.0)	6.4	380 PJ	ND (0.10)	NT	ND (0.62)	0.41 J (2.1)
6615	85-1-GR-018-00-SSO	0	2.6	340	NT	ND (0.21)	10	260 PJ	ND (0.10)	NT	0.81 J (1.0)	ND (0.20)
6615	85-1-GR-019-00-SSO	0	2.5	170	NT	ND (0.21)	6.1	23 PJ	ND (0.098)	NT	ND (0.62)	ND (0.20)
6615	85-1-GR-020-00-SSO	0	2.3	120	NT	ND (0.21)	7.5	140 PJ	ND (0.10)	NT	ND (0.62)	ND (0.20)
6615	85-1-GR-020-00-SSD	0	3.0	130	NT	ND (0.21)	7.1	27 PJ	ND (0.10)	NT	ND (0.63)	ND (0.21)
6615	85-1-GR-021-00-SSO	0	3.0	110	NT	ND (0.20)	7.8	6.3 PJ	ND (0.10)	NT	ND (0.61)	ND (0.20)
6615	85-1-GR-022-00-SSO	0	2.4	79	NT	ND (0.20)	5.8	17 PJ	ND (0.10)	NT	0.64 J (1.0)	ND (0.21)
6615	85-1-GR-023-00-SSO	0	3.3	110	NT	ND (0.21)	9.3	93 PJ	ND (0.10)	NT	ND (0.63)	ND (0.21)
Firing Site 2												
6615	85-2-GR-011-00-SSO	0	3.2	87	NT	ND (0.21)	17	9 PJ	ND (0.094)	NT	ND (0.62)	ND (0.19)
6615	85-2-GR-012-00-SSO	0	2.8	80	NT	ND (0.21)	16	15 PJ	ND (0.10)	NT	ND (0.63)	ND (0.20)
6615	85-2-GR-013-00-SSO	0	2.7	73	NT	ND (0.21)	9.8	14	ND (0.099)	NT	ND (0.63)	ND (0.20)
6615	85-2-GR-013-00-SSD	0	2.9	79	NT	ND (0.21)	9.9	13	ND (0.090)	NT	ND (0.62)	ND (0.21)
6615	85-2-GR-014-00-SSO	0	2.5	96	NT	ND (0.21)	13	18	ND (0.098)	NT	ND (0.62)	ND (0.21)
6615	85-2-GR-015-00-SSO	0	3.4	83	NT	ND (0.21)	10	9.1	ND (0.11)	NT	ND (0.64)	ND (0.21)

Refer to footnotes at end of table.

Table 10.4.4-1(Continued)
Summary of SWMU 85 Confirmatory Soil Sampling Metals Analytical Results, April—October 1997

Sample Attributes			Metals (EPA 6010/7000) ^a (mg/kg)									
Record Number ^b	ER Sample ID (Figures 10.4.4-1, 10.4.4-2, and 10.4.4-3)	Sample Depth (ft)	Arsenic	Barium	Beryllium	Cadmium	Chromium	Lead	Mercury	Nickel	Selenium	Silver
6433	85-1-GR-029-0-SSO	0	2.14	78.2	0.393 J (0.490)	0.341 J (0.490)	7.31	13.2	ND (.0173)	7.12	0.255 J (0.490)	ND (.031)
6433	85-1-GR-030-0-SSO	0	1.80	59.9	0.307 J (0.500)	0.135 J (0.500)	5.33	9.33	0.0137 J (0.0259)	4.82	0.199 J (0.500)	ND (.031)
6433	85-1-GR-031-0-SSO	0	2.27	78.1	0.417 J (0.476)	0.0915 J (0.476)	6.79	30.8	ND (.0173)	6.38	ND (.07)	ND (.031)
6433	85-1-GR-032-0-SSO	0	2.39	108	0.419 J (0.485)	0.214 J (0.485)	8.24	13.8	ND (.0173)	7.65	ND (.07)	ND (.031)
6433	85-1-GR-032-0-SSD	0	2.46	108	0.436 J (0.495)	0.198 J (0.495)	10.5	20.3	ND (.0173)	7.87	ND (.07)	ND (.031)
Firing Site 3												
6614	85-GR-006-00-SS	0	3.94	86.5	0.583	0.399 J (0.472)	9.77	7.20	0.0165 J (0.0297)	8.93	0.648	0.890 J (0.943)
6614	85-GR-007-00-SS	0	2.02	64.7	0.381 J (0.459)	0.349 J (0.459)	6.00	5.26	ND (.0167)	6.76	0.44 J (0.459)	3.000
6614	85-GR-008-00-SS	0	1.75	52.3	0.334 J (0.485)	0.218 J (0.485)	5.07	4.58	ND (.0167)	5.03	0.255 J (0.485)	0.449 J (0.971)
6614	85-GR-009-00-SS	0	2.06	71.5	0.465 J (0.481)	0.373 J (0.481)	5.93	5.79	ND (.0167)	5.60	0.602	0.770 J (0.962)
6614	85-GR-010-00-SS	0	3.25	100	0.510	0.301 J (0.485)	7.28	6.06	ND (.0167)	6.68	0.333 J (0.485)	0.503 J (0.971)
6614	85-GR-010-00-SD	0	2.70	65.2	0.423 J (0.485)	0.279 J (0.485)	6.84	5.67	ND (.0167)	6.21	0.307 J (0.485)	0.575 J (0.971)
Firing Site 4												
6615	85-4-GR-021-00-SSO	0	2.9	57	NT	ND (0.20)	9.7	8.7	ND (0.093)	NT	ND (0.61)	ND (0.20)
6615	85-4-GR-022-00-SSO	0	3.7	72	NT	ND (0.21)	13	10	ND (0.094)	NT	0.76 J (1.0)	ND (0.21)
6615	85-4-GR-023-00-SSO	0	2.7	59	NT	ND (0.20)	7.8	8.2	ND (0.096)	NT	ND (0.59)	ND (0.20)
6615	85-4-GR-024-00-SSO	0	2.6	57	NT	ND (0.20)	8.7	8.2	ND (0.093)	NT	ND (0.60)	ND (0.20)
6615	85-4-GR-025-00-SSO	0	3.6	160	NT	ND (0.21)	9.1	5.9	ND (0.090)	NT	0.63 J (1.0)	ND (0.21)
6615	85-4-GR-026-00-SSO	0	2.7	52	NT	ND (0.20)	8.7	7.0	ND (0.087)	NT	ND (0.60)	ND (0.20)
6615	85-4-GR-027-00-SSO	0	2.4	52	NT	ND (0.20)	7.3	6.7	ND (0.087)	NT	ND (0.60)	ND (0.20)
6615	85-4-GR-028-00-SSO	0	2.9	61	NT	ND (0.21)	10	6.1	ND (0.098)	NT	ND (0.62)	ND (0.21)
6615	85-4-GR-028-00-SSD	0	2.6	63	NT	ND (0.21)	9.4	6.1	ND (0.095)	NT	ND (0.63)	ND (0.21)
Quality Assurance/Quality Control Sample (in mg/L)												
6354	85-1 BH-008-EB (equipment blank)	NA	ND (0.0030)	0.0029 J (0.20)	ND (0.0010)	ND (0.0010)	0.0045 J (0.010)	0.0026 J (0.0030)	ND (0.00020)	0.0033 ^c J (0.040)	ND (0.0030)	ND (0.0010)
6614	85-GR-010-00-EB (equipment blank)	NA	ND (.00276)	0.000269 J (0.0100)	ND (.000135)	ND (.000209)	ND (.00621)	ND (.00136)	ND (.0001)	ND (.000996)	ND (.00228)	ND (.000424)
6615	85-4-GR-028-00-EB (equipment blank)	NA	ND (0.0030)	0.012 J (0.20)	NT	ND (0.0010)	0.0046 J (0.010)	0.049J B	ND (0.0020)	NT	ND (0.0030)	ND (0.0010)

Refer to footnotes at end of table.

Table 10.4.4-1 (Concluded)
Summary of SWMU 85 Confirmatory Soil Sampling Metals Analytical Results, April—October 1997

Sample Attributes			Metals (EPA 6010/7000) ^a (mg/kg)									
Record Number ^b	ER Sample ID (Figures 10.4.4-1, 10.4.4-2, and 10.4.4-3)	Sample Depth (ft)	Arsenic	Barium	Beryllium	Cadmium	Chromium	Lead	Mercury	Nickel	Selenium	Silver
6433	85-1-GR-032-EB (equipment blank)	NA	ND (.00293)	ND (.000332)	ND (.000223)	ND (.000208)	ND (.000729)	ND (.000678)	0.000168 J (0.000200)	ND (.00227)	ND (.0014)	0.00218 J (0.00500)
Approved SNL/NM SWTA Surface/Subsurface Background Soil Concentrations ^d			5.6/4.4	130/214	0.65/0.65	<1/0.9	17.3/15.9	21.4/11.8	<0.25/<0.1	11.5/11.5	<1/<1	<1/<1

^aEPA November 1986.

^bAnalysis request/chain of custody record.

^cBold indicates these values are greater than NMED-approved quantified background values.

^dFrom Dinwiddie September 1997.

B = Analyte detected in associated blank.
EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
ft = Foot (feet).
GR = Grab sample.
ID = Identification.
J = The associated value is an estimated quantity.
J () = The reported value is above the MDL but is less than the reporting limit or required detection limit, shown in parenthesis.
mg/kg = Milligram(s) per kilogram.
mg/L = Milligram(s) per liter.
NA = Not applicable.
ND () = Not detected above the MDL, shown in parenthesis.
NMED = New Mexico Environment Department.
NT = Not tested.
P = Laboratory precision measurements for the laboratory control sample and duplicate (LCS/LCSD) do not meet acceptance criteria.
SNL/NM = Sandia National Laboratories/New Mexico.
SD and SSD = Surface soil sample duplicate.
SS and SSO = Surface soil sample.
SWTA = Southwest Test Area.
UTL = Upper tolerance limit.

Table 10.4.4-2
Summary of SWMU 85 Confirmatory Soil Sampling HE Analytical Results, April—October 1997

Sample Attributes			Explosives, Methods (EPA 8330) ^a (µg/kg)							
Record Number ^b	ER Sample ID (Figures 10.4.4-1, 10.4.4-2, and 10.4.4-3)	Sample Depth (ft)	2,4,6-Trinitrotoluene	2,4-Dinitrotoluene	2,6-Dinitrotoluene	2-Amino, 4,6-dinitrotoluene	4-Amino, 2,6-dinitrotoluene	o-Nitrotoluene (2)	m-Nitrotoluene (3)	p-Nitrotoluene (4)
Firing Site 1										
6354	85-BH-006-0.0-S	0	ND (110) AR	ND (160) AR	ND (190) AR	ND (130) AR	ND (55) AR	ND (70) AR	ND (160) AR	ND (170) AR
6354	85-BH-006-0.0-SD	0	ND (110) AR	ND (160) AR	ND (190) AR	ND (130) AR	ND (55) AR	ND (70) AR	ND (160) AR	ND (170) AR
6354	85-BH-006-5.0-S	5	ND (110) AR	ND (160) AR	ND (190) AR	ND (130) AR	ND (55) AR	ND (70) AR	ND (160) AR	ND (170) AR
6354	85-BH-006-10.0-S	10	ND (110) AR	ND (160) AR	ND (190) AR	ND (130) AR	ND (55) AR	ND (70) AR	ND (160) AR	ND (170) AR
6354	85-BH-006-15.0-S	15	ND (110) AR	ND (160) AR	ND (190) AR	ND (130) AR	ND (55) AR	ND (70) AR	ND (160) AR	ND (170) AR
6354	85-BH-007-0.0-S	0	ND (110) AR	ND (160) AR	ND (190) AR	ND (130) AR	ND (55) AR	ND (70) AR	ND (160) AR	ND (170) AR
6354	85-BH-007-0.0-SD	0	ND (110) AR	ND (160) AR	ND (190) AR	ND (130) AR	ND (55) AR	ND (70) AR	ND (160) AR	ND (170) AR
6354	85-BH-007-5.0-S	5	ND (110) AR	ND (160) AR	ND (190) AR	ND (130) AR	ND (55) AR	ND (70) AR	ND (160) AR	ND (170) AR
6354	85-BH-007-10.0-S	10	ND (110) AR	ND (160) AR	ND (190) AR	ND (130) AR	ND (55) AR	ND (70) AR	ND (160) AR	ND (170) AR
6354	85-BH-007-15.0-S	15	ND (110) AR	ND (160) AR	ND (190) AR	ND (130) AR	ND (55) AR	ND (70) AR	ND (160) AR	ND (170) AR
6354	85-BH-008-0.0-S	0	ND (110) AR	ND (160) AR	ND (190) AR	ND (130) AR	ND (55) AR	ND (70) AR	ND (160) AR	ND (170) AR
6354	85-BH-008-0.0-SD	0	ND (110) AR	ND (160) AR	ND (190) AR	ND (130) AR	ND (55) AR	ND (70) AR	ND (160) AR	ND (170) AR
6354	85-BH-008-5.0-S	5	ND (110) AR	ND (160) AR	ND (190) AR	ND (130) AR	ND (55) AR	ND (70) AR	ND (160) AR	ND (170) AR
6354	85-BH-008-10.0-S	10	ND (110) AR	ND (160) AR	ND (190) AR	ND (130) AR	ND (55) AR	ND (70) AR	ND (160) AR	ND (170) AR
6354	85-BH-008-15.0-S	15	ND (110)	ND (160)	ND (190)	ND (130)	ND (55)	ND (70)	ND (160)	ND (170)
6615	85-1-GR-016-00-SSO	0	ND (110)	ND (160)	ND (190)	ND (130)	ND (55)	ND (70)	ND (160)	ND (170)
6615	85-1-GR-017-00-SSO	0	ND (110)	ND (160)	ND (190)	ND (130)	ND (55)	ND (70)	ND (160)	ND (170)
6615	85-1-GR-018-00-SSO	0	ND (110)	ND (160)	ND (190)	ND (130)	ND (55)	ND (70)	ND (160)	ND (170)
6615	85-1-GR-019-00-SSO	0	ND (110)	ND (160)	ND (190)	ND (130)	ND (55)	ND (70)	ND (160)	ND (170)
6615	85-1-GR-020-00-SSO	0	ND (110)	ND (160)	ND (190)	ND (130)	ND (55)	ND (70)	ND (160)	ND (170)
6615	85-1-GR-020-00-SSD	0	ND (110)	ND (160)	ND (190)	ND (130)	ND (55)	ND (70)	ND (160)	ND (170)
6615	85-1-GR-021-00-SSO	0	ND (110)	ND (160)	ND (190)	ND (130)	ND (55)	ND (70)	ND (160)	ND (170)
6615	85-1-GR-022-00-SSO	0	ND (110)	ND (160)	ND (190)	ND (130)	ND (55)	ND (70)	ND (160)	ND (170)
6615	85-1-GR-023-00-SSO	0	ND (110)	ND (160)	ND (190)	ND (130)	ND (55)	ND (70)	ND (160)	ND (170)
Firing Site 2										
6615	85-2-GR-011-00-SSO	0	ND (110)	ND (160)	ND (190)	ND (130)	ND (55)	ND (70)	ND (160)	ND (170)
6615	85-2-GR-012-00-SSO	0	ND (110)	ND (160)	ND (190)	ND (130)	ND (55)	ND (70)	ND (160)	ND (170)
6615	85-2-GR-013-00-SSO	0	ND (110)	ND (160)	ND (190)	ND (130)	ND (55)	ND (70)	ND (160)	ND (170)
6615	85-2-GR-013-00-SSD	0	ND (110)	ND (160)	ND (190)	ND (130)	ND (55)	ND (70)	ND (160)	ND (170)
6615	85-2-GR-014-00-SSO	0	ND (110)	ND (160)	ND (190)	ND (130)	ND (55)	ND (70)	ND (160)	ND (170)
6615	85-2-GR-015-00-SSO	0	ND (110)	ND (160)	ND (190)	ND (130)	ND (55)	ND (70)	ND (160)	ND (170)
6433	85-1-GR-029-0-SSO	0	ND (5.67)	ND (6.18)	ND (6.48)	ND (6.6)	ND (5.45)	ND (7.83)	ND (11.1)	ND (10.6)
6433	85-1-GR-030-0-SSO	0	ND (5.67)	ND (6.18)	ND (6.48)	ND (6.6)	ND (5.45)	ND (7.83)	ND (11.1)	ND (10.6)

Refer to footnotes at end of table.

Table 10.4.4-2 (Continued)
Summary of SWMU 85 Confirmatory Soil Sampling HE Analytical Results, April—October 1997

Sample Attributes			Explosives, Methods (EPA 8330 ^b) (µg/kg)					
Record Number ^b	ER Sample ID (Figures 10.4.4-1, 10.4.4-2, and 10.4.4-3)	Sample Depth (ft)	Nitrobenzene	1,3 Dinitrobenzene	1,3,5 Trinitrobenzene	RDX	Tetryl	HMX
Firing Site 1								
6354	85-BH-006-0.0-S	0	ND (150) AR	ND (100) AR	ND (70) AR	ND (190) AR	ND (340) AR	ND (420) AR
6354	85-BH-006-0.0-SD	0	ND (150) AR	ND (100) AR	ND (70) AR	ND (190) AR	ND (340) AR	ND (420) AR
6354	85-BH-006-5.0-S	5	ND (150) AR	ND (100) AR	ND (70) AR	ND (190) AR	ND (340) AR	ND (420) AR
6354	85-BH-006-10.0-S	10	ND (150) AR	ND (100) AR	ND (70) AR	ND (190) AR	ND (340) AR	ND (420) AR
6354	85-BH-006-15.0-S	15	ND (150) AR	ND (100) AR	ND (70) AR	ND (190) AR	ND (340) AR	ND (420) AR
6354	85-BH-007-0.0-S	0	ND (150) AR	ND (100) AR	ND (70) AR	ND (190) AR	ND (340) AR	ND (420) AR
6354	85-BH-007-0.0-SD	0	ND (150) AR	ND (100) AR	ND (70) AR	ND (190) AR	ND (340) AR	ND (420) AR
6354	85-BH-007-5.0-S	5	ND (150) AR	ND (100) AR	ND (70) AR	ND (190) AR	ND (340) AR	ND (420) AR
6354	85-BH-007-10.0-S	10	ND (150) AR	ND (100) AR	ND (70) AR	ND (190) AR	ND (340) AR	ND (420) AR
6354	85-BH-007-15.0-S	15	ND (150) AR	ND (100) AR	ND (70) AR	ND (190) AR	ND (340) AR	ND (420) AR
6354	85-BH-008-0.0-S	0	ND (150) AR	ND (100) AR	ND (70) AR	ND (190) AR	ND (340) AR	ND (420) AR
6354	85-BH-008-0.0-SD	0	ND (150) AR	ND (100) AR	ND (70) AR	ND (190) AR	ND (340) AR	ND (420) AR
6354	85-BH-008-5.0-S	5	ND (150) AR	ND (100) AR	ND (70) AR	ND (190) AR	ND (340) AR	ND (420) AR
6354	85-BH-008-10.0-S	10	ND (150) AR	ND (100) AR	ND (70) AR	ND (190) AR	ND (340) AR	ND (420) AR
6354	85-BH-008-15.0-S	15	ND (150)	ND (100)	ND (70)	ND (190)	ND (340)	ND (420)
6615	85-1-GR-016-00-SSO	0	ND (150)	ND (100)	ND (70)	ND (190)	ND (340)	ND (420)
6615	85-1-GR-017-00-SSO	0	ND (150)	ND (100)	ND (70)	ND (190)	ND (340)	ND (420)
6615	85-1-GR-018-00-SSO	0	ND (150)	ND (100)	ND (70)	ND (190)	ND (340)	ND (420)
6615	85-1-GR-019-00-SSO	0	ND (150)	ND (100)	ND (70)	ND (190)	ND (340)	ND (420)
6615	85-1-GR-020-00-SSO	0	ND (150)	ND (100)	ND (70)	ND (190)	ND (340)	ND (420)
6615	85-1-GR-020-00-SSD	0	ND (150)	ND (100)	ND (70)	ND (190)	ND (340)	ND (420)
6615	85-1-GR-021-00-SSO	0	ND (150)	ND (100)	ND (70)	ND (190)	ND (340)	ND (420)
6615	85-1-GR-022-00-SSO	0	ND (150)	ND (100)	ND (70)	ND (190)	ND (340)	ND (420)
6615	85-1-GR-023-00-SSO	0	ND (150)	ND (100)	ND (70)	ND (190)	ND (340)	ND (420)
Firing Site 2								
6615	85-2-GR-011-00-SSO	0	ND (150)	ND (100)	ND (70)	ND (190)	ND (340)	ND (420)
6615	85-2-GR-012-00-SSO	0	ND (150)	ND (100)	ND (70)	ND (190)	ND (340)	ND (420)
6615	85-2-GR-013-00-SSO	0	ND (150)	ND (100)	ND (70)	ND (190)	ND (340)	ND (420)
6615	85-2-GR-013-00-SSD	0	ND (150)	ND (100)	ND (70)	ND (190)	ND (340)	ND (420)
6615	85-2-GR-014-00-SSO	0	ND (150)	ND (100)	ND (70)	ND (190)	ND (340)	ND (420)
6615	85-2-GR-015-00-SSO	0	ND (150)	ND (100)	ND (70)	ND (190)	ND (340)	ND (420)
6433	85-1-GR-029-0-SSO	0	ND (5.21)	ND (4.05)	ND (6.62)	ND (9.71)	ND (7.55)	ND (5.27)
6433	85-1-GR-030-0-SSO	0	ND (5.21)	ND (4.05)	ND (6.62)	ND (9.71)	ND (7.55)	ND (5.27)

Refer to footnotes at end of table.

Table 10.4.4-2 (Continued)
Summary of SWMU 85 Confirmatory Soil Sampling HE Analytical Results, April—October 1997

Sample Attributes			Explosives, Methods (EPA 8330) ^a (µg/kg)							
Record Number ^b	ER Sample ID (Figures 10.4.4-1, 10.4.4-2, and 10.4.4-3)	Sample Depth (ft)	2,4,6- Trinitrotoluene	2,4- Dinitrotoluene	2,6- Dinitrotoluene	2-Amino, 4,6- dinitrotoluene	4-Amino, 2,6- dinitrotoluene	o-Nitrotoluene (2)	m-Nitrotoluene (3)	p-Nitrotoluene (4)
6433	85-1-GR-031-0-SSO	0	ND (5.67)	ND (6.18)	ND (6.48)	ND (6.6)	ND (5.45)	ND (7.83)	ND (11.1)	(ND (10.6)
6433	85-1-GR-032-0-SSO	0	ND (5.67)	ND (6.18)	ND (6.48)	ND (6.6)	ND (5.45)	ND (7.83)	ND (11.1)	(ND (10.6)
6433	85-1-GR-032-0-SSD	0	ND (5.67)	ND (6.18)	ND (6.48)	ND (6.6)	ND (5.45)	ND (7.83)	ND (11.1)	(ND (10.6)
Firing Site 3										
6614	85-GR-006-00-SS	0	ND (5.67)	ND (6.18)	ND (6.48)	ND (6.6)	ND (5.45)	ND (7.83)	ND (11.1)	(ND (10.6)
6614	85-GR-007-00-SS	0	ND (5.67)	ND (6.18)	ND (6.48)	ND (6.6)	ND (5.45)	ND (7.83)	ND (11.1)	(ND (10.6)
6614	85-GR-008-00-SS	0	ND (5.67)	ND (6.18)	ND (6.48)	ND (6.6)	ND (5.45)	ND (7.83)	ND (11.1)	ND (10.6)
6614	85-GR-009-00-SS	0	ND (5.67)	ND (6.18)	ND (6.48)	ND (6.6)	ND (5.45)	ND (7.83)	ND (11.1)	ND (10.6)
6614	85-GR-010-00-SS	0	ND (5.67)	ND (6.18)	ND (6.48)	ND (6.6)	ND (5.45)	ND (7.83)	ND (11.1)	ND (10.6)
6614	85-GR-010-00-SD	0	ND (5.67)	ND (6.18)	ND (6.48)	ND (6.6)	ND (5.45)	ND (7.83)	ND (11.1)	ND (10.6)
Firing Site 4										
6615	85-4-GR-021-00-SSO	0	ND (110)	ND (160)	ND (190)	ND (130)	ND (55)	ND (70)	ND (160)	ND (170)
6615	85-4-GR-022-00-SSO	0	ND (110)	ND (160)	ND (190)	ND (130)	ND (55)	ND (70)	ND (160)	ND (170)
6615	85-4-GR-023-00-SSO	0	ND (110)	ND (160)	ND (190)	ND (130)	ND (55)	ND (70)	ND (160)	ND (170)
6615	85-4-GR-024-00-SSO	0	ND (110)	ND (160)	ND (190)	ND (130)	ND (55)	ND (70)	ND (160)	ND (170)
6615	85-4-GR-025-00-SSO	0	ND (110)	ND (160)	ND (190)	ND (130)	ND (55)	ND (70)	ND (160)	ND (170)
6615	85-4-GR-026-00-SSO	0	ND (110)	ND (160)	ND (190)	ND (130)	ND (55)	ND (70)	ND (160)	ND (170)
6615	85-4-GR-027-00-SSO	0	ND (110)	ND (160)	ND (190)	ND (130)	ND (55)	ND (70)	ND (160)	ND (170)
6615	85-4-GR-028-00-SSO	0	ND (110)	ND (160)	ND (190)	ND (130)	ND (55)	ND (70)	ND (160)	ND (170)
6615	85-4-GR-028-00-SSD	0	ND (110)	ND (160)	ND (190)	ND (130)	ND (55)	ND (70)	ND (160)	ND (170)
Quality Assurance/Quality Control Sample (µg/L [water])										
6354	85-1-BH-008-EB (equipment blank)	NA	ND (0.030)	ND (0.11)	ND (0.070)	ND (0.040)	ND (0.050)	ND (0.030)	ND (0.020)	ND (0.030)
6433	85-1-GR-032-EB (equipment blank)	NA	ND (0.0293)	ND (0.0137)	ND (0.0425)	ND (0.0186)	ND (0.0195)	ND (0.0238)	ND (0.0312)	ND (0.0335)
6614	85-GR-010-00-EB (equipment blank)	NA	ND (0.0293)	ND (0.0137)	ND (0.0425)	ND (0.0186)	ND (0.0195)	ND (0.0238)	ND (0.0312)	ND (0.0335)
6615	85-4-GR-028-00-EB (equipment blank)	NA	ND (0.030)	ND (0.11)	ND (0.070)	ND (0.040)	ND (0.050)	ND (0.030)	ND (0.020)	ND (0.030)

Refer to footnotes at end of table.

Table 10.4.4-2 (Concluded)
Summary of SWMU 85 Confirmatory Soil Sampling HE Analytical Results, April—October 1997

Sample Attributes			Explosives, Methods (EPA 8330 ^a) (µg/kg)					
Record Number ^b	ER Sample ID (Figures 10.4.4-1, 10.4.4-2, and 10.4.4-3)	Sample Depth (ft)	Nitrobenzene	1,3 Dinitrobenzene	1,3,5 Trinitrobenzene	RDX	Tetryl	HMX
6433	85-1-GR-031-0-SSO	0	ND (5.21)	ND (4.05)	ND (6.62)	ND (9.71)	ND (7.55)	ND (5.27)
6433	85-1-GR-032-0-SSO	0	ND (5.21)	ND (4.05)	ND (6.62)	ND (9.71)	ND (7.55)	ND (5.27)
6433	85-1-GR-032-0-SSD	0	ND (5.21)	ND (4.05)	ND (6.62)	ND (9.71)	ND (7.55)	ND (5.27)
Firing Site 3								
6614	85-GR-006-00-SS	0	ND (5.21)	ND (4.05)	ND (6.62)	ND (9.71)	ND (7.55)	ND (5.27)
6614	85-GR-007-00-SS	0	ND (5.21)	ND (4.05)	ND (6.62)	ND (9.71)	ND (7.55)	ND (5.27)
6614	85-GR-008-00-SS	0	ND (5.21)	ND (4.05)	ND (6.62)	ND (9.71)	ND (7.55)	ND (5.27)
6614	85-GR-009-00-SS	0	ND (5.21)	ND (4.05)	ND (6.62)	ND (9.71)	ND (7.55)	ND (5.27)
6614	85-GR-010-00-SS	0	ND (5.21)	ND (4.05)	ND (6.62)	ND (9.71)	ND (7.55)	ND (5.27)
6614	85-GR-010-00-SD	0	ND (5.21)	ND (4.05)	ND (6.62)	ND (9.71)	ND (7.55)	ND (5.27)
Firing Site 4								
6615	85-4-GR-021-00-SSO	0	ND (150)	ND (100)	ND (70)	ND (190)	ND (340)	ND (420)
6615	85-4-GR-022-00-SSO	0	ND (150)	ND (100)	ND (70)	ND (190)	ND (340)	ND (420)
6615	85-4-GR-023-00-SSO	0	ND (150)	ND (100)	ND (70)	ND (190)	ND (340)	ND (420)
6615	85-4-GR-024-00-SSO	0	ND (150)	ND (100)	ND (70)	ND (190)	ND (340)	ND (420)
6615	85-4-GR-025-00-SSO	0	ND (150)	ND (100)	ND (70)	ND (190)	ND (340)	ND (420)
6615	85-4-GR-026-00-SSO	0	ND (150)	ND (100)	ND (70)	ND (190)	ND (340)	8400
6615	85-4-GR-027-00-SSO	0	ND (150)	ND (100)	ND (70)	ND (190)	ND (340)	ND (420)
6615	85-4-GR-028-00-SSO	0	ND (150)	ND (100)	ND (70)	ND (190)	ND (340)	ND (420)
6615	85-4-GR-028-00-SSD	0	ND (150)	ND (100)	ND (70)	ND (190)	ND (340)	ND (420)
Quality Assurance/Quality Control Sample (µg/L [water])								
6354	85-1-BH-008-EB (equipment blank)	NA	ND (0.040) AR	ND (0.030) AR	ND (0.040) AR	ND (0.20) AR	ND (0.040) AR	ND (0.080) AR
6433	85-1-GR-032-EB (equipment blank)	NA	ND (0.0161)	ND (0.0202)	ND (0.0206)	ND (0.0185)	ND (0.0215)	ND (0.0459)
6614	85-GR-010-00-EB (equipment blank)	NA	ND (0.0161)	ND (0.0202)	ND (0.0206)	ND (0.0185)	ND (0.0215)	ND (0.0459)
6615	85-4-GR-028-00-EB (equipment blank)	NA	ND (0.040)	ND (0.030)	ND (0.040)	ND (0.20)	ND (0.040)	ND (0.080)

^aEPA November 1986.^bAnalysis request/chain of custody record.

A = Laboratory accuracy and/or bios measurements for the associated laboratory control sample (LCS) do not meet acceptance criteria.

BH = Borehole.

EPA = U.S. Environmental Protection Agency.

ER = Environmental Restoration.

ft = Foot (feet).

GR = Grab sample.

HMX = 1,3,5,7-tetranitro-1,3,5,7-tetrazacyclooctane.

ID = Identification.

µg/kg = Micrograms per kilogram.

µg/L = Micrograms per liter.

NA = Not applicable.

ND () = Not detected above the method detection limit, shown in parenthesis.

NT = Not tested.

NG = Nitroglycerin.

PETN = 1,3-dinitrato-2,2-bis(nitratomethyl) propane.

R = The data are unusable for their intended purpose (Note: the analyte may or may not be present).

RDX = 1,3,5-trinitro-1,3,5-triazacyclohexane.

S, SS, SSO = Soil sample.

SD and SSD = Soil sample duplicate.

TETRYL = 2,4,6-trinitrophenylmethylnitramine.

Table 10.4.4-3
Summary of SWMU 85 Confirmatory Soil Sampling Gamma Spectroscopy Analytical Results, April–October 1997

Sample Attributes			Gamma Spectroscopy Activity (pCi/g)							
Record Number ^a	ER Sample ID (Figures 10.4.4-1, 10.4.4-2, and 10.4.4-3)	Sample Depth (ft)	Uranium-238		Thorium-232		Uranium-235		Cesium-137	
			Result	Error ^b	Result	Error ^b	Result	Error ^b	Result	Error ^b
Firing Site 1										
6353	85-BH-006-0.0-S	0	ND (3.25E+00)	--	7.07E-01	3.74E-01	ND (2.38E-01)	--	2.95E-02	2.59E-02
6353	85-BH-006-0.0-SD	0	ND (3.43E+00)	--	7.37E-01	3.91E-01	ND (2.53E-01)	--	3.00E-02	1.89E-02
6353	85-BH-006-5.0-S	5	ND (3.58E+00)	--	6.59E-01	3.33E-01	ND (2.59E-01)	--	ND (3.96E-02)	--
6353	85-BH-006-10.0-S	10	ND (3.98E+00)	--	7.39E-01	4.11E-01	ND (2.96E-01)	--	ND (4.00E-02)	--
6353	85-BH-006-15.0-S	15	ND (3.77E+00)	--	ND (1.75E-01)	--	ND (1.80E-01)	--	ND (4.04E-02)	--
6341	85-BH-007-0.0-S	0	ND (1.41E+00)	--	7.69E-01	4.25E-01	ND (1.94E-01)	--	3.09E-02	1.90E-02
6353	85-BH-007-0.0-SD	0	ND (3.34E+00)	--	7.11E-01	3.49E-01	ND (2.53E-01)	--	1.43E-02	1.51E-02
6353	85-BH-007-5.0-S	5	ND (3.69E+00)	--	6.73E-01	4.12E-01	ND (2.73E-01)	--	ND (3.66E-02)	--
6353	85-BH-007-10.0-S	10	ND (2.10E+00)	--	8.34E-01	4.55E-01	ND (2.48E-01)	--	ND (4.72E-02)	--
6341	85-BH-007-15.0-S	15	1.21E+00	1.14E+00	7.71E-01	4.38E-01	ND (2.15E-01)	--	ND (4.45E-02)	--
6353	85-BH-008-0.0-S	0	ND (2.05E+00)	--	8.24E-01	4.50E-01	ND (2.76E-01)	--	ND (5.25E-02)	--
6353	85-BH-008-0.0-SD	0	6.42E-01	1.16E+00	7.53E-01	4.14E-01	1.41E-01	1.78E-01	ND (4.84E-02)	--
6341	85-BH-008-5.0-S	5	ND (1.40E+00)	--	6.27E-01	3.20E-01	ND (1.96E-01)	--	ND (3.91E-02)	--
6353	85-BH-008-10.0-S	10	ND (1.79E+00)	--	7.12E-01	3.91E-01	ND (2.52E-01)	--	ND (4.69E-02)	--
6341	85-BH-008-15.0-S	15	9.91E-01	1.04E+00	8.32E-01	4.58E-01	ND (2.27E-01)	--	ND (4.47E-02)	--
6344	85-1-GR-016-00-SSO	0	ND (1.49E+00)	--	6.71E-01	3.80E-01	ND (2.05E-01)	--	2.36E-02	1.85E-02
6344	85-1-GR-017-00-SSO	0	ND (1.42E+00)	--	5.87E-01	3.53E-01	ND (2.02E-01)	--	ND (3.93E-02)	--
6344	85-1-GR-018-00-SSO	0	ND (1.52E+00)	--	6.81E-01	3.35E-01	ND (2.10E-01)	--	2.21E-02	3.23E-02
6344	85-1-GR-019-00-SSO	0	ND (1.45E+00)	--	7.14E-01	3.46E-01	ND (1.96E-01)	--	ND (3.60E-02)	--
6345	85-1-GR-020-00-SSO	0	ND (1.42E+00)	--	6.37E-01	3.41E-01	ND (1.98E-01)	--	ND (3.91E-02)	--
6344	85-1-GR-020-00-SSD	0	ND (1.42E+00)	--	6.12E-01	3.31E-01	ND (1.97E-01)	--	ND (3.80E-02)	--
6344	85-1-GR-021-00-SSO	0	ND (1.62E+00)	--	8.72E-01	4.55E-01	ND (2.19E-01)	--	ND (3.84E-02)	--
6344	85-1-GR-022-00-SSO	0	ND (1.42E+00)	--	6.68E-01	3.76E-01	ND (1.91E-01)	--	ND (3.57E-02)	--
6344	85-1-GR-023-00-SSO	0	ND (1.45E+00)	--	7.27E-01	4.56E-01	ND (2.01E-01)	--	2.26E-02	3.34E-02
Firing Site 2										
6344	85-2-GR-011-00-SSO	0	2.18E+00	1.09E+00	6.69E-01	3.65E-01	ND (2.12E-01)	--	2.04E-02	2.27E-02
6344	85-2-GR-012-00-SSO	0	2.67E+01	6.58E+00	6.49E-01	4.12E-01	5.38E-01	2.06E-01	1.40E-02	1.50E-02
6345	85-2-GR-013-00-SSO	0	1.71E+01	4.45E+00	ND (1.77E-01)	--	3.84E-01	1.47E-01	ND (2.26E-02)	--
6344	85-2-GR-013-00-SSD	0	6.51E+00	2.02E+00	7.55E-01	4.35E-01	2.25E-01	3.51E-01	ND (4.45E-02)	--
6344	85-2-GR-014-00-SSO	0	1.63E+01	4.09E+00	5.65E-01	3.30E-01	3.02E-01	3.18E-01	ND (4.19E-02)	--
6344	85-2-GR-015-00-SSO	0	ND (1.66E+00)	--	6.90E-01	3.59E-01	ND (2.31E-01)	--	ND (4.13E-02)	--
6434	85-1-GR-029-0-SSO	0	1.31E+01	4.48E+00	6.55E-01	3.40E-01	3.19E-01	1.53E-01	1.27E-02	1.37E-02
6435	85-1-GR-030-0-SS	0	1.77E+00	1.74E+00	5.18E-01	2.75E-01	ND (1.95E-01)	--	1.72E-02	2.31E-02
6435	85-1-GR-031-0-SS	0	ND (1.47E+00)	--	6.26E-01	3.30E-01	ND (8.94E-02)	--	ND (3.87E-02)	--
6435	85-1-GR-032-0-SSO	0	1.87E+00	1.90E+00	7.07E-01	3.89E-01	ND (2.21E-01)	--	ND (3.93E-02)	--
6435	85-1-GR-032-0-SSD	0	ND (1.54E+00)	--	7.69E-01	4.00E-01	ND (2.04E-01)	--	ND (4.01E-02)	--
Firing Site 3										
6340	85-GR-006-00-SS	0	ND (3.98E+00)	--	9.55E-01	5.10E-01	ND (2.83E-01)	--	ND (4.22E-02)	--
6340	85-GR-007-00-SS	0	ND (3.72E+00)	--	ND (1.65E-01)	--	ND (2.71E-01)	--	ND (3.69E-02)	--
6340	85-GR-008-00-SS	0	ND (3.65E+00)	--	8.28E-01	1.40E-01	ND (2.77E-01)	--	ND (3.53E-02)	--
6340	85-GR-009-00-SS	0	ND (3.51E+00)	--	8.26E-01	4.22E-01	ND (2.53E-01)	--	ND (3.53E-02)	--
6340	85-GR-010-00-SS	0	ND (3.45E+00)	--	6.67E-01	3.80E-01	ND (2.57E-01)	--	ND (3.55E-02)	--

Refer to footnotes at end of table.

Table 10.4.4-3 (Concluded)
Summary of SWMU 85 Confirmatory Soil Sampling Gamma Spectroscopy Analytical Results, April—October 1997

Sample Attributes			Gamma Spectroscopy Activity (pCi/g)							
Record Number ^a	ER Sample ID (Figures 10.4.4-1, 10.4.4-2, and 10.4.4-3)	Sample Depth (ft)	Uranium-238		Thorium-232		Uranium-235		Cesium-137	
			Result	Error ^b	Result	Error ^b	Result	Error ^b	Result	Error ^b
6339	85-GR-010-00-SD	0	ND (1.51E+00)	--	8.14E-01	4.03E-01	ND (2.11E-01)	--	ND (4.65E-02)	--
Firing Site 4										
6344	85-4-GR-021-00-SSO	0	ND (1.35E+00)	--	4.84E-01	2.81E-01	ND (1.84E-01)	--	2.13E-01	4.89E-02
6344	85-4-GR-022-00-SSO	0	6.09E-01	2.78E-01	7.89E-01	4.11E-01	ND (2.01E-01)	--	1.03E-01	5.29E-02
6345	85-4-GR-023-00-SSO	0	ND (8.91E-01)	--	7.38E-01	3.59E-01	ND (8.98E-02)	--	3.47E-01	7.37E-02
6344	85-4-GR-024-00-SSO	0	8.21E-01	7.73E-01	6.38E-01	3.13E-01	ND (1.94E-01)	--	3.61E-01	1.04E-01
6344	85-4-GR-025-00-SSO	0	1.21E+00	7.84E-01	5.43E-01	2.95E-01	ND (1.68E-01)	--	2.66E-02	4.79E-02
6344	85-4-GR-026-00-SSO	0	ND (1.40E+00)	--	7.10E-01	3.62E-01	ND (1.97E-01)	--	1.09E-01	3.06E-02
6344	85-4-GR-027-00-SSO	0	ND (1.42E+00)	--	6.46E-01	4.41E-01	ND (1.95E-01)	--	8.48E-02	2.72E-02
6345	85-4-GR-028-00-SSO	0	ND (1.50E+00)	--	6.39E-01	4.00E-01	ND (2.14E-01)	--	1.37E-02	1.39E-02
6345	85-4-GR-028-00-SSD	0	ND (1.47E+00)	--	6.54E-01	3.90E-01	ND (2.03E-01)	--	ND (1.91E-02)	--
1307	14E1C-SS	0	5.23	1.88	5.10E-01	2.06E-01	ND (3.91E-01)	--	ND (5.21E-02)	--
1307	14E1D-SS	0	1.09E+01	2.82	3.89E-01	1.97E-01	ND (4.51E-01)	--	ND (5.89E-02)	--
6353	14-GR-090297	0	6.55E+00	2.19E+00	5.67E-01	3.35E-01	1.44E-01	1.20E-01	2.50E-02	3.98E-02
Quality Assurance/Quality Control Sample (pCi/L)										
6353	85-BH-008-EB (equipment blank)	NA	ND (8.15E-01)	--	ND (1.53E-01)	--	ND (1.39E-01)	--	ND (2.56E-02)	--
6435	85-1-GR-032-EB (equipment blank)	NA	ND (7.65E-01)	--	ND (1.56E-01)	--	ND (1.31E-01)	--	ND (2.74E-02)	--
Approved SNL/NM SWTA Surface/Subsurface Background Soil Concentrations ^c			1.4/1.4	NA	1.01/1.01	NA	0.16/0.16	NA	0.664/0.079	NA

^aAnalysis request/chain of custody record.^bTwo standard deviation about the mean detected activity.^cFrom Dinwiddie September 1997.

BH = Borehole.
 ER = Environmental Restoration.
 ft = Foot (feet).
 GR = Grab sample.
 ID = Identification.
 NA = Not applicable.
 ND () = Not detected above the minimum detectable activity, shown in parenthesis.
 NT = Not tested.
 pCi/g = Picocurie(s) per gram.
 pCi/L = Picocurie(s) per liter.
 S, SS, and SSO = Soil sample.
 SD and SSD = Soil sample duplicate.
 SNL/NM = Sandia National Laboratories/New Mexico.
 SWTA = Southwest Test Area.
 UTL = Upper tolerance limit.
 -- = Error not calculated for nondetected results.

Table 10.4.4-4
Summary of SWMU 85 Confirmatory Soil Sampling Isotopic Uranium Analytical Results, April—October 1997

Sample Attributes			Gamma Spectroscopy Activity (pCi/g)					
Record Number ^a	ER Sample ID (Figures 10.4.4-1, 10.4.4-2, and 10.4.4-3)	Sample Depth (ft)	Uranium-233/234 ^b		Uranium-235 ^b		Uranium-238 ^b	
			Result	Error ^b	Result	Error ^b	Result	Error ^b
6433	85-1-GR-029-0-SSO	0	0.757	0.168	0.0852	0.0493	3.08	0.461
6433	85-1-GR-030-0-SSO	0	0.380	0.112	0.0254	0.0309	0.414	0.118
6433	85-1-GR-031-0-SSO	0	0.394	0.115	0.0334	0.0351	0.442	0.124
6433	85-1-GR-032-0-SSO	0	0.909	0.186	0.0836	0.0474	3.15	0.467
6433	85-GR-032-00-SSD	0	0.459	0.128	0.0412	0.0356	0.544	0.141
6614	85-GR-006-00-SS	0	0.571	0.0888	0.0191	0.0128	0.636	0.133
6614	85-GR-007-00-SS	0	0.730	0.11	0.0288	0.0139	0.731	0.152
6614	85-GR-008-00-SS	0	0.575	0.095	0.0512	0.0205	0.625	0.136
6614	85-GR-009-00-SS	0	0.754	0.112	0.0218	0.0156	0.792	0.164
6614	85-GR-010-00-SS	0	0.497	0.0841	0.0347	0.0166	0.596	0.129
6614	85-GR-010-00-SD	0	0.482	0.0774	0.0266	0.0146	0.566	0.12
Quality Assurance/Quality Control Sample (pCi/L)								
6433	85-1-GR-032-EB (equipment blank)	NA	ND (0.0874)	--	ND (0.0355)	--	ND (0.0478)	--
6614	85-GR-010-EB (equipment blank)	NA	0.104	0.0386	ND (0.0382)	--	0.0728	0.0322
Approved SNL/NM SWTA Surface/Subsurface Background Soil Concentrations ^c			1.6/1.6	NA	0.16/0.16	NA	1.4/1.4	NA

^aAnalysis request/chain of custody record.^bTwo standard deviation about the mean detected activity.^cFrom Dinwiddie September 1997.

BH = Borehole.
 ER = Environmental Restoration.
 ft = Foot (feet).
 GR = Grab sample.
 ID = Identification.
 NA = Not applicable.
 ND () = Not detected above the minimum detectable activity, shown in parenthesis.
 NT = Not tested.
 pCi/g = Picocurie(s) per gram.
 pCi/L = Picocurie(s) per liter.
 S, SS, and SSO = Soil sample.
 SD and SSD = Soil sample duplicate.
 SNL/NM = Sandia National Laboratories/New Mexico.
 SWTA = Southwest Test Area.
 UTL = Upper tolerance limit.
 - = Error not calculated for nondetected results.

Explosives

For HE, all analytes were below the detectable limits except for 1,3,5,7-tetranitro-1,3,5,7-tetrazacyclooctane (HMX) in one sample (85-004-GR-026-0.0-SSO). The HMX concentration at this location was 8,400 micrograms per kilogram ($\mu\text{g}/\text{kg}$). This surface soil sample was collected near the center of Firing Site 4. In other samples from the immediate area (85-004-GR-027-0.0-SSO and, 85-004-GR-028-0.0-SSO), HMX values were below detection limits, which suggests the 8,400 $\mu\text{g}/\text{kg}$ sample may be a local anomaly.

Radioisotopes

The radioisotope activities that were evaluated for SWMU 85 include the Geotech VCM samples that were collected in September 1995, the screening samples that were collected by SNL/NM in July 1995, and the confirmation samples that were collected by SNL/NM from April through October 1997. All radiological data were considered to be at a quality level sufficient for a risk assessment. Thorium-232 was the only radioisotope with activities from both surface and subsurface soils below the NMED-approved background levels of 1.01 picocuries per gram (pCi/g).

Cesium-137 was detected below background levels for surface soils. Although the MDA was variable among the samples for cesium-137, it was detected at levels below the approved background levels. One subsurface soil sample was above the background level of 0.079 pCi/g for cesium-137 (at 0.347 pCi/g).

All uranium-235 subsurface soil samples were detected below background level (0.16 pCi/g). Five surface samples were above the approved background level (0.16 pCi/g) for uranium-235. The maximum value of these five samples was 0.538 pCi/g.

Uranium-238 was detected above background in both the surface and subsurface soils. Eight of the surface samples were above the background levels (1.4 pCi/g). Activities for the eight samples were detected at ranges of from 1.77 to 26.7 pCi/g. One sample was detected above the background level (1.4 pCi/g) in subsurface soils. The activity for this sample was 99.1 pCi/g.

Alpha spectroscopy was performed on the grab samples collected from around the VGES tank at Firing Site 2 (ER-85-GR-029-0.0-SS, ER-85-GR-030-0.0-SS, ER-85-GR-031-0.0-SS, and ER-85-GR-032-0.0-SS) and Firing Site 3 (85-GR-006-00-SS, 85-GR-007-00-SS, 85-GR-008-00-SS, 85-GR-009-00-SS, and 85-GR-010-00-SS). The maximum alpha activity was detected at 0.909 pCi/g for isotopic uranium; 0.0852 pCi/g for uranium-235; and 3.15 pCi/g for uranium-238.

10.4.4.5 QA/QC

Tables 10.4.3-1 and 10.4.3-4 show the QA/QC results for metals. Two field blanks (85-BH-15-FB for Record Number 3982 and 85-BH5-15-FB for Record Number 50942), and two equipment blanks (85-BH5-15-EB for Record Number 3982 and 85-BH-15-EB for Record Number 50942) from the screening sample event were analyzed for metals. Results revealed no detections for metals. HE results also revealed no detections (Tables 10.4.3-3 and 10.4.3-2). However, an H qualifier was assigned to the results because holding times were missed by the on-site

laboratory. Results for QA samples for the screening samples all revealed no detections for gamma radiation (Table 10.4.3-2); however, alpha radiation was detected in the field blank and in the equipment blank (Table 10.4.4-3).

Four equipment blanks (85-1BH-008-EB, 85-GR-010-00-EB, 85-4-GR-028-00-EB, 85-1-GR-032-EB) from the confirmatory sampling event were analyzed for metals (Table 10.4.4-1). Results of the blank analyses revealed concentrations of several metals detected below the quantifiable detection limits. Barium was detected in three of the four samples. Chromium was detected in two of the four samples, and there was one detection for silver. Results revealed no detections for HE in the four QA samples (Table 10.4.4-2). However, sample 85-1-BH-008-EB was given an A, R qualifier, signifying that the laboratory accuracy and bias measurement for the LCS did not meet acceptance criteria (the A qualifier) and is therefore not usable for its intended purpose (the R Qualifier). All other QA results met acceptance criteria. Two of the equipment blanks were analyzed for radiological activity using gamma spectroscopy, and two were analyzed for isotopic uranium using alpha spectroscopy (Table 10.4.4-3). For gamma radiation, the results revealed no detections. For isotopic uranium, the results revealed values of 0.001 pCi/g for uranium-233/234, 0.007 pCi/g for uranium-235 and 0.07 pCi/g for uranium-238 from sample 85-GR-010-EB.

10.4.4.6 Data Validation

Metals

The confirmatory data sampling data were validated at Level III data quality level. For the metals for Analysis Request/Chain of Custody (AR/COC) 6615, the data are considered acceptable, and the QC results are adequate; however, field precision did not meet acceptance criteria for the associated field duplicate pair. In addition, the relative percent difference (RPD) for the MS/MSD did not meet the criteria for lead. Because of sample heterogeneity associated with the soil samples, lead were results assigned J values for the samples associated with sample pair 85-1-GR-020-SSO, 85-1-GR-020-SSD. This is consistent where RPD exceeds 20 percent and 35 percent for technical review purposes. The matrix blank shows lead at levels above the reportable detection limits. No data are qualified in the equipment blank (Sample Number 85-4-GR-028-00-EB) because the sample results are greater than five times the blank.

For AR/COC 6354 metals, the QC results are acceptable. The field duplicate pairs show an RPD outside the control limits for chromium. The sample results for these associated samples were J valued.

Organics

For organic results for AR/COC 6615, all data are acceptable and QC measures are adequate. No data are qualified.

For AR/COC 6354 for organic results, the laboratory accuracy for LCS did not meet the acceptance criteria. The data are not usable for the intended purposes. The LCS percent recoveries were below the acceptable limits for half the analyses in the LCS. No LCSD was

reported, and no MS/MSD were run on the samples from AR/COC 6354. The MS/MSD was reported from AR/COC 6615 and met the limits. The sample results were assigned A,R values, because in the samples yielded no detections. The LCSD percent recovery for the aqueous samples was below the acceptance limits for over half of the analytes in the LCSD. The LCS met the acceptance limits, but the MS/MSD did not. Because no analytes were detected, all associated sample results were assigned qualified A, R values. It is noted that although the explosives data analyses were not acceptable as Level III data, the results do compare favorably with the results for AR/COC 6615, which is acceptable, and with the screening sample results shown in Table 10.4.3-3. All these data revealed no detections. The unacceptable Level III data were, therefore, not used for risk assessment purposes. The results, however, are comparable to the acceptable Level III data. This correlation provides strong evidence for the absence of explosives contamination at the site.

10.5 Site Conceptual Model

Section 10.5 describes the conceptual model for SWMU 85 and summarizes the nature and extent of contamination and the environmental fate of COCs.

10.5.1 Nature and Extent of Contamination

Review of the analytical data at SWMU 85 identified several COC at concentrations above approved background limits, including arsenic, barium, chromium, lead, nickel, and silver for metals; HMX for explosives; and the radiological constituents uranium-238 and uranium-235 (see Table 10.5.1-1). Mercury, silver, selenium, and cadmium do not have quantified background limits; therefore, it is not known whether these constituents exceed background and are included in Table 10.5.1-1. These COCs, however, do not pose significant risk to human health or the environment, based upon maximum concentrations detected in surface and subsurface soils at SWMU 85. The nature and extent of contamination is discussed below.

Firing Site 1

The metals arsenic, barium, chromium, nickel, and lead were all detected above approved background limits at Firing Site 1. Chromium (at 23 J mg/kg) occurred in one surface soil sample (85-BH-008-0.0-SS) above approved background levels (21.4 mg/kg). Barium also occurred over approved background levels at six surface soil locations. The maximum concentration at Firing Site 1 were 400 mg/kg. Barium (at 370 mg/kg) was also detected above approved background limits in one borehole (85-BH-8-5.0-SS) at a depth of 5 feet.

Lead occurred above approved background limits at seven surface soil locations. The maximum concentration detected at Firing Site 1 was 380 PJ mg/kg. No lead was detected above approved background limits in the boreholes at this location.

Arsenic and nickel occurred above approved background limits in one subsurface location, BH.6. The maximum concentration for these COCs were 4.6 and 38 mg/kg, respectively.

No HE were detected at Firing Site 1, and the radiological activities were all below background levels.

**Table 10.5.1-1
Summary of COCs for SWMU 85**

COC Type	Number of Samples (surface/subsurface)	COCs greater than background	Maximum Background Limit/SWTA ^a (surface/subsurface except where noted)	Maximum Concentration (mg/kg except where noted)	Average Concentration ^b (surface/subsurface) (mg/kg except where noted)	Sampling Locations Where Background Concentration Limit Exceeded
Inorganic Nonradio-nuclides	41/9	Barium	130 / 214	400/370	115/162	85-BH-006-00-S, 85-BH-006-0.0-SD, 85-BH-007-0.0-S, 85-BH-007-0.0-SD, 85-1-GR-016-0.0-SSO, 85-1-GR-017-0.0-SSO, 85-1-GR-018-0.0-SSO, 85-GR-019-0.0-SSO, 85-1-GR-020-SSD, 85-4-GR-025-0.0-SSO, 85-BH-008-5.0-S
		Chromium	17.3/15.9	23/NA ^c	9.06/NA	85-BH-008-0.0-SS
		Lead	21.4/11.8	380 PJ/NA	35.5/NA	85-BH-006-0.0-S, 85-BH-006-0.0-SD, 85-1-GR-017-0.0-SSD, 85-1-GR-016-0.0-SSO, 85-1-GR-018-0.0-SSO, 85-1-GR-019-0.0-SSO, 85-1-GR-020-0.0-SSO, 85-1-GR-023-0.0-SSO
		Silver	<1.0/<1.0	3.0/NA	0.3/0.11(ND)	85-GR-007-0.0-SS
		Arsenic	5.6/4.4	NA/4.6	NA/3.4	85-BH-006-10-S
		Cadmium	<1.0 ^d /0.9	0.399/NA	0.21/NA	All surface samples were less than the nonquantified background values
		Mercury	<0.25/<0.1	0.165 J/ND (all)	0.077/0.11	All surface samples were less than the nonquantified background values
		Nickel	11.5/11.5	NA/38	NA/11.8	85-BH-006-5.0-S
		Selenium	<1 ^d / ^d <1 ^d	0.815/0.38 J	0.523/0.33	All surface samples were less than the nonquantified background values
Explosives	41/9	HMX	NA	8400 µg/kg	Not calculated ^e	85-4-GR-026-0.0-SSO
Radionuclides		U-238	1.4/1.4 pCi/g	26.7/1.21 pCi/g	Not calculated ^f	85-2-GR-012-0.0-SSO, 85-2-GR-013-0.0-SSO, 85-2-GR-013-0.0-SSD, 85-2-GR-014-0.0-SSO, 85-1-GR-030-0.0-SS, 85-1-GR-032-0.0-SSO, 85-2-GR-011-SSO, 85-4-GR-025-0.0-SSO, 14E1C-SS, 14E1D-SS, 14-GR-090297
		U-235	0.16/0.16 pCi/g	0.54/NA pCi/g	Not calculated ^f	85-2-GR-012-0.0-SSO, 85-2-GR-013-0.0-SSO, 85-2-GR-013-0.0-SSD, 85-2-GR-014-0.0-SSO,

^aFrom Dinwiddie (September 1997).

^bAverage concentration includes all samples and duplicates, and nondetects with MDLs greater than background.

^cAll values are below background levels.

^dUnquantified background levels.

^eHMX was detected in one sample. All others were nondetect.

^fAn average minimum detectable activity (MDA) is not calculated due to the variability of the counting error and the number of reported nondetectable activities. These nondetectable activities are solely a function of instrument counting duration, rather than an indication of the presence or absence of a specific radionuclide in the environment.

µg/kg = Microgram(s) per kilogram.

pCi/g = Picocurie(s) per gram.

COC = Constituent of concern.

PJ = Laboratory precision measurements do not meet acceptance criteria.

mg/kg = Milligram(s) per kilogram.

SWMU = Solid waste management unit.

NA = Not applicable.

SWTA = Southwest Test Area.

Contamination at Firing Site 1 consists of barium, lead, and chromium that extends laterally and to the area around the cable run boxes (Figure 10.4.4-1). The contamination extends vertically no deeper than 5 feet bgs (e.g., barium in BH-8 at a concentration of 370 mg/kg). At 10 and 15 feet bgs, barium is below the NMED-approved subsurface background limit.

Firing Site 2

No nonradiological metals were detected above approved background limits at Firing site 2 and no explosives were detected. The primary COCs at Firing Site 2 are the radionuclides uranium-238 and uranium-235. These constituents appear to be centered on the VGES tank, which would be their likely source (Figure 10.4.4-1). The horizontal extent of radiological contamination was defined by the RUST Geotech Inc. survey and VCM that were conducted in July and September 1995 and from March through June 1996. RUST Geotech Inc. removed all contamination that was 30 percent greater than local background. However, the confirmation sampling that was conducted from September through October 1997 indicates that some soil contamination at levels greater than NMED-approved background levels remains. The maximum activities are 2.67 pCi/g for uranium-238 and 0.31 pCi/g for uranium-235. These values are within acceptable risk levels as discussed in Annex 10-C.

The subsurface soils at Firing Site 2 were investigated in the SWMU 14 investigation (SNL/NM June 1998). Sample locations ER14-TR1-003-3.0-TR and ER14-TR6-018-3.0-TR were collected at a depth of 3 feet in the area of the VGES tank (see Figure 3.4.4-1 and Tables 3.4.4-1, 3.4.4-2 and 3.4.4-3 in Annex 10-C). When compared to approved background limits, these data shows that metals and radionuclides are within acceptable limits and HE is nondetect at this depth. Impact to the subsurface soils from these COCs was determined to be minimal (see Annex 10-C). These results are described more completely in the SWMU 14 NFA Proposal (SNL/NM June 1998).

Firing Site 3

Silver (at 3.00 mg/kg) was the only metal detected at a concentration above background at Firing Site 3 in one sample (85-GR-007-0.0-SS) (Figure 10.4.4-2). No explosives were detected at levels above approved background limits. Gamma activities for thorium-234 (85-GR-007-0.0-SS) and radium-228 (85-GR-006-0.0-SS and 85-GR-007-0.0-SS) were detected above NMED-approved background levels.

Firing Site 4

Barium, the only nonradiological metal detected above approved background limits at Firing Site 4, was detected in surface soil sample 85-4-GR-025-0.0-SSO (Figure 10.4.4-3). The explosive compound HMX was detected in 85-4-GR-026-0.0-SSO. Uranium-238 was the only radiological metal of concern that was detected above background. Contamination at Firing Site 4 appears to be localized in the immediate area of these samples. The sample 85-4-GR-026 0.0-SSO was collected near the center of the firing site, which would be the immediate firing test area. This was near an area of discolored surface soils. This material was black carbonaceous material that occurred as a thin (less than 2-inch-thick) discontinuous layer in the immediate area of 85-4-GR-027-0.0-SS. This material covers an approximate area of less than 100 square feet.

No hazardous or radiological constituents were detected above NMED-approved background levels in this sample. Explosives detections were below the background limits.

The barium and uranium that were detected in 85-4-GR-025-0.0-SSO appear to be local anomalies. This location is 200 feet from the center of the test site. It is unlikely that this material is anthropogenic. Concentrations/activities of these constituents would be expected to be higher closer to the point of origin of the firing test (i.e., the center of the firing site). Concentrations in samples from this area were all at less than NMED-approved background limits. This material may, therefore, reflect a local soil anomaly, and the extent of contamination appears to be confined to the HMX anomaly at 85-4-GR-026-SS.

10.5.2 Environmental Fate

From the background interviews and from knowledge of the site operations, the primary sources of COCs at SWMU 85 were nonradiological metals (primarily beryllium) and HE from subsurface firing tests at Firing Site 1; DU and metals from the steam reaction tests at the VGES tank on the surface soil at Firing Site 2; and DU, C-4 explosives, and barium from Baratol explosives on the surface of the firing sites from surface tests.

The primary nonradiological metals that were detected above NMED-approved background levels include arsenic, barium, chromium, nickel, lead, and silver. Mercury, cadmium, and selenium levels, however, must be considered in a risk assessment of the SWMU because they do not have quantified background concentrations. Radiological constituents above background levels include uranium-238 and uranium-235. The explosive, HMX was also detected (see Table 10.5.1-1).

Figure 10.5.2-1 shows the environmental fate for the constituents at SWMU 85. The current and future projected land uses for SWMU 85 are industrial (DOE and USAF March 1996.) The potential human receptor is the industrial worker. Exposure routes to industrial workers would be through dust emissions from surface soil and dust contamination through ingestion or by external irradiation. Ecological receptors would be more affected by the uptake of biota, ingestion and dermal contact of surface-water runoff, and percolation to the vadose zone.

Several factors preclude a groundwater pathway as a potential exposure route. The infiltration rates for the SWTA have been determined to be on the order of 0.002 to 0.071 cm/yr, and seepage rates from 0.03 to 11.8 cm/yr (see Section 10.2.1). Groundwater has been estimated to be at an approximate depth of 347 feet bgs. High-partitioning coefficients and low mobility of the ions of the COCs would dilute the low concentrations of these constituents even more. For these reasons, groundwater was not evaluated as a contaminant migration pathway. Annex 10-C provides additional discussion of the exposure routes and receptors at SWMU 85.

10.6 Site Assessments

10.6.1 Summary

The site assessment concludes that SWMU 85 does not have significant potential to affect human health under an industrial land-use scenario. After consideration of the uncertainties associated with the available data and modeling assumptions, ecological risks associated with

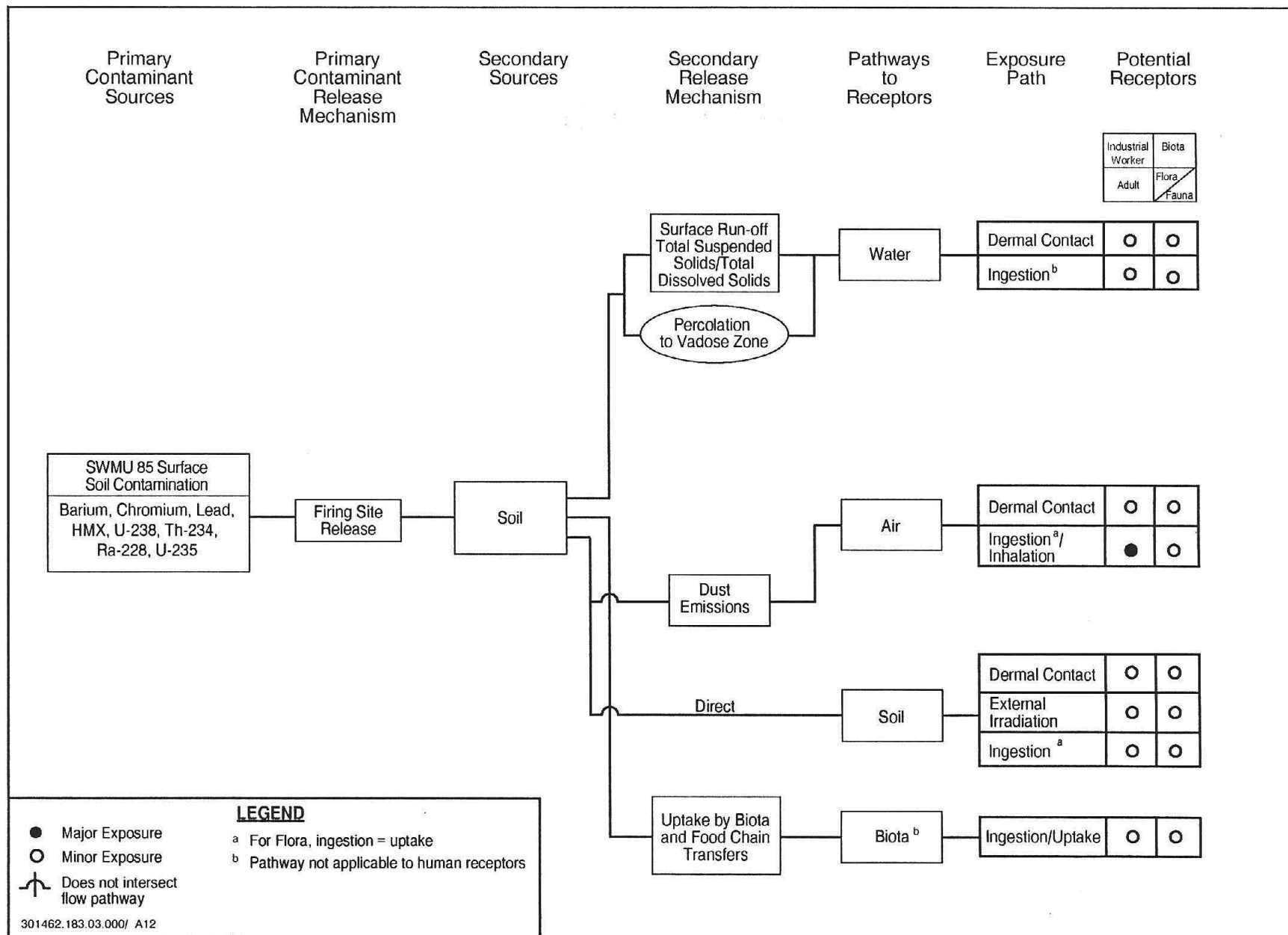


Figure 10.5.2-1
Conceptual Model Flow Diagram for SWMU 85, Building 9920 – Firing Site

This page intentionally left blank.

SWMU 85 were found to be insignificant. This section briefly describes and Annex 10-C provides detailed descriptions of the site assessments.

10.6.2 Screening Assessments

10.6.2.1 Human Health

SWMU 85 has been recommended for industrial land-use (DOE and USAF March 1996). Annex 10-C provides a complete discussion of the risk assessment process, results, and uncertainties.

Because COCs are present in concentrations or activity levels greater than background levels, it was necessary to perform a health risk screening assessment analysis for the site. Besides COC metals, this assessment included any HE detected above their reporting limits and any radionuclide compounds detected either above background levels and/or MDAs. The risk assessment process provides a quantitative evaluation of the potential adverse human health effects caused by constituents in the site's soil. The Risk Assessment Report calculated the hazard index (HI) and excess cancer risk for both an industrial land-use and residential land-use setting. The excess cancer risk from nonradiological COCs and the radiological COCs is not additive (EPA 1989).

In summary, the HI calculated for SWMU 85 nonradiological COCs is 0.03 for an industrial land-use setting, which is less than the numerical standard of 1.0 suggested by risk assessment guidance (EPA 1989). Incremental risk is determined by subtracting risk associated with background from potential nonradiological COC risk. The incremental HI is 0.02. The total excess cancer risk for SWMU 85 nonradiological COCs is $2\text{E}-6$ for an industrial land use setting. Guidance from the NMED indicates that excess lifetime risk of developing cancer by an individual must be less than $1\text{E}-6$ for Class A and B carcinogens and less than $1\text{E}-5$ for Class C carcinogens (NMED March 1998). Thus, the total excess cancer risk for this site is above the suggested acceptable risk value ($1\text{E}-6$). However, the incremental excess cancer risk for SWMU 85 is $5\text{E}-8$, which is below proposed guidelines.

The incremental total effective dose equivalent for radionuclides for an industrial land-use setting for SWMU 85 is $7.4\text{E}-1$ millirem (mrem)/yr which is well below the recommended dose limit of 15 mrem/yr found in EPA's OSWER Directive No. 9200.4-18 and reflected in a document entitled "Sandia National Laboratories, New Mexico Environmental Restoration Project—RESRAD Input Parameter Assumptions and Justification" (SNL/NM February 1998). The incremental excess cancer risk for radionuclides is $8.3\text{E}-6$ for industrial land-use scenario, which is much less than risk values calculated from naturally occurring radiation and from intakes considered background concentration values.

The residential land-use scenarios for this site are provided only for comparison in the Risk Assessment Report (Annex 10-C). The report concludes that SWMU 85 does not have significant potential to affect human health under an industrial land-use scenario.

10.6.2.2 *Ecological*

As set forth by the NMED Risk-Based Decision Tree, an ecological screening assessment that corresponds with the screening procedures (NMED March 1998) in the EPA's Ecological Risk Assessment Guidance for Superfund (EPA 1997) was performed. An early step in the evaluation is comparing COC concentrations and identifying potentially bioaccumulative constituents. This is presented in Annex 10-C. This methodology also requires a site conceptual model and a food web model be developed and ecological receptors be selected. Each of these items is presented in the "Predictive Ecological Risk Assessment Methodology for SNL/NM ER Program, Sandia National Laboratories/ New Mexico" (IT June 1998) and will not be duplicated here. The screening also includes estimation of exposure and ecological risk.

Tables 16, 17, 18, and 19 of Annex 10-C present the results of the ecological risk assessment screening. Site-specific information was incorporated into the screening assessment when such data were available. Hazard quotients greater than unity were originally predicted; however, closer examination of the exposure assumptions revealed an overestimation of risk primarily attributed to exposure concentration (maximum COC concentration was used in the estimation of risk), exposure setting (area use factors of one were assumed), background risk, quality of analytical data, and use of detection limits as exposure concentrations. Based upon an evaluation of these uncertainties, ecological risks associated with this site are expected to be low.

10.7 **No Further Action Proposal**

10.7.1 **Rationale**

Based upon field investigation data and the human health risk assessment analysis, an NFA is being recommended for SWMU 85 for the following reasons:

- The nature and extent of contamination at SWMU 85 has been defined and are minimal.
- Human health and ecological risk evaluations indicate the COCs will have no significant impact on human health or the environment.

10.7.2 **Criterion**

Based upon the evidence provided above, SWMU 85 is proposed for an NFA decision in conformance with Criterion 5 (NMED March 1998), which states that "the SWMU has been fully characterized and remediated in accordance with current and applicable state or federal regulations and that available data indicate that contaminants pose an acceptable level of risk under current and projected future land use."

REFERENCES

Author [unk] Date [unk]. Interview conducted for the Environmental Restoration Project, Department 7585, ER/7785/1335/108/INT/206, Sandia National Laboratories, Albuquerque, New Mexico.

Dinwiddie, R.S. (New Mexico Environment Department). Letter to M.J. Zamorski (U.S. Department of Energy), "Request for Supplemental Information: Background Concentrations Report, SNL/KAFB." September 24, 1997.

DOE, see U.S. Department of Energy.

EPA, see U.S. Environmental Protection Agency.

Fate, D. (Sandia National Laboratories/New Mexico). Memorandum to B. Marshall, Sandia National Laboratories, Albuquerque, New Mexico. June 1997.

Gaither, K. (Sandia National Laboratories/New Mexico). Memorandum to ERST Files, Sandia National Laboratories, Albuquerque, New Mexico. October 28, 1991.

Hoagland, S. and R. Dello-Russo, February 1995. "Cultural Resources Investigation for Sandia National Laboratories/New Mexico, Environmental Restoration Program, Kirtland Air Force Base, New Mexico," Butler Service Group, Albuquerque, New Mexico.

Hyndman, D.A., April 1997. "Geophysical Investigation of Environmental Site 117 and 14," Sandia National Laboratories, New Mexico," IT Corporation, Albuquerque, New Mexico.

IT, see IT Corporation.

IT Corporation (IT), June 1998. "Predictive Ecological Risk Assessment Methodology for the SNL/NM ER Program, Sandia National Laboratories, New Mexico," IT Corporation, Albuquerque, New Mexico.

New Mexico Environment Department (NMED), March 1998. "RPMP Document Requirement Guide," Hazardous and Radioactive Materials Bureau, RCRA Permits Management Program, New Mexico Environment Department, Santa Fe, New Mexico.

Marshall, B.W., Jr., Memorandum of Record, Sandia National Laboratories, Albuquerque, New Mexico. September 15, 1993.

Martz, M.K. Interview conducted for the Environmental Restoration Project, Department 7585, ER/7585/1332/82/INT/85-111 and ER/7585/1335/INT/85-179, Sandia National Laboratories, Albuquerque, New Mexico. September 23, 1985.

Martz, M.K. Interview conducted for the Environmental Restoration Project, Department 7585, ER/7585/1335/INT/85, Sandia National Laboratories, Albuquerque, New Mexico. October 4, 1985a.

Martz, M.K. Interview conducted for the Environmental Restoration Project, Department 7585, ER/7585/INT/85-138, Sandia National Laboratories, Albuquerque, New Mexico. October 24, 1985b.

New Mexico Environment Department (NMED), March 1998. "RPMP Document Requirement Guide," New Mexico Environment Department, Hazardous and Radioactive Materials Bureau, RCRA Permits Management Program, Santa Fe, New Mexico.

NMED, see New Mexico Environment Department.

Perkins, B. Interview conducted for the Environmental Restoration Project, Department 7585, ER/7585/1335/85/INT/84, CEARP Notes, Sandia National Laboratories, Albuquerque, New Mexico. December 12, 1984.

RUST Geotech Inc. December 1994. "Final Report, Surface Gamma Radiation Surveys for Sandia National Laboratories/New Mexico Environmental Restoration Project," prepared for U.S. Department of Energy by RUST Geotech Inc., Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM) Date [unk]a. "Sandia National Laboratories, Environmental Restoration Program Information Sheet, Site 85," Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), [unk]b. "Utility Plan and Details, Shock Wave Studies Laboratory Building 9926, Site 14, Engineering Drawing 89528," Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), August 1982. "Site Plan West Conc. Test Structure, Flame Facility, Building 9920, Site 14, Engineering Drawing 97327/A1," Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), July 1994. "Verification and Validation of Chemical and Radiochemical Data," TOP 94-03, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), September 1994. "UXO/HE Visual Survey of SWMUs Final Report," Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), March 1995. "Site-Wide Hydrogeologic Characterization Project, Calendar Year 1994 Annual Report," Sandia National Laboratories Environmental Restoration Project, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), October 1995. "Chemical Waste Landfill Groundwater Assessment Report," Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), February 1996. "Sampling and Analysis Plan ER Site 85," Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), March 1996a. "RCRA Facility Investigation Work Plan for Operable Unit 1335, Southwest Test Area," Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories, New Mexico (SNL/NM), March 1996b. "Sitewide Hydrogeologic Characterization Project, Calendar Year 1995, Annual Report" Sandia National Laboratories, Environmental Restoration Project, Albuquerque, New Mexico.

Sandia National Laboratories, New Mexico (SNL/NM), June 1997. Bullets of understanding between NMED/DOE OB and DOE/SNL ER Project for sampling and analyses plans for ER Sites 14 and 85, OU 1335, Southwest Test Area, Sandia National Laboratories, Environmental Restoration Project, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), September 1997. "Final Report, Survey and Removal of Radioactive Surface Contamination at Environmental Restoration Sites, Sandia National Laboratories/New Mexico," SAND97-2320/1/2-UC-902, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), February 1998. "RESRAD Input Parameter Assumptions and Justification," Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), June 1998. "Proposals for No Further Action Environmental Restoration Project," Environmental Restoration Project, Vol. 2, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM) and Inhalation Toxicology Research Institute (ITRI), April 1988. "U.S. DOE Environment, Safety and Health, Office of Environmental Audit Environmental Survey Preliminary Report," Sandia National Laboratories, Albuquerque, New Mexico.

SNL/NM, see Sandia National Laboratories/New Mexico.

U.S. Department of Energy (DOE), Albuquerque Operations Office, Environmental Safety and Health Division, Environmental Program Branch, September 1987, draft. "Comprehensive Environmental Assessment and Response Program (CEARP) Phase 1: Installation Assessment, Sandia National Laboratories, Albuquerque," Albuquerque Operations Office, U.S. Department of Energy, Albuquerque, New Mexico.

U.S. Department of Energy and U.S. Air Force (DOE and USAF), March 1996. "Workbook: Future Use Management Area 7," prepared by Future Use Logistics and Support Working Group in cooperation with the Department of Energy Affiliates and the U.S. Air Force, Albuquerque, New Mexico.

U.S. Department of Energy (DOE), Kirtland Area Office, March 1996. "Environmental Assessment of the Environmental Restoration Project at Sandia National Laboratories/ New Mexico," Kirtland Area Office, U.S. Department of Energy, Albuquerque, New Mexico.

U.S. Environmental Protection Agency (EPA), November 1986. "Test Methods for Evaluating Solid Waste," 3rd ed., Update III, SW-846, Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, D.C.

U.S. Environmental Protection Agency (EPA), April 1987. "Final RCRA Facility Assessment Report of Solid Waste Management Units at Sandia National Laboratories, Albuquerque, New Mexico," Contract No. 68-01-7038, Region 6, U.S. Environmental Protection Agency, Dallas, Texas.

U.S. Environmental Protection Agency (EPA), 1989. "Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual," EPA/540-1089/002, Office of Emergency and Remedial Response, U.S. Environmental Protection Agency, Washington, D.C.

U.S. Environmental Protection Agency (EPA), 1997. "Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risks," Interim Final, U.S. Environmental Protection Agency, Washington, D.C.

New Mexico Environment Department (NMED), March 1998. "RPMP Document Requirement Guide," RCRA Permits Management Program, Hazardous and Radioactive Materials Bureau, and New Mexico Environment Department, Santa Fe, New Mexico.

Young, M. (SNL/NM). Interview conducted for the Environmental Restoration Project, Department 7585, ER/6134/1335/85/INT/96-211 or ER/7585/1335/85/INT/95-200, Sandia National Laboratories, Albuquerque, New Mexico. January 11, 1996.

Young, M., and Wrightson, S. (SNL/NM). Interview conducted for the Environmental Restoration Project, Department 7585, ER/7585/1335/55/95-81, Sandia National Laboratories, Albuquerque, New Mexico. April 4, 1995.

Annex 10-A
Gamma Spectroscopy Results

PAGE 7 OF 1

SF 2001-COC (9-94)

AR/COCC-0394

[illegible]

WHITE - To Accompany Samples. BLUE- To Accompany Samples. YELLOW- SMO Suspense Copy

Organization: 7585

Project Location: Scoping Sampling

Phone: 284-2601

Date Results Needed: 8-3-95

Suspect Isotopes: None

Other Information: 03941

Hazards/Special Instructions:

Batch Log Number

Logged By

Analysis Type

LIMS Login

Results Faxed

Sample Disposal

☒ Gamma Spec

10 H-3

☐ Alpha/Beta

□ Alpha Spec

☐ Total U

☐ Other[illegible]

Post-It [®] brand fax transmittal memo 7671	# of pages
--	------------

To <u>Rose</u>	From <u>Sally</u>
Co. <u>Thanks a</u>	Co. <u>Bunch!</u>
Dept. <u></u>	Phone <u></u>
Fax # <u>284-2025</u>	Fax # <u></u>

Relinquished by [Signature] Date 8-1-95 Time 1036

Received by [Signature] Date 3/1/75 Time 1036

Relinquished by [Signature] Date 8/3/85 Time 1542

Received by SP/LIN Date 8-8-15 Time 1542

Relinquished by _____ Date _____ Time _____

Received by [Signature] Date Time

Relinquished by _____ Date: _____ Time _____

Received by	Date	Time
-------------	------	------

TOTAL P.01

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [Area IV Lab] *
 * 8-08-95 7:49:31 AM *

 * Analyzed by: *R. Preston* 8/08/95 Reviewed by: *[Signature]* 8/8/95 *

Customer : S. WRIGHTSON (7585) SCOPING
 Customer Sample ID : 018007-01
 Lab Sample ID : 50061401

85-BH2-0-S-1

Sample Description : SOLID MARINELLI
 Sample Type : Solid
 Sample Geometry : 1SMAR
 Sample Quantity : 605.000 gram
 Sample Date/Time : 7-31-95 10:15:00 AM
 Acquire Start Date : 8-03-95 11:25:27 AM
 Detector Name : LAB1
 Elapsed Live Time : 6000 seconds
 Elapsed Real Time : 6002 seconds

Comments:

Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	Not Detected	-----	1.43E-01
TH-234	7.50E-01	3.33E-01	3.88E-01
U-234	Not Detected	-----	1.41E+01
RA-226	1.33	4.54E-01	5.96E-01
PB-214	5.86E-01	1.06E-01	7.05E-02
BI-214	5.31E-01	9.58E-02	7.28E-02
PB-210	5.05E-01	3.89E-01	5.54E-01
TH-232	5.22E-01	1.61E-01	1.88E-01
RA-228	6.16E-01	1.89E-01	1.43E-01
AC-228	5.60E-01	1.35E-01	1.31E-01
TH-228	4.73E-01	3.03E-01	4.49E-01
RA-224	1.40	3.42E-01	3.79E-01
PB-212	6.56E-01	1.34E-01	3.77E-02
BI-212	8.03E-01	3.40E-01	4.62E-01
TL-208	6.35E-01	1.21E-01	8.75E-02
U-235	Not Detected	-----	1.84E-01
TH-231	Not Detected	-----	3.72E-01
PA-231	Not Detected	-----	9.38E-01
AC-227	Not Detected	-----	1.32
TH-227	Not Detected	-----	3.53E-01
RA-223	Not Detected	-----	1.46E-01
RN-219	Not Detected	-----	2.50E-01
PB-211	Not Detected	-----	6.61E-01
TL-207	Not Detected	-----	1.57E+01
AM-241	Not Detected	-----	2.03E-01
PU-239	Not Detected	-----	1.89E+02
NP-237	Not Detected	-----	2.56E-01
PA-233	Not Detected	-----	5.19E-02
TH-229	Not Detected	-----	1.98E-01

[Summary Report] - Sample ID: 50061401

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	-----	3.31E-02
AR-41	Not Detected	-----	7.10E+10
BA-133	Not Detected	-----	3.42E-02
BA-140	Not Detected	-----	1.36E-01
CD-109	Not Detected	-----	8.85E-01
CD-115	Not Detected	-----	1.66E-01
CE-139	Not Detected	-----	2.44E-02
CE-141	Not Detected	-----	4.31E-02
CE-144	Not Detected	-----	1.61E-01
CO-56	Not Detected	-----	3.97E-02
CO-57	Not Detected	-----	2.21E-02
CO-58	Not Detected	-----	3.50E-02
CO-60	Not Detected	-----	3.82E-02
CR-51	Not Detected	-----	2.23E-01
CS-134	Not Detected	-----	4.99E-02
CS-137	Not Detected	-----	3.91E-02
CU-64	Not Detected	-----	4.81E+02
EU-152	Not Detected	-----	2.72E-01
EU-154	Not Detected	-----	1.95E-01
EU-155	Not Detected	-----	9.48E-02
FE-59	Not Detected	-----	8.63E-02
GD-153	Not Detected	-----	7.46E-02
HG-203	Not Detected	-----	2.83E-02
I-131	Not Detected	-----	3.65E-02
IN-115m	Not Detected	-----	5.93E+03
IR-192	Not Detected	-----	2.65E-02
K-40	1.73E+01	2.41	2.87E-01
LA-140	Not Detected	-----	1.44E-01
MN-54	1.34E-02	1.30E-02	2.08E-02
MN-56	Not Detected	-----	1.68E+07
MO-99	Not Detected	-----	5.67E-01
NA-22	Not Detected	-----	4.69E-02
NA-24	Not Detected	-----	1.10
NB-95	Not Detected	-----	2.80E-01
ND-147	Not Detected	-----	2.33E-01
NI-57	Not Detected	-----	2.03E-01
BE-7	Not Detected	-----	2.49E-01
RU-103	Not Detected	-----	2.93E-02
RU-106	Not Detected	-----	2.96E-01
SB-122	Not Detected	-----	9.52E-02
SB-124	Not Detected	-----	3.07E-02
SB-125	Not Detected	-----	8.06E-02
SC-46	Not Detected	-----	6.24E-02
SR-85	Not Detected	-----	4.12E-02
TA-182	Not Detected	-----	1.82E-01
TA-183	Not Detected	-----	2.61E-01
TE-132	Not Detected	-----	4.49E-02
TL-201	Not Detected	-----	1.84E-01
V-48	Not Detected	-----	4.41E-02
XE-133	Not Detected	-----	2.19E-01
Y-88	Not Detected	-----	3.37E-02
ZN-65	Not Detected	-----	1.20E-01
ZR-95	Not Detected	-----	6.57E-02

Not detected
RTP 8/08/95

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [Area IV Lab] *
 * 8-08-95 7:57:26 AM *

 * Analyzed by: *R. Preston 8/08/95* Reviewed by: *[Signature] 8/8/95* *

Customer : S. WRIGHTSON (7585) SCOPING
 Customer Sample ID : 018008-01
 Lab Sample ID : 50061402

Sample Description : SOLID MARINELLI
 Sample Type : Solid
 Sample Geometry : 1SMAR
 Sample Quantity : 657.000 gram
 Sample Date/Time : 7-31-95 11:40:00 AM
 Acquire Start Date : 8-03-95 1:48:37 PM
 Detector Name : LAB1
 Elapsed Live Time : 6000 seconds
 Elapsed Real Time : 6002 seconds

85-B43-S-S-1

Comments:

Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	Not Detected	-----	1.44
TH-234	1.10	3.96E-01	3.98E-01
U-234	Not Detected	-----	1.30E+01
RA-226	1.21	4.46E-01	6.07E-01
PB-214	6.08E-01	1.13E-01	8.61E-02
BI-214	5.16E-01	8.79E-02	5.36E-02
PB-210	Not Detected	-----	8.09E-01
TH-232	6.71E-01	1.69E-01	1.62E-01
RA-228	6.97E-01	1.97E-01	1.39E-01
AC-228	6.52E-01	1.47E-01	1.37E-01
TH-228	Not Detected	-----	6.75E-01
RA-224	1.47	3.18E-01	3.49E-01
PB-212	6.69E-01	1.22E-01	3.73E-02
BI-212	7.75E-01	3.33E-01	4.58E-01
TL-208	5.72E-01	1.11E-01	8.33E-02
U-235	Not Detected	-----	1.79E-01
TH-231	1.81E-01	1.16E-01	2.77E-01
PA-231	Not Detected	-----	9.36E-01
AC-227	Not Detected	-----	1.29
TH-227	Not Detected	-----	3.47E-01
RA-223	Not Detected	-----	1.34E-01
RN-219	Not Detected	-----	2.46E-01
PB-211	Not Detected	-----	6.15E-01
TL-207	Not Detected	-----	1.46E+01
AM-241	Not Detected	-----	1.85E-01
PU-239	Not Detected	-----	1.91E+02
NP-237	Not Detected	-----	1.82E-01
PA-233	Not Detected	-----	5.01E-02
TH-229	Not Detected	-----	1.88E-01

[Summary Report] - Sample ID: 50061402

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	-----	3.28E-02
AR-41	Not Detected	-----	9.50E+10
BA-133	Not Detected	-----	3.44E-02
BA-140	Not Detected	-----	1.23E-01
CD-109	Not Detected	-----	8.65E-01
CD-115	Not Detected	-----	1.66E-01
CE-139	Not Detected	-----	2.24E-02
CE-141	Not Detected	-----	4.27E-02
CE-144	Not Detected	-----	1.59E-01
CO-56	Not Detected	-----	3.29E-02
CO-57	Not Detected	-----	2.04E-02
CO-58	Not Detected	-----	3.40E-02
CO-60	Not Detected	-----	3.71E-02
CR-51	Not Detected	-----	2.11E-01
CS-134	Not Detected	-----	4.71E-02
CS-137	2.25E-02	1.47E-02	1.97E-02
CU-64	Not Detected	-----	4.64E+02
EU-152	Not Detected	-----	2.34E-01
EU-154	Not Detected	-----	1.87E-01
EU-155	Not Detected	-----	9.01E-02
FE-59	Not Detected	-----	7.90E-02
GD-153	Not Detected	-----	7.06E-02
HG-203	Not Detected	-----	2.65E-02
I-131	Not Detected	-----	3.32E-02
IN-115m	Not Detected	-----	6.79E+03
IR-192	Not Detected	-----	2.43E-02
K-40	1.54E+01	2.16	3.18E-01
LA-140	Not Detected	-----	1.23E-01
MN-54	Not Detected	-----	3.45E-02
MN-56	Not Detected	-----	1.81E+07
MO-99	Not Detected	-----	5.78E-01
NA-22	Not Detected	-----	4.82E-02
NA-24	Not Detected	-----	9.84E-01
NB-95	Not Detected	-----	2.74E-01
ND-147	Not Detected	-----	2.25E-01
NI-57	Not Detected	-----	1.95E-01
BE-7	Not Detected	-----	2.32E-01
RU-103	Not Detected	-----	2.70E-02
RU-106	Not Detected	-----	2.81E-01
SB-122	Not Detected	-----	8.75E-02
SB-124	Not Detected	-----	3.13E-02
SB-125	Not Detected	-----	7.49E-02
SC-46	Not Detected	-----	5.99E-02
SR-85	Not Detected	-----	3.89E-02
TA-182	Not Detected	-----	1.76E-01
TA-183	Not Detected	-----	2.38E-01
TE-132	Not Detected	-----	4.04E-02
TL-201	Not Detected	-----	1.81E-01
V-48	Not Detected	-----	4.33E-02
XE-133	Not Detected	-----	2.04E-01
Y-88	Not Detected	-----	2.82E-02
ZN-65	Not Detected	-----	1.17E-01
ZR-95	Not Detected	-----	6.25E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [Area IV Lab] *
 * 8-08-95 8:09:11 AM *

 * Analyzed by: *R. Preston 8/08/95* Reviewed by: *[Signature] 8/8/95* *

Customer : S. WRIGHTSON (7585) SCOPING
 Customer Sample ID : 018009-01
 Lab Sample ID : 50061403

Sample Description : SOLID MARINELLI
 Sample Type : Solid
 Sample Geometry : 1SMAR
 Sample Quantity : 546.000 gram
 Sample Date/Time : 7-31-95 1:15:00 PM
 Acquire Start Date : 8-03-95 3:51:53 PM
 Detector Name : LAB1
 Elapsed Live Time : 6000 seconds
 Elapsed Real Time : 6002 seconds

85-BH4-10-S-1

Comments:

Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	Not Detected	-----	1.55
TH-234	Not Detected	-----	6.19E-01
U-234	Not Detected	-----	1.42E+01
RA-226	1.43	5.33E-01	7.27E-01
PB-214	6.25E-01	1.18E-01	9.21E-02
BI-214	5.21E-01	9.77E-02	7.92E-02
PB-210	Not Detected	-----	9.17E-01
TH-232	5.43E-01	1.73E-01	2.06E-01
RA-228	6.27E-01	1.99E-01	1.57E-01
AC-228	7.45E-01	1.64E-01	1.43E-01
TH-228	Not Detected	-----	7.23E-01
RA-224	1.66	3.61E-01	4.16E-01
PB-212	7.08E-01	1.31E-01	4.05E-02
BI-212	8.70E-01	3.99E-01	5.60E-01
TL-208	6.44E-01	1.25E-01	9.09E-02
U-235	Not Detected	-----	1.92E-01
TH-231	Not Detected	-----	3.92E-01
PA-231	Not Detected	-----	1.00
AC-227	Not Detected	-----	1.38
TH-227	Not Detected	-----	3.86E-01
RA-223	Not Detected	-----	1.54E-01
RN-219	Not Detected	-----	2.85E-01
PB-211	Not Detected	-----	7.17E-01
TL-207	Not Detected	-----	1.55E+01
AM-241	Not Detected	-----	2.04E-01
PU-239	Not Detected	-----	2.07E+02
NP-237	Not Detected	-----	2.75E-01
PA-233	Not Detected	-----	5.76E-02
TH-229	Not Detected	-----	2.11E-01

[Summary Report] - Sample ID: 50061403

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	-----	3.27E-02
AR-41	Not Detected	-----	1.36E+11
BA-133	Not Detected	-----	3.80E-02
BA-140	Not Detected	-----	1.42E-01
CD-109	Not Detected	-----	9.55E-01
CD-115	Not Detected	-----	1.76E-01
CE-139	Not Detected	-----	2.49E-02
CE-141	Not Detected	-----	4.60E-02
CE-144	Not Detected	-----	1.73E-01
CO-56	Not Detected	-----	3.81E-02
CO-57	Not Detected	-----	2.26E-02
CO-58	Not Detected	-----	3.41E-02
CO-60	Not Detected	-----	3.97E-02
CR-51	Not Detected	-----	2.27E-01
CS-134	Not Detected	-----	5.56E-02
CS-137	Not Detected	-----	3.65E-02
CU-64	Not Detected	-----	5.60E+02
EU-152	Not Detected	-----	2.79E-01
EU-154	Not Detected	-----	2.19E-01
EU-155	Not Detected	-----	1.02E-01
FE-59	Not Detected	-----	9.41E-02
GD-153	Not Detected	-----	7.93E-02
HG-203	Not Detected	-----	3.04E-02
I-131	Not Detected	-----	3.85E-02
IN-115m	Not Detected	-----	7.73E+03
IR-192	Not Detected	-----	2.64E-02
K-40	1.61E+01	2.28	4.18E-01
LA-140	Not Detected	-----	1.47E-01
MN-54	Not Detected	-----	4.20E-02
MN-56	Not Detected	-----	2.38E+07
MO-99	Not Detected	-----	6.52E-01
NA-22	Not Detected	-----	5.25E-02
NA-24	Not Detected	-----	1.28
NB-95	Not Detected	-----	3.08E-01
ND-147	Not Detected	-----	2.60E-01
NI-57	Not Detected	-----	2.32E-01
BE-7	Not Detected	-----	2.59E-01
RU-103	Not Detected	-----	3.16E-02
RU-106	Not Detected	-----	3.02E-01
SB-122	Not Detected	-----	9.67E-02
SB-124	Not Detected	-----	3.60E-02
SB-125	Not Detected	-----	8.70E-02
SC-46	Not Detected	-----	6.67E-02
SR-85	Not Detected	-----	4.42E-02
TA-182	Not Detected	-----	1.93E-01
TA-183	Not Detected	-----	2.69E-01
TE-132	Not Detected	-----	4.71E-02
TL-201	Not Detected	-----	1.99E-01
V-48	Not Detected	-----	4.55E-02
XE-133	Not Detected	-----	2.34E-01
Y-88	Not Detected	-----	3.35E-02
ZN-65	Not Detected	-----	1.26E-01
ZR-95	Not Detected	-----	6.73E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [Area IV Lab] *
 * 8-08-95 8:21:06 AM *

 * Analyzed by: R. Prutor 8/08/95 Reviewed by: [Signature] 8/8/95 *

Customer : S. WRIGHTSON (7585) SCOPING
 Customer Sample ID : 018011-01
 Lab Sample ID : 50061404

85-BH5-15-S-1

Sample Description : SOLID MARINELLI
 Sample Type : Solid
 Sample Geometry : 1SMAR
 Sample Quantity : 502.000 gram
 Sample Date/Time : 7-31-95 2:15:00 PM
 Acquire Start Date : 8-04-95 8:04:43 AM
 Detector Name : LAB1
 Elapsed Live Time : 6000 seconds
 Elapsed Real Time : 6002 seconds

Comments:

Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	6.61E-01	5.72E-01	1.09
TH-234	1.10	4.33E-01	4.71E-01
U-234	Not Detected	-----	1.58E+01
RA-226	1.69	5.40E-01	6.86E-01
PB-214	7.30E-01	1.35E-01	9.82E-02
BI-214	6.35E-01	1.09E-01	6.62E-02
PB-210	5.80E-01	4.28E-01	5.91E-01
TH-232	6.11E-01	1.71E-01	1.78E-01
RA-228	6.10E-01	2.18E-01	2.78E-01
AC-228	7.18E-01	1.57E-01	1.26E-01
TH-228	Not Detected	-----	7.60E-01
RA-224	1.88	4.04E-01	4.12E-01
PB-212	6.69E-01	1.26E-01	4.07E-02
BI-212	5.58E-01	3.70E-01	5.57E-01
TL-208	5.96E-01	1.24E-01	1.04E-01
U-235	Not Detected	-----	2.17E-01
TH-231	Not Detected	-----	4.35E-01
PA-231	Not Detected	-----	1.05
AC-227	Not Detected	-----	1.56
TH-227	Not Detected	-----	3.94E-01
RA-223	Not Detected	-----	1.74E-01
RN-219	Not Detected	-----	3.05E-01
PB-211	Not Detected	-----	7.53E-01
TL-207	Not Detected	-----	1.63E+01
AM-241	Not Detected	-----	2.19E-01
PU-239	Not Detected	-----	2.26E+02
NP-237	Not Detected	-----	2.18E-01
PA-233	Not Detected	-----	6.13E-02
TH-229	Not Detected	-----	2.27E-01

[Summary Report] - Sample ID: 50061404

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	-----	3.50E-02
AR-41	Not Detected	-----	4.36E+13
BA-133	Not Detected	-----	3.98E-02
BA-140	Not Detected	-----	1.61E-01
CD-109	Not Detected	-----	1.07
CD-115	Not Detected	-----	2.40E-01
CE-139	Not Detected	-----	2.66E-02
CE-141	Not Detected	-----	5.25E-02
CE-144	Not Detected	-----	1.85E-01
CO-56	Not Detected	-----	3.93E-02
CO-57	Not Detected	-----	2.45E-02
CO-58	Not Detected	-----	4.01E-02
CO-60	Not Detected	-----	4.74E-02
CR-51	Not Detected	-----	2.64E-01
CS-134	Not Detected	-----	6.35E-02
CS-137	Not Detected	-----	3.95E-02
CU-64	Not Detected	-----	1.40E+03
EU-152	Not Detected	-----	2.89E-01
EU-154	Not Detected	-----	2.13E-01
EU-155	Not Detected	-----	1.09E-01
FE-59	Not Detected	-----	9.71E-02
GD-153	Not Detected	-----	8.79E-02
HG-203	Not Detected	-----	3.20E-02
I-131	Not Detected	-----	4.12E-02
IN-115m	Not Detected	-----	9.07E+04
IR-192	Not Detected	-----	2.94E-02
K-40	1.70E+01	2.41	4.06E-01
LA-140	Not Detected	-----	2.17E-01
MN-54	Not Detected	-----	4.44E-02
MN-56	Not Detected	-----	1.46E+09
MO-99	Not Detected	-----	7.91E-01
NA-22	Not Detected	-----	5.50E-02
NA-24	Not Detected	-----	2.93
NB-95	Not Detected	-----	3.61E-01
ND-147	Not Detected	-----	2.88E-01
NI-57	Not Detected	-----	3.61E-01
BE-7	Not Detected	-----	2.83E-01
RU-103	Not Detected	-----	3.45E-02
RU-106	Not Detected	-----	3.50E-01
SB-122	Not Detected	-----	1.21E-01
SB-124	Not Detected	-----	4.05E-02
SB-125	Not Detected	-----	9.13E-02
SC-46	Not Detected	-----	7.63E-02
SR-85	Not Detected	-----	4.65E-02
TA-182	Not Detected	-----	2.18E-01
TA-183	Not Detected	-----	3.14E-01
TE-132	Not Detected	-----	5.82E-02
TL-201	Not Detected	-----	2.59E-01
V-48	Not Detected	-----	5.29E-02
XE-133	Not Detected	-----	2.97E-01
Y-88	Not Detected	-----	3.29E-02
ZN-65	Not Detected	-----	1.42E-01
ZR-95	Not Detected	-----	8.16E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [Area IV Lab] *
 * 8-08-95 8:46:02 AM *

 * Analyzed by: *R. Preston 8/08/95* Reviewed by: *[Signature] 8/18/95* *

Customer : S. WRIGHTSON (7585) SCOPING
 Customer Sample ID : 018010-01
 Lab Sample ID : 50061407

Sample Description : SOLID MARINELLI
 Sample Type : Solid
 Sample Geometry : 1SMAR
 Sample Quantity : 592.000 gram
 Sample Date/Time : 7-31-95 2:15:00 PM
 Acquire Start Date : 8-04-95 1:24:31 PM
 Detector Name : LAB1
 Elapsed Live Time : 6000 seconds
 Elapsed Real Time : 6002 seconds

85-BH5-15-SD-1

Comments:

Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	Not Detected	-----	1.53
TH-234	Not Detected	-----	5.77E-01
U-234	Not Detected	-----	1.42E+01
RA-226	1.69	4.76E-01	5.64E-01
PB-214	6.51E-01	1.10E-01	4.87E-02
BI-214	6.47E-01	1.10E-01	7.14E-02
PB-210	8.27E-01	3.71E-01	3.31E-01
TH-232	7.18E-01	1.92E-01	1.99E-01
RA-228	6.11E-01	2.26E-01	1.53E-01
AC-228	7.39E-01	1.49E-01	1.02E-01
TH-228	Not Detected	-----	7.23E-01
RA-224	1.38	3.14E-01	4.17E-01
PB-212	7.17E-01	1.39E-01	3.77E-02
BI-212	7.30E-01	3.45E-01	4.85E-01
TL-208	5.85E-01	1.13E-01	8.26E-02
U-235	Not Detected	-----	1.86E-01
TH-231	Not Detected	-----	3.91E-01
PA-231	Not Detected	-----	1.00
AC-227	Not Detected	-----	1.41
TH-227	Not Detected	-----	3.71E-01
RA-223	Not Detected	-----	1.59E-01
RN-219	Not Detected	-----	2.66E-01
PB-211	Not Detected	-----	7.04E-01
TL-207	Not Detected	-----	1.57E+01
AM-241	Not Detected	-----	2.08E-01
PU-239	Not Detected	-----	2.02E+02
NP-237	Not Detected	-----	2.73E-01
PA-233	Not Detected	-----	5.58E-02
TH-229	Not Detected	-----	1.94E-01

[Summary Report] - Sample ID: 50061407

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	-----	3.24E-02
AR-41	Not Detected	-----	2.94E+14
BA-133	Not Detected	-----	3.34E-02
BA-140	Not Detected	-----	1.41E-01
CD-109	Not Detected	-----	9.56E-01
CD-115	Not Detected	-----	2.38E-01
CE-139	Not Detected	-----	2.49E-02
CE-141	Not Detected	-----	4.68E-02
CE-144	Not Detected	-----	1.76E-01
CO-56	Not Detected	-----	3.70E-02
CO-57	Not Detected	-----	2.31E-02
CO-58	Not Detected	-----	3.56E-02
CO-60	Not Detected	-----	4.08E-02
CR-51	Not Detected	-----	2.40E-01
CS-134	Not Detected	-----	5.67E-02
CS-137	Not Detected	-----	3.68E-02
CU-64	Not Detected	-----	1.59E+03
EU-152	Not Detected	-----	2.61E-01
EU-154	Not Detected	-----	2.11E-01
EU-155	Not Detected	-----	9.97E-02
FE-59	Not Detected	-----	9.24E-02
GD-153	Not Detected	-----	7.47E-02
HG-203	Not Detected	-----	2.91E-02
I-131	Not Detected	-----	3.97E-02
IN-115m	Not Detected	-----	1.91E+05
IR-192	Not Detected	-----	2.75E-02
K-40	1.57E+01	2.22	3.98E-01
LA-140	Not Detected	-----	2.01E-01
MN-54	Not Detected	-----	3.90E-02
MN-56	Not Detected	-----	5.73E+09
MO-99	Not Detected	-----	6.99E-01
NA-22	Not Detected	-----	5.11E-02
NA-24	Not Detected	-----	3.00
NB-95	9.06E-02	5.05E-02	1.28E-01
ND-147	Not Detected	-----	2.69E-01
NI-57	Not Detected	-----	3.58E-01
BE-7	Not Detected	-----	2.64E-01
RU-103	Not Detected	-----	3.01E-02
RU-106	Not Detected	-----	2.88E-01
SB-122	Not Detected	-----	1.18E-01
SB-124	Not Detected	-----	3.41E-02
SB-125	Not Detected	-----	8.53E-02
SC-46	Not Detected	-----	6.17E-02
SR-85	Not Detected	-----	4.34E-02
TA-182	Not Detected	-----	1.82E-01
TA-183	Not Detected	-----	3.06E-01
TE-132	Not Detected	-----	5.38E-02
TL-201	Not Detected	-----	2.39E-01
V-48	Not Detected	-----	4.52E-02
XE-133	Not Detected	-----	2.95E-01
Y-88	Not Detected	-----	3.47E-02
ZN-65	Not Detected	-----	1.20E-01
ZR-95	Not Detected	-----	6.35E-02

not detected
RTP 8/08/95

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [Area IV Lab] *
 * 8-08-95 8:28:46 AM *

 * Analyzed by: *R. Preston* 8/08/95 Reviewed by: *[Signature]* 8/8/95 *

Customer : S. WRIGHTSON (7585) SCOPING
 Customer Sample ID : 018012-01
 Lab Sample ID : 50061405

Sample Description : LIQUID MARINELLI
 Sample Type : Liquid
 Sample Geometry : 1WMAR
 Sample Quantity : 500.000 mL
 Sample Date/Time : 7-31-95 3:10:00 PM
 Acquire Start Date : 8-04-95 9:51:28 AM
 Detector Name : LAB1
 Elapsed Live Time : 6000 seconds
 Elapsed Real Time : 6001 seconds

85-BH5-15-EB-1

Comments:

Nuclide	Activity (pCi/mL)	2S Error	MDA
U-238	Not Detected	-----	6.51E-01
TH-234	Not Detected	-----	2.75E-01
U-234	Not Detected	-----	7.04
RA-226	1.83E-01	2.31E-01	3.73E-01
PB-214	Not Detected	-----	3.90E-02
BI-214	Not Detected	-----	4.65E-02
PB-210	Not Detected	-----	6.26E-01
TH-232	Not Detected	-----	1.07E-01
RA-228	Not Detected	-----	1.35E-01
AC-228	Not Detected	-----	7.98E-02
TH-228	Not Detected	-----	3.67E-01
RA-224	Not Detected	-----	3.48E-01
PB-212	Not Detected	-----	3.17E-02
BI-212	Not Detected	-----	3.09E-01
TL-208	Not Detected	-----	6.06E-02
U-235	Not Detected	-----	8.59E-02
TH-231	Not Detected	-----	1.54E-01
PA-231	Not Detected	-----	5.09E-01
AC-227	Not Detected	-----	6.60E-01
TH-227	Not Detected	-----	1.20E-01
RA-223	Not Detected	-----	6.33E-02
RN-219	Not Detected	-----	1.18E-01
PB-211	Not Detected	-----	3.27E-01
TL-207	Not Detected	-----	7.72
AM-241	Not Detected	-----	9.84E-02
PU-239	Not Detected	-----	9.15E+01
NP-237	Not Detected	-----	9.69E-02
PA-233	Not Detected	-----	3.20E-02
TH-229	Not Detected	-----	9.27E-02

[Summary Report] - Sample ID: 50061405

Nuclide	Activity (pCi/mL)	2S Error	MDA
AG-110m	Not Detected	-----	1.88E-02
AR-41	Not Detected	-----	3.27E+13
BA-133	Not Detected	-----	2.13E-02
BA-140	Not Detected	-----	6.66E-02
CD-109	Not Detected	-----	3.28E-01
CD-115	Not Detected	-----	9.23E-02
CE-139	Not Detected	-----	1.15E-02
CE-141	Not Detected	-----	2.13E-02
CE-144	Not Detected	-----	8.68E-02
CO-56	Not Detected	-----	2.26E-02
CO-57	Not Detected	-----	1.12E-02
CO-58	Not Detected	-----	1.96E-02
CO-60	Not Detected	-----	2.41E-02
CR-51	Not Detected	-----	1.38E-01
CS-134	Not Detected	-----	2.27E-02
CS-137	Not Detected	-----	1.81E-02
CU-64	Not Detected	-----	6.68E+02
EU-152	Not Detected	-----	1.62E-01
EU-154	Not Detected	-----	1.10E-01
EU-155	Not Detected	-----	4.51E-02
FE-59	Not Detected	-----	4.31E-02
GD-153	Not Detected	-----	3.44E-02
HG-203	Not Detected	-----	1.64E-02
I-131	Not Detected	-----	2.19E-02
IN-115m	Not Detected	-----	3.93E+04
IR-192	Not Detected	-----	1.50E-02
K-40	Not Detected	-----	2.72E-01
LA-140	Not Detected	-----	1.41E-01
MN-54	Not Detected	-----	2.33E-02
MN-56	Not Detected	-----	1.05E+09
MO-99	Not Detected	-----	4.17E-01
NA-22	Not Detected	-----	2.16E-02
NA-24	Not Detected	-----	1.50
NB-95	Not Detected	-----	1.14E-01
ND-147	Not Detected	-----	1.44E-01
NI-57	Not Detected	-----	1.38E-01
BE-7	Not Detected	-----	1.43E-01
RU-103	Not Detected	-----	1.68E-02
RU-106	Not Detected	-----	1.72E-01
SB-122	Not Detected	-----	6.28E-02
SB-124	Not Detected	-----	2.17E-02
SB-125	Not Detected	-----	5.03E-02
SC-46	Not Detected	-----	2.41E-02
SR-85	Not Detected	-----	2.97E-02
TA-182	Not Detected	-----	7.11E-02
TA-183	Not Detected	-----	1.42E-01
TE-132	Not Detected	-----	2.82E-02
TL-201	Not Detected	-----	9.87E-02
V-48	Not Detected	-----	2.36E-02
XE-133	Not Detected	-----	1.10E-01
Y-88	Not Detected	-----	2.86E-02
ZN-65	Not Detected	-----	4.92E-02
ZR-95	Not Detected	-----	3.27E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [Area IV Lab] *
 * 8-08-95 8:37:31 AM *

 * Analyzed by: *R. Preston 8/08/95* Reviewed by: *[Signature] 8/8/95* *

Customer : S. WRIGHTSON (7585) SCOPING
 Customer Sample ID : 018013-01
 Lab Sample ID : 50061406

Sample Description : LIQUID MARINELLI
 Sample Type : Liquid
 Sample Geometry : 1WMAR
 Sample Quantity : 500.000 mL
 Sample Date/Time : 7-31-95 3:10:00 PM
 Acquire Start Date : 8-04-95 11:37:22 AM
 Detector Name : LAB1
 Elapsed Live Time : 6000 seconds
 Elapsed Real Time : 6001 seconds

85-BH5-15-FB-1

Comments:

Nuclide	Activity (pCi/mL)	2S Error	MDA
U-238	Not Detected	-----	6.86E-01
TH-234	Not Detected	-----	2.46E-01
U-234	Not Detected	-----	6.85
RA-226	Not Detected	-----	2.93E-01
PB-214	Not Detected	-----	3.86E-02
BI-214	Not Detected	-----	4.83E-02
PB-210	Not Detected	-----	6.26E-01
TH-232	Not Detected	-----	1.08E-01
RA-228	Not Detected	-----	1.22E-01
AC-228	Not Detected	-----	8.65E-02
TH-228	Not Detected	-----	3.74E-01
RA-224	Not Detected	-----	3.29E-01
PB-212	Not Detected	-----	2.99E-02
BI-212	Not Detected	-----	2.70E-01
TL-208	Not Detected	-----	6.34E-02
U-235	Not Detected	-----	8.77E-02
TH-231	Not Detected	-----	1.69E-01
PA-231	Not Detected	-----	5.19E-01
AC-227	Not Detected	-----	6.66E-01
TH-227	Not Detected	-----	1.08E-01
RA-223	Not Detected	-----	6.85E-02
RN-219	Not Detected	-----	1.17E-01
PB-211	Not Detected	-----	3.99E-01
TL-207	Not Detected	-----	8.83
AM-241	Not Detected	-----	1.00E-01
PU-239	Not Detected	-----	8.34E+01
NP-237	Not Detected	-----	1.12E-01
PA-233	Not Detected	-----	2.97E-02
TH-229	Not Detected	-----	9.23E-02

[Summary Report] - Sample ID: 50061406

Nuclide	Activity (pCi/mL)	2S Error	MDA
AG-110m	Not Detected	-----	1.96E-02
AR-41	Not Detected	-----	6.83E+13
BA-133	Not Detected	-----	1.84E-02
BA-140	Not Detected	-----	7.80E-02
CD-109	Not Detected	-----	3.51E-01
CD-115	Not Detected	-----	9.34E-02
CE-139	Not Detected	-----	1.13E-02
CE-141	Not Detected	-----	2.14E-02
CE-144	Not Detected	-----	8.10E-02
CO-56	Not Detected	-----	2.44E-02
CO-57	Not Detected	-----	1.11E-02
CO-58	Not Detected	-----	1.94E-02
CO-60	Not Detected	-----	2.25E-02
CR-51	Not Detected	-----	1.22E-01
CS-134	Not Detected	-----	2.41E-02
CS-137	Not Detected	-----	2.04E-02
CU-64	Not Detected	-----	8.12E+02
EU-152	Not Detected	-----	1.46E-01
EU-154	Not Detected	-----	9.27E-02
EU-155	Not Detected	-----	4.73E-02
FE-59	Not Detected	-----	4.20E-02
GD-153	Not Detected	-----	3.50E-02
HG-203	Not Detected	-----	1.58E-02
I-131	Not Detected	-----	2.28E-02
IN-115m	Not Detected	-----	5.11E+04
IR-192	Not Detected	-----	1.47E-02
K-40	Not Detected	-----	3.18E-01
LA-140	Not Detected	-----	1.58E-01
MN-54	Not Detected	-----	2.07E-02
MN-56	Not Detected	-----	1.83E+09
MO-99	Not Detected	-----	4.51E-01
NA-22	Not Detected	-----	2.16E-02
NA-24	Not Detected	-----	1.73
NB-95	Not Detected	-----	1.06E-01
ND-147	Not Detected	-----	1.57E-01
NI-57	Not Detected	-----	1.74E-01
BE-7	Not Detected	-----	1.38E-01
RU-103	Not Detected	-----	1.98E-02
RU-106	Not Detected	-----	1.62E-01
SB-122	Not Detected	-----	6.19E-02
SB-124	Not Detected	-----	2.25E-02
SB-125	Not Detected	-----	4.65E-02
SC-46	Not Detected	-----	2.50E-02
SR-85	Not Detected	-----	3.08E-02
TA-182	Not Detected	-----	7.55E-02
TA-183	Not Detected	-----	1.47E-01
TE-132	Not Detected	-----	2.83E-02
TL-201	Not Detected	-----	1.01E-01
V-48	Not Detected	-----	2.46E-02
XE-133	Not Detected	-----	1.15E-01
Y-88	Not Detected	-----	2.93E-02
ZN-65	Not Detected	-----	4.86E-02
ZR-95	Not Detected	-----	3.76E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [Area IV Lab] *
 * 8-04-95 4:18:52 PM *

 * Analyzed by: *R. Preston 8/07/95* Reviewed by: *[Signature] 8/18/95* *

Customer : S. WRIGHTSON (7585)
 Customer Sample ID : LCS ANALYSIS FOR SOURCE #DA610
 Lab Sample ID : 50061408

Sample Description : MIXED_GAMMA_STANDARD
 Sample Type : Solid
 Sample Geometry : SMAR
 Sample Quantity : 1.000 Each
 Sample Date/Time : 8-01-92 12:00:00 PM
 Acquire Start Date : 8-04-95 4:06:33 PM
 Detector Name : LAB1
 Elapsed Live Time : 600 seconds
 Elapsed Real Time : 610 seconds

Comments:

Nuclide	Activity (pCi/Each)	2S Error	MDA
U-238	Not Detected	-----	1.35E+04
TH-234	Not Detected	-----	4.68E+03
U-234	Not Detected	-----	1.73E+05
RA-226	Not Detected	-----	6.84E+03
PB-214	Not Detected	-----	9.03E+02
BI-214	Not Detected	-----	8.88E+02
PB-210	Not Detected	-----	5.53E+03
TH-232	Not Detected	-----	2.65E+03
RA-228	Not Detected	-----	4.02E+03
AC-228	Not Detected	-----	2.60E+03
TH-228	Not Detected	-----	2.72E+04
RA-224	Not Detected	-----	2.26E+04
PB-212	Not Detected	-----	2.06E+03
BI-212	Not Detected	-----	2.09E+04
TL-208	Not Detected	-----	3.87E+03
U-235	Not Detected	-----	2.02E+03
TH-231	Not Detected	-----	3.87E+03
PA-231	Not Detected	-----	1.27E+04
AC-227	Not Detected	-----	1.74E+04
TH-227	Not Detected	-----	2.78E+03
RA-223	Not Detected	-----	1.00E+26
RN-219	Not Detected	-----	3.70E+03
PB-211	Not Detected	-----	1.17E+04
TL-207	Not Detected	-----	3.10E+05
AM-241	8.10E+04	1.31E+04	3.77E+03
PU-239	Not Detected	-----	2.17E+06
NP-237	Not Detected	-----	3.25E+03
PA-233	Not Detected	-----	8.06E+02
TH-229	Not Detected	-----	2.07E+03

[Summary Report] - Sample ID: 50061408

Nuclide	Activity (pCi/Each)	2S Error	MDA
AG-110m	Not Detected	-----	4.29E+04
AR-41	Not Detected	-----	1.00E+26
BA-133	Not Detected	-----	6.44E+02
BA-140	Not Detected	-----	1.00E+26
CD-109	4.09E+05	7.74E+04	5.98E+04
CD-115	Not Detected	-----	1.00E+26
CE-139	Not Detected	-----	7.14E+04
CE-141	Not Detected	-----	6.82E+12
CE-144	Not Detected	-----	2.77E+04
CO-56	Not Detected	-----	1.10E+07
CO-57	1.44E+04	4.14E+03	5.45E+03
CO-58	Not Detected	-----	2.55E+07
CO-60	8.93E+04	1.16E+04	6.66E+02
CR-51	Not Detected	-----	2.62E+15
CS-134	Not Detected	-----	1.15E+03
CS-137	7.96E+04	1.04E+04	6.13E+02
CU-64	Not Detected	-----	1.00E+26
EU-152	Not Detected	-----	4.65E+03
EU-154	Not Detected	-----	3.00E+03
EU-155	Not Detected	-----	1.64E+03
FE-59	Not Detected	-----	3.56E+10
GD-153	Not Detected	-----	1.84E+04
HG-203	Not Detected	-----	4.57E+09
I-131	Not Detected	-----	1.00E+26
IN-115m	Not Detected	-----	1.00E+26
IR-192	Not Detected	-----	1.11E+07
K-40	Not Detected	-----	2.29E+03
LA-140	Not Detected	-----	1.00E+26
MN-54	Not Detected	-----	6.55E+03
MN-56	Not Detected	-----	1.00E+26
MO-99	Not Detected	-----	1.00E+26
NA-22	2.08E+02	2.60E+02	4.19E+02
NA-24	Not Detected	-----	1.00E+26
NB-95	Not Detected	-----	1.00E+26
ND-147	Not Detected	-----	1.00E+26
NI-57	Not Detected	-----	1.00E+26
BE-7	Not Detected	-----	6.91E+09
RU-103	Not Detected	-----	1.19E+11
RU-106	Not Detected	-----	3.35E+04
SB-122	Not Detected	-----	1.00E+26
SB-124	Not Detected	-----	1.29E+08
SB-125	Not Detected	-----	3.10E+03
SC-46	Not Detected	-----	6.13E+06
SR-85	Not Detected	-----	5.94E+07
TA-182	Not Detected	-----	1.49E+06
TA-183	Not Detected	-----	1.00E+26
TE-132	Not Detected	-----	1.00E+26
TL-201	Not Detected	-----	1.00E+26
V-48	Not Detected	-----	1.00E+26
XE-133	Not Detected	-----	1.00E+26
Y-88	Not Detected	-----	3.42E+05
ZN-65	Not Detected	-----	3.30E+04
ZR-95	Not Detected	-----	1.32E+08

not detected RTP
8/07/95

57685

SMO ANALYTICAL DATA ROUTING FORM

Project Name: Scoping

Case Number: 3635400

SNL Task Leader: Young

Org/Mail Stop: 7585/1148

SMO Project Coordinator: Gonzales

Sample Ship Date: 8/17/95

ARCOC

Lab

Lab ID

8/8/95
8/1/95

01502

7715

500704

03679

7715

500653

03941

7715

500624

Date Results Received:

Preliminary: _____

Final: 8/22/95 / 8/15/95 / 8/8/95

Corrections Requested From Laboratory: _____ Requestor: _____

Date Corrections Received: _____

Date Assigned to

SMO Reviewer: _____

Reviewer: _____

Date Review

Complete: _____

Signature: _____

Date of Preliminary

Notification: _____

Person

Notified: _____

Date of Final

Transmittal: 9/21/95

Transmitted

To: Young

Transmitted By: dfm

Filed In

Record Center: dfm

Comments: _____

PAGE 7 OF 7

Batch No. _____

AR/COC-| 06339

[illegible]

**BLUE- To Accompany Samples,
Return to SMO**

YELLOW SMO Suspense Copy

PINK - Field Copy

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 4-14-97 6:26:14 PM *

 * Analyzed by: *[Signature]* 4/15/97 Reviewed by: *[Signature]* 4/16/97 *

Customer : B.GALLOWAY/MAC (6682/SMO)
 Customer Sample ID : 034512-002
 Lab Sample ID : 70056401

85-GR-010-00-SD

Sample Description : MARINELLI SOIL SAMPLE
 Sample Quantity : 596.000 gram
 Sample Date/Time : 4-14-97 9:25:00 AM
 Acquire Start Date/Time : 4-14-97 4:37:39 PM
 Detector Name : LAB03
 Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	1.51E+00
TH-234	1.18E+00	4.17E-01	4.67E-01
RA-226	1.34E+00	5.03E-01	5.59E-01
PB-214	6.58E-01	1.36E-01	6.01E-02
BI-214	7.34E-01	1.76E-01	5.57E-02
TH-232	8.14E-01	4.03E-01	1.67E-01
RA-228	7.81E-01	3.63E-01	2.25E-01
AC-228	6.64E-01	2.35E-01	1.14E-01
TH-228	6.26E-01	4.19E-01	5.60E-01
RA-224	Not Detected	-----	5.69E+00
PB-212	7.84E-01	1.44E-01	4.25E-02
BI-212	5.51E-01	3.83E-01	2.51E-01
TL-208	7.26E-01	5.56E-01	7.99E-02
U-235	Not Detected	-----	2.11E+01
TH-231	Not Detected	-----	8.33E+00
PA-231	Not Detected	-----	1.58E+00
TH-227	Not Detected	-----	4.03E-01
RA-223	Not Detected	-----	1.35E-01
RN-219	Not Detected	-----	4.82E-01
PB-211	Not Detected	-----	1.07E+00
TL-207	Not Detected	-----	1.68E+01
AM-241	Not Detected	-----	1.72E-01
PU-239	Not Detected	-----	3.70E+02
NP-237	Not Detected	-----	2.88E-01
PA-233	Not Detected	-----	6.49E-02
TH-229	Not Detected	-----	2.12E-01

[Summary Report] - Sample ID: : 70056401

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	5.34E-02
AG-110m	Not Detected	-----	4.32E-02
BA-133	Not Detected	-----	7.12E-02
BE-7	Not Detected	-----	3.19E-01
CD-109	1.93E+00	5.38E-01	7.25E-01
CD-115	Not Detected	-----	8.59E-02
CE-139	Not Detected	-----	2.89E-02
CE-141	Not Detected	-----	4.58E-02
CE-144	Not Detected	-----	2.10E-01
CO-56	Not Detected	-----	4.16E-02
CO-57	Not Detected	-----	2.61E-02
CO-58	Not Detected	-----	4.29E-02
CO-60	Not Detected	-----	4.90E-02
CR-51	Not Detected	-----	2.75E-01
CS-134	Not Detected	-----	5.05E-02
CS-137	Not Detected	-----	4.65E-02
EU-152	Not Detected	-----	7.86E-02
EU-154	Not Detected	-----	2.48E-01
EU-155	Not Detected	-----	1.22E-01
FE-59	Not Detected	-----	9.92E-02
GD-153	Not Detected	-----	8.68E-02
HG-203	Not Detected	-----	3.48E-02
I-131	Not Detected	-----	3.53E-02
IR-192	Not Detected	-----	3.15E-02
K-40	2.07E+01	3.38E+00	3.74E-01
MN-52	Not Detected	-----	4.62E-02
MN-54	Not Detected	-----	4.84E-02
MO-99	Not Detected	-----	3.32E-01
NA-22	Not Detected	-----	5.65E-02
NA-24	Not Detected	-----	5.99E-02
NB-95	Not Detected	-----	1.79E-01
ND-147	Not Detected	-----	2.56E-01
NI-57	Not Detected	-----	7.48E-02
PB-210	Not Detected	-----	5.03E+00
RU-103	Not Detected	-----	3.57E-02
RU-106	Not Detected	-----	3.68E-01
SB-122	Not Detected	-----	5.23E-02
SB-124	Not Detected	-----	3.71E-02
SB-125	Not Detected	-----	9.71E-02
SN-113	Not Detected	-----	4.54E-02
SR-85	Not Detected	-----	4.67E-02
TA-182	Not Detected	-----	2.05E-01
TA-183	Not Detected	-----	1.51E-01
TC-99m	Not Detected	-----	5.56E-02
TL-201	Not Detected	-----	1.05E-01
XE-133	Not Detected	-----	1.03E-01
Y-88	Not Detected	-----	3.42E-02
ZN-65	Not Detected	-----	1.40E-01
ZR-95	Not Detected	-----	7.44E-02

not detected

7/4/15/97

51 APR 1985 06:50

AR/COC-1 Ub34U

WHITE - To Accompany Samples, Laboratory Copy **BLUE** - To Accompany Samples, Return to SMO **YELLOW** - SMO Suspense Copy **PINK** - Field Copy

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 4-15-97 9:17:51 AM *

 * Analyzed by: *[Signature]* 4/16/97 Reviewed by: *[Signature]* 4/17/97 *

 Customer : B.GALLOWAY/MAC (6682/SMO)
 Customer Sample ID : 034507-002
 Lab Sample ID : 70056501 85-GR oct-00-SS

Sample Description : MARINELLI SOIL SAMPLE
 Sample Quantity : 558.000 gram
 Sample Date/Time : 4-14-97 9:15:00 AM
 Acquire Start Date/Time : 4-15-97 7:35:08 AM
 Detector Name : LAB02
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected		3.98E+00
TH-234	1.24E+00	7.01E-01	9.63E-01
RA-226	1.41E+00	8.88E-01	5.47E-01
PB-214	6.17E-01	1.30E-01	5.98E-02
BI-214	5.41E-01	2.31E-01	3.20E-01
TH-232	9.55E-01	5.10E-01	1.94E-01
RA-228	1.06E+00	3.12E-01	1.60E-01
AC-228	8.08E-01	8.22E-01	8.80E-02
TH-228	7.38E-01	2.73E-01	5.49E-01
RA-224	9.44E-01	3.48E-01	8.48E-02
PB-212	8.37E-01	1.41E-01	4.67E-02
BI-212	3.87E-01	3.07E-01	2.18E-01
TL-208	8.08E-01	1.89E-01	7.54E-02
U-235	Not Detected		2.83E-01
TH-231	Not Detected		1.51E+01
PA-231	Not Detected		1.66E+00
TH-227	Not Detected		4.19E-01
RA-223	Not Detected		2.49E-01
RN-219	Not Detected		4.40E-01
PB-211	Not Detected		1.03E+00
TL-207	Not Detected		1.65E+01
AM-241	Not Detected		5.62E-01
PU-239	Not Detected		5.12E+02
NP-237	Not Detected		3.20E-01
PA-233	Not Detected		7.04E-02
TH-229	Not Detected		2.81E-01

[Summary Report] - Sample ID: : 70056501

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.95E-02
AG-110m	Not Detected	-----	3.78E-02
BA-133	Not Detected	-----	7.22E-02
BE-7	Not Detected	-----	3.13E-01
CD-109	1.61E+00	6.83E-01	1.09E+00
CD-115	Not Detected	-----	1.07E-01
CE-139	Not Detected	-----	3.33E-02
CE-141	Not Detected	-----	6.11E-02
CE-144	Not Detected	-----	2.76E-01
CO-56	Not Detected	-----	4.57E-02
CO-57	Not Detected	-----	3.52E-02
CO-58	Not Detected	-----	3.57E-02
CO-60	Not Detected	-----	4.13E-02
CR-51	Not Detected	-----	2.65E-01
CS-134	Not Detected	-----	5.46E-02
CS-137	Not Detected	-----	4.22E-02
EU-152	Not Detected	-----	1.06E-01
EU-154	Not Detected	-----	2.28E-01
EU-155	Not Detected	-----	1.75E-01
FE-59	Not Detected	-----	8.27E-02
GD-153	Not Detected	-----	1.20E-01
HG-203	Not Detected	-----	3.77E-02
I-131	Not Detected	-----	3.41E-02
IR-192	Not Detected	-----	3.21E-02
K-40	1.78E+01	2.69E+00	3.61E-01
MN-52	Not Detected	-----	3.72E-02
MN-54	Not Detected	-----	4.35E-02
MO-99	Not Detected	-----	3.53E-01
NA-22	Not Detected	-----	4.89E-02
NA-24	Not Detected	-----	1.04E-01
NB-95	Not Detected	-----	2.30E-01
ND-147	Not Detected	-----	2.47E-01
NI-57	Not Detected	-----	8.07E-02
PB-210	Not Detected	-----	4.10E+01
RU-103	Not Detected	-----	3.49E-02
RU-106	Not Detected	-----	3.41E-01
SB-122	2.10E-02	2.47E-02	2.43E-02
SB-124	Not Detected	-----	3.67E-02
SB-125	Not Detected	-----	9.61E-02
SN-113	Not Detected	-----	4.33E-02
SR-85	Not Detected	-----	4.40E-02
TA-182	Not Detected	-----	1.72E-01
TA-183	Not Detected	-----	5.44E-01
TC-99m	Not Detected	-----	4.47E-01
TL-201	Not Detected	-----	2.67E-01
XE-133	Not Detected	-----	2.28E-01
Y-88	Not Detected	-----	3.07E-02
ZN-65	Not Detected	-----	1.17E-01
ZR-95	Not Detected	-----	6.48E-02

not detected 7/16/57

not detected 7/16/57

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 4-15-97 11:02:44 AM *

 * Analyzed by: *[Signature]* 4/16/97 Reviewed by: *[Signature]* 4/17/97 *

Customer : B.GALLOWAY/MAC (6682/SMO)
 Customer Sample ID : 034508-002
 Lab Sample ID : 70056502

85-GR-C07-00-55

Sample Description : MARINELLI SOIL SAMPLE
 Sample Quantity : 630.000 gram
 Sample Date/Time : 4-14-97 9:30:00 AM
 Acquire Start Date/Time : 4-15-97 9:19:57 AM
 Detector Name : LAB02
 Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected		3.72E+00
TH-234	1.42E+00	7.03E-01	9.17E-01
RA-226	1.60E+00	8.26E-01	5.73E-01
PB-214	6.76E-01	2.06E-01	5.47E-02
BI-214	6.02E-01	2.15E-01	2.83E-01
TH-232	Not Detected		1.65E-01
RA-228	1.04E+00	3.92E-01	1.78E-01
AC-228	8.65E-01	2.14E-01	9.64E-02
TH-228	6.49E-01	2.56E-01	5.25E-01
RA-224	9.15E-01	3.17E-01	8.62E-02
PB-212	8.77E-01	1.81E-01	4.72E-02
BI-212	5.63E-01	2.28E-01	1.86E-01
TL-208	8.01E-01	4.28E-01	7.43E-02
U-235	Not Detected		2.71E-01
TH-231	Not Detected		1.41E+01
PA-231	Not Detected		1.58E+00
TH-227	Not Detected		3.99E-01
RA-223	Not Detected		2.32E-01
RN-219	Not Detected		3.96E-01
PB-211	Not Detected		9.41E-01
TL-207	Not Detected		1.54E+01
AM-241	Not Detected		5.30E-01
PU-239	Not Detected		4.92E+02
NP-237	Not Detected		3.07E-01
PA-233	Not Detected		6.39E-02
TH-229	Not Detected		2.81E-01

[Summary Report] - Sample ID: : 70056502

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.72E-02
AG-110m	Not Detected	-----	3.42E-02
BA-133	Not Detected	-----	7.20E-02
BE-7	Not Detected	-----	2.85E-01
CD-109	1.31E+00	5.75E-01	1.04E+00
CD-115	Not Detected	-----	1.03E-01
CE-139	Not Detected	-----	3.27E-02
CE-141	Not Detected	-----	5.85E-02
CE-144	Not Detected	-----	2.69E-01
CO-56	Not Detected	-----	4.02E-02
CO-57	Not Detected	-----	3.37E-02
CO-58	Not Detected	-----	3.57E-02
CO-60	Not Detected	-----	3.65E-02
CR-51	Not Detected	-----	2.57E-01
CS-134	Not Detected	-----	5.07E-02
CS-137	Not Detected	-----	3.69E-02
EU-152	Not Detected	-----	1.01E-01
EU-154	Not Detected	-----	2.16E-01
EU-155	Not Detected	-----	1.65E-01
FE-59	Not Detected	-----	7.89E-02
GD-153	Not Detected	-----	1.16E-01
HG-203	Not Detected	-----	3.47E-02
I-131	Not Detected	-----	3.43E-02
IR-192	Not Detected	-----	3.02E-02
K-40	1.91E+01	2.84E+00	2.95E-01
MN-52	Not Detected	-----	3.43E-02
MN-54	Not Detected	-----	3.88E-02
MO-99	Not Detected	-----	3.38E-01
NA-22	Not Detected	-----	5.01E-02
NA-24	Not Detected	-----	1.11E-01
NB-95	Not Detected	-----	2.22E-01
ND-147	Not Detected	-----	2.34E-01
NI-57	7.15E-02	4.24E-02	4.74E-02
PB-210	Not Detected	-----	3.78E+01
RU-103	Not Detected	-----	3.14E-02
RU-106	Not Detected	-----	3.22E-01
SB-122	Not Detected	-----	5.56E-02
SB-124	Not Detected	-----	3.26E-02
SB-125	Not Detected	-----	9.14E-02
SN-113	Not Detected	-----	4.26E-02
SR-85	Not Detected	-----	4.23E-02
TA-182	Not Detected	-----	1.58E-01
TA-183	Not Detected	-----	5.21E-01
TC-99m	Not Detected	-----	5.10E-01
TL-201	Not Detected	-----	2.58E-01
XE-133	Not Detected	-----	2.19E-01
Y-88	Not Detected	-----	2.75E-02
ZN-65	Not Detected	-----	1.13E-01
ZR-95	Not Detected	-----	6.29E-02

not detected 4/16/57

not detected 4/16/57

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 4-15-97 12:48:13 PM *

 *
 * Analyzed by: *[Signature]* 4/16/97 Reviewed by: *[Signature]* 4/17/97 *

Customer : B.GALLOWAY/MAC (6682/SMO)
 Customer Sample ID : 034509-002
 Lab Sample ID : 70056503 85-GR-008-00-SS

Sample Description : MARINELLI SOIL SAMPLE
 Sample Quantity : 629.000 gram
 Sample Date/Time : 4-14-97 9:40:00 AM
 Acquire Start Date/Time : 4-15-97 11:04:53 AM
 Detector Name : LAB02
 Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	3.65E+00
TH-234	9.22E-01	9.01E-01	9.22E-01
RA-226	Not Detected	-----	5.91E-01
PB-214	6.42E-01	1.15E-01	5.24E-02
BI-214	6.07E-01	2.23E-01	2.84E-01
TH-232	8.28E-01	1.40E+00	1.63E-01
RA-228	9.99E-01	3.16E-01	1.65E-01
AC-228	8.76E-01	1.07E+00	8.86E-02
TH-228	7.54E-01	8.32E-01	5.44E-01
RA-224	9.01E-01	2.66E-01	8.49E-02
PB-212	8.44E-01	2.38E-01	4.69E-02
BI-212	4.72E-01	1.92E-01	1.90E-01
TL-208	7.14E-01	1.47E-01	7.20E-02
U-235	Not Detected	-----	2.77E-01
TH-231	Not Detected	-----	1.42E+01
PA-231	Not Detected	-----	1.68E+00
TH-227	Not Detected	-----	3.97E-01
RA-223	Not Detected	-----	2.35E-01
RN-219	Not Detected	-----	4.15E-01
PB-211	Not Detected	-----	9.14E-01
TL-207	Not Detected	-----	1.56E+01
AM-241	Not Detected	-----	5.32E-01
PU-239	Not Detected	-----	5.12E+02
NP-237	Not Detected	-----	3.23E-01
PA-233	Not Detected	-----	6.77E-02
TH-229	Not Detected	-----	2.87E-01

[Summary Report] - Sample ID: : 70056503

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.46E-02
AG-110m	Not Detected	-----	3.42E-02
BA-133	Not Detected	-----	7.17E-02
BE-7	Not Detected	-----	2.89E-01
CD-109	1.42E+00	1.38E+00	1.09E+00
CD-115	Not Detected	-----	1.02E-01
CE-139	Not Detected	-----	3.42E-02
CE-141	Not Detected	-----	6.07E-02
CE-144	Not Detected	-----	2.76E-01
CO-56	Not Detected	-----	2.79E-02
CO-57	Not Detected	-----	3.44E-02
CO-58	Not Detected	-----	3.53E-02
CO-60	Not Detected	-----	4.11E-02
CR-51	Not Detected	-----	2.67E-01
CS-134	Not Detected	-----	5.26E-02
CS-137	Not Detected	-----	3.53E-02
EU-152	Not Detected	-----	1.04E-01
EU-154	Not Detected	-----	2.07E-01
EU-155	Not Detected	-----	1.68E-01
FE-59	Not Detected	-----	7.58E-02
GD-153	Not Detected	-----	1.21E-01
HG-203	Not Detected	-----	3.61E-02
I-131	Not Detected	-----	3.54E-02
IR-192	Not Detected	-----	3.16E-02
K-40	1.96E+01	2.86E+00	3.12E-01
MN-52	Not Detected	-----	4.07E-02
MN-54	Not Detected	-----	2.16E-02
MO-99	Not Detected	-----	3.39E-01
NA-22	Not Detected	-----	4.85E-02
NA-24	Not Detected	-----	1.22E-01
NB-95	Not Detected	-----	2.24E-01
ND-147	Not Detected	-----	2.33E-01
NI-57	Not Detected	-----	8.00E-02
PB-210	Not Detected	-----	4.05E+01
RU-103	Not Detected	-----	3.31E-02
RU-106	Not Detected	-----	3.45E-01
SB-122	Not Detected	-----	5.65E-02
SB-124	Not Detected	-----	3.46E-02
SB-125	Not Detected	-----	9.10E-02
SN-113	Not Detected	-----	4.41E-02
SR-85	Not Detected	-----	4.30E-02
TA-182	Not Detected	-----	1.60E-01
TA-183	Not Detected	-----	5.20E-01
TC-99m	Not Detected	-----	6.27E-01
TL-201	Not Detected	-----	2.63E-01
XE-133	Not Detected	-----	2.25E-01
Y-88	Not Detected	-----	2.84E-02
ZN-65	Not Detected	-----	1.12E-01
ZR-95	Not Detected	-----	6.52E-02

not detected 7/16/5

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 4-15-97 2:39:21 PM *

 *
 * Analyzed by: *[Signature]* 4/16/97 Reviewed by: *[Signature]* 4/17/97 *

Customer : B.GALLOWAY/MAC (6682/SMO)
 Customer Sample ID : 034510-002
 Lab Sample ID : 70056504

85-GR-009-00-SS

Sample Description : MARINELLI SOIL SAMPLE
 Sample Quantity : 687.000 gram
 Sample Date/Time : 4-14-97 9:35:00 AM
 Acquire Start Date/Time : 4-15-97 12:50:28 PM
 Detector Name : LAB02
 Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected		3.51E+00
TH-234	1.03E+00	7.07E-01	8.90E-01
RA-226	1.36E+00	5.01E-01	5.66E-01
PB-214	6.27E-01	1.32E-01	4.75E-02
BI-214	5.59E-01	2.01E-01	2.61E-01
TH-232	8.26E-01	4.22E-01	1.51E-01
RA-228	7.28E-01	2.31E-01	1.61E-01
AC-228	7.72E-01	2.15E-01	9.14E-02
TH-228	7.85E-01	2.56E-01	5.03E-01
RA-224	7.90E-01	2.95E-01	7.85E-02
PB-212	8.13E-01	2.49E-01	4.24E-02
BI-212	4.81E-01	2.57E-01	1.99E-01
TL-208	7.33E-01	1.92E-01	7.27E-02
U-235	Not Detected		2.53E-01
TH-231	Not Detected		1.33E+01
PA-231	Not Detected		1.50E+00
TH-227	Not Detected		3.71E-01
RA-223	Not Detected		2.21E-01
RN-219	3.51E-01	3.34E-01	4.05E-01
PB-211	Not Detected		9.16E-01
TL-207	Not Detected		1.49E+01
AM-241	Not Detected		5.08E-01
PU-239	Not Detected		4.63E+02
NP-237	Not Detected		3.35E-01
PA-233	Not Detected		6.15E-02
TH-229	Not Detected		2.68E-01

not detected 4/16/97

[Summary Report] - Sample ID: : 70056504

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.13E-02
AG-110m	Not Detected	-----	3.24E-02
BA-133	Not Detected	-----	6.62E-02
BE-7	Not Detected	-----	2.69E-01
CD-109	1.88E+00	1.07E+00	1.13E+00
CD-115	Not Detected	-----	9.64E-02
CE-139	Not Detected	-----	3.11E-02
CE-141	Not Detected	-----	5.61E-02
CE-144	Not Detected	-----	2.58E-01
CO-56	Not Detected	-----	3.97E-02
CO-57	Not Detected	-----	3.15E-02
CO-58	Not Detected	-----	3.41E-02
CO-60	Not Detected	-----	3.91E-02
CR-51	Not Detected	-----	2.57E-01
CS-134	Not Detected	-----	4.98E-02
CS-137	Not Detected	-----	3.53E-02
EU-152	Not Detected	-----	9.49E-02
EU-154	Not Detected	-----	1.90E-01
EU-155	Not Detected	-----	1.64E-01
FE-59	Not Detected	-----	7.91E-02
GD-153	Not Detected	-----	1.12E-01
HG-203	Not Detected	-----	3.31E-02
I-131	Not Detected	-----	3.42E-02
IR-192	Not Detected	-----	2.92E-02
K-40	2.05E+01	4.03E+00	2.87E-01
MN-52	Not Detected	-----	3.69E-02
MN-54	Not Detected	-----	3.63E-02
MO-99	Not Detected	-----	3.48E-01
NA-22	Not Detected	-----	4.79E-02
NA-24	Not Detected	-----	1.15E-01
NB-95	Not Detected	-----	2.12E-01
ND-147	Not Detected	-----	2.20E-01
NI-57	6.40E-02	5.13E-02	4.58E-02
PB-210	Not Detected	-----	3.74E+01
RU-103	Not Detected	-----	3.11E-02
RU-106	Not Detected	-----	3.01E-01
SB-122	Not Detected	-----	5.75E-02
SB-124	Not Detected	-----	3.33E-02
SB-125	Not Detected	-----	8.55E-02
SN-113	Not Detected	-----	3.83E-02
SR-85	Not Detected	-----	4.00E-02
TA-182	Not Detected	-----	1.61E-01
TA-183	Not Detected	-----	5.02E-01
TC-99m	Not Detected	-----	7.07E-01
TL-201	Not Detected	-----	2.49E-01
XE-133	Not Detected	-----	2.10E-01
Y-88	Not Detected	-----	2.52E-02
ZN-65	Not Detected	-----	1.06E-01
ZR-95	Not Detected	-----	5.97E-02

not detected 7/16/57

not detected 7/16/57

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 4-15-97 4:25:18 PM *

 * Analyzed by: *[Signature]* 4/16/97 Reviewed by: *[Signature]* 4/17/97 *

Customer : B.GALLOWAY/MAC (6682/SMO)
 Customer Sample ID : 034511-002
 Lab Sample ID : 70056505

85-GR-C10-00-SS

Sample Description : MARINELLI SOIL SAMPLE
 Sample Quantity : 666.000 gram
 Sample Date/Time : 4-14-97 9:25:00 AM
 Acquire Start Date/Time : 4-15-97 2:42:01 PM
 Detector Name : LAB02
 Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	3.45E+00
TH-234	8.15E-01	3.67E-01	5.74E-01
RA-226	Not Detected	-----	5.76E-01
PB-214	5.55E-01	3.37E-01	4.89E-02
BI-214	5.40E-01	6.60E-01	2.67E-01
TH-232	6.67E-01	3.80E-01	1.54E-01
RA-228	8.72E-01	2.84E-01	1.58E-01
AC-228	Not Detected	-----	8.56E-02
TH-228	8.98E-01	1.19E+00	4.87E-01
RA-224	7.88E-01	2.46E-01	8.05E-02
PB-212	7.48E-01	1.44E-01	4.21E-02
BI-212	4.50E-01	1.91E-01	1.85E-01
TL-208	7.30E-01	1.56E-01	6.83E-02
U-235	1.30E-01	1.99E-01	2.57E-01
TH-231	Not Detected	-----	1.28E+01
PA-231	Not Detected	-----	1.49E+00
TH-227	Not Detected	-----	3.62E-01
RA-223	Not Detected	-----	2.20E-01
RN-219	Not Detected	-----	3.89E-01
PB-211	Not Detected	-----	8.73E-01
TL-207	Not Detected	-----	1.44E+01
AM-241	Not Detected	-----	4.99E-01
PU-239	Not Detected	-----	4.62E+02
NP-237	2.48E-01	1.39E-01	2.93E-01
PA-233	Not Detected	-----	5.97E-02
TH-229	Not Detected	-----	2.69E-01

not detected *[Signature]* 4/16/97

not detected *[Signature]* 4/16/97

[Summary Report] - Sample ID: : 70056505

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.26E-02
AG-110m	Not Detected	-----	3.34E-02
BA-133	Not Detected	-----	6.45E-02
BE-7	7.21E-02	1.09E-01	1.16E-01
CD-109	Not Detected	-----	9.96E-01
CD-115	Not Detected	-----	9.70E-02
CE-139	Not Detected	-----	3.07E-02
CE-141	Not Detected	-----	5.58E-02
CE-144	Not Detected	-----	2.52E-01
CO-56	Not Detected	-----	2.77E-02
CO-57	Not Detected	-----	3.10E-02
CO-58	Not Detected	-----	3.54E-02
CO-60	Not Detected	-----	3.85E-02
CR-51	Not Detected	-----	2.50E-01
CS-134	Not Detected	-----	4.87E-02
CS-137	Not Detected	-----	3.55E-02
EU-152	Not Detected	-----	9.31E-02
EU-154	Not Detected	-----	1.96E-01
EU-155	Not Detected	-----	1.57E-01
FE-59	Not Detected	-----	7.75E-02
GD-153	Not Detected	-----	1.13E-01
HG-203	Not Detected	-----	3.32E-02
I-131	Not Detected	-----	3.36E-02
IR-192	Not Detected	-----	2.82E-02
K-40	1.93E+01	2.86E+00	2.93E-01
MN-52	Not Detected	-----	3.55E-02
MN-54	Not Detected	-----	3.88E-02
MO-99	Not Detected	-----	3.40E-01
NA-22	Not Detected	-----	4.39E-02
NA-24	Not Detected	-----	1.27E-01
NB-95	Not Detected	-----	2.10E-01
ND-147	Not Detected	-----	2.23E-01
NI-57	5.30E-02	7.31E-02	4.51E-02
PB-210	Not Detected	-----	3.70E+01
RU-103	Not Detected	-----	3.05E-02
RU-106	Not Detected	-----	3.12E-01
SB-122	Not Detected	-----	5.55E-02
SB-124	Not Detected	-----	3.28E-02
SB-125	Not Detected	-----	8.28E-02
SN-113	Not Detected	-----	4.04E-02
SR-85	Not Detected	-----	4.00E-02
TA-182	Not Detected	-----	1.54E-01
TA-183	Not Detected	-----	5.06E-01
TC-99m	Not Detected	-----	9.00E-01
TL-201	Not Detected	-----	2.53E-01
XE-133	Not Detected	-----	2.12E-01
Y-88	Not Detected	-----	2.83E-02
ZN-65	Not Detected	-----	1.05E-01
ZR-95	Not Detected	-----	6.18E-02

not detected 7/11/57

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 4-15-97 4:41:12 PM *

 *
 * Analyzed by: *[Signature]* 4/16/97 Reviewed by: *[Signature]* 4/17/97 *

Customer : B.GALLOWAY/MAC (6682/SMO)
 Customer Sample ID : LAB CONTROL SAMPLE USING CG134
 Lab Sample ID : 70056506

Sample Description : MIXED GAMMA STANDARD CG134
 Sample Quantity : 1.000 Each
 Sample Date/Time : 11-01-90 12:00:00 PM
 Acquire Start Date/Time : 4-15-97 4:27:52 PM
 Detector Name : LAB02
 Elapsed Live/Real Time : 600 / 605 seconds

Comments:

Nuclide Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
U-238	Not Detected	-----	2.18E+04
TH-234	Not Detected	-----	4.78E+03
RA-226	Not Detected	-----	6.56E+03
PB-214	Not Detected	-----	7.51E+02
BI-214	Not Detected	-----	6.84E+02
TH-232	Not Detected	-----	2.34E+03
RA-228	Not Detected	-----	2.81E+03
AC-228	Not Detected	-----	1.64E+03
TH-228	Not Detected	-----	7.51E+04
RA-224	Not Detected	-----	2.14E+03
PB-212	Not Detected	-----	5.38E+03
BI-212	Not Detected	-----	2.74E+04
TL-208	Not Detected	-----	1.03E+04
U-235	Not Detected	-----	1.86E+03
TH-231	Not Detected	-----	8.43E+04
PA-231	Not Detected	-----	1.50E+04
TH-227	Not Detected	-----	2.51E+03
RA-223	Not Detected	-----	1.00E+26
RN-219	Not Detected	-----	5.75E+03
PB-211	Not Detected	-----	1.30E+04
TL-207	Not Detected	-----	2.28E+05
AM-241	8.20E+04	1.50E+04	3.31E+03
PU-239	Not Detected	-----	3.29E+06
NP-237	Not Detected	-----	2.57E+03
PA-233	Not Detected	-----	6.50E+02
TH-229	Not Detected	-----	1.81E+03

[Summary Report] - Sample ID: : 70056506

Nuclide Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
AG-108m	Not Detected		3.52E+02
AG-110m	Not Detected		1.17E+06
BA-133	Not Detected		7.10E+02
BE-7	Not Detected		7.57E+16
CD-109	3.04E+05	2.88E+05	2.38E+05
CD-115	Not Detected		1.00E+26
CE-139	Not Detected		3.44E+07
CE-141	Not Detected		1.00E+26
CE-144	Not Detected		5.82E+05
CO-56	Not Detected		6.25E+11
CO-57	Not Detected		9.65E+04
CO-58	Not Detected		3.74E+12
CO-60	8.00E+04	1.08E+04	3.32E+02
CR-51	Not Detected		1.00E+26
CS-134	Not Detected		2.75E+03
CS-137	7.06E+04	9.40E+03	2.91E+02
EU-152	Not Detected		9.92E+02
EU-154	Not Detected		2.62E+03
EU-155	Not Detected		2.80E+03
FE-59	Not Detected		7.75E+18
GD-153	Not Detected		6.53E+05
HG-203	Not Detected		5.21E+17
I-131	Not Detected		1.00E+26
IR-192	Not Detected		1.22E+12
K-40	Not Detected		1.75E+03
MN-52	Not Detected		1.00E+26
MN-54	Not Detected		7.33E+04
MO-99	Not Detected		1.00E+26
NA-22	Not Detected		1.40E+03
NA-24	Not Detected		1.00E+26
NB-95	Not Detected		1.00E+26
ND-147	Not Detected		1.00E+26
NI-57	Not Detected		1.00E+26
PB-210	Not Detected		2.61E+05
RU-103	Not Detected		4.49E+20
RU-106	Not Detected		2.76E+05
SB-122	Not Detected		1.00E+26
SB-124	Not Detected		1.86E+14
SB-125	Not Detected		5.81E+03
SN-113	Not Detected		6.72E+08
SR-85	Not Detected		3.38E+13
TA-182	Not Detected		1.88E+09
TA-183	Not Detected		1.00E+26
TC-99m	Not Detected		1.00E+26
TL-201	Not Detected		1.00E+26
XE-133	Not Detected		1.00E+26
Y-88	Not Detected		8.27E+08
ZN-65	Not Detected		7.77E+05
ZR-95	Not Detected		6.95E+13

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 4-15-97 7:04:52 AM *

 * Analyzed by: *[Signature]* 4/15/97 Reviewed by: *[Signature]* 4/15/97 *

Customer : B.GALLOWAY/MAC (6682/SMO)
 Customer Sample ID : LAB CONTROL SAMPLE USING CG134
 Lab Sample ID : 70056402

Sample Description : MIXED GAMMA STANDARD_CG134
 Sample Quantity : 1.000 Each
 Sample Date/Time : 11-01-90 12:00:00 PM
 Acquire Start Date/Time : 4-15-97 6:52:47 AM
 Detector Name : LAB03
 Elapsed Live/Real Time : 600 / 607 seconds

Comments:

Nuclide Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
U-238	Not Detected	-----	7.37E+03
TH-234	Not Detected	-----	2.93E+03
RA-226	Not Detected	-----	6.19E+03
PB-214	Not Detected	-----	8.01E+02
BI-214	Not Detected	-----	7.83E+02
TH-232	Not Detected	-----	2.44E+03
RA-228	Not Detected	-----	3.37E+03
AC-228	Not Detected	-----	1.95E+03
TH-228	Not Detected	-----	7.81E+04
RA-224	Not Detected	-----	3.14E+03
PB-212	Not Detected	-----	5.46E+03
BI-212	Not Detected	-----	3.13E+04
TL-208	Not Detected	-----	1.14E+04
U-235	Not Detected	-----	1.46E+03
TH-231	Not Detected	-----	4.42E+04
PA-231	Not Detected	-----	1.49E+04
TH-227	Not Detected	-----	2.46E+03
RA-223	Not Detected	-----	1.00E+26
RN-219	Not Detected	-----	6.46E+03
PB-211	Not Detected	-----	1.44E+04
TL-207	Not Detected	-----	2.72E+05
AM-241	8.74E+04	1.45E+04	1.18E+03
PU-239	Not Detected	-----	2.51E+06
NP-237	Not Detected	-----	1.53E+03
PA-233	Not Detected	-----	6.88E+02
TH-229	Not Detected	-----	1.29E+03

[Summary Report] - Sample ID: : 70056402

Nuclide Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
AG-108m	Not Detected	-----	4.10E+02
AG-110m	Not Detected	-----	1.34E+06
BA-133	Not Detected	-----	7.68E+02
BE-7	Not Detected	-----	8.08E+16
CD-109	3.29E+05	1.09E+05	1.13E+05
CD-115	Not Detected	-----	1.00E+26
CE-139	Not Detected	-----	2.99E+07
CE-141	Not Detected	-----	1.00E+26
CE-144	Not Detected	-----	4.44E+05
CO-56	Not Detected	-----	7.31E+11
CO-57	Not Detected	-----	7.48E+04
CO-58	Not Detected	-----	4.40E+12
CO-60	8.04E+04	1.12E+04	4.54E+02
CR-51	Not Detected	-----	1.00E+26
CS-134	Not Detected	-----	2.96E+03
CS-137	7.11E+04	9.55E+03	3.40E+02
EU-152	Not Detected	-----	7.69E+02
EU-154	Not Detected	-----	3.05E+03
EU-155	Not Detected	-----	1.99E+03
FE-59	Not Detected	-----	8.83E+18
GD-153	Not Detected	-----	4.50E+05
HG-203	Not Detected	-----	5.06E+17
I-131	Not Detected	-----	1.00E+26
IR-192	Not Detected	-----	1.31E+12
K-40	Not Detected	-----	1.60E+03
MN-52	Not Detected	-----	1.00E+26
MN-54	Not Detected	-----	8.50E+04
MO-99	Not Detected	-----	1.00E+26
NA-22	Not Detected	-----	1.46E+03
NA-24	Not Detected	-----	1.00E+26
NB-95	Not Detected	-----	1.00E+26
ND-147	Not Detected	-----	1.00E+26
NI-57	Not Detected	-----	1.00E+26
PB-210	Not Detected	-----	4.41E+04
RU-103	Not Detected	-----	4.71E+20
RU-106	Not Detected	-----	3.14E+05
SB-122	Not Detected	-----	1.00E+26
SB-124	Not Detected	-----	2.07E+14
SB-125	Not Detected	-----	6.43E+03
SN-113	Not Detected	-----	7.37E+08
SR-85	Not Detected	-----	3.52E+13
TA-182	Not Detected	-----	2.19E+09
TA-183	Not Detected	-----	1.00E+26
TC-99m	Not Detected	-----	1.00E+26
TL-201	Not Detected	-----	1.00E+26
XE-133	Not Detected	-----	1.00E+26
Y-88	Not Detected	-----	8.64E+08
ZN-65	Not Detected	-----	9.01E+05
ZR-95	Not Detected	-----	8.29E+13

Internal Lab

Batch No.

AR/COC- 06341

[illegible]

**WHITE - To Accompany Samples,
Laboratory Copy**

BLUE- To Accompany Samples,
Return to SMO

YELLOW- SMO Suspense Copy.

PINK- Field Copy

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 9-03-97 12:31:58 PM *

 *
 * Analyzed by: *[Signature]* 9/3/97 Reviewed by: *[Signature]* 9/4/97 *

Customer : B.GALLOWAY/D.BISWELL 6682/SMO
 Customer Sample ID : 033852-002
 Lab Sample ID : 70153501

Sample Description : SOIL MARINELLI SAMPLE 85-BH-007-C.O-S
 Sample Quantity : 691.000 gram
 Sample Date/Time : 9-02-97 11:40:00 AM
 Acquire Start Date/Time : 9-03-97 10:47:34 AM
 Detector Name : LAB03
 Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	1.41E+00
TH-234	7.83E-01	2.89E-01	4.06E-01
RA-226	1.23E+00	4.48E-01	4.98E-01
PB-214	6.17E-01	1.25E-01	4.93E-02
BI-214	5.99E-01	1.05E-01	5.96E-02
TH-232	7.69E-01	4.25E-01	1.74E-01
RA-228	Not Detected	-----	2.01E-01
AC-228	7.53E-01	2.13E-01	1.12E-01
TH-228	7.54E-01	3.89E-01	4.73E-01
RA-224	7.50E-01	3.32E-01	1.11E-01
PB-212	8.13E-01	1.38E-01	4.22E-02
BI-212	9.88E-01	1.23E+00	3.18E-01
TL-208	6.16E-01	7.46E-01	8.32E-02
U-235	Not Detected	-----	1.94E-01
TH-231	Not Detected	-----	7.85E+00
PA-231	Not Detected	-----	1.42E+00
TH-227	Not Detected	-----	3.87E-01
RA-223	Not Detected	-----	1.32E-01
RN-219	Not Detected	-----	4.34E-01
PB-211	Not Detected	-----	9.67E-01
TL-207	Not Detected	-----	1.75E+01
AM-241	Not Detected	-----	1.66E-01
PU-239	Not Detected	-----	3.62E+02
NP-237	3.55E-01	1.34E-01	2.07E-01
PA-233	Not Detected	-----	6.24E-02
TH-229	Not Detected	-----	2.00E-01

not detected 9/3/97

[Summary Report] - Sample ID: : 70153501

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.74E-02
AG-110m	Not Detected	-----	4.26E-02
BA-133	Not Detected	-----	5.44E-02
BE-7	Not Detected	-----	2.76E-01
CD-109	Not Detected	-----	8.99E-01
CD-115	Not Detected	-----	9.52E-02
CE-139	Not Detected	-----	2.60E-02
CE-141	Not Detected	-----	4.33E-02
CE-144	Not Detected	-----	1.96E-01
CO-56	Not Detected	-----	3.88E-02
CO-57	Not Detected	-----	2.49E-02
CO-58	Not Detected	-----	4.07E-02
CO-60	Not Detected	-----	4.26E-02
CR-51	Not Detected	-----	2.59E-01
CS-134	Not Detected	-----	5.33E-02
CS-137	3.09E-02	1.90E-02	2.14E-02
EU-152	Not Detected	-----	7.49E-02
EU-154	Not Detected	-----	2.17E-01
EU-155	Not Detected	-----	1.10E-01
FE-59	Not Detected	-----	8.82E-02
GD-153	Not Detected	-----	8.10E-02
HG-203	Not Detected	-----	3.18E-02
I-131	Not Detected	-----	3.40E-02
IR-192	Not Detected	-----	3.04E-02
K-40	2.27E+01	3.48E+00	3.15E-01
MN-52	Not Detected	-----	4.45E-02
MN-54	Not Detected	-----	4.07E-02
MO-99	Not Detected	-----	3.71E-01
NA-22	Not Detected	-----	5.20E-02
NA-24	Not Detected	-----	1.18E-01
NB-95	Not Detected	-----	2.12E-01
ND-147	Not Detected	-----	2.40E-01
NI-57	Not Detected	-----	9.30E-02
PB-210	Not Detected	-----	4.68E+00
RU-103	Not Detected	-----	3.21E-02
RU-106	Not Detected	-----	3.33E-01
SB-122	Not Detected	-----	6.03E-02
SB-124	Not Detected	-----	3.40E-02
SB-125	Not Detected	-----	9.44E-02
SN-113	Not Detected	-----	4.31E-02
SR-85	Not Detected	-----	4.08E-02
TA-182	Not Detected	-----	1.86E-01
TA-183	Not Detected	-----	1.60E-01
TC-99m	Not Detected	-----	3.33E-01
TL-201	Not Detected	-----	1.11E-01
XE-133	Not Detected	-----	1.15E-01
Y-88	Not Detected	-----	3.25E-02
ZN-65	Not Detected	-----	1.30E-01
ZR-95	Not Detected	-----	7.12E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 9-03-97 2:15:30 PM *

* Analyzed by: *[Signature]* 9/3/97 Reviewed by: *[Signature]* 9/4/97 *

Customer : B.GALLOWAY/D.BISWELL 6682/SMO
 Customer Sample ID : 034067-002
 Lab Sample ID : 70153502

Sample Description : SOIL MARINELLI SAMPLE
 Sample Quantity : 575.000 gram
 Sample Date/Time : 9-02-97 12:20:00 PM
 Acquire Start Date/Time : 9-03-97 12:30:48 PM
 Detector Name : LAB03
 Elapsed Live/Real Time : 6000 / 6002 seconds

85-B14-007-15.0-S

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	1.21E+00	1.14E+00	1.59E+00
TH-234	1.40E+00	4.06E-01	4.49E-01
RA-226	2.07E+00	7.30E-01	6.74E-01
PB-214	8.41E-01	3.30E-01	5.76E-02
BI-214	7.98E-01	5.24E-01	6.35E-02
TH-232	7.71E-01	4.38E-01	1.89E-01
RA-228	8.79E-01	3.37E-01	2.01E-01
AC-228	8.67E-01	2.30E-01	1.18E-01
TH-228	8.20E-01	6.28E-01	5.42E-01
RA-224	7.41E-01	3.04E-01	1.06E-01
PB-212	8.31E-01	1.57E-01	4.97E-02
BI-212	1.05E+00	6.54E-01	3.77E-01
TL-208	7.53E-01	1.81E-01	9.34E-02
U-235	Not Detected	-----	2.15E-01
TH-231	Not Detected	-----	8.74E+00
PA-231	Not Detected	-----	1.58E+00
TH-227	Not Detected	-----	4.35E-01
RA-223	Not Detected	-----	1.48E-01
RN-219	Not Detected	-----	4.98E-01
PB-211	Not Detected	-----	1.16E+00
TL-207	Not Detected	-----	1.78E+01
AM-241	Not Detected	-----	1.85E-01
PU-239	Not Detected	-----	3.98E+02
NP-237	5.94E-01	1.70E-01	2.21E-01
PA-233	Not Detected	-----	7.33E-02
TH-229	Not Detected	-----	2.16E-01

not detected 9/3/97

[Summary Report] - Sample ID: : 70153502

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	5.19E-02
AG-110m	Not Detected	-----	3.86E-02
BA-133	Not Detected	-----	6.57E-02
BE-7	Not Detected	-----	3.12E-01
CD-109	Not Detected	-----	9.99E-01
CD-115	Not Detected	-----	1.11E-01
CE-139	Not Detected	-----	3.07E-02
CE-141	Not Detected	-----	4.77E-02
CE-144	Not Detected	-----	2.16E-01
CO-56	Not Detected	-----	4.20E-02
CO-57	Not Detected	-----	2.66E-02
CO-58	Not Detected	-----	4.15E-02
CO-60	Not Detected	-----	4.65E-02
CR-51	Not Detected	-----	2.90E-01
CS-134	Not Detected	-----	6.29E-02
CS-137	Not Detected	-----	4.45E-02
EU-152	Not Detected	-----	8.01E-02
EU-154	Not Detected	-----	2.40E-01
EU-155	Not Detected	-----	1.24E-01
FE-59	Not Detected	-----	9.62E-02
GD-153	Not Detected	-----	8.73E-02
HG-203	Not Detected	-----	3.59E-02
I-131	Not Detected	-----	3.96E-02
IR-192	Not Detected	-----	3.36E-02
K-40	1.66E+01	2.64E+00	3.78E-01
MN-52	Not Detected	-----	4.80E-02
MN-54	Not Detected	-----	4.75E-02
MO-99	Not Detected	-----	3.94E-01
NA-22	Not Detected	-----	5.61E-02
NA-24	Not Detected	-----	1.29E-01
NB-95	Not Detected	-----	2.41E-01
ND-147	Not Detected	-----	2.49E-01
NI-57	Not Detected	-----	1.00E-01
PB-210	Not Detected	-----	5.26E+00
RU-103	Not Detected	-----	3.60E-02
RU-106	Not Detected	-----	3.77E-01
SB-122	Not Detected	-----	6.37E-02
SB-124	Not Detected	-----	3.89E-02
SB-125	Not Detected	-----	1.03E-01
SN-113	Not Detected	-----	4.69E-02
SR-85	Not Detected	-----	4.74E-02
TA-182	Not Detected	-----	2.05E-01
TA-183	Not Detected	-----	1.80E-01
TC-99m	Not Detected	-----	4.07E-01
TL-201	Not Detected	-----	1.24E-01
XE-133	Not Detected	-----	1.29E-01
Y-88	Not Detected	-----	3.91E-02
ZN-65	Not Detected	-----	1.40E-01
ZR-95	Not Detected	-----	7.48E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 9-03-97 3:56:08 PM *

Analyzed by: *[Signature]* 9/3/97 Reviewed by: *[Signature]* 9/4/97

Customer : B.GALLOWAY/D.BISWELL 6682/SMO
 Customer Sample ID : 034070-002
 Lab Sample ID : 70153503

Sample Description : SOIL MARINELLI SAMPLE
 Sample Quantity : 586.000 gram
 Sample Date/Time : 9-02-97 2:00:00 PM
 Acquire Start Date/Time : 9-03-97 2:12:52 PM
 Detector Name : LAB03
 Elapsed Live/Real Time : 6000 / 6002 seconds

85-BH-008-5.0-S

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected		1.40E+00
TH-234	1.07E+00	3.70E-01	4.44E-01
RA-226	9.07E-01	4.25E-01	5.04E-01
PB-214	5.76E-01	1.16E-01	5.04E-02
BI-214	6.51E-01	1.57E-01	5.39E-02
TH-232	6.27E-01	3.20E-01	1.46E-01
RA-228	6.80E-01	9.37E-01	1.90E-01
AC-228	6.08E-01	7.59E-01	1.06E-01
TH-228	2.69E-01	2.32E-01	3.77E-01
RA-224	6.26E-01	3.46E-01	1.10E-01
PB-212	6.33E-01	1.21E-01	4.43E-02
BI-212	8.43E-01	1.30E+00	3.80E-01
TL-208	5.35E-01	2.03E-01	8.45E-02
U-235	Not Detected		1.96E-01
TH-231	Not Detected		7.94E+00
PA-231	Not Detected		1.53E+00
TH-227	Not Detected		3.77E-01
RA-223	Not Detected		1.34E-01
RN-219	Not Detected		4.36E-01
PB-211	Not Detected		9.90E-01
TL-207	Not Detected		1.77E+01
AM-241	Not Detected		1.65E-01
PU-239	Not Detected		3.54E+02
NP-237	4.30E-01	1.65E-01	2.05E-01
PA-233	Not Detected		6.54E-02
TH-229	Not Detected		1.97E-01

not detected *[Signature]* 9/3/97

[Summary Report] - Sample ID: : 70153503

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected		4.79E-02
AG-110m	Not Detected		3.55E-02
BA-133	Not Detected		5.67E-02
BE-7	Not Detected		2.85E-01
CD-109	Not Detected		8.84E-01
CD-115	Not Detected		9.91E-02
CE-139	Not Detected		2.72E-02
CE-141	Not Detected		4.37E-02
CE-144	Not Detected		1.96E-01
CO-56	Not Detected		4.08E-02
CO-57	Not Detected		2.46E-02
CO-58	Not Detected		4.01E-02
CO-60	Not Detected		4.52E-02
CR-51	Not Detected		2.64E-01
CS-134	Not Detected		5.74E-02
CS-137	Not Detected		3.91E-02
EU-152	Not Detected		7.30E-02
EU-154	Not Detected		2.23E-01
EU-155	Not Detected		1.10E-01
FE-59	Not Detected		9.17E-02
GD-153	Not Detected		8.08E-02
HG-203	Not Detected		3.34E-02
I-131	Not Detected		3.54E-02
IR-192	Not Detected		3.24E-02
K-40	1.64E+01	2.69E+00	3.24E-01
MN-52	Not Detected		5.02E-02
MN-54	Not Detected		4.24E-02
MO-99	Not Detected		3.68E-01
NA-22	Not Detected		5.22E-02
NA-24	Not Detected		1.23E-01
NB-95	Not Detected		2.10E-01
ND-147	Not Detected		2.45E-01
NI-57	Not Detected		9.82E-02
PB-210	Not Detected		4.76E+00
RU-103	Not Detected		3.36E-02
RU-106	Not Detected		3.36E-01
SB-122	Not Detected		5.92E-02
SB-124	Not Detected		3.58E-02
SB-125	Not Detected		9.69E-02
SN-113	Not Detected		4.26E-02
SR-85	Not Detected		4.35E-02
TA-182	Not Detected		1.91E-01
TA-183	Not Detected		1.60E-01
TC-99m	Not Detected		3.86E-01
TL-201	Not Detected		1.15E-01
XE-133	Not Detected		1.18E-01
Y-88	Not Detected		3.64E-02
ZN-65	Not Detected		1.33E-01
ZR-95	Not Detected		7.25E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 9-03-97 5:41:02 PM *

Analyzed by: *[Signature]* 9/3/97 Reviewed by: *[Signature]* 9/4/97

Customer : B.GALLOWAY/D.BISWELL 6682/SMO
 Customer Sample ID : 034072-002
 Lab Sample ID : 70153504

Sample Description : SOIL MARINELLI SAMPLE
 Sample Quantity : 541.000 gram *ER 85-BH-008-15.0-S*
 Sample Date/Time : 9-02-97 2:30:00 PM
 Acquire Start Date/Time : 9-03-97 3:57:12 PM
 Detector Name : LAB03
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	9.91E-01	1.04E+00	1.68E+00
TH-234	1.37E+00	4.68E-01	5.30E-01
RA-226	1.71E+00	3.35E-01	6.41E-01
PB-214	7.96E-01	1.52E-01	5.97E-02
BI-214	7.81E-01	3.62E-01	6.23E-02
TH-232	8.32E-01	4.58E-01	2.03E-01
RA-228	6.98E-01	3.50E-01	2.32E-01
AC-228	7.96E-01	4.54E-01	1.07E-01
TH-228	3.53E-01	3.47E-01	5.19E-01
RA-224	8.67E-01	3.24E-01	1.13E-01
PB-212	7.98E-01	1.41E-01	5.03E-02
BI-212	7.55E-01	5.81E-01	4.22E-01
TL-208	7.83E-01	1.93E-01	9.24E-02
U-235	Not Detected	-----	2.27E-01
TH-231	Not Detected	-----	9.14E+00
PA-231	Not Detected	-----	1.64E+00
TH-227	Not Detected	-----	4.47E-01
RA-223	Not Detected	-----	1.55E-01
RN-219	2.96E-01	3.93E-01	4.97E-01
PB-211	Not Detected	-----	1.11E+00
TL-207	Not Detected	-----	1.99E+01
AM-241	Not Detected	-----	1.88E-01
PU-239	Not Detected	-----	4.11E+02
NP-237	7.27E-01	2.59E-01	2.40E-01
PA-233	Not Detected	-----	7.25E-02
TH-229	Not Detected	-----	2.24E-01

not detected 9/3/97

not detected 9/3/97

[Summary Report] - Sample ID: : 70153504

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	5.40E-02
AG-110m	Not Detected	-----	4.20E-02
BA-133	Not Detected	-----	6.88E-02
BE-7	Not Detected	-----	3.38E-01
CD-109	Not Detected	-----	1.08E+00
CD-115	Not Detected	-----	1.15E-01
CE-139	Not Detected	-----	3.22E-02
CE-141	Not Detected	-----	5.10E-02
CE-144	Not Detected	-----	2.21E-01
CO-56	Not Detected	-----	4.51E-02
CO-57	Not Detected	-----	2.71E-02
CO-58	Not Detected	-----	4.36E-02
CO-60	Not Detected	-----	4.60E-02
CR-51	Not Detected	-----	2.99E-01
CS-134	Not Detected	-----	6.37E-02
CS-137	Not Detected	-----	4.47E-02
EU-152	Not Detected	-----	8.16E-02
EU-154	Not Detected	-----	2.47E-01
EU-155	Not Detected	-----	1.30E-01
FE-59	Not Detected	-----	1.05E-01
GD-153	Not Detected	-----	9.24E-02
HG-203	Not Detected	-----	3.64E-02
I-131	Not Detected	-----	4.21E-02
IR-192	Not Detected	-----	3.42E-02
K-40	1.63E+01	2.79E+00	3.94E-01
MN-52	Not Detected	-----	5.32E-02
MN-54	Not Detected	-----	5.08E-02
MO-99	Not Detected	-----	4.38E-01
NA-22	Not Detected	-----	5.44E-02
NA-24	Not Detected	-----	1.61E-01
NB-95	Not Detected	-----	2.50E-01
ND-147	Not Detected	-----	2.69E-01
NI-57	Not Detected	-----	1.20E-01
PB-210	Not Detected	-----	5.39E+00
RU-103	Not Detected	-----	3.75E-02
RU-106	Not Detected	-----	4.04E-01
SB-122	Not Detected	-----	6.66E-02
SB-124	Not Detected	-----	3.92E-02
SB-125	Not Detected	-----	1.06E-01
SN-113	Not Detected	-----	5.10E-02
SR-85	Not Detected	-----	5.10E-02
TA-182	Not Detected	-----	2.09E-01
TA-183	Not Detected	-----	1.84E-01
TC-99m	Not Detected	-----	4.80E-01
TL-201	Not Detected	-----	1.32E-01
XE-133	Not Detected	-----	1.36E-01
Y-88	Not Detected	-----	3.56E-02
ZN-65	Not Detected	-----	1.44E-01
ZR-95	Not Detected	-----	8.23E-02

```
Report Date       : 9-03-97 5:53:35 PM
QA File          : C:\GENIEPC\CAMFILES\LCS3.QAF
Analyst          : FCD
Sample ID        : 70153505
Sample Quantity   : 1.00 Each
Sample Date       : 11-01-90 12:00:00 PM
Measurement Date  : 9-03-97 5:40:32 PM
Elapsed Live Time : 600 seconds
Elapsed Real Time : 607 seconds
```

Parameter	Mean	1S Error	New Value	< LU : SD : UD : ES >
AM-241 Activity	8.704E-02	2.125E-03	8.863E-02	< : : : >
CS-137 Activity	6.800E-02	1.693E-03	7.056E-02	< :In : : >
CO-60 Activity	7.781E-02	2.698E-03	8.170E-02	< :In : : >

Flags Key: LU = Boundary Test (Ab = Above, Be = Below)
SD = Sample Driven N-Sigma Test (In = Investigate, Ac = Action)
UD = User Driven N-Sigma Test (In = Investigate, Ac = Action)
BS = Measurement Bias Test (In = Investigate, Ac = Action)

Reviewed by:

PAGE 1 OF 2

Batch No: 701027

AR/COC-06344

Dept. No./Mail Stop: 6682/1147
Project/Task Manager: Bob Galloway
Project Name: Site 85
Record Center Code: ER/1335-85/DAT
Logbook Ref No: #205
Service Order No.: CF0431

Date Sampled: 6/12/97
 Date Sampled Shipped: 6/12/97
 Lab Contact: HC
 Lab Destination: Fernando Dominguez
 SMO Contact/Phone: RPSO, Bld. 881
PAM Puissant/844 -
 Send Report to SMO PAM Puissant ³¹⁸⁵

Contract No. AJ-2480

Case No.: 8835.208/508

SMO Authorization: _____
Bill to: Sandia National Laboratories
Supplier Services Department
P.O. Box 5800 MS 0154
Albuquerque, NM 87185-0154

Parameter & Method Requested

[illegible]

RMMA ☒ Yes ☐ No Ref. No. _____

Sample Disposal ☒ Return to Client ☐ Disposal by lab

Turnaround Time ☒ Normal ☐ Rush Required Report Date

Serial No.	Name	Signature	Init	Company/Organization/Phone
------------	------	-----------	------	----------------------------

Team: JAN CURTIS, J.C. WESTON/6684/284-2N

Members	Shipwrights (shdnt)	11/6831 289-260
---------	---------------------	-----------------

Special Instructions/QC Requirements

Abstract

LAB USE

Being Released by Don M. [Signature] Org. 60684 Date 6/18/97 Time 1537

Recd. [illegible] Org. 7578 Date 6/18/97 Time 1537

2. Relinquished to: John J. ... Org. ID: 7574 Date: 1/18/97 Time: 11:05

2. Received by _____ Org. SNL7578 Date 6/18/57 Time 1608

3.5. Published by 2 Org. 5467578 Date 6/26/87 Time 1525

4. Relinquished by: _____ Org.: _____ Date: ____/____/____ Time: AM/PM

4. Received by _____ Org. _____ Date _____ Time _____

5. Relinquished by: _____ Org: _____ Date: _____ Time: _____

5. Received by	Org.	Date	Time
----------------	------	------	------

6. Relinquished by _____ Org. _____ Date _____ Time _____

WHITE - Accompanying Samples, **BLUE** - To Accompany Samples, **YELLOW** - SMO Suspense Copy, **PINK** - Field Copy

BATCH # 701027

Project Name: Site 85

Project/Task Manager: Bob Galloway

Case No.: 8835.208500

Location

Tech Area: CTF

Reference LOV (available at SMO)

Building

Room

Beginning
Depth in Ft.

ER Site No.

Date/Time Collected

Sample Matrix

Container

Type

Volume

Preservative

**Sample
College
Method**

Sample Type

Gamma spec

**Lab
Sample
ID**

LAB
USE

WHITE - 10 company samples;
Laboratory Copy

BLUE: To Accompany Samples,
Return to SMO

YELLOW- SMO Suspense Copy

PINK- Field Copy

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 6-19-97 5:55:16 PM *

 * Analyzed by: *KA 6/23/97* Reviewed by: *AY 6/25/97* *

Customer : GALLOWAY/STEFANOV (6682/SMO)
 Customer Sample ID : 033472-002
 Lab Sample ID : 70102701

85-1-GR-016-00-SS0

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 723.000 gram
 Sample Date/Time : 6-18-97 8:37:00 AM
 Acquire Start Date/Time : 6-19-97 4:11:05 PM
 Detector Name : LAB01
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	1.49E+00
TH-234	1.15E+00	3.71E-01	4.60E-01
RA-226	1.09E+00	5.26E-01	5.54E-01
PB-214	5.82E-01	1.15E-01	5.30E-02
BI-214	5.27E-01	1.33E-01	5.13E-02
TH-232	6.71E-01	3.80E-01	1.49E-01
RA-228	4.97E-01	8.62E-01	1.80E-01
AC-228	6.93E-01	4.89E-01	1.03E-01
TH-228	6.23E-01	6.17E-01	4.78E-01
RA-224	7.81E-01	3.06E-01	9.00E-02
PB-212	6.75E-01	1.21E-01	3.67E-02
BI-212	8.08E-01	6.40E-01	3.22E-01
TL-208	5.77E-01	1.30E-01	7.54E-02
U-235	Not Detected	-----	2.05E-01
TH-231	Not Detected	-----	8.76E+00
PA-231	Not Detected	-----	1.47E+00
TH-227	Not Detected	-----	3.65E-01
RA-223	Not Detected	-----	1.46E-01
RN-219	1.75E-01	3.45E-01	4.29E-01
PB-211	Not Detected	-----	9.97E-01
TL-207	Not Detected	-----	1.60E+01
AM-241	Not Detected	-----	1.87E-01
PU-239	Not Detected	-----	3.46E+02
NP-237	4.57E-01	1.47E-01	2.11E-01
PA-233	Not Detected	-----	6.00E-02
TH-229	Not Detected	-----	1.91E-01

NOT DETECTED 6/23/97 KAG

NOT DETECTED 6/23/97 KAG

[Summary Report] - Sample ID: : 70102701

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.66E-02
AG-110m	Not Detected	-----	3.64E-02
BA-133	Not Detected	-----	5.26E-02
BE-7	Not Detected	-----	2.77E-01
CD-109	Not Detected	-----	7.17E-01
CD-115	Not Detected	-----	9.90E-02
CE-139	Not Detected	-----	2.62E-02
CE-141	Not Detected	-----	4.60E-02
CE-144	Not Detected	-----	1.95E-01
CO-56	Not Detected	-----	3.22E-02
CO-57	Not Detected	-----	2.45E-02
CO-58	Not Detected	-----	3.66E-02
CO-60	Not Detected	-----	4.29E-02
CR-51	Not Detected	-----	2.43E-01
CS-134	Not Detected	-----	4.92E-02
CS-137	2.36E-02	1.85E-02	2.09E-02
EU-152	Not Detected	-----	7.36E-02
EU-154	Not Detected	-----	2.17E-01
EU-155	Not Detected	-----	1.13E-01
FE-59	Not Detected	-----	8.74E-02
GD-153	Not Detected	-----	7.96E-02
HG-203	Not Detected	-----	3.15E-02
I-131	Not Detected	-----	3.28E-02
IR-192	Not Detected	-----	2.81E-02
K-40	1.81E+01	2.88E+00	2.69E-01
MN-52	Not Detected	-----	3.84E-02
MN-54	Not Detected	-----	3.60E-02
MO-99	Not Detected	-----	3.90E-01
NA-22	Not Detected	-----	4.99E-02
NA-24	Not Detected	-----	1.64E-01
NB-95	Not Detected	-----	2.01E-01
ND-147	Not Detected	-----	2.34E-01
NI-57	Not Detected	-----	1.04E-01
PB-210	Not Detected	-----	7.55E+00
RU-103	Not Detected	-----	3.02E-02
RU-106	Not Detected	-----	3.15E-01
SB-122	Not Detected	-----	6.04E-02
SB-124	Not Detected	-----	3.25E-02
SB-125	Not Detected	-----	9.07E-02
SN-113	Not Detected	-----	3.82E-02
SR-85	Not Detected	-----	4.10E-02
TA-182	Not Detected	-----	1.75E-01
TA-183	Not Detected	-----	1.90E-01
TC-99m	Not Detected	-----	9.09E-01
TL-201	Not Detected	-----	1.44E-01
XE-133	Not Detected	-----	1.48E-01
Y-88	Not Detected	-----	3.20E-02
ZN-65	Not Detected	-----	1.21E-01
ZR-95	Not Detected	-----	6.92E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 6-19-97 7:40:21 PM *

 *
 * Analyzed by: *K 6/23/97* Reviewed by: *Y 6/25/97* *

Customer : GALLOWAY/STEFANOV (6682/SMO)
 Customer Sample ID : 033473-002
 Lab Sample ID : 70102702 *85-1-GR-07-00-SS0*

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 779.000 gram
 Sample Date/Time : 6-18-97 8:45:00 AM
 Acquire Start Date/Time : 6-19-97 5:57:49 PM
 Detector Name : LAB01
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	1.42E+00
TH-234	Not Detected	-----	5.64E-01
RA-226	1.30E+00	5.44E-01	5.99E-01
PB-214	5.47E-01	1.24E-01	4.90E-02
BI-214	5.32E-01	1.31E-01	4.79E-02
TH-232	5.87E-01	3.53E-01	1.36E-01
RA-228	5.64E-01	1.91E-01	1.64E-01
AC-228	5.38E-01	9.72E-02	1.03E-01
TH-228	5.55E-01	6.74E-01	4.24E-01
RA-224	5.65E-01	2.25E-01	8.36E-02
PB-212	5.79E-01	1.15E-01	3.83E-02
BI-212	6.04E-01	3.60E-01	3.37E-01
TL-208	5.31E-01	1.30E-01	7.30E-02
U-235	Not Detected	-----	2.02E-01
TH-231	Not Detected	-----	8.26E+00
PA-231	Not Detected	-----	1.34E+00
TH-227	Not Detected	-----	3.30E-01
RA-223	Not Detected	-----	1.39E-01
RN-219	Not Detected	-----	3.95E-01
PB-211	Not Detected	-----	8.85E-01
TL-207	Not Detected	-----	1.56E+01
AM-241	Not Detected	-----	1.71E-01
PU-239	Not Detected	-----	3.26E+02
NP-237	Not Detected	-----	2.67E-01
PA-233	Not Detected	-----	5.36E-02
TH-229	Not Detected	-----	1.83E-01

[Summary Report] - Sample ID: : 70102702

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.32E-02
AG-110m	Not Detected	-----	3.42E-02
BA-133	Not Detected	-----	4.81E-02
BE-7	1.84E-01	1.30E-01	1.68E-01
CD-109	7.51E-01	5.74E-01	5.58E-01
CD-115	Not Detected	-----	9.41E-02
CE-139	Not Detected	-----	2.44E-02
CE-141	Not Detected	-----	2.02E-02
CE-144	Not Detected	-----	1.84E-01
CO-56	Not Detected	-----	3.71E-02
CO-57	Not Detected	-----	2.35E-02
CO-58	Not Detected	-----	3.54E-02
CO-60	Not Detected	-----	4.13E-02
CR-51	Not Detected	-----	2.30E-01
CS-134	Not Detected	-----	4.65E-02
CS-137	Not Detected	-----	3.93E-02
EU-152	Not Detected	-----	7.17E-02
EU-154	Not Detected	-----	1.99E-01
EU-155	Not Detected	-----	1.07E-01
FE-59	Not Detected	-----	8.41E-02
GD-153	Not Detected	-----	7.55E-02
HG-203	Not Detected	-----	2.86E-02
I-131	Not Detected	-----	3.00E-02
IR-192	Not Detected	-----	2.65E-02
K-40	1.74E+01	2.76E+00	2.77E-01
MN-52	Not Detected	-----	3.96E-02
MN-54	Not Detected	-----	3.68E-02
MO-99	Not Detected	-----	3.49E-01
NA-22	Not Detected	-----	4.86E-02
NA-24	Not Detected	-----	1.70E-01
NB-95	Not Detected	-----	1.86E-01
ND-147	Not Detected	-----	2.13E-01
NI-57	Not Detected	-----	1.02E-01
PB-210	Not Detected	-----	7.15E+00
RU-103	Not Detected	-----	2.95E-02
RU-106	Not Detected	-----	2.85E-01
SB-122	Not Detected	-----	5.63E-02
SB-124	Not Detected	-----	3.03E-02
SB-125	Not Detected	-----	8.14E-02
SN-113	Not Detected	-----	3.51E-02
SR-85	Not Detected	-----	3.61E-02
TA-182	Not Detected	-----	1.73E-01
TA-183	Not Detected	-----	1.76E-01
TC-99m	Not Detected	-----	1.08E+00
TL-201	Not Detected	-----	1.34E-01
XE-133	Not Detected	-----	1.39E-01
Y-88	Not Detected	-----	2.67E-02
ZN-65	Not Detected	-----	1.18E-01
ZR-95	Not Detected	-----	6.48E-02

NOT DETECTED 6/23/97 RAS

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 6-19-97 9:25:23 PM *

* Analyzed by: *JK 6/23/97* Reviewed by: *YH 6/25/97* *

Customer : GALLOWAY/STEFANOV (6682/SMO)
 Customer Sample ID : 033474-002
 Lab Sample ID : 70102703 85-1-GR-018-00-SSO

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 765.000 gram
 Sample Date/Time : 6-18-97 8:48:00 AM
 Acquire Start Date/Time : 6-19-97 7:42:45 PM
 Detector Name : LAB01
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	1.52E+00
TH-234	1.13E+00	4.05E-01	4.63E-01
RA-226	1.31E+00	7.67E-01	5.95E-01
PB-214	5.90E-01	1.02E+00	5.26E-02
BI-214	6.03E-01	1.07E-01	4.86E-02
TH-232	6.81E-01	3.35E-01	1.41E-01
RA-228	5.97E-01	2.02E-01	1.75E-01
AC-228	5.76E-01	1.78E-01	1.02E-01
TH-228	Not Detected	-----	4.72E-01
RA-224	7.83E-01	2.82E-01	7.59E-02
PB-212	7.07E-01	1.21E-01	4.00E-02
BI-212	9.00E-01	3.96E-01	3.81E-01
TL-208	5.89E-01	1.33E-01	7.29E-02
U-235	Not Detected	-----	2.10E-01
TH-231	Not Detected	-----	8.61E+00
PA-231	Not Detected	-----	1.40E+00
TH-227	Not Detected	-----	3.63E-01
RA-223	Not Detected	-----	1.47E-01
RN-219	2.49E-01	3.35E-01	4.19E-01
PB-211	Not Detected	-----	9.49E-01
TL-207	Not Detected	-----	1.57E+01
AM-241	Not Detected	-----	1.84E-01
PU-239	Not Detected	-----	3.53E+02
NP-237	Not Detected	-----	2.74E-01
PA-233	Not Detected	-----	5.92E-02
TH-229	Not Detected	-----	1.98E-01

NOT DETECTED 6/23/97 *JK*

[Summary Report] - Sample ID: : 70102703

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.82E-02
AG-110m	Not Detected	-----	3.44E-02
BA-133	Not Detected	-----	5.03E-02
BE-7	Not Detected	-----	2.73E-01
CD-109	1.45E+00	5.12E-01	7.35E-01
CD-115	Not Detected	-----	1.01E-01
CE-139	Not Detected	-----	2.58E-02
CE-141	Not Detected	-----	4.67E-02
CE-144	Not Detected	-----	1.87E-01
CO-56	Not Detected	-----	3.97E-02
CO-57	Not Detected	-----	2.39E-02
CO-58	Not Detected	-----	3.51E-02
CO-60	Not Detected	-----	4.30E-02
CR-51	Not Detected	-----	2.38E-01
CS-134	Not Detected	-----	4.86E-02
CS-137	2.21E-02	3.23E-02	2.23E-02
EU-152	Not Detected	-----	7.22E-02
EU-154	Not Detected	-----	2.22E-01
EU-155	Not Detected	-----	1.16E-01
FE-59	Not Detected	-----	8.70E-02
GD-153	Not Detected	-----	8.18E-02
HG-203	Not Detected	-----	3.12E-02
I-131	Not Detected	-----	3.33E-02
IR-192	Not Detected	-----	2.78E-02
K-40	1.92E+01	2.94E+00	3.13E-01
MN-52	Not Detected	-----	4.02E-02
MN-54	Not Detected	-----	3.93E-02
MO-99	Not Detected	-----	3.86E-01
NA-22	Not Detected	-----	5.20E-02
NA-24	Not Detected	-----	1.82E-01
NB-95	Not Detected	-----	2.05E-01
ND-147	Not Detected	-----	2.45E-01
NI-57	Not Detected	-----	1.04E-01
PB-210	Not Detected	-----	7.76E+00
RU-103	Not Detected	-----	3.28E-02
RU-106	Not Detected	-----	2.99E-01
SB-122	Not Detected	-----	6.23E-02
SB-124	Not Detected	-----	3.24E-02
SB-125	Not Detected	-----	9.23E-02
SN-113	Not Detected	-----	3.68E-02
SR-85	Not Detected	-----	3.93E-02
TA-182	Not Detected	-----	1.74E-01
TA-183	Not Detected	-----	1.90E-01
TC-99m	Not Detected	-----	1.39E+00
TL-201	Not Detected	-----	1.47E-01
XE-133	Not Detected	-----	1.50E-01
Y-88	Not Detected	-----	3.40E-02
ZN-65	Not Detected	-----	1.17E-01
ZR-95	Not Detected	-----	6.21E-02

NOT DETECTED 6/23/97 ~~for~~

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 6-19-97 11:10:27 PM *

 * Analyzed by: *[Signature]* 6/23/97 Reviewed by: *[Signature]* 6/25/97 *

Customer : GALLOWAY/STEFANOV (6682/SMO)
 Customer Sample ID : 033475-002
 Lab Sample ID : 70102704

85-1-GR-019-00-SSO

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 855.000 gram
 Sample Date/Time : 6-18-97 8:54:00 AM
 Acquire Start Date/Time : 6-19-97 9:27:49 PM
 Detector Name : LAB01
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	1.45E+00
TH-234	7.25E-01	2.81E-01	4.08E-01
RA-226	1.51E+00	5.04E-01	4.72E-01
PB-214	6.32E-01	1.17E-01	4.79E-02
BI-214	6.25E-01	1.37E-01	4.43E-02
TH-232	7.14E-01	3.46E-01	1.44E-01
RA-228	5.85E-01	2.35E-01	1.62E-01
AC-228	6.65E-01	2.29E-01	1.02E-01
TH-228	4.93E-01	3.31E-01	4.41E-01
RA-224	7.79E-01	2.29E-01	6.78E-02
PB-212	6.58E-01	1.06E-01	3.64E-02
BI-212	9.36E-01	6.03E-01	3.17E-01
TL-208	6.52E-01	1.41E-01	6.81E-02
U-235	Not Detected	-----	1.96E-01
TH-231	Not Detected	-----	8.25E+00
PA-231	Not Detected	-----	1.28E+00
TH-227	Not Detected	-----	3.31E-01
RA-223	Not Detected	-----	1.44E-01
RN-219	Not Detected	-----	3.80E-01
PB-211	Not Detected	-----	8.67E-01
TL-207	Not Detected	-----	1.44E+01
AM-241	Not Detected	-----	1.72E-01
PU-239	Not Detected	-----	3.32E+02
NP-237	Not Detected	-----	1.91E-01
PA-233	Not Detected	-----	5.33E-02
TH-229	Not Detected	-----	1.82E-01

[Summary Report] - Sample ID: : 70102704

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.34E-02
AG-110m	Not Detected	-----	3.21E-02
BA-133	Not Detected	-----	4.73E-02
BE-7	Not Detected	-----	2.49E-01
CD-109	1.39E+00	5.21E-01	6.48E-01
CD-115	Not Detected	-----	9.83E-02
CE-139	Not Detected	-----	2.44E-02
CE-141	Not Detected	-----	4.37E-02
CE-144	Not Detected	-----	1.79E-01
CO-56	Not Detected	-----	3.53E-02
CO-57	Not Detected	-----	2.24E-02
CO-58	Not Detected	-----	3.20E-02
CO-60	Not Detected	-----	3.85E-02
CR-51	Not Detected	-----	2.30E-01
CS-134	Not Detected	-----	4.60E-02
CS-137	Not Detected	-----	3.60E-02
EU-152	Not Detected	-----	6.73E-02
EU-154	Not Detected	-----	1.99E-01
EU-155	Not Detected	-----	1.04E-01
FE-59	Not Detected	-----	7.82E-02
GD-153	Not Detected	-----	7.53E-02
HG-203	Not Detected	-----	2.90E-02
I-131	Not Detected	-----	2.92E-02
IR-192	Not Detected	-----	2.50E-02
K-40	1.61E+01	2.54E+00	2.92E-01
MN-52	Not Detected	-----	3.83E-02
MN-54	Not Detected	-----	3.58E-02
MO-99	Not Detected	-----	3.58E-01
NA-22	Not Detected	-----	4.84E-02
NA-24	Not Detected	-----	1.68E-01
NB-95	1.54E-02	1.89E-02	8.11E-02
ND-147	Not Detected	-----	2.25E-01
NI-57	Not Detected	-----	9.45E-02
PB-210	Not Detected	-----	7.15E+00
RU-103	Not Detected	-----	2.91E-02
RU-106	Not Detected	-----	2.84E-01
SB-122	Not Detected	-----	5.61E-02
SB-124	Not Detected	-----	2.92E-02
SB-125	Not Detected	-----	8.18E-02
SN-113	Not Detected	-----	3.69E-02
SR-85	Not Detected	-----	3.56E-02
TA-182	Not Detected	-----	1.65E-01
TA-183	Not Detected	-----	1.80E-01
TC-99m	Not Detected	-----	1.58E+00
TL-201	Not Detected	-----	1.39E-01
XE-133	Not Detected	-----	1.45E-01
Y-88	Not Detected	-----	3.01E-02
ZN-65	Not Detected	-----	1.13E-01
ZR-95	Not Detected	-----	5.76E-02

NOT DETECTED 6/23/97 KAS

not detected 6/25/97

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 6-20-97 12:55:56 AM *

 * Analyzed by: *K. Galloway* Reviewed by: *W. J. 6/25/97* *

Customer : GALLOWAY/STEFANOV (6682/SMO)
 Customer Sample ID : 033477-002
 Lab Sample ID : 70102705

85-1-GR-020-00-SSD

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 805.000 gram
 Sample Date/Time : 6-18-97 8:58:00 AM
 Acquire Start Date/Time : 6-19-97 11:13:17 PM
 Detector Name : LAB01
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	1.42E+00
TH-234	Not Detected	-----	4.55E-01
RA-226	1.52E+00	7.41E-01	4.97E-01
PB-214	5.41E-01	1.06E-01	5.20E-02
BI-214	5.53E-01	1.35E-01	4.72E-02
TH-232	6.12E-01	3.31E-01	1.47E-01
RA-228	7.44E-01	3.08E-01	1.64E-01
AC-228	5.87E-01	1.87E-01	1.09E-01
TH-228	2.45E-01	3.01E-01	4.33E-01
RA-224	6.37E-01	4.00E-01	1.08E-01
PB-212	6.53E-01	1.15E-01	3.51E-02
BI-212	5.99E-01	6.62E-01	3.49E-01
TL-208	5.88E-01	1.60E-01	6.64E-02
U-235	Not Detected	-----	1.97E-01
TH-231	Not Detected	-----	7.89E+00
PA-231	Not Detected	-----	1.27E+00
TH-227	Not Detected	-----	3.33E-01
RA-223	Not Detected	-----	1.40E-01
RN-219	Not Detected	-----	3.80E-01
PB-211	Not Detected	-----	8.71E-01
TL-207	Not Detected	-----	1.53E+01
AM-241	Not Detected	-----	1.73E-01
PU-239	Not Detected	-----	3.28E+02
NP-237	Not Detected	-----	2.12E-01
PA-233	Not Detected	-----	5.27E-02
TH-229	Not Detected	-----	1.91E-01

[Summary Report] - Sample ID: : 70102705

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.14E-02
AG-110m	Not Detected	-----	3.10E-02
BA-133	Not Detected	-----	4.65E-02
BE-7	Not Detected	-----	2.47E-01
CD-109	Not Detected	-----	8.86E-01
CD-115	Not Detected	-----	9.93E-02
CE-139	Not Detected	-----	2.38E-02
CE-141	Not Detected	-----	4.46E-02
CE-144	Not Detected	-----	1.79E-01
CO-56	Not Detected	-----	3.74E-02
CO-57	Not Detected	-----	2.29E-02
CO-58	Not Detected	-----	3.06E-02
CO-60	Not Detected	-----	3.85E-02
CR-51	Not Detected	-----	2.18E-01
CS-134	Not Detected	-----	4.60E-02
CS-137	Not Detected	-----	3.80E-02
EU-152	Not Detected	-----	6.76E-02
EU-154	Not Detected	-----	1.90E-01
EU-155	Not Detected	-----	1.05E-01
FE-59	Not Detected	-----	8.43E-02
GD-153	Not Detected	-----	7.57E-02
HG-203	Not Detected	-----	2.92E-02
I-131	Not Detected	-----	3.24E-02
IR-192	Not Detected	-----	2.58E-02
K-40	1.62E+01	2.49E+00	2.83E-01
MN-52	Not Detected	-----	3.98E-02
MN-54	Not Detected	-----	1.53E-02
MO-99	Not Detected	-----	3.75E-01
NA-22	Not Detected	-----	4.81E-02
NA-24	Not Detected	-----	1.96E-01
NB-95	Not Detected	-----	1.93E-01
ND-147	Not Detected	-----	2.07E-01
NI-57	Not Detected	-----	1.05E-01
PB-210	Not Detected	-----	7.20E+00
RU-103	Not Detected	-----	3.01E-02
RU-106	Not Detected	-----	2.84E-01
SB-122	Not Detected	-----	6.03E-02
SB-124	Not Detected	-----	3.14E-02
SB-125	Not Detected	-----	8.39E-02
SN-113	Not Detected	-----	3.51E-02
SR-85	Not Detected	-----	3.78E-02
TA-182	Not Detected	-----	1.63E-01
TA-183	Not Detected	-----	1.83E-01
TC-99m	Not Detected	-----	1.86E+00
TL-201	Not Detected	-----	1.42E-01
XE-133	Not Detected	-----	1.45E-01
Y-88	Not Detected	-----	2.91E-02
ZN-65	Not Detected	-----	1.12E-01
ZR-95	Not Detected	-----	5.86E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 6-20-97 2:41:07 AM *

 *
 * Analyzed by: *KA 6/23/97* Reviewed by: *YJG/25/97* *

Customer : GALLOWAY/STEFANOV (6682/SMO)
 Customer Sample ID : 033478-002
 Lab Sample ID : 70102706

85-1-GR-021-00-SSO

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 723.000 gram
 Sample Date/Time : 6-18-97 9:05:00 AM
 Acquire Start Date/Time : 6-20-97 12:58:26 AM
 Detector Name : LAB01
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected		1.62E+00
TH-234	8.85E-01	3.07E-01	4.76E-01
RA-226	1.68E+00	5.28E-01	5.44E-01
PB-214	7.31E-01	1.36E-01	5.19E-02
BI-214	6.74E-01	2.70E-01	5.88E-02
TH-232	8.72E-01	4.55E-01	1.63E-01
RA-228	6.05E-01	2.33E-01	2.01E-01
AC-228	8.88E-01	2.61E-01	9.87E-02
TH-228	8.72E-01	5.99E-01	4.93E-01
RA-224	8.00E-01	2.96E-01	9.98E-02
PB-212	7.87E-01	4.12E-01	4.19E-02
BI-212	9.50E-01	5.75E-01	3.80E-01
TL-208	7.74E-01	2.53E-01	7.09E-02
U-235	8.12E-02	1.56E-01	2.19E-01
TH-231	Not Detected		9.31E+00
PA-231	Not Detected		1.52E+00
TH-227	Not Detected		3.88E-01
RA-223	Not Detected		1.61E-01
RN-219	1.82E-01	3.38E-01	4.21E-01
PB-211	Not Detected		9.48E-01
TL-207	Not Detected		1.68E+01
AM-241	Not Detected		1.92E-01
PU-239	Not Detected		3.71E+02
NP-237	Not Detected		3.02E-01
PA-233	Not Detected		6.25E-02
TH-229	Not Detected		2.03E-01

NOT DETECTED *KA 6/23/97*

NOT DETECTED *KA 6/23/97*

[Summary Report] - Sample ID: : 70102706

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.95E-02
AG-110m	Not Detected	-----	3.30E-02
BA-133	Not Detected	-----	5.43E-02
BE-7	Not Detected	-----	2.79E-01
CD-109	1.75E+00	5.44E-01	7.14E-01
CD-115	Not Detected	-----	1.19E-01
CE-139	Not Detected	-----	2.85E-02
CE-141	Not Detected	-----	4.94E-02
CE-144	Not Detected	-----	2.01E-01
CO-56	Not Detected	-----	3.08E-02
CO-57	Not Detected	-----	2.45E-02
CO-58	Not Detected	-----	3.91E-02
CO-60	Not Detected	-----	4.20E-02
CR-51	Not Detected	-----	2.49E-01
CS-134	Not Detected	-----	5.52E-02
CS-137	Not Detected	-----	3.84E-02
EU-152	Not Detected	-----	7.43E-02
EU-154	Not Detected	-----	2.25E-01
EU-155	Not Detected	-----	7.13E-02
FE-59	Not Detected	-----	8.80E-02
GD-153	Not Detected	-----	8.52E-02
HG-203	Not Detected	-----	3.43E-02
I-131	Not Detected	-----	3.68E-02
IR-192	Not Detected	-----	2.86E-02
K-40	1.71E+01	2.72E+00	2.67E-01
MN-52	Not Detected	-----	4.66E-02
MN-54	Not Detected	-----	3.97E-02
MO-99	Not Detected	-----	4.43E-01
NA-22	Not Detected	-----	5.03E-02
NA-24	Not Detected	-----	2.56E-01
NB-95	Not Detected	-----	2.25E-01
ND-147	Not Detected	-----	2.39E-01
NI-57	Not Detected	-----	1.38E-01
PB-210	Not Detected	-----	8.47E+00
RU-103	Not Detected	-----	3.26E-02
RU-106	Not Detected	-----	3.17E-01
SB-122	Not Detected	-----	6.84E-02
SB-124	Not Detected	-----	3.47E-02
SB-125	Not Detected	-----	9.39E-02
SN-113	Not Detected	-----	4.02E-02
SR-85	Not Detected	-----	4.04E-02
TA-182	Not Detected	-----	1.88E-01
TA-183	Not Detected	-----	2.05E-01
TC-99m	Not Detected	-----	2.55E+00
TL-201	Not Detected	-----	1.64E-01
XE-133	Not Detected	-----	1.71E-01
Y-88	Not Detected	-----	3.37E-02
ZN-65	Not Detected	-----	1.30E-01
ZR-95	Not Detected	-----	6.48E-02

NOT DETECTED ~~KAS~~ 6/23/97

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 6-20-97 4:26:13 AM *

 * Analyzed by: *K. 6/25/97* Reviewed by: *Y. 6/25/97* *

Customer : GALLOWAY/STEFANOV (6682/SMO)
 Customer Sample ID : 033479-002
 Lab Sample ID : 70102707

85-1-GR-022-00-SSO

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 846.000 gram
 Sample Date/Time : 6-18-97 9:10:00 AM
 Acquire Start Date/Time : 6-20-97 2:43:37 AM
 Detector Name : LAB01
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	1.42E+00
TH-234	6.02E-01	3.53E-01	4.78E-01
RA-226	1.20E+00	4.61E-01	4.62E-01
PB-214	5.78E-01	1.06E-01	4.75E-02
BI-214	6.26E-01	1.35E-01	3.97E-02
TH-232	6.68E-01	3.76E-01	1.37E-01
RA-228	4.32E-01	1.79E-01	1.71E-01
AC-228	5.82E-01	1.61E-01	1.01E-01
TH-228	5.13E-01	4.54E-01	4.26E-01
RA-224	6.56E-01	2.89E-01	6.90E-02
PB-212	6.50E-01	1.13E-01	3.55E-02
BI-212	7.22E-01	4.06E-01	3.31E-01
TL-208	6.22E-01	1.31E-01	6.42E-02
U-235	Not Detected	-----	1.91E-01
TH-231	Not Detected	-----	7.67E+00
PA-231	Not Detected	-----	1.29E+00
TH-227	Not Detected	-----	3.29E-01
RA-223	Not Detected	-----	1.38E-01
RN-219	Not Detected	-----	3.73E-01
PB-211	Not Detected	-----	8.37E-01
TL-207	Not Detected	-----	1.40E+01
AM-241	Not Detected	-----	1.73E-01
PU-239	Not Detected	-----	3.24E+02
NP-237	Not Detected	-----	2.61E-01
PA-233	Not Detected	-----	5.33E-02
TH-229	Not Detected	-----	1.82E-01

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.10E-02
AG-110m	Not Detected	-----	3.07E-02
BA-133	Not Detected	-----	4.87E-02
BE-7	Not Detected	-----	2.39E-01
CD-109	1.01E+00	4.82E-01	6.23E-01
CD-115	Not Detected	-----	1.04E-01
CE-139	Not Detected	-----	2.38E-02
CE-141	Not Detected	-----	4.30E-02
CE-144	Not Detected	-----	1.74E-01
CO-56	Not Detected	-----	3.56E-02
CO-57	Not Detected	-----	2.24E-02
CO-58	Not Detected	-----	3.29E-02
CO-60	Not Detected	-----	3.76E-02
CR-51	Not Detected	-----	2.15E-01
CS-134	Not Detected	-----	4.56E-02
CS-137	Not Detected	-----	3.57E-02
EU-152	Not Detected	-----	6.67E-02
EU-154	Not Detected	-----	1.88E-01
EU-155	Not Detected	-----	1.03E-01
FE-59	Not Detected	-----	7.42E-02
GD-153	Not Detected	-----	7.40E-02
HG-203	Not Detected	-----	2.92E-02
I-131	Not Detected	-----	3.13E-02
IR-192	Not Detected	-----	2.54E-02
K-40	1.57E+01	2.44E+00	2.78E-01
MN-52	Not Detected	-----	4.01E-02
MN-54	Not Detected	-----	3.62E-02
MO-99	Not Detected	-----	3.83E-01
NA-22	Not Detected	-----	4.45E-02
NA-24	Not Detected	-----	2.27E-01
NB-95	Not Detected	-----	1.95E-01
ND-147	Not Detected	-----	2.20E-01
NI-57	Not Detected	-----	1.09E-01
PB-210	Not Detected	-----	6.99E+00
RU-103	Not Detected	-----	3.01E-02
RU-106	Not Detected	-----	2.90E-01
SB-122	Not Detected	-----	6.38E-02
SB-124	Not Detected	-----	2.76E-02
SB-125	Not Detected	-----	7.89E-02
SN-113	Not Detected	-----	3.51E-02
SR-85	Not Detected	-----	3.55E-02
TA-182	Not Detected	-----	1.59E-01
TA-183	Not Detected	-----	1.86E-01
TC-99m	Not Detected	-----	2.68E+00
TL-201	Not Detected	-----	1.46E-01
XE-133	Not Detected	-----	6.21E-02
Y-88	Not Detected	-----	2.95E-02
ZN-65	Not Detected	-----	1.11E-01
ZR-95	Not Detected	-----	6.04E-02

NOT DETECTED 6/23/97 AG

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 6-23-97 1:20:32 PM *

 * Analyzed by: *K. Galloway* Reviewed by: *V. J. Galloway* *

Customer : GALLOWAY/STEFANOV (6682/SMO)
 Customer Sample ID : 033520-002
 Lab Sample ID : 70102719 85-1-6R-023-00-SSO

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 718.000 gram
 Sample Date/Time : 6-18-97 11:10:00 AM
 Acquire Start Date/Time : 6-23-97 11:08:24 AM
 Detector Name : LAB01
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	1.45E+00
TH-234	1.11E+00	3.71E-01	4.68E-01
RA-226	1.13E+00	1.43E+00	5.46E-01
PB-214	5.68E-01	1.22E-01	5.22E-02
BI-214	5.28E-01	2.84E-01	4.79E-02
TH-232	7.27E-01	4.56E-01	1.65E-01
RA-228	5.33E-01	2.40E-01	1.78E-01
AC-228	5.29E-01	1.67E-01	1.08E-01
TH-228	6.65E-01	4.94E-01	4.04E-01
RA-224	5.69E-01	2.50E-01	1.12E-01
PB-212	6.34E-01	1.22E-01	3.93E-02
BI-212	5.71E-01	5.86E-01	3.22E-01
TL-208	6.31E-01	1.71E-01	7.22E-02
U-235	Not Detected	-----	2.01E-01
TH-231	Not Detected	-----	8.43E+00
PA-231	Not Detected	-----	1.39E+00
TH-227	Not Detected	-----	3.55E-01
RA-223	Not Detected	-----	1.83E-01
RN-219	Not Detected	-----	4.13E-01
PB-211	Not Detected	-----	9.22E-01
TL-207	Not Detected	-----	1.60E+01
AM-241	Not Detected	-----	1.91E-01
PU-239	Not Detected	-----	3.45E+02
NP-237	Not Detected	-----	2.79E-01
PA-233	Not Detected	-----	5.80E-02
TH-229	Not Detected	-----	1.94E-01

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.65E-02
AG-110m	Not Detected	-----	3.70E-02
BA-133	Not Detected	-----	5.30E-02
BE-7	Not Detected	-----	2.85E-01
CD-109	1.11E+00	4.15E-01	7.72E-01
CD-115	Not Detected	-----	3.19E-01
CE-139	Not Detected	-----	2.60E-02
CE-141	Not Detected	-----	4.91E-02
CE-144	Not Detected	-----	1.90E-01
CO-56	Not Detected	-----	4.30E-02
CO-57	Not Detected	-----	2.45E-02
CO-58	Not Detected	-----	3.63E-02
CO-60	Not Detected	-----	4.42E-02
CR-51	Not Detected	-----	2.60E-01
CS-134	Not Detected	-----	4.76E-02
CS-137	2.26E-02	3.34E-02	2.58E-02
EU-152	Not Detected	-----	7.20E-02
EU-154	Not Detected	-----	2.13E-01
EU-155	Not Detected	-----	1.11E-01
FE-59	Not Detected	-----	9.67E-02
GD-153	Not Detected	-----	8.03E-02
HG-203	Not Detected	-----	3.29E-02
I-131	Not Detected	-----	4.39E-02
IR-192	Not Detected	-----	2.82E-02
K-40	1.66E+01	2.63E+00	3.17E-01
MN-52	Not Detected	-----	6.81E-02
MN-54	Not Detected	-----	3.93E-02
MO-99	Not Detected	-----	9.48E-01
NA-22	Not Detected	-----	5.09E-02
NA-24	Not Detected	-----	9.64E+00
NB-95	Not Detected	-----	3.91E-01
ND-147	Not Detected	-----	3.07E-01
NI-57	Not Detected	-----	5.53E-01
PB-210	Not Detected	-----	7.53E+00
RU-103	Not Detected	-----	3.43E-02
RU-106	Not Detected	-----	3.09E-01
SB-122	Not Detected	-----	1.59E-01
SB-124	Not Detected	-----	3.35E-02
SB-125	Not Detected	-----	8.66E-02
SN-113	Not Detected	-----	3.86E-02
SR-85	Not Detected	-----	4.09E-02
TA-182	Not Detected	-----	1.85E-01
TA-183	Not Detected	-----	3.21E-01
TC-99m	Not Detected	-----	2.52E+04
TL-201	Not Detected	-----	3.32E-01
XE-133	Not Detected	-----	4.58E-01
Y-88	Not Detected	-----	3.30E-02
ZN-65	Not Detected	-----	1.23E-01
ZR-95	Not Detected	-----	6.76E-02

NOT DETECTED 6/23/93 JHS

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 6-20-97 6:11:17 AM *

* Analyzed by: *KS 6/23/97* Reviewed by: *SM 6/25/97* *

Customer : GALLOWAY/STEFANOV (6682/SMO)
 Customer Sample ID : 033480-002
 Lab Sample ID : 70102708 85-2-GR-011-00-SSO

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 757.000 gram
 Sample Date/Time : 6-18-97 9:21:00 AM
 Acquire Start Date/Time : 6-20-97 4:28:37 AM
 Detector Name : LAB01
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	2.18E+00	1.09E+00	1.28E+00
TH-234	2.83E+00	7.30E-01	4.62E-01
RA-226	2.01E+00	8.10E-01	5.41E-01
PB-214	5.65E-01	1.13E-01	4.83E-02
BI-214	5.22E-01	1.13E-01	5.00E-02
TH-232	6.69E-01	3.65E-01	1.37E-01
RA-228	7.05E-01	2.26E-01	1.90E-01
AC-228	Not Detected	-----	8.96E-02
TH-228	4.40E-01	3.33E-01	5.15E-01
RA-224	6.57E-01	3.03E-01	6.56E-02
PB-212	6.52E-01	1.15E-01	3.99E-02
BI-212	6.43E-01	1.02E+00	3.69E-01
TL-208	6.02E-01	1.55E-01	7.03E-02
U-235	Not Detected	-----	2.12E-01
TH-231	Not Detected	-----	8.93E+00
PA-231	Not Detected	-----	1.39E+00
TH-227	Not Detected	-----	3.50E-01
RA-223	Not Detected	-----	1.58E-01
RN-219	Not Detected	-----	4.00E-01
PB-211	Not Detected	-----	9.10E-01
TL-207	Not Detected	-----	1.51E+01
AM-241	Not Detected	-----	1.87E-01
PU-239	Not Detected	-----	3.47E+02
NP-237	Not Detected	-----	2.84E-01
PA-233	Not Detected	-----	5.51E-02
TH-229	Not Detected	-----	2.08E-01

[Summary Report] - Sample ID: : 70102708

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.30E-02
AG-110m	Not Detected	-----	3.50E-02
BA-133	Not Detected	-----	5.03E-02
BE-7	Not Detected	-----	2.62E-01
CD-109	1.11E+00	3.66E-01	6.92E-01
CD-115	Not Detected	-----	1.14E-01
CE-139	Not Detected	-----	2.70E-02
CE-141	Not Detected	-----	4.78E-02
CE-144	Not Detected	-----	1.87E-01
CO-56	Not Detected	-----	4.01E-02
CO-57	Not Detected	-----	2.47E-02
CO-58	Not Detected	-----	3.64E-02
CO-60	Not Detected	-----	4.23E-02
CR-51	Not Detected	-----	2.37E-01
CS-134	Not Detected	-----	4.80E-02
CS-137	2.04E-02	2.27E-02	2.45E-02
EU-152	Not Detected	-----	7.43E-02
EU-154	Not Detected	-----	1.99E-01
EU-155	Not Detected	-----	1.11E-01
FE-59	Not Detected	-----	8.57E-02
GD-153	Not Detected	-----	8.40E-02
HG-203	Not Detected	-----	3.17E-02
I-131	Not Detected	-----	3.25E-02
IR-192	Not Detected	-----	2.65E-02
K-40	1.69E+01	2.91E+00	3.03E-01
MN-52	Not Detected	-----	4.26E-02
MN-54	Not Detected	-----	3.80E-02
MO-99	Not Detected	-----	4.33E-01
NA-22	Not Detected	-----	4.83E-02
NA-24	Not Detected	-----	2.62E-01
NB-95	Not Detected	-----	2.12E-01
ND-147	Not Detected	-----	2.28E-01
NI-57	Not Detected	-----	1.16E-01
PB-210	Not Detected	-----	4.44E+00
RU-103	Not Detected	-----	3.18E-02
RU-106	Not Detected	-----	3.11E-01
SB-122	Not Detected	-----	6.61E-02
SB-124	Not Detected	-----	3.19E-02
SB-125	Not Detected	-----	8.45E-02
SN-113	Not Detected	-----	3.75E-02
SR-85	Not Detected	-----	3.86E-02
TA-182	Not Detected	-----	1.71E-01
TA-183	Not Detected	-----	2.02E-01
TC-99m	Not Detected	-----	3.59E+00
TL-201	Not Detected	-----	1.68E-01
XE-133	Not Detected	-----	1.72E-01
Y-88	Not Detected	-----	3.14E-02
ZN-65	Not Detected	-----	1.13E-01
ZR-95	Not Detected	-----	6.49E-02

NOT DETECTED 6/23/97 KGA

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 6-20-97 8:02:08 AM *

* Analyzed by: *KE 6/23/97* Reviewed by: *JP 6/25/97* *

Customer : GALLOWAY/STEFANOV (6682/SMO)
 Customer Sample ID : 033481-002
 Lab Sample ID : 70102709

85-2-6R-012-00-SSO

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 745.000 gram
 Sample Date/Time : 6-18-97 9:25:00 AM
 Acquire Start Date/Time : 6-20-97 6:13:44 AM
 Detector Name : LAB01
 Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	2.67E+01	6.58E+00	2.48E+00
TH-234	3.59E+01	6.90E+00	8.99E-01
RA-226	1.74E+00	1.84E+00	7.33E-01
PB-214	5.32E-01	1.26E-01	6.42E-02
BI-214	4.70E-01	1.05E-01	5.77E-02

TH-232	6.49E-01	4.12E-01	1.88E-01
RA-228	6.37E-01	2.75E-01	1.78E-01
AC-228	7.02E-01	2.69E-01	9.85E-02
TH-228	Not Detected	-----	8.80E-01
RA-224	5.97E-01	2.69E-01	6.67E-02
PB-212	6.18E-01	1.15E-01	4.86E-02
BI-212	4.96E-01	3.64E-01	4.00E-01
TL-208	5.66E-01	1.36E-01	8.54E-02

U-235	5.38E-01	2.06E-01	2.15E-01
TH-231	Not Detected	-----	1.73E+01
PA-231	Not Detected	-----	1.79E+00
TH-227	Not Detected	-----	3.92E-01
RA-223	Not Detected	-----	3.05E-01
RN-219	Not Detected	-----	4.93E-01
PB-211	Not Detected	-----	1.11E+00
TL-207	Not Detected	-----	1.73E+01

AM-241	Not Detected	-----	3.27E-01
PU-239	Not Detected	-----	5.22E+02
NP-237	3.08E-01	1.49E-01	3.92E-01
PA-233	Not Detected	-----	7.57E-02
TH-229	Not Detected	-----	4.55E-01

NOT DETECTED 6/23/97 *KE*

[Summary Report] - Sample ID: : 70102709

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	5.16E-02
AG-110m	Not Detected	-----	4.04E-02
BA-133	Not Detected	-----	5.84E-02
BE-7	Not Detected	-----	3.45E-01
CD-109	Not Detected	-----	1.71E+00
CD-115	Not Detected	-----	1.39E-01
CE-139	Not Detected	-----	3.93E-02
CE-141	Not Detected	-----	7.51E-02
CE-144	Not Detected	-----	2.92E-01
CO-56	Not Detected	-----	2.85E-02
CO-57	Not Detected	-----	3.80E-02
CO-58	Not Detected	-----	4.17E-02
CO-60	Not Detected	-----	4.46E-02
CR-51	Not Detected	-----	3.17E-01
CS-134	Not Detected	-----	5.17E-02
CS-137	1.40E-02	1.50E-02	2.13E-02
EU-152	Not Detected	-----	1.14E-01
EU-154	Not Detected	-----	2.36E-01
EU-155	Not Detected	-----	1.95E-01
FE-59	Not Detected	-----	8.57E-02
GD-153	Not Detected	-----	1.96E-01
HG-203	Not Detected	-----	4.11E-02
I-131	Not Detected	-----	4.47E-02
IR-192	Not Detected	-----	3.67E-02
K-40	1.59E+01	2.53E+00	3.17E-01
MN-52	Not Detected	-----	4.94E-02
MN-54	Not Detected	-----	4.11E-02
MO-99	Not Detected	-----	5.80E-01
NA-22	Not Detected	-----	5.03E-02
NA-24	Not Detected	-----	3.07E-01
NB-95	Not Detected	-----	2.46E-01
ND-147	Not Detected	-----	3.08E-01
NI-57	Not Detected	-----	1.23E-01
PB-210	Not Detected	-----	1.23E+01
RU-103	Not Detected	-----	3.97E-02
RU-106	Not Detected	-----	3.59E-01
SB-122	Not Detected	-----	8.38E-02
SB-124	Not Detected	-----	3.88E-02
SB-125	Not Detected	-----	1.08E-01
SN-113	Not Detected	-----	5.09E-02
SR-85	Not Detected	-----	4.30E-02
TA-182	Not Detected	-----	1.74E-01
TA-183	Not Detected	-----	3.58E-01
TC-99m	Not Detected	-----	6.41E+00
TL-201	Not Detected	-----	3.00E-01
XE-133	Not Detected	-----	3.44E-01
Y-88	Not Detected	-----	3.65E-02
ZN-65	Not Detected	-----	1.17E-01
ZR-95	Not Detected	-----	7.68E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 6-23-97 2:21:46 PM *

 * Analyzed by: *K 6/23/97* Reviewed by: *W 6/25/97* *

Customer : GALLOWAY/STEFANOV (6682/SMO)
 Customer Sample ID : 033483-002
 Lab Sample ID : 70102710

85-2-GR-013-00-SSD

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 682.000 gram
 Sample Date/Time : 6-18-97 9:35:00 AM
 Acquire Start Date/Time : 6-20-97 8:05:07 AM
 Detector Name : LAB01
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	6.51E+00	2.02E+00	1.71E+00
TH-234	8.56E+00	1.78E+00	6.21E-01
RA-226	4.26E-01	7.99E-01	6.29E-01
PB-214	5.79E-01	1.40E-01	6.21E-02
BI-214	5.19E-01	3.06E-01	5.44E-02
TH-232	7.55E-01	4.35E-01	1.85E-01
RA-228	8.02E-01	3.36E-01	1.89E-01
AC-228	7.08E-01	2.14E-01	1.07E-01
TH-228	Not Detected		7.96E-01
RA-224	6.73E-01	3.43E-01	9.26E-02
PB-212	7.53E-01	1.33E-01	4.37E-02
BI-212	7.25E-01	3.75E-01	4.03E-01
TL-208	5.74E-01	1.34E-01	7.95E-02
U-235	2.25E-01	3.51E-01	2.04E-01
TH-231	Not Detected		1.18E+01
PA-231	Not Detected		1.60E+00
TH-227	Not Detected		3.92E-01
RA-223	Not Detected		2.10E-01
RN-219	Not Detected		4.67E-01
PB-211	Not Detected		1.03E+00
TL-207	Not Detected		1.66E+01
AM-241	Not Detected		2.40E-01
PU-239	Not Detected		4.13E+02
NP-237	4.19E-01	1.31E-01	2.68E-01
PA-233	Not Detected		6.68E-02
TH-229	Not Detected		2.80E-01

NOT DETECTED 6/23/97 #5

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	5.30E-02
AG-110m	Not Detected	-----	3.89E-02
BA-133	Not Detected	-----	5.66E-02
BE-7	1.32E-01	8.85E-02	1.48E-01
CD-109	Not Detected	-----	1.25E+00
CD-115	Not Detected	-----	1.35E-01
CE-139	Not Detected	-----	3.08E-02
CE-141	Not Detected	-----	5.72E-02
CE-144	Not Detected	-----	2.28E-01
CO-56	Not Detected	-----	4.50E-02
CO-57	Not Detected	-----	3.01E-02
CO-58	Not Detected	-----	3.83E-02
CO-60	Not Detected	-----	4.33E-02
CR-51	Not Detected	-----	2.64E-01
CS-134	Not Detected	-----	5.03E-02
CS-137	Not Detected	-----	4.45E-02
EU-152	Not Detected	-----	9.11E-02
EU-154	Not Detected	-----	2.42E-01
EU-155	Not Detected	-----	1.45E-01
FE-59	Not Detected	-----	8.78E-02
GD-153	Not Detected	-----	1.16E-01
HG-203	Not Detected	-----	3.57E-02
I-131	Not Detected	-----	3.82E-02
IR-192	Not Detected	-----	3.09E-02
K-40	1.75E+01	2.83E+00	2.91E-01
MN-52	Not Detected	-----	4.59E-02
MN-54	Not Detected	-----	4.30E-02
MO-99	Not Detected	-----	4.97E-01
NA-22	Not Detected	-----	5.10E-02
NA-24	Not Detected	-----	2.94E-01
NB-95	Not Detected	-----	2.46E-01
ND-147	Not Detected	-----	2.70E-01
NI-57	Not Detected	-----	1.38E-01
PB-210	Not Detected	-----	9.67E+00
RU-103	Not Detected	-----	3.54E-02
RU-106	Not Detected	-----	3.31E-01
SB-122	Not Detected	-----	7.60E-02
SB-124	Not Detected	-----	3.55E-02
SB-125	Not Detected	-----	1.02E-01
SN-113	Not Detected	-----	4.20E-02
SR-85	Not Detected	-----	4.29E-02
TA-182	Not Detected	-----	1.86E-01
TA-183	Not Detected	-----	2.66E-01
TC-99m	Not Detected	-----	3.77E+00
TL-201	Not Detected	-----	2.13E-01
XE-133	Not Detected	-----	2.36E-01
Y-88	Not Detected	-----	3.54E-02
ZN-65	Not Detected	-----	1.29E-01
ZR-95	Not Detected	-----	7.23E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 6-20-97 1:11:05 PM *

* Analyzed by: *K 6/23/97* Reviewed by: *YJ 6/25/97* *

 Customer : GALLOWAY/STEFANOV (6682/SMO)
 Customer Sample ID : 033484-002
 Lab Sample ID : 70102711 85-2-GR-014-00-SSO

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 821.000 gram
 Sample Date/Time : 6-18-97 9:40:00 AM
 Acquire Start Date/Time : 6-20-97 11:28:18 AM
 Detector Name : LAB01
 Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	1.63E+01	4.09E+00	1.77E+00
TH-234	1.91E+01	3.71E+00	6.72E-01
RA-226	Not Detected	-----	5.95E-01
PB-214	5.57E-01	1.28E-01	5.13E-02
BI-214	5.02E-01	1.04E-01	5.11E-02
TH-232	5.65E-01	3.30E-01	1.50E-01
RA-228	6.75E-01	3.44E-01	1.69E-01
AC-228	6.63E-01	3.05E-01	9.48E-02
TH-228	6.42E-01	3.49E-01	4.39E-01
RA-224	6.50E-01	2.98E-01	9.74E-02
PB-212	6.57E-01	1.13E-01	4.20E-02
BI-212	8.68E-01	5.59E-01	3.65E-01
TL-208	5.72E-01	1.43E-01	8.11E-02
U-235	3.02E-01	3.18E-01	1.89E-01
TH-231	Not Detected	-----	1.31E+01
PA-231	Not Detected	-----	1.55E+00
TH-227	Not Detected	-----	3.48E-01
RA-223	Not Detected	-----	2.35E-01
RN-219	Not Detected	-----	4.24E-01
PB-211	Not Detected	-----	9.45E-01
TL-207	Not Detected	-----	1.56E+01
AM-241	Not Detected	-----	2.61E-01
PU-239	Not Detected	-----	4.19E+02
NP-237	2.98E-01	1.21E-01	3.02E-01
PA-233	Not Detected	-----	6.27E-02
TH-229	Not Detected	-----	3.04E-01

NOT DETECTED 6/23/97 *HA*

[Summary Report] - Sample ID: : 70102711

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.38E-02
AG-110m	Not Detected	-----	3.61E-02
BA-133	Not Detected	-----	4.89E-02
BE-7	Not Detected	-----	2.68E-01
CD-109	Not Detected	-----	1.32E+00
CD-115	Not Detected	-----	1.25E-01
CE-139	Not Detected	-----	3.02E-02
CE-141	Not Detected	-----	5.88E-02
CE-144	Not Detected	-----	2.28E-01
CO-56	Not Detected	-----	3.79E-02
CO-57	Not Detected	-----	3.00E-02
CO-58	Not Detected	-----	3.61E-02
CO-60	Not Detected	-----	3.82E-02
CR-51	Not Detected	-----	2.52E-01
CS-134	Not Detected	-----	4.75E-02
CS-137	Not Detected	-----	4.19E-02
EU-152	Not Detected	-----	8.91E-02
EU-154	Not Detected	-----	2.03E-01
EU-155	Not Detected	-----	1.48E-01
FE-59	Not Detected	-----	8.40E-02
GD-153	Not Detected	-----	1.29E-01
HG-203	Not Detected	-----	3.39E-02
I-131	Not Detected	-----	3.76E-02
IR-192	Not Detected	-----	2.88E-02
K-40	1.67E+01	2.61E+00	2.79E-01
MN-52	Not Detected	-----	4.64E-02
MN-54	Not Detected	-----	3.77E-02
MO-99	Not Detected	-----	4.94E-01
NA-22	Not Detected	-----	4.70E-02
NA-24	Not Detected	-----	3.62E-01
NB-95	Not Detected	-----	2.24E-01
ND-147	Not Detected	-----	2.56E-01
NI-57	Not Detected	-----	1.24E-01
PB-210	Not Detected	-----	9.81E+00
RU-103	Not Detected	-----	3.20E-02
RU-106	Not Detected	-----	3.12E-01
SB-122	Not Detected	-----	7.17E-02
SB-124	Not Detected	-----	3.36E-02
SB-125	Not Detected	-----	9.24E-02
SN-113	Not Detected	-----	3.97E-02
SR-85	Not Detected	-----	3.92E-02
TA-182	Not Detected	-----	1.63E-01
TA-183	Not Detected	-----	2.94E-01
TC-99m	Not Detected	-----	9.15E+00
TL-201	Not Detected	-----	2.46E-01
XE-133	Not Detected	-----	2.77E-01
Y-88	Not Detected	-----	2.79E-02
ZN-65	Not Detected	-----	1.12E-01
ZR-95	Not Detected	-----	6.73E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 6-20-97 2:56:37 PM *
 * *****
 * Analyzed by: *[Signature]* 6/23/97 Reviewed by: *[Signature]* 6/25/97 *
 * *****

Customer : GALLOWAY/STEFANOV (6682/SMO)
 Customer Sample ID : 033485-002
 Lab Sample ID : 70102712 85-Z-GR-015-00-SSO

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 646.000 gram
 Sample Date/Time : 6-18-97 9:45:00 AM
 Acquire Start Date/Time : 6-20-97 1:13:38 PM
 Detector Name : LAB01
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	1.66E+00
TH-234	1.47E+00	5.22E-01	5.41E-01
RA-226	1.08E+00	4.47E-01	4.99E-01
PB-214	5.99E-01	1.26E-01	5.54E-02
BI-214	4.98E-01	1.28E-01	5.60E-02
TH-232	6.90E-01	3.59E-01	1.84E-01
RA-228	8.20E-01	2.94E-01	1.82E-01
AC-228	8.00E-01	2.31E-01	1.10E-01
TH-228	6.94E-01	8.53E-01	5.81E-01
RA-224	7.54E-01	3.42E-01	1.00E-01
PB-212	7.87E-01	2.11E-01	4.41E-02
BI-212	9.55E-01	6.54E-01	4.54E-01
TL-208	6.62E-01	1.54E-01	8.42E-02
U-235	Not Detected	-----	2.31E-01
TH-231	Not Detected	-----	9.78E+00
PA-231	Not Detected	-----	1.51E+00
TH-227	Not Detected	-----	4.05E-01
RA-223	Not Detected	-----	1.71E-01
RN-219	2.20E-01	3.57E-01	4.49E-01
PB-211	Not Detected	-----	1.00E+00
TL-207	Not Detected	-----	1.78E+01
AM-241	Not Detected	-----	2.09E-01
PU-239	Not Detected	-----	3.78E+02
NP-237	Not Detected	-----	3.09E-01
PA-233	Not Detected	-----	6.36E-02
TH-229	Not Detected	-----	2.17E-01

NOT DETECTED 6/23/97 *[Signature]*

[Summary Report] - Sample ID: : 70102712

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.96E-02
AG-110m	Not Detected	-----	3.60E-02
BA-133	Not Detected	-----	5.52E-02
BE-7	Not Detected	-----	3.01E-01
CD-109	1.14E+00	6.05E-01	7.44E-01
CD-115	Not Detected	-----	1.40E-01
CE-139	Not Detected	-----	2.78E-02
CE-141	Not Detected	-----	5.17E-02
CE-144	Not Detected	-----	2.10E-01
CO-56	Not Detected	-----	3.19E-02
CO-57	Not Detected	-----	2.67E-02
CO-58	Not Detected	-----	4.24E-02
CO-60	Not Detected	-----	4.87E-02
CR-51	Not Detected	-----	2.53E-01
CS-134	Not Detected	-----	5.13E-02
CS-137	Not Detected	-----	4.13E-02
EU-152	Not Detected	-----	7.92E-02
EU-154	Not Detected	-----	2.29E-01
EU-155	Not Detected	-----	1.23E-01
FE-59	Not Detected	-----	9.80E-02
GD-153	Not Detected	-----	8.89E-02
HG-203	Not Detected	-----	3.40E-02
I-131	Not Detected	-----	3.81E-02
IR-192	Not Detected	-----	2.91E-02
K-40	1.63E+01	2.61E+00	3.53E-01
MN-52	Not Detected	-----	5.38E-02
MN-54	Not Detected	-----	2.53E-02
MO-99	Not Detected	-----	4.93E-01
NA-22	Not Detected	-----	5.06E-02
NA-24	Not Detected	-----	4.42E-01
NB-95	Not Detected	-----	2.60E-01
ND-147	Not Detected	-----	2.59E-01
NI-57	Not Detected	-----	1.55E-01
PB-210	Not Detected	-----	8.39E+00
RU-103	Not Detected	-----	3.53E-02
RU-106	Not Detected	-----	3.42E-01
SB-122	Not Detected	-----	7.89E-02
SB-124	Not Detected	-----	3.66E-02
SB-125	Not Detected	-----	9.22E-02
SN-113	Not Detected	-----	4.33E-02
SR-85	Not Detected	-----	4.52E-02
TA-182	Not Detected	-----	1.88E-01
TA-183	Not Detected	-----	2.37E-01
TC-99m	Not Detected	-----	1.04E+01
TL-201	Not Detected	-----	1.94E-01
XE-133	Not Detected	-----	2.08E-01
Y-88	Not Detected	-----	3.45E-02
ZN-65	Not Detected	-----	1.30E-01
ZR-95	Not Detected	-----	7.05E-02

NOT DETECTED 6/23/97 ~~KS~~

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 6-20-97 4:41:37 PM *

 * Analyzed by: *[Signature]* Reviewed by: *[Signature]* 6/25/97 *

Customer : GALLOWAY/STEFANOV (6682/SMO)
 Customer Sample ID : 033486-002
 Lab Sample ID : 70102713 85-4-GR-021-00-SSO

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 874.000 gram
 Sample Date/Time : 6-18-97 10:10:00 AM
 Acquire Start Date/Time : 6-20-97 2:59:01 PM
 Detector Name : LAB01
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	1.35E+00
TH-234	7.63E-01	3.24E-01	3.92E-01
RA-226	9.71E-01	3.96E-01	4.86E-01
PB-214	4.11E-01	1.02E-01	4.68E-02
BI-214	3.90E-01	4.00E-01	4.48E-02
TH-232	4.84E-01	2.81E-01	1.35E-01
RA-228	5.53E-01	1.82E-01	1.58E-01
AC-228	4.86E-01	1.51E-01	9.33E-02
TH-228	Not Detected	-----	3.94E-01
RA-224	4.74E-01	2.02E-01	9.63E-02
PB-212	5.72E-01	1.02E-01	3.51E-02
BI-212	6.40E-01	3.54E-01	2.94E-01
TL-208	4.73E-01	1.20E-01	6.87E-02
U-235	7.64E-02	1.31E-01	1.84E-01
TH-231	Not Detected	-----	7.60E+00
PA-231	Not Detected	-----	1.27E+00
TH-227	Not Detected	-----	3.07E-01
RA-223	Not Detected	-----	1.36E-01
RN-219	Not Detected	-----	3.53E-01
PB-211	Not Detected	-----	8.29E-01
TL-207	Not Detected	-----	1.42E+01
AM-241	Not Detected	-----	1.62E-01
PU-239	Not Detected	-----	3.05E+02
NP-237	Not Detected	-----	1.72E-01
PA-233	Not Detected	-----	5.12E-02
TH-229	Not Detected	-----	1.72E-01

NOT DETECTED *[Handwritten note]*

[Summary Report] - Sample ID: : 70102713

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.93E-02
AG-110m	Not Detected	-----	4.94E-02
BA-133	Not Detected	-----	4.48E-02
BE-7	Not Detected	-----	2.57E-01
CD-109	1.07E+00	3.84E-01	5.05E-01
CD-115	Not Detected	-----	1.10E-01
CE-139	Not Detected	-----	2.26E-02
CE-141	Not Detected	-----	4.15E-02
CE-144	Not Detected	-----	1.68E-01
CO-56	Not Detected	-----	2.68E-02
CO-57	Not Detected	-----	2.14E-02
CO-58	Not Detected	-----	3.23E-02
CO-60	Not Detected	-----	3.83E-02
CR-51	Not Detected	-----	2.14E-01
CS-134	Not Detected	-----	3.81E-02
CS-137	2.13E-01	4.89E-02	2.26E-02
EU-152	Not Detected	-----	6.41E-02
EU-154	Not Detected	-----	1.81E-01
EU-155	4.10E-02	3.70E-02	6.51E-02
FE-59	Not Detected	-----	8.02E-02
GD-153	Not Detected	-----	6.75E-02
HG-203	Not Detected	-----	2.85E-02
I-131	Not Detected	-----	3.22E-02
IR-192	Not Detected	-----	2.44E-02
K-40	1.98E+01	3.04E+00	2.65E-01
MN-52	Not Detected	-----	4.21E-02
MN-54	Not Detected	-----	1.75E-02
MO-99	Not Detected	-----	4.23E-01
NA-22	Not Detected	-----	4.63E-02
NA-24	Not Detected	-----	4.04E-01
NB-95	Not Detected	-----	2.01E-01
ND-147	Not Detected	-----	2.18E-01
NI-57	Not Detected	-----	1.30E-01
PB-210	Not Detected	-----	6.89E+00
RU-103	Not Detected	-----	2.91E-02
RU-106	Not Detected	-----	2.72E-01
SB-122	Not Detected	-----	6.46E-02
SB-124	Not Detected	-----	2.76E-02
SB-125	Not Detected	-----	8.00E-02
SN-113	Not Detected	-----	3.49E-02
SR-85	Not Detected	-----	3.48E-02
TA-182	Not Detected	-----	1.53E-01
TA-183	Not Detected	-----	1.86E-01
TC-99m	Not Detected	-----	9.53E+00
TL-201	Not Detected	-----	1.54E-01
XE-133	Not Detected	-----	1.70E-01
Y-88	Not Detected	-----	2.23E-02
ZN-65	Not Detected	-----	1.05E-01
ZR-95	Not Detected	-----	5.53E-02

NOT DETECTED 6/23/97 K&K

NOT DETECTED 6/23/97

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 6-20-97 6:27:06 PM *

 * Analyzed by: *KY 6/23/97* Reviewed by: *YJ 6/25/97* *

Customer : GALLOWAY/STEFANOV (6682/SMO)
 Customer Sample ID : 033487-002
 Lab Sample ID : 70102714 85-4-GR-022-00-SS0

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 843.000 gram
 Sample Date/Time : 6-18-97 10:15:00 AM
 Acquire Start Date/Time : 6-20-97 4:44:30 PM
 Detector Name : LAB01
 Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	6.09E-01	2.78E-01	1.45E+00
TH-234	1.23E+00	3.57E-01	4.28E-01
RA-226	1.48E+00	4.67E-01	5.04E-01
PB-214	6.42E-01	1.34E-01	4.80E-02
BI-214	6.01E-01	2.16E-01	4.55E-02
TH-232	7.89E-01	4.11E-01	1.43E-01
RA-228	7.63E-01	2.93E-01	1.77E-01
AC-228	8.30E-01	2.24E-01	9.42E-02
TH-228	9.91E-01	4.17E-01	4.79E-01
RA-224	7.90E-01	2.62E-01	6.86E-02
PB-212	8.00E-01	2.56E-01	3.77E-02
BI-212	8.68E-01	4.61E-01	3.28E-01
TL-208	7.57E-01	1.48E-01	6.58E-02
U-235	Not Detected	-----	2.01E-01
TH-231	Not Detected	-----	8.31E+00
PA-231	Not Detected	-----	1.33E+00
TH-227	Not Detected	-----	3.59E-01
RA-223	Not Detected	-----	1.49E-01
RN-219	Not Detected	-----	3.90E-01
PB-211	Not Detected	-----	8.96E-01
TL-207	Not Detected	-----	1.46E+01
AM-241	Not Detected	-----	1.77E-01
PU-239	Not Detected	-----	3.43E+02
NP-237	4.87E-01	1.45E-01	1.84E-01
PA-233	Not Detected	-----	5.74E-02
TH-229	Not Detected	-----	1.91E-01

NOT DETECTED 6/23/97 KY

[Summary Report] - Sample ID: : 70102714

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.40E-02
AG-110m	Not Detected	-----	4.24E-02
BA-133	Not Detected	-----	4.79E-02
BE-7	Not Detected	-----	2.74E-01
CD-109	Not Detected	-----	9.15E-01
CD-115	Not Detected	-----	1.31E-01
CE-139	Not Detected	-----	2.57E-02
CE-141	Not Detected	-----	4.64E-02
CE-144	Not Detected	-----	1.84E-01
CO-56	Not Detected	-----	3.65E-02
CO-57	Not Detected	-----	2.35E-02
CO-58	Not Detected	-----	3.38E-02
CO-60	Not Detected	-----	3.92E-02
CR-51	Not Detected	-----	2.29E-01
CS-134	Not Detected	-----	4.80E-02
CS-137	1.03E-01	5.29E-02	2.60E-02
EU-152	Not Detected	-----	6.98E-02
EU-154	Not Detected	-----	2.03E-01
EU-155	Not Detected	-----	1.08E-01
FE-59	Not Detected	-----	8.36E-02
GD-153	Not Detected	-----	7.69E-02
HG-203	Not Detected	-----	3.11E-02
I-131	Not Detected	-----	3.36E-02
IR-192	Not Detected	-----	2.66E-02
K-40	1.71E+01	2.68E+00	2.60E-01
MN-52	Not Detected	-----	4.68E-02
MN-54	Not Detected	-----	3.82E-02
MO-99	Not Detected	-----	4.49E-01
NA-22	Not Detected	-----	4.92E-02
NA-24	Not Detected	-----	4.51E-01
NB-95	Not Detected	-----	2.37E-01
ND-147	Not Detected	-----	2.38E-01
NI-57	Not Detected	-----	1.47E-01
PB-210	Not Detected	-----	7.55E+00
RU-103	Not Detected	-----	3.05E-02
RU-106	Not Detected	-----	2.96E-01
SB-122	Not Detected	-----	7.26E-02
SB-124	Not Detected	-----	3.16E-02
SB-125	Not Detected	-----	8.71E-02
SN-113	Not Detected	-----	3.73E-02
SR-85	Not Detected	-----	3.90E-02
TA-182	Not Detected	-----	1.65E-01
TA-183	Not Detected	-----	2.05E-01
TC-99m	Not Detected	-----	1.26E+01
TL-201	Not Detected	-----	1.75E-01
XE-133	Not Detected	-----	1.86E-01
Y-88	Not Detected	-----	3.07E-02
ZN-65	Not Detected	-----	1.11E-01
ZR-95	Not Detected	-----	6.12E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 6-20-97 8:12:12 PM *

 * Analyzed by: *KA 6/23/97* Reviewed by: *JP 6/25/97* *

Customer : GALLOWAY/STEFANOV (6682/SMO)
 Customer Sample ID : 033489-002
 Lab Sample ID : 70102715

85-4-6R-024-00-SSO

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 852.000 gram
 Sample Date/Time : 6-18-97 10:35:00 AM
 Acquire Start Date/Time : 6-20-97 6:29:30 PM
 Detector Name : LAB01
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	8.21E-01	7.73E-01	1.14E+00
TH-234	1.02E+00	3.30E-01	4.46E-01
RA-226	1.08E+00	4.20E-01	4.87E-01
PB-214	5.82E-01	1.10E-01	4.97E-02
BI-214	5.15E-01	1.11E-01	4.24E-02
TH-232	6.38E-01	3.13E-01	1.30E-01
RA-228	5.70E-01	2.40E-01	1.76E-01
AC-228	6.25E-01	1.95E-01	9.31E-02
TH-228	8.19E-01	4.31E-01	4.81E-01
RA-224	5.95E-01	2.89E-01	7.16E-02
PB-212	6.70E-01	1.13E-01	3.75E-02
BI-212	8.92E-01	4.43E-01	2.86E-01
TL-208	6.41E-01	4.38E-01	6.83E-02
U-235	Not Detected	-----	1.94E-01
TH-231	Not Detected	-----	8.05E+00
PA-231	Not Detected	-----	1.33E+00
TH-227	Not Detected	-----	3.34E-01
RA-223	Not Detected	-----	1.47E-01
RN-219	3.48E-01	3.17E-01	3.98E-01
PB-211	Not Detected	-----	9.03E-01
TL-207	Not Detected	-----	1.40E+01
AM-241	Not Detected	-----	1.77E-01
PU-239	Not Detected	-----	3.30E+02
NP-237	3.92E-01	1.35E-01	2.90E-01
PA-233	Not Detected	-----	5.52E-02
TH-229	Not Detected	-----	1.77E-01

NOT DETECTED 6/23/97 *KA*

NOT DETECTED 6/23/97 *KA*

[Summary Report] - Sample ID: : 70102715

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.14E-02
AG-110m	Not Detected	-----	6.08E-02
BA-133	Not Detected	-----	4.66E-02
BE-7	Not Detected	-----	2.76E-01
CD-109	Not Detected	-----	8.94E-01
CD-115	Not Detected	-----	1.26E-01
CE-139	Not Detected	-----	2.46E-02
CE-141	Not Detected	-----	4.40E-02
CE-144	Not Detected	-----	1.79E-01
CO-56	Not Detected	-----	2.76E-02
CO-57	Not Detected	-----	2.32E-02
CO-58	Not Detected	-----	3.10E-02
CO-60	Not Detected	-----	3.76E-02
CR-51	Not Detected	-----	2.32E-01
CS-134	Not Detected	-----	4.41E-02
CS-137	3.61E-01	1.04E-01	2.49E-02
EU-152	Not Detected	-----	6.86E-02
EU-154	Not Detected	-----	1.91E-01
EU-155	Not Detected	-----	1.06E-01
FE-59	Not Detected	-----	7.66E-02
GD-153	Not Detected	-----	7.54E-02
HG-203	Not Detected	-----	2.97E-02
I-131	Not Detected	-----	3.45E-02
IR-192	Not Detected	-----	2.59E-02
K-40	1.59E+01	2.52E+00	2.75E-01
MN-52	Not Detected	-----	4.39E-02
MN-54	Not Detected	-----	1.50E-02
MO-99	Not Detected	-----	4.33E-01
NA-22	Not Detected	-----	4.91E-02
NA-24	Not Detected	-----	4.42E-01
NB-95	Not Detected	-----	2.23E-01
ND-147	Not Detected	-----	2.43E-01
NI-57	Not Detected	-----	1.45E-01
PB-210	Not Detected	-----	7.35E+00
RU-103	Not Detected	-----	3.09E-02
RU-106	Not Detected	-----	2.75E-01
SB-122	Not Detected	-----	7.33E-02
SB-124	Not Detected	-----	2.95E-02
SB-125	Not Detected	-----	8.49E-02
SN-113	Not Detected	-----	3.72E-02
SR-85	Not Detected	-----	3.66E-02
TA-182	Not Detected	-----	1.60E-01
TA-183	Not Detected	-----	2.06E-01
TC-99m	Not Detected	-----	1.45E+01
TL-201	Not Detected	-----	1.68E-01
XE-133	Not Detected	-----	1.81E-01
Y-88	Not Detected	-----	2.69E-02
ZN-65	Not Detected	-----	1.09E-01
ZR-95	Not Detected	-----	6.29E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 6-20-97 9:57:19 PM *

 * Analyzed by: *[Signature]* Reviewed by: *[Signature]* 6/25/97 *

Customer : GALLOWAY/STEFANOV (6682/SMO)
 Customer Sample ID : 033490-002
 Lab Sample ID : 70102716 *85-4-GR-025-00-SSO*

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 901.000 gram
 Sample Date/Time : 6-18-97 10:40:00 AM
 Acquire Start Date/Time : 6-20-97 8:14:42 PM
 Detector Name : LAB01
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	1.21E+00	7.84E-01	1.13E+00
TH-234	5.23E-01	2.27E-01	3.72E-01
RA-226	1.04E+00	3.90E-01	4.33E-01
PB-214	4.67E-01	9.20E-02	4.46E-02
BI-214	4.48E-01	2.82E-01	3.91E-02
TH-232	5.43E-01	2.95E-01	1.21E-01
RA-228	6.28E-01	3.15E-01	1.30E-01
AC-228	5.94E-01	1.91E-01	7.22E-02
TH-228	4.30E-01	3.02E-01	4.05E-01
RA-224	5.21E-01	2.02E-01	7.76E-02
PB-212	5.53E-01	6.85E-01	3.05E-02
BI-212	6.74E-01	4.64E-01	3.02E-01
TL-208	4.91E-01	1.27E-01	6.06E-02
U-235	Not Detected	-----	1.68E-01
TH-231	Not Detected	-----	7.18E+00
PA-231	Not Detected	-----	1.14E+00
TH-227	Not Detected	-----	2.97E-01
RA-223	Not Detected	-----	1.32E-01
RN-219	Not Detected	-----	3.34E-01
PB-211	Not Detected	-----	7.63E-01
TL-207	Not Detected	-----	1.20E+01
AM-241	Not Detected	-----	1.54E-01
PU-239	Not Detected	-----	2.89E+02
NP-237	Not Detected	-----	2.31E-01
PA-233	Not Detected	-----	4.90E-02
TH-229	Not Detected	-----	1.65E-01

[Summary Report] - Sample ID: : 70102716

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.61E-02
AG-110m	Not Detected	-----	3.09E-02
BA-133	Not Detected	-----	4.09E-02
BE-7	Not Detected	-----	2.31E-01
CD-109	1.08E+00	3.98E-02	5.57E-01
CD-115	Not Detected	-----	1.11E-01
CE-139	Not Detected	-----	2.21E-02
CE-141	Not Detected	-----	3.82E-02
CE-144	Not Detected	-----	1.60E-01
CO-56	Not Detected	-----	3.35E-02
CO-57	Not Detected	-----	2.02E-02
CO-58	Not Detected	-----	2.84E-02
CO-60	Not Detected	-----	3.50E-02
CR-51	Not Detected	-----	2.02E-01
CS-134	Not Detected	-----	3.90E-02
CS-137	2.66E-02	4.79E-02	2.19E-02
EU-152	Not Detected	-----	6.02E-02
EU-154	Not Detected	-----	1.67E-01
EU-155	Not Detected	-----	9.22E-02
FE-59	Not Detected	-----	7.19E-02
GD-153	Not Detected	-----	6.99E-02
HG-203	Not Detected	-----	2.67E-02
I-131	Not Detected	-----	2.96E-02
IR-192	Not Detected	-----	2.34E-02
K-40	1.25E+01	2.02E+00	2.31E-01
MN-52	Not Detected	-----	3.73E-02
MN-54	Not Detected	-----	3.20E-02
MO-99	Not Detected	-----	4.10E-01
NA-22	1.10E-02	1.24E-02	1.72E-02
NA-24	Not Detected	-----	4.32E-01
NB-95	Not Detected	-----	2.03E-01
ND-147	Not Detected	-----	1.96E-01
NI-57	Not Detected	-----	1.43E-01
PB-210	Not Detected	-----	6.34E+00
RU-103	Not Detected	-----	2.57E-02
RU-106	Not Detected	-----	2.45E-01
SB-122	Not Detected	-----	6.26E-02
SB-124	Not Detected	-----	2.75E-02
SB-125	Not Detected	-----	7.22E-02
SN-113	Not Detected	-----	3.08E-02
SR-85	Not Detected	-----	3.32E-02
TA-182	Not Detected	-----	1.38E-01
TA-183	Not Detected	-----	1.81E-01
TC-99m	Not Detected	-----	1.56E+01
TL-201	Not Detected	-----	1.47E-01
XE-133	Not Detected	-----	1.68E-01
Y-88	Not Detected	-----	2.97E-02
ZN-65	Not Detected	-----	9.79E-02
ZR-95	Not Detected	-----	5.34E-02

NOT DETECTED 6/23/97 *AK*

NOT DETECTED 6/23/97 *AK*

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 6-23-97 9:44:26 AM *

 * Analyzed by: *KA 6/23/97* Reviewed by: *YH 6/25/97* *

Customer : GALLOWAY/STEFANOV (6682/SMO)
 Customer Sample ID : 033491-002
 Lab Sample ID : 70102717 *85-4-GR-026-00-SSO*

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 878.000 gram
 Sample Date/Time : 6-18-97 10:45:00 AM
 Acquire Start Date/Time : 6-23-97 7:31:18 AM
 Detector Name : LAB01
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	1.40E+00
TH-234	9.74E-01	3.14E-01	4.19E-01
RA-226	1.08E+00	8.68E-01	4.69E-01
PB-214	5.48E-01	1.19E-01	4.67E-02
BI-214	5.26E-01	1.16E-01	4.49E-02
TH-232	7.10E-01	3.62E-01	1.35E-01
RA-228	6.14E-01	2.31E-01	1.41E-01
AC-228	6.91E-01	2.99E-01	8.23E-02
TH-228	5.28E-01	3.67E-01	4.70E-01
RA-224	6.85E-01	2.85E-01	6.64E-02
PB-212	6.66E-01	1.28E-01	3.36E-02
BI-212	4.27E-01	2.49E-01	3.16E-01
TL-208	5.63E-01	1.06E-01	6.55E-02
U-235	2.02E-01	1.41E-01	1.97E-01
TH-231	Not Detected	-----	7.72E+00
PA-231	Not Detected	-----	1.31E+00
TH-227	Not Detected	-----	3.26E-01
RA-223	Not Detected	-----	1.64E-01
RN-219	Not Detected	-----	3.73E-01
PB-211	Not Detected	-----	8.66E-01
TL-207	Not Detected	-----	1.45E+01
AM-241	Not Detected	-----	1.71E-01
PU-239	Not Detected	-----	3.13E+02
NP-237	Not Detected	-----	2.53E-01
PA-233	Not Detected	-----	5.27E-02
TH-229	Not Detected	-----	1.82E-01

NOT DETECTED 6/23/97 KA

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.99E-02
AG-110m	Not Detected	-----	4.15E-02
BA-133	Not Detected	-----	4.55E-02
BE-7	3.48E-01	1.48E-01	1.46E-01
CD-109	1.15E+00	3.86E-01	6.59E-01
CD-115	Not Detected	-----	2.70E-01
CE-139	Not Detected	-----	2.45E-02
CE-141	Not Detected	-----	4.59E-02
CE-144	Not Detected	-----	1.72E-01
CO-56	Not Detected	-----	3.46E-02
CO-57	Not Detected	-----	2.20E-02
CO-58	Not Detected	-----	3.11E-02
CO-60	Not Detected	-----	3.93E-02
CR-51	Not Detected	-----	2.30E-01
CS-134	Not Detected	-----	4.34E-02
CS-137	1.09E-01	3.06E-02	2.43E-02
EU-152	Not Detected	-----	6.53E-02
EU-154	Not Detected	-----	1.83E-01
EU-155	Not Detected	-----	1.04E-01
FE-59	Not Detected	-----	7.97E-02
GD-153	Not Detected	-----	7.37E-02
HG-203	Not Detected	-----	3.13E-02
I-131	Not Detected	-----	4.12E-02
IR-192	Not Detected	-----	2.46E-02
K-40	1.70E+01	2.63E+00	2.62E-01
MN-52	Not Detected	-----	5.41E-02
MN-54	Not Detected	-----	3.33E-02
MO-99	Not Detected	-----	7.77E-01
NA-22	Not Detected	-----	4.46E-02
NA-24	Not Detected	-----	7.41E+00
NB-95	Not Detected	-----	3.50E-01
ND-147	Not Detected	-----	2.55E-01
NI-57	Not Detected	-----	4.77E-01
PB-210	Not Detected	-----	7.04E+00
RU-103	Not Detected	-----	2.97E-02
RU-106	Not Detected	-----	2.64E-01
SB-122	Not Detected	-----	1.32E-01
SB-124	Not Detected	-----	3.14E-02
SB-125	Not Detected	-----	8.07E-02
SN-113	Not Detected	-----	3.72E-02
SR-85	Not Detected	-----	3.58E-02
TA-182	Not Detected	-----	1.58E-01
TA-183	Not Detected	-----	2.82E-01
TC-99m	Not Detected	-----	1.57E+04
TL-201	Not Detected	-----	2.95E-01
XE-133	Not Detected	-----	3.88E-01
Y-88	Not Detected	-----	2.43E-02
ZN-65	Not Detected	-----	1.08E-01
ZR-95	Not Detected	-----	6.05E-02

not detected 6/25/97

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 6-23-97 11:31:45 AM *

 * Analyzed by: *JS 6/22/97* Reviewed by: *JS 6/25/97* *

Customer : GALLOWAY/STEFANOV (6682/SMO)
 Customer Sample ID : 033512-002
 Lab Sample ID : 70102718 85-4-GR-027-00-SS0

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 864.000 gram
 Sample Date/Time : 6-18-97 10:50:00 AM
 Acquire Start Date/Time : 6-23-97 9:22:08 AM
 Detector Name : LAB01
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected		1.42E+00
TH-234	5.32E-01	3.82E-01	4.47E-01
RA-226	1.07E+00	4.00E-01	5.15E-01
PB-214	6.22E-01	1.16E-01	4.67E-02
BI-214	5.32E-01	5.30E-01	4.49E-02

TH-232	6.46E-01	4.41E-01	1.44E-01
RA-228	6.46E-01	2.61E-01	1.72E-01
AC-228	6.43E-01	1.90E-01	9.59E-02
TH-228	Not Detected		3.97E-01
RA-224	6.90E-01	2.28E-01	9.24E-02
PB-212	7.13E-01	1.31E-01	3.79E-02
BI-212	6.02E-01	3.60E-01	3.32E-01
TL-208	6.39E-01	9.96E-02	6.37E-02

U-235	1.19E-01	1.39E-01	1.95E-01
TH-231	Not Detected		7.96E+00
PA-231	Not Detected		1.32E+00
TH-227	Not Detected		3.33E-01
RA-223	Not Detected		1.70E-01
RN-219	3.21E-01	3.12E-01	3.91E-01
PB-211	Not Detected		8.53E-01
TL-207	Not Detected		1.45E+01

NOT DETECTED K49 6/23/97

NOT DETECTED 6/23/97 K49

AM-241	Not Detected		1.70E-01
PU-239	Not Detected		3.26E+02
NP-237	Not Detected		2.59E-01
PA-233	Not Detected		5.16E-02
TH-229	Not Detected		1.82E-01

[Summary Report] - Sample ID: : 70102718

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.10E-02
AG-110m	Not Detected	-----	4.06E-02
BA-133	Not Detected	-----	4.86E-02
BE-7	5.43E-01	1.94E-01	1.74E-01
CD-109	9.06E-01	4.39E-01	6.19E-01
CD-115	Not Detected	-----	2.82E-01
CE-139	Not Detected	-----	2.50E-02
CE-141	Not Detected	-----	4.60E-02
CE-144	Not Detected	-----	1.76E-01
CO-56	Not Detected	-----	2.59E-02
CO-57	Not Detected	-----	2.26E-02
CO-58	Not Detected	-----	3.34E-02
CO-60	Not Detected	-----	3.92E-02
CR-51	Not Detected	-----	2.39E-01
CS-134	Not Detected	-----	4.40E-02
CS-137	8.48E-02	2.72E-02	2.53E-02
EU-152	Not Detected	-----	6.71E-02
EU-154	Not Detected	-----	1.91E-01
EU-155	Not Detected	-----	1.05E-01
FE-59	Not Detected	-----	8.36E-02
GD-153	Not Detected	-----	7.42E-02
HG-203	Not Detected	-----	3.12E-02
I-131	Not Detected	-----	4.13E-02
IR-192	Not Detected	-----	2.63E-02
K-40	1.64E+01	2.54E+00	2.43E-01
MN-52	Not Detected	-----	5.95E-02
MN-54	Not Detected	-----	3.40E-02
MO-99	Not Detected	-----	8.44E-01
NA-22	Not Detected	-----	4.67E-02
NA-24	Not Detected	-----	8.58E+00
NB-95	Not Detected	-----	3.64E-01
ND-147	Not Detected	-----	2.68E-01
NI-57	Not Detected	-----	5.13E-01
PB-210	Not Detected	-----	7.47E+00
RU-103	Not Detected	-----	3.27E-02
RU-106	Not Detected	-----	2.81E-01
SB-122	Not Detected	-----	1.36E-01
SB-124	Not Detected	-----	2.98E-02
SB-125	Not Detected	-----	8.26E-02
SN-113	Not Detected	-----	3.76E-02
SR-85	Not Detected	-----	3.75E-02
TA-182	Not Detected	-----	1.60E-01
TA-183	Not Detected	-----	2.82E-01
TC-99m	Not Detected	-----	1.97E+04
TL-201	Not Detected	-----	2.97E-01
XE-133	Not Detected	-----	4.17E-01
Y-88	Not Detected	-----	2.85E-02
ZN-65	Not Detected	-----	1.09E-01
ZR-95	Not Detected	-----	6.15E-02

not detected YH 6/25/97

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 6-23-97 1:29:23 PM *

 * Analyzed by: *K. Udoz/PA* Reviewed by: *YJ 6/25/97* *

Customer : GALLOWAY/STEFANOV (6682/SMO)
 Customer Sample ID : LAB CONTROL SAMPLE USING CG134
 Lab Sample ID : 70102720

Sample Description : MIXED GAMMA STANDARD CG134
 Sample Quantity : 1.000 Each
 Sample Date/Time : 11-01-90 12:00:00 PM
 Acquire Start Date/Time : 6-23-97 1:17:14 PM
 Detector Name : LAB01
 Elapsed Live/Real Time : 600 / 605 seconds

Comments:

Nuclide Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
U-238	Not Detected	-----	8.90E+03
TH-234	Not Detected	-----	3.45E+03
RA-226	Not Detected	-----	5.96E+03
PB-214	Not Detected	-----	7.87E+02
BI-214	Not Detected	-----	7.37E+02
TH-232	Not Detected	-----	2.37E+03
RA-228	Not Detected	-----	3.40E+03
AC-228	Not Detected	-----	2.00E+03
TH-228	Not Detected	-----	8.10E+04
RA-224	Not Detected	-----	2.51E+03
PB-212	Not Detected	-----	6.01E+03
BI-212	Not Detected	-----	6.02E+04
TL-208	Not Detected	-----	1.19E+04
U-235	Not Detected	-----	1.62E+03
TH-231	Not Detected	-----	5.63E+04
PA-231	Not Detected	-----	1.53E+04
TH-227	Not Detected	-----	2.57E+03
RA-223	Not Detected	-----	1.00E+26
RN-219	Not Detected	-----	6.66E+03
PB-211	Not Detected	-----	1.48E+04
TL-207	Not Detected	-----	2.73E+05
AM-241	8.32E+04	1.41E+04	1.54E+03
PU-239	Not Detected	-----	2.57E+06
NP-237	Not Detected	-----	1.81E+03
PA-233	Not Detected	-----	6.56E+02
TH-229	Not Detected	-----	1.40E+03

Nuclide Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
AG-108m	Not Detected	-----	4.20E+02
AG-110m	Not Detected	-----	1.62E+06
BA-133	Not Detected	-----	7.60E+02
BE-7	Not Detected	-----	1.97E+17
CD-109	3.72E+05	1.45E+05	1.58E+05
CD-115	Not Detected	-----	1.00E+26
CE-139	Not Detected	-----	4.27E+07
CE-141	Not Detected	-----	1.00E+26
CE-144	Not Detected	-----	5.46E+05
CO-56	Not Detected	-----	1.33E+12
CO-57	Not Detected	-----	9.09E+04
CO-58	Not Detected	-----	8.50E+12
CO-60	7.83E+04	1.08E+04	5.10E+02
CR-51	Not Detected	-----	1.00E+26
CS-134	Not Detected	-----	3.23E+03
CS-137	6.92E+04	9.26E+03	3.30E+02
EU-152	Not Detected	-----	7.84E+02
EU-154	Not Detected	-----	3.15E+03
EU-155	Not Detected	-----	2.15E+03
FE-59	Not Detected	-----	2.76E+19
GD-153	Not Detected	-----	6.14E+05
HG-203	Not Detected	-----	1.46E+18
I-131	Not Detected	-----	1.00E+26
IR-192	Not Detected	-----	2.39E+12
K-40	Not Detected	-----	1.81E+03
MN-52	Not Detected	-----	1.00E+26
MN-54	Not Detected	-----	9.93E+04
MO-99	Not Detected	-----	1.00E+26
NA-22	Not Detected	-----	1.40E+03
NA-24	Not Detected	-----	1.00E+26
NB-95	Not Detected	-----	1.00E+26
ND-147	Not Detected	-----	1.00E+26
NI-57	Not Detected	-----	1.00E+26
PB-210	Not Detected	-----	6.93E+04
RU-103	Not Detected	-----	1.65E+21
RU-106	Not Detected	-----	3.27E+05
SB-122	Not Detected	-----	1.00E+26
SB-124	Not Detected	-----	4.70E+14
SB-125	Not Detected	-----	6.93E+03
SN-113	Not Detected	-----	1.08E+09
SR-85	Not Detected	-----	7.68E+13
TA-182	Not Detected	-----	3.21E+09
TA-183	Not Detected	-----	1.00E+26
TC-99m	Not Detected	-----	1.00E+26
TL-201	Not Detected	-----	1.00E+26
XE-133	Not Detected	-----	1.00E+26
Y-88	Not Detected	-----	1.21E+09
ZN-65	Not Detected	-----	1.04E+06
ZR-95	Not Detected	-----	1.72E+14

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program *
 * Quality Assurance Report *

Report Date : 6-23-97 1:30:02 PM
 QA File : C:\GENIEPC\CAMFILES\LCS1.QAF
 Analyst : KIC
 Sample ID : 70102720
 Sample Quantity : 1.00 Each
 Sample Date : 11-01-90 12:00:00 PM
 Measurement Date : 6-23-97 1:17:14 PM
 Elapsed Live Time : 600 seconds
 Elapsed Real Time : 605 seconds

Parameter	Mean	1S Error	New Value	< LU : SD : UD : BS >
AM-241 Activity	8.754E-02	2.699E-03	8.320E-02	< :In : : >
CS-137 Activity	6.887E-02	1.682E-03	6.922E-02	< : : : >
CO-60 Activity	7.584E-02	3.006E-03	7.840E-02	< : : : >

Flags Key: LU = Boundary Test (Ab = Above , Be = Below)
 SD = Sample Driven N-Sigma Test (In = Investigate, Ac = Action)
 UD = User Driven N-Sigma Test (In = Investigate, Ac = Action)
 BS = Measurement Bias Test (In = Investigate, Ac = Action)

Reviewed by: KIC 6/23/97

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.95E-02
AG-110m	Not Detected	-----	3.78E-02
BA-133	Not Detected	-----	7.22E-02
BE-7	Not Detected	-----	3.13E-01
CD-109	1.61E+00	6.83E-01	1.09E+00
CD-115	Not Detected	-----	1.07E-01
CE-139	Not Detected	-----	3.33E-02
CE-141	Not Detected	-----	6.11E-02
CE-144	Not Detected	-----	2.76E-01
CO-56	Not Detected	-----	4.57E-02
CO-57	Not Detected	-----	3.52E-02
CO-58	Not Detected	-----	3.57E-02
CO-60	Not Detected	-----	4.13E-02
CR-51	Not Detected	-----	2.65E-01
CS-134	Not Detected	-----	5.46E-02
CS-137	Not Detected	-----	4.22E-02
EU-152	Not Detected	-----	1.06E-01
EU-154	Not Detected	-----	2.28E-01
EU-155	Not Detected	-----	1.75E-01
FE-59	Not Detected	-----	8.27E-02
GD-153	Not Detected	-----	1.20E-01
HG-203	Not Detected	-----	3.77E-02
I-131	Not Detected	-----	3.41E-02
IR-192	Not Detected	-----	3.21E-02
K-40	1.78E+01	2.69E+00	3.61E-01
MN-52	Not Detected	-----	3.72E-02
MN-54	Not Detected	-----	4.35E-02
MO-99	Not Detected	-----	3.53E-01
NA-22	Not Detected	-----	4.89E-02
NA-24	Not Detected	-----	1.04E-01
NB-95	Not Detected	-----	2.30E-01
ND-147	Not Detected	-----	2.47E-01
NI-57	Not Detected	-----	8.07E-02
PB-210	Not Detected	-----	4.10E+01
RU-103	Not Detected	-----	3.49E-02
RU-106	Not Detected	-----	3.41E-01
SB-122	2.10E-02	2.47E-02	2.43E-02
SB-124	Not Detected	-----	3.67E-02
SB-125	Not Detected	-----	9.61E-02
SN-113	Not Detected	-----	4.33E-02
SR-85	Not Detected	-----	4.40E-02
TA-182	Not Detected	-----	1.72E-01
TA-183	Not Detected	-----	5.44E-01
TC-99m	Not Detected	-----	4.47E-01
TL-201	Not Detected	-----	2.67E-01
XE-133	Not Detected	-----	2.28E-01
Y-88	Not Detected	-----	3.07E-02
ZN-65	Not Detected	-----	1.17E-01
ZR-95	Not Detected	-----	6.48E-02

not detected 7/16/57

not detected 7/16/57

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 6-19-97 12:35:06 PM *

 * Analyzed by: *KA 6/19/97* Reviewed by: *KA 6/19/97* *

Customer : B.GALLOWAY/C.STEFANOV (6682/SMO)
 Customer Sample ID : 033476-002
 Lab Sample ID : 70102601 85-1-GR-020-00-SSO

Sample Description : MARINELLI SOIL SAMPLE
 Sample Quantity : 787.000 gram
 Sample Date/Time : 6-18-97 8:58:00 AM
 Acquire Start Date/Time : 6-18-97 5:28:27 PM
 Detector Name : LAB01
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
--------------	---------------------	---------------	----------------

U-238	Not Detected		1.42E+00
TH-234	8.31E-01	2.99E-01	4.17E-01
RA-226	1.30E+00	8.42E-01	5.19E-01
PB-214	5.34E-01	1.60E-01	5.00E-02
BI-214	5.00E-01	1.22E-01	4.87E-02

TH-232	6.37E-01	3.41E-01	1.33E-01
RA-228	6.41E-01	2.97E-01	1.71E-01
AC-228	6.01E-01	2.04E-01	1.02E-01
TH-228	5.87E-01	3.93E-01	3.63E-01
RA-224	5.80E-01	2.56E-01	8.02E-02
PB-212	6.73E-01	1.14E-01	3.58E-02
BI-212	7.18E-01	3.94E-01	3.65E-01
TL-208	5.65E-01	1.38E-01	6.91E-02

U-235	7.68E-02	1.41E-01	1.98E-01
TH-231	Not Detected		8.15E+00
PA-231	Not Detected		1.33E+00
TH-227	Not Detected		3.43E-01
RA-223	Not Detected		1.30E-01
RN-219	Not Detected		3.78E-01
PB-211	Not Detected		8.48E-01
TL-207	Not Detected		1.42E+01

AM-241	Not Detected		1.69E-01
PU-239	Not Detected		3.32E+02
NP-237	3.65E-01	1.32E-01	1.84E-01
PA-233	Not Detected		5.43E-02
TH-229	Not Detected		1.82E-01

NOT DETECTED 6/19/97 *KA*

NOT DETECTED 6/19/97 *KA*

[Summary Report] - Sample ID: : 70102601

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.18E-02
AG-110m	Not Detected	-----	3.40E-02
BA-133	Not Detected	-----	4.87E-02
BE-7	Not Detected	-----	2.39E-01
CD-109	Not Detected	-----	6.23E-01
CD-115	Not Detected	-----	6.87E-02
CE-139	Not Detected	-----	2.43E-02
CE-141	Not Detected	-----	4.26E-02
CE-144	Not Detected	-----	1.82E-01
CO-56	Not Detected	-----	3.41E-02
CO-57	Not Detected	-----	2.30E-02
CO-58	Not Detected	-----	3.16E-02
CO-60	Not Detected	-----	3.86E-02
CR-51	Not Detected	-----	2.14E-01
CS-134	Not Detected	-----	4.45E-02
CS-137	Not Detected	-----	3.91E-02
EU-152	Not Detected	-----	6.95E-02
EU-154	Not Detected	-----	1.94E-01
EU-155	Not Detected	-----	1.04E-01
FE-59	Not Detected	-----	7.64E-02
GD-153	Not Detected	-----	7.44E-02
HG-203	Not Detected	-----	2.93E-02
I-131	Not Detected	-----	2.76E-02
IR-192	Not Detected	-----	2.65E-02
K-40	1.65E+01	3.05E+00	3.44E-01
MN-52	Not Detected	-----	3.47E-02
MN-54	Not Detected	-----	3.66E-02
MO-99	Not Detected	-----	2.79E-01
NA-22	Not Detected	-----	4.45E-02
NA-24	Not Detected	-----	5.57E-02
NB-95	Not Detected	-----	1.56E-01
ND-147	Not Detected	-----	2.01E-01
NI-57	Not Detected	-----	5.68E-02
PB-210	Not Detected	-----	7.25E+00
RU-103	Not Detected	-----	2.98E-02
RU-106	Not Detected	-----	2.80E-01
SB-122	Not Detected	-----	4.34E-02
SB-124	Not Detected	-----	2.96E-02
SB-125	Not Detected	-----	8.33E-02
SN-113	Not Detected	-----	3.66E-02
SR-85	Not Detected	-----	3.69E-02
TA-182	Not Detected	-----	1.60E-01
TA-183	Not Detected	-----	1.51E-01
TC-99m	Not Detected	-----	6.20E-02
TL-201	Not Detected	-----	1.06E-01
XE-133	Not Detected	-----	1.01E-01
Y-88	Not Detected	-----	2.35E-02
ZN-65	Not Detected	-----	1.15E-01
ZR-95	Not Detected	-----	5.95E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 6-19-97 8:54:06 AM *

 * Analyzed by: *KC 6/19/97* Reviewed by: *JS 6/19/97* *

Customer : B.GALLOWAY/C.STEFANOV (6682/SMO)
 Customer Sample ID : 033482-002
 Lab Sample ID : 70102602

85-2-GR-013-00-SSO

Sample Description : MARINELLI SOIL SAMPLE
 Sample Quantity : 711.000 gram
 Sample Date/Time : 6-18-97 9:35:00 AM
 Acquire Start Date/Time : 6-19-97 7:11:22 AM
 Detector Name : LAB01
 Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	1.71E+01	4.45E+00	2.23E+00
TH-234	2.15E+01	4.31E+00	7.99E-01
RA-226	1.11E+00	1.54E+00	6.66E-01
PB-214	5.41E-01	1.10E-01	6.05E-02
BI-214	5.10E-01	1.38E-01	5.67E-02
TH-232	Not Detected	-----	1.77E-01
RA-228	8.69E-01	3.65E-01	1.77E-01
AC-228	Not Detected	-----	1.01E-01
TH-228	6.62E-01	3.88E-01	5.27E-01
RA-224	7.36E-01	2.80E-01	9.72E-02
PB-212	7.26E-01	1.29E-01	5.01E-02
BI-212	1.01E+00	6.60E-01	3.86E-01
TL-208	6.43E-01	1.62E-01	8.89E-02
U-235	3.84E-01	1.47E-01	1.98E-01
TH-231	Not Detected	-----	1.48E+01
PA-231	Not Detected	-----	1.72E+00
TH-227	Not Detected	-----	4.03E-01
RA-223	1.60E-01	1.17E-01	1.76E-01
RN-219	Not Detected	-----	4.72E-01
PB-211	Not Detected	-----	1.08E+00
TL-207	Not Detected	-----	1.63E+01
AM-241	Not Detected	-----	2.85E-01
PU-239	Not Detected	-----	4.64E+02
NP-237	Not Detected	-----	4.46E-01
PA-233	Not Detected	-----	7.27E-02
TH-229	Not Detected	-----	3.97E-01

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	5.11E-02
AG-110m	Not Detected	-----	4.07E-02
BA-133	Not Detected	-----	5.76E-02
BE-7	Not Detected	-----	3.18E-01
CD-109	Not Detected	-----	1.49E+00
CD-115	Not Detected	-----	9.74E-02
CE-139	Not Detected	-----	3.54E-02
CE-141	Not Detected	-----	6.49E-02
CE-144	Not Detected	-----	2.66E-01
CO-56	Not Detected	-----	2.92E-02
CO-57	Not Detected	-----	3.43E-02
CO-58	Not Detected	-----	3.99E-02
CO-60	Not Detected	-----	4.66E-02
CR-51	Not Detected	-----	2.90E-01
CS-134	Not Detected	-----	5.21E-02
CS-137	Not Detected	-----	2.26E-02
EU-152	Not Detected	-----	1.03E-01
EU-154	Not Detected	-----	2.36E-01
EU-155	Not Detected	-----	1.75E-01
FE-59	Not Detected	-----	8.87E-02
GD-153	Not Detected	-----	1.69E-01
HG-203	Not Detected	-----	3.83E-02
I-131	Not Detected	-----	3.85E-02
IR-192	Not Detected	-----	3.35E-02
K-40	1.77E+01	2.75E+00	2.98E-01
MN-52	Not Detected	-----	4.50E-02
MN-54	Not Detected	-----	4.41E-02
MO-99	Not Detected	-----	4.25E-01
NA-22	Not Detected	-----	4.98E-02
NA-24	Not Detected	-----	1.08E-01
NB-95	Not Detected	-----	2.07E-01
ND-147	Not Detected	-----	2.74E-01
NI-57	Not Detected	-----	8.53E-02
PB-210	Not Detected	-----	1.12E+01
RU-103	Not Detected	-----	3.87E-02
RU-106	Not Detected	-----	3.48E-01
SB-122	Not Detected	-----	6.59E-02
SB-124	Not Detected	-----	3.79E-02
SB-125	Not Detected	-----	1.08E-01
SN-113	Not Detected	-----	4.68E-02
SR-85	Not Detected	-----	4.39E-02
TA-182	Not Detected	-----	1.84E-01
TA-183	Not Detected	-----	2.74E-01
TC-99m	Not Detected	-----	3.95E-01
TL-201	Not Detected	-----	2.12E-01
XE-133	Not Detected	-----	2.17E-01
Y-88	Not Detected	-----	3.15E-02
ZN-65	Not Detected	-----	1.24E-01
ZR-95	Not Detected	-----	7.35E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 6-19-97 10:39:18 AM *

* Analyzed by: *KS 6/19/97* Reviewed by: *SL 6/19/97* *

Customer : B.GALLOWAY/C.STEFANOV (6682/SMO)
 Customer Sample ID : 033488-002
 Lab Sample ID : 70102603

Sample Description : MARINELLI SOIL SAMPLE *85-4-GR-023 -CO-SSO*
 Sample Quantity : 804.000 gram
 Sample Date/Time : 6-18-97 10:30:00 AM
 Acquire Start Date/Time : 6-19-97 8:56:42 AM
 Detector Name : LAB01
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	8.91E-01
TH-234	Not Detected	-----	5.49E-01
RA-226	Not Detected	-----	6.37E-01
PB-214	5.77E-01	9.73E-01	4.85E-02
BI-214	5.43E-01	1.18E-01	5.28E-02
TH-232	7.38E-01	3.59E-01	1.42E-01
RA-228	6.17E-01	1.99E-01	1.61E-01
AC-228	7.08E-01	1.80E-01	9.41E-02
TH-228	5.00E-01	6.52E-01	4.60E-01
RA-224	6.70E-01	2.28E-01	9.49E-02
PB-212	6.81E-01	1.23E-01	3.69E-02
BI-212	7.53E-01	5.23E-01	3.19E-01
TL-208	5.56E-01	1.46E-01	7.42E-02
U-235	Not Detected	-----	8.98E-02
TH-231	Not Detected	-----	8.23E+00
PA-231	Not Detected	-----	1.39E+00
TH-227	Not Detected	-----	3.45E-01
RA-223	Not Detected	-----	1.39E-01
RN-219	3.47E-01	3.28E-01	4.13E-01
PB-211	Not Detected	-----	9.08E-01
TL-207	Not Detected	-----	1.44E+01
AM-241	Not Detected	-----	1.83E-01
PU-239	Not Detected	-----	3.27E+02
NP-237	Not Detected	-----	2.69E-01
PA-233	Not Detected	-----	5.66E-02
TH-229	Not Detected	-----	1.90E-01

NOT DETECTED 6/19/97 KS

[Summary Report] - Sample ID: : 70102603

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.22E-02
AG-110m	Not Detected	-----	6.24E-02
BA-133	Not Detected	-----	4.96E-02
BE-7	Not Detected	-----	2.73E-01
CD-109	1.11E+00	8.18E-01	6.67E-01
CD-115	Not Detected	-----	8.55E-02
CE-139	Not Detected	-----	2.46E-02
CE-141	Not Detected	-----	4.41E-02
CE-144	Not Detected	-----	1.83E-01
CO-56	Not Detected	-----	3.77E-02
CO-57	Not Detected	-----	2.25E-02
CO-58	Not Detected	-----	3.35E-02
CO-60	Not Detected	-----	3.93E-02
CR-51	Not Detected	-----	2.30E-01
CS-134	Not Detected	-----	4.64E-02
CS-137	3.47E-01	7.37E-02	2.57E-02
EU-152	Not Detected	-----	6.74E-02
EU-154	Not Detected	-----	1.96E-01
EU-155	Not Detected	-----	1.09E-01
FE-59	Not Detected	-----	7.49E-02
GD-153	Not Detected	-----	7.77E-02
HG-203	Not Detected	-----	2.96E-02
I-131	Not Detected	-----	3.21E-02
IR-192	Not Detected	-----	2.72E-02
K-40	1.56E+01	2.45E+00	2.79E-01
MN-52	Not Detected	-----	3.47E-02
MN-54	Not Detected	-----	1.85E-02
MO-99	Not Detected	-----	3.21E-01
NA-22	Not Detected	-----	4.39E-02
NA-24	Not Detected	-----	9.71E-02
NB-95	Not Detected	-----	1.78E-01
ND-147	Not Detected	-----	2.23E-01
NI-57	Not Detected	-----	7.94E-02
PB-210	Not Detected	-----	7.53E+00
RU-103	Not Detected	-----	3.06E-02
RU-106	Not Detected	-----	2.97E-01
SB-122	7.60E-03	2.08E-03	2.05E-02
SB-124	Not Detected	-----	3.14E-02
SB-125	Not Detected	-----	8.78E-02
SN-113	Not Detected	-----	3.77E-02
SR-85	Not Detected	-----	3.81E-02
TA-182	Not Detected	-----	1.57E-01
TA-183	Not Detected	-----	1.77E-01
TC-99m	Not Detected	-----	3.08E-01
TL-201	Not Detected	-----	1.22E-01
XE-133	Not Detected	-----	1.21E-01
Y-88	Not Detected	-----	2.83E-02
ZN-65	Not Detected	-----	1.07E-01
ZR-95	Not Detected	-----	6.02E-02

NOT DETECTED 6/19/97 K&J

NOT DETECTED 6/19/97 K&J

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 6-19-97 12:24:18 PM *

 * Analyzed by: *K 6/19/97* Reviewed by: *6/19/97* *

Customer : B.GALLOWAY/C.STEFANOV (6682/SMO)
 Customer Sample ID : 033513-002
 Lab Sample ID : 70102604

Sample Description : MARINELLI SOIL SAMPLE *85-4-GR-028-00-SSO*
 Sample Quantity : 695.000 gram
 Sample Date/Time : 6-18-97 10:55:00 AM
 Acquire Start Date/Time : 6-19-97 10:41:45 AM
 Detector Name : LAB01
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	1.50E+00
TH-234	Not Detected	-----	6.03E-01
RA-226	1.27E+00	5.02E-01	5.74E-01
PB-214	5.60E-01	1.38E-01	5.60E-02
BI-214	4.88E-01	1.07E-01	5.52E-02

TH-232	6.39E-01	4.00E-01	1.59E-01
RA-228	5.84E-01	2.84E-01	1.57E-01
AC-228	6.92E-01	2.50E-01	9.75E-02
TH-228	7.52E-01	4.08E-01	5.16E-01
RA-224	5.94E-01	2.32E-01	8.23E-02
PB-212	6.74E-01	1.24E-01	4.04E-02
BI-212	6.56E-01	3.82E-01	3.86E-01
TL-208	6.02E-01	1.37E-01	7.64E-02

U-235	8.71E-02	1.52E-01	2.14E-01 NOT DETECTED 6/19/97 <i>K</i>
TH-231	Not Detected	-----	8.65E+00
PA-231	Not Detected	-----	1.40E+00
TH-227	Not Detected	-----	3.71E-01
RA-223	Not Detected	-----	1.47E-01
RN-219	Not Detected	-----	4.15E-01
PB-211	Not Detected	-----	9.44E-01
TL-207	Not Detected	-----	1.69E+01

AM-241	Not Detected	-----	1.88E-01
PU-239	Not Detected	-----	3.54E+02
NP-237	2.86E-01	1.59E-01	1.99E-01 NOT DETECTED 6/19/97 <i>K</i>
PA-233	Not Detected	-----	5.77E-02
TH-229	Not Detected	-----	1.99E-01

[Summary Report] - Sample ID: : 70102604

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.82E-02
AG-110m	Not Detected	-----	3.55E-02
BA-133	Not Detected	-----	5.18E-02
BE-7	Not Detected	-----	2.68E-01
CD-109	Not Detected	-----	9.59E-01
CD-115	Not Detected	-----	9.29E-02
CE-139	Not Detected	-----	2.59E-02
CE-141	Not Detected	-----	4.66E-02
CE-144	Not Detected	-----	1.90E-01
CO-56	Not Detected	-----	4.03E-02
CO-57	Not Detected	-----	2.37E-02
CO-58	Not Detected	-----	3.45E-02
CO-60	Not Detected	-----	4.23E-02
CR-51	Not Detected	-----	2.33E-01
CS-134	Not Detected	-----	5.00E-02
CS-137	1.37E-02	1.39E-02	1.96E-02
EU-152	Not Detected	-----	7.07E-02
EU-154	Not Detected	-----	2.22E-01
EU-155	5.43E-02	1.03E-01	7.03E-02
FE-59	Not Detected	-----	8.49E-02
GD-153	Not Detected	-----	7.91E-02
HG-203	Not Detected	-----	3.18E-02
I-131	Not Detected	-----	3.17E-02
IR-192	Not Detected	-----	2.67E-02
K-40	1.69E+01	2.71E+00	3.12E-01
MN-52	Not Detected	-----	3.87E-02
MN-54	Not Detected	-----	4.00E-02
MO-99	Not Detected	-----	3.44E-01
NA-22	Not Detected	-----	4.93E-02
NA-24	Not Detected	-----	9.75E-02
NB-95	Not Detected	-----	1.91E-01
ND-147	Not Detected	-----	2.33E-01
NI-57	Not Detected	-----	8.42E-02
PB-210	Not Detected	-----	8.00E+00
RU-103	Not Detected	-----	3.28E-02
RU-106	Not Detected	-----	3.32E-01
SB-122	Not Detected	-----	5.54E-02
SB-124	Not Detected	-----	3.37E-02
SB-125	Not Detected	-----	9.33E-02
SN-113	Not Detected	-----	3.91E-02
SR-85	Not Detected	-----	4.08E-02
TA-182	Not Detected	-----	1.66E-01
TA-183	Not Detected	-----	1.83E-01
TC-99m	Not Detected	-----	3.90E-01
TL-201	Not Detected	-----	1.37E-01
XE-133	Not Detected	-----	1.30E-01
Y-88	Not Detected	-----	2.56E-02
ZN-65	Not Detected	-----	1.19E-01
ZR-95	Not Detected	-----	6.91E-02

NOT DETECTED 6/19/97

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 6-19-97 2:09:15 PM *

 * Analyzed by: *[Signature]* 6/19/97 Reviewed by: *[Signature]* 6/19/97 *

Customer : B.GALLOWAY/C.STEFANOV (6682/SMO)
 Customer Sample ID : 033514-002
 Lab Sample ID : 70102605

85-4-6R-028-00-SSD

Sample Description : MARINELLI SOIL SAMPLE
 Sample Quantity : 709.000 gram
 Sample Date/Time : 6-18-97 10:55:00 AM
 Acquire Start Date/Time : 6-19-97 12:26:41 PM
 Detector Name : LAB01
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	1.47E+00
TH-234	Not Detected	-----	5.95E-01
RA-226	1.44E+00	6.14E-01	5.55E-01
PB-214	5.51E-01	4.51E-01	5.14E-02
BI-214	4.75E-01	2.20E-01	4.86E-02
TH-232	6.54E-01	3.90E-01	1.49E-01
RA-228	7.05E-01	3.13E-01	1.67E-01
AC-228	6.11E-01	1.82E-01	9.52E-02
TH-228	6.25E-01	4.85E-01	4.77E-01
RA-224	6.12E-01	2.30E-01	8.74E-02
PB-212	6.39E-01	3.44E-01	3.94E-02
BI-212	5.74E-01	3.53E-01	3.57E-01
TL-208	6.63E-01	1.82E-01	7.31E-02
U-235	Not Detected	-----	2.03E-01
TH-231	Not Detected	-----	8.70E+00
PA-231	Not Detected	-----	1.37E+00
TH-227	Not Detected	-----	3.57E-01
RA-223	Not Detected	-----	1.43E-01
RN-219	Not Detected	-----	4.04E-01
PB-211	Not Detected	-----	9.20E-01
TL-207	Not Detected	-----	1.62E+01
AM-241	Not Detected	-----	1.89E-01
PU-239	Not Detected	-----	3.43E+02
NP-237	3.01E-01	2.25E-01	1.92E-01
PA-233	Not Detected	-----	5.55E-02
TH-229	Not Detected	-----	2.01E-01

NR DETECTED 6/19/97 *[Signature]*

[Summary Report] - Sample ID: : 70102605

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.61E-02
AG-110m	Not Detected	-----	3.46E-02
BA-133	Not Detected	-----	5.12E-02
BE-7	Not Detected	-----	2.84E-01
CD-109	Not Detected	-----	9.33E-01
CD-115	Not Detected	-----	9.11E-02
CE-139	Not Detected	-----	2.54E-02
CE-141	Not Detected	-----	4.55E-02
CE-144	Not Detected	-----	1.85E-01
CO-56	Not Detected	-----	3.09E-02
CO-57	Not Detected	-----	2.38E-02
CO-58	Not Detected	-----	3.37E-02
CO-60	Not Detected	-----	4.30E-02
CR-51	Not Detected	-----	2.29E-01
CS-134	Not Detected	-----	4.68E-02
CS-137	Not Detected	-----	1.91E-02
EU-152	Not Detected	-----	7.16E-02
EU-154	Not Detected	-----	2.12E-01
EU-155	Not Detected	-----	1.12E-01
FE-59	Not Detected	-----	8.55E-02
GD-153	Not Detected	-----	8.18E-02
HG-203	Not Detected	-----	3.12E-02
I-131	Not Detected	-----	3.08E-02
IR-192	Not Detected	-----	2.77E-02
K-40	1.65E+01	2.62E+00	3.02E-01
MN-52	Not Detected	-----	4.31E-02
MN-54	Not Detected	-----	4.03E-02
MO-99	Not Detected	-----	3.45E-01
NA-22	Not Detected	-----	4.66E-02
NA-24	Not Detected	-----	1.20E-01
NB-95	Not Detected	-----	1.88E-01
ND-147	Not Detected	-----	2.24E-01
NI-57	Not Detected	-----	9.30E-02
PB-210	Not Detected	-----	7.70E+00
RU-103	Not Detected	-----	3.15E-02
RU-106	Not Detected	-----	2.99E-01
SB-122	Not Detected	-----	5.72E-02
SB-124	Not Detected	-----	3.27E-02
SB-125	Not Detected	-----	8.75E-02
SN-113	Not Detected	-----	3.79E-02
SR-85	Not Detected	-----	3.91E-02
TA-182	Not Detected	-----	1.68E-01
TA-183	Not Detected	-----	1.86E-01
TC-99m	Not Detected	-----	4.63E-01
TL-201	Not Detected	-----	1.33E-01
XE-133	Not Detected	-----	1.33E-01
Y-88	Not Detected	-----	2.78E-02
ZN-65	Not Detected	-----	1.21E-01
ZR-95	Not Detected	-----	6.17E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 6-19-97 2:25:11 PM *

 * Analyzed by: *[Signature]* 6/19/97 Reviewed by: *[Signature]* 6/19/97 *

Customer : B.GALLOWAY/C.STEFANOV (6682/SMO)
 Customer Sample ID : LAB CONTROL SAMPLE USING CG134
 Lab Sample ID : 70102606

Sample Description : MIXED GAMMA STANDARD CG134
 Sample Quantity : 1.000 Each
 Sample Date/Time : 11-01-90 12:00:00 PM
 Acquire Start Date/Time : 6-19-97 2:13:12 PM
 Detector Name : LAB01
 Elapsed Live/Real Time : 600 / 605 seconds

Comments:

Nuclide Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
U-238	Not Detected	-----	9.04E+03
TH-234	Not Detected	-----	3.49E+03
RA-226	Not Detected	-----	5.92E+03
PB-214	Not Detected	-----	7.89E+02
BI-214	Not Detected	-----	7.52E+02
TH-232	Not Detected	-----	2.43E+03
RA-228	Not Detected	-----	3.35E+03
AC-228	Not Detected	-----	2.07E+03
TH-228	Not Detected	-----	8.22E+04
RA-224	Not Detected	-----	9.18E+02
PB-212	Not Detected	-----	6.01E+03
BI-212	Not Detected	-----	6.30E+04
TL-208	Not Detected	-----	1.19E+04
U-235	Not Detected	-----	1.61E+03
TH-231	Not Detected	-----	5.55E+04
PA-231	Not Detected	-----	1.56E+04
TH-227	Not Detected	-----	2.57E+03
RA-223	Not Detected	-----	1.00E+26
RN-219	Not Detected	-----	6.72E+03
PB-211	Not Detected	-----	1.53E+04
TL-207	Not Detected	-----	2.83E+05
AM-241	8.67E+04	1.47E+04	1.50E+03
PU-239	Not Detected	-----	2.54E+06
NP-237	Not Detected	-----	1.82E+03
PA-233	Not Detected	-----	6.76E+02
TH-229	Not Detected	-----	1.40E+03

[Summary Report] - Sample ID: : 70102606

Nuclide Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
AG-108m	Not Detected	-----	4.23E+02
AG-110m	Not Detected	-----	1.62E+06
BA-133	Not Detected	-----	7.62E+02
BE-7	Not Detected	-----	1.86E+17
CD-109	3.00E+05	1.38E+05	1.65E+05
CD-115	Not Detected	-----	1.00E+26
CE-139	Not Detected	-----	4.33E+07
CE-141	Not Detected	-----	1.00E+26
CE-144	Not Detected	-----	5.32E+05
CO-56	Not Detected	-----	1.36E+12
CO-57	Not Detected	-----	8.74E+04
CO-58	Not Detected	-----	8.17E+12
CO-60	7.95E+04	1.10E+04	5.42E+02
CR-51	Not Detected	-----	1.00E+26
CS-134	Not Detected	-----	3.18E+03
CS-137	6.97E+04	9.32E+03	3.66E+02
EU-152	Not Detected	-----	7.70E+02
EU-154	Not Detected	-----	3.20E+03
EU-155	Not Detected	-----	2.15E+03
FE-59	Not Detected	-----	2.54E+19
GD-153	Not Detected	-----	5.88E+05
HG-203	Not Detected	-----	1.41E+18
I-131	Not Detected	-----	1.00E+26
IR-192	Not Detected	-----	2.35E+12
K-40	Not Detected	-----	1.78E+03
MN-52	Not Detected	-----	1.00E+26
MN-54	Not Detected	-----	9.79E+04
MO-99	Not Detected	-----	1.00E+26
NA-22	Not Detected	-----	1.56E+03
NA-24	Not Detected	-----	1.00E+26
NB-95	Not Detected	-----	1.00E+26
ND-147	Not Detected	-----	1.00E+26
NI-57	Not Detected	-----	1.00E+26
PB-210	Not Detected	-----	6.74E+04
RU-103	Not Detected	-----	1.56E+21
RU-106	Not Detected	-----	3.36E+05
SB-122	Not Detected	-----	1.00E+26
SB-124	Not Detected	-----	4.44E+14
SB-125	Not Detected	-----	6.87E+03
SN-113	Not Detected	-----	1.07E+09
SR-85	Not Detected	-----	7.41E+13
TA-182	Not Detected	-----	3.36E+09
TA-183	Not Detected	-----	1.00E+26
TC-99m	Not Detected	-----	1.00E+26
TL-201	Not Detected	-----	1.00E+26
XE-133	Not Detected	-----	1.00E+26
Y-88	Not Detected	-----	1.41E+09
ZN-65	Not Detected	-----	1.08E+06
ZR-95	Not Detected	-----	1.70E+14

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program *
 * Quality Assurance Report *

Report Date : 6-19-97 2:25:46 PM
 QA File : C:\GENIEPC\CAMFILES\LCS1.QAF
 Analyst : GLS
 Sample ID : 70102606
 Sample Quantity : 1.00 Each
 Sample Date : 11-01-90 12:00:00 PM
 Measurement Date : 6-19-97 2:13:12 PM
 Elapsed Live Time : 600 seconds
 Elapsed Real Time : 605 seconds

Parameter	Mean	1S Error	New Value	< LU : SD : UD : BS >
AM-241 Activity	8.755E-02	2.701E-03	8.666E-02	< : : : >
CS-137 Activity	6.887E-02	1.683E-03	6.969E-02	< : : : >
CO-60 Activity	7.583E-02	3.005E-03	7.954E-02	< :In : : >

Flags Key: LU = Boundary Test (Ab = Above , Be = Below)
 SD = Sample Driven N-Sigma Test (In = Investigate, Ac = Action)
 UD = User Driven N-Sigma Test (In = Investigate, Ac = Action)
 BS = Measurement Bias Test (In = Investigate, Ac = Action)

Reviewed by: K 6/19/97

PAGE 1 OF 1

Batch No.

AR/COC-06353

Dept. No./Mail Stop: 6682/1147
Project/Task Manager: BOB GALLOWAY
Project Name: Site 85
Record Center Code: ER/1335/85/DAT
Logbook Ref No: #205
Service Order No.: CF0431

Date Samples Shipped: 9/13/94
Carrier/Waybill No.: HC
Lab Contact: Fernando Dominguez
Lab Destination: RPSD, Bld. 881
SMO Contact/Phone: PAMI PUISSANT/844-3155
Send Report to SMO PAMI PUISSANT

Contract No.:	NA	Parameter & Method Requested
Case No.:	8835-208	
SMO Authorization:	DNK/10	
Bill to:	Sandia National Laboratories Supplier Services Department P.O. Box 5800 MS 0154 Albuquerque, NM 87185-0154	

[illegible]

RMMA <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Ref. No. _____		Sample Tracking Date Entered (mm/dd/yy) <u>7/11/97</u> Entered by: <u>[Signature]</u>		Special Instructions/QC Requirements _____	
Sample Disposal <input checked="" type="checkbox"/> Return to Client <input type="checkbox"/> Disposal by lab		Turnaround Time <input checked="" type="checkbox"/> Normal <input type="checkbox"/> Rush Required Report Date _____		QC Initials: <u>LHC</u>	
Sample Team Members	Name <u>JAN CURTIS</u> <u>Nelson Capitan</u>	Signature <u>[Signature]</u> <u>[Signature]</u>	Init <u>JC</u> <u>AC</u>	Company/Organization/Phone <u>WESTON/6621/284-2610</u> <u>IT/6621/284-3307</u>	

1. Relinquished by	Org.	Date	Time	4. Relinquished by	Org.	Date	Time
1. Received by	Org.	Date	Time	4. Received by	Org.	Date	Time
2. Relinquished by	Org.	Date	Time	5. Relinquished by	Org.	Date	Time
2. Received by	Org.	Date	Time	5. Received by	Org.	Date	Time
3. Relinquished by	Org.	Date	Time	6. Relinquished by	Org.	Date	Time
3. Received by	Org.	Date	Time	6. Received by	Org.	Date	Time

WHITE - To Accompany Samples, Laboratory Copy **BLUE** - To Accompany Samples, Return to SMO **YELLOW** - SMO Suspense Copy **PINK** - Field Copy

Parameter & Method Requested

Location**Tech Area**

Building

Room

**Beginning
Depth in Ft.**

EA Site No.

Date/Time Collected

Reference LOV (available at SMO)

Sample Matrix

Ty

Volume

Preservative

Sample Collection Method

Sample	Type
--------	------

Lab
Sample
ID

034077	-002	355-ER85-BH- 008-10.0-5	10	85	1217/1415	S	M	500ml	4°C	G	SA	X
034078	-003	355-ER85-BH- 008-10.0-5	NA	85	1445	DIW	M	500ml	4°C	G	EB	X
033855	-002	14-GR-010297	0	14	1510	S	M	500ml	4°C	G	SA	X

LAB
USE

9/11/97 L.L.

1. $\frac{1}{2}$

Abnormal Conditions on Receipt

LAB USE

WHITE - To Accompany Samples, Laboratory Copy **BLUE** - To Accompany Samples, Return to SMO **YELLOW** - SMO Suspense Copy **PINK** - Field Copy

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 9-03-97 12:40:14 PM *

 *
 * Analyzed by: *J 9/3/97* Reviewed by: *W 9/4/97* *

 Customer : B.GALLOWAY/D.BISWELL (6682/SMO)
 Customer Sample ID : 033847-002
 Lab Sample ID : 70153601 *85-BH-006-C.C-S*

Sample Description : SOIL MARINELLI SAMPLE
 Sample Quantity : 727.000 gram
 Sample Date/Time : 9-02-97 10:30:00 AM
 Acquire Start Date/Time : 9-03-97 10:57:03 AM
 Detector Name : LAB02
 Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected		3.25E+00
TH-234	1.09E+00	4.79E-01	6.31E-01
RA-226	1.55E+00	6.10E-01	6.30E-01
PB-214	5.72E-01	1.62E-01	6.62E-02
BI-214	5.83E-01	1.15E-01	4.66E-02

TH-232	7.07E-01	3.74E-01	1.51E-01
RA-228	7.42E-01	3.49E-01	1.58E-01
AC-228	7.01E-01	1.62E-01	8.33E-02
TH-228	6.32E-01	2.39E-01	4.94E-01
RA-224	7.24E-01	2.39E-01	7.57E-02
PB-212	7.13E-01	1.25E-01	3.96E-02
BI-212	8.70E-01	5.88E-01	3.00E-01
TL-208	6.77E-01	1.43E-01	6.19E-02

U-235	Not Detected		2.38E-01
TH-231	Not Detected		1.25E+01
PA-231	Not Detected		1.39E+00
TH-227	Not Detected		3.38E-01
RA-223	Not Detected		2.11E-01
RN-219	Not Detected		3.78E-01
PB-211	Not Detected		8.50E-01
TL-207	Not Detected		1.44E+01

AM-241	Not Detected		4.63E-01
PU-239	Not Detected		4.41E+02
NP-237	3.45E-01	1.47E-01	2.76E-01
PA-233	Not Detected		5.89E-02
TH-229	Not Detected		2.53E-01


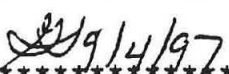
not detected J 9/3/97

[Summary Report] - Sample ID: : 70153601

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.03E-02
AG-110m	Not Detected	-----	3.40E-02
BA-133	Not Detected	-----	6.30E-02
BE-7	Not Detected	-----	2.47E-01
CD-109	Not Detected	-----	9.36E-01
CD-115	Not Detected	-----	8.75E-02
CE-139	Not Detected	-----	2.89E-02
CE-141	Not Detected	-----	5.19E-02
CE-144	Not Detected	-----	2.37E-01
CO-56	Not Detected	-----	3.71E-02
CO-57	Not Detected	-----	3.04E-02
CO-58	Not Detected	-----	3.15E-02
CO-60	Not Detected	-----	3.82E-02
CR-51	Not Detected	-----	2.42E-01
CS-134	Not Detected	-----	4.82E-02
CS-137	2.95E-02	2.59E-02	2.25E-02
EU-152	Not Detected	-----	9.14E-02
EU-154	Not Detected	-----	1.86E-01
EU-155	Not Detected	-----	1.50E-01
FE-59	Not Detected	-----	7.41E-02
GD-153	Not Detected	-----	1.04E-01
HG-203	Not Detected	-----	3.06E-02
I-131	Not Detected	-----	3.00E-02
IR-192	Not Detected	-----	2.79E-02
K-40	2.14E+01	3.11E+00	2.43E-01
MN-52	Not Detected	-----	3.17E-02
MN-54	Not Detected	-----	3.46E-02
MO-99	Not Detected	-----	3.10E-01
NA-22	Not Detected	-----	4.45E-02
NA-24	Not Detected	-----	9.89E-02
NB-95	Not Detected	-----	1.89E-01
ND-147	Not Detected	-----	2.02E-01
NI-57	6.54E-02	3.68E-02	3.79E-02
PB-210	Not Detected	-----	3.44E+01
RU-103	Not Detected	-----	2.79E-02
RU-106	Not Detected	-----	2.97E-01
SB-122	Not Detected	-----	4.99E-02
SB-124	Not Detected	-----	3.08E-02
SB-125	Not Detected	-----	7.80E-02
SN-113	Not Detected	-----	3.66E-02
SR-85	Not Detected	-----	3.72E-02
TA-182	Not Detected	-----	1.50E-01
TA-183	Not Detected	-----	4.57E-01
TC-99m	Not Detected	-----	4.78E-01
TL-201	Not Detected	-----	2.24E-01
XE-133	Not Detected	-----	1.95E-01
Y-88	Not Detected	-----	2.76E-02
ZN-65	Not Detected	-----	1.03E-01
ZR-95	Not Detected	-----	5.56E-02

not detected 9/3/57

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 9-03-97 2:26:49 PM *

 *
 * Analyzed by:  9/3/97 Reviewed by:  9/4/97 *

 Customer : B.GALLOWAY/D.BISWELL (6682/SMO)
 Customer Sample ID : 033848-002
 Lab Sample ID : 70153602 85-BH-006-C.C-SD

Sample Description : SOIL MARINELLI SAMPLE
 Sample Quantity : 695.000 gram
 Sample Date/Time : 9-02-97 10:30:00 AM
 Acquire Start Date/Time : 9-03-97 12:43:27 PM
 Detector Name : LAB02
 Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	3.43E+00
TH-234	7.30E-01	3.96E-01	6.29E-01
RA-226	1.21E+00	5.58E-01	5.70E-01
PB-214	6.74E-01	1.26E-01	6.95E-02
BI-214	5.82E-01	1.16E-01	4.95E-02
TH-232	7.37E-01	3.91E-01	1.61E-01
RA-228	7.78E-01	2.60E-01	1.56E-01
AC-228	7.40E-01	2.95E-01	8.95E-02
TH-228	6.00E-01	2.28E-01	4.81E-01
RA-224	8.27E-01	2.74E-01	7.33E-02
PB-212	7.81E-01	1.39E-01	4.22E-02
BI-212	Not Detected	-----	3.28E-01
TL-208	6.92E-01	1.38E-01	6.34E-02
U-235	Not Detected	-----	2.53E-01
TH-231	Not Detected	-----	1.31E+01
PA-231	Not Detected	-----	1.48E+00
TH-227	Not Detected	-----	3.62E-01
RA-223	Not Detected	-----	2.18E-01
RN-219	Not Detected	-----	4.12E-01
PB-211	Not Detected	-----	9.14E-01
TL-207	Not Detected	-----	1.46E+01
AM-241	Not Detected	-----	4.95E-01
PU-239	Not Detected	-----	4.61E+02
NP-237	Not Detected	-----	3.98E-01
PA-233	Not Detected	-----	6.26E-02
TH-229	Not Detected	-----	2.65E-01

[Summary Report] - Sample ID: : 70153602

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.29E-02
AG-110m	Not Detected	-----	3.61E-02
BA-133	Not Detected	-----	6.86E-02
BE-7	Not Detected	-----	2.65E-01
CD-109	1.20E+00	5.64E-01	9.69E-01
CD-115	Not Detected	-----	9.63E-02
CE-139	Not Detected	-----	3.03E-02
CE-141	Not Detected	-----	5.45E-02
CE-144	Not Detected	-----	2.48E-01
CO-56	Not Detected	-----	1.08E-01
CO-57	Not Detected	-----	3.14E-02
CO-58	Not Detected	-----	3.49E-02
CO-60	Not Detected	-----	4.10E-02
CR-51	Not Detected	-----	2.47E-01
CS-134	Not Detected	-----	4.96E-02
CS-137	3.00E-02	1.89E-02	2.31E-02
EU-152	Not Detected	-----	9.45E-02
EU-154	Not Detected	-----	1.97E-01
EU-155	Not Detected	-----	1.55E-01
FE-59	Not Detected	-----	8.00E-02
GD-153	Not Detected	-----	1.12E-01
HG-203	Not Detected	-----	3.28E-02
I-131	Not Detected	-----	3.41E-02
IR-192	Not Detected	-----	2.90E-02
K-40	2.27E+01	3.28E+00	2.33E-01
MN-52	Not Detected	-----	3.64E-02
MN-54	Not Detected	-----	3.75E-02
MO-99	Not Detected	-----	3.16E-01
NA-22	Not Detected	-----	4.78E-02
NA-24	Not Detected	-----	1.13E-01
NB-95	Not Detected	-----	2.05E-01
ND-147	Not Detected	-----	2.22E-01
NI-57	Not Detected	-----	8.67E-02
PB-210	Not Detected	-----	3.71E+01
RU-103	Not Detected	-----	3.02E-02
RU-106	Not Detected	-----	2.99E-01
SB-122	Not Detected	-----	5.62E-02
SB-124	Not Detected	-----	3.26E-02
SB-125	Not Detected	-----	8.39E-02
SN-113	Not Detected	-----	4.12E-02
SR-85	Not Detected	-----	3.89E-02
TA-182	Not Detected	-----	1.59E-01
TA-183	Not Detected	-----	4.95E-01
TC-99m	Not Detected	-----	6.38E-01
TL-201	Not Detected	-----	2.39E-01
XE-133	Not Detected	-----	2.08E-01
Y-88	Not Detected	-----	2.59E-02
ZN-65	Not Detected	-----	1.08E-01
ZR-95	Not Detected	-----	5.97E-02

not detected 9/3/57

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 9-03-97 4:10:31 PM *

 * Analyzed by: *[Signature]* 9/3/97 Reviewed by: *[Signature]* 9/4/97 *

 Customer : B.GALLOWAY/D.BISWELL (6682/SMO)
 Customer Sample ID : 033849-002
 Lab Sample ID : 70153603 85-BH-006-S.O-S

Sample Description : SOIL MARINELLI SAMPLE
 Sample Quantity : 562.000 gram
 Sample Date/Time : 9-02-97 10:50:00 AM
 Acquire Start Date/Time : 9-03-97 2:27:16 PM
 Detector Name : LAB02
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	3.58E+00
TH-234	Not Detected	-----	8.65E-01
RA-226	1.04E+00	4.96E-01	5.88E-01
PB-214	5.45E-01	1.61E-01	8.08E-02
BI-214	5.08E-01	6.18E-01	5.91E-02
TH-232	6.59E-01	3.33E-01	1.70E-01
RA-228	7.10E-01	2.30E-01	1.56E-01
AC-228	Not Detected	-----	2.10E-01
TH-228	5.38E-01	1.90E-01	5.32E-01
RA-224	6.96E-01	2.54E-01	7.97E-02
PB-212	6.54E-01	1.22E-01	4.38E-02
BI-212	6.53E-01	5.20E-01	3.75E-01
TL-208	6.01E-01	1.33E-01	6.73E-02
U-235	Not Detected	-----	2.59E-01
TH-231	Not Detected	-----	1.35E+01
PA-231	Not Detected	-----	1.60E+00
TH-227	Not Detected	-----	3.75E-01
RA-223	Not Detected	-----	2.26E-01
RN-219	Not Detected	-----	4.26E-01
PB-211	Not Detected	-----	9.37E-01
TL-207	Not Detected	-----	1.58E+01
AM-241	Not Detected	-----	4.99E-01
PU-239	Not Detected	-----	4.78E+02
NP-237	Not Detected	-----	2.54E-01
PA-233	Not Detected	-----	6.70E-02
TH-229	Not Detected	-----	2.68E-01

[Summary Report] - Sample ID: : 70153603

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.47E-02
AG-110m	Not Detected	-----	3.71E-02
BA-133	Not Detected	-----	7.02E-02
BE-7	Not Detected	-----	2.71E-01
CD-109	8.49E-01	5.86E-01	8.63E-01
CD-115	Not Detected	-----	1.03E-01
CE-139	Not Detected	-----	3.18E-02
CE-141	Not Detected	-----	5.72E-02
CE-144	Not Detected	-----	2.62E-01
CO-56	Not Detected	-----	1.32E-01
CO-57	Not Detected	-----	3.26E-02
CO-58	Not Detected	-----	3.62E-02
CO-60	Not Detected	-----	4.30E-02
CR-51	Not Detected	-----	2.59E-01
CS-134	Not Detected	-----	5.40E-02
CS-137	Not Detected	-----	3.96E-02
EU-152	Not Detected	-----	9.82E-02
EU-154	Not Detected	-----	2.03E-01
EU-155	Not Detected	-----	1.62E-01
FE-59	Not Detected	-----	8.43E-02
GD-153	Not Detected	-----	1.13E-01
HG-203	Not Detected	-----	3.56E-02
I-131	Not Detected	-----	3.62E-02
IR-192	Not Detected	-----	3.02E-02
K-40	1.65E+01	2.51E+00	2.95E-01
MN-52	Not Detected	-----	3.94E-02
MN-54	Not Detected	-----	3.98E-02
MO-99	Not Detected	-----	3.55E-01
NA-22	Not Detected	-----	4.70E-02
NA-24	Not Detected	-----	1.27E-01
NB-95	Not Detected	-----	2.15E-01
ND-147	Not Detected	-----	2.47E-01
NI-57	Not Detected	-----	5.17E-02
PB-210	Not Detected	-----	3.90E+01
RU-103	Not Detected	-----	3.24E-02
RU-106	Not Detected	-----	3.32E-01
SB-122	Not Detected	-----	5.81E-02
SB-124	Not Detected	-----	3.61E-02
SB-125	Not Detected	-----	9.51E-02
SN-113	Not Detected	-----	4.19E-02
SR-85	Not Detected	-----	4.17E-02
TA-182	Not Detected	-----	1.62E-01
TA-183	Not Detected	-----	5.03E-01
TC-99m	Not Detected	-----	7.44E-01
TL-201	Not Detected	-----	2.53E-01
XE-133	Not Detected	-----	2.19E-01
Y-88	Not Detected	-----	2.83E-02
ZN-65	Not Detected	-----	1.09E-01
ZR-95	Not Detected	-----	5.84E-02

not detected 7/3/97

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 9-03-97 6:02:33 PM *

 * Analyzed by: *[Signature]* 9/3/97 Reviewed by: *[Signature]* 9/4/97 *

 Customer : B.GALLOWAY/D.BISWELL (6682/SMO)
 Customer Sample ID : 033850-002
 Lab Sample ID : 70153604 85-BH-006-10.0-S

Sample Description : SOIL MARINELLI SAMPLE
 Sample Quantity : 507.000 gram
 Sample Date/Time : 9-02-97 11:00:00 AM
 Acquire Start Date/Time : 9-03-97 4:15:08 PM
 Detector Name : LAB02
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected		3.98E+00
TH-234	1.29E+00	5.84E-01	8.18E-01
RA-226	1.88E+00	6.88E-01	6.80E-01
PB-214	7.21E-01	1.48E-01	8.83E-02
BI-214	6.17E-01	2.22E-01	6.22E-02

TH-232	7.39E-01	4.11E-01	1.83E-01
RA-228	8.07E-01	2.54E-01	1.74E-01
AC-228	7.86E-01	2.19E-01	1.05E-01
TH-228	5.23E-01	2.49E-01	5.76E-01
RA-224	8.03E-01	2.86E-01	8.88E-02
PB-212	7.32E-01	1.22E-01	4.93E-02
BI-212	7.41E-01	5.26E-01	3.65E-01
TL-208	6.91E-01	1.54E-01	7.86E-02

U-235	1.52E-01	2.28E-01	2.95E-01
TH-231	Not Detected		1.49E+01
PA-231	Not Detected		1.77E+00
TH-227	Not Detected		4.13E-01
RA-223	Not Detected		2.48E-01
RN-219	Not Detected		4.53E-01
PB-211	Not Detected		1.00E+00
TL-207	Not Detected		1.60E+01

AM-241	Not Detected		5.79E-01
PU-239	Not Detected		5.26E+02
NP-237	Not Detected		4.65E-01
PA-233	Not Detected		7.28E-02
TH-229	Not Detected		2.90E-01

not detected *[Signature]* 9/3/97

[Summary Report] - Sample ID: : 70153604

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.90E-02
AG-110m	Not Detected	-----	3.70E-02
BA-133	Not Detected	-----	8.10E-02
BE-7	1.12E-01	2.49E-02	1.71E-01
CD-109	1.32E+00	6.15E-01	1.25E+00
CD-115	Not Detected	-----	1.17E-01
CE-139	Not Detected	-----	3.61E-02
CE-141	Not Detected	-----	6.46E-02
CE-144	Not Detected	-----	2.91E-01
CO-56	Not Detected	-----	4.47E-02
CO-57	Not Detected	-----	3.56E-02
CO-58	Not Detected	-----	4.04E-02
CO-60	Not Detected	-----	3.96E-02
CR-51	Not Detected	-----	2.90E-01
CS-134	Not Detected	-----	5.97E-02
CS-137	Not Detected	-----	4.00E-02
EU-152	Not Detected	-----	1.07E-01
EU-154	Not Detected	-----	2.25E-01
EU-155	Not Detected	-----	1.78E-01
FE-59	Not Detected	-----	8.69E-02
GD-153	Not Detected	-----	1.21E-01
HG-203	Not Detected	-----	3.96E-02
I-131	Not Detected	-----	3.85E-02
IR-192	Not Detected	-----	3.33E-02
K-40	1.54E+01	3.21E+00	3.08E-01
MN-52	Not Detected	-----	4.27E-02
MN-54	Not Detected	-----	4.29E-02
MO-99	Not Detected	-----	3.66E-01
NA-22	Not Detected	-----	4.87E-02
NA-24	Not Detected	-----	1.50E-01
NB-95	Not Detected	-----	9.26E-02
ND-147	Not Detected	-----	2.56E-01
NI-57	Not Detected	-----	9.78E-02
PB-210	Not Detected	-----	4.17E+01
RU-103	Not Detected	-----	3.79E-02
RU-106	Not Detected	-----	3.58E-01
SB-122	Not Detected	-----	6.47E-02
SB-124	Not Detected	-----	3.93E-02
SB-125	Not Detected	-----	9.79E-02
SN-113	Not Detected	-----	4.60E-02
SR-85	Not Detected	-----	4.57E-02
TA-182	Not Detected	-----	1.74E-01
TA-183	Not Detected	-----	5.84E-01
TC-99m	Not Detected	-----	1.03E+00
TL-201	Not Detected	-----	2.86E-01
XE-133	Not Detected	-----	2.48E-01
Y-88	Not Detected	-----	3.42E-02
ZN-65	Not Detected	-----	1.24E-01
ZR-95	Not Detected	-----	7.17E-02

not detected 9/3/97

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 9-03-97 7:47:45 PM *

 * Analyzed by: *J 5/4/97* Reviewed by: *JS 9/4/97* *

Customer : B.GALLOWAY/D.BISWELL (6682/SMO)
 Customer Sample ID : 033851-002
 Lab Sample ID : 70153605 *85-BH-006-15.0-5*

Sample Description : SOIL MARINELLI SAMPLE
 Sample Quantity : 543.000 gram
 Sample Date/Time : 9-02-97 11:30:00 AM
 Acquire Start Date/Time : 9-03-97 6:05:07 PM
 Detector Name : LAB02
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected		3.77E-00
TH-234	1.21E+00	6.49E-01	7.45E-01
RA-226	Not Detected		6.41E-01
PB-214	8.43E-01	1.60E-01	8.33E-02
BI-214	6.76E-01	2.37E-01	6.01E-02

TH-232	Not Detected		1.75E-01
RA-228	7.99E-01	3.77E-01	1.87E-01
AC-228	8.28E-01	2.18E-01	9.80E-02
TH-228	6.73E-01	2.74E-01	5.29E-01
RA-224	7.79E-01	3.10E-01	9.54E-02
PB-212	8.37E-01	3.24E-01	4.69E-02
BI-212	6.83E-01	3.66E-01	3.49E-01
TL-208	6.88E-01	1.54E-01	7.66E-02

U-235	Not Detected		1.80E-01
TH-231	Not Detected		1.45E+01
PA-231	Not Detected		1.70E+00
TH-227	Not Detected		4.22E-01
RA-223	Not Detected		2.47E-01
RN-219	1.93E-01	3.83E-01	4.60E-01
PB-211	Not Detected		1.04E+00
TL-207	Not Detected		1.57E+01

AM-241	Not Detected		5.33E-01
PU-239	Not Detected		5.28E+02
NP-237	4.40E-01	2.38E-01	3.01E-01
PA-233	Not Detected		6.91E-02
TH-229	Not Detected		2.92E-01

not detected J 5/4/97

not detected J 5/4/97

[Summary Report] - Sample ID: : 70153605

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected		4.82E-02
AG-110m	Not Detected		3.68E-02
BA-133	Not Detected		8.21E-02
BE-7	Not Detected		3.06E-01
CD-109	Not Detected		1.02E+00
CD-115	Not Detected		1.17E-01
CE-139	Not Detected		3.50E-02
CE-141	Not Detected		4.01E-02
CE-144	Not Detected		2.89E-01
CO-56	Not Detected		4.46E-02
CO-57	Not Detected		3.47E-02
CO-58	Not Detected		3.92E-02
CO-60	Not Detected		4.35E-02
CR-51	Not Detected		2.80E-01
CS-134	Not Detected		5.90E-02
CS-137	Not Detected		1.04E-02
EU-152	Not Detected		1.04E-01
EU-154	Not Detected		2.20E-01
EU-155	Not Detected		1.79E-01
FE-59	Not Detected		8.40E-02
GD-153	Not Detected		1.20E-01
HG-203	Not Detected		3.81E-02
I-131	Not Detected		3.80E-02
IR-192	Not Detected		3.33E-02
K-40	1.55E+01	2.38E+00	3.10E-01
MN-52	Not Detected		4.04E-02
MN-54	Not Detected		4.00E-02
MO-99	Not Detected		3.84E-01
NA-22	Not Detected		4.80E-02
NA-24	Not Detected		1.49E-01
NB-95	Not Detected		2.48E-01
ND-147	Not Detected		2.59E-01
NI-57	Not Detected		9.27E-02
PB-210	Not Detected		4.26E+01
RU-103	Not Detected		3.46E-02
RU-106	Not Detected		3.38E-01
SB-122	Not Detected		6.30E-02
SB-124	Not Detected		3.68E-02
SB-125	Not Detected		1.01E-01
SN-113	Not Detected		4.38E-02
SR-85	Not Detected		4.53E-02
TA-182	Not Detected		1.75E-01
TA-183	Not Detected		5.43E-01
TC-99m	Not Detected		1.18E+00
TL-201	Not Detected		2.84E-01
XE-133	Not Detected		2.44E-01
Y-88	Not Detected		2.96E-02
ZN-65	Not Detected		1.23E-01
ZR-95	Not Detected		6.27E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 9-03-97 9:32:33 PM *

 *
 * Analyzed by: *[Signature]* 5/4/97 Reviewed by: *[Signature]* 9/4/97 *

Customer : B.GALLOWAY/D.BISWELL (6682/SMO)
 Customer Sample ID : 033853-002
 Lab Sample ID : 70153606 85-BH-007-C.C-SD

Sample Description : SOIL MARINELLI SAMPLE
 Sample Quantity : 686.000 gram
 Sample Date/Time : 9-02-97 11:40:00 AM
 Acquire Start Date/Time : 9-03-97 7:49:49 PM
 Detector Name : LAB02
 Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected		1.34E+00
TH-234	9.37E-01	4.37E-01	6.48E-01
RA-226	1.35E+00	7.14E-01	5.79E-01
PB-214	6.10E-01	1.26E-01	7.00E-02
BI-214	5.59E-01	7.42E-01	4.94E-02
TH-232	7.11E-01	3.49E-01	1.48E-01
RA-228	7.71E-01	7.75E-01	1.72E-01
AC-228	7.28E-01	1.87E-01	8.42E-02
TH-228	6.92E-01	2.48E-01	4.92E-01
RA-224	7.73E-01	2.35E-01	7.09E-02
PB-212	7.46E-01	1.36E-01	4.13E-02
BI-212	8.02E-01	9.26E-01	3.49E-01
TL-208	6.99E-01	1.47E-01	6.56E-02
U-235	Not Detected		2.53E-01
TH-231	Not Detected		1.29E+01
PA-231	Not Detected		1.43E+00
TH-227	Not Detected		3.58E-01
RA-223	Not Detected		2.14E-01
RN-219	Not Detected		3.90E-01
PB-211	Not Detected		8.80E-01
TL-207	Not Detected		1.50E+01
AM-241	Not Detected		4.90E-01
PU-239	Not Detected		4.65E+02
NP-237	Not Detected		3.92E-01
PA-233	Not Detected		5.83E-02
TH-229	Not Detected		2.61E-01

[Summary Report] - Sample ID: : 70153606

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.15E-02
AG-110m	Not Detected	-----	3.45E-02
BA-133	Not Detected	-----	6.56E-02
BE-7	Not Detected	-----	2.67E-01
CD-109	2.38E+00	5.76E-01	9.86E-01
CD-115	Not Detected	-----	1.05E-01
CE-139	Not Detected	-----	3.04E-02
CE-141	Not Detected	-----	5.64E-02
CE-144	Not Detected	-----	2.52E-01
CO-56	Not Detected	-----	1.08E-01
CO-57	Not Detected	-----	3.22E-02
CO-58	Not Detected	-----	3.22E-02
CO-60	Not Detected	-----	3.82E-02
CR-51	Not Detected	-----	2.51E-01
CS-134	Not Detected	-----	4.97E-02
CS-137	1.43E-02	1.51E-02	2.04E-02
EU-152	Not Detected	-----	9.69E-02
EU-154	Not Detected	-----	1.92E-01
EU-155	Not Detected	-----	1.56E-01
FE-59	Not Detected	-----	7.75E-02
GD-153	Not Detected	-----	1.08E-01
HG-203	Not Detected	-----	3.17E-02
I-131	Not Detected	-----	3.26E-02
IR-192	Not Detected	-----	2.85E-02
K-40	2.19E+01	3.24E+00	2.58E-01
MN-52	Not Detected	-----	3.85E-02
MN-54	Not Detected	-----	3.57E-02
MO-99	Not Detected	-----	3.47E-01
NA-22	Not Detected	-----	4.53E-02
NA-24	Not Detected	-----	1.41E-01
NB-95	Not Detected	-----	2.13E-01
ND-147	Not Detected	-----	2.23E-01
NI-57	5.22E-02	5.29E-02	4.92E-02
PB-210	Not Detected	-----	3.56E+01
RU-103	Not Detected	-----	2.99E-02
RU-106	Not Detected	-----	3.05E-01
SB-122	Not Detected	-----	5.84E-02
SB-124	Not Detected	-----	3.16E-02
SB-125	Not Detected	-----	7.96E-02
SN-113	Not Detected	-----	3.90E-02
SR-85	Not Detected	-----	3.89E-02
TA-182	Not Detected	-----	1.55E-01
TA-183	Not Detected	-----	5.04E-01
TC-99m	Not Detected	-----	1.21E+00
TL-201	Not Detected	-----	2.52E-01
XE-133	Not Detected	-----	2.22E-01
Y-88	Not Detected	-----	2.70E-02
ZN-65	Not Detected	-----	1.09E-01
ZR-95	Not Detected	-----	5.90E-02

not detected 7/14/57

not detected 7/14/57

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 9-03-97 11:17:16 PM *

 * Analyzed by: *[Signature]* 9/4/97 Reviewed by: *[Signature]* 9/4/97 *

 Customer : B.GALLOWAY/D.BISWELL (6682/SMO)
 Customer Sample ID : 033854-002
 Lab Sample ID : 70153607 85-BH-007-5.C-5

Sample Description : SOIL MARINELLI SAMPLE
 Sample Quantity : 558.000 gram
 Sample Date/Time : 9-02-97 11:50:00 AM
 Acquire Start Date/Time : 9-03-97 9:34:43 PM
 Detector Name : LAB02
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	3.69E+00
TH-234	Not Detected	-----	8.60E-01
RA-226	1.14E+00	4.81E-01	6.03E-01
PB-214	5.01E-01	1.06E-01	7.80E-02
BI-214	4.96E-01	1.84E-01	5.81E-02
TH-232	6.73E-01	4.12E-01	1.81E-01
RA-228	6.55E-01	3.11E-01	1.75E-01
AC-228	6.48E-01	2.11E-01	9.24E-02
TH-228	6.78E-01	2.57E-01	5.12E-01
RA-224	6.62E-01	2.29E-01	9.06E-02
PB-212	6.83E-01	1.23E-01	4.74E-02
BI-212	6.92E-01	7.43E-01	3.39E-01
TL-208	6.05E-01	1.37E-01	7.10E-02
U-235	2.34E-01	2.10E-01	2.73E-01
TH-231	Not Detected	-----	1.35E+01
PA-231	Not Detected	-----	1.57E+00
TH-227	Not Detected	-----	3.72E-01
RA-223	Not Detected	-----	2.25E-01
RN-219	5.14E-02	5.79E-02	1.77E-01
PB-211	Not Detected	-----	9.42E-01
TL-207	Not Detected	-----	1.65E+01
AM-241	Not Detected	-----	5.05E-01
PU-239	Not Detected	-----	4.81E+02
NP-237	Not Detected	-----	4.16E-01
PA-233	Not Detected	-----	6.47E-02
TH-229	Not Detected	-----	2.75E-01

not detected 9/4/97
not detected 9/4/97

[Summary Report] - Sample ID: : 70153607

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.33E-02
AG-110m	Not Detected	-----	3.31E-02
BA-133	Not Detected	-----	6.80E-02
BE-7	Not Detected	-----	2.87E-01
CD-109	1.16E+00	1.14E+00	9.68E-01
CD-115	Not Detected	-----	1.11E-01
CE-139	Not Detected	-----	3.25E-02
CE-141	Not Detected	-----	5.95E-02
CE-144	Not Detected	-----	2.65E-01
CO-56	Not Detected	-----	4.25E-02
CO-57	Not Detected	-----	3.24E-02
CO-58	Not Detected	-----	3.53E-02
CO-60	Not Detected	-----	4.05E-02
CR-51	Not Detected	-----	2.64E-01
CS-134	Not Detected	-----	5.35E-02
CS-137	Not Detected	-----	3.66E-02
EU-152	Not Detected	-----	9.76E-02
EU-154	Not Detected	-----	1.98E-01
EU-155	Not Detected	-----	1.61E-01
FE-59	Not Detected	-----	7.92E-02
GD-153	Not Detected	-----	1.14E-01
HG-203	Not Detected	-----	3.45E-02
I-131	Not Detected	-----	3.55E-02
IR-192	Not Detected	-----	3.13E-02
K-40	1.65E+01	2.53E+00	2.82E-01
MN-52	Not Detected	-----	4.12E-02
MN-54	Not Detected	-----	3.83E-02
MO-99	Not Detected	-----	3.58E-01
NA-22	Not Detected	-----	4.76E-02
NA-24	Not Detected	-----	1.63E-01
NB-95	Not Detected	-----	2.24E-01
ND-147	Not Detected	-----	2.49E-01
NI-57	Not Detected	-----	4.76E-02
PB-210	Not Detected	-----	3.84E+01
RU-103	Not Detected	-----	3.20E-02
RU-106	Not Detected	-----	3.30E-01
SB-122	Not Detected	-----	6.27E-02
SB-124	Not Detected	-----	3.53E-02
SB-125	Not Detected	-----	9.07E-02
SN-113	Not Detected	-----	4.03E-02
SR-85	Not Detected	-----	4.36E-02
TA-182	Not Detected	-----	1.58E-01
TA-183	Not Detected	-----	5.11E-01
TC-99m	Not Detected	-----	1.56E+00
TL-201	Not Detected	-----	2.73E-01
XE-133	Not Detected	-----	2.41E-01
Y-88	Not Detected	-----	2.99E-02
ZN-65	Not Detected	-----	1.11E-01
ZR-95	Not Detected	-----	6.06E-02

Not detected 7/5/4/97

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 9-03-97 6:10:22 PM *

* Analyzed by: *J 5/3/97* Reviewed by: *MS 9/4/97* *

Customer : B.GALLOWAY/D.BISWELL (6682/SMO)
 Customer Sample ID : 034066-002
 Lab Sample ID : 70153608

85-BH-007-10.C-5

Sample Description : SOIL MARINELLI SAMPLE
 Sample Quantity : 537.000 gram
 Sample Date/Time : 9-02-97 12:00:00 PM
 Acquire Start Date/Time : 9-03-97 4:22:30 PM
 Detector Name : LAB01
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected		2.10E+00
TH-234	9.34E-01	3.81E-01	5.51E-01
RA-226	1.54E+00	6.16E-01	6.92E-01
PB-214	6.94E-01	1.43E-01	6.36E-02
BI-214	6.32E-01	3.18E-01	6.98E-02
TH-232	8.34E-01	4.55E-01	2.91E-01
RA-228	7.17E-01	2.83E-01	2.14E-01
AC-228	7.91E-01	2.78E-01	1.31E-01
TH-228	5.60E-01	4.82E-01	5.57E-01
RA-224	6.68E-01	3.69E-01	1.08E-01
PB-212	7.74E-01	4.11E-01	4.82E-02
BI-212	1.31E+00	5.00E-01	4.05E-01
TL-208	6.54E-01	1.92E-01	1.00E-01
U-235	Not Detected		2.48E-01
TH-231	Not Detected		1.09E+01
PA-231	Not Detected		1.71E+00
TH-227	Not Detected		4.44E-01
RA-223	Not Detected		1.78E-01
RN-219	Not Detected		5.07E-01
PB-211	Not Detected		1.14E+00
TL-207	Not Detected		1.93E+01
AM-241	Not Detected		2.32E-01
PU-239	Not Detected		4.27E+02
NP-237	Not Detected		3.46E-01
PA-233	Not Detected		7.21E-02
TH-229	Not Detected		2.48E-01

[Summary Report] - Sample ID: : 70153608

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	5.82E-02
AG-110m	Not Detected	-----	3.99E-02
BA-133	Not Detected	-----	6.66E-02
BE-7	Not Detected	-----	3.28E-01
BI-207	Not Detected	-----	4.23E-02
CD-109	1.72E+00	6.06E-01	8.78E-01
CD-115	Not Detected	-----	1.23E-01
CE-139	Not Detected	-----	3.18E-02
CE-141	Not Detected	-----	5.51E-02
CE-144	Not Detected	-----	2.29E-01
CO-56	Not Detected	-----	3.92E-02
CO-57	Not Detected	-----	2.90E-02
CO-58	Not Detected	-----	4.49E-02
CO-60	Not Detected	-----	5.14E-02
CR-51	Not Detected	-----	3.02E-01
CS-134	Not Detected	-----	5.57E-02
CS-137	Not Detected	-----	4.72E-02
EU-152	Not Detected	-----	8.82E-02
EU-154	Not Detected	-----	2.72E-01
EU-155	Not Detected	-----	1.32E-01
FE-59	Not Detected	-----	1.13E-01
GD-153	Not Detected	-----	1.03E-01
HG-203	Not Detected	-----	3.77E-02
I-131	Not Detected	-----	4.20E-02
IR-192	Not Detected	-----	3.58E-02
K-40	1.73E+01	2.88E+00	4.51E-01
MN-52	Not Detected	-----	5.67E-02
MN-54	Not Detected	-----	4.89E-02
MO-99	Not Detected	-----	4.61E-01
NA-22	Not Detected	-----	5.58E-02
NA-24	Not Detected	-----	1.61E-01
NB-95	Not Detected	-----	2.36E-01
ND-147	Not Detected	-----	2.96E-01
NI-57	Not Detected	-----	1.14E-01
PB-210	Not Detected	-----	9.04E+00
RU-103	Not Detected	-----	3.99E-02
RU-106	Not Detected	-----	3.85E-01
SB-122	Not Detected	-----	7.01E-02
SB-124	Not Detected	-----	4.15E-02
SB-125	Not Detected	-----	1.13E-01
SN-113	Not Detected	-----	4.87E-02
SR-85	Not Detected	-----	5.23E-02
TA-182	Not Detected	-----	2.22E-01
TA-183	Not Detected	-----	2.32E-01
TC-99m	Not Detected	-----	7.66E-01
TL-201	Not Detected	-----	1.70E-01
XE-133	Not Detected	-----	1.72E-01
Y-88	Not Detected	-----	3.81E-02
ZN-65	Not Detected	-----	1.49E-01
ZR-95	Not Detected	-----	8.06E-02

Not detected 7/9/3/57

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 9-03-97 8:02:14 PM *

* Analyzed by: *J* 9/4/97 Reviewed by: *J* 9/4/97 *

Customer : B.GALLOWAY/D.BISWELL (6682/SMO)
 Customer Sample ID : 034068-002
 Lab Sample ID : 70153609 85-BH-008-0.0-5

Sample Description : SOIL MARINELLI SAMPLE
 Sample Quantity : 488.000 gram
 Sample Date/Time : 9-02-97 1:50:00 PM
 Acquire Start Date/Time : 9-03-97 6:19:40 PM
 Detector Name : LAB01
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected		2.05E+00
TH-234	9.40E-01	4.00E-01	5.79E-01
RA-226	1.64E+00	9.55E-01	7.45E-01
PB-214	6.75E-01	1.50E-01	6.92E-02
BI-214	5.67E-01	2.17E-01	7.32E-02
TH-232	8.24E-01	4.50E-01	3.17E-01
RA-228	6.99E-01	2.75E-01	2.23E-01
AC-228	9.44E-01	2.92E-01	1.27E-01
TH-228	9.26E-01	1.14E+00	5.98E-01
RA-224	7.83E-01	4.36E-01	1.60E-01
PB-212	8.36E-01	1.27E-01	5.09E-02
BI-212	6.58E-01	5.42E-01	5.33E-01
TL-208	7.92E-01	2.11E-01	9.36E-02
U-235	1.11E-01	1.95E-01	2.76E-01
TH-231	Not Detected		1.11E+01
PA-231	Not Detected		1.81E+00
TH-227	Not Detected		4.84E-01
RA-223	Not Detected		1.91E-01
RN-219	Not Detected		5.15E-01
PB-211	Not Detected		1.18E+00
TL-207	Not Detected		2.02E+01
AM-241	Not Detected		2.46E-01
PU-239	Not Detected		4.58E+02
NP-237	5.62E-01	2.05E-01	2.80E-01
PA-233	Not Detected		7.73E-02
TH-229	Not Detected		2.52E-01

not detected J 9/4/97

not detected J 9/4/97

[Summary Report] - Sample ID: : 70153609

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	6.04E-02
AG-110m	Not Detected	-----	4.49E-02
BA-133	Not Detected	-----	7.23E-02
BE-7	Not Detected	-----	3.47E-01
BI-207	Not Detected	-----	4.43E-02
CD-109	Not Detected	-----	1.26E+00
CD-115	Not Detected	-----	1.29E-01
CE-139	Not Detected	-----	3.33E-02
CE-141	Not Detected	-----	6.15E-02
CE-144	Not Detected	-----	2.45E-01
CO-56	Not Detected	-----	4.30E-02
CO-57	Not Detected	-----	3.07E-02
CO-58	Not Detected	-----	4.73E-02
CO-60	Not Detected	-----	5.17E-02
CR-51	Not Detected	-----	3.16E-01
CS-134	Not Detected	-----	6.03E-02
CS-137	Not Detected	-----	5.25E-02
EU-152	Not Detected	-----	9.14E-02
EU-154	Not Detected	-----	2.78E-01
EU-155	Not Detected	-----	1.41E-01
FE-59	Not Detected	-----	1.17E-01
GD-153	Not Detected	-----	1.03E-01
HG-203	Not Detected	-----	4.06E-02
I-131	Not Detected	-----	4.45E-02
IR-192	Not Detected	-----	3.66E-02
K-40	1.82E+01	2.99E+00	5.28E-01
MN-52	Not Detected	-----	5.64E-02
MN-54	Not Detected	-----	5.48E-02
MO-99	Not Detected	-----	4.76E-01
NA-22	Not Detected	-----	6.43E-02
NA-24	Not Detected	-----	1.84E-01
NB-95	Not Detected	-----	2.54E-01
ND-147	Not Detected	-----	3.17E-01
NI-57	Not Detected	-----	1.24E-01
PB-210	Not Detected	-----	1.00E+01
RU-103	Not Detected	-----	4.24E-02
RU-106	Not Detected	-----	3.98E-01
SB-122	Not Detected	-----	8.12E-02
SB-124	Not Detected	-----	4.61E-02
SB-125	Not Detected	-----	1.19E-01
SN-113	Not Detected	-----	5.05E-02
SR-85	Not Detected	-----	5.50E-02
TA-182	Not Detected	-----	2.21E-01
TA-183	Not Detected	-----	2.46E-01
TC-99m	Not Detected	-----	8.41E-01
TL-201	Not Detected	-----	1.81E-01
XE-133	Not Detected	-----	1.76E-01
Y-88	Not Detected	-----	3.81E-02
ZN-65	Not Detected	-----	1.43E-01
ZR-95	Not Detected	-----	8.34E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 9-03-97 9:47:10 PM *

 *
 * Analyzed by: *[Signature]* 9/4/97 Reviewed by: *[Signature]* 9/4/97 *

Customer : B.GALLOWAY/D.BISWELL (6682/SMO)
 Customer Sample ID : 034069-002
 Lab Sample ID : 70153610 *85-BH-00E-C.C-SD*

Sample Description : SOIL MARINELLI SAMPLE
 Sample Quantity : 557.000 gram
 Sample Date/Time : 9-02-97 1:50:00 PM
 Acquire Start Date/Time : 9-03-97 8:04:38 PM
 Detector Name : LAB01
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	6.42E-01	1.16E+00	2.09E+00
TH-234	1.23E+00	4.33E-01	5.65E-01
RA-226	1.36E+00	5.56E-01	6.29E-01
PB-214	7.33E-01	1.40E-01	5.77E-02
BI-214	6.27E-01	1.39E-01	6.37E-02
TH-232	7.53E-01	4.14E-01	2.71E-01
RA-228	9.21E-01	3.22E-01	2.20E-01
AC-228	7.92E-01	2.70E-01	1.30E-01
TH-228	8.00E-01	5.16E-01	5.98E-01
RA-224	9.18E-01	3.97E-01	9.03E-02
PB-212	8.39E-01	1.47E-01	5.02E-02
BI-212	8.60E-01	6.81E-01	4.50E-01
TL-208	7.65E-01	2.02E-01	9.34E-02
U-235	1.41E-01	1.78E-01	2.51E-01
TH-231	Not Detected	-----	1.03E+01
PA-231	Not Detected	-----	1.66E+00
TH-227	Not Detected	-----	4.50E-01
RA-223	Not Detected	-----	1.78E-01
RN-219	Not Detected	-----	5.15E-01
PB-211	Not Detected	-----	1.16E+00
TL-207	Not Detected	-----	1.91E+01
AM-241	Not Detected	-----	2.26E-01
PU-239	Not Detected	-----	4.22E+02
NP-237	Not Detected	-----	3.41E-01
PA-233	Not Detected	-----	7.09E-02
TH-229	Not Detected	-----	2.32E-01

[Summary Report] - Sample ID: : 70153610

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	5.68E-02
AG-110m	Not Detected	-----	4.09E-02
BA-133	Not Detected	-----	7.00E-02
BE-7	Not Detected	-----	3.18E-01
BI-207	Not Detected	-----	2.76E-02
CD-109	1.35E+00	5.01E-01	9.27E-01
CD-115	Not Detected	-----	1.18E-01
CE-139	Not Detected	-----	3.03E-02
CE-141	Not Detected	-----	5.52E-02
CE-144	Not Detected	-----	2.35E-01
CO-56	Not Detected	-----	5.01E-02
CO-57	Not Detected	-----	2.86E-02
CO-58	Not Detected	-----	4.35E-02
CO-60	Not Detected	-----	4.88E-02
CR-51	Not Detected	-----	2.84E-01
CS-134	Not Detected	-----	5.80E-02
CS-137	Not Detected	-----	4.84E-02
EU-152	Not Detected	-----	8.69E-02
EU-154	Not Detected	-----	2.64E-01
EU-155	Not Detected	-----	1.35E-01
FE-59	Not Detected	-----	1.08E-01
GD-153	Not Detected	-----	9.34E-02
HG-203	Not Detected	-----	3.92E-02
I-131	Not Detected	-----	4.09E-02
IR-192	Not Detected	-----	3.30E-02
K-40	1.88E+01	4.21E+00	4.17E-01
MN-52	Not Detected	-----	5.06E-02
MN-54	Not Detected	-----	4.86E-02
MO-99	Not Detected	-----	4.63E-01
NA-22	Not Detected	-----	5.90E-02
NA-24	Not Detected	-----	1.78E-01
NB-95	Not Detected	-----	2.41E-01
ND-147	Not Detected	-----	2.84E-01
NI-57	Not Detected	-----	1.25E-01
PB-210	Not Detected	-----	9.03E+00
RU-103	Not Detected	-----	3.77E-02
RU-106	Not Detected	-----	3.94E-01
SB-122	Not Detected	-----	6.98E-02
SB-124	Not Detected	-----	4.23E-02
SB-125	Not Detected	-----	1.12E-01
SN-113	Not Detected	-----	4.74E-02
SR-85	Not Detected	-----	4.97E-02
TA-182	Not Detected	-----	2.12E-01
TA-183	Not Detected	-----	2.28E-01
TC-99m	Not Detected	-----	9.36E-01
TL-201	Not Detected	-----	1.71E-01
XE-133	Not Detected	-----	1.71E-01
Y-88	Not Detected	-----	4.47E-02
ZN-65	Not Detected	-----	1.43E-01
ZR-95	Not Detected	-----	7.58E-02

not detected 7/9/97

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 9-03-97 4:14:34 PM *

 * Analyzed by: *[Signature]* 9/3/97 Reviewed by: *[Signature]* 9/14/97 *

Customer : B.GALLOWAY/D.BISWELL (6682/SMO)
 Customer Sample ID : 034071-002
 Lab Sample ID : 70153611 ES-BH-00E-10.0-5

Sample Description : SOIL MARINELLI SAMPLE
 Sample Quantity : 539.000 gram
 Sample Date/Time : 9-02-97 2:15:00 PM
 Acquire Start Date/Time : 9-03-97 2:27:00 PM
 Detector Name : LAB01
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected		1.79E+00
TH-234	1.21E+00	4.31E-01	5.21E-01
RA-226	1.65E+00	6.49E-01	7.03E-01
PB-214	6.54E-01	1.31E-01	6.37E-02
BI-214	6.25E-01	1.37E-01	6.38E-02
TH-232	7.12E-01	3.91E-01	2.75E-01
RA-228	6.38E-01	2.57E-01	2.09E-01
AC-228	6.39E-01	2.22E-01	1.27E-01
TH-228	6.85E-01	4.49E-01	5.61E-01
RA-224	8.41E-01	3.33E-01	1.43E-01
PB-212	7.56E-01	1.65E-01	4.69E-02
BI-212	7.59E-01	7.09E-01	4.52E-01
TL-208	7.47E-01	5.46E-01	8.96E-02
U-235	Not Detected		2.52E-01
TH-231	Not Detected		1.04E+01
PA-231	Not Detected		1.69E+00
TH-227	Not Detected		4.38E-01
RA-223	Not Detected		1.76E-01
RN-219	Not Detected		4.92E-01
PB-211	Not Detected		1.10E+00
TL-207	Not Detected		1.94E+01
AM-241	Not Detected		2.24E-01
PU-239	Not Detected		4.26E+02
NP-237	4.43E-01	1.69E-01	2.62E-01
PA-233	Not Detected		7.19E-02
TH-229	Not Detected		2.28E-01

not detected 9/3/97

[Summary Report] - Sample ID: : 70153611

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	5.56E-02
AG-110m	Not Detected	-----	4.27E-02
BA-133	Not Detected	-----	6.56E-02
BE-7	Not Detected	-----	3.24E-01
BI-207	Not Detected	-----	3.88E-02
CD-109	Not Detected	-----	1.15E+00
CD-115	Not Detected	-----	1.07E-01
CE-139	Not Detected	-----	3.10E-02
CE-141	Not Detected	-----	5.54E-02
CE-144	Not Detected	-----	2.29E-01
CO-56	Not Detected	-----	4.87E-02
CO-57	Not Detected	-----	2.87E-02
CO-58	Not Detected	-----	4.35E-02
CO-60	Not Detected	-----	4.95E-02
CR-51	Not Detected	-----	2.83E-01
CS-134	Not Detected	-----	5.60E-02
CS-137	Not Detected	-----	4.69E-02
EU-152	Not Detected	-----	8.51E-02
EU-154	Not Detected	-----	2.57E-01
EU-155	Not Detected	-----	9.47E-02
FE-59	Not Detected	-----	1.04E-01
GD-153	Not Detected	-----	9.59E-02
HG-203	Not Detected	-----	3.78E-02
I-131	Not Detected	-----	3.99E-02
IR-192	Not Detected	-----	3.38E-02
K-40	1.68E+01	2.76E+00	4.34E-01
MN-52	Not Detected	-----	5.11E-02
MN-54	Not Detected	-----	4.82E-02
MO-99	Not Detected	-----	4.11E-01
NA-22	Not Detected	-----	5.84E-02
NA-24	Not Detected	-----	1.53E-01
NB-95	Not Detected	-----	2.26E-01
ND-147	Not Detected	-----	2.87E-01
NI-57	Not Detected	-----	1.02E-01
PB-210	Not Detected	-----	9.52E+00
RU-103	Not Detected	-----	3.79E-02
RU-106	Not Detected	-----	3.69E-01
SB-122	Not Detected	-----	6.69E-02
SB-124	Not Detected	-----	4.16E-02
SB-125	Not Detected	-----	1.10E-01
SN-113	Not Detected	-----	4.85E-02
SR-85	Not Detected	-----	4.90E-02
TA-182	Not Detected	-----	2.12E-01
TA-183	Not Detected	-----	2.19E-01
TC-99m	Not Detected	-----	4.84E-01
TL-201	Not Detected	-----	1.58E-01
XE-133	Not Detected	-----	1.54E-01
Y-88	Not Detected	-----	4.50E-02
ZN-65	Not Detected	-----	1.47E-01
ZR-95	Not Detected	-----	8.34E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 9-03-97 2:26:43 PM *

* Analyzed by: *[Signature]* 9/3/97 Reviewed by: *[Signature]* 9/4/97 *

Customer : B.GALLOWAY/D.BISWELL (6682/SMO)
 Customer Sample ID : 034073-003
 Lab Sample ID : 70153612 85-BH-008-EB

Sample Description : WATER MARINELLI SAMPLE
 Sample Quantity : 500.000 mL
 Sample Date/Time : 9-02-97 2:45:00 PM
 Acquire Start Date/Time : 9-03-97 12:43:47 PM
 Detector Name : LAB01
 Elapsed Live/Real Time : 6000 / 6001 seconds

Comments:

Nuclide Name	Activity (pCi/mL)	2-sigma Error	MDA (pCi/mL)
U-238	Not Detected	-----	8.15E-01
TH-234	Not Detected	-----	3.16E-01
RA-226	Not Detected	-----	4.74E-01
PB-214	Not Detected	-----	4.77E-02
BI-214	Not Detected	-----	6.14E-02
TH-232	Not Detected	-----	1.53E-01
RA-228	Not Detected	-----	1.71E-01
AC-228	Not Detected	-----	9.34E-02
TH-228	Not Detected	-----	4.98E-01
RA-224	Not Detected	-----	1.45E-01
PB-212	Not Detected	-----	4.22E-02
BI-212	Not Detected	-----	3.56E-01
TL-208	Not Detected	-----	7.67E-02
U-235	Not Detected	-----	1.39E-01
TH-231	Not Detected	-----	4.66E+00
PA-231	Not Detected	-----	9.90E-01
TH-227	Not Detected	-----	1.52E-01
RA-223	Not Detected	-----	7.79E-02
RN-219	Not Detected	-----	3.03E-01
PB-211	Not Detected	-----	6.90E-01
TL-207	Not Detected	-----	1.02E+01
AM-241	Not Detected	-----	9.63E-02
PU-239	Not Detected	-----	2.11E+02
NP-237	Not Detected	-----	1.37E-01
PA-233	Not Detected	-----	4.29E-02
TH-229	Not Detected	-----	1.15E-01

[Summary Report] - Sample ID: : 70153612

Nuclide Name	Activity (pCi/mL)	2-sigma Error	MDA (pCi/mL)
AG-108m	Not Detected	-----	2.66E-02
AG-110m	Not Detected	-----	2.38E-02
BA-133	Not Detected	-----	3.09E-02
BE-7	Not Detected	-----	1.78E-01
BI-207	Not Detected	-----	2.78E-02
CD-109	Not Detected	-----	4.60E-01
CD-115	Not Detected	-----	4.97E-02
CE-139	Not Detected	-----	1.67E-02
CE-141	Not Detected	-----	3.09E-02
CE-144	Not Detected	-----	1.16E-01
CO-56	Not Detected	-----	3.58E-02
CO-57	Not Detected	-----	1.59E-02
CO-58	Not Detected	-----	2.54E-02
CO-60	Not Detected	-----	3.16E-02
CR-51	Not Detected	-----	1.70E-01
CS-134	Not Detected	-----	2.83E-02
CS-137	Not Detected	-----	2.56E-02
EU-152	Not Detected	-----	4.86E-02
EU-154	Not Detected	-----	1.20E-01
EU-155	Not Detected	-----	6.63E-02
FE-59	Not Detected	-----	5.84E-02
GD-153	Not Detected	-----	4.53E-02
HG-203	Not Detected	-----	2.15E-02
I-131	Not Detected	-----	2.28E-02
IR-192	Not Detected	-----	1.97E-02
K-40	Not Detected	-----	3.82E-01
MN-52	Not Detected	-----	3.15E-02
MN-54	Not Detected	-----	2.55E-02
MO-99	Not Detected	-----	2.55E-01
NA-22	Not Detected	-----	2.63E-02
NA-24	Not Detected	-----	8.14E-02
NB-95	Not Detected	-----	8.25E-02
ND-147	Not Detected	-----	1.82E-01
NI-57	Not Detected	-----	5.65E-02
PB-210	Not Detected	-----	3.77E+00
RU-103	Not Detected	-----	2.43E-02
RU-106	Not Detected	-----	2.05E-01
SB-122	Not Detected	-----	4.02E-02
SB-124	Not Detected	-----	2.70E-02
SB-125	Not Detected	-----	6.51E-02
SN-113	Not Detected	-----	2.82E-02
SR-85	Not Detected	-----	3.30E-02
TA-182	Not Detected	-----	8.79E-02
TA-183	Not Detected	-----	9.25E-02
TC-99m	8.87E-02	9.31E-02	1.42E-01
TL-201	Not Detected	-----	6.43E-02
XE-133	Not Detected	-----	6.72E-02
Y-88	Not Detected	-----	3.89E-02
ZN-65	Not Detected	-----	5.68E-02
ZR-95	Not Detected	-----	3.99E-02

not detected
9/3/57

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 9-03-97 12:42:34 PM *

 *
 * Analyzed by: *[Signature]* 9/3/97 Reviewed by: *[Signature]* 9/14/97 *

Customer : B.GALLOWAY/D.BISWELL (6682/SMO)
 Customer Sample ID : 033855-002
 Lab Sample ID : 70153613

Sample Description : SOIL MARINELLI SAMPLE 14-GR-090297
 Sample Quantity : 789.000 gram
 Sample Date/Time : 9-02-97 3:10:00 PM
 Acquire Start Date/Time : 9-03-97 10:58:11 AM
 Detector Name : LAB01
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	6.55E+00	2.19E+00	1.93E+00
TH-234	7.81E+00	1.59E+00	5.29E-01
RA-226	7.53E-01	8.20E-01	5.55E-01
PB-214	4.97E-01	1.08E-01	4.87E-02
BI-214	4.47E-01	2.11E-01	5.15E-02

TH-232	5.67E-01	3.35E-01	2.08E-01
RA-228	6.70E-01	2.11E-01	1.72E-01
AC-228	6.10E-01	2.09E-01	1.01E-01
TH-228	5.36E-01	3.51E-01	4.68E-01
RA-224	5.04E-01	3.18E-01	9.08E-02
PB-212	5.66E-01	1.01E-01	4.21E-02
BI-212	5.94E-01	4.58E-01	3.24E-01
TL-208	5.24E-01	1.35E-01	6.68E-02

U-235	1.44E-01	1.20E-01	1.68E-01
TH-231	Not Detected	-----	1.04E+01
PA-231	Not Detected	-----	1.43E+00
TH-227	Not Detected	-----	3.30E-01
RA-223	Not Detected	-----	1.71E-01
RN-219	Not Detected	-----	4.00E-01
PB-211	Not Detected	-----	9.02E-01
TL-207	Not Detected	-----	1.47E+01

AM-241	Not Detected	-----	2.07E-01
PU-239	Not Detected	-----	3.60E+02
NP-237	4.41E-01	1.22E-01	2.30E-01
PA-233	Not Detected	-----	5.70E-02
TH-229	Not Detected	-----	2.38E-01

not detected 9/3/97

[Summary Report] - Sample ID: : 70153613


Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.33E-02
AG-110m	Not Detected	-----	3.35E-02
BA-133	Not Detected	-----	5.11E-02
BE-7	1.68E+00	4.19E-01	1.87E-01
BI-207	Not Detected	-----	3.11E-02
CD-109	Not Detected	-----	1.09E+00
CD-115	Not Detected	-----	8.04E-02
CE-139	Not Detected	-----	2.69E-02
CE-141	Not Detected	-----	4.93E-02
CE-144	Not Detected	-----	1.99E-01
CO-56	Not Detected	-----	3.94E-02
CO-57	Not Detected	-----	2.49E-02
CO-58	Not Detected	-----	3.51E-02
CO-60	Not Detected	-----	3.91E-02
CR-51	Not Detected	-----	2.31E-01
CS-134	Not Detected	-----	4.22E-02
CS-137	2.50E-02	3.98E-02	2.49E-02
EU-152	Not Detected	-----	7.54E-02
EU-154	Not Detected	-----	2.02E-01
EU-155	Not Detected	-----	1.23E-01
FE-59	Not Detected	-----	8.42E-02
GD-153	Not Detected	-----	9.93E-02
HG-203	Not Detected	-----	3.15E-02
I-131	Not Detected	-----	3.14E-02
IR-192	Not Detected	-----	2.70E-02
K-40	1.76E+01	2.76E+00	3.26E-01
MN-52	Not Detected	-----	4.06E-02
MN-54	Not Detected	-----	3.85E-02
MO-99	Not Detected	-----	3.20E-01
NA-22	Not Detected	-----	4.82E-02
NA-24	Not Detected	-----	8.71E-02
NB-95	Not Detected	-----	1.65E-01
ND-147	Not Detected	-----	2.26E-01
NI-57	Not Detected	-----	7.33E-02
PB-210	Not Detected	-----	8.40E+00
RU-103	Not Detected	-----	3.14E-02
RU-106	Not Detected	-----	2.90E-01
SB-122	Not Detected	-----	5.30E-02
SB-124	Not Detected	-----	3.12E-02
SB-125	Not Detected	-----	8.59E-02
SN-113	Not Detected	-----	3.88E-02
SR-85	Not Detected	-----	3.69E-02
TA-182	Not Detected	-----	1.60E-01
TA-183	Not Detected	-----	1.97E-01
TC-99m	Not Detected	-----	2.52E-01
TL-201	Not Detected	-----	1.48E-01
XE-133	Not Detected	-----	1.47E-01
Y-88	Not Detected	-----	2.80E-02
ZN-65	Not Detected	-----	1.14E-01
ZR-95	Not Detected	-----	6.20E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program *
 * Quality Assurance Report *

Report Date : 9-04-97 7:27:28 AM
 QA File : C:\GENIEPC\CAMFILES\LCS1.QAF
 Analyst : FCD
 Sample ID : 70153615
 Sample Quantity : 1.00 Each
 Sample Date : 11-01-90 12:00:00 PM
 Measurement Date : 9-04-97 7:13:34 AM
 Elapsed Live Time : 600 seconds
 Elapsed Real Time : 605 seconds

Parameter	Mean	1S Error	New Value	< LU : SD : UD : BS >
AM-241 Activity	8.726E-02	3.916E-03	8.410E-02	< : : : >
CS-137 Activity	6.879E-02	2.739E-03	6.875E-02	< : : : >
CO-60 Activity	7.584E-02	3.794E-03	7.827E-02	< : : : >

Flags Key: LU = Boundary Test (Ab = Above , Be = Below)
 SD = Sample Driven N-Sigma Test (In = Investigate, Ac = Action)
 UD = User Driven N-Sigma Test (In = Investigate, Ac = Action)
 BS = Measurement Bias Test (In = Investigate, Ac = Action)

Reviewed by:  9/4/97

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program *
 * Quality Assurance Report *

Report Date : 9-04-97 7:11:51 AM
 QA File : C:\GENIEPC\CAMFILES\LCS2.QAF
 Analyst : FCD
 Sample ID : 70153614
 Sample Quantity : 1.00 Each
 Sample Date : 11-01-90 12:00:00 PM
 Measurement Date : 9-04-97 6:59:07 AM
 Elapsed Live Time : 600 seconds
 Elapsed Real Time : 605 seconds

Parameter	Mean	1S Error	New Value	< LU : SD : UD : BS >
AM-241 Activity	8.728E-02	4.076E-03	7.852E-02	< : Ac: : >
CS-137 Activity	6.976E-02	1.926E-03	7.139E-02	< : : : >
CO-60 Activity	7.743E-02	2.055E-03	8.043E-02	< : In: : >

Handwritten: 6/2
 J 9/4/97

Flags Key: LU = Boundary Test (Ab = Above, Be = Below)
 SD = Sample Driven N-Sigma Test (In = Investigate, Ac = Action)
 UD = User Driven N-Sigma Test (In = Investigate, Ac = Action)
 BS = Measurement Bias Test (In = Investigate, Ac = Action)

Reviewed by: J 5/4/97

SANDIA NATIONAL LABORATORIES
Albuquerque, NM 87185
Environmental Restoration Project Fax Sheet

Date: 4/17/98To: Doug VetterPages to Follow 4Org: ITFax Nr: 262 8855

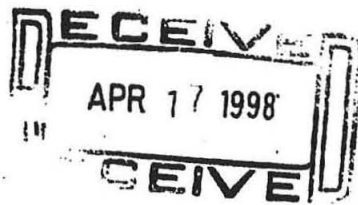
Verification Nr: _____

From: Skip Wright

Org: _____

Mail Stop: _____

Fax Nr: 505-284-2617

Verification Nr: 505-284- 2601Message: Doug here'sSite 14 (RAD) DATA-Skip

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 9-11-95 2:31:23 PM *
 * *****
 * Analyzed by: *S.B. Elara 9/12/95* Reviewed by: *[Signature]* *9/22/95* *
 * *****

Customer : SMITH (7714)
 Customer Sample ID : 14E1C-SS
 Lab Sample ID : 50076001

Sample Description : SOLID MARINELLI
 Sample Type : Solid
 Sample Geometry : 1SMAR
 Sample Quantity : 782.000 gram
 Sample Date/Time : 9-08-95 12:00:00 PM
 Acquire Start Date : 9-11-95 1:57:18 PM
 Detector Name : LAB01
 Elapsed Live Time : 1800 seconds
 Elapsed Real Time : 1801 seconds

Comments:

Nuclide	Activity (pCi/gram)	2S Error	MDA
TH-232	5.23	1.88	2.47
TH-234	6.01	1.80	2.18E-01
U-234	Not Detected	-----	9.21E-01
RA-226	2.30	7.58E-01	9.72E-01
PB-214	5.04E-01	1.11E-01	1.01E-01
BI-214	3.92E-01	8.86E-02	8.11E-02
PB-210	Not Detected	-----	1.35
TH-232	5.10E-01	2.06E-01	2.69E-01
RA-228	4.63E-01	2.16E-01	2.19E-01
AC-228	Not Detected	-----	2.94E-01
TH-228	8.01E-01	3.72E-01	4.75E-01
RA-224	5.15E-01	3.53E-01	6.53E-01
PB-212	6.01E-01	1.54E-01	5.52E-02
BI-212	5.46E-01	3.50E-01	5.09E-01
TL-208	4.64E-01	1.25E-01	1.33E-01
U-235	Not Detected	-----	1.87E-01
TH-231	Not Detected	-----	4.97E-01
PA-231	Not Detected	-----	2.48
AC-227	Not Detected	-----	3.02
TH-227	Not Detected	-----	5.30E-01
RA-223	Not Detected	-----	3.09E-01
RN-219	Not Detected	-----	7.74E-01
PB-211	Not Detected	-----	1.07
TL-207	Not Detected	-----	2.10E+01
AM-241	Not Detected	-----	3.50E-01
PU-239	Not Detected	-----	3.94E+02
NP-237	Not Detected	-----	3.33E-01
PA-233	Not Detected	-----	9.36E-02
TH-229	Not Detected	-----	4.40E-01

[Summary Report] - Sample ID: 50076001

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	-----	4.73E-02
AR-41	Not Detected	-----	1.16E+11
BA-133	Not Detected	-----	9.40E-02
BA-140	Not Detected	-----	2.01E-01
CD-109	Not Detected	-----	1.15
CD-115	Not Detected	-----	2.61E-01
CE-139	Not Detected	-----	5.26E-02
CE-141	Not Detected	-----	9.34E-02
CE-144	Not Detected	-----	3.58E-01
CO-56	Not Detected	-----	5.75E-02
CO-57	Not Detected	-----	4.61E-02
CO-58	Not Detected	-----	5.01E-02
CO-60	Not Detected	-----	5.24E-02
CR-51	Not Detected	-----	3.99E-01
CS-134	Not Detected	-----	7.43E-02
CS-137	Not Detected	-----	5.21E-02
CU-64	Not Detected	-----	6.09E+02
EU-152	Not Detected	-----	4.10E-01
EU-154	Not Detected	-----	2.74E-01
EU-155	Not Detected	-----	2.05E-01
FE-59	Not Detected	-----	1.22E-01
GD-153	Not Detected	-----	2.11E-01
HG-203	Not Detected	-----	5.08E-02
I-131	Not Detected	-----	6.00E-02
IN-115m	Not Detected	-----	9.62E+03
IR-192	Not Detected	-----	4.66E-02
K-40	1.66E+01	2.42	4.20E-01
LA-140	Not Detected	-----	1.77E-01
MN-54	Not Detected	-----	5.77E-02
MN-56	Not Detected	-----	2.59E+07
MO-99	Not Detected	-----	9.27E-01
NA-22	Not Detected	-----	6.56E-02
NA-24	Not Detected	-----	1.67
NB-95	Not Detected	-----	4.44E-01
ND-147	Not Detected	-----	3.87E-01
NI-57	Not Detected	-----	2.80E-01
BE-7	Not Detected	-----	4.17E-01
RU-103	Not Detected	-----	4.71E-02
RU-106	Not Detected	-----	4.63E-01
SB-122	Not Detected	-----	1.47E-01
SB-124	Not Detected	-----	5.62E-02
SB-125	Not Detected	-----	1.31E-01
SC-46	Not Detected	-----	8.07E-02
SR-85	Not Detected	-----	5.78E-02
TA-182	Not Detected	-----	2.39E-01
TA-183	Not Detected	-----	4.52E-01
TE-132	Not Detected	-----	8.65E-02
TL-201	Not Detected	-----	3.40E-01
V-48	Not Detected	-----	6.83E-02
XE-133	Not Detected	-----	4.91E-01
Y-88	Not Detected	-----	4.09E-02
ZN-65	Not Detected	-----	1.51E-01
ZR-95	Not Detected	-----	9.84E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 9-11-95 3:11:06 PM *

 * Analyzed by: S.B. Ebara 9/12/95 Reviewed by: [Signature] 9/12/95 *

Customer : SMITH (7714)
 Customer Sample ID : 14E1D-SS
 Lab Sample ID : 50076002

Sample Description : SOLID MARINELLI
 Sample Type : Solid
 Sample Geometry : 1SMAR
 Sample Quantity : 797.000 gram
 Sample Date/Time : 9-08-95 12:00:00 PM
 Acquire Start Date : 9-11-95 2:37:07 PM
 Detector Name : LAB01
 Elapsed Live Time : 1800 seconds
 Elapsed Real Time : 1801 seconds

Comments:

Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	1.09E-01	3.82	2.85
TH-234	1.30E-01	3.77	2.80E-01
U-234	2.83E-01	3.34E-01	5.34E-01
RA-226	4.95	1.10	1.06
PB-214	4.48E-01	1.06E-01	1.07E-01
BI-214	4.23E-01	1.01E-01	1.05E-01
PB-210	Not Detected	-----	1.11
TH-232	3.89E-01	1.97E-01	2.79E-01
RA-228	5.25E-01	2.05E-01	2.58E-01
AC-228	6.61E-01	1.70E-01	1.63E-01
TH-228	Not Detected	-----	1.55
RA-224	Not Detected	-----	1.45
PB-212	4.89E-01	1.05E-01	9.03E-02
BI-212	Not Detected	-----	8.57E-01
TL-208	4.98E-01	1.23E-01	1.21E-01
U-235	Not Detected	-----	1.54E-01
TH-231	Not Detected	-----	1.01
PA-231	Not Detected	-----	2.60
AC-227	Not Detected	-----	3.37
TH-227	Not Detected	-----	5.58E-01
RA-223	Not Detected	-----	3.89E-01
RN-219	Not Detected	-----	8.21E-01
PB-211	Not Detected	-----	1.13
TL-207	Not Detected	-----	2.13E+01
AM-241	Not Detected	-----	4.33E-01
PU-239	Not Detected	-----	4.67E+02
NP-237	Not Detected	-----	4.08E-01
PA-233	Not Detected	-----	1.07E-01
TH-229	Not Detected	-----	5.53E-01

[Summary Report] - Sample ID: 50076002

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	-----	5.62E-02
AR-41	Not Detected	-----	1.32E+11
BA-133	Not Detected	-----	9.37E-02
BA-140	Not Detected	-----	2.11E-01
CD-109	Not Detected	-----	1.41
CD-115	Not Detected	-----	2.67E-01
CE-139	Not Detected	-----	5.95E-02
CE-141	Not Detected	-----	1.08E-01
CE-144	Not Detected	-----	4.19E-01
CO-56	Not Detected	-----	6.08E-02
CO-57	Not Detected	-----	5.42E-02
CO-58	Not Detected	-----	5.48E-02
CO-60	Not Detected	-----	4.90E-02
CR-51	Not Detected	-----	4.35E-01
CS-134	Not Detected	-----	7.81E-02
CS-137	Not Detected	-----	5.19E-02
CU-64	Not Detected	-----	6.56E+02
EU-152	Not Detected	-----	4.29E-01
EU-154	Not Detected	-----	2.89E-01
EU-155	Not Detected	-----	2.49E-01
FE-59	Not Detected	-----	1.07E-01
GD-153	Not Detected	-----	2.75E-01
HG-203	Not Detected	-----	5.36E-02
I-131	Not Detected	-----	6.44E-02
IN-115m	Not Detected	-----	1.08E+04
IR-192	Not Detected	-----	5.16E-02
K-40	1.42E+01	2.11	5.12E-01
LA-140	Not Detected	-----	2.07E-01
MN-54	Not Detected	-----	5.73E-02
MN-56	Not Detected	-----	3.27E+07
MO-99	Not Detected	-----	9.56E-01
NA-22	Not Detected	-----	6.24E-02
NA-24	Not Detected	-----	1.72
NB-95	Not Detected	-----	4.70E-01
ND-147	Not Detected	-----	4.02E-01
NI-57	Not Detected	-----	3.09E-01
BE-7	Not Detected	-----	4.35E-01
RU-103	Not Detected	-----	5.00E-02
RU-106	Not Detected	-----	4.77E-01
SB-122	Not Detected	-----	1.56E-01
SB-124	Not Detected	-----	5.95E-02
SB-125	Not Detected	-----	1.41E-01
SC-46	Not Detected	-----	7.63E-02
SR-85	Not Detected	-----	6.07E-02
TA-182	Not Detected	-----	2.24E-01
TA-183	Not Detected	-----	5.62E-01
TE-132	Not Detected	-----	9.45E-02
TL-201	Not Detected	-----	4.20E-01
V-48	Not Detected	-----	5.95E-02
XE-133	Not Detected	-----	6.08E-01
Y-88	Not Detected	-----	4.38E-02
ZN-65	Not Detected	-----	1.47E-01
ZR-95	Not Detected	-----	9.39E-02

Table --
Summary of Gamma Spectroscopy and Isotopic Uranium Results in Samples Collected at Site 85

Sample Attributes						Gamma Spectroscopy Activity (a)								
COC#	Sample Number	ER Sample ID	Sample Matrix	Sample Date	Sample Depth (ft)	U-238 (b)	Th-234 (b)	Th-232 (b)	Ra-228 (b)	Th-228	U-234	U-235 (b)	Cs-137(b)	U-233/234
1307	14E1C-SS	14E1C-SS	Soil	9/8/95	0 ft	5.23E+00	6.01E+00	5.10E-01	4.63E-01	8.01E-01	ND(9.21E-01)	nd (3.91E-01)	ND (5.21E-02)	NT
1307	14E1D-SS	14E1D-SS	Soil	9/8/95	0 ft	1.09E+01	1.30E+01	3.89E-01	5.25E-01	ND(1.55E+00)	2.83E-01	ND (4.51E-01)	ND(5.89E-02)	NT
6433 6433	036289-001	1335S-ER85-1-GR-029	Soil	10/21/97	0 ft	3.08E+00	NT	NT	NT	NT	NT	8.52E-02	NT	7.57E-01
SNL/NM SWTA Background Range (c)														
SNL/NM SWTA Soil Background UTL or 95th Percentile														

(a) U-238 and Th-232 decay chain isotopes with a short half-life are not presented in this table.

(b) Value in parenthesis represents the minimum detection activity.

(c) Background range for U-234 and U-235 from SNL/NM sitewide background data (SNL/NM 1996).

Cs = cesium

D = duplicate

ER = Environmental Restoration

ft - feet

ID = Identification

pCi/g = picocuries per gram

NA = not applicable

ND = nondetect - the analyte was not observed above the MDA

NT= Not Tested

Ra = radium

RB = rinsate

S = soil sample

Th = thorium

U = uranium



GENERAL ENGINEERING LABORATORIES

Meeting today's needs with a vision for tomorrow.

Client: Sandia National Laboratories
MS-0854
PO Box 5800
Albuquerque, New Mexico 87185-0854
Contact: Mr. Doug Salimi
Project Description: RFP #A12480A

SNLS00395

Report Date: November 07, 1997

Page 2 of 3

Sample ID : 030289-001 13338-10185-1-GR-029

Parameter	Qualifier	Result	DI	RL	Units	DP	Analyst	Date	Time	Batch	M
Uranium-235/238		0.757	+/- 0.168	0.00537	0.0331	pCi/g	1.0	CAS	11/05/97	1144	110660 4
Uranium-235		0.0852	+/- 0.0497	0.0130	0.0352	pCi/g	1.0	CAS	11/05/97	1144	110660 4
Uranium-238		3.08	+/- 0.461	0.0289	0.0331	pCi/g	1.0				

The following prep procedures were performed:

Mercury
TRACE

CRB 10/24/97 1300 110090 2
CRB 10/27/97 3000 110077 5

Surrogate Recovery	Test	Percent%	Acceptable Limits
1,2-Dimethylnaphthalene	HKXP	104.	(50.0 - 150.)

M = Method	Method-Description
M1	EPA 8230
M2	EPA 7471
M3	EPA 6010A
M4	EPA A-011D
M5	EPA 7040

GEL Laboratory Certifications

EPL Laboratory Certifications

P O Box 30712 • Charleston, SC 29417 • 2040 Savage Road • 29414

9710606-01-

(803) 556 8171 • Fax (803) 766-1178

Printed on recycled paper.



GENERAL ENGINEERING LABORATORIES

Meeting today's needs with a vision for tomorrow.

Client: Sandia National Laboratories
MS 0854
PO Box 5800
Albuquerque, New Mexico 87183-0854
Contract: Mr. Doug Salmi
Project Description: RFP #AJ248UA

cc: SNLSU0395

Report Date: November 07, 1997

Page 3 of 3

Sample ID

: 036289-001 13355-BR85-1-DR-029

GEL Laboratory Certifications

AL - 41040
CA - 2089
DE - SC017
ME - SC012
NC - 233
RI - 135
TN - 02934
VA - 00151
WI - 99987790

AZ - A70514
CT - PH-0169
FL - B87156/87394
MS - 10120
NY - 11901
SC - 10120
UT - E-251
WA - C223
WV - 236

EPL Laboratory Certifications

AL - 41050
CA - 1-1023/2056
FL - B87472/87438
NY - 11970
SC - 10582
UT - E 227
WA - C225
PA - 68-483

AZ - AZ0514
CT - PH-0175
MS - 29417
RI - 138
TN - 02934
VA - 00111
NJ - 70003
WV - 235

This data report has been prepared and reviewed
in accordance with General Engineering Laboratories
standard operating procedures. Please direct
any questions to your Project Manager, Edie Kent at (803) 766 7385.

Edie M. Kent
Analytical Report Specialist

P O Box 30712 • Charleston, SC 29417 • 2040 Savage Road • 29414

• 9710600-01 •

(803) 556 8171 • Fax (803) 766-1178



Printed on recycled paper.

P. 004

TEL: 803-852-5812

NOV -07 97 (PRI) 17:14 GEN. ENGINEERING

Internal Lab

Batch No. 701397

AR/COC- 06434

SF 2001 CUM 06 950

[illegible]

**WHITE - To Accompany Samples,
Laboratory Copy**

**BLUE- To Accompany Samples,
Return to SMO**

YELLOW- SMO Suspense Copy

PINK- Field Copy

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 10-21-97 4:00:59 PM *

 * Analyzed by: *J* *10/21/97* Reviewed by: *MDJ* *10/21/97* *

Customer : R.CONWAY/D.BISWELL (6134/SMO)
 Customer Sample ID : 036289-002
 Lab Sample ID : 70184701

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 617.000 gram
 Sample Date/Time : 10-21-97 9:10:00 AM
 Acquire Start Date/Time : 10-21-97 2:10:51 PM
 Detector Name : LAB04
 Elapsed Live/Real Time : 6000 / 6004 seconds

85-1-GR-029-C-SSC

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	1.31E+01	4.48E+00	2.24E+00
TH-234	1.49E+01	2.95E+00	7.23E-01
RA-226	Not Detected	-----	6.18E-01
PB-214	8.75E-01	1.49E-01	5.36E-02
BI-214	8.28E-01	4.08E-01	5.52E-02
PB-210	Not Detected	-----	1.29E+01
TH-232	6.55E-01	3.40E-01	1.65E-01
RA-228	6.01E-01	3.53E-01	1.66E-01
AC-228	6.33E-01	1.89E-01	8.96E-02
TH-228	5.19E-01	2.35E-01	5.79E-01
RA-224	6.12E-01	2.28E-01	9.11E-02
PB-212	6.64E-01	1.23E-01	4.27E-02
BI-212	6.48E-01	3.39E-01	3.18E-01
TL-208	5.11E-01	1.63E-01	7.37E-02
U-235	3.19E-01	1.53E-01	1.92E-01
TH-231	Not Detected	-----	2.81E+00
PA-231	Not Detected	-----	4.64E+00
TH-227	Not Detected	-----	3.58E-01
RA-223	Not Detected	-----	2.34E-01
RN-219	Not Detected	-----	4.22E-01
PB-211	Not Detected	-----	9.54E-01
TL-207	Not Detected	-----	1.40E+01
AM-241	Not Detected	-----	3.56E-01
PU-239	Not Detected	-----	4.61E+02
NP-237	Not Detected	-----	3.20E-01
PA-233	Not Detected	-----	6.71E-02
TH-229	Not Detected	-----	3.38E-01

[Summary Report] - Sample ID: : 70184701

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.23E-02
AG-110m	Not Detected	-----	3.44E-02
BA-133	Not Detected	-----	7.60E-02
BE-7	4.53E-01	2.21E-01	1.88E-01
CD-109	Not Detected	-----	1.09E+00
CD-115	Not Detected	-----	7.39E-02
CE-139	Not Detected	-----	3.44E-02
CE-141	Not Detected	-----	6.17E-02
CE-144	Not Detected	-----	2.61E-01
CO-56	Not Detected	-----	3.44E-02
CO-57	Not Detected	-----	3.33E-02
CO-58	Not Detected	-----	3.62E-02
CO-60	Not Detected	-----	3.75E-02
CR-51	Not Detected	-----	2.66E-01
CS-134	Not Detected	-----	5.59E-02
CS-137	1.27E-02	1.37E-02	2.13E-02
EU-152	Not Detected	-----	1.00E-01
EU-154	Not Detected	-----	1.95E-01
EU-155	Not Detected	-----	1.67E-01
FE-59	Not Detected	-----	7.11E-02
GD-153	Not Detected	-----	1.57E-01
HG-203	Not Detected	-----	3.45E-02
I-131	Not Detected	-----	3.24E-02
IR-192	Not Detected	-----	3.11E-02
K-40	2.03E+01	2.96E+00	2.69E-01
MN-52	Not Detected	-----	3.29E-02
MN-54	Not Detected	-----	3.55E-02
MO-99	Not Detected	-----	3.01E-01
NA-22	Not Detected	-----	4.30E-02
NA-24	Not Detected	-----	4.09E-02
NB-95	Not Detected	-----	1.73E-01
ND-147	Not Detected	-----	2.34E-01
NI-57	Not Detected	-----	5.36E-02
RU-103	Not Detected	-----	3.23E-02
RU-106	Not Detected	-----	3.18E-01
SB-122	Not Detected	-----	4.62E-02
SB-124	Not Detected	-----	3.37E-02
SB-125	Not Detected	-----	9.00E-02
SN-113	Not Detected	-----	4.04E-02
SR-85	Not Detected	-----	3.88E-02
TA-182	Not Detected	-----	1.62E-01
TA-183	Not Detected	-----	3.08E-01
TC-99m	Not Detected	-----	6.18E-02
TL-201	Not Detected	-----	1.77E-01
XE-133	Not Detected	-----	1.89E-01
Y-88	Not Detected	-----	2.93E-02
ZN-65	Not Detected	-----	1.12E-01
ZR-95	Not Detected	-----	6.45E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program *
 * Quality Assurance Report *

Report Date : 10-21-97 4:09:55 PM
 QA File : C:\GENIEPC\CAMFILES\LCS4.QAF
 Analyst : FCD
 Sample ID : 70184702
 Sample Quantity : 1.00 Each
 Sample Date : 11-01-90 12:00:00 PM
 Measurement Date : 10-21-97 3:56:55 PM
 Elapsed Live Time : 600 seconds
 Elapsed Real Time : 606 seconds

Parameter	Mean	1S Error	New Value	< LU : SD : UD : BS >
AM-241 Activity	8.764E-02	1.593E-03	8.689E-02	< : : : >
CS-137 Activity	7.055E-02	1.832E-03	7.219E-02	< : : : >
CO-60 Activity	7.904E-02	2.454E-03	8.113E-02	< : : : >

Flags Key: LU = Boundary Test (Ab = Above , Be = Below)
 SD = Sample Driven N-Sigma Test (In = Investigate, Ac = Action)
 UD = User Driven N-Sigma Test (In = Investigate, Ac = Action)
 BS = Measurement Bias Test (In = Investigate, Ac = Action)

Reviewed by:

J 10/21/97

ANALYSIS REQUEST AND CHAIN OF CUSTODY

PAGE 1 OF 1

Internal Lab

Batch No. 701848

AR/COC- 06435

SF 2001-COC (6-95)

Dept. No./Mail Stop: 6134/1148
 Project/Task Manager: Rauler Conway
 Project Name: Site 85 VGES Tanks
 Record Center Code: ER/1335-85/DAT
 Logbook Ref No: 205
 Service Order No.: CF 0519

Date Samples Shipped: 10/21/97
 Carrier/Waybill No.: 701848
 Lab Contact: Fernando Dominguez
 Lab Destination: Bld. 881
 SMO Contact/Phone: Doug Salmi/844-3310
 Send Report to SMO: Doug Salmi

Contract No.: N/A

Case No.: 7216.2206

SMO Authorization: DMS
 Bill to: Sandia National Laboratories
 Supplier Services Department
 P.O. Box 5800 MS 0154
 Albuquerque, NM 87185-0154

Parameter & Method Requested

Location				Tech Area		Beginning Depth in Ft.	ER Site No.	Reference LOV (available at SMO)							Lab Sample ID	
Building		Room		Sample No.	Fraction			ER Sample ID or Sample Location Detail	Date/Time Collected	Sample Matrix	Container		Preservative	Sample Collection Method		Sample Type
											Type	Volume				
036290	-002	1335-ER85-1-GR-030-0-SSD	0	85	10/21/97 0915	S	M	500ml	none	G	SA	X				
036291	-002	1335-ER85-1-GR-031-0-SSD	0	85	0917	S	M	500ml	none	G	SA	X				
036292	-002	1335-ER85-1-GR-032-0-SSD	0	85	0920	S	M	500ml	none	G	SA	X				
036293	-002	1335-ER85-1-GR-032-0-SSD	0	85	0920	S	M	500ml	none	G	SA	X				
036295	-003	1335-ER85-1-GR-032-4B	0	85	0945	DIW	M	500ml	none	G	SA	X				

RMMA ☒ Yes ☐ No Ref. No. _____

Sample Disposal ☒ Return to Client ☐ Disposal by lab

Turnaround Time ☒ Normal ☐ Rush Required Report Date _____

Sample Tracking

Date Entered (m/d/yyyy): 10/21/97
 Entered by: [Signature]

Special Instructions/QC Requirements

Abnormal Conditions on Receipt

Sample Team Members

Name	Signature	Init	Company/Organization/Phone
JAN CURTIS	[Signature]	JC	WESTON/6131/284-2600

1. Relinquished by: [Signature]	Org. 6131	Date 10/21/97	Time 1315	4. Relinquished by:	Org.	Date	Time
2. Received by: [Signature]	Org. 7578	Date 10/21/97	Time 1315	4. Received by:	Org.	Date	Time
3. Relinquished by: [Signature]	Org. 7578	Date 10/21/97	Time 1345	5. Relinquished by:	Org.	Date	Time
2. Received by: [Signature]	Org. SNL 7578	Date 10/21/97	Time 1345	5. Received by:	Org.	Date	Time
3. Relinquished by: [Signature]	Org. 7578	Date 10/24/97	Time 1330	6. Relinquished by:	Org.	Date	Time
2. Received by: [Signature]	Org. 7578	Date 10/24/97	Time 1330	6. Received by:	Org.	Date	Time

WHITE - To Accompany Samples, BLUE - To Accompany Samples, YELLOW - SMO Suspense Copy, PINK - Field Copy

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 10-21-97 4:07:29 PM *

 *
 * Analyzed by: *[Signature]* 10/23/97 Reviewed by: *[Signature]* 10/23/97 *

 Customer : R.CONWAY/D.BISWELL (6134/SMO) --
 Customer Sample ID : 036290-002
 Lab Sample ID : 70184801

85-1-GR-C3C-0-SSC

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 795.000 gram
 Sample Date/Time : 10-21-97 9:15:00 AM
 Acquire Start Date/Time : 10-21-97 2:18:37 PM
 Detector Name : LAB01
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	1.77E+00	1.74E+00	2.73E+00
TH-234	3.02E+00	7.91E-01	4.66E-01
RA-226	1.52E+00	5.92E-01	4.90E-01
PB-214	4.90E-01	1.04E-01	4.76E-02
BI-214	4.17E-01	6.33E-01	4.64E-02
PB-210	Not Detected	-----	7.47E+00
TH-232	5.18E-01	2.75E-01	1.32E-01
RA-228	5.52E-01	2.01E-01	1.66E-01
AC-228	5.82E-01	3.92E-01	9.90E-02
TH-228	4.82E-01	6.45E-01	4.52E-01
RA-224	5.84E-01	2.22E-01	1.26E-01
PB-212	5.32E-01	1.05E-01	3.49E-02
BI-212	6.02E-01	5.26E-01	3.34E-01
TL-208	5.50E-01	1.45E-01	6.72E-02
U-235	Not Detected	-----	1.95E-01
TH-231	Not Detected	-----	2.09E+00
PA-231	Not Detected	-----	3.27E+00
TH-227	Not Detected	-----	3.18E-01
RA-223	Not Detected	-----	1.40E-01
RN-219	Not Detected	-----	3.79E-01
PB-211	Not Detected	-----	8.52E-01
TL-207	Not Detected	-----	1.42E+01
AM-241	Not Detected	-----	1.85E-01
PU-239	Not Detected	-----	3.23E+02
NP-237	Not Detected	-----	2.73E-01
PA-233	Not Detected	-----	5.61E-02
TH-229	Not Detected	-----	1.93E-01

[Summary Report] - Sample ID: : 70184801

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.18E-02
AG-110m	Not Detected	-----	3.20E-02
BA-133	Not Detected	-----	4.79E-02
BE-7	3.98E-01	2.89E-01	1.81E-01
CD-109	Not Detected	-----	9.27E-01
CD-115	Not Detected	-----	6.54E-02
CE-139	Not Detected	-----	2.43E-02
CE-141	Not Detected	-----	4.21E-02
CE-144	Not Detected	-----	1.82E-01
CO-56	Not Detected	-----	3.85E-02
CO-57	Not Detected	-----	2.33E-02
CO-58	Not Detected	-----	3.26E-02
CO-60	Not Detected	-----	3.98E-02
CR-51	Not Detected	-----	2.14E-01
CS-134	Not Detected	-----	4.09E-02
CS-137	1.72E-02	2.31E-02	2.25E-02
EU-152	Not Detected	-----	6.99E-02
EU-154	Not Detected	-----	1.92E-01
EU-155	Not Detected	-----	1.09E-01
FE-59	Not Detected	-----	8.91E-02
GD-153	Not Detected	-----	8.04E-02
HG-203	Not Detected	-----	2.87E-02
I-131	Not Detected	-----	2.93E-02
IR-192	Not Detected	-----	2.56E-02
K-40	1.75E+01	2.78E+00	2.93E-01
MN-52	Not Detected	-----	3.24E-02
MN-54	Not Detected	-----	3.45E-02
MO-99	Not Detected	-----	2.73E-01
NA-22	Not Detected	-----	4.69E-02
NA-24	Not Detected	-----	4.53E-02
NB-95	Not Detected	-----	1.42E-01
ND-147	Not Detected	-----	1.92E-01
NI-57	Not Detected	-----	5.50E-02
RU-103	Not Detected	-----	2.78E-02
RU-106	Not Detected	-----	2.87E-01
SB-122	Not Detected	-----	4.33E-02
SB-124	Not Detected	-----	2.97E-02
SB-125	Not Detected	-----	8.64E-02
SN-113	Not Detected	-----	3.49E-02
SR-85	Not Detected	-----	3.58E-02
TA-182	Not Detected	-----	1.59E-01
TA-183	Not Detected	-----	1.63E-01
TC-99m	Not Detected	-----	4.50E-02
TL-201	Not Detected	-----	1.09E-01
XE-133	Not Detected	-----	1.01E-01
Y-88	Not Detected	-----	2.69E-02
ZN-65	Not Detected	-----	1.12E-01
ZR-95	Not Detected	-----	5.53E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 10-21-97 5:52:30 PM *

 * Analyzed by: *J 10/23/97* Reviewed by: *KA 10/23/97* *

 Customer : R.CONWAY/D.BISWELL (6134/SMO) -
 Customer Sample ID : 036291-002
 Lab Sample ID : 70184802

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 771.000 gram
 Sample Date/Time : 10-21-97 9:17:00 AM
 Acquire Start Date/Time : 10-21-97 4:09:57 PM
 Detector Name : LAB01
 Elapsed Live/Real Time : 6000 / 6002 seconds

85-1-GR-031-C-SSC

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected		1.47E+00
TH-234	1.32E+00	5.35E-01	4.53E-01
RA-226	1.29E+00	4.83E-01	5.05E-01
PB-214	5.21E-01	1.01E-01	4.59E-02
BI-214	4.94E-01	1.11E-01	4.61E-02
PB-210	Not Detected		7.48E+00

TH-232	6.26E-01	3.30E-01	1.59E-01
RA-228	6.40E-01	3.46E-01	1.63E-01
AC-228	6.44E-01	1.93E-01	9.80E-02
TH-228	5.98E-01	3.39E-01	4.13E-01
RA-224	4.80E-01	2.46E-01	1.28E-01
PB-212	6.27E-01	1.07E-01	3.99E-02
BI-212	6.39E-01	2.65E-01	3.01E-01
TL-208	5.80E-01	1.42E-01	6.87E-02

U-235	Not Detected		8.94E-02
TH-231	Not Detected		2.10E+00
PA-231	Not Detected		3.33E+00
TH-227	Not Detected		3.41E-01
RA-223	Not Detected		1.29E-01
RN-219	Not Detected		3.86E-01
PB-211	Not Detected		8.89E-01
TL-207	Not Detected		1.48E+01

AM-241	Not Detected		1.87E-01
PU-239	Not Detected		3.22E+02
NP-237	4.64E-01	1.83E-01	1.84E-01
PA-233	Not Detected		5.49E-02
TH-229	Not Detected		1.83E-01

not detected J 10/23/97

[Summary Report] - Sample ID: : 70184802

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.37E-02
AG-110m	Not Detected	-----	3.31E-02
BA-133	Not Detected	-----	4.88E-02
BE-7	4.83E-01	2.76E-01	1.66E-01
CD-109	Not Detected	-----	8.90E-01
CD-115	Not Detected	-----	6.92E-02
CE-139	Not Detected	-----	2.48E-02
CE-141	Not Detected	-----	4.21E-02
CE-144	Not Detected	-----	1.79E-01
CO-56	Not Detected	-----	3.83E-02
CO-57	Not Detected	-----	2.32E-02
CO-58	Not Detected	-----	3.27E-02
CO-60	Not Detected	-----	4.34E-02
CR-51	Not Detected	-----	2.32E-01
CS-134	Not Detected	-----	4.40E-02
CS-137	Not Detected	-----	3.87E-02
EU-152	Not Detected	-----	6.94E-02
EU-154	Not Detected	-----	2.01E-01
EU-155	Not Detected	-----	1.08E-01
FE-59	Not Detected	-----	8.30E-02
GD-153	Not Detected	-----	7.54E-02
HG-203	Not Detected	-----	3.04E-02
I-131	Not Detected	-----	2.94E-02
IR-192	Not Detected	-----	2.71E-02
K-40	1.72E+01	2.72E+00	2.58E-01
MN-52	Not Detected	-----	3.40E-02
MN-54	Not Detected	-----	3.67E-02
MO-99	Not Detected	-----	2.85E-01
NA-22	Not Detected	-----	4.64E-02
NA-24	Not Detected	-----	4.92E-02
NB-95	Not Detected	-----	1.55E-01
ND-147	Not Detected	-----	2.01E-01
NI-57	Not Detected	-----	5.81E-02
RU-103	Not Detected	-----	3.00E-02
RU-106	Not Detected	-----	2.88E-01
SB-122	Not Detected	-----	4.34E-02
SB-124	Not Detected	-----	3.11E-02
SB-125	Not Detected	-----	8.43E-02
SN-113	Not Detected	-----	3.67E-02
SR-85	Not Detected	-----	3.83E-02
TA-182	Not Detected	-----	1.66E-01
TA-183	Not Detected	-----	1.66E-01
TC-99m	Not Detected	-----	5.67E-02
TL-201	Not Detected	-----	1.07E-01
XE-133	Not Detected	-----	9.81E-02
Y-88	Not Detected	-----	2.81E-02
ZN-65	Not Detected	-----	1.15E-01
ZR-95	Not Detected	-----	6.09E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 10-21-97 7:37:33 PM *

 *
 * Analyzed by: *[Signature]* 10/23/97 Reviewed by: *[Signature]* 10/23/97 *

Customer : R.CONWAY/D.BISWELL (6134/SMO)
 Customer Sample ID : 036292-002
 Lab Sample ID : 70184803

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 771.000 gram
 Sample Date/Time : 10-21-97 9:20:00 AM
 Acquire Start Date/Time : 10-21-97 5:54:56 PM
 Detector Name : LAB01
 Elapsed Live/Real Time : 6000 / 6002 seconds

85-1-GR-032-C-SSO

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	1.87E+00	1.90E+00	2.91E+00
TH-234	4.14E+00	1.01E+00	4.97E-01
RA-226	2.36E+00	8.63E-01	5.96E-01
PB-214	6.03E-01	1.31E-01	4.83E-02
BI-214	5.54E-01	1.14E-01	4.54E-02
PB-210	Not Detected	-----	8.07E+00

TH-232	7.07E-01	3.89E-01	1.57E-01
RA-228	5.56E-01	2.07E-01	1.85E-01
AC-228	7.34E-01	2.55E-01	1.03E-01
TH-228	5.76E-01	4.95E-01	5.18E-01
RA-224	7.60E-01	3.08E-01	1.15E-01
PB-212	6.51E-01	1.14E-01	3.99E-02
BI-212	7.74E-01	4.20E-01	3.66E-01
TL-208	6.43E-01	1.54E-01	7.37E-02

U-235	Not Detected	-----	2.21E-01
TH-231	Not Detected	-----	2.29E+00
PA-231	Not Detected	-----	3.62E+00
TH-227	Not Detected	-----	3.47E-01
RA-223	Not Detected	-----	1.56E-01
RN-219	Not Detected	-----	4.07E-01
PB-211	Not Detected	-----	9.30E-01
TL-207	Not Detected	-----	1.54E+01

AM-241	Not Detected	-----	2.03E-01
PU-239	Not Detected	-----	3.71E+02
NP-237	Not Detected	-----	3.10E-01
PA-233	Not Detected	-----	6.05E-02
TH-229	Not Detected	-----	2.35E-01

[Summary Report] - Sample ID: : 70184803

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.59E-02
AG-110m	Not Detected	-----	3.38E-02
BA-133	Not Detected	-----	5.23E-02
BE-7	Not Detected	-----	2.86E-01
CD-109	1.21E+00	3.99E-01	7.56E-01
CD-115	Not Detected	-----	7.44E-02
CE-139	Not Detected	-----	2.75E-02
CE-141	Not Detected	-----	4.80E-02
CE-144	Not Detected	-----	2.01E-01
CO-56	Not Detected	-----	3.80E-02
CO-57	Not Detected	-----	2.60E-02
CO-58	Not Detected	-----	3.73E-02
CO-60	Not Detected	-----	3.96E-02
CR-51	Not Detected	-----	2.40E-01
CS-134	Not Detected	-----	4.55E-02
CS-137	Not Detected	-----	3.93E-02
EU-152	Not Detected	-----	7.81E-02
EU-154	Not Detected	-----	2.12E-01
EU-155	Not Detected	-----	1.19E-01
FE-59	Not Detected	-----	8.25E-02
GD-153	Not Detected	-----	9.70E-02
HG-203	Not Detected	-----	3.14E-02
I-131	Not Detected	-----	3.17E-02
IR-192	Not Detected	-----	2.83E-02
K-40	1.83E+01	2.80E+00	2.79E-01
MN-52	Not Detected	-----	3.62E-02
MN-54	Not Detected	-----	2.09E-02
MO-99	Not Detected	-----	2.94E-01
NA-22	Not Detected	-----	4.82E-02
NA-24	Not Detected	-----	5.79E-02
NB-95	Not Detected	-----	1.58E-01
ND-147	Not Detected	-----	2.24E-01
NI-57	Not Detected	-----	6.40E-02
RU-103	Not Detected	-----	3.30E-02
RU-106	Not Detected	-----	3.19E-01
SB-122	Not Detected	-----	4.82E-02
SB-124	Not Detected	-----	3.21E-02
SB-125	Not Detected	-----	8.91E-02
SN-113	Not Detected	-----	3.93E-02
SR-85	Not Detected	-----	3.97E-02
TA-182	Not Detected	-----	1.70E-01
TA-183	Not Detected	-----	1.82E-01
TC-99m	Not Detected	-----	7.51E-02
TL-201	Not Detected	-----	1.29E-01
XE-133	Not Detected	-----	1.17E-01
Y-88	Not Detected	-----	2.94E-02
ZN-65	Not Detected	-----	1.22E-01
ZR-95	Not Detected	-----	6.58E-02

not detected 7/10/23/57

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 10-21-97 9:22:34 PM *

 * Analyzed by: *[Signature]* 10/23/97 Reviewed by: *[Signature]* 10/23/97 *

Customer : R.CONWAY/D.BISWELL (6134/SMO)
 Customer Sample ID : 036293-002
 Lab Sample ID : 70184804

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 769.000 gram
 Sample Date/Time : 10-21-97 9:20:00 AM
 Acquire Start Date/Time : 10-21-97 7:40:02 PM
 Detector Name : LAB01
 Elapsed Live/Real Time : 6000 / 6002 seconds

85-1-GR-C32-C-SSD

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected		1.54E+00
TH-234	1.49E+00	4.84E-01	4.49E-01
RA-226	1.64E+00	5.87E-01	5.59E-01
PB-214	6.24E-01	1.21E-01	4.77E-02
BI-214	5.15E-01	1.49E-01	4.52E-02
PB-210	Not Detected		7.69E+00
TH-232	7.69E-01	4.00E-01	1.57E-01
RA-228	5.81E-01	3.07E-01	2.01E-01
AC-228	6.15E-01	6.43E-01	9.81E-02
TH-228	5.67E-01	3.24E-01	4.30E-01
RA-224	7.05E-01	3.21E-01	1.20E-01
PB-212	6.76E-01	1.16E-01	3.63E-02
BI-212	5.14E-01	3.14E-01	3.18E-01
TL-208	6.19E-01	1.70E-01	7.29E-02
U-235	Not Detected		2.04E-01
TH-231	Not Detected		2.21E+00
PA-231	Not Detected		3.33E+00
TH-227	Not Detected		3.50E-01
RA-223	Not Detected		1.37E-01
RN-219	Not Detected		4.04E-01
PB-211	Not Detected		9.08E-01
TL-207	Not Detected		1.54E+01
AM-241	Not Detected		1.87E-01
PU-239	Not Detected		3.44E+02
NP-237	5.37E-01	1.87E-01	1.94E-01
PA-233	Not Detected		5.65E-02
TH-229	Not Detected		1.96E-01

not detected
[Signature] 10/23/97

[Summary Report] - Sample ID: : 70184804

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.32E-02
AG-110m	Not Detected	-----	3.36E-02
BA-133	Not Detected	-----	5.25E-02
BE-7	Not Detected	-----	1.13E-01
CD-109	Not Detected	-----	9.47E-01
CD-115	Not Detected	-----	7.68E-02
CE-139	Not Detected	-----	2.58E-02
CE-141	Not Detected	-----	4.41E-02
CE-144	Not Detected	-----	1.87E-01
CO-56	Not Detected	-----	3.82E-02
CO-57	Not Detected	-----	2.32E-02
CO-58	Not Detected	-----	3.54E-02
CO-60	Not Detected	-----	4.35E-02
CR-51	Not Detected	-----	2.20E-01
CS-134	Not Detected	-----	4.34E-02
CS-137	Not Detected	-----	4.01E-02
EU-152	Not Detected	-----	6.94E-02
EU-154	Not Detected	-----	1.99E-01
EU-155	Not Detected	-----	1.10E-01
FE-59	Not Detected	-----	8.51E-02
GD-153	Not Detected	-----	7.97E-02
HG-203	Not Detected	-----	3.08E-02
I-131	Not Detected	-----	2.92E-02
IR-192	Not Detected	-----	2.60E-02
K-40	1.84E+01	2.87E+00	2.34E-01
MN-52	Not Detected	-----	3.51E-02
MN-54	Not Detected	-----	3.79E-02
MO-99	Not Detected	-----	2.94E-01
NA-22	Not Detected	-----	4.86E-02
NA-24	Not Detected	-----	6.44E-02
NB-95	Not Detected	-----	1.62E-01
ND-147	Not Detected	-----	2.14E-01
NI-57	Not Detected	-----	6.79E-02
RU-103	Not Detected	-----	3.14E-02
RU-106	Not Detected	-----	2.79E-01
SB-122	Not Detected	-----	4.67E-02
SB-124	Not Detected	-----	3.13E-02
SB-125	Not Detected	-----	8.59E-02
SN-113	Not Detected	-----	3.70E-02
SR-85	Not Detected	-----	3.79E-02
TA-182	Not Detected	-----	1.73E-01
TA-183	Not Detected	-----	1.69E-01
TC-99m	Not Detected	-----	8.80E-02
TL-201	Not Detected	-----	1.16E-01
XE-133	Not Detected	-----	1.06E-01
Y-88	Not Detected	-----	3.29E-02
ZN-65	Not Detected	-----	1.20E-01
ZR-95	Not Detected	-----	6.01E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 10-21-97 11:06:40 PM *

* Analyzed by: *[Signature]* 10/23/97 Reviewed by: *[Signature]* 10/23/97 *

Customer : R.CONWAY/D.BISWELL (6134/SMO) -
 Customer Sample ID : 036295-003
 Lab Sample ID : 70184805

Sample Description : MARINELLI LIQUID SAMPLE 85-1-GR-C32-EB
 Sample Quantity : 500.000 mL
 Sample Date/Time : 10-21-97 9:45:00 AM
 Acquire Start Date/Time : 10-21-97 9:25:01 PM
 Detector Name : LAB01
 Elapsed Live/Real Time : 6000 / 6001 seconds

Comments:

Nuclide Name	Activity (pCi/mL)	2-sigma Error	MDA (pCi/mL)
U-238	Not Detected	-----	7.65E-01
TH-234	Not Detected	-----	3.37E-01
RA-226	Not Detected	-----	4.76E-01
PB-214	Not Detected	-----	5.66E-02
BI-214	Not Detected	-----	5.57E-02
PB-210	Not Detected	-----	3.45E+00
TH-232	Not Detected	-----	1.56E-01
RA-228	Not Detected	-----	1.48E-01
AC-228	Not Detected	-----	1.07E-01
TH-228	Not Detected	-----	5.20E-01
RA-224	Not Detected	-----	1.54E-01
PB-212	Not Detected	-----	4.12E-02
BI-212	Not Detected	-----	3.56E-01
TL-208	Not Detected	-----	7.30E-02
U-235	Not Detected	-----	1.31E-01
TH-231	Not Detected	-----	1.58E+00
PA-231	Not Detected	-----	2.39E+00
TH-227	Not Detected	-----	1.56E-01
RA-223	Not Detected	-----	7.51E-02
RN-219	Not Detected	-----	2.74E-01
PB-211	Not Detected	-----	6.41E-01
TL-207	Not Detected	-----	1.14E+01
AM-241	Not Detected	-----	9.56E-02
PU-239	Not Detected	-----	2.25E+02
NP-237	Not Detected	-----	1.35E-01
PA-233	Not Detected	-----	4.37E-02
TH-229	Not Detected	-----	1.17E-01

[Summary Report] - Sample ID: : 70184805

Nuclide Name	Activity (pCi/mL)	2-sigma Error	MDA (pCi/mL)
AG-108m	Not Detected	-----	2.73E-02
AG-110m	Not Detected	-----	2.32E-02
BA-133	Not Detected	-----	3.31E-02
BE-7	Not Detected	-----	2.13E-01
CD-109	Not Detected	-----	4.69E-01
CD-115	Not Detected	-----	4.39E-02
CE-139	Not Detected	-----	1.78E-02
CE-141	Not Detected	-----	2.90E-02
CE-144	Not Detected	-----	1.24E-01
CO-56	Not Detected	-----	3.44E-02
CO-57	Not Detected	-----	1.58E-02
CO-58	Not Detected	-----	2.56E-02
CO-60	Not Detected	-----	3.07E-02
CR-51	Not Detected	-----	1.85E-01
CS-134	Not Detected	-----	2.58E-02
CS-137	Not Detected	-----	2.74E-02
EU-152	Not Detected	-----	4.80E-02
EU-154	Not Detected	-----	1.25E-01
EU-155	Not Detected	-----	6.71E-02
FE-59	Not Detected	-----	4.82E-02
GD-153	Not Detected	-----	4.80E-02
HG-203	Not Detected	-----	2.15E-02
I-131	Not Detected	-----	2.36E-02
IR-192	Not Detected	-----	2.14E-02
K-40	Not Detected	-----	3.59E-01
MN-52	Not Detected	-----	3.06E-02
MN-54	Not Detected	-----	2.80E-02
MO-99	Not Detected	-----	2.04E-01
NA-22	Not Detected	-----	2.26E-02
NA-24	Not Detected	-----	4.60E-02
NE-95	Not Detected	-----	7.87E-02
ND-147	Not Detected	-----	1.58E-01
NI-57	Not Detected	-----	4.94E-02
RU-103	Not Detected	-----	2.50E-02
RU-106	Not Detected	-----	2.42E-01
SB-122	Not Detected	-----	3.69E-02
SB-124	Not Detected	-----	2.47E-02
SB-125	Not Detected	-----	6.94E-02
SN-113	Not Detected	-----	2.88E-02
SR-85	Not Detected	-----	3.27E-02
TA-182	Not Detected	-----	8.58E-02
TA-183	Not Detected	-----	8.70E-02
TC-99m	5.27E-02	5.89E-02	5.58E-02
TL-201	Not Detected	-----	6.17E-02
XE-133	Not Detected	-----	6.39E-02
Y-88	Not Detected	-----	3.21E-02
ZN-65	Not Detected	-----	5.75E-02
ZR-95	Not Detected	-----	3.71E-02

not detected 7/10/23/27

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 10-22-97 7:47:59 AM *

 *
 * Analyzed by: *MDJ 10/22/97* Reviewed by: *[Signature] 10/23/97* *

Customer : R.CONWAY/D.BISWELL (6134/SMO) --
 Customer Sample ID : LAB CONTROL SAMPLE USING CG134
 Lab Sample ID : 70184806

Sample Description : MIXED GAMMA STANDARD CG134
 Sample Quantity : 1.000 Each
 Sample Date/Time : 11-01-90 12:00:00 PM
 Acquire Start Date/Time : 10-22-97 7:36:07 AM
 Detector Name : LAB01
 Elapsed Live/Real Time : 600 / 605 seconds

Comments:

Nuclide Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
U-238	Not Detected	-----	8.52E+03
TH-234	Not Detected	-----	3.45E+03
RA-226	Not Detected	-----	5.79E+03
PB-214	Not Detected	-----	7.89E+02
EI-214	Not Detected	-----	7.49E+02
PB-210	Not Detected	-----	6.71E+04
TH-232	Not Detected	-----	2.32E+03
RA-228	Not Detected	-----	3.38E+03
AC-228	Not Detected	-----	1.97E+03
TH-228	Not Detected	-----	9.17E+04
RA-224	Not Detected	-----	2.83E+03
PB-212	Not Detected	-----	6.60E+03
EI-212	Not Detected	-----	6.63E+04
TL-208	Not Detected	-----	1.32E+04
U-235	Not Detected	-----	1.56E+03
TH-231	Not Detected	-----	2.14E+04
PA-231	Not Detected	-----	3.37E+04
TH-227	Not Detected	-----	2.56E+03
RA-223	Not Detected	-----	1.00E+26
RN-219	Not Detected	-----	6.53E+03
PB-211	Not Detected	-----	1.47E+04
TL-207	Not Detected	-----	2.70E+05
AM-241	8.46E+04	1.44E+04	1.44E+03
PU-239	Not Detected	-----	2.56E+06
NP-237	Not Detected	-----	1.73E+03
PA-233	Not Detected	-----	6.54E+02
TH-229	Not Detected	-----	1.39E+03

Nuclide Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
AG-108m	Not Detected		4.00E+02
AG-110m	Not Detected		2.19E+06
BA-133	Not Detected		7.82E+02
BE-7	Not Detected		9.57E+17
CD-109	3.68E+05	1.15E+05	1.74E+05
CD-115	Not Detected		1.00E+26
CE-139	Not Detected		7.60E+07
CE-141	Not Detected		1.00E+26
CE-144	Not Detected		7.05E+05
CO-56	Not Detected		3.92E+12
CO-57	Not Detected		1.24E+05
CO-58	Not Detected		2.70E+13
CO-60	7.88E+04	1.11E+04	4.96E+02
CR-51	Not Detected		1.00E+26
CS-134	Not Detected		3.64E+03
CS-137	6.82E+04	9.16E+03	3.38E+02
EU-152	Not Detected		8.06E+02
EU-154	Not Detected		3.09E+03
EU-155	Not Detected		2.28E+03
FE-59	Not Detected		1.78E+20
GD-153	Not Detected		8.32E+05
HG-203	Not Detected		8.62E+18
I-131	Not Detected		1.00E+26
IR-192	Not Detected		7.44E+12
K-40	Not Detected		1.91E+03
MN-52	Not Detected		1.00E+26
MN-54	Not Detected		1.26E+05
MO-99	Not Detected		1.00E+26
NA-22	Not Detected		1.57E+03
NA-24	Not Detected		1.00E+26
NB-95	Not Detected		1.00E+26
ND-147	Not Detected		1.00E+26
NI-57	Not Detected		1.00E+26
RU-103	Not Detected		1.41E+22
RU-106	Not Detected		3.95E+05
SB-122	Not Detected		1.00E+26
SB-124	Not Detected		1.88E+15
SE-125	Not Detected		7.43E+03
SN-113	Not Detected		2.26E+09
SR-85	Not Detected		2.77E+14
TA-182	Not Detected		7.15E+09
TA-183	Not Detected		1.00E+26
TC-99m	Not Detected		1.00E+26
TL-201	Not Detected		1.00E+26
XE-133	Not Detected		1.00E+26
Y-88	Not Detected		2.77E+09
ZN-65	Not Detected		1.60E+06
ZR-95	Not Detected		6.47E+14



Sandia National Laboratories

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

No: 505

Page 1 of 1

Department No: <u>7585</u>	Date Samples Shipped: <u>7/28/95</u>	Bill to: <u>Sandia National Laboratories</u> <u>Supplier Services Department 0154</u> <u>P.O. Box 5800</u> <u>Albuquerque, NM 87185</u>
Project/Task Manager: <u>John Wrightson</u>	Carrier/Waybill No: <u>N/A</u>	
Project Name: <u>Scoping Sampling</u>	Lab Destination: <u>SNL 7715</u>	
Sample Team Members: <u>Alexis Fournier</u> <u>Ed Page</u> <u>Jeff Johnson</u>	Lab Contact: <u>Amie A. Buchanan</u>	
	SMO Contact/Phone: <u>505-260-1111</u>	
	Send Report to SMO: <u>SNL Wrightson</u>	Contract No: <u>7585</u>
	SMO Reference No: <u></u>	Case No: <u>7585</u>
		SMO Authorization: <u></u>

Sample Number	Sample Type	Date/Time Collected	Container Type	Sample Volume	Preservative	Requested Testing Program	QC	Lab Sample Number	Condition on Receipt
85-BH1-0-S-1	Soil	7/28/95 1115	AEF	500ml	None	Gamma Spec			
85-BH1-5-S-1	↓	↓ 1125	↓	↓	↓	↓	↓		
85-BH1-10-S-1	↓	↓ 1137	↓	↓	↓	↓	↓		
85-BH1-15-S-1	↓	↓ 1145	↓	↓	↓	↓	↓		

Possible Hazard Identification Non-hazard <input checked="" type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Other <input type="checkbox"/>				Special Instructions/QC Requirements			
Turnaround Time Normal <input checked="" type="checkbox"/> Rush <input type="checkbox"/> Required Report Date _____							
Sample Disposal Return to Client <input checked="" type="checkbox"/> Disposal by Lab <input type="checkbox"/> Archive Until _____							
1. Relinquished by <u>John Wrightson</u> Org <u>7585</u> Date <u>7/28/95</u> Time <u>1420</u>							
1. Received by <u>Amie A. Buchanan</u> Org <u>SNL 7715</u> Date <u>7/28/95</u> Time <u>1420</u>				4. Relinquished by _____ Org _____ Date _____ Time _____			
2. Relinquished by _____ Org _____ Date _____ Time _____				5. Relinquished by _____ Org _____ Date _____ Time _____			
2. Received by _____ Org _____ Date _____ Time _____				5. Received by _____ Org _____ Date _____ Time _____			
3. Relinquished by _____ Org _____ Date _____ Time _____				6. Relinquished by _____ Org _____ Date _____ Time _____			
3. Received by _____ Org _____ Date _____ Time _____				6. Received by _____ Org _____ Date _____ Time _____			

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 7-29-95 2:42:21 AM *
 * *****
 * Analyzed by: *W 7/29/95* Reviewed by: *W 7/29/95* *
 * *****

Customer : WRIGHTSON (7585)
 Customer Sample ID : 85-BH1-0-S-1
 Lab Sample ID : 50060301
 Sample Description : MARINELLI SOIL SAMPLE
 Sample Type : Solid
 Sample Geometry : 1SMAR
 Sample Quantity : 458.000 gram
 Sample Date/Time : 7-28-95 11:15:00 AM
 Acquire Start Date : 7-29-95 2:08:22 AM
 Detector Name : LAB01
 Elapsed Live Time : 1800 seconds
 Elapsed Real Time : 1801 seconds

Comments:

Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	Not Detected		2.51
TH-234	Not Detected		1.27
U-234	Not Detected		2.85E+01
RA-226	8.57E-01	1.03	1.66
PB-214	6.49E-01	1.49E-01	1.39E-01
BI-214	5.04E-01	1.25E-01	1.23E-01
PB-210	Not Detected		1.77
TH-232	5.83E-01	2.87E-01	4.00E-01
RA-228	5.96E-01	2.72E-01	3.49E-01
AC-228	Not Detected		4.28E-01
TH-228	6.13E-01	4.57E-01	1.04
RA-224	1.93	5.76E-01	8.28E-01
PB-212	7.75E-01	1.69E-01	7.88E-02
BI-212	Not Detected		1.27
TL-208	5.74E-01	1.63E-01	1.73E-01
U-235	Not Detected		4.75E-01
TH-231	Not Detected		8.72E-01
PA-231	Not Detected		2.81
AC-227	Not Detected		3.60
TH-227	Not Detected		7.60E-01
RA-223	Not Detected		2.87E-01
RN-219	4.00E-01	3.04E-01	4.61E-01
PB-211	Not Detected		1.53
TL-207	Not Detected		3.37E+01
AM-241	Not Detected		3.20E-01
PU-239	Not Detected		5.22E+02
NP-237	Not Detected		5.64E-01
PA-233	Not Detected		1.36E-01
TH-229	Not Detected		5.03E-01

Not Detected W 7/29/95

[Summary Report] - Sample ID: 50060301

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	-----	8.05E-02
AR-41	Not Detected	-----	3.00E+01
BA-133	Not Detected	-----	1.35E-01
BA-140	Not Detected	-----	2.65E-01
CD-109	Not Detected	-----	1.96
CD-115	Not Detected	-----	1.67E-01
CE-139	Not Detected	-----	6.52E-02
CE-141	Not Detected	-----	1.07E-01
CE-144	Not Detected	-----	4.73E-01
CO-56	Not Detected	-----	8.34E-02
CO-57	Not Detected	-----	6.05E-02
CO-58	Not Detected	-----	7.61E-02
CO-60	Not Detected	-----	9.07E-02
CR-51	Not Detected	-----	5.52E-01
CS-134	Not Detected	-----	1.08E-01
CS-137	Not Detected	-----	8.85E-02
CU-64	Not Detected	-----	4.03E+01
EU-152	Not Detected	-----	5.74E-01
EU-154	Not Detected	-----	3.99E-01
EU-155	Not Detected	-----	2.54E-01
FE-59	Not Detected	-----	1.68E-01
GD-153	Not Detected	-----	2.06E-01
HG-203	Not Detected	-----	6.63E-02
I-131	Not Detected	-----	7.16E-02
IN-115m	Not Detected	-----	1.44
IR-192	Not Detected	-----	6.53E-02
K-40	2.27E+01	3.38	5.61E-01
LA-140	Not Detected	-----	9.93E-02
MN-54	Not Detected	-----	8.37E-02
MN-56	Not Detected	-----	4.90
MO-99	Not Detected	-----	6.41E-01
NA-22	Not Detected	-----	9.73E-02
NA-24	Not Detected	-----	1.71E-01
NB-95	Not Detected	-----	3.98E-01
ND-147	Not Detected	-----	4.73E-01
NI-57	Not Detected	-----	1.39E-01
BE-7	Not Detected	-----	5.78E-01
RU-103	Not Detected	-----	6.42E-02
RU-106	Not Detected	-----	6.35E-01
SB-122	Not Detected	-----	1.17E-01
SB-124	Not Detected	-----	7.66E-02
SB-125	Not Detected	-----	1.92E-01
SC-46	Not Detected	-----	1.19E-01
SR-85	Not Detected	-----	8.21E-02
TA-182	Not Detected	-----	3.53E-01
TA-183	Not Detected	-----	2.97E-01
TE-132	Not Detected	-----	7.10E-02
TL-201	Not Detected	-----	2.10E-01
V-48	Not Detected	-----	8.16E-02
XE-133	Not Detected	-----	2.60E-01
Y-88	Not Detected	-----	6.71E-02
ZN-65	Not Detected	-----	2.28E-01
ZR-95	Not Detected	-----	1.43E-01

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 7-29-95 3:22:10 AM *

 * Analyzed by: *W 7/29/95* Reviewed by: *W 7/29/95* *

Customer : WRIGHTSON (7585)
 Customer Sample ID : 85-BH1-5-S-1
 Lab Sample ID : 50060302

 Sample Description : MARINELLI SOIL SAMPLE
 Sample Type : Solid
 Sample Geometry : 1SMAR
 Sample Quantity : 562.000 gram
 Sample Date/Time : 7-28-95 11:25:00 AM
 Acquire Start Date : 7-29-95 2:49:45 AM
 Detector Name : LAB01
 Elapsed Live Time : 1800 seconds
 Elapsed Real Time : 1801 seconds

Comments:

Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	Not Detected		2.12
TH-234	6.97E-01	5.15E-01	7.51E-01
U-234	Not Detected		2.30E+01
RA-226	1.12	7.64E-01	1.16
PB-214	5.41E-01	1.31E-01	1.36E-01
BI-214	4.47E-01	1.13E-01	1.17E-01
PB-210	Not Detected		1.53
TH-232	6.03E-01	2.39E-01	3.07E-01
RA-228	3.25E-01	2.24E-01	3.31E-01
AC-228	Not Detected		3.55E-01
TH-228	Not Detected		3.66
RA-224	Not Detected		7.67E-01
PB-212	5.92E-01	1.32E-01	7.10E-02
BI-212	4.63E-01	3.41E-01	4.98E-01
TL-208	5.20E-01	1.34E-01	1.25E-01
U-235	Not Detected		4.11E-01
TH-231	Not Detected		7.49E-01
PA-231	Not Detected		2.31
AC-227	Not Detected		2.93
TH-227	Not Detected		6.14E-01
RA-223	Not Detected		2.50E-01
RN-219	Not Detected		4.77E-01
PB-211	Not Detected		1.16
TL-207	Not Detected		2.72E+01
AM-241	Not Detected		2.70E-01
PU-239	Not Detected		4.59E+02
NP-237	Not Detected		4.91E-01
PA-233	Not Detected		1.04E-01
TH-229	Not Detected		4.08E-01

[Summary Report] - Sample ID: 50060302

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	-----	5.92E-02
AR-41	Not Detected	-----	3.34E+01
BA-133	Not Detected	-----	1.11E-01
BA-140	Not Detected	-----	1.92E-01
CD-109	Not Detected	-----	1.67
CD-115	Not Detected	-----	1.42E-01
CE-139	Not Detected	-----	5.35E-02
CE-141	Not Detected	-----	9.04E-02
CE-144	Not Detected	-----	4.07E-01
CO-56	Not Detected	-----	6.91E-02
CO-57	Not Detected	-----	5.12E-02
CO-58	Not Detected	-----	6.32E-02
CO-60	Not Detected	-----	8.37E-02
CR-51	Not Detected	-----	4.35E-01
CS-134	Not Detected	-----	9.26E-02
CS-137	Not Detected	-----	6.30E-02
CU-64	Not Detected	-----	3.38E+01
EU-152	Not Detected	-----	4.82E-01
EU-154	Not Detected	-----	3.16E-01
EU-155	Not Detected	-----	2.14E-01
FE-59	Not Detected	-----	1.36E-01
GD-153	Not Detected	-----	1.70E-01
HG-203	Not Detected	-----	5.14E-02
I-131	Not Detected	-----	5.25E-02
IN-115m	Not Detected	-----	1.32
IR-192	Not Detected	-----	5.09E-02
K-40	1.83E+01	2.73	5.20E-01
LA-140	Not Detected	-----	6.71E-02
MN-54	Not Detected	-----	6.85E-02
MN-56	Not Detected	-----	4.67
MO-99	Not Detected	-----	5.17E-01
NA-22	Not Detected	-----	8.02E-02
NA-24	Not Detected	-----	1.31E-01
NB-95	Not Detected	-----	3.23E-01
ND-147	Not Detected	-----	3.55E-01
NI-57	Not Detected	-----	1.19E-01
BE-7	Not Detected	-----	4.49E-01
RU-103	Not Detected	-----	5.58E-02
RU-106	Not Detected	-----	5.20E-01
SB-122	Not Detected	-----	9.12E-02
SB-124	Not Detected	-----	6.43E-02
SB-125	Not Detected	-----	1.48E-01
SC-46	Not Detected	-----	9.88E-02
SR-85	Not Detected	-----	7.28E-02
TA-182	Not Detected	-----	2.87E-01
TA-183	Not Detected	-----	2.51E-01
TE-132	Not Detected	-----	5.58E-02
TL-201	Not Detected	-----	1.78E-01
V-48	Not Detected	-----	6.38E-02
XE-133	Not Detected	-----	2.26E-01
Y-88	Not Detected	-----	5.87E-02
ZN-65	Not Detected	-----	1.92E-01
ZR-95	Not Detected	-----	1.06E-01

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 7-29-95 10:10:56 AM *
 * *****
 * Analyzed by: *W 7/29/95* Reviewed by: *W 7/29/95* *
 * *****

Customer : WRIGHTSON (7585)
 Customer Sample ID : 85-BH1-10-S-1
 Lab Sample ID : 50060303

Sample Description : MARINELLI SOIL SAMPLE
 Sample Type : Solid
 Sample Geometry : 1SMAR
 Sample Quantity : 596.000 gram
 Sample Date/Time : 7-28-95 11:37:00 AM
 Acquire Start Date : 7-29-95 9:20:33 AM
 Detector Name : LAB01
 Elapsed Live Time : 1800 seconds
 Elapsed Real Time : 1801 seconds

Comments:

Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	7.18E-01	1.74E-01	1.07
TH-234	Not Detected		6.87E-01
U-234	Not Detected		2.21E+01
RA-226	1.65	1.11	1.70
PB-214	6.35E-01	1.29E-01	1.00E-01
BI-214	4.62E-01	1.11E-01	1.11E-01
PB-210	1.29	6.76E-01	6.71E-01
TH-232	6.14E-01	2.20E-01	2.64E-01
RA-228	4.31E-01	2.39E-01	2.37E-01
AC-228	7.99E-01	1.92E-01	1.41E-01
TH-228	4.69E-01	3.33E-01	4.26E-01
RA-224	Not Detected		7.75E-01
PB-212	6.78E-01	1.43E-01	7.04E-02
BI-212	7.07E-01	4.53E-01	6.59E-01
TL-208	6.52E-01	1.58E-01	1.50E-01
U-235	Not Detected		4.12E-01
TH-231	Not Detected		7.74E-01
PA-231	Not Detected		2.39
AC-227	Not Detected		3.04
TH-227	Not Detected		6.28E-01
RA-223	Not Detected		2.59E-01
RN-219	Not Detected		4.79E-01
PB-211	Not Detected		1.16
TL-207	Not Detected		2.54E+01
AM-241	Not Detected		2.71E-01
PU-239	Not Detected		4.53E+02
NP-237	Not Detected		3.21E-01
PA-233	Not Detected		1.02E-01
TH-229	Not Detected		4.20E-01

[Summary Report] - Sample ID: 50060303

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	-----	5.63E-02
AR-41	Not Detected	-----	3.27E+02
BA-133	Not Detected	-----	1.12E-01
BA-140	Not Detected	-----	2.13E-01
CD-109	Not Detected	-----	1.10
CD-115	Not Detected	-----	1.53E-01
CE-139	Not Detected	-----	5.76E-02
CE-141	Not Detected	-----	9.43E-02
CE-144	Not Detected	-----	3.89E-01
CO-56	Not Detected	-----	6.86E-02
CO-57	Not Detected	-----	5.15E-02
CO-58	Not Detected	-----	5.86E-02
CO-60	Not Detected	-----	7.52E-02
CR-51	Not Detected	-----	4.18E-01
CS-134	Not Detected	-----	9.28E-02
CS-137	Not Detected	-----	6.57E-02
CU-64	Not Detected	-----	4.54E+01
EU-152	Not Detected	-----	4.58E-01
EU-154	Not Detected	-----	3.31E-01
EU-155	Not Detected	-----	2.13E-01
FE-59	Not Detected	-----	1.30E-01
GD-153	Not Detected	-----	1.75E-01
HG-203	Not Detected	-----	5.24E-02
I-131	Not Detected	-----	5.69E-02
IN-115m	Not Detected	-----	3.47
IR-192	Not Detected	-----	5.04E-02
K-40	1.69E+01	2.55	6.65E-01
LA-140	Not Detected	-----	8.44E-02
MN-54	Not Detected	-----	6.61E-02
MN-56	Not Detected	-----	2.52E+01
MO-99	Not Detected	-----	6.12E-01
NA-22	Not Detected	-----	8.19E-02
NA-24	Not Detected	-----	1.54E-01
NB-95	Not Detected	-----	3.48E-01
ND-147	Not Detected	-----	3.79E-01
NI-57	Not Detected	-----	1.39E-01
BE-7	Not Detected	-----	4.50E-01
RU-103	Not Detected	-----	5.40E-02
RU-106	Not Detected	-----	5.18E-01
SB-122	Not Detected	-----	1.03E-01
SB-124	Not Detected	-----	6.57E-02
SB-125	Not Detected	-----	1.44E-01
SC-46	Not Detected	-----	1.00E-01
SR-85	Not Detected	-----	6.79E-02
TA-182	Not Detected	-----	2.94E-01
TA-183	Not Detected	-----	2.61E-01
TE-132	Not Detected	-----	6.18E-02
TL-201	Not Detected	-----	1.87E-01
V-48	Not Detected	-----	6.97E-02
XE-133	Not Detected	-----	2.46E-01
Y-88	Not Detected	-----	5.55E-02
ZN-65	Not Detected	-----	1.96E-01
ZR-95	Not Detected	-----	1.07E-01

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 7-29-95 10:25:03 AM *

 * Analyzed by: *JP 7/28/95* Reviewed by: *JP 7/29/95* *

Customer : WRIGHTSON (7585)
 Customer Sample ID : B5-BH1-15-S-1
 Lab Sample ID : 50060304
 Sample Description : MARINELLI SOIL SAMPLE
 Sample Type : Solid
 Sample Geometry : 1SMAR
 Sample Quantity : 614.000 gram
 Sample Date/Time : 7-28-95 12:05:00 PM
 Acquire Start Date : 7-29-95 9:52:33 AM
 Detector Name : LAB01
 Elapsed Live Time : 1800 seconds
 Elapsed Real Time : 1801 seconds

Comments:

Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	Not Detected	-----	2.00
TH-234	Not Detected	-----	5.22E-01
U-234	Not Detected	-----	2.10E+01
RA-226	1.40	6.87E-01	9.87E-01
PB-214	4.76E-01	1.03E-01	8.53E-02
BI-214	4.67E-01	1.04E-01	9.22E-02
PB-210	Not Detected	-----	1.27
TH-232	4.88E-01	2.01E-01	2.59E-01
RA-228	4.32E-01	2.11E-01	2.07E-01
AC-228	6.08E-01	2.57E-01	1.23E-01
TH-228	Not Detected	-----	1.53
RA-224	1.40	4.59E-01	6.71E-01
PB-212	5.87E-01	1.49E-01	6.52E-02
BI-212	5.54E-01	4.49E-01	6.86E-01
TL-208	5.32E-01	1.37E-01	1.35E-01
U-235	Not Detected	-----	3.57E-01
TH-231	Not Detected	-----	7.16E-01
PA-231	Not Detected	-----	2.13
AC-227	Not Detected	-----	2.70
TH-227	Not Detected	-----	5.69E-01
RA-223	Not Detected	-----	2.40E-01
RN-219	Not Detected	-----	3.45E-01
PB-211	Not Detected	-----	1.06
TL-207	Not Detected	-----	2.34E+01
AM-241	Not Detected	-----	2.45E-01
PU-239	Not Detected	-----	4.33E+02
NP-237	Not Detected	-----	4.60E-01
PA-233	Not Detected	-----	1.03E-01
TH-229	Not Detected	-----	3.86E-01

[Summary Report] - Sample ID: 50060304

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	-----	5.04E-02
AR-41	Not Detected	-----	3.01E+02
BA-133	Not Detected	-----	9.95E-02
BA-140	Not Detected	-----	2.11E-01
CD-109	Not Detected	-----	8.67E-01
CD-115	Not Detected	-----	1.42E-01
CE-139	Not Detected	-----	5.02E-02
CE-141	Not Detected	-----	8.39E-02
CE-144	Not Detected	-----	3.85E-01
CO-56	Not Detected	-----	6.78E-02
CO-57	Not Detected	-----	4.86E-02
CO-58	Not Detected	-----	5.42E-02
CO-60	Not Detected	-----	6.30E-02
CR-51	Not Detected	-----	4.03E-01
CS-134	Not Detected	-----	8.49E-02
CS-137	Not Detected	-----	5.94E-02 ←
CU-64	Not Detected	-----	4.54E+01
EU-152	Not Detected	-----	4.51E-01
EU-154	Not Detected	-----	3.11E-01
EU-155	Not Detected	-----	1.92E-01
FE-59	Not Detected	-----	1.16E-01
GD-153	Not Detected	-----	1.62E-01
HG-203	Not Detected	-----	4.88E-02
I-131	Not Detected	-----	5.22E-02
IN-115m	Not Detected	-----	3.25
IR-192	Not Detected	-----	4.85E-02
K-40	1.66E+01	2.48	5.31E-01
LA-140	Not Detected	-----	8.60E-02
MN-54	Not Detected	-----	5.76E-02
MN-56	Not Detected	-----	2.54E+01
MO-99	Not Detected	-----	5.30E-01
NA-22	Not Detected	-----	7.47E-02
NA-24	Not Detected	-----	1.50E-01
NB-95	Not Detected	-----	3.15E-01
ND-147	Not Detected	-----	3.82E-01
NI-57	Not Detected	-----	1.17E-01
BE-7	Not Detected	-----	4.07E-01
RU-103	Not Detected	-----	4.66E-02
RU-106	Not Detected	-----	4.86E-01
SB-122	Not Detected	-----	8.75E-02
SB-124	Not Detected	-----	5.74E-02
SB-125	Not Detected	-----	1.48E-01
SC-46	Not Detected	-----	8.06E-02
SR-85	Not Detected	-----	6.44E-02
TA-182	Not Detected	-----	2.30E-01
TA-183	Not Detected	-----	2.37E-01
TE-132	Not Detected	-----	5.62E-02
TL-201	Not Detected	-----	1.70E-01
V-48	Not Detected	-----	6.77E-02
XE-133	Not Detected	-----	2.34E-01
Y-88	Not Detected	-----	5.38E-02
ZN-65	Not Detected	-----	1.61E-01
ZR-95	Not Detected	-----	9.95E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 7-29-95 11:16:41 AM *

 * Analyzed by: *W 7/29/95* Reviewed by: *W 7/29/95* *

Customer : WRIGHTSON (7585)
 Customer Sample ID : LAB CONTROL SAMPLE ANALYSIS #CG134
 Lab Sample ID : 50060305

Sample Description : MIXED GAMMA STANDARD
 Sample Type : Liquid
 Sample Geometry : WMAR
 Sample Quantity : 1.000 Each
 Sample Date/Time : 11-01-90 12:00:00 PM
 Acquire Start Date : 7-29-95 11:00:14 AM
 Detector Name : LAB01
 Elapsed Live Time : 600 seconds
 Elapsed Real Time : 608 seconds

Comments:

Nuclide	Activity (pCi/Each)	2S Error	MDA
U-238	Not Detected	-----	2.07E+04
TH-234	Not Detected	-----	3.91E+03
U-234	Not Detected	-----	1.14E+05
RA-226	Not Detected	-----	5.99E+03
PB-214	Not Detected	-----	6.97E+02
BI-214	Not Detected	-----	6.23E+02
PB-210	Not Detected	-----	4.24E+03
TH-232	Not Detected	-----	2.02E+03
RA-228	Not Detected	-----	2.69E+03
AC-228	Not Detected	-----	1.75E+03
TH-228	Not Detected	-----	3.65E+04
RA-224	Not Detected	-----	3.19E+04
PB-212	Not Detected	-----	2.88E+03
BI-212	Not Detected	-----	2.62E+04
TL-208	Not Detected	-----	5.26E+03
U-235	Not Detected	-----	1.64E+03
TH-231	Not Detected	-----	2.64E+03
PA-231	Not Detected	-----	9.12E+03
AC-227	Not Detected	-----	1.46E+04
TH-227	Not Detected	-----	2.35E+03
RA-223	Not Detected	-----	1.00E+26
RN-219	Not Detected	-----	2.82E+03
PB-211	Not Detected	-----	8.55E+03
TL-207	Not Detected	-----	2.20E+05
AM-241	8.90E+04	1.41E+04	1.93E+03
PU-239	Not Detected	-----	1.83E+06
NP-237	Not Detected	-----	1.78E+03
PA-233	Not Detected	-----	6.04E+02
TH-229	Not Detected	-----	1.60E+03

[Summary Report] - Sample ID: 50060305

Nuclide	Activity (pCi/Each)	2S Error	MDA
AG-110m	Not Detected	-----	1.78E+05
AR-41	Not Detected	-----	1.00E+26
BA-133	Not Detected	-----	5.53E+02
BA-140	Not Detected	-----	1.00E+26
CD-109	3.10E+05	6.57E+04	6.13E+04
CD-115	Not Detected	-----	1.00E+26
CE-139	Not Detected	-----	1.46E+06
CE-141	Not Detected	-----	3.99E+18
CE-144	Not Detected	-----	1.11E+05
CO-56	Not Detected	-----	2.33E+09
CO-57	1.33E+04	9.83E+03	1.54E+04
CO-58	Not Detected	-----	8.17E+09
CO-60	7.40E+04	9.62E+03	5.41E+02
CR-51	Not Detected	-----	1.51E+22
CS-134	Not Detected	-----	1.46E+03
CS-137	6.80E+04	8.78E+03	7.22E+02
CU-64	Not Detected	-----	1.00E+26
EU-152	Not Detected	-----	3.44E+03
EU-154	Not Detected	-----	2.23E+03
EU-155	Not Detected	-----	1.66E+03
FE-59	Not Detected	-----	4.49E+14
GD-153	Not Detected	-----	8.59E+04
HG-203	Not Detected	-----	4.10E+13
I-131	Not Detected	-----	1.00E+26
IN-115m	Not Detected	-----	1.00E+26
IR-192	Not Detected	-----	3.23E+09
K-40	Not Detected	-----	1.74E+03
LA-140	Not Detected	-----	1.00E+26
MN-54	Not Detected	-----	1.78E+04
MN-56	Not Detected	-----	1.00E+26
MO-99	Not Detected	-----	1.00E+26
NA-22	Not Detected	-----	7.96E+02
NA-24	Not Detected	-----	1.00E+26
NB-95	Not Detected	-----	1.00E+26
ND-147	Not Detected	-----	1.00E+26
NI-57	Not Detected	-----	1.00E+26
BE-7	Not Detected	-----	1.98E+13
RU-103	Not Detected	-----	6.35E+15
RU-106	Not Detected	-----	7.69E+04
SB-122	Not Detected	-----	1.00E+26
SB-124	Not Detected	-----	1.34E+11
SB-125	Not Detected	-----	3.56E+03
SC-46	Not Detected	-----	7.52E+08
SR-85	Not Detected	-----	3.85E+10
TA-182	Not Detected	-----	4.44E+07
TA-183	Not Detected	-----	1.00E+26
TE-132	Not Detected	-----	1.00E+26
TL-201	Not Detected	-----	1.00E+26
V-48	Not Detected	-----	1.00E+26
XE-133	Not Detected	-----	1.00E+26
Y-88	Not Detected	-----	1.37E+07
ZN-65	Not Detected	-----	1.30E+05
ZR-95	Not Detected	-----	8.22E+10

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program *
 * Quality Assurance Report *

Report Date : 7-29-95 11:25:26 AM
 QA File : C:\GENIEPC\CAMFILES\LCS1.QAF
 Analyst : FCD
 Sample ID : 50060305
 Sample Quantity : 1.00 Each
 Sample Date : 11-01-90 12:00:00 PM
 Measurement Date : 7-29-95 11:00:14 AM
 Elapsed Live Time : 600 seconds
 Elapsed Real Time : 608 seconds

Parameter	Mean	1S Error	New Value	< LU : SD : UD : BS >
AM-241 Activity	8.611E-02	1.037E-02	8.902E-02	< : : : >
CS-137 Activity	6.929E-02	7.029E-03	6.800E-02	< : : : >
CO-60 Activity	7.812E-02	8.226E-03	7.406E-02	< : : : >

Flags Key: LU = Boundary Test (Ab = Above , Be = Below)
 SD = Sample Driven N-Sigma Test (In = Investigate, Ac = Action)
 UD = User Driven N-Sigma Test (In = Investigate, Ac = Action)
 BS = Measurement Bias Test (In = Investigate, Ac = Action)

Reviewed by: JK 7/28/95



500615
Sandia National Laboratories

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

No: 509408

Page 1 of 1

Department No: <u>7585</u>	Date Samples Shipped: <u>7/31/95</u>	Bill to: <u>Sandia National Laboratories</u>
Project/Task Manager: <u>Skip Wrightson</u>	Carrier/Waybill No: _____	<u>Supplier Services Department 0154</u>
Project Name: <u>Scoping Sampling</u>	Lab Destination: _____	<u>P.O. Box 5800</u>
Sample Team Members: <u>Alise Trent</u>	Lab Contact: <u>Amir Mahdighi</u>	<u>Albuquerque, NM 87185</u>
<u>Red Nagel</u>	SMO Contact/Phone: <u>294-2601</u>	Contract No: _____
<u>Jeff Johnston</u>	Send Report to SMO: <u>Skip Wrightson</u>	Case No: <u>3628-600</u>
	SMO Reference No: _____	SMO Authorization: _____

Sample Number	Sample Type	Date/Time Collected	Container Type	Sample Volume	Preservative	Requested Testing Program	QC	Lab Sample Number	Condition on Receipt
85-BH2-0-S-1	Soil	7/31/95 10:15	P 500ml	500ml	none	Gamma Spec	N		
85-BH2-5-S-1	↓	10:25	P	500ml			↓		
85-BH2-10-S-1	↓	10:40					↓		
85-BH2-15-S-1	↓	10:55					↓		
85-BH3-0-S-1	↓	11:25					↓		
85-BH3-5-S-1	↓	11:40					↓		
85-BH3-5-SD-1	↓	11:40					Y		
85-BH3-10-S-1	↓	11:55					N		
85-BH3-15-S-1	↓	12:10					↓		
85-BH4-0-S-1	↓	12:50					↓		
85-BH4-5-S-1	↓	13:05	↓	↓	↓	↓	↓		

Possible Hazard Identification
Non-hazard ☒ Flammable ☐ Skin Irritant ☐ Poison B ☐ Other ☐

Special Instructions/QC Requirements

Turnaround Time

Normal ☒ Rush ☐ Required Report Date _____

Sample Disposal

Return to Client ☒ Disposal by Lab ☐ Archive Until _____

1. Relinquished by <u>R. Nagel</u>	Org <u>TS/584</u>	Date <u>8/1/95</u>	Time <u>1100</u>
1. Received by <u>2</u>	Org <u>SM/7715</u>	Date <u>8/1/95</u>	Time <u>1100</u>
2. Relinquished by	Org	Date	Time
2. Received by	Org	Date	Time
3. Relinquished by	Org	Date	Time
3. Received by	Org	Date	Time

4. Relinquished by	Org	Date	Time
4. Received by	Org	Date	Time
5. Relinquished by	Org	Date	Time
5. Received by	Org	Date	Time
6. Relinquished by	Org	Date	Time
6. Received by	Org	Date	Time



Sandia National Laboratories

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD (cont.)

500615

No: 5094115

Page ____ of ____

Project Name: Scoping Sampling

Project/Task Manager: Steph Wrightson

Case Number: 3628.600

[illegible]



Sai. 500603 National Laboratories

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

No: 505 1

Page 1 of 1

Department No: <u>7585</u>	Date Samples Shipped: <u>7/28/91</u>	Bill to: <u>Sandia National Laboratories</u>
Project/Task Manager: <u>SLIA Wright</u>	Carrier/Waybill No: <u>WA</u>	Supplier Services Department 0154
Project Name: <u>Scoping study</u>	Lab Destination: <u>SNL 7715</u>	P.O. Box 5800
Sample Team Members: <u>AKSS Team</u>	Lab Contact: <u>Amir Al-Badraghi</u>	Albuquerque, NM 87185
<u>John J. Smith</u>	SMO Contact/Phone: <u>241-2601</u>	Contract No: _____
<u>John J. Smith</u>	Send Report to SMO: <u>SLIA Wright</u>	Case No: <u>56-8.605</u>
	SMO Reference No: _____	SMO Authorization: _____

Sample Number	Sample Type	Date/Time Collected	Container Type	Sample Volume	Preservative	Requested Testing Program	QC	Lab Sample Number	Condition on Receipt
85-BH1-C-S-1	Soil	7/28/91 1115	AEP	500ml	none	Gamma Spec	u		
85-BH1-R-S-1	↓	↓ 1125	↓ P	↓	↓	↓	↓		
85-BH1-10-S-1	↓	↓ 1137	↓ P	↓	↓	↓	↓		
85-BH1-K-S-1	↓	↓ 1215	↓ P	↓	↓	↓	↓		

Possible Hazard Identification				Special Instructions/QC Requirements			
Non-hazard <input checked="" type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Other <input type="checkbox"/>							
Turnaround Time							
Normal <input type="checkbox"/> Rush <input type="checkbox"/> Required Report Date _____							
Sample Disposal							
Return to Client <input type="checkbox"/> Disposal by Lab <input type="checkbox"/> Archive Until _____							
1. Relinquished by <u>SLIA Wright</u>	Org <u>7/28/91</u>	Date <u>7/28/91</u>	Time <u>1430</u>	4. Relinquished by	Org	Date	Time
1. Received by <u>Amir Al-Badraghi</u>	Org <u>SNL 7715</u>	Date <u>7/28/91</u>	Time <u>1420</u>	4. Received by	Org	Date	Time
2. Relinquished by	Org	Date	Time	5. Relinquished by	Org	Date	Time
2. Received by	Org	Date	Time	5. Received by	Org	Date	Time
3. Relinquished by	Org	Date	Time	6. Relinquished by	Org	Date	Time
3. Received by	Org	Date	Time	6. Received by	Org	Date	Time

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 8-02-95 4:11:30 PM *
 * *****
 * Analyzed by: *Sec 8/3/95* Reviewed by: *gdm 8/4/95* *
 * *****

Customer : S.WRIGHTSON (7585)
 Customer Sample ID : 85 -BH2-0-S-1
 Lab Sample ID : 50061501
 Sample Description : MARINELLI SOIL SAMPLES
 Sample Type : Solid
 Sample Geometry : 2SMAR
 Sample Quantity : 517.000 gram
 Sample Date/Time : 7-31-95 10:15:00 AM
 Acquire Start Date : 8-02-95 3:34:17 PM
 Detector Name : LAB02
 Elapsed Live Time : 1800 seconds
 Elapsed Real Time : 1801 seconds

Comments:

Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	Not Detected		6.48
TH-234	Not Detected		1.52
U-234	Not Detected	-----	2.44E+01
RA-226	9.09E-01	6.81E-01	1.04
PB-214	7.33E-01	1.59E-01	1.38E-01
BI-214	6.24E-01	1.36E-01	1.12E-01
PB-210	Not Detected	-----	1.94
TH-232	6.07E-01	2.83E-01	3.85E-01
RA-228	5.14E-01	2.66E-01	2.78E-01
AC-228	Not Detected	-----	4.17E-01
TH-228	Not Detected	-----	1.52
RA-224	7.73E-01	5.61E-01	1.04
PB-212	6.55E-01	1.58E-01	8.85E-02
BI-212	7.60E-01	5.56E-01	8.31E-01
TL-208	5.59E-01	1.63E-01	1.77E-01
U-235	Not Detected	-----	4.92E-01
TH-231	Not Detected	-----	1.13
PA-231	Not Detected	-----	2.10
AC-227	Not Detected	-----	3.44
TH-227	Not Detected	-----	7.01E-01
RA-223	Not Detected	-----	4.02E-01
RN-219	Not Detected	-----	5.43E-01
PB-211	Not Detected	-----	1.23
TL-207	Not Detected	-----	2.97E+01
AM-241	Not Detected	-----	1.08
PU-239	Not Detected	-----	5.61E+02
NP-237	Not Detected	-----	7.41E-01
PA-233	Not Detected	-----	1.24E-01
TH-229	Not Detected	-----	5.66E-01

[Summary Report] - Sample ID: 50061501

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	-----	7.36E-02
AR-41	Not Detected	-----	5.79E+07
BA-133	Not Detected	-----	1.28E-01
BA-140	Not Detected	-----	2.43E-01
CD-109	Not Detected	-----	2.57
CD-115	Not Detected	-----	2.54E-01
CE-139	Not Detected	-----	5.95E-02
CE-141	Not Detected	-----	1.14E-01
CE-144	Not Detected	-----	4.85E-01
CO-56	Not Detected	-----	8.52E-02
CO-57	Not Detected	-----	6.16E-02
CO-58	Not Detected	-----	7.08E-02
CO-60	Not Detected	-----	8.52E-02
CR-51	Not Detected	-----	4.92E-01
CS-134	Not Detected	-----	1.03E-01
CS-137	4.27E-02	3.17E-02	4.67E-02
CU-64	Not Detected	-----	2.62E+02
EU-152	Not Detected	-----	5.98E-01
EU-154	Not Detected	-----	4.11E-01
EU-155	Not Detected	-----	2.75E-01
FE-59	Not Detected	-----	1.76E-01
GD-153	Not Detected	-----	2.23E-01
HG-203	Not Detected	-----	5.84E-02
I-131	Not Detected	-----	6.84E-02
IN-115m	Not Detected	-----	5.05E+02
IR-192	Not Detected	-----	6.08E-02
K-40	1.93E+01	2.93	7.06E-01
LA-140	Not Detected	-----	2.04E-01
MN-54	Not Detected	-----	7.43E-02
MN-56	Not Detected	-----	1.51E+05
MO-99	Not Detected	-----	9.63E-01
NA-22	Not Detected	-----	9.44E-02
NA-24	Not Detected	-----	9.71E-01
NB-95	Not Detected	-----	4.88E-01
ND-147	Not Detected	-----	4.27E-01
NI-57	Not Detected	-----	2.89E-01
BE-7	Not Detected	-----	5.41E-01
RU-103	Not Detected	-----	5.83E-02
RU-106	Not Detected	-----	6.20E-01
SB-122	Not Detected	-----	1.56E-01
SB-124	Not Detected	-----	7.11E-02
SB-125	Not Detected	-----	1.60E-01
SC-46	Not Detected	-----	1.09E-01
SR-85	Not Detected	-----	7.68E-02
TA-182	Not Detected	-----	3.20E-01
TA-183	Not Detected	-----	1.26
TE-132	Not Detected	-----	8.80E-02
TL-201	Not Detected	-----	5.02E-01
V-48	Not Detected	-----	8.07E-02
XE-133	Not Detected	-----	4.87E-01
Y-88	Not Detected	-----	6.23E-02
ZN-65	Not Detected	-----	2.20E-01
ZR-95	Not Detected	-----	1.35E-01

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 8-03-95 1:53:22 PM *
 * *****
 * Analyzed by: *Sly 8/2/95* Reviewed by: *AGM 8/4/95* *
 * *****

Customer : S.WRIGHTSON (7585)
 Customer Sample ID : 85-BH2-5-S-1
 Lab Sample ID : 50061502

Sample Description : MARINELLI SOIL SAMPLE
 Sample Type : Solid
 Sample Geometry : 2SMAR
 Sample Quantity : 725.000 gram
 Sample Date/Time : 7-31-95 10:25:00 AM
 Acquire Start Date : 8-03-95 1:16:08 PM
 Detector Name : LAB02
 Elapsed Live Time : 1800 seconds
 Elapsed Real Time : 1801 seconds

Comments:

Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	Not Detected	-----	4.59
TH-234	Not Detected	-----	1.03
U-234	Not Detected	-----	1.85E+01
RA-226	Not Detected	-----	1.06
PB-214	4.32E-01	1.03E-01	1.01E-01
BI-214	3.91E-01	1.02E-01	1.10E-01
PB-210	Not Detected	-----	1.34
TH-232	4.47E-01	1.82E-01	2.30E-01
RA-228	5.58E-01	2.03E-01	2.30E-01
AC-228	4.84E-01	1.68E-01	2.00E-01
TH-228	3.51E-01	2.73E-01	7.40E-01
RA-224	Not Detected	-----	1.50
PB-212	5.20E-01	1.17E-01	6.45E-02
BI-212	7.84E-01	3.60E-01	4.55E-01
TL-208	4.05E-01	1.12E-01	1.13E-01
U-235	Not Detected	-----	3.51E-01
TH-231	Not Detected	-----	8.18E-01
PA-231	Not Detected	-----	1.48
AC-227	Not Detected	-----	2.42
TH-227	Not Detected	-----	5.12E-01
RA-223	Not Detected	-----	3.06E-01
RN-219	Not Detected	-----	4.10E-01
PB-211	Not Detected	-----	9.86E-01
TL-207	Not Detected	-----	2.07E+01
AM-241	Not Detected	-----	7.79E-01
PU-239	Not Detected	-----	3.98E+02
NP-237	Not Detected	-----	5.36E-01
PA-233	Not Detected	-----	9.24E-02
TH-229	Not Detected	-----	3.89E-01

[Summary Report] - Sample ID: 50061502

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	-----	4.37E-02
AR-41	Not Detected	-----	1.59E+11
BA-133	Not Detected	-----	8.81E-02
BA-140	Not Detected	-----	1.92E-01
CD-109	Not Detected	-----	1.84
CD-115	Not Detected	-----	2.45E-01
CE-139	Not Detected	-----	4.39E-02
CE-141	Not Detected	-----	8.43E-02
CE-144	Not Detected	-----	3.56E-01
CO-56	Not Detected	-----	5.38E-02
CO-57	Not Detected	-----	4.62E-02
CO-58	Not Detected	-----	4.57E-02
CO-60	Not Detected	-----	5.00E-02
CR-51	Not Detected	-----	3.82E-01
CS-134	Not Detected	-----	6.98E-02
CS-137	Not Detected	-----	5.25E-02
CU-64	Not Detected	-----	6.76E+02
EU-152	Not Detected	-----	3.85E-01
EU-154	Not Detected	-----	2.71E-01
EU-155	Not Detected	-----	2.16E-01
FE-59	Not Detected	-----	1.16E-01
GD-153	Not Detected	-----	1.55E-01
HG-203	Not Detected	-----	4.47E-02
I-131	Not Detected	-----	5.16E-02
IN-115m	Not Detected	-----	1.02E+04
IR-192	Not Detected	-----	4.35E-02
K-40	1.29E+01	1.97	4.33E-01
LA-140	Not Detected	-----	1.73E-01
MN-54	Not Detected	-----	5.49E-02
MN-56	Not Detected	-----	3.08E+07
MO-99	Not Detected	-----	8.21E-01
NA-22	Not Detected	-----	7.13E-02
NA-24	Not Detected	-----	1.80
NB-95	Not Detected	-----	4.16E-01
ND-147	Not Detected	-----	3.51E-01
NI-57	Not Detected	-----	3.13E-01
BE-7	Not Detected	-----	3.74E-01
RU-103	Not Detected	-----	4.14E-02
RU-106	Not Detected	-----	4.33E-01
SB-122	Not Detected	-----	1.32E-01
SB-124	Not Detected	-----	4.73E-02
SB-125	Not Detected	-----	1.21E-01
SC-46	Not Detected	-----	7.34E-02
SR-85	Not Detected	-----	5.44E-02
TA-182	Not Detected	-----	2.16E-01
TA-183	Not Detected	-----	1.03
TE-132	Not Detected	-----	7.20E-02
TL-201	Not Detected	-----	4.89E-01
V-48	Not Detected	-----	6.21E-02
XE-133	Not Detected	-----	4.94E-01
Y-88	Not Detected	-----	4.84E-02
ZN-65	Not Detected	-----	1.41E-01
ZR-95	Not Detected	-----	8.69E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 8-03-95 2:39:38 PM *

 * Analyzed by: *SLC 8/3/95* Reviewed by: *DM 8/4/95* *

Customer : S.WRIGHTSON (7585)
 Customer Sample ID : 85-BH2-10-S-1
 Lab Sample ID : 50061503

Sample Description : MARINELLI SOIL SAMPLE
 Sample Type : Solid
 Sample Geometry : 2SMAR
 Sample Quantity : 752.000 gram
 Sample Date/Time : 7-31-95 10:40:00 AM
 Acquire Start Date : 8-03-95 2:03:51 PM
 Detector Name : LAB02
 Elapsed Live Time : 1800 seconds
 Elapsed Real Time : 1801 seconds

Comments:

Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	Not Detected		5.23
TH-234	Not Detected		9.46E-01
U-234	Not Detected		2.05E+01
RA-226	8.24E-01	5.40E-01	8.10E-01
PB-214	5.69E-01	1.20E-01	1.03E-01
BI-214	4.43E-01	9.58E-02	7.91E-02
PB-210	Not Detected		1.29
TH-232	5.61E-01	2.27E-01	2.98E-01
RA-228	5.88E-01	2.58E-01	3.44E-01
AC-228	6.87E-01	1.72E-01	1.42E-01
TH-228	6.60E-01	3.40E-01	6.68E-01
RA-224	Not Detected		1.67
PB-212	4.88E-01	1.05E-01	8.73E-02
BI-212	6.65E-01	4.27E-01	6.24E-01
TL-208	5.30E-01	1.31E-01	1.24E-01
U-235	Not Detected		3.62E-01
TH-231	Not Detected		9.05E-01
PA-231	Not Detected		1.63
AC-227	Not Detected		2.68
TH-227	Not Detected		5.54E-01
RA-223	Not Detected		3.47E-01
RN-219	Not Detected		4.40E-01
PB-211	Not Detected		1.04
TL-207	Not Detected		2.23E+01
AM-241	Not Detected		8.96E-01
PU-239	Not Detected		3.94E+02
NP-237	Not Detected		5.53E-01
PA-233	Not Detected		9.02E-02
TH-229	Not Detected		4.19E-01

[Summary Report] - Sample ID: 50061503

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	-----	4.73E-02
AR-41	Not Detected	-----	2.04E+11
BA-133	Not Detected	-----	9.44E-02
BA-140	Not Detected	-----	1.99E-01
CD-109	Not Detected	-----	1.92
CD-115	Not Detected	-----	2.77E-01
CE-139	Not Detected	-----	4.73E-02
CE-141	Not Detected	-----	8.28E-02
CE-144	Not Detected	-----	3.58E-01
CO-56	Not Detected	-----	6.20E-02
CO-57	Not Detected	-----	4.77E-02
CO-58	Not Detected	-----	4.81E-02
CO-60	Not Detected	-----	5.81E-02
CR-51	Not Detected	-----	3.75E-01
CS-134	Not Detected	-----	7.85E-02
CS-137	Not Detected	-----	5.35E-02
CU-64	Not Detected	-----	6.64E+02
EU-152	Not Detected	-----	4.50E-01
EU-154	Not Detected	-----	2.92E-01
EU-155	Not Detected	-----	2.12E-01
FE-59	Not Detected	-----	1.27E-01
GD-153	Not Detected	-----	1.69E-01
HG-203	Not Detected	-----	4.62E-02
I-131	Not Detected	-----	5.50E-02
IN-115m	Not Detected	-----	1.25E+04
IR-192	Not Detected	-----	4.40E-02
K-40	1.53E+01	2.29	4.98E-01
LA-140	Not Detected	-----	2.13E-01
MN-54	Not Detected	-----	6.03E-02
MN-56	Not Detected	-----	4.12E+07
MO-99	Not Detected	-----	8.95E-01
NA-22	Not Detected	-----	7.44E-02
NA-24	Not Detected	-----	1.83
NB-95	Not Detected	-----	4.57E-01
ND-147	Not Detected	-----	3.55E-01
NI-57	Not Detected	-----	3.50E-01
BE-7	Not Detected	-----	3.88E-01
RU-103	Not Detected	-----	4.05E-02
RU-106	Not Detected	-----	4.54E-01
SB-122	Not Detected	-----	1.47E-01
SB-124	Not Detected	-----	5.45E-02
SB-125	Not Detected	-----	1.24E-01
SC-46	Not Detected	-----	8.68E-02
SR-85	Not Detected	-----	5.99E-02
TA-182	Not Detected	-----	2.54E-01
TA-183	Not Detected	-----	1.19
TE-132	Not Detected	-----	7.84E-02
TL-201	Not Detected	-----	5.11E-01
V-48	Not Detected	-----	6.41E-02
XE-133	Not Detected	-----	5.67E-01
Y-88	Not Detected	-----	3.46E-02
ZN-65	Not Detected	-----	1.66E-01
ZR-95	Not Detected	-----	9.32E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 8-02-95 6:59:34 PM *

 * Analyzed by: *Sp 8/3/95* Reviewed by: *JGM 8/4/95* *

Customer : S.WRIGHTSON (7585)
 Customer Sample ID : 85-BH2-15-S-1
 Lab Sample ID : 50061504
 Sample Description : MARINELLI SOIL SAMPLES
 Sample Type : Solid
 Sample Geometry : 2SMAR
 Sample Quantity : 601.000 gram
 Sample Date/Time : 7-31-95 10:53:00 AM
 Acquire Start Date : 8-02-95 6:22:09 PM
 Detector Name : LAB02
 Elapsed Live Time : 1800 seconds
 Elapsed Real Time : 1801 seconds

Comments:

Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	Not Detected	-----	6.27
TH-234	Not Detected	-----	1.43
U-234	Not Detected	-----	2.23E+01
RA-226	1.27	9.29E-01	1.43
PB-214	7.13E-01	1.45E-01	1.11E-01
BI-214	5.82E-01	1.37E-01	1.39E-01
PB-210	Not Detected	-----	1.39
TH-232	9.16E-01	3.54E-01	4.64E-01
RA-228	6.93E-01	2.70E-01	3.29E-01
AC-228	Not Detected	-----	3.94E-01
TH-228	Not Detected	-----	1.53
RA-224	Not Detected	-----	1.93
PB-212	7.56E-01	1.62E-01	7.63E-02
BI-212	6.87E-01	3.55E-01	5.43E-01
TL-208	5.14E-01	1.47E-01	1.59E-01
U-235	Not Detected	-----	4.35E-01
TH-231	Not Detected	-----	1.09
PA-231	Not Detected	-----	2.12
AC-227	Not Detected	-----	3.18
TH-227	Not Detected	-----	6.68E-01
RA-223	Not Detected	-----	4.05E-01
RN-219	Not Detected	-----	5.17E-01
PB-211	Not Detected	-----	1.14
TL-207	Not Detected	-----	2.53E+01
AM-241	Not Detected	-----	1.00
PU-239	Not Detected	-----	4.99E+02
NP-237	Not Detected	-----	7.00E-01
PA-233	Not Detected	-----	1.09E-01
TH-229	Not Detected	-----	4.90E-01

[Summary Report] - Sample ID: 50061504

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	-----	5.52E-02
AR-41	Not Detected	-----	1.22E+08
BA-133	Not Detected	-----	1.18E-01
BA-140	Not Detected	-----	2.15E-01
CD-109	Not Detected	-----	2.30
CD-115	Not Detected	-----	2.59E-01
CE-139	Not Detected	-----	5.65E-02
CE-141	Not Detected	-----	1.06E-01
CE-144	Not Detected	-----	4.40E-01
CO-56	Not Detected	-----	6.76E-02
CO-57	Not Detected	-----	5.65E-02
CO-58	Not Detected	-----	6.76E-02
CO-60	Not Detected	-----	7.09E-02
CR-51	Not Detected	-----	4.23E-01
CS-134	Not Detected	-----	9.55E-02
CS-137	Not Detected	-----	6.25E-02
CU-64	Not Detected	-----	2.98E+02
EU-152	Not Detected	-----	4.62E-01
EU-154	Not Detected	-----	3.48E-01
EU-155	Not Detected	-----	2.58E-01
FE-59	Not Detected	-----	1.39E-01
GD-153	Not Detected	-----	1.98E-01
HG-203	Not Detected	-----	5.67E-02
I-131	Not Detected	-----	6.39E-02
IN-115m	Not Detected	-----	6.98E+02
IR-192	Not Detected	-----	4.79E-02
K-40	1.46E+01	2.25	5.26E-01
LA-140	Not Detected	-----	1.72E-01
MN-54	Not Detected	-----	6.03E-02
MN-56	Not Detected	-----	2.14E+05
MO-99	Not Detected	-----	8.97E-01
NA-22	Not Detected	-----	7.77E-02
NA-24	Not Detected	-----	8.80E-01
NB-95	Not Detected	-----	4.75E-01
ND-147	Not Detected	-----	4.25E-01
NI-57	Not Detected	-----	2.64E-01
BE-7	Not Detected	-----	4.63E-01
RU-103	Not Detected	-----	5.20E-02
RU-106	Not Detected	-----	5.63E-01
SB-122	Not Detected	-----	1.37E-01
SB-124	Not Detected	-----	5.77E-02
SB-125	Not Detected	-----	1.43E-01
SC-46	Not Detected	-----	1.04E-01
SR-85	Not Detected	-----	7.45E-02
TA-182	Not Detected	-----	3.05E-01
TA-183	Not Detected	-----	1.19
TE-132	Not Detected	-----	7.71E-02
TL-201	Not Detected	-----	5.14E-01
V-48	Not Detected	-----	6.73E-02
XE-133	Not Detected	-----	5.17E-01
Y-88	Not Detected	-----	5.66E-02
ZN-65	Not Detected	-----	1.99E-01
ZR-95	Not Detected	-----	1.07E-01

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 8-02-95 7:39:23 PM *
 * *****
 * Analyzed by: *Spa 8/3/95* Reviewed by: *Jim 8/4/95* *
 * *****

Customer : S.WRIGHTSON (7585)
 Customer Sample ID : 85-BH3-0-S-1
 Lab Sample ID : 50061505

Sample Description : MARINELLI SOIL SAMPLES
 Sample Type : Solid
 Sample Geometry : 2SMAR
 Sample Quantity : 689.000 gram
 Sample Date/Time : 7-31-95 11:25:00 AM
 Acquire Start Date : 8-02-95 7:05:39 PM
 Detector Name : LAB02
 Elapsed Live Time : 1800 seconds
 Elapsed Real Time : 1801 seconds

Comments:

Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	Not Detected		5.53
TH-234	Not Detected		1.25
U-234	Not Detected	-----	2.17E+01
RA-226	1.16	5.69E-01	8.00E-01
PB-214	5.46E-01	1.18E-01	1.00E-01
BI-214	6.14E-01	1.19E-01	8.00E-02
PB-210	8.44E-01	5.72E-01	7.02E-01
TH-232	4.36E-01	1.93E-01	2.54E-01
RA-228	6.13E-01	2.50E-01	3.18E-01
AC-228	6.11E-01	1.73E-01	1.67E-01
TH-228	7.49E-01	4.15E-01	8.77E-01
RA-224	Not Detected	-----	1.76
PB-212	5.77E-01	1.31E-01	7.81E-02
BI-212	6.22E-01	4.37E-01	6.49E-01
TL-208	5.43E-01	1.36E-01	1.29E-01
U-235	Not Detected	-----	3.94E-01
TH-231	Not Detected	-----	9.59E-01
PA-231	Not Detected	-----	1.91
AC-227	Not Detected	-----	2.82
TH-227	Not Detected	-----	5.84E-01
RA-223	Not Detected	-----	3.46E-01
RN-219	Not Detected	-----	4.67E-01
PB-211	Not Detected	-----	9.54E-01
TL-207	Not Detected	-----	2.53E+01
AM-241	Not Detected	-----	8.85E-01
PU-239	Not Detected	-----	4.68E+02
NP-237	Not Detected	-----	6.19E-01
PA-233	Not Detected	-----	9.97E-02
TH-229	Not Detected	-----	4.46E-01

[Summary Report] - Sample ID: 50061505

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	-----	5.49E-02
AR-41	Not Detected	-----	1.15E+08
BA-133	Not Detected	-----	1.01E-01
BA-140	Not Detected	-----	2.17E-01
CD-109	Not Detected	-----	2.10
CD-115	Not Detected	-----	2.28E-01
CE-139	Not Detected	-----	5.29E-02
CE-141	Not Detected	-----	9.57E-02
CE-144	Not Detected	-----	4.02E-01
CO-56	Not Detected	-----	6.40E-02
CO-57	Not Detected	-----	5.10E-02
CO-58	Not Detected	-----	5.55E-02
CO-60	Not Detected	-----	6.84E-02
CR-51	Not Detected	-----	4.27E-01
CS-134	Not Detected	-----	8.90E-02
CS-137	Not Detected	-----	5.93E-02
CU-64	Not Detected	-----	3.08E+02
EU-152	Not Detected	-----	4.44E-01
EU-154	Not Detected	-----	3.01E-01
EU-155	Not Detected	-----	2.37E-01
FE-59	Not Detected	-----	1.21E-01
GD-153	Not Detected	-----	1.76E-01
HG-203	Not Detected	-----	5.27E-02
I-131	Not Detected	-----	5.90E-02
IN-115m	Not Detected	-----	6.33E+02
IR-192	Not Detected	-----	4.91E-02
K-40	1.64E+01	2.46	4.92E-01
LA-140	Not Detected	-----	1.85E-01
MN-54	Not Detected	-----	6.10E-02
MN-56	Not Detected	-----	2.14E+05
MO-99	Not Detected	-----	7.62E-01
NA-22	Not Detected	-----	7.97E-02
NA-24	Not Detected	-----	8.41E-01
NB-95	Not Detected	-----	4.10E-01
ND-147	Not Detected	-----	4.01E-01
NI-57	Not Detected	-----	2.67E-01
BE-7	Not Detected	-----	4.23E-01
RU-103	Not Detected	-----	5.03E-02
RU-106	Not Detected	-----	4.57E-01
SB-122	Not Detected	-----	1.20E-01
SB-124	Not Detected	-----	5.53E-02
SB-125	Not Detected	-----	1.42E-01
SC-46	Not Detected	-----	9.25E-02
SR-85	Not Detected	-----	6.58E-02
TA-182	Not Detected	-----	2.69E-01
TA-183	Not Detected	-----	1.05
TE-132	Not Detected	-----	7.48E-02
TL-201	Not Detected	-----	4.52E-01
V-48	Not Detected	-----	6.65E-02
XE-133	Not Detected	-----	4.33E-01
Y-88	Not Detected	-----	5.53E-02
ZN-65	Not Detected	-----	1.83E-01
ZR-95	Not Detected	-----	1.05E-01

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 8-02-95 8:19:03 PM *

 * Analyzed by: *Spu 8/3/95* Reviewed by: *TRM 8/4/95* *

Customer : S.WRIGHTSON (7585)
 Customer Sample ID : 85-BH3-5-S-1
 Lab Sample ID : 50061506

Sample Description : MARINELLI SOIL SAMPLES
 Sample Type : Solid
 Sample Geometry : 2SMAR
 Sample Quantity : 618.000 gram
 Sample Date/Time : 7-31-95 11:40:00 AM
 Acquire Start Date : 8-02-95 7:45:42 PM
 Detector Name : LAB02
 Elapsed Live Time : 1800 seconds
 Elapsed Real Time : 1801 seconds

Comments:

Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	Not Detected	-----	6.24
TH-234	Not Detected	-----	1.42
U-234	Not Detected	-----	2.36E+01
RA-226	1.38	7.58E-01	1.11
PB-214	6.54E-01	1.39E-01	1.18E-01
BI-214	6.94E-01	1.37E-01	1.02E-01
PB-210	Not Detected	-----	1.38
TH-232	4.05E-01	2.60E-01	3.87E-01
RA-228	6.77E-01	2.72E-01	3.41E-01
AC-228	Not Detected	-----	3.84E-01
TH-228	5.36E-01	3.85E-01	9.34E-01
RA-224	Not Detected	-----	1.82
PB-212	6.26E-01	1.42E-01	7.80E-02
BI-212	Not Detected	-----	1.08
TL-208	6.47E-01	1.55E-01	1.37E-01
U-235	Not Detected	-----	4.35E-01
TH-231	Not Detected	-----	1.02
PA-231	Not Detected	-----	2.01
AC-227	Not Detected	-----	3.07
TH-227	Not Detected	-----	6.27E-01
RA-223	Not Detected	-----	3.79E-01
RN-219	Not Detected	-----	5.02E-01
PB-211	Not Detected	-----	1.18
TL-207	Not Detected	-----	2.67E+01
AM-241	Not Detected	-----	9.98E-01
PU-239	Not Detected	-----	4.95E+02
NP-237	Not Detected	-----	6.33E-01
PA-233	Not Detected	-----	1.07E-01
TH-229	Not Detected	-----	4.84E-01

[Summary Report] - Sample ID: 50061506

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	-----	5.59E-02
AR-41	Not Detected	-----	1.51E+08
BA-133	Not Detected	-----	1.11E-01
BA-140	Not Detected	-----	2.18E-01
CD-109	Not Detected	-----	2.19
CD-115	Not Detected	-----	2.42E-01
CE-139	Not Detected	-----	5.62E-02
CE-141	Not Detected	-----	1.00E-01
CE-144	Not Detected	-----	4.15E-01
CO-56	Not Detected	-----	6.39E-02
CO-57	Not Detected	-----	5.36E-02
CO-58	Not Detected	-----	5.97E-02
CO-60	Not Detected	-----	6.71E-02
CR-51	Not Detected	-----	4.36E-01
CS-134	Not Detected	-----	9.76E-02
CS-137	Not Detected	-----	6.16E-02
CU-64	Not Detected	-----	2.72E+02
EU-152	Not Detected	-----	4.49E-01
EU-154	Not Detected	-----	3.42E-01
EU-155	Not Detected	-----	2.45E-01
FE-59	Not Detected	-----	1.38E-01
GD-153	Not Detected	-----	1.89E-01
HG-203	Not Detected	-----	5.43E-02
I-131	Not Detected	-----	6.22E-02
IN-115m	Not Detected	-----	7.11E+02
IR-192	Not Detected	-----	5.11E-02
K-40	1.63E+01	2.46	4.62E-01
LA-140	Not Detected	-----	1.64E-01
MN-54	Not Detected	-----	6.55E-02
MN-56	Not Detected	-----	2.38E+05
MO-99	Not Detected	-----	8.85E-01
NA-22	Not Detected	-----	8.09E-02
NA-24	Not Detected	-----	9.72E-01
NB-95	Not Detected	-----	4.42E-01
ND-147	Not Detected	-----	4.03E-01
NI-57	Not Detected	-----	2.86E-01
BE-7	Not Detected	-----	4.40E-01
RU-103	Not Detected	-----	5.21E-02
RU-106	Not Detected	-----	5.47E-01
SB-122	Not Detected	-----	1.27E-01
SB-124	Not Detected	-----	6.42E-02
SB-125	Not Detected	-----	1.42E-01
SC-46	Not Detected	-----	9.19E-02
SR-85	Not Detected	-----	6.91E-02
TA-182	Not Detected	-----	2.71E-01
TA-183	Not Detected	-----	1.19
TE-132	Not Detected	-----	7.78E-02
TL-201	Not Detected	-----	4.72E-01
V-48	Not Detected	-----	7.34E-02
XE-133	Not Detected	-----	4.94E-01
Y-88	Not Detected	-----	5.21E-02
ZN-65	Not Detected	-----	1.83E-01
ZR-95	Not Detected	-----	1.12E-01

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 8-02-95 8:58:32 PM *
 *
 * Analyzed by: *She 8/3/95* Reviewed by: *AM 8/4/95* *

Customer : S.WRIGHTSON (7585)
 Customer Sample ID : 85-BH3-5-SD-1
 Lab Sample ID : 50061507

Sample Description : MARINELLI SOIL SAMPLES
 Sample Type : Solid
 Sample Geometry : 2SMAR
 Sample Quantity : 615.000 gram
 Sample Date/Time : 7-31-95 11:40:00 AM
 Acquire Start Date : 8-02-95 8:25:17 PM
 Detector Name : LAB02
 Elapsed Live Time : 1800 seconds
 Elapsed Real Time : 1801 seconds

Comments:

Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	Not Detected		6.41
TH-234	Not Detected		1.33
U-234	Not Detected		2.34E+01
RA-226	Not Detected		1.34
PB-214	5.55E-01	1.25E-01	1.13E-01
BI-214	6.29E-01	1.29E-01	1.01E-01
PB-210	Not Detected		1.56
TH-232	3.35E-01	2.39E-01	3.61E-01
RA-228	4.86E-01	2.48E-01	3.39E-01
AC-228	Not Detected		3.79E-01
TH-228	Not Detected		1.42
RA-224	Not Detected		1.88
PB-212	6.33E-01	1.59E-01	8.23E-02
BI-212	5.47E-01	3.94E-01	5.78E-01
TL-208	5.90E-01	1.49E-01	1.41E-01
U-235	Not Detected		4.42E-01
TH-231	Not Detected		1.04
PA-231	Not Detected		1.97
AC-227	Not Detected		3.18
TH-227	Not Detected		6.39E-01
RA-223	Not Detected		3.77E-01
RN-219	Not Detected		5.14E-01
PB-211	Not Detected		1.10
TL-207	Not Detected		2.60E+01
AM-241	Not Detected		1.00
PU-239	Not Detected		5.04E+02
NP-237	Not Detected		6.63E-01
PA-233	Not Detected		1.08E-01
TH-229	Not Detected		5.25E-01

[Summary Report] - Sample ID: 50061507

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	-----	6.38E-02
AR-41	Not Detected	-----	1.92E+08
BA-133	Not Detected	-----	1.13E-01
BA-140	Not Detected	-----	2.37E-01
CD-109	Not Detected	-----	2.25
CD-115	Not Detected	-----	2.33E-01
CE-139	Not Detected	-----	5.48E-02
CE-141	Not Detected	-----	1.04E-01
CE-144	Not Detected	-----	4.57E-01
CO-56	Not Detected	-----	6.91E-02
CO-57	Not Detected	-----	5.68E-02
CO-58	Not Detected	-----	6.19E-02
CO-60	Not Detected	-----	7.10E-02
CR-51	Not Detected	-----	4.40E-01
CS-134	Not Detected	-----	9.47E-02
CS-137	2.21E-02	2.61E-02	4.16E-02
CU-64	Not Detected	-----	3.39E+02
EU-152	Not Detected	-----	4.65E-01
EU-154	Not Detected	-----	3.17E-01
EU-155	Not Detected	-----	2.51E-01
FE-59	Not Detected	-----	1.45E-01
GD-153	Not Detected	-----	1.96E-01
HG-203	Not Detected	-----	5.70E-02
I-131	Not Detected	-----	6.58E-02
IN-115m	Not Detected	-----	7.52E+02
IR-192	Not Detected	-----	5.22E-02
K-40	1.59E+01	2.43	6.88E-01
LA-140	Not Detected	-----	1.89E-01
MN-54	Not Detected	-----	6.12E-02
MN-56	Not Detected	-----	3.08E+05
MO-99	Not Detected	-----	8.88E-01
NA-22	Not Detected	-----	8.36E-02
NA-24	Not Detected	-----	9.21E-01
NB-95	Not Detected	-----	4.55E-01
ND-147	Not Detected	-----	4.19E-01
NI-57	Not Detected	-----	2.87E-01
BE-7	Not Detected	-----	5.33E-01
RU-103	Not Detected	-----	5.49E-02
RU-106	Not Detected	-----	5.24E-01
SB-122	Not Detected	-----	1.42E-01
SB-124	Not Detected	-----	5.71E-02
SB-125	Not Detected	-----	1.44E-01
SC-46	Not Detected	-----	1.08E-01
SR-85	Not Detected	-----	7.13E-02
TA-182	Not Detected	-----	3.14E-01
TA-183	Not Detected	-----	1.20
TE-132	Not Detected	-----	8.36E-02
TL-201	Not Detected	-----	4.95E-01
V-48	Not Detected	-----	7.00E-02
XE-133	Not Detected	-----	4.98E-01
Y-88	Not Detected	-----	6.45E-02
ZN-65	Not Detected	-----	2.04E-01
ZR-95	Not Detected	-----	1.09E-01

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 8-02-95 9:38:11 PM *
 * *****
 * Analyzed by: *She 8/3/95* Reviewed by: *gmm 8/4/95* *
 * *****

Customer : S.WRIGHTSON (7585)
 Customer Sample ID : 85-BH3-10-S-1
 Lab Sample ID : 50061508
 Sample Description : MARINELLI SOIL SAMPLES
 Sample Type : Solid
 Sample Geometry : 2SMAR
 Sample Quantity : 702.000 gram
 Sample Date/Time : 7-31-95 11:55:00 AM
 Acquire Start Date : 8-02-95 9:04:43 PM
 Detector Name : LAB02
 Elapsed Live Time : 1800 seconds
 Elapsed Real Time : 1801 seconds

Comments:

Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	Not Detected	-----	5.55
TH-234	Not Detected	-----	1.25
U-234	Not Detected	-----	2.04E+01
RA-226	1.24	7.07E-01	1.04
PB-214	5.70E-01	1.19E-01	9.60E-02
BI-214	4.81E-01	1.12E-01	1.10E-01
PB-210	Not Detected	-----	1.43
TH-232	4.79E-01	2.04E-01	2.67E-01
RA-228	3.23E-01	2.26E-01	3.36E-01
AC-228	6.44E-01	1.74E-01	1.59E-01
TH-228	Not Detected	-----	1.28
RA-224	Not Detected	-----	1.60
PB-212	5.72E-01	1.28E-01	7.29E-02
BI-212	7.43E-01	3.36E-01	4.09E-01
TL-208	4.38E-01	1.26E-01	1.36E-01
U-235	Not Detected	-----	3.98E-01
TH-231	Not Detected	-----	9.03E-01
PA-231	Not Detected	-----	1.77
AC-227	Not Detected	-----	2.85
TH-227	Not Detected	-----	5.48E-01
RA-223	Not Detected	-----	3.30E-01
RN-219	Not Detected	-----	4.38E-01
PB-211	Not Detected	-----	9.93E-01
TL-207	Not Detected	-----	2.34E+01
AM-241	Not Detected	-----	8.77E-01
PU-239	Not Detected	-----	4.43E+02
NP-237	Not Detected	-----	5.91E-01
PA-233	Not Detected	-----	9.52E-02
TH-229	Not Detected	-----	4.70E-01

[Summary Report] - Sample ID: 50061508

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	-----	4.85E-02
AR-41	Not Detected	-----	1.89E+08
BA-133	Not Detected	-----	9.76E-02
BA-140	Not Detected	-----	1.96E-01
CD-109	Not Detected	-----	2.00
CD-115	Not Detected	-----	2.24E-01
CE-139	Not Detected	-----	4.80E-02
CE-141	Not Detected	-----	9.33E-02
CE-144	Not Detected	-----	3.88E-01
CO-56	Not Detected	-----	6.19E-02
CO-57	Not Detected	-----	4.96E-02
CO-58	Not Detected	-----	5.25E-02
CO-60	Not Detected	-----	5.96E-02
CR-51	Not Detected	-----	3.93E-01
CS-134	Not Detected	-----	8.32E-02
CS-137	Not Detected	-----	5.90E-02
CU-64	Not Detected	-----	2.85E+02
EU-152	Not Detected	-----	4.19E-01
EU-154	Not Detected	-----	2.83E-01
EU-155	Not Detected	-----	2.27E-01
FE-59	Not Detected	-----	1.25E-01
GD-153	Not Detected	-----	1.77E-01
HG-203	Not Detected	-----	4.87E-02
I-131	Not Detected	-----	5.82E-02
IN-115m	Not Detected	-----	7.66E+02
IR-192	Not Detected	-----	4.51E-02
K-40	1.58E+01	2.38	6.24E-01
LA-140	Not Detected	-----	1.71E-01
MN-54	Not Detected	-----	5.84E-02
MN-56	Not Detected	-----	3.07E+05
MO-99	Not Detected	-----	7.38E-01
NA-22	Not Detected	-----	7.12E-02
NA-24	Not Detected	-----	9.21E-01
NB-95	Not Detected	-----	3.92E-01
ND-147	Not Detected	-----	3.66E-01
NI-57	Not Detected	-----	2.75E-01
BE-7	Not Detected	-----	4.64E-01
RU-103	Not Detected	-----	4.79E-02
RU-106	Not Detected	-----	4.63E-01
SB-122	Not Detected	-----	1.14E-01
SB-124	Not Detected	-----	5.44E-02
SB-125	Not Detected	-----	1.28E-01
SC-46	Not Detected	-----	9.39E-02
SR-85	Not Detected	-----	6.57E-02
TA-182	Not Detected	-----	2.73E-01
TA-183	Not Detected	-----	1.05
TE-132	Not Detected	-----	7.25E-02
TL-201	Not Detected	-----	4.52E-01
V-48	Not Detected	-----	5.90E-02
XE-133	Not Detected	-----	4.21E-01
Y-88	Not Detected	-----	4.17E-02
ZN-65	Not Detected	-----	1.81E-01
ZR-95	Not Detected	-----	9.95E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 8-02-95 10:18:00 PM *
 * *****
 * Analyzed by: *Spec 8/3/95* Reviewed by: *YAM 8/4/95* *
 * *****

Customer : S.WRIGHTSON (7585)
 Customer Sample ID : 85-BH3-15-S-1
 Lab Sample ID : 50061509

Sample Description : MARINELLI SOIL SAMPLES
 Sample Type : Solid
 Sample Geometry : 2SMAR
 Sample Quantity : 639.000 gram
 Sample Date/Time : 7-31-95 12:10:00 PM
 Acquire Start Date : 8-02-95 9:44:29 PM
 Detector Name : LAB02
 Elapsed Live Time : 1800 seconds
 Elapsed Real Time : 1801 seconds

Comments:

Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	Not Detected		5.62
TH-234	1.19	6.59E-01	8.57E-01
U-234	Not Detected		2.08E+01
RA-226	1.09	6.28E-01	9.20E-01
PB-214	7.77E-01	1.58E-01	1.29E-01
BI-214	5.76E-01	1.27E-01	1.17E-01
PB-210	8.98E-01	6.26E-01	7.89E-01
TH-232	7.89E-01	3.26E-01	4.39E-01
RA-228	5.70E-01	2.52E-01	2.18E-01
AC-228	6.86E-01	1.79E-01	1.48E-01
TH-228	1.04	4.40E-01	7.77E-01
RA-224	5.82E-01	3.97E-01	6.85E-01
PB-212	7.12E-01	1.52E-01	6.99E-02
BI-212	4.54E-01	4.48E-01	7.02E-01
TL-208	5.31E-01	1.31E-01	1.13E-01
U-235	Not Detected		4.26E-01
TH-231	Not Detected		9.95E-01
PA-231	Not Detected		1.88
AC-227	Not Detected		3.06
TH-227	Not Detected		6.23E-01
RA-223	Not Detected		3.68E-01
RN-219	Not Detected		4.82E-01
PB-211	Not Detected		1.10
TL-207	Not Detected		2.50E+01
AM-241	Not Detected		8.91E-01
PU-239	2.06E+02	2.83E+02	4.59E+02
NP-237	Not Detected		6.35E-01
PA-233	Not Detected		1.02E-01
TH-229	Not Detected		4.77E-01

NO mec 8/3/95

[Summary Report] - Sample ID: 50061509

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	-----	4.95E-02
AR-41	Not Detected	-----	2.57E+08
BA-133	Not Detected	-----	1.12E-01
BA-140	Not Detected	-----	2.15E-01
CD-109	Not Detected	-----	2.16
CD-115	Not Detected	-----	2.56E-01
CE-139	Not Detected	-----	5.44E-02
CE-141	Not Detected	-----	1.01E-01
CE-144	Not Detected	-----	4.22E-01
CO-56	Not Detected	-----	6.63E-02
CO-57	Not Detected	-----	5.32E-02
CO-58	Not Detected	-----	5.52E-02
CO-60	Not Detected	-----	6.13E-02
CR-51	Not Detected	-----	4.30E-01
CS-134	Not Detected	-----	9.25E-02
CS-137	Not Detected	-----	5.93E-02
CU-64	Not Detected	-----	3.02E+02
EU-152	Not Detected	-----	4.48E-01
EU-154	Not Detected	-----	3.18E-01
EU-155	Not Detected	-----	2.47E-01
FE-59	Not Detected	-----	1.17E-01
GD-153	Not Detected	-----	1.91E-01
HG-203	Not Detected	-----	5.37E-02
I-131	Not Detected	-----	6.07E-02
IN-115m	Not Detected	-----	9.27E+02
IR-192	Not Detected	-----	5.08E-02
K-40	1.23E+01	1.95	6.22E-01
LA-140	Not Detected	-----	2.14E-01
MN-54	Not Detected	-----	6.07E-02
MN-56	Not Detected	-----	3.68E+05
MO-99	Not Detected	-----	8.77E-01
NA-22	Not Detected	-----	7.07E-02
NA-24	Not Detected	-----	9.56E-01
NB-95	Not Detected	-----	4.48E-01
ND-147	Not Detected	-----	4.02E-01
NI-57	Not Detected	-----	2.83E-01
BE-7	Not Detected	-----	4.78E-01
RU-103	Not Detected	-----	4.96E-02
RU-106	Not Detected	-----	5.25E-01
SB-122	Not Detected	-----	1.33E-01
SB-124	Not Detected	-----	5.60E-02
SB-125	Not Detected	-----	1.51E-01
SC-46	Not Detected	-----	9.62E-02
SR-85	Not Detected	-----	6.85E-02
TA-182	Not Detected	-----	2.84E-01
TA-183	Not Detected	-----	1.07
TE-132	Not Detected	-----	7.36E-02
TL-201	Not Detected	-----	4.71E-01
V-48	Not Detected	-----	6.31E-02
XE-133	Not Detected	-----	4.79E-01
Y-88	Not Detected	-----	5.60E-02
ZN-65	Not Detected	-----	1.85E-01
ZR-95	Not Detected	-----	1.05E-01

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 8-02-95 10:57:39 PM *

 * Analyzed by: *See 8/3/95* Reviewed by: *JMM 8/4/95* *

Customer : S.WRIGHTSON (7585)
 Customer Sample ID : 85-BH4-0-S-1
 Lab Sample ID : 50061510
 Sample Description : MARINELLI SOIL SAMPLES
 Sample Type : Solid
 Sample Geometry : 2SMAR
 Sample Quantity : 752.000 gram
 Sample Date/Time : 7-31-95 12:50:00 PM
 Acquire Start Date : 8-02-95 10:24:06 PM
 Detector Name : LAB02
 Elapsed Live Time : 1800 seconds
 Elapsed Real Time : 1801 seconds

Comments:

Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	Not Detected		5.14
TH-234	Not Detected		1.16
U-234	Not Detected		1.94E+01
RA-226	7.02E-01	4.69E-01	7.02E-01
PB-214	4.65E-01	1.02E-01	8.68E-02
BI-214	4.49E-01	9.76E-02	8.28E-02
PB-210	Not Detected		1.23
TH-232	4.88E-01	1.99E-01	2.56E-01
RA-228	5.15E-01	2.08E-01	2.57E-01
AC-228	Not Detected		3.02E-01
TH-228	Not Detected		1.23
RA-224	Not Detected		1.58
PB-212	5.84E-01	1.49E-01	6.51E-02
BI-212	4.02E-01	3.54E-01	5.45E-01
TL-208	6.00E-01	1.45E-01	1.39E-01
U-235	Not Detected		3.66E-01
TH-231	Not Detected		9.25E-01
PA-231	Not Detected		1.71
AC-227	Not Detected		2.63
TH-227	Not Detected		5.30E-01
RA-223	Not Detected		3.34E-01
RN-219	Not Detected		3.98E-01
PB-211	Not Detected		9.98E-01
TL-207	Not Detected		2.21E+01
AM-241	Not Detected		8.52E-01
PU-239	Not Detected		4.28E+02
NP-237	Not Detected		5.77E-01
PA-233	Not Detected		8.93E-02
TH-229	Not Detected		4.06E-01

[Summary Report] - Sample ID: 50061510

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	-----	5.71E-02
AR-41	Not Detected	-----	2.23E+08
BA-133	Not Detected	-----	8.62E-02
BA-140	Not Detected	-----	1.73E-01
CD-109	Not Detected	-----	1.98
CD-115	Not Detected	-----	2.14E-01
CE-139	Not Detected	-----	4.74E-02
CE-141	Not Detected	-----	8.31E-02
CE-144	Not Detected	-----	3.64E-01
CO-56	Not Detected	-----	5.58E-02
CO-57	Not Detected	-----	4.64E-02
CO-58	Not Detected	-----	5.14E-02
CO-60	Not Detected	-----	5.99E-02
CR-51	Not Detected	-----	3.74E-01
CS-134	Not Detected	-----	7.41E-02
CS-137	4.67E-02	2.66E-02	3.74E-02
CU-64	Not Detected	-----	2.75E+02
EU-152	Not Detected	-----	3.77E-01
EU-154	Not Detected	-----	2.74E-01
EU-155	Not Detected	-----	2.22E-01
FE-59	Not Detected	-----	1.27E-01
GD-153	Not Detected	-----	1.62E-01
HG-203	Not Detected	-----	4.42E-02
I-131	Not Detected	-----	5.11E-02
IN-115m	Not Detected	-----	7.74E+02
IR-192	Not Detected	-----	4.35E-02
K-40	1.59E+01	2.37	5.47E-01
LA-140	Not Detected	-----	1.43E-01
MN-54	Not Detected	-----	5.21E-02
MN-56	Not Detected	-----	3.09E+05
MO-99	Not Detected	-----	7.52E-01
NA-22	Not Detected	-----	7.02E-02
NA-24	Not Detected	-----	8.41E-01
NB-95	Not Detected	-----	3.83E-01
ND-147	Not Detected	-----	3.47E-01
NI-57	Not Detected	-----	2.66E-01
BE-7	Not Detected	-----	3.96E-01
RU-103	Not Detected	-----	4.37E-02
RU-106	Not Detected	-----	4.40E-01
SB-122	Not Detected	-----	1.23E-01
SB-124	Not Detected	-----	4.88E-02
SB-125	Not Detected	-----	1.17E-01
SC-46	Not Detected	-----	8.35E-02
SR-85	Not Detected	-----	5.79E-02
TA-182	Not Detected	-----	2.44E-01
TA-183	Not Detected	-----	1.02
TE-132	Not Detected	-----	6.84E-02
TL-201	Not Detected	-----	4.35E-01
V-48	Not Detected	-----	5.87E-02
XE-133	Not Detected	-----	4.19E-01
Y-88	Not Detected	-----	4.16E-02
ZN-65	Not Detected	-----	1.60E-01
ZR-95	Not Detected	-----	9.62E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 8-02-95 11:37:09 PM *

 * Analyzed by: *Jue 8/3/95* Reviewed by: *JRM 8/4/95* *

Customer : S.WRIGHTSON (7585)
 Customer Sample ID : 85-BH4-5-S-1
 Lab Sample ID : 50061511

Sample Description : MARINELLI SOIL SAMPLES
 Sample Type : Solid
 Sample Geometry : 2SMAR
 Sample Quantity : 655.000 gram
 Sample Date/Time : 7-31-95 1:05:00 PM
 Acquire Start Date : 8-02-95 11:03:39 PM
 Detector Name : LAB02
 Elapsed Live Time : 1800 seconds
 Elapsed Real Time : 1801 seconds

Comments:

Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	Not Detected	-----	5.37
TH-234	Not Detected	-----	1.20
U-234	Not Detected	-----	1.95E+01
RA-226	1.16	8.11E-01	1.24
PB-214	4.65E-01	1.06E-01	9.41E-02
BI-214	4.32E-01	1.14E-01	1.27E-01
PB-210	Not Detected	-----	1.28
TH-232	5.00E-01	2.11E-01	2.73E-01
RA-228	4.74E-01	2.51E-01	3.5E-01
AC-228	Not Detected	-----	3.13E-01
TH-228	Not Detected	-----	1.25
RA-224	Not Detected	-----	1.59
PB-212	5.24E-01	1.22E-01	6.97E-02
BI-212	5.59E-01	3.86E-01	5.63E-01
TL-208	4.08E-01	1.23E-01	1.36E-01
U-235	Not Detected	-----	3.66E-01
TH-231	Not Detected	-----	9.30E-01
PA-231	Not Detected	-----	1.73
AC-227	Not Detected	-----	2.80
TH-227	Not Detected	-----	5.58E-01
RA-223	Not Detected	-----	3.39E-01
RN-219	Not Detected	-----	4.49E-01
PB-211	Not Detected	-----	1.01
TL-207	Not Detected	-----	2.14E+01
AM-241	Not Detected	-----	8.36E-01
PU-239	Not Detected	-----	4.26E+02
NP-237	Not Detected	-----	5.88E-01
PA-233	Not Detected	-----	9.59E-02
TH-229	Not Detected	-----	4.35E-01

[Summary Report] - Sample ID: 50061511

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	-----	4.80E-02
AR-41	Not Detected	-----	2.37E+08
BA-133	Not Detected	-----	9.31E-02
BA-140	Not Detected	-----	1.94E-01
CD-109	Not Detected	-----	1.13
CD-115	Not Detected	-----	2.27E-01
CE-139	Not Detected	-----	4.79E-02
CE-141	Not Detected	-----	8.59E-02
CE-144	Not Detected	-----	3.64E-01
CO-56	Not Detected	-----	5.73E-02
CO-57	Not Detected	-----	4.83E-02
CO-58	Not Detected	-----	5.78E-02
CO-60	Not Detected	-----	6.16E-02
CR-51	Not Detected	-----	4.10E-01
CS-134	Not Detected	-----	8.16E-02
CS-137	Not Detected	-----	5.52E-02
CU-64	Not Detected	-----	3.07E+02
EU-152	Not Detected	-----	4.02E-01
EU-154	Not Detected	-----	2.93E-01
EU-155	Not Detected	-----	2.21E-01
FE-59	Not Detected	-----	1.19E-01
GD-153	Not Detected	-----	1.67E-01
HG-203	Not Detected	-----	4.70E-02
I-131	Not Detected	-----	5.73E-02
IN-115m	Not Detected	-----	8.71E+02
IR-192	Not Detected	-----	4.77E-02
K-40	1.29E+01	2.00	4.33E-01
LA-140	Not Detected	-----	1.79E-01
MN-54	Not Detected	-----	5.69E-02
MN-56	Not Detected	-----	3.54E+05
MO-99	Not Detected	-----	7.98E-01
NA-22	Not Detected	-----	7.23E-02
NA-24	Not Detected	-----	8.10E-01
NB-95	Not Detected	-----	4.03E-01
ND-147	Not Detected	-----	3.27E-01
NI-57	Not Detected	-----	2.40E-01
BE-7	Not Detected	-----	4.05E-01
RU-103	Not Detected	-----	4.60E-02
RU-106	Not Detected	-----	4.88E-01
SB-122	Not Detected	-----	1.16E-01
SB-124	Not Detected	-----	5.51E-02
SB-125	Not Detected	-----	1.28E-01
SC-46	Not Detected	-----	8.32E-02
SR-85	Not Detected	-----	6.33E-02
TA-182	Not Detected	-----	2.49E-01
TA-183	Not Detected	-----	1.01
TE-132	Not Detected	-----	7.02E-02
TL-201	Not Detected	-----	4.73E-01
V-48	Not Detected	-----	6.46E-02
XE-133	Not Detected	-----	4.43E-01
Y-88	Not Detected	-----	5.20E-02
ZN-65	Not Detected	-----	1.57E-01
ZR-95	Not Detected	-----	8.70E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 8-03-95 8:56:22 AM *
 * *****
 * Analyzed by: *Spec 8/2/95* Reviewed by: *JMM 8/4/95* *
 * *****

Customer : S.WRIGHTSON (7585)
 Customer Sample ID : 85-BH4-10-S-1
 Lab Sample ID : 50061512

Sample Description : MARINELLI SOIL SAMPLE
 Sample Type : Solid
 Sample Geometry : 2SMAR
 Sample Quantity : 559.000 gram
 Sample Date/Time : 7-31-95 1:16:35 PM
 Acquire Start Date : 8-03-95 8:23:37 AM
 Detector Name : LAB02
 Elapsed Live Time : 1800 seconds
 Elapsed Real Time : 1801 seconds

Comments:

Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	Not Detected	-----	5.80
TH-234	Not Detected	-----	1.36
U-234	Not Detected	-----	2.45E+01
RA-226	Not Detected	-----	1.38
PB-214	6.48E-01	1.45E-01	1.33E-01
BI-214	5.04E-01	1.19E-01	1.10E-01
PB-210	Not Detected	-----	1.50

TH-232	4.97E-01	2.33E-01	3.13E-01
RA-228	5.43E-01	2.69E-01	2.62E-01
AC-228	Not Detected	-----	3.92E-01
TH-228	Not Detected	-----	1.45
RA-224	1.00	5.78E-01	7.86E-01
PB-212	6.40E-01	1.48E-01	7.90E-02
BI-212	4.51E-01	3.54E-01	5.21E-01
TL-208	5.55E-01	1.48E-01	1.43E-01

U-235	Not Detected	-----	4.31E-01
TH-231	Not Detected	-----	1.08
PA-231	Not Detected	-----	2.01
AC-227	Not Detected	-----	3.29
TH-227	Not Detected	-----	6.67E-01
RA-223	Not Detected	-----	4.03E-01
RN-219	3.25E-01	4.16E-01	6.67E-01
PB-211	Not Detected	-----	1.23
TL-207	Not Detected	-----	2.68E+01

AM-241	Not Detected	-----	1.03
PU-239	Not Detected	-----	5.39E+02
NP-237	Not Detected	-----	6.93E-01
PA-233	Not Detected	-----	1.19E-01
TH-229	Not Detected	-----	4.69E-01

no mcs 8/3/95

[Summary Report] - Sample ID: 50061512

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	-----	5.70E-02
AR-41	Not Detected	-----	1.03E+10
BA-133	Not Detected	-----	1.17E-01
BA-140	Not Detected	-----	2.18E-01
CD-109	Not Detected	-----	2.33
CD-115	Not Detected	-----	2.83E-01
CE-139	Not Detected	-----	5.56E-02
CE-141	Not Detected	-----	1.02E-01
CE-144	Not Detected	-----	4.58E-01
CO-56	Not Detected	-----	6.92E-02
CO-57	Not Detected	-----	5.82E-02
CO-58	Not Detected	-----	6.18E-02
CO-60	Not Detected	-----	7.22E-02
CR-51	Not Detected	-----	4.72E-01
CS-134	Not Detected	-----	9.24E-02
CS-137	Not Detected	-----	6.58E-02
CU-64	Not Detected	-----	5.99E+02
EU-152	Not Detected	-----	4.96E-01
EU-154	Not Detected	-----	3.21E-01
EU-155	Not Detected	-----	2.48E-01
FE-59	Not Detected	-----	1.44E-01
GD-153	Not Detected	-----	1.93E-01
HG-203	Not Detected	-----	5.82E-02
I-131	Not Detected	-----	7.35E-02
IN-115m	Not Detected	-----	3.97E+03
IR-192	Not Detected	-----	5.64E-02
K-40	1.68E+01	2.59	7.97E-01
LA-140	Not Detected	-----	2.26E-01
MN-54	Not Detected	-----	6.85E-02
MN-56	Not Detected	-----	4.97E+06
MO-99	Not Detected	-----	9.14E-01
NA-22	Not Detected	-----	8.74E-02
NA-24	Not Detected	-----	1.39
NB-95	Not Detected	-----	5.12E-01
ND-147	Not Detected	-----	4.27E-01
NI-57	Not Detected	-----	3.43E-01
BE-7	Not Detected	-----	4.87E-01
RU-103	Not Detected	-----	5.88E-02
RU-106	Not Detected	-----	5.82E-01
SB-122	Not Detected	-----	1.54E-01
SB-124	Not Detected	-----	6.16E-02
SB-125	Not Detected	-----	1.52E-01
SC-46	Not Detected	-----	1.04E-01
SR-85	Not Detected	-----	7.13E-02
TA-182	Not Detected	-----	3.04E-01
TA-183	Not Detected	-----	1.30
TE-132	Not Detected	-----	8.68E-02
TL-201	Not Detected	-----	5.68E-01
V-48	Not Detected	-----	7.44E-02
XE-133	Not Detected	-----	5.67E-01
Y-88	Not Detected	-----	4.86E-02
ZN-65	Not Detected	-----	2.04E-01
ZR-95	Not Detected	-----	1.20E-01

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 8-03-95 9:42:12 AM *

 * Analyzed by: *Spec 8/3/95* Reviewed by: *JAM 8/4/95* *

Customer : S.WRIGHTSON (7585)
 Customer Sample ID : 85-BH4-15-S-1
 Lab Sample ID : 50061513

Sample Description : MARINELLI SOIL SAMPLE
 Sample Type : Solid
 Sample Geometry : 2SMAR
 Sample Quantity : 611.000 gram
 Sample Date/Time : 7-31-95 1:30:35 PM
 Acquire Start Date : 8-03-95 9:04:33 AM
 Detector Name : LAB02
 Elapsed Live Time : 1800 seconds
 Elapsed Real Time : 1801 seconds

Comments:

Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	Not Detected	-----	6.13
TH-234	Not Detected	-----	1.42
U-234	Not Detected	-----	2.36E+01
RA-226	1.63	8.98E-01	1.32
PB-214	6.38E-01	1.35E-01	1.09E-01
BI-214	5.98E-01	1.27E-01	1.07E-01
PB-210	1.53	7.78E-01	7.88E-01
TH-232	6.96E-01	2.33E-01	2.62E-01
RA-228	6.47E-01	2.57E-01	2.17E-01
AC-228	Not Detected	-----	3.56E-01
TH-228	4.58E-01	2.80E-01	8.18E-01
RA-224	1.04	5.14E-01	6.20E-01
PB-212	6.56E-01	1.45E-01	8.13E-02
BI-212	8.59E-01	5.90E-01	8.82E-01
TL-208	5.10E-01	1.44E-01	1.53E-01
U-235	Not Detected	-----	4.36E-01
TH-231	Not Detected	-----	1.01
PA-231	Not Detected	-----	1.90
AC-227	Not Detected	-----	3.22
TH-227	Not Detected	-----	6.35E-01
RA-223	Not Detected	-----	3.79E-01
RN-219	Not Detected	-----	4.97E-01
PB-211	Not Detected	-----	1.16
TL-207	Not Detected	-----	2.41E+01
AM-241	Not Detected	-----	1.08
PU-239	Not Detected	-----	5.09E+02
NP-237	Not Detected	-----	6.60E-01
PA-233	Not Detected	-----	1.01E-01
TH-229	Not Detected	-----	4.93E-01

[Summary Report] - Sample ID: 50061513

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	-----	5.97E-02
AR-41	Not Detected	-----	1.11E+10
BA-133	Not Detected	-----	1.13E-01
BA-140	Not Detected	-----	2.19E-01
CD-109	Not Detected	-----	2.22
CD-115	Not Detected	-----	2.82E-01
CE-139	Not Detected	-----	5.60E-02
CE-141	Not Detected	-----	1.02E-01
CE-144	Not Detected	-----	4.37E-01
CO-56	Not Detected	-----	6.87E-02
CO-57	Not Detected	-----	5.38E-02
CO-58	Not Detected	-----	5.55E-02
CO-60	Not Detected	-----	6.48E-02
CR-51	Not Detected	-----	4.50E-01
CS-134	Not Detected	-----	9.29E-02
CS-137	Not Detected	-----	6.29E-02
CU-64	Not Detected	-----	5.08E+02
EU-152	Not Detected	-----	5.02E-01
EU-154	Not Detected	-----	3.39E-01
EU-155	Not Detected	-----	2.50E-01
FE-59	Not Detected	-----	1.28E-01
GD-153	Not Detected	-----	1.91E-01
HG-203	Not Detected	-----	5.37E-02
I-131	Not Detected	-----	6.62E-02
IN-115m	Not Detected	-----	4.20E+03
IR-192	Not Detected	-----	5.07E-02
K-40	1.40E+01	2.16	4.46E-01
LA-140	Not Detected	-----	2.24E-01
MN-54	Not Detected	-----	6.39E-02
MN-56	Not Detected	-----	5.57E+06
MO-99	Not Detected	-----	1.00
NA-22	Not Detected	-----	7.80E-02
NA-24	Not Detected	-----	1.30
NB-95	Not Detected	-----	4.91E-01
ND-147	Not Detected	-----	4.13E-01
NI-57	Not Detected	-----	3.65E-01
BE-7	Not Detected	-----	4.51E-01
RU-103	Not Detected	-----	4.96E-02
RU-106	Not Detected	-----	4.95E-01
SB-122	Not Detected	-----	1.47E-01
SB-124	Not Detected	-----	5.89E-02
SB-125	Not Detected	-----	1.37E-01
SC-46	Not Detected	-----	9.30E-02
SR-85	Not Detected	-----	6.85E-02
TA-182	Not Detected	-----	2.72E-01
TA-183	Not Detected	-----	1.37
TE-132	Not Detected	-----	8.91E-02
TL-201	Not Detected	-----	5.67E-01
V-48	Not Detected	-----	7.14E-02
XE-133	Not Detected	-----	5.32E-01
Y-88	Not Detected	-----	4.97E-02
ZN-65	Not Detected	-----	1.76E-01
ZR-95	Not Detected	-----	1.04E-01

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 8-03-95 10:25:32 AM *

 * Analyzed by: *See 8/4/95* Reviewed by: *MM 8/4/95* *

Customer : S.WRIGHTSON (7585)
 Customer Sample ID : 85-BH5-0-S-1
 Lab Sample ID : 50061514

Sample Description : MARINELLI SOIL SAMPLE
 Sample Type : Solid
 Sample Geometry : 2SMAR
 Sample Quantity : 736.000 gram
 Sample Date/Time : 7-31-95 1:45:35 PM
 Acquire Start Date : 8-03-95 9:51:35 AM
 Detector Name : LAB02
 Elapsed Live Time : 1800 seconds
 Elapsed Real Time : 1801 seconds

Comments:

Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	Not Detected	-----	6.18
TH-234	Not Detected	-----	1.34
U-234	Not Detected	-----	2.19E+01
RA-226	1.46	9.62E-01	1.47
PB-214	6.70E-01	1.41E-01	1.25E-01
BI-214	6.09E-01	1.27E-01	1.14E-01
PB-210	Not Detected	-----	1.57
TH-232	7.15E-01	2.26E-01	2.50E-01
RA-228	7.04E-01	2.77E-01	2.64E-01
AC-228	8.19E-01	2.00E-01	1.71E-01
TH-228	9.02E-01	3.97E-01	7.17E-01
RA-224	8.09E-01	4.43E-01	7.52E-01
PB-212	8.13E-01	1.66E-01	7.47E-02
BI-212	7.84E-01	4.73E-01	6.87E-01
TL-208	6.55E-01	1.64E-01	1.69E-01
U-235	Not Detected	-----	4.23E-01
TH-231	Not Detected	-----	1.02
PA-231	Not Detected	-----	1.93
AC-227	Not Detected	-----	3.05
TH-227	Not Detected	-----	6.41E-01
RA-223	Not Detected	-----	3.77E-01
RN-219	Not Detected	-----	4.85E-01
PB-211	Not Detected	-----	1.13
TL-207	Not Detected	-----	2.41E+01
AM-241	Not Detected	-----	9.33E-01
PU-239	Not Detected	-----	4.92E+02
NP-237	Not Detected	-----	6.48E-01
PA-233	Not Detected	-----	1.05E-01
TH-229	Not Detected	-----	4.85E-01

[Summary Report] - Sample ID: 50061514

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	-----	5.91E-02
AR-41	Not Detected	-----	1.43E+10
BA-133	Not Detected	-----	1.06E-01
BA-140	Not Detected	-----	2.44E-01
CD-109	Not Detected	-----	2.22
CD-115	Not Detected	-----	2.86E-01
CE-139	Not Detected	-----	5.33E-02
CE-141	Not Detected	-----	1.00E-01
CE-144	Not Detected	-----	4.28E-01
CO-56	Not Detected	-----	6.02E-02
CO-57	Not Detected	-----	5.45E-02
CO-58	Not Detected	-----	5.67E-02
CO-60	Not Detected	-----	6.31E-02
CR-51	Not Detected	-----	4.28E-01
CS-134	Not Detected	-----	8.71E-02
CS-137	Not Detected	-----	6.99E-02
CU-64	Not Detected	-----	5.43E+02
EU-152	Not Detected	-----	4.40E-01
EU-154	Not Detected	-----	3.16E-01
EU-155	Not Detected	-----	2.47E-01
FE-59	Not Detected	-----	1.30E-01
GD-153	Not Detected	-----	1.90E-01
HG-203	Not Detected	-----	5.31E-02
I-131	Not Detected	-----	6.22E-02
IN-115m	Not Detected	-----	4.61E+03
IR-192	Not Detected	-----	4.78E-02
K-40	1.97E+01	2.88	6.33E-01
LA-140	Not Detected	-----	2.21E-01
MN-54	Not Detected	-----	6.26E-02
MN-56	Not Detected	-----	5.63E+06
MO-99	Not Detected	-----	9.57E-01
NA-22	Not Detected	-----	7.94E-02
NA-24	Not Detected	-----	1.39
NB-95	Not Detected	-----	5.02E-01
ND-147	Not Detected	-----	4.08E-01
NI-57	Not Detected	-----	3.10E-01
BE-7	Not Detected	-----	4.50E-01
RU-103	Not Detected	-----	4.87E-02
RU-106	Not Detected	-----	5.21E-01
SB-122	Not Detected	-----	1.41E-01
SB-124	Not Detected	-----	5.48E-02
SB-125	Not Detected	-----	1.43E-01
SC-46	Not Detected	-----	1.03E-01
SR-85	Not Detected	-----	6.64E-02
TA-182	Not Detected	-----	2.97E-01
TA-183	Not Detected	-----	1.19
TE-132	Not Detected	-----	8.83E-02
TL-201	Not Detected	-----	5.51E-01
V-48	Not Detected	-----	6.80E-02
XE-133	Not Detected	-----	5.37E-01
Y-88	Not Detected	-----	4.98E-02
ZN-65	Not Detected	-----	1.97E-01
ZR-95	Not Detected	-----	1.04E-01

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 8-03-95 11:04:30 AM *

 Analyzed by: *See 8/4/95* Reviewed by: *ANN 8/4/95*

Customer : S.WRIGHTSON (7585)
 Customer Sample ID : 85-BH5-5-S-1
 Lab Sample ID : 50061515

 Sample Description : MARINELLI SOIL SAMPLE
 Sample Type : Solid
 Sample Geometry : 2SMAR
 Sample Quantity : 692.000 gram
 Sample Date/Time : 7-31-95 1:55:35 PM
 Acquire Start Date : 8-03-95 10:32:15 AM
 Detector Name : LAB02
 Elapsed Live Time : 1800 seconds
 Elapsed Real Time : 1801 seconds

Comments:

Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	Not Detected		5.09
TH-234	7.36E-01	5.66E-01	8.27E-01
U-234	Not Detected		1.96E+01
RA-226	5.96E-01	9.38E-01	1.52
PB-214	4.24E-01	1.14E-01	1.29E-01
BI-214	4.59E-01	9.68E-02	7.10E-02
PB-210	Not Detected		1.29
TH-232	4.33E-01	1.92E-01	2.54E-01
RA-228	4.28E-01	1.87E-01	2.31E-01
AC-228	Not Detected		3.01E-01
TH-228	Not Detected		1.19
RA-224	Not Detected		1.59
PB-212	5.19E-01	1.19E-01	6.66E-02
BI-212	6.21E-01	3.42E-01	4.61E-01
TL-208	4.16E-01	1.28E-01	1.47E-01
U-235	Not Detected		3.64E-01
TH-231	Not Detected		8.77E-01
PA-231	Not Detected		1.65
AC-227	Not Detected		2.66
TH-227	Not Detected		5.29E-01
RA-223	Not Detected		3.30E-01
RN-219	Not Detected		4.15E-01
PB-211	Not Detected		9.33E-01
TL-207	Not Detected		2.11E+01
AM-241	Not Detected		8.32E-01
PU-239	Not Detected		4.13E+02
NP-237	Not Detected		5.38E-01
PA-233	Not Detected		9.66E-02
TH-229	Not Detected		4.27E-01

[Summary Report] - Sample ID: 50061515

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	-----	4.75E-02
AR-41	Not Detected	-----	1.36E+10
BA-133	Not Detected	-----	9.16E-02
BA-140	Not Detected	-----	1.92E-01
CD-109	Not Detected	-----	1.80
CD-115	Not Detected	-----	2.44E-01
CE-139	Not Detected	-----	4.57E-02
CE-141	Not Detected	-----	8.52E-02
CE-144	Not Detected	-----	3.62E-01
CO-56	Not Detected	-----	5.59E-02
CO-57	Not Detected	-----	4.67E-02
CO-58	Not Detected	-----	5.18E-02
CO-60	Not Detected	-----	6.36E-02
CR-51	Not Detected	-----	4.20E-01
CS-134	Not Detected	-----	7.48E-02
CS-137	Not Detected	-----	5.74E-02
CU-64	Not Detected	-----	4.98E+02
EU-152	Not Detected	-----	3.85E-01
EU-154	Not Detected	-----	2.74E-01
EU-155	Not Detected	-----	2.21E-01
FE-59	Not Detected	-----	1.31E-01
GD-153	Not Detected	-----	1.62E-01
HG-203	Not Detected	-----	4.82E-02
I-131	Not Detected	-----	5.65E-02
IN-115m	Not Detected	-----	4.21E+03
IR-192	Not Detected	-----	4.68E-02
K-40	1.32E+01	2.03	4.44E-01
LA-140	Not Detected	-----	1.73E-01
MN-54	Not Detected	-----	5.13E-02
MN-56	Not Detected	-----	6.00E+06
MO-99	Not Detected	-----	8.05E-01
NA-22	Not Detected	-----	6.43E-02
NA-24	Not Detected	-----	1.30
NB-95	Not Detected	-----	4.14E-01
ND-147	Not Detected	-----	3.82E-01
NI-57	Not Detected	-----	2.99E-01
BE-7	Not Detected	-----	3.97E-01
RU-103	Not Detected	-----	4.73E-02
RU-106	Not Detected	-----	4.66E-01
SB-122	Not Detected	-----	1.26E-01
SB-124	Not Detected	-----	4.67E-02
SB-125	Not Detected	-----	1.19E-01
SC-46	Not Detected	-----	8.00E-02
SR-85	Not Detected	-----	5.65E-02
TA-182	Not Detected	-----	2.40E-01
TA-183	Not Detected	-----	1.06
TE-132	Not Detected	-----	7.58E-02
TL-201	Not Detected	-----	5.06E-01
V-48	Not Detected	-----	6.43E-02
XE-133	Not Detected	-----	4.93E-01
Y-88	Not Detected	-----	5.53E-02
ZN-65	Not Detected	-----	1.57E-01
ZR-95	Not Detected	-----	1.00E-01

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 8-03-95 11:46:01 AM *

 * Analyzed by: *See 8/4/95* Reviewed by: *Aug 8/4/95* *

Customer : S.WRIGHTSON (7585)
 Customer Sample ID : 85-BH5-10-S-1
 Lab Sample ID : 50061516
 Sample Description : MARINELLI SOIL SAMPLE
 Sample Type : Solid
 Sample Geometry : 2SMAR
 Sample Quantity : 714.000 gram
 Sample Date/Time : 7-31-95 2:07:00 PM
 Acquire Start Date : 8-03-95 11:08:53 AM
 Detector Name : LAB02
 Elapsed Live Time : 1800 seconds
 Elapsed Real Time : 1801 seconds

Comments:

Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	Not Detected		5.28
TH-234	Not Detected		1.22
U-234	Not Detected		2.03E+01
RA-226	1.07	8.22E-01	1.27
PB-214	6.13E-01	1.32E-01	1.19E-01
BI-214	5.68E-01	1.15E-01	8.80E-02
PB-210	Not Detected		1.55
TH-232	5.83E-01	2.87E-01	4.08E-01
RA-228	4.20E-01	2.13E-01	2.90E-01
AC-228	Not Detected		3.14E-01
TH-228	7.99E-01	3.86E-01	7.45E-01
RA-224	Not Detected		1.53
PB-212	6.04E-01	1.68E-01	7.20E-02
BI-212	Not Detected		9.05E-01
TL-208	5.78E-01	1.54E-01	1.65E-01
U-235	Not Detected		3.85E-01
TH-231	Not Detected		9.37E-01
PA-231	Not Detected		1.80
AC-227	Not Detected		2.84
TH-227	Not Detected		5.64E-01
RA-223	Not Detected		3.57E-01
RN-219	Not Detected		4.28E-01
PB-211	Not Detected		1.08
TL-207	Not Detected		2.40E+01
AM-241	Not Detected		8.99E-01
PU-239	Not Detected		4.48E+02
NP-237	Not Detected		5.88E-01
PA-233	Not Detected		9.47E-02
TH-229	Not Detected		4.35E-01

[Summary Report] - Sample ID: 50061516

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	-----	5.32E-02
AR-41	Not Detected	-----	1.60E+10
BA-133	Not Detected	-----	9.93E-02
BA-140	Not Detected	-----	1.93E-01
CD-109	Not Detected	-----	2.02
CD-115	Not Detected	-----	2.49E-01
CE-139	Not Detected	-----	4.90E-02
CE-141	Not Detected	-----	9.41E-02
CE-144	Not Detected	-----	3.88E-01
CO-56	Not Detected	-----	5.85E-02
CO-57	Not Detected	-----	4.96E-02
CO-58	Not Detected	-----	5.27E-02
CO-60	Not Detected	-----	5.20E-02
CR-51	Not Detected	-----	3.87E-01
CS-134	Not Detected	-----	8.37E-02
CS-137	Not Detected	-----	6.16E-02
CU-64	Not Detected	-----	6.03E+02
EU-152	Not Detected	-----	4.20E-01
EU-154	Not Detected	-----	2.96E-01
EU-155	Not Detected	-----	2.23E-01
FE-59	Not Detected	-----	1.28E-01
GD-153	Not Detected	-----	1.74E-01
HG-203	Not Detected	-----	4.67E-02
I-131	Not Detected	-----	5.64E-02
IN-115m	Not Detected	-----	4.57E+03
IR-192	Not Detected	-----	4.54E-02
K-40	1.64E+01	2.43	4.67E-01
LA-140	Not Detected	-----	1.91E-01
MN-54	Not Detected	-----	5.65E-02
MN-56	Not Detected	-----	7.03E+06
MO-99	Not Detected	-----	8.66E-01
NA-22	Not Detected	-----	7.65E-02
NA-24	Not Detected	-----	1.50
NB-95	Not Detected	-----	4.44E-01
ND-147	Not Detected	-----	3.89E-01
NI-57	Not Detected	-----	3.19E-01
BE-7	Not Detected	-----	3.80E-01
RU-103	Not Detected	-----	4.66E-02
RU-106	Not Detected	-----	4.33E-01
SB-122	Not Detected	-----	1.40E-01
SB-124	Not Detected	-----	5.17E-02
SB-125	Not Detected	-----	1.18E-01
SC-46	Not Detected	-----	8.67E-02
SR-85	Not Detected	-----	6.09E-02
TA-182	Not Detected	-----	2.56E-01
TA-183	Not Detected	-----	1.15
TE-132	Not Detected	-----	8.13E-02
TL-201	Not Detected	-----	5.07E-01
V-48	Not Detected	-----	6.01E-02
XE-133	Not Detected	-----	5.24E-01
Y-88	Not Detected	-----	4.78E-02
ZN-65	Not Detected	-----	1.70E-01
ZR-95	Not Detected	-----	1.06E-01

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 8-03-95 12:23:58 PM *
 * *****
 * Analyzed by: *See 8/4/95* Reviewed by: *ARM 8/4/95* *
 * *****

Customer : S.WRIGHTSON (7585)
 Customer Sample ID : 85-BH5-15-S-1
 Lab Sample ID : 50061517

 Sample Description : MARINELLI SOIL SAMPLE
 Sample Type : Solid
 Sample Geometry : 2SMAR
 Sample Quantity : 504.000 gram
 Sample Date/Time : 7-31-95 2:15:00 PM
 Acquire Start Date : 8-03-95 11:51:17 AM
 Detector Name : LAB02
 Elapsed Live Time : 1800 seconds
 Elapsed Real Time : 1801 seconds

Comments:

Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	Not Detected	-----	6.59
TH-234	Not Detected	-----	1.62
U-234	Not Detected	-----	2.55E+01
RA-226	1.54	8.86E-01	1.30
PB-214	7.68E-01	1.56E-01	1.11E-01
BI-214	5.58E-01	1.36E-01	1.34E-01
PB-210	Not Detected	-----	2.22
TH-232	8.45E-01	3.54E-01	4.72E-01
RA-228	6.82E-01	1.02E-01	3.36E-01
AC-228	8.29E-01	2.73E-01	3.22E-01
TH-228	Not Detected	-----	1.64
RA-224	Not Detected	-----	2.19
PB-212	7.48E-01	1.69E-01	8.93E-02
BI-212	9.71E-01	6.52E-01	9.64E-01
TL-208	6.54E-01	1.74E-01	1.73E-01
U-235	Not Detected	-----	5.08E-01
TH-231	Not Detected	-----	1.18
PA-231	Not Detected	-----	2.28
AC-227	Not Detected	-----	3.40
TH-227	Not Detected	-----	7.30E-01
RA-223	Not Detected	-----	4.47E-01
RN-219	Not Detected	-----	5.79E-01
PB-211	Not Detected	-----	1.36
TL-207	Not Detected	-----	2.90E+01
AM-241	Not Detected	-----	1.11
PU-239	Not Detected	-----	5.78E+02
NP-237	Not Detected	-----	7.52E-01
PA-233	Not Detected	-----	1.31E-01
TH-229	Not Detected	-----	5.49E-01

[Summary Report] - Sample ID: 50061517

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	-----	6.96E-02
AR-41	Not Detected	-----	2.97E+10
BA-133	Not Detected	-----	1.31E-01
BA-140	Not Detected	-----	2.70E-01
CD-109	Not Detected	-----	2.58
CD-115	Not Detected	-----	3.43E-01
CE-139	Not Detected	-----	6.05E-02
CE-141	Not Detected	-----	1.21E-01
CE-144	Not Detected	-----	4.98E-01
CO-56	Not Detected	-----	8.15E-02
CO-57	Not Detected	-----	6.05E-02
CO-58	1.38E-02	9.66E-02	2.41E-02
CO-60	Not Detected	-----	8.23E-02
CR-51	Not Detected	-----	5.15E-01
CS-134	Not Detected	-----	1.05E-01
CS-137	Not Detected	-----	7.84E-02
CU-64	Not Detected	-----	7.06E+02
EU-152	Not Detected	-----	5.84E-01
EU-154	Not Detected	-----	3.69E-01
EU-155	Not Detected	-----	2.94E-01
FE-59	Not Detected	-----	1.65E-01
GD-153	Not Detected	-----	2.19E-01
HG-203	Not Detected	-----	6.14E-02
I-131	Not Detected	-----	7.56E-02
IN-115m	Not Detected	-----	6.82E+03
IR-192	Not Detected	-----	6.37E-02
K-40	1.73E+01	2.70	8.71E-01
LA-140	Not Detected	-----	3.02E-01
MN-54	Not Detected	-----	7.44E-02
MN-56	Not Detected	-----	1.14E+07
MO-99	Not Detected	-----	1.07
NA-22	Not Detected	-----	9.27E-02
NA-24	Not Detected	-----	1.95
NB-95	Not Detected	-----	5.75E-01
ND-147	Not Detected	-----	5.39E-01
NI-57	Not Detected	-----	4.57E-01
BE-7	Not Detected	-----	5.50E-01
RU-103	Not Detected	-----	5.77E-02
RU-106	Not Detected	-----	6.34E-01
SB-122	Not Detected	-----	1.77E-01
SB-124	Not Detected	-----	7.12E-02
SB-125	Not Detected	-----	1.62E-01
SC-46	Not Detected	-----	1.21E-01
SR-85	Not Detected	-----	8.60E-02
TA-182	Not Detected	-----	3.41E-01
TA-183	Not Detected	-----	1.42
TE-132	Not Detected	-----	1.06E-01
TL-201	Not Detected	-----	6.53E-01
V-48	Not Detected	-----	8.40E-02
XE-133	Not Detected	-----	6.34E-01
Y-88	Not Detected	-----	6.78E-02
ZN-65	Not Detected	-----	2.28E-01
ZR-95	Not Detected	-----	1.38E-01

N.D. Aug 8/4/95

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 8-03-95 1:05:43 PM *

 * Analyzed by: *She 8/4/95* Reviewed by: *DM 8/4/95* *

Customer : S.WRIGHTSON (7585)
 Customer Sample ID : 85-BH5-15-SD-1
 Lab Sample ID : 50061518

Sample Description : MARINELLI SOIL SAMPLE
 Sample Type : Solid
 Sample Geometry : 2SMAR
 Sample Quantity : 547.000 gram
 Sample Date/Time : 7-31-95 2:15:00 PM
 Acquire Start Date : 8-03-95 12:28:18 PM
 Detector Name : LAB02
 Elapsed Live Time : 1800 seconds
 Elapsed Real Time : 1801 seconds

Comments:

Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	Not Detected		7.11
TH-234	Not Detected		1.52
U-234	Not Detected		2.59E+01
RA-226	7.14E-01	7.55E-01	1.20
PB-214	6.46E-01	1.11E-01	9.52E-02
BI-214	5.68E-01	1.26E-01	1.08E-01
PB-210	Not Detected		1.69
TH-232	6.93E-01	2.85E-01	3.72E-01
RA-228	7.86E-01	2.90E-01	3.38E-01
AC-228	Not Detected		4.11E-01
TH-228	7.93E-01	4.55E-01	9.24E-01
RA-224	Not Detected		2.02
PB-212	7.42E-01	2.04E-01	8.69E-02
BI-212	7.97E-01	5.05E-01	7.27E-01
TL-208	5.93E-01	1.69E-01	1.84E-01
U-235	Not Detected		4.84E-01
TH-231	Not Detected		1.19
PA-231	Not Detected		2.17
AC-227	Not Detected		3.31
TH-227	Not Detected		6.96E-01
RA-223	Not Detected		4.39E-01
RN-219	Not Detected		5.46E-01
PB-211	Not Detected		1.37
TL-207	Not Detected		2.93E+01
AM-241	Not Detected		1.07
PU-239	Not Detected		5.53E+02
NP-237	Not Detected		7.58E-01
PA-233	Not Detected		1.20E-01
TH-229	Not Detected		5.40E-01

[Summary Report] - Sample ID: 50061518

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	-----	6.02E-02
AR-41	Not Detected	-----	3.41E+10
BA-133	Not Detected	-----	1.21E-01
BA-140	Not Detected	-----	2.53E-01
CD-109	Not Detected	-----	1.67
CD-115	Not Detected	-----	3.23E-01
CE-139	Not Detected	-----	5.83E-02
CE-141	Not Detected	-----	1.14E-01
CE-144	Not Detected	-----	4.80E-01
CO-56	Not Detected	-----	7.64E-02
CO-57	Not Detected	-----	6.12E-02
CO-58	Not Detected	-----	7.10E-02
CO-60	Not Detected	-----	7.99E-02
CR-51	Not Detected	-----	5.02E-01
CS-134	Not Detected	-----	9.95E-02
CS-137	Not Detected	-----	7.19E-02
CU-64	Not Detected	-----	7.40E+02
EU-152	Not Detected	-----	5.40E-01
EU-154	Not Detected	-----	3.34E-01
EU-155	Not Detected	-----	2.73E-01
FE-59	Not Detected	-----	1.54E-01
GD-153	Not Detected	-----	2.10E-01
HG-203	Not Detected	-----	6.22E-02
I-131	Not Detected	-----	7.51E-02
IN-115m	Not Detected	-----	7.01E+03
IR-192	Not Detected	-----	5.84E-02
K-40	1.90E+01	2.86	4.41E-01
LA-140	Not Detected	-----	2.44E-01
MN-54	Not Detected	-----	7.21E-02
MN-56	Not Detected	-----	1.26E+07
MO-99	Not Detected	-----	1.06
NA-22	Not Detected	-----	8.49E-02
NA-24	Not Detected	-----	1.68
NB-95	Not Detected	-----	5.54E-01
ND-147	Not Detected	-----	4.75E-01
NI-57	Not Detected	-----	3.76E-01
BE-7	Not Detected	-----	5.12E-01
RU-103	Not Detected	-----	6.14E-02
RU-106	Not Detected	-----	5.90E-01
SB-122	Not Detected	-----	1.70E-01
SB-124	Not Detected	-----	6.68E-02
SB-125	Not Detected	-----	1.51E-01
SC-46	Not Detected	-----	1.07E-01
SR-85	Not Detected	-----	7.78E-02
TA-182	Not Detected	-----	3.13E-01
TA-183	Not Detected	-----	1.38
TE-132	Not Detected	-----	9.83E-02
TL-201	Not Detected	-----	6.25E-01
V-48	Not Detected	-----	8.01E-02
XE-133	Not Detected	-----	6.34E-01
Y-88	Not Detected	-----	6.08E-02
ZN-65	Not Detected	-----	2.11E-01
ZR-95	Not Detected	-----	1.19E-01

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 8-03-95 1:25:20 AM *
 * *****
 * Analyzed by: *See 8/4/95* Reviewed by: *JAM 8/4/95* *
 * *****

Customer : S.WRIGHTSON (7585)
 Customer Sample ID : 85-BH5-15-FB-1
 Lab Sample ID : 50061519

Sample Description : MARINELLI WATER SAMPLE
 Sample Type : Liquid
 Sample Geometry : 2WMAR
 Sample Quantity : 500.000 mL
 Sample Date/Time : 7-31-95 3:10:00 PM
 Acquire Start Date : 8-02-95 11:43:24 PM
 Detector Name : LAB02
 Elapsed Live Time : 6000 seconds
 Elapsed Real Time : 6001 seconds

Comments:

Nuclide	Activity (pCi/mL)	2S Error	MDA
U-238	Not Detected		1.56
TH-234	Not Detected		3.73E-01
U-234	Not Detected	-----	6.35
RA-226	Not Detected	-----	4.06E-01
PB-214	Not Detected	-----	4.43E-02
BI-214	Not Detected	-----	4.62E-02
PB-210	Not Detected	-----	4.20E-01
TH-232	Not Detected	-----	1.14E-01
RA-228	Not Detected	-----	1.22E-01
AC-228	Not Detected	-----	7.99E-02
TH-228	Not Detected	-----	4.22E-01
RA-224	Not Detected	-----	4.44E-01
PB-212	Not Detected	-----	3.47E-02
BI-212	Not Detected	-----	2.97E-01
TL-208	Not Detected	-----	6.13E-02
U-235	Not Detected	-----	1.46E-01
TH-231	Not Detected	-----	2.70E-01
PA-231	Not Detected	-----	5.86E-01
AC-227	Not Detected	-----	1.09
TH-227	Not Detected	-----	1.30E-01
RA-223	Not Detected	-----	1.01E-01
RN-219	Not Detected	-----	1.61E-01
PB-211	Not Detected	-----	3.68E-01
TL-207	Not Detected	-----	8.38
AM-241	Not Detected	-----	2.77E-01
PU-239	Not Detected	-----	1.70E+02
NP-237	Not Detected	-----	1.62E-01
PA-233	Not Detected	-----	3.74E-02
TH-229	Not Detected	-----	1.51E-01

[Summary Report] - Sample ID: 50061519

Nuclide	Activity (pCi/mL)	2S Error	MDA
AG-110m	Not Detected	-----	2.10E-02
AR-41	Not Detected	-----	6.29E+07
BA-133	Not Detected	-----	2.39E-02
BA-140	Not Detected	-----	7.79E-02
CD-109	Not Detected	-----	5.46E-01
CD-115	Not Detected	-----	6.51E-02
CE-139	Not Detected	-----	1.83E-02
CE-141	Not Detected	-----	3.34E-02
CE-144	Not Detected	-----	1.50E-01
CO-56	Not Detected	-----	2.72E-02
CO-57	Not Detected	-----	1.86E-02
CO-58	Not Detected	-----	2.13E-02
CO-60	Not Detected	-----	2.16E-02
CR-51	Not Detected	-----	1.63E-01
CS-134	Not Detected	-----	2.36E-02
CS-137	Not Detected	-----	2.18E-02
CU-64	Not Detected	-----	1.08E+02
EU-152	Not Detected	-----	1.76E-01
EU-154	Not Detected	-----	1.05E-01
EU-155	Not Detected	-----	8.23E-02
FE-59	Not Detected	-----	3.32E-02
GD-153	Not Detected	-----	5.70E-02
HG-203	Not Detected	-----	1.71E-02
I-131	Not Detected	-----	2.31E-02
IN-115m	Not Detected	-----	2.21E+02
IR-192	Not Detected	-----	1.83E-02
K-40	Not Detected	-----	2.90E-01
LA-140	Not Detected	-----	5.76E-02
MN-54	Not Detected	-----	1.98E-02
MN-56	Not Detected	-----	1.33E+05
MO-99	Not Detected	-----	3.21E-01
NA-22	Not Detected	-----	2.02E-02
NA-24	Not Detected	-----	3.08E-01
NB-95	Not Detected	-----	9.46E-02
ND-147	Not Detected	-----	1.49E-01
NI-57	Not Detected	-----	8.55E-02
BE-7	Not Detected	-----	1.63E-01
RU-103	Not Detected	-----	1.97E-02
RU-106	Not Detected	-----	1.88E-01
SB-122	Not Detected	-----	4.68E-02
SB-124	Not Detected	-----	2.24E-02
SB-125	Not Detected	-----	5.17E-02
SC-46	Not Detected	-----	2.49E-02
SR-85	Not Detected	-----	2.90E-02
TA-182	Not Detected	-----	7.51E-02
TA-183	Not Detected	-----	3.34E-01
TE-132	Not Detected	-----	2.46E-02
TL-201	Not Detected	-----	1.31E-01
V-48	Not Detected	-----	2.41E-02
XE-133	Not Detected	-----	1.34E-01
Y-88	Not Detected	-----	2.50E-02
ZN-65	Not Detected	-----	4.54E-02
ZR-95	Not Detected	-----	3.61E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 8-03-95 3:11:48 AM *
 * *****
 * Analyzed by: *See 8/4/95* Reviewed by: *8/4/95* *
 * *****

Customer : S.WRIGHTSON (7585)
 Customer Sample ID : 85-BH5-15-EB-1
 Lab Sample ID : 50061520
 Sample Description : MARINELLI WATER SAMPLE
 Sample Type : Liquid
 Sample Geometry : 2WMAR
 Sample Quantity : 500.000 mL
 Sample Date/Time : 7-31-95 3:10:00 PM
 Acquire Start Date : 8-03-95 1:29:51 AM
 Detector Name : LAB02
 Elapsed Live Time : 6000 seconds
 Elapsed Real Time : 6001 seconds

Comments:

Nuclide	Activity (pCi/mL)	2S Error	MDA
U-238	Not Detected	-----	1.59
TH-234	Not Detected	-----	3.80E-01
U-234	Not Detected	-----	6.42
RA-226	Not Detected	-----	4.02E-01
PB-214	Not Detected	-----	4.47E-02
BI-214	Not Detected	-----	4.86E-02
PB-210	Not Detected	-----	5.88E-01
TH-232	Not Detected	-----	1.28E-01
RA-228	Not Detected	-----	1.28E-01
AC-228	Not Detected	-----	7.99E-02
TH-228	Not Detected	-----	4.35E-01
RA-224	Not Detected	-----	4.47E-01
PB-212	Not Detected	-----	3.46E-02
BI-212	Not Detected	-----	2.81E-01
TL-208	Not Detected	-----	6.82E-02
U-235	Not Detected	-----	1.48E-01
TH-231	Not Detected	-----	2.73E-01
PA-231	Not Detected	-----	6.04E-01
AC-227	Not Detected	-----	1.08
TH-227	Not Detected	-----	1.29E-01
RA-223	Not Detected	-----	1.02E-01
RN-219	Not Detected	-----	1.57E-01
PB-211	Not Detected	-----	3.74E-01
TL-207	Not Detected	-----	8.16
AM-241	Not Detected	-----	2.65E-01
PU-239	Not Detected	-----	1.67E+02
NP-237	Not Detected	-----	1.70E-01
PA-233	Not Detected	-----	3.90E-02
TH-229	Not Detected	-----	1.65E-01

[Summary Report] - Sample ID: 50061520

Nuclide	Activity (pCi/mL)	2S Error	MDA
AG-110m	Not Detected	-----	1.89E-02
AR-41	Not Detected	-----	1.42E+08
BA-133	Not Detected	-----	2.54E-02
BA-140	Not Detected	-----	7.25E-02
CD-109	Not Detected	-----	5.74E-01
CD-115	Not Detected	-----	7.19E-02
CE-139	Not Detected	-----	1.83E-02
CE-141	Not Detected	-----	3.31E-02
CE-144	Not Detected	-----	1.46E-01
CO-56	Not Detected	-----	2.74E-02
CO-57	Not Detected	-----	1.85E-02
CO-58	Not Detected	-----	1.99E-02
CO-60	Not Detected	-----	2.21E-02
CR-51	Not Detected	-----	1.56E-01
CS-134	Not Detected	-----	2.43E-02
CS-137	Not Detected	-----	2.09E-02
CU-64	Not Detected	-----	1.17E+02
EU-152	Not Detected	-----	1.79E-01
EU-154	Not Detected	-----	9.55E-02
EU-155	Not Detected	-----	8.14E-02
FE-59	Not Detected	-----	3.98E-02
GD-153	Not Detected	-----	6.24E-02
HG-203	Not Detected	-----	1.78E-02
I-131	Not Detected	-----	2.39E-02
IN-115m	Not Detected	-----	3.14E+02
IR-192	Not Detected	-----	1.77E-02
K-40	Not Detected	-----	2.83E-01
LA-140	Not Detected	-----	6.93E-02
MN-54	Not Detected	-----	1.96E-02
MN-56	Not Detected	-----	2.16E+05
MO-99	Not Detected	-----	2.93E-01
NA-22	Not Detected	-----	2.26E-02
NA-24	Not Detected	-----	4.05E-01
NB-95	Not Detected	-----	9.65E-02
ND-147	Not Detected	-----	1.40E-01
NI-57	Not Detected	-----	9.49E-02
BE-7	Not Detected	-----	1.61E-01
RU-103	Not Detected	-----	1.87E-02
RU-106	Not Detected	-----	1.95E-01
SB-122	Not Detected	-----	4.95E-02
SB-124	Not Detected	-----	2.39E-02
SB-125	Not Detected	-----	5.02E-02
SC-46	Not Detected	-----	2.21E-02
SR-85	Not Detected	-----	2.84E-02
TA-182	Not Detected	-----	6.35E-02
TA-183	Not Detected	-----	3.22E-01
TE-132	Not Detected	-----	2.72E-02
TL-201	Not Detected	-----	1.29E-01
V-48	Not Detected	-----	2.24E-02
XE-133	Not Detected	-----	1.36E-01
Y-88	Not Detected	-----	2.47E-02
ZN-65	Not Detected	-----	4.58E-02
ZR-95	Not Detected	-----	3.69E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 8-03-95 3:08:36 PM *

 * Analyzed by: *See 8/4/95* Reviewed by: *DPM 8/4/95* *

Customer : S.WRIGHTSON (7585)
 Customer Sample ID : LAB CONTROL SAMPLE ANALYSIS #CG134
 Lab Sample ID : 50061521

Sample Description : MIXED GAMMA STANDARD
 Sample Type : Liquid
 Sample Geometry : WMAR
 Sample Quantity : 1.000 Each
 Sample Date/Time : 11-01-90 12:00:00 PM
 Acquire Start Date : 8-03-95 2:54:20 PM
 Detector Name : LAB02
 Elapsed Live Time : 600 seconds
 Elapsed Real Time : 606 seconds

Comments:

Nuclide	Activity (pCi/Each)	2S Error	MDA
U-238	Not Detected	-----	2.13E+04
TH-234	Not Detected	-----	4.63E+03
U-234	Not Detected	-----	1.21E+05
RA-226	Not Detected	-----	5.93E+03
PB-214	Not Detected	-----	7.04E+02
BI-214	Not Detected	-----	6.55E+02
PB-210	Not Detected	-----	4.89E+03
TH-232	Not Detected	-----	2.03E+03
RA-228	Not Detected	-----	2.74E+03
AC-228	Not Detected	-----	1.75E+03
TH-228	Not Detected	-----	3.75E+04
RA-224	Not Detected	-----	5.37E+04
PB-212	Not Detected	-----	2.97E+03
BI-212	Not Detected	-----	2.60E+04
TL-208	Not Detected	-----	5.49E+03
U-235	Not Detected	-----	1.85E+03
TH-231	Not Detected	-----	3.86E+03
PA-231	Not Detected	-----	9.33E+03
AC-227	Not Detected	-----	1.59E+04
TH-227	Not Detected	-----	2.30E+03
RA-223	Not Detected	-----	1.00E+26
RN-219	Not Detected	-----	2.83E+03
PB-211	Not Detected	-----	8.37E+03
TL-207	Not Detected	-----	2.23E+05
AM-241	8.78E+04	1.54E+04	4.36E+03
PU-239	Not Detected	-----	2.16E+06
NP-237	Not Detected	-----	2.70E+03
PA-233	Not Detected	-----	6.10E+02
TH-229	Not Detected	-----	2.02E+03

[Summary Report] - Sample ID: 50061521

Nuclide	Activity (pCi/Each)	2S Error	MDA
AG-110m	Not Detected	-----	1.92E+05
AR-41	Not Detected	-----	1.00E+26
BA-133	Not Detected	-----	5.57E+02
BA-140	Not Detected	-----	1.00E+26
CD-109	3.01E+05	8.87E+04	1.10E+05
CD-115	Not Detected	-----	1.00E+26
CE-139	Not Detected	-----	1.52E+06
CE-141	Not Detected	-----	4.96E+18
CE-144	Not Detected	-----	1.30E+05
CO-56	Not Detected	-----	2.41E+09
CO-57	Not Detected	-----	2.12E+04
CO-58	Not Detected	-----	8.68E+09
CO-60	7.52E+04	9.79E+03	5.27E+02
CR-51	Not Detected	-----	1.72E+22
CS-134	Not Detected	-----	1.52E+03
CS-137	6.83E+04	8.82E+03	4.69E+02
CU-64	Not Detected	-----	1.00E+26
EU-152	Not Detected	-----	3.52E+03
EU-154	Not Detected	-----	2.21E+03
EU-155	Not Detected	-----	2.13E+03
FE-59	Not Detected	-----	5.07E+14
GD-153	Not Detected	-----	1.15E+05
HG-203	Not Detected	-----	4.43E+13
I-131	Not Detected	-----	1.00E+26
IN-115m	Not Detected	-----	1.00E+26
IR-192	Not Detected	-----	3.41E+09
K-40	Not Detected	-----	1.66E+03
LA-140	Not Detected	-----	1.00E+26
MN-54	Not Detected	-----	1.86E+04
MN-56	Not Detected	-----	1.00E+26
MO-99	Not Detected	-----	1.00E+26
NA-22	Not Detected	-----	8.20E+02
NA-24	Not Detected	-----	1.00E+26
NB-95	Not Detected	-----	1.00E+26
ND-147	Not Detected	-----	1.00E+26
NI-57	Not Detected	-----	1.00E+26
BE-7	Not Detected	-----	2.10E+13
RU-103	Not Detected	-----	6.90E+15
RU-106	Not Detected	-----	8.10E+04
SB-122	Not Detected	-----	1.00E+26
SB-124	Not Detected	-----	1.48E+11
SB-125	Not Detected	-----	3.39E+03
SC-46	Not Detected	-----	7.87E+08
SR-85	Not Detected	-----	3.99E+10
TA-182	Not Detected	-----	4.56E+07
TA-183	Not Detected	-----	1.00E+26
TE-132	Not Detected	-----	1.00E+26
TL-201	Not Detected	-----	1.00E+26
V-48	Not Detected	-----	1.00E+26
XE-133	Not Detected	-----	1.00E+26
Y-88	Not Detected	-----	1.50E+07
ZN-65	Not Detected	-----	1.32E+05
ZR-95	Not Detected	-----	8.94E+10

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program *
 * Quality Assurance Report *

Report Date : 8-03-95 3:15:14 PM
 QA File : C:\GENIEPC\CAMFILES\LCS2.QAF
 Analyst : MEC
 Sample ID : 50061521
 Sample Quantity : 1.00 Each
 Sample Date : 11-01-90 12:00:00 PM
 Measurement Date : 8-03-95 2:54:20 PM
 Elapsed Live Time : 600 seconds
 Elapsed Real Time : 606 seconds

Parameter	Mean	1S Error	New Value	< LU : SD : UD : BS >
AM-241 Activity	9.154E-02	7.767E-03	8.779E-02	< : : : >
CS-137 Activity	6.905E-02	4.785E-03	6.825E-02	< : : : >
CO-60 Activity	7.565E-02	5.297E-03	7.456E-02	< : : : >

Flags Key: LU = Boundary Test (Ab = Above , Be = Below)
 SD = Sample Driven N-Sigma Test (In = Investigate, Ac = Action)
 UD = User Driven N-Sigma Test (In = Investigate, Ac = Action)
 BS = Measurement Bias Test (In = Investigate, Ac = Action)

Reviewed by: _____

Spec 8/4/95

Annex 10-B
Data Validation Results

Sandia National Laboratories
Albuquerque, New Mexico 87185

date: 10/25/95

to: Skip Wightson

85-
BH2, 3, 4, 5
metals, HE

from: Mark Lyon, 7513

project: Scoping Sampling ARCOG: 03982

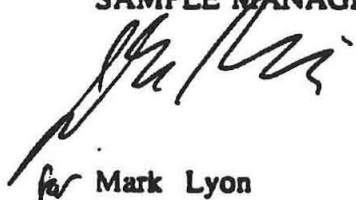
Lab: L45

Lab #: L5091

Date Sampled: 7/31/95

Enclosed are/is 1 data package(s) for your project. The package(s) include a copy of the sample collection documentation, ARCOG form(s), analytical report(s), verification check lists, and additional supporting documentation. The SMO has completed data verification levels 1 and 2 (DV1/DV2) on the data package(s). All original documentation will be forwarded to the Environmental Operations Record Center. With the data you may perform project specific data validation for acceptance approval. Refer to the report narrative and verification check lists for comments regarding data quality. If you need assistance with the data review or have any questions regarding the data please contact me at 262-8920.

SAMPLE MANAGEMENT OFFICE


for Mark Lyon

MLL:7513

Distribution:
Environmental Operations Record Center

SMO ANALYTICAL DATA ROUTING FORM

Project Name: Scoping Sampling

Case Number: 3635400

SNL Task Leader: Wrightson

Org/Mail Stop: 7585/1148

SMO Project Coordinator: Gonzalez

Sample Ship Date: 8/9/95

ARCOC

Lab

Lab ID

03882

LAS

L5091

Date Results Received:

Preliminary: _____ Final: 9/15/95

Corrections Requested From Laboratory: _____ Requestor: _____

Date Corrections Received: _____

Date Assigned to
SMO Reviewer: 10/20/95

Reviewer: Lyon / Stuber

Date Review
Complete: 10/25/95

Signature: [Signature]

Date of Preliminary
Notification: _____

Person
Notified: _____

Date of Final
Transmittal: 10/25/95

Transmitted
To: Skip Wrightson

Transmitted By: [Signature]

Filed In
Record Center: _____

Comments: _____

DOCUMENTATION COMPLETENESS CHECKLIST
(DATA VERIFICATION/VALIDATION LEVEL 1—DV1)

Project Name Scoping Sampling Page 1 of 4
Case Number 3635.400
Sample Numbers 018007 - 7 018013

AR/COC No. 03982 Analytical laboratory LAS SDG No. L5091
AR/COC No. Analytical laboratory SDG No.
AR/COC No. Analytical laboratory SDG No.
AR/COC No. Analytical laboratory SDG No.

In the tables below, mark any information that is missing or incorrect.

1.0 Sample Collection Log

Item	Complete?		Corrected?	
	Yes	No	Yes	No ^a
Date				
Sheet number and total number of sheets below				
General information				
Sample description				
Sample ID number(s) and fraction number(s)				
Location				
Time of sample collection				
Sample type				
Depth below surface				
QC sample? ^b				
Comments				
Analyses requested				
Project information				
Project name				
Case number/service order number				
Contact information				
Turnaround time				
Regulatory program				
Special QC requirements				
Sample team member(s), their signature(s), and initials				
Sample tracing information (the "Data Entered" and "By" spaces may be empty)				

^a Describe any uncorrected deficiencies in Section 5.0, "Completeness Assessment," below.

^b Comments are only required for QC samples; for other samples, this item can be blank.

Reviewed by: [Signature]

Date: 10/25/95

DOCUMENTATION COMPLETENESS CHECKLIST (DATA VERIFICATION/VALIDATION LEVEL 1—DV1)

Page 2 of 4

2.0 Analysis Request and Chain of Custody Record

Item	Complete?		Corrected?	
	Yes	No	Yes	No ^a
Page number and total number of pages	✓			
Project information	✓			
Sample shipping information	✓			
Contract and case number	✓			
SMD authorization signature	✓			
Location information	✓			
Sample number(s)/traction number(s)	✓			
Sample ID information	✓			
Determine sample(s) collected	✓			
Sample matrix	✓			
Container type(s)	✓			
Sample volume	✓			
Preservative (chemical and/or thermal)	✓			
Sample collection method	✓			
Sample type	✓			
Required analytical testing	✓			
Sample information	✓			
Special instruction/QC requirements	✓			
Custody records	✓			
Lab sample number	✓			
Condition upon receipt	✓			

^a Describe any uncorrected deficiencies in Section 5.0 "Completeness Assessment" below.

3.0 Document Comparison

Item	Complete?		Corrected?	
	Yes	No	Yes	No ^a
Date on Sample Collection Log and AR/COC agree.	NA			
Sample team members on the Sample Collection Log and the AR/COC agree.	NA			
Sample ID numbers on Sample Collection Log and AR/COC agree.	NA			
Date and time on Sample Collection Log and AR/COC agree.	NA			
Analyses requested on AR/COC agree with those shown on Sample Collection Log.	NA			
Project information on Sample Collection Log and AR/COC agree.	NA			
The sample location on the Sample Collection Log agrees with the AR/COC and project-specific plan requirements or authorized changes to the plan(s).	✓			
The number of investigative and QC samples collected was that specified in the project-specific plan(s) or authorized changes to the plan(s).	✓			
The analyses requested on the AR/COC were those specified in the project-specific plan(s) or authorized changes to the plan(s).	✓			

^a Describe any uncorrected deficiencies in Section 5.0, "Completeness Assessment," below.

Reviewed by: *[Signature]*

Date: 10/25/95

DOCUMENTATION COMPLETENESS CHECKLIST (DATA VERIFICATION/VALIDATION LEVEL 1—DV1)

Page 3 of 4

4.0 Analytical Laboratory Report

Item	Complete?		Corrected?	
	Yes	No	Yes	No ^a
Data reviewed, signature	/			
Date samples received	/			
Method reference number(s)	/			
Quality control data	/			
Matrix spike/matrix spike duplicate data	/			
Narrative complete	/			

^a Describe any uncorrected deficiencies in Section 5.0 "Completeness Assessment" below.

5.0 Completeness Assessment For each section below, mark the appropriate box and describe any problems that remain unresolved.

5.1 Sample Collection Log

Yes No

All boxes on the Sample Collection Log are complete:

all ☒ ☐

Some boxes have been checked no; all problems are resolved.

all ☒ ☐

If any boxes have been checked no, describe problem and resolution:

5.2 Analysis Request And Chain Of Custody Record AR/COC

Yes No

All boxes on the AR/COC review are complete:

☒ ☐

Some boxes have been checked no; all problems are resolved.

all ☒ ☐

If any boxes have been checked no, describe problem and resolution:

Reviewed by:

Date: 10/25/95

DOCUMENTATION COMPLETENESS CHECKLIST
(DATA VERIFICATION/VALIDATION LEVEL 1—DV1)

Page 4 of 4

5.3 Document Comparison

All boxes on the Document Comparison are complete:

Some boxes have been checked no; all problems are resolved.

Yes	No
<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>

If any boxes have been checked no, describe problem and resolution:

5.4 Analytical Laboratory Report

All boxes on the Lab Report review are complete:

Some boxes have been checked no; all problems are resolved.

Yes	No
<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>

If any boxes have been checked no, describe problem and resolution:

BASED ON THE REVIEW, DOCUMENTATION IS COMPLETE:

☒ Yes ☐ No

Reviewed by:

Date: 10/25/95

Approved by:

Date:

* Task/Project Leader must approve data package.

COMMENTS:

DATA QUALITY INDICATOR CHECKLIST (DATA VERIFICATION/VALIDATION LEVEL 2—DV2)

Project Name Scoping Sampling Page 1 of 5
Case Number 3632-400
Sample Numbers 018007 → 018013

AR/COC No. 03982 Analytical laboratory LAS SDG No. L5091
AR/COC No. Analytical laboratory SDG No.
AR/COC No. Analytical laboratory SDG No.
AR/COC No. Analytical laboratory SDG No.

1.0 EVALUATION

Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
1) Sample volume, container, and preservation correct?	✓		
2) Holding times met for all samples?		X	018012-03, 018013-03 - (Meth 8330)
3) Reporting units appropriate for the matrix and meet project-specific requirements?	✓		
4) Quantitation limit met for all samples?	✓		
5) Accuracy			
a) Laboratory control sample accuracy reported and met for all samples?	✓		
b) Surrogate data reported and met for all organic samples analyzed by a gas chromatography technique?		X	018007-03, 018008-03 - recovery high for 4-MT (amine)

Reviewed by: [Signature]

Date: 10/25/95

**DATA QUALITY INDICATOR CHECKLIST
(DATA VERIFICATION/VALIDATION LEVEL 2—DV2)**

Page 2 of 5

Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
c) Matrix spike recovery data reported and met for all samples for which it was requested?		X	018007-02 018009-02 018010-02 018008-02 018010-02 — Sb, Hg recovery low, Pb recovery high
6) Precision			
a) Laboratory control sample precision reported and met for all samples?	✓		
b) Matrix spike duplicate RPD data reported and met for all samples for which it was requested?		X	018007-02 018009-02 018010-02 — Pb out of range
7) Blank data			
a) Method or reagent blank data reported and met for all samples?	✓		
b) Sampling blank (e.g., field, trip, and equipment) data reported and met?	✓		
8) Narrative included, correct, and complete?	✓		

2.0 COMMENTS: All items marked "No" above must be explained in this section. For each item, give SNL/NM ID No. and the analysis, if appropriate, of all samples affected by the finding.

018007-03, 018008-03, 018009-03, 018010-03, 018011-03 — assayed to method 8330 compounds.

concentration below PQL

018007-03, 018008-03 — surrogate recovery high for 4-NITROANILINE

Reviewed by: [Signature]

Date: 10/25/95

DATA QUALITY INDICATOR CHECKLIST
(DATA VERIFICATION/VALIDATION LEVEL 2—DV2)

Page 3 of 5

2.0 COMMENTS CONTINUATION SHEET

018007-03 018010-03
018008-03 018011-03 - ms/msd recovers and RPD out of range

018012-03 - method 8330 - assign U to all compounds - concentration below PQL
018013-03 - holding time exceeded.

018012-04 - U-235 - assign J - error lowers concentration below LC.
Assign J to U-235, U-238 - error drops concentration below LC

018013-04 - Assign U to U-235, - concentration below LC

018012-04, 018013-04 - RPD out of range for all.

018012-02, 018013-02 - Assign U to All gold except Fe, Pb.

018012-02 - Assign U to All gold.

018007-02 018010-02
018008-02 018011-02 ms/msd - Sb, Hg recovery low, Pb recovery high, Hg RPD out of range.

- Assign U to Sb, Be, Cd, Co, Ag, Ni, Se, Ti, Hg - concentration below reporting limit

- 018007-02 - Assign U to Ni, K, As - concentration below reporting limit

- Assign J to Fe, Pb - detected in blank.

Reviewed by:

Date:

10/25/95

DATA QUALITY INDICATOR CHECKLIST
(DATA VERIFICATION/VALIDATION LEVEL 2—DV2)

Page 4 of 5

3.0 SUMMARY: Summarize the findings in the table below. List only samples/fractions for which deficiencies have been noted. Use the qualifiers given at the end of the table if possible. Explain any other qualifiers in the comments column.

Sample/ Fraction No.	Analysis	Qualifiers	Comments
018007-03, 018008-03 018009-03, 018010-03 018011-03	All method 8330 compounds	U	concentration below PQL
018012-03 018013-03	↓	↓	↓
018012-04	U-235	J	error lowers concentration below LC
018013-04	U-233/4 U-235	J	↓
↓	U-235	U	concentration below LC
018012-02	All 6010 metals except Fe, Pb	U	concentration below reporting limit
018013-02	All 6010 metals	U	↓

Attach continuation sheet for additional samples

QUALIFIERS:

- | | |
|--|--|
| J = Estimated quantity (provide reason) | Q = Quantitation limit does not meet criteria |
| B = Contamination in blank (indicate which blank) | A = Laboratory accuracy does not meet criteria |
| P = Laboratory precision does not meet criteria | U = Analyte is undetected (indicate which analyte and reason for qualification) |
| R = Reporting units inappropriate | NJ = There is presumptive evidence of the presence of the material at an estimated quantity. |
| N = There is presumptive evidence of the presence of the material | |
| UJ = The material was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise. | |

Reviewed by: 

Date: 10/25/95

SAMPLE FINDINGS SUMMARY

Site: 85

AR/COC: 06354

Data Classification: Organic

Sample Fraction No.	Analysis	DV Qualifiers	Comments	3/19/98
1335-ER85-BH-006-0-S ↓ -0-SD -5.0-S	EPA 8330 (HE)	A, R	Lab accuracy for LCS/LCSD. did not meet acceptance criteria.	ML
1335-ER85-BH-007-0-SD ↓ -15.0-S -5.0-S			Data is unusable.	
1335-ER85-BH-008-0-S ↓ -10.0-S -15.0-S				
1335-ER85-BH-008-EB ↓ -0-SD -5.0-S -10.0-S	↓	↓	↓	

Sample No./Fraction No. - This value is located on the Chain of Custody in the ER Sample Id field.

Analysis - Use valid test methods provided below or if the result applies to an individual analyte within a test method, use the CAS number from the analytical data sheet.

DV Qualifiers - The entry will be taken from the list of valid qualifiers and associated comments. If other qualifiers not on the list are needed, contact Tina Sanchez to coordinate adding them to the list.

Comments - This is only to be used if a comment associated with the qualifier is not appropriate, needs modification because of an unusual circumstance, or additional clarification is warranted.

Test Methods - Anions_CE, EPA6010, EPA6020, EPA7470/1, EPA8015B, EPA8081, EPA8260, EPA8260-M3, EPA8270, HACH_ALK, HACH_NO2, HACH_NO3, MEKC_HE, PCBRISC

Reviewed by: Kevin A. Lambert Date: 3/19/98

List of Data Qualifiers used in Data Validation and Associated Comment Responses

Qualifier	Comment
A	Laboratory accuracy and/or bias measurements for the associated Laboratory Control Sample (LCS) do not meet acceptance criteria.
A1	Laboratory accuracy and/or bias measurements for the associated Surrogate Spike do not meet acceptance criteria.
A2	Laboratory accuracy and/or bias measurements for the associated Matrix Spike (MS) do not meet acceptance criteria.
B	Analyte present in laboratory method blank
B1	Analyte present in trip blank.
B2	Analyte present in equipment blank.
B3	Analyte present in continuing calibration blank.
J	The associated value is an estimated quantity. (Note: this qualifier may be used in conjunction with other qualifiers (i.e., A,J)
J1	The method requirements for sample preservation/temperature were not met for the sample analysis. The associated value is an estimated quantity.
J2	The holding time was exceeded for the associated sample analysis. The associated value is an estimated quantity.
P	Laboratory precision measurements for the Laboratory Control Sample and duplicate (LCS/LCSD) do not meet acceptance criteria.
P1	Laboratory precision measurements for the Matrix Spike Sample and associated duplicate (MS/MSD) do not meet acceptance criteria.
P2	Insufficient quality control data to determine laboratory precision.
Q	Quantitation limit reported does not meet Data Quality Objective (DQO) requirements.
R	The data are unusable for their intended purpose (Note: Analyte may or may not be present.)
U	The analyte is a common laboratory contaminant. The associated result is less than ten times the concentration in any blank.
U1	The analyte was also detected in a blank. The associated result is less than five times the concentration in any blank.
UJ	The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

* This is not a definitive list. Other qualifiers are potentially available, see TOP 94-03. Notify Tina Sanchez to revise list.

Updated: March 10, 1998

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 1 of 18

SITE OR PROJECT 85
ANALYTICAL LABORATORY L10446 LAS
LABORATORY REPORT # L10446
CASE NO. 7216.2206
ARCOL# 06354

↑ SAMPLE IDS 16; 15 soil, 1 water
NO. OF SAMPLES 033847-001 to
033854-001, 034066-001 to 034072-001
034073-005

DATA ASSESSMENT SUMMARY

Describe problems/qualifications below (Action Items and Areas of Concern)

	VOC	SVOC	PEST/PCB	HE OTHER
1. HOLDING TIMES/PRESERVATION	NA	NA	NA	✓
2. GC/MS INST. PERFORM.				NA
3. CALIBRATIONS WINDOWS				✓
4. BLANKS				✓
5. SURROGATES				✓
6. MATRIX SPIKE/DUP				✓
7. LABORATORY CONTROL SAMPLES				A, R
8. INTERNAL STANDARDS				NA
9. COMPOUND IDENTIFICATION				↓
10. SYSTEM PERFORMANCE				↓
11. OVERALL ASSESSMENT	↓	↓	↓	NA N

✓ (check mark) — Acceptable: Data had no problems or qualified due to minor problems

N - Data qualified due to major problems

X - Problems, but do not affect data

Qualifiers: J - Estimate

UJ - Undetected, estimated

NA - Not Applicable

ACTION ITEMS: Complete Batch QC Summary report not provided
Have requested laboratory submit complete report in
future. Available data is adequate to assess data quality
QC (soils)

AREAS OF CONCERN: The LCS TO REC for batch 53239A were below
acceptance limits for half the analytes in LCS. No LCS/D reported
No MS/MSD run on the batch sample from ARCOL. MS/MSD
NA

Reviewed By:

Kevin A. Lambert

Date:

3/19/98

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 2 of 18

PROJECT/TASK LEADER: _____

ACTION ITEMS: _____

AREAS OF CONCERN: reported from another ARCO and met limits.
All associated sample results will be qualified "A.R" since
all analytes were non-detected in samples

The LCSD % recovery for batch 53235 (aqueous) were below
acceptance limits for over half the analytes in the LCSD.
The RPDs for over half the analytes exceeded acceptance limits
The LCS met acceptance limits but not MS/MSD reported.
No analytes were detected. All associated sample results
will be qualified "A.R".

OVERALL DATA QUALITY ASSESSMENT Data is acceptable for only
one Batch (53470). The other two batches have associated
sample results qualified unusable for intended
purpose.

Reviewed By: Kevin A. Lambert

Date: 3/19/97

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 3 of 18

1.0 HOLDING TIMES AND PRESERVATION

Indicate the holding time criteria below that was used to evaluate the samples.

SW-846, 3rd. ed.

Other: _____

List below samples that were over holding time criteria.

Sample ID	VTSR	Date Analyzed	Action

*SEE CVP
Form*

NOTE: VTSR = Validated time of sample receipt.

Were the correct preservatives used? Yes ☒ No ☐

List below samples that were incorrectly preserved.

Sample No.	Type of Sample	Deficiency	Action

Reviewed By: *Kevin A. Lambert 3/19/98*

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 4 of 18

2.0 GC/MS TUNING CRITERIA

Not Applicable

Has a GC/MS tuning performance been analyzed for every twelve hours of sample analysis for each GC/MS instrument used? Yes ☐ No ☐

Was the correct standard (listed in the EPA Method) used? Yes ☐ No ☐

Have the ion abundance criteria been met for each tune? Yes ☐ No ☐

NOTE: GC/MS abundance criteria is specified by EPA method for GC/MS analysis (EPA 8240A or 8270A).

If no for any of the above, list all the data associated with the tune that either failed criteria or in which there was no tune.

Date/Time	Problem	Sample Affected (Action)

Check for transcription/calculation errors. If errors are present, briefly summarize necessary changes:

Is the spectra of the mass calibration acceptable? Yes ☐ No ☐

Reviewed By:
Date:

Kevin A. Lambert
3/19/98

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 5 of 18

3.0 GC INSTRUMENT PERFORMANCE. *Not Applicable*

3.1 DDT Retention Time

Is DDT retention time for packed columns >12 minutes (except for OV-1 and OV-101)?

Yes ☐ No ☐

If no, list below the DDT standards that failed criteria: _____

Affected samples and compounds: _____

3.2 Retention Time Windows

List below compounds that were not within the retention time windows.

Date/Time	Compound	RT	RT Window	Action	Affected Samples

Reviewed By: *Kevin A. Lambert 3/19/98*

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 6 of 18

3.3 DDT and Endrin Degradation

Not Applicable

List below the standards that have a DDT or Endrin breakdown of >20% (or a combined breakdown of >20%).

Date/Time	Standard ID	DDT/Endrin	% Breakdown	Action	Affected Samples

3.4 DBC Retention Time Check

Is the %D between EVAL A and each analysis (quantitation and confirmation) DBC retention time within QC limits (2% for packed column, 0.3% capillary ID < 0.32 mm, and 1% for megabore)?

Yes ☐ No ☐

Date	Sample ID	DBC %D	Action

For the above criteria outlined in Sections 8.1-8.4, check for transcription/calculation errors.

If errors are found, list below with necessary corrections: _____

Reviewed By:
Date:

Kevin A. Lambert
2/19/98

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 7 of 18

4.0 INITIAL CALIBRATION

Has initial calibration been performed as required in the EPA method? Yes ☒ No ☐

Were the correct number of standards used to calibrate the instrument? Yes ☒ No ☐

For GC analyses of PCBs and Pesticides, did the laboratory follow the correct 72-hour sequence of analysis?
Yes ☐ No ☐ *Not Applicable*

List below compounds which did not meet initial calibration criteria outlined by the EPA method.

Instrument ID	Date	Compound	RP%RSD	Action	Samples Affected

*Met
Criteria*

Check for transcription/calculation errors. If errors are present, summarize necessary corrections below:

Reviewed By:
Date:

Kurt A. Lambert
3/19/98

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 8 of 18

5.0 CONTINUING CALIBRATION

Have continuing calibration standards been analyzed at the frequency specified in the EPA method?

Yes ☒ No ☐

List below all compounds which did not meet continuing calibration requirements.

Instrument ID	Date	Compound	RF%SD	Action	Samples Affected

Check for transcription and calculation errors. If errors are found, briefly summarize necessary corrections below:

Reviewed By: Kevin A. Lambert
Date: 3/19/98

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 9 of 18

6.0 BLANK ANALYSES

6.1 Method/Reagent and Instrument Blanks

Has a method/reagent blank been analyzed for each set of samples or for every 20 samples of similar matrix, whichever is more frequent? Yes ☒ No ☐

Has an instrument blank been analyzed at least once every twelve hours for each GC/MS system used? Yes ☒ No ☐

6.2 Field Rinse/Equipment Blanks

Are there field rinse/equipment blanks associated with each sampling day or at frequency specified in the sampling plan. Yes ☒ No ☐

List below compounds for which analyses were requested that were detected in any of the blanks analyzed:

Date	Blank ID	Compound	Conc. ()	PQL ()	Action Level	Samples Affected (Action)

No analytes above PQL detected

PQL = Practical Quantitation Limit from EPA Method.

Reviewed By: Karin A. Lambert
Date: 2/16/00

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 10 of 18

Are there any TICs present in the blanks that are also present in the samples? Yes ☐ No ☐ *Not Applicable*
If yes, list below.

7.0 SURROGATE RECOVERY

Were surrogate recoveries evaluated for each of the samples analyzed by GC or GC/MS?

Yes ☒ No ☐

If surrogate standards other than those presented by SW-846 are used, list below with reference to applicable control limits used to evaluate the percent recoveries.

Surrogate Compound

Control Limits

List below the percent recoveries which did not meet either SW-846 criteria or criteria listed above.

Date	Sample ID/Matrix	Surrogate Compound	%Rec	Action
9/20/97	53235LCSD / <i>Aqueous</i>	4-Nitroaniline	47% 49-110	<i>No data qualified Sample results are Non-detects</i>

Reviewed By:

Date:

Kenn A. Lambert
3/19/98

ORGANIC DATA ASSESSMENT SUMMARY FORM

(Data Verification/Validation Level 3 DV-3)

Page 11 of 18

If surrogate recovery was outside of control limits, were the samples or method blank reanalyzed?

Yes ☐ No ☒

Are method blank surrogate recoveries outside of limits upon reanalysis? Yes ☐ No ☒

Are transcription/calculation errors present? Yes ☐ No ☒

If yes, note necessary corrections. _____

Reviewed By: Kevin A. Lambert 3/19/00
Date:

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 12 of 18

8.0 MATRIX SPIKE: MATRIX SPIKE DUPLICATE (MS/MSD) ANALYSIS

Were MS/MSDs analyzed at the frequency required by the EPA method or QAPP for each matrix type?

Yes ☒ No ☐

List below % recoveries and RPDs of compounds which did not meet criteria. Indicate on chart criteria used to evaluate recoveries and RPDs.

Date	Sample ID: Matrix	Compound	%Rec RPD	Action

MS/MSD from other SDG.

Reviewed By: Kevin A. Lambert

Date: 3/19/98

9.0 LCS/LCSD

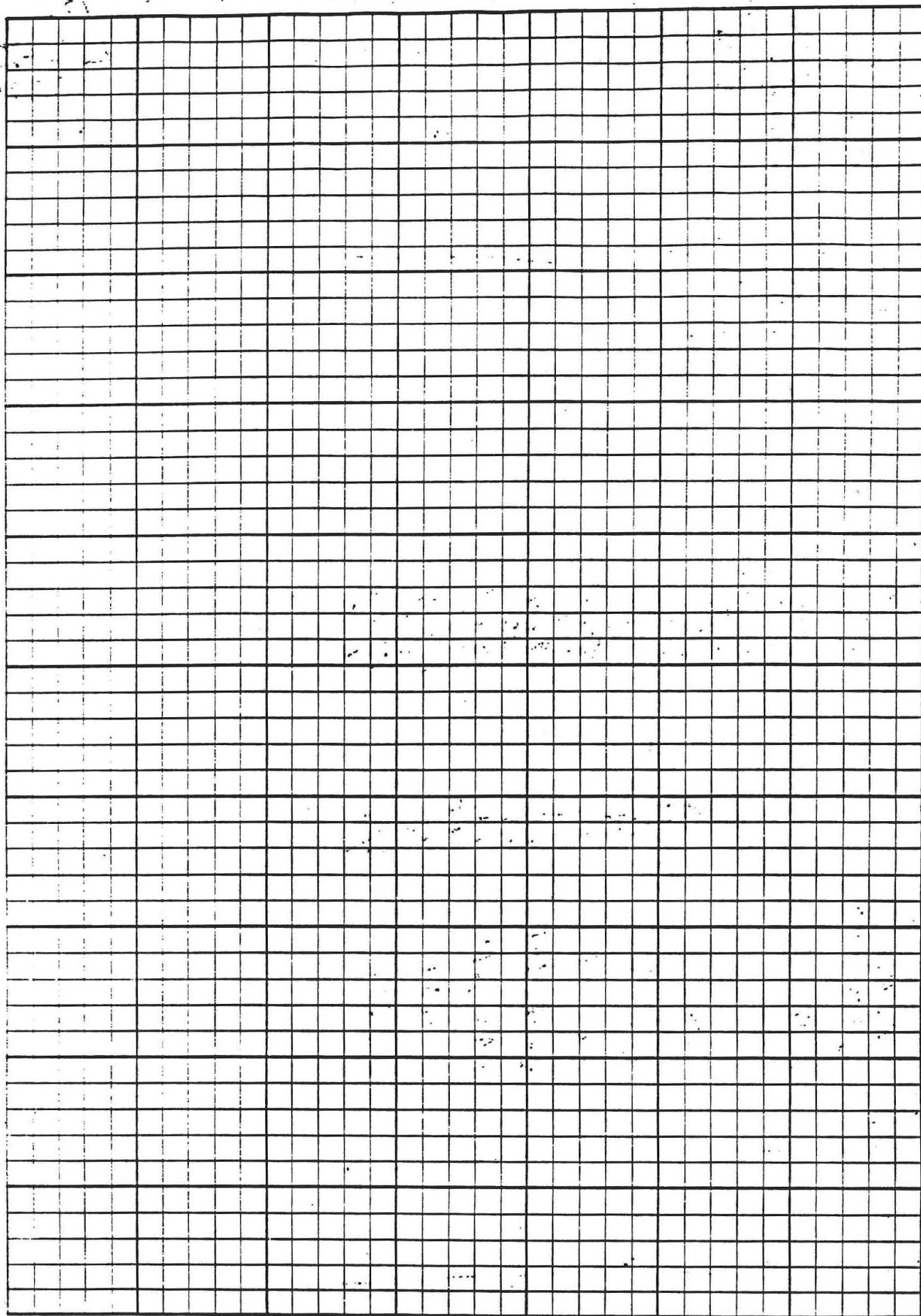


22-141 50 SHEETS
22-142 100 SHEETS
22-144 200 SHEETS

Batch	Date	Analyte	90 REF/ RPD	Control Limits	Action/Samples Affected
53235 LCSD	9/20/97	1,3-DNB	67	±30	LCS met limits. MS/MSD not reported. No analytes were detected. Since more than half of the analytes are not within acceptance criteria then all associated non-detects will be "R".
		2-Nitrotoluene	54	75-129	
			64	±30	
		3-Nitrotoluene	50	60-134	
			67	±30	
		RDX	55	75-132	
			49	±30	
		Tetryl	36	57-125	
			100	±30	
		1,3,5-TNB	43	68-116	
			81	30	
		2,4,6-TNT	41	75-128	
			89	±30	
		2-Am-4,6-DNT	48	69-121	
			74	±30	
		4-Am-2,6-DNT	49	68-126	
			77	±30	
		2,6-DNT	47	75-129	
			73	±30	
		2,4-DNT	47	75-125	
			75	±30	

Kim A. Z. / 3/19/98

13a



ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 13 of 18

9.0 LABORATORY CONTROL SAMPLE ANALYSIS

Have laboratory control samples containing a representative number of the compounds of interest been analyzed at the frequency specified in the EPA method or QAPjP?

Yes ☒ No ☐

Evaluate percent recoveries based on control limits established in individual EPA methods, or use established laboratory control limits. List below recoveries of compounds which did not meet criteria with reference to control limits used.

MC No Analytes detected, however

Date	Compound	%Rec	Control Limits	Action	Samples Affected
53239 LOS 9/19/97	HMX	59.61	65-152	64-147	Half of the analytes are not within recovery criteria
	1,3,5-TNB	61	65-152		all associated non-detect compounds will be qualified "P" and MC
	2,4,6-TNT	53	65-138		
	2,4,6-Trinitrophenol	62	67-137		
	1,3,5-Trinitrobenzene	62	68-138		
	2,6-DNT	62	65-139		
	2,4-DNT	62	65-135		

Control Limit Reference: _____

Evaluate RPD based on control limits established in individual EPA methods, or use established laboratory control limits. List below recoveries of compounds which did not meet criteria with reference to control limits used.

See Attachment

Date	Compound	%Rec	Control Limits	Action	Samples Affected

Control Limit Reference: _____

No LCSD runs for Batch 53239 and 53470. MS/MSD runs on samples from other SDG. Sample results look good (i.e. met criteria) for MS/MSD.

Reviewed By: Karin A. Lambert
Date: 3/19/98

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 14 of 18

10.0 INTERNAL STANDARDS EVALUATION *Not Reported*

List below the internal standard areas of samples or blanks which did not meet criteria.

Date	Sample ID	Internal Out	Acceptable Range	Action

Are retention times of the internal standards within 30 seconds of the associated calibration standard?

Yes ☐ No ☐

11.0 TARGET COMPOUND LIST ANALYTES

Not Applicable

11.1 GC/MS Analyses

Are the reconstructed ion chromatograms, the mass spectra for the identified compounds, and the data system printouts included? Yes ☐ No ☐

Is chromatographic performance acceptable with respect to:

Baseline stability? Yes ☐ No ☐

Resolution? Yes ☐ No ☐

Peak shape? Yes ☐ No ☐

Full-scale graph (attenuation)? Yes ☐ No ☐

Reviewed By:

Date:

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 15 of 18

Other: _____

Is the RRT of each reported compound within the limits given in the method of the standard RRT in the continuing calibration? Yes ☐ No ☐

Are all the ions present in the standard mass spectrum at a relative intensity greater than 10% also present in the mass spectrum? Yes ☐ No ☐

Do sample and standard relative intensities agree within 20%? Yes ☐ No ☐

If no for any of the above, indicate below problems and qualifications made to data:

11.2 GC Analyses

Not Applicable

Are there any transcription/calculation errors between the raw data and the reporting forms?

Yes ☐ No ☐

If yes, review errors and necessary corrections below; if errors are large, resubmittal of laboratory package may be necessary.

Are retention times of sample compounds within the calculated retention time windows for both quantitation and confirmation analysis? Yes ☐ No ☐

Was GC/MS confirmation performed when required by the EPA method? Yes ☐ No ☐

If no for any of the above, reject positive results except for retention time windows if associated standard compounds are similarly shifted.

Reviewed By:

Kevin A. Lambert

Date:

7/10/00

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 16 of 13

Samples affected: _____

Check chromatograms for false negatives, especially for the multiple peak components (toxaphene and PCBs). If false negatives are apparent and the appropriate PCB standards were not analyzed, or if confirmed analysis was not present, flag the affected data.

Samples affected: _____

NOTE: Due to the complexities of PCB pesticide analysis, each analytical run should be reviewed to verify identification and column performance.

12.0 FIELD DUPLICATE ANALYSIS

Were field duplicates submitted for analysis? Yes ☒ No ☐

If yes, calculate RPD and use professional judgment to determine if the data needs to be qualified. List results below.

Date	Sample ID	Compound	Sample Result	Duplicate Result	RPD	Affected Samples

No analytes were detected

13.0 COMPOUND QUANTITATION/REPORTED DETECTION LIMITS

Are there any transcription/calculation errors from raw data to reported results (check at least 10% of positive results)? Yes ☐ No ☐

In addition, verify that the correct internal standard, quantitation ion, and RRF were used to calculate the result for a minimum of 10% of sample data.

Reviewed By: Kim A. Lambert

Date: 3/19/98

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 17 of 13

13.1 Chromatogram Quality

Not Applicable

Were baselines stable? Yes ☐ No ☐

Were any negative peaks or unusual peaks present? Yes ☐ No ☐

Were early eluting peaks resolved to baseline? Yes ☐ No ☐

If incorrect quantitations are evident, note corrections necessary below:

Are the required quantitation limits (detection limits) adjusted to reflect sample dilutions and for soils, sample moisture? Yes ☐ No ☐

If no, make necessary corrections and note below.

14.0 TENTATIVELY IDENTIFIED COMPOUNDS

Not Applicable

Are Tentatively Identified Compounds (TIC) properly identified with scan number or retention time, estimated concentration, and J qualifier? Yes ☐ No ☐

Are the mass spectra for TICs and associated "best match" spectra included? Yes ☐ No ☐

Are any TCL compounds listed as TIC compounds? Yes ☐ No ☐

Are each of the ions present in the reference mass spectra with a relative intensity greater than 10% also present in the sample mass spectrum? Yes ☐ No ☐

Reviewed By:

Date:

Kevin A. Lambert
3/19/98

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 18 of 18

Do TIC and "best match" standard relative ion intensities agree within 20%? Yes ☐ No ☐

Comments

Reviewed By:

Kevin A. Zambert

Date:

3/19/98

Approved By:

Date

*Data package must be approved by Project/Task Leader.

SAMPLE FINDINGS SUMMARY

Site: 85

AR COC: 06354

Data Classification: Inorganic

Sample Fraction No.	Analysis	DV Qualifiers	Comments
1335-ER85-BH-007 -0.0-S -0.0-SD -5.0-S -10.0-S -15.0-S	(Chromium) 7440-47-3	J	Field precision measurements for field duplicate pairs did not meet acceptance criteria
1335-ER85-BH-008 -0.0-S -0.0-SD -5.0-S -10.0-S 15.0-S			

Sample No. Fraction No. - This value is located on the Chain of Custody in the ER Sample Id field.

Analysis - Use valid test methods provided below or if the result applies to an individual analyte within a test method, use the CAS number from the analytical data sheet.

DV Qualifiers - The entry will be taken from the list of valid qualifiers and associated comments. If other qualifiers not on the list are needed, contact Tina Sanchez to coordinate adding them to the list.

Comments - This is only to be used if a comment associated with the qualifier is not appropriate, needs modification because of an unusual circumstance, or additional clarification is warranted.

Test Methods - Anions_CE, EPA6010, EPA6020, EPA7470-1, EPA8015B, EPA8081, EPA8260, EPA8260-M3, EPA8270, HACH_ALK, HACH_NO2, HACH_NO3, MEKC_HE, PCBRISC

Reviewed by: Karin A. Lambert Date: 3/19/98

List of Data Qualifiers used in Data Validation and Associated Comment Responses

Qualifier	Comment
A	Laboratory accuracy and/or bias measurements for the associated Laboratory Control Sample (LCS) do not meet acceptance criteria.
A1	Laboratory accuracy and/or bias measurements for the associated Surrogate Spike do not meet acceptance criteria.
A2	Laboratory accuracy and/or bias measurements for the associated Matrix Spike (MS) do not meet acceptance criteria.
B	Analyte present in laboratory method blank
B1	Analyte present in trip blank.
B2	Analyte present in equipment blank.
B3	Analyte present in continuing calibration blank.
J	The associated value is an estimated quantity. (Note: this qualifier may be used in conjunction with other qualifiers i.e., A.J)
J1	The method requirements for sample preservation/temperature were not met for the sample analysis. The associated value is an estimated quantity.
J2	The holding time was exceeded for the associated sample analysis. The associated value is an estimated quantity.
P	Laboratory precision measurements for the Laboratory Control Sample and duplicate (LCS/LCSD) do not meet acceptance criteria.
P1	Laboratory precision measurements for the Matrix Spike Sample and associated duplicate (MS/MSD) do not meet acceptance criteria.
Q	Quantitation limit reported does not meet Data Quality Objective (DQO) requirements.
R	The data are unusable for their intended purpose (Note: Analyte may or may not be present.)
U	The analyte is a common laboratory contaminant. The associated result is less than ten times the concentration in any blank.
U1	The analyte was also detected in a method or reagent blank. The associated result is less than five times the concentration in any blank.
UJ	The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

* This is not a definitive list. Other qualifiers are potentially available, see TOP 94-03. Notify Tina Sanchez to revise list.

INORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3—DV3)

Page 1 of 16

SITE OR PROJECT 85

CASE NO. 7216.2206

ANALYTICAL LABORATORY LAS

SAMPLE IDS 033847-001 to 033854-001

LABORATORY REPORT # L10446

034066-001 to 034072-001

TASK LEADER ARCOC #06354

034073-004

NO. OF SAMPLES 16; 15 soil, 1 water

DATA ASSESSMENT SUMMARY

	ICP	AA	MERCURY	CYANIDE
1. HOLDING TIMES	✓	NA	✓	NA
2. CALIBRATIONS	✓		✓	
3. BLANKS	✓		✓	
4. ICS	✓			
5. LCS	✓			
6. DUPLICATE ANALYSIS	✓		✓	
7. MATRIX SPIKE	✓		✓	
8. MSA				
9. SERIAL DILUTION	✓			
10. SAMPLE VERIFICATION	✓		✓	
11. OTHER QC <u>Field Dup</u>	J		J	
12. OVERALL ASSESSMENT	✓	↓	✓	↓

✓ (check mark) — Acceptable

Other — Qualified:

J - Estimate

UJ - Undetected, estimated

R - Unusable (analyte may or may not be present)

ACTION ITEMS: Complete batch QC summary report not provided.
Have requested laboratory submit complete report in future.
Available data is adequate to assess data quality.

AREAS OF CONCERN: QC measures are acceptable. Field Dup
pass show 90 RFE-KK RPD outside control limit for
chromium. Sample results for associated samples
will be "J" coded.

REVIEWED BY: Kevin A Lambert

DATE REVIEWED: 3/19/98

INORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3—DV3)

Page 2 of 16

ACTION ITEMS: _____

AREAS OF CONCERN: _____

OVERALL DATA QUALITY ASSESSMENT *Data is acceptable. OC ^{measures} are*
adequate

Reviewed By: *Kevin A. Lambert* Date: *3/19/98*

[illegible]

Sample No.	Type of Samples	Deficiency	Action

See CVR Form

AL 2-54 WP:SNL:SOP3044C.R1

INORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3—DV3)

Page 4 of 16

2.0 INSTRUMENT CALIBRATION

2.1 Percent Recovery Criteria

Indicate %Recovery (%R) criteria used to evaluate calibration standards:

Metals: 89.6 - 110.4
Mercury: 79.6 - 120.4
Cyanide: _____
Other: _____

List below the analytes which did not meet %R criteria for initial and continuing calibration standards:

Analysis Date	ICV/CCV #	Analyte	%R	Action	Samples Affected

2.2 Analytical Sequence

Did the laboratory use the proper number of standards for calibration as described in the EPA method? Yes ☐ No ☒

Have initial calibrations been performed at the beginning of each analysis and at the frequency indicated by the EPA method? Yes ☒ No ☐

Have continuing calibration standards been analyzed at the beginning of sample analysis and at a minimum frequency indicated by the EPA method and at the end of the analysis sequence? Yes ☒ No ☐

If no for any of the above, outline deviations and actions taken below:

Reviewed By: Karin A. Lambert Date: 3/19/98

INORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3—DV3)

Page 5 of 16

Were the correlation coefficients for the calibration curves for AA, Hg, CN, and other spectrophotometric methods ≥ 0.995 ? (Check calculations performed for calibration curves.) Yes ☐ No ☐

If no, list: _____

No Reported

Date	Analyte	Coefficient	Action	Samples Affected

Check for transcription and calculation errors involving calibration summary forms and raw data. Briefly summarize errors and associated actions when data quality might have been affected.

3.0 BLANK ANALYSIS

3.1 Initial and Continuing Calibration Blanks

Have Initial and Continuing Calibration Blanks (ICB/CCB) been analyzed at the frequency required in the EPA method? Yes ☒ No ☐

If no, summarize problems and resolutions in the narrative report.

List analytes detected in ICB and CCBs below:

NOTE: For soil samples, convert blank values to mg/kg using digestion weights and volumes.

Analysis Date	ICB/CCB No.	Analyte	Conc.	Required Detection Limits	Action Level	Samples Affected

No analytes detected above RDL

Reviewed By: Karin A. Lambert

Date: 3/19/98

INORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3—DV3)

Page 6 of 16

3.2 Method Blank

Was one method blank analyzed for:

Each of 20 samples? Yes ☒ No ☐

Each digestion batch? Yes ☒ No ☐

Each matrix type? Yes ☒ No ☐

Both AA and ICP when both are used for the same analyte? Yes ☐ No ☐ *Not Applicable*
or

At the frequency indicated in the EPA method or QAPjP? Yes ☒ No ☐

NOTE: Method blank is the same as the calibration blank for mercury and for wet chemistry analysis.

List analytes detected in method blank samples below. NOTE: For soil samples, be sure to calculate blank values using digestion weights and volumes.

Preparation Date	Analyte	Conc.	Required Detection Limits	Action Level	Samples Affected

3/17/98
No analytes reported above RDL

Is concentration in the method blank below the detection limit? Yes ☒ No ☐

Affected samples: _____

Reviewed By: Kevin A. Lambert Date: 3/19/98

INORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3—DV3)

Page 7 of 16

3.3 Field/Rinse/Equipment Blanks

Was a field/equipment blank analyzed as required by the EPA method or QAPP? Yes ☒ No ☐

List below analytes detected in the field blanks. NOTE: For soil samples, calculate blank values using digestion weights and volumes.

Collection Date	Blank ID	Analyte	Conc.	Required Detection Limits	Action Level	Samples Affected
<i>No analytes detected above RDL</i>						

4.0 ICP INTERFERENCE CHECK SAMPLE ANALYSIS

Was an ICP interference check sample (ICS) analyzed at the beginning and end of a run or at least twice every 8 hours? (Not required for Ca, Mg, K, and Na) Yes ☒ No ☐

Samples affected: _____

Are the values of the ICS for solution AB within 80-120%R? Yes ☒ No ☐

If no, is the concentration of Al, Ca, Fe, or Mg lower than in ICS? Yes ☐ No ☐

Reviewed By: Kevin A. Lambert Date: 3/19/98

INORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3—DV3)

Page 8 of 16

If no, list below all analytes which did not meet %R criteria and in which the concentration of Al, Ca, Fe, or Mg is higher than in the ICS:

Date	Analyte	%R	Action	Samples Affected

Are any results > IDL for those analytes which are not present in the ICS solution A? Yes ☐ No ☒

If yes, results >2 (absolute value of the IDL) indicate either a positive or negative interference and must be qualified.

Samples affected: _____

Check for transcription/calculation errors. Briefly summarize errors and associated actions when data quality might have been affected.

5.0 LABORATORY CONTROL SAMPLES (LCS)

Was an LCS analyzed at required frequency? Yes ☒ No ☐

Samples affected: _____

Reviewed By: Kevin A Lambert Date: 3/19/98

INORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3—DV3)

Page 9 of 16

List below any LCS recoveries not within limits.

Preparation Date	Analyte	%R	Action	Samples Affected

6.0 LABORATORY DUPLICATE ANALYSIS

Were laboratory duplicates analyzed at required frequency? Yes ☒ No ☐

Samples affected: _____

Was laboratory duplicate analysis performed on field or equipment blanks? Yes ☐ No ☒

Samples affected: _____

Is any value for sample duplicate pair <PQL and the other value >10xPQL? Yes ☐ No ☒

Samples affected: _____

Reviewed By: Kevin A. Lambert Date: 3/19/98

INORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3—DV3)

Page 10 of 16

List below concentrations of any analyte that did not meet criteria for duplicate precision:

Sample ID	Matrix	Preparation Date	Analyte	PQL	RPD	Action	Samples Affected

Check for transcription/calculation errors. Briefly summarize errors and associated actions when data quality might have been affected.

7.0 FIELD DUPLICATE SAMPLE ANALYSIS

Were field duplicates collected at the frequency indicated in the EPA method or QAPjP?

Yes ☒ No ☐

If yes, qualify data associated only with the field duplicate pair. Calculate RPDs for each analyte in which both values are greater than the IDL.

Is any value for sample duplicate < practical quantitation limit (PQL) and other value >10xPQL? Yes ☐ No ☒

Reviewed By: Kevin A. Lambert Date: 3/17/98

INORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3—DV3)

Page 11 of 16

Samples affected: _____

List below the analytes that do not meet RPD or PQL criteria. Use the same criteria as those used for laboratory duplicate analysis or criteria specified in EPA method or sampling plan.

Sample ID	Matrix	Collection Date	RPD	Control Limit	Action	Samples Affected
033852-001 033852-001	soil	9/2/97	41%	± 35	"J" code	associated sample results
034068-001 034069-001	soil	9/2/97	94%	" "	↓	

Check for transcription/calculation errors. Briefly summarize errors and associated actions when data quality might have been affected.

8.0 MATRIX SPIKE ANALYSIS

NOTE: This matrix spike is a predigestion/predistillation spike.

Was a matrix spike prepared and analyzed at the required frequency? Yes ☒ No ☐

Reviewed By: Kevin A. Lambert Date: 3/19/98

INORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3—DV3)

Page 12 of 16

Were matrix spikes performed at the concentrations specified by the EPA method? Yes ☒ No ☐

Samples affected: _____

Was matrix spike analysis performed on field or equipment blanks? Yes ☒ No ☐

If equipment or field blanks are the only aqueous samples, matrix spike analysis may be performed; however, matrix spike samples must be present for the other matrices.

Samples affected: EB only aqueous sample. MS sample are
provided for soil samples

List below the % recoveries for analytes that did not meet the criteria:

Sample ID	Matrix	Preparation Date	Analyte	%R	Action	Samples Affected
033847-001	soil	9/25/97	Lead	74	80-120	MS met limits. LCS/LCSD met limits. No data qualified

Check for transcription/calculation errors. Also check to ensure matrix spike concentrations are not affected by sample dilutions performed. If matrix spike concentrations are diluted below or close to IDL based on sample dilutions performed, use professional judgment in qualifying data. Ensure that the laboratory performed sample dilutions only when necessary as indicated by QA/QC requirements. Briefly summarize errors and associated actions when data quality might have been affected.

Reviewed By: Kevin A. Lambert Date: 3/19/98

INORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3—DV3)

Page 13 of 16

NOTE: If preparation blank spikes are analyzed, evaluate recoveries. These recoveries can indicate whether excursions in matrix spike recovery are caused by sample matrix effects or poor digestion efficiencies and/or problems with matrix spike solution. For example, if matrix spike recovery for selenium is 0% and preparation blank spike recovery for selenium is 92%, this may indicate sample matrix effects.

9.0 FURNACE ATOMIC ABSORPTION ANALYSIS

Not Applicable

Were duplicate injections present for each sample, including required QC analyses (not required if MSA is done)? Yes ☐ No ☐

Samples affected: _____

Were postdigestion spikes analyzed for samples, including QC samples? Yes ☒ No ☐

Were postdigestion spikes analyzed at the required concentration? Yes ☐ No ☐

Samples affected: _____

Was a dilution analyzed for samples with postdigestion spike recovery <40%? Yes ☐ No ☐

Samples affected: _____

MSA Analysis (Method of Standard Additions)—MSA is required when serial dilutions are not within $\pm 10\%$. Was MSA required for any sample but not performed? Yes ☐ No ☐

Are MSA calculations outside the linear range of the calibration curve? Yes ☐ No ☐

Reviewed By: *Karin A. Lambert* Date: *3/19/98*

INORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3—DV3)

Page 14 of 16

NOTE: Ensure the spiking concentrations used for MSA analysis were at 50–100% and 150% of sample concentration or absorbance.

Not Applicable

Samples affected: _____

10.0 SERIAL DILUTION ANALYSIS

NOTE: Serial dilution analysis (ICP) is required only for initial concentrations equal to or greater than 10xIDL.

If applicable, was a serial dilution performed for:

Each 20 samples? Yes ☒ No ☐

Each matrix type? Yes ☒ No ☐

Samples affected: _____

List below results which did not meet criteria of %D <10% for analyte concentrations greater than 50xIDL before dilution:

Analysis Date	Sample ID	Analyte	IDL	%D	Action	Samples Affected

Met Criteria

Check for calculation errors and negative interferences.

Reviewed By: Kevin A. Lambert Date: 3/19/98

INORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3—DV3)

Page 15 of 16

11.0 SAMPLE RESULT VERIFICATION

11.1 Verification of Instrumental Parameters

Are instrument detection limits present and verified on a quarterly basis? Yes ☐ No ☐ *Not Reported*

Are IDLs present for each analyte and each instrument used? Yes ☒ No ☐

Is the IDL greater than the required detection limits for any analyte? Yes ☐ No ☒
(If IDL > required detection limits, flag values less than 5xIDL.)

Samples affected: _____

Are ICP Interelement Correction Factors established and verified annually? Yes ☐ No ☐ *Not Reported*

Are ICP Linear Ranges established and verified quarterly? Yes ☐ No ☐ *Not Reported*

If no for any of the above, review problems and resolutions in narrative report. _____

11.2 Reporting Requirements

Were sample results reported down to the PQL? Yes ☒ No ☐

If no, indicate necessary corrections. _____

Were sample results that were analyzed by ICP for Se, Tl, As, or Pb at least 5xIDL? Yes ☒ No ☐

Were sample weights, volumes, and dilutions taken into account when reporting sample results and detection limits? Yes ☐ No ☐ *Not Reported*

Reviewed By: Karin A Lambert Date: 3/19/98

INORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3—DV3)

Page 16 of 16

If no for any of the above, sample results may be inaccurate. Note necessary changes and if errors are present, request resubmittal of laboratory package.

Were any sample results higher than the linear range of calibration curve and not subsequently reanalyzed at the appropriate dilution? Yes ☐ No ☐ *Not Reported*

Samples affected: _____

11.3 Sample Quantitation

Check a minimum of 10% of positive sample results for transcription/calculation errors. Summarize necessary corrections. If errors are large, request resubmittal of laboratory package.

Comments: _____

Approved By: _____

Date: _____

*Task/Project Leader is responsible for approval of data set.

Reviewed By: *Kevin A Lambert* Date: *3/19/98*

David H. 9-7

DOCUMENTATION COMPLETENESS CHECKLIST
(DATA VERIFICATION/VALIDATION LEVEL 1 - DV1)

Project Leader B. Galloway
AR/COC No. 06614

Project Name Site 85 Accelerated Sampling
Analytical Lab GEL

Case No. 8835.208500 CF0419
SDG No. 9704374

In the tables below, mark any information that is missing or incorrect and give an explanation.

1.0 Analysis Request and Chain of Custody Record

Line No.	Item	Complete?		If no, explain	Resolved?	
		Yes	No		Yes	No
1.1	All items on COC complete - data entry clerk Initialed and dated	✓				
1.2	Container type(s) correct for analyses requested	✓				
1.3	Sample volume adequate for # and types of analyses requested	✓				
1.4	Preservative correct for analyses requested	✓				
1.5	Custody records continuous and complete	✓				
1.6	Lab sample number(s) provided	✓				
1.7	Condition upon receipt information provided	✓				
1.8	Trillium Screen data provided (Rad labs)	✓		Released by ARcoc # 06339		

2.0 Analytical Laboratory Report

Line No.	Item	Complete?		If no, explain	Resolved?	
		Yes	No		Yes	No
2.1	Data reviewed, signature	✓				
2.2	Date samples received	✓				
2.3	Method reference number(s) complete and correct	✓				
2.4	Quality control data provided (MB, LCS, LCD, Detection Limit)	✓				
2.5	Matrix spike/matrix spike duplicate data provided (if requested)	✓		Not requested		
2.6	Narrative provided	✓				
2.7	TAT met	✓		TAT exceeded 15-day request. -		✓
2.8	Hold times met	✓				
2.9	All requested result data provided	✓				

Based on the review, this data package is complete

☒ Yes

☐ No

Preliminary Results dated 4/24/97.

If no, provide: correction request tracking # _____

and date correction request was submitted: _____

Reviewed by: 4-Hz 4-Rale

Date: 5/19/97

Closed by: _____

Date: _____

**DATA QUALITY INDICATOR CHECKLIST
(DATA VERIFICATION/VALIDATION LEVEL 2—DV2)**

Project Name Site 85 Accelerated Sampling

Page 1 of 5

Case Number 8835.208500

Sample Numbers 034507 through 034513

AR/COC No. <u>06614</u>	Analytical laboratory <u>GEL</u>	SDG No. <u>9704374</u>
AR/COC No. _____	Analytical laboratory _____	SDG No. _____
AR/COC No. _____	Analytical laboratory _____	SDG No. _____
AR/COC No. _____	Analytical laboratory _____	SDG No. _____

1.0 EVALUATION

Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
1) Sample volume, container, and preservation correct?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
2) Holding times met for all samples?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
3) Reporting units appropriate for the matrix and meet project-specific requirements?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
4) Quantitation limit met for all samples?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
5) Accuracy			
a) Laboratory control sample accuracy reported and met for all samples?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	LCS 100847 Metals (Autonomy) ① See comment
b) Surrogate data reported and met for all organic samples analyzed by a gas chromatography technique?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

Reviewed by: Anthony A. Rabe

Date: 5/19/97

**DATA QUALITY INDICATOR CHECKLIST
(DATA VERIFICATION/VALIDATION LEVEL 2—DV2)**

Page 2 of 5

Item	Yes	No	If no. Sample ID No./Fraction(s) and Analysis
c) Matrix spike recovery data reported and met for all samples for which it was requested?	NR		Not requested.
6) Precision			
a) Laboratory control sample precision reported and met for all samples?		—	LCS DUP 100848 Pb, Ag, Na ② see comment
b) Matrix spike duplicate RPD data reported and met for all samples for which it was requested?	NR		Not requested.
7) Blank data			
a) Method or reagent blank data reported and met for all samples?	✓		
b) Sampling blank (e.g., field, trip, and equipment) data reported and met?	✓		
8) Narrative included, correct, and complete?		—	LCS 100847 metals. Antimony ③ See comment

2.0 COMMENTS: All items marked "No" above must be explained in this section. For each item, give SNL/NM ID No. and the analysis, if appropriate, of all samples affected by the finding.

① LCS 100847 metals, antimony is out of QC windows for accuracy. All other QC data associated with this sample is within QC criteria. (Soil matrix).

Reviewed by: Jeffrey Rabe

Date: 5/19/97

DATA QUALITY INDICATOR CHECKLIST
(DATA VERIFICATION/VALIDATION LEVEL 2—DV2)

Page 3 of 5

2.0 COMMENTS CONTINUATION SHEET

② LCS DUP 100848 metals, Pb, Ag, and Na are out of QC windows for precision. All other QC data associated with this sample is within QC criteria (H₂O matrix).

③ Accuracy for antimony in LCS 100847 metals is not addressed in analytical narrative

Reviewed by:

Arthur D. Rabe

Date:

5/19/97

**DATA QUALITY INDICATOR CHECKLIST
(DATA VERIFICATION/VALIDATION LEVEL 2—DV2)**

Page 4 of 5

3.0 SUMMARY: Summarize the findings in the table below. List only samples/fractions for which deficiencies have been noted. Use the qualifiers given at the end of the table if possible. Explain any other qualifiers in the comments column.

Sample/ Fraction No.	Analysis	Qualifiers	Comments
034513-003	Ca	U	Result < 5x blank value
2	Fe	S	
3	Mg	S	
4	Zn	S	
		sketch	sketch

Attach continuation sheet for additional samples

QUALIFIERS:

J = Estimated quantity (provide reason)

B = Contamination in blank (indicate which blank)

P = Laboratory precision does not meet criteria

R = Reporting units inappropriate

N = There is presumptive evidence of the presence of the material

UJ = The material was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

Q = Quantitation limit does not meet criteria

A = Laboratory accuracy does not meet criteria

U = Analyte is undetected (indicate which analyte and reason for qualification)

NJ = There is presumptive evidence of the presence of the material at an estimated quantity.

Reviewed by:

Jeffrey A. Rabe

Date:

5/19/97

Page 5 of 5

[illegible]

A. H. A. Rahr

5/19/97

AL/2-94/SNL:SOP3044B.R1

SAMPLE FINDINGS SUMMARY

Site: 85

AR/COC: 06615

Data Classification: Organic

Sample Fraction No.	Analysis	DV Qualifiers	Comments
	No Data is Qualified		
	Data is Acceptable		
	QC measures are adequate		

Sample No./Fraction No. - This value is located on the Chain of Custody in the ER Sample Id field.

Analysis - Use valid test methods provided below or if the result applies to an individual analyte within a test method, use the CAS number from the analytical data sheet.

DV Qualifiers - The entry will be taken from the list of valid qualifiers and associated comments. If other qualifiers not on the list are needed, contact Tina Sanchez to coordinate adding them to the list.

Comments - This is only to be used if a comment associated with the qualifier is not appropriate, needs modification because of an unusual circumstance, or additional clarification is warranted.

Test Methods - Anions_CE, EPA6010, EPA6020, EPA7470-1, EPA8015B, EPA8081, EPA8260, EPA8260-M3, EPA8270, HACH_ALK, HACH_NO2, HACH_NO3, MEKC_HE, PCBRISC

Reviewed by: Karin A. Lambert Date: 3/31/98

List of Data Qualifiers used in Data Validation and Associated Comment Responses

Qualifier	Comment
A	Laboratory accuracy and/or bias measurements for the associated Laboratory Control Sample (LCS) do not meet acceptance criteria.
A1	Laboratory accuracy and/or bias measurements for the associated Surrogate Spike do not meet acceptance criteria.
A2	Laboratory accuracy and/or bias measurements for the associated Matrix Spike (MS) do not meet acceptance criteria.
B	Analyte present in laboratory method blank
B1	Analyte present in trip blank.
B2	Analyte present in equipment blank.
B3	Analyte present in continuing calibration blank.
J	The associated value is an estimated quantity. (Note: this qualifier may be used in conjunction with other qualifiers (i.e., A,J)
J1	The method requirements for sample preservation/temperature were not met for the sample analysis. The associated value is an estimated quantity.
J2	The holding time was exceeded for the associated sample analysis. The associated value is an estimated quantity.
P	Laboratory precision measurements for the Laboratory Control Sample and duplicate (LCS/LCSD) do not meet acceptance criteria.
P1	Laboratory precision measurements for the Matrix Spike Sample and associated duplicate (MS/MSD) do not meet acceptance criteria.
P2	Insufficient quality control data to determine laboratory precision.
Q	Quantitation limit reported does not meet Data Quality Objective (DQO) requirements.
R	The data are unusable for their intended purpose (Note: Analyte may or may not be present.)
U	The analyte is a common laboratory contaminant. The associated result is less than ten times the concentration in any blank.
U1	The analyte was also detected in a blank. The associated result is less than five times the concentration in any blank.
UJ	The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

* This is not a definitive list. Other qualifiers are potentially available, see TOP 94-03. Notify Tina Sanchez to revise list.
 Updated: March 10, 1998

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 1 of 18

SITE OR PROJECT 85
ANALYTICAL LABORATORY LAS
LABORATORY REPORT # L9757
CASE NO. 7216-2206
ARLCO# 06615

↑ SAMPLE IDS 26; 24 soil, 2 aqueous
NO. OF SAMPLES 033472-001 to
033491-001, 033512-001 to 033514-001,
033515-003, 004, 033520-001

DATA ASSESSMENT SUMMARY

Describe problems/qualifications below (Action Items and Areas of Concern)

	VOC	SVOC	PEST/PCB	HE OTHER
1. HOLDING TIMES/PRESERVATION	NA	NA	NA	✓
2. GC/MS INST. PERFORM.				✓
3. CALIBRATIONS WINDOWS				✓
4. BLANKS				✓
5. SURROGATES				✓
6. MATRIX SPIKE/DUP				✓
7. LABORATORY CONTROL SAMPLES				✓
8. INTERNAL STANDARDS				✓
9. COMPOUND IDENTIFICATION				✓
10. SYSTEM PERFORMANCE				✓
11. OVERALL ASSESSMENT	✓	✓	✓	✓

✓ (check mark) — Acceptable: Data had no problems or qualified due to minor problems

N - Data qualified due to major problems

X - Problems, but do not affect data

Qualifiers: J - Estimate

UJ - Undetected, estimated

ACTION ITEMS: ① All samples were prepared and analyzed
in accordance with the specified method and
acceptable procedures.

AREAS OF CONCERN: All Q.C. measures reported met acceptance
criteria. No data is qualified

Reviewed By: Karin A. Lambert

Date: 3/31/98

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 2 of 18

PROJECT/TASK LEADER: _____

ACTION ITEMS: OK no problems

AREAS OF CONCERN: OK no problems

OVERALL DATA QUALITY ASSESSMENT Data is acceptable.

QC measures are adequate

Reviewed By: Kevin A. Lambert
Date: 3/31/98

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 3 of 18

1.0 HOLDING TIMES AND PRESERVATION

Indicate the holding time criteria below that was used to evaluate the samples.

SW-846, 3rd. ed.

Other: _____

List below samples that were over holding time criteria.

Sample ID	VTSR	Date Analyzed	Action

NOTE: VTSR = Validated time of sample receipt.

Were the correct preservatives used? Yes ☐ No ☐

List below samples that were incorrectly preserved.

Sample No.	Type of Sample	Deficiency	Action

Reviewed By: Kevin A. Lambert 3/31/94

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 4 of 18

2.0 GC/MS TUNING CRITERIA

Not Applicable

Has a GC/MS tuning performance been analyzed for every twelve hours of sample analysis for each GC/MS instrument used? Yes ☐ No ☐

Was the correct standard (listed in the EPA Method) used? Yes ☐ No ☐

Have the ion abundance criteria been met for each tune? Yes ☐ No ☐

NOTE: GC/MS abundance criteria is specified by EPA method for GC/MS analysis (EPA 8240A or 8270A).

If no for any of the above, list all the data associated with the tune that either failed criteria or in which there was no tune.

Date/Time	Problem	Sample Affected (Action)

Check for transcription/calculation errors. If errors are present, briefly summarize necessary changes:

Is the spectra of the mass calibration acceptable? Yes ☐ No ☐

Reviewed By:
Date:

Kevin A. Lambert
3/31/98

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 5 of 18

3.0 GC INSTRUMENT PERFORMANCE.

Not Applicable

3.1 DDT Retention Time

Is DDT retention time for packed columns >12 minutes (except for OV-1 and OV-101)?

Yes ☐ No ☐

If no, list below the DDT standards that failed criteria: _____

Affected samples and compounds: _____

3.2 Retention Time Windows

List below compounds that were not within the retention time windows.

Date/Time	Compound	RT	RT Window	Action	Affected Samples

Reviewed By: Kevin A. Lambert 3/31/98

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 6 of 18

3.3 DDT and Endrin Degradation

Not Applicable

List below the standards that have a DDT or Endrin breakdown of >20% (or a combined breakdown of >20%).

Date/Time	Standard ID	DDT/Endrin	% Breakdown	Action	Affected Samples

3.4 DBC Retention Time Check

Is the %D between EVAL A and each analysis (quantitation and confirmation) DBC retention time within QC limits (2% for packed column, 0.3% capillary ID <0.32 mm, and 1% for megabore)?

Yes ☐ No ☐

Date	Sample ID	DBC %D	Action

For the above criteria outlined in Sections 8.1–8.4, check for transcription/calculation errors.

If errors are found, list below with necessary corrections: _____

Reviewed By:

Kevin A. Lambert

Date:

7/21/98

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 8 of 18

5.0 CONTINUING CALIBRATION

Have continuing calibration standards been analyzed at the frequency specified in the EPA method?

Yes ☒ No ☐

List below all compounds which did not meet continuing calibration requirements.

Instrument ID	Date	Compound	RF%RD	Action	Samples Affected

Check for transcription and calculation errors. If errors are found, briefly summarize necessary corrections below:

Reviewed By: Kevin A. Lambert
Date: 3/31/98

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 9 of 18

6.0 BLANK ANALYSES

6.1 Method/Reagent and Instrument Blanks

Has a method/reagent blank been analyzed for each set of samples or for every 20 samples of similar matrix, whichever is more frequent? Yes ☒ No ☐

Has an instrument blank been analyzed at least once every twelve hours for each GC/MS system used? Yes ☒ No ☐

6.2 Field Rinse/Equipment Blanks

Are there field rinse/equipment blanks associated with each sampling day or at frequency specified in the sampling plan. Yes ☒ No ☐

List below compounds for which analyses were requested that were detected in any of the blanks analyzed:

Date	Blank ID	Compound	Conc. ()	PQL ()	Action Level	Samples Affected (Action)

No target analytes were detected

PQL = Practical Quantitation Limit from EPA Method.

Reviewed By: Kenn A. Lambert
Date: 7/1/94

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 10 of 18

Are there any TICs present in the blanks that are also present in the samples? Yes ☐ No ☐ *Not Applicable*
If yes, list below.

7.0 SURROGATE RECOVERY

Were surrogate recoveries evaluated for each of the samples analyzed by GC or GC/MS?
Yes ☒ No ☐

If surrogate standards other than those presented by SW-846 are used, list below with reference to applicable control limits used to evaluate the percent recoveries.

Surrogate Compound

Control Limits

List below the percent recoveries which did not meet either SW-846 criteria or criteria listed above.

Date	Sample ID/Matrix	Surrogate Compound	%Rec	Action

*Met
Criteria*

*Two samples in QC group from another SDG (L9737) failed % Rec
50053
for 4-Nitroaniline (biased low for both samples). No data qualified
since only one surrogate failed %
Rec. Guidelines require*

Reviewed By: Kevin A. Lambert
Date: _____

ORGANIC DATA ASSESSMENT SUMMARY FORM

(Data Verification/Validation Level 3 DV-3)

Page 11 of 18

If surrogate recovery was outside of control limits, were the samples or method blank reanalyzed?

Yes ☐

No ☐

Not Applicable

Are method blank surrogate recoveries outside of limits upon reanalysis? Yes ☐ No ☒

Are transcription/calculation errors present? Yes ☐ No ☒

If yes, note necessary corrections.

Reviewed By:

Date:

Kevin A. Lambert

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 12 of 18

8.0 MATRIX SPIKE: MATRIX SPIKE DUPLICATE (MS/MSD) ANALYSIS

Were MS/MSDs analyzed at the frequency required by the EPA method or QAPJP for each matrix type?

Yes ☒ No ☐

List below % recoveries and RPDs of compounds which did not meet criteria. Indicate on chart criteria used to evaluate recoveries and RPDs.

MSD ↓

Date	Sample ID: Matrix	Compound	%Rec RPD	Action
7/11/97	033515-004 Aqueous	RDX Tetryl	49 (57-125) 63 (±30)	The MS % REC m criteria and the
		RDX	34 (30)	and RPD for the LCS/LCSD met crit
		4-Am-2,6-DNT	154 (68-126) 44 (±30)	No data is qualified
				Minor matrix interferences that does not affect data quality
				No target analytes were detected.

Reviewed By: Karin A. Schubert
Date: 2/21/98

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 13 of 18

9.0 LABORATORY CONTROL SAMPLE ANALYSIS

Have laboratory control samples containing a representative number of the compounds of interest been analyzed at the frequency specified in the EPA method or QAPjP?

Yes ☒ No ☐

Evaluate percent recoveries based on control limits established in individual EPA methods, or use established laboratory control limits. List below recoveries of compounds which did not meet criteria with reference to control limits used.

Date	Compound	%Rec	Control Limits	Action	Samples Affected
7/11/97	2,6-Dinitrotoluene	73	75-129	LCS met criteria + MS/MSD met criteria No data qualified	
7/31/97	HMX	62	64-147	LCS met criteria + MS/MSD met criteria No data qualified	
	1,3,5-TNB	56	65-152		
	2,4,6-TNB	60	65-138		

Control Limit Reference: _____

Evaluate RPD based on control limits established in individual EPA methods, or use established laboratory control limits. List below recoveries of compounds which did not meet criteria with reference to control limits used.

RDD ~~4/2~~ 3/31/98

Date	Compound	%Rec	Control Limits	Action	Samples Affected
7/18/97	Tetryl	41	± 30	MS/MSD RPD met criteria No data qualified	
7/31/97	4-Am-2,6-DNT	33	± 30		

Control Limit Reference: _____

Reviewed By: Karin A. Lambert

Date: 3/31/98

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 14 of 18

10.0 INTERNAL STANDARDS EVALUATION *Not Applicable*

List below the internal standard areas of samples or blanks which did not meet criteria.

Date	Sample ID	Internal Out	Acceptable Range	Action

Are retention times of the internal standards within 30 seconds of the associated calibration standard?

Yes ☐ No ☐

11.0 TARGET COMPOUND LIST ANALYTES

11.1 GC/MS Analyses

Not Applicable

Are the reconstructed ion chromatograms, the mass spectra for the identified compounds, and the data system printouts included? Yes ☐ No ☐

Is chromatographic performance acceptable with respect to:

Baseline stability? Yes ☐ No ☐

Resolution? Yes ☐ No ☐

Peak shape? Yes ☐ No ☐

Full-scale graph (attenuation)? Yes ☐ No ☐

Reviewed By:

Date:

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 15 of 18

Other: _____

Is the RRT of each reported compound within the limits given in the method of the standard RRT in the continuing calibration? Yes ☐ No ☐

Are all the ions present in the standard mass spectrum at a relative intensity greater than 10% also present in the mass spectrum? Yes ☐ No ☐

Do sample and standard relative intensities agree within 20%? Yes ☐ No ☐

If no for any of the above, indicate below problems and qualifications made to data:

11.2 GC Analyses

Not Applicable

Are there any transcription/calculation errors between the raw data and the reporting forms?

Yes ☐ No ☐

If yes, review errors and necessary corrections below; if errors are large, resubmittal of laboratory package may be necessary.

Are retention times of sample compounds within the calculated retention time windows for both quantitation and confirmation analysis? Yes ☐ No ☐

Was GC/MS confirmation performed when required by the EPA method? Yes ☐ No ☐

If no for any of the above, reject positive results except for retention time windows if associated standard compounds are similarly shifted.

Reviewed By: Karin A. Lambert

Date: 7/12/94

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 16 of 18

Samples affected: _____

Check chromatograms for false negatives, especially for the multiple peak components (toxaphene and PCBs). If false negatives are apparent and the appropriate PCB standards were not analyzed, or if confirmed analysis was not present, flag the affected data.

Samples affected: _____

NOTE: Due to the complexities of PCB pesticide analysis, each analytical run should be reviewed to verify identification and column performance.

12.0 FIELD DUPLICATE ANALYSIS

Were field duplicates submitted for analysis? Yes ☒ No ☐

If yes, calculate RPD and use professional judgment to determine if the data needs to be qualified. List results below.

Date	Sample ID	Compound	Sample Result	Duplicate Result	RPD	Affected Samples

No target analytes were detected

13.0 COMPOUND QUANTITATION/REPORTED DETECTION LIMITS

Are there any transcription/calculation errors from raw data to reported results (check at least 10% of positive results)? Yes ☐ No ☒

In addition, verify that the correct internal standard, quantitation ion, and RRF were used to calculate the result for a minimum of 10% of sample data.

Reviewed By: Kevin A. Lambert

Date: 3/31/98

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 17 of 13

13.1 Chromatogram Quality *Not Applicable*

Were baselines stable? Yes ☐ No ☐

Were any negative peaks or unusual peaks present? Yes ☐ No ☐

Were early eluting peaks resolved to baseline? Yes ☐ No ☐

If incorrect quantitations are evident, note corrections necessary below: _____

Are the required quantitation limits (detection limits) adjusted to reflect sample dilutions and for soils, sample moisture? Yes ☐ No ☐

If no, make necessary corrections and note below. _____

14.0 TENTATIVELY IDENTIFIED COMPOUNDS

Not Applicable

Are Tentatively Identified Compounds (TIC) properly identified with scan number or retention time, estimated concentration, and J qualifier? Yes ☐ No ☐

Are the mass spectra for TICs and associated "best match" spectra included? Yes ☐ No ☐

Are any TCL compounds listed as TIC compounds? Yes ☐ No ☐

Are each of the ions present in the reference mass spectra with a relative intensity greater than 10% also present in the sample mass spectrum? Yes ☐ No ☐

Reviewed By: *Kern A. Lambert*

Date: 3/31/98

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Not Applicable Page 18 of 18

Do TIC and "best match" standard relative ion intensities agree within 20%? Yes ☐ No ☐

Comments

[The following section contains 15 horizontal lines for comments, which are crossed out by a diagonal line from the bottom left to the top right.]

Reviewed By: *Kevin A. Lambert*

Date: *3/31/98*

Approved By: _____

Date: _____

*Data package must be approved by Project/Task Leader.

SAMPLE FINDINGS SUMMARY

Site: 83

AR'COC: 06615

Data Classification: INORGANIC

Sample Fraction No.	Analysis	DV Qualifiers	Comments
1335-ER85 - 1-GR-	7439-92-1 (lead)	P, J	Field precision did not meet acceptance criteria for the associated field duplicate pair. Also the RPD for the MS/MSD did not meet criteria for lead.
016-00-SSD			
017-00-SSD			
018-00-SSD			
019-00-SSD			
020-00-SSD			
020-00-SSD			
021-00-SSD			
022-00-SSD			
011-00-SSD.			
012-00-SSD			
<i>Data is acceptable.</i>			
<i>QC measures are adequate</i>			

Sample No./Fraction No. - This value is located on the Chain of Custody in the ER Sample Id field.

Analysis - Use valid test methods provided below or if the result applies to an individual analyte within a test method, use the CAS number from the analytical data sheet.

DV Qualifiers - The entry will be taken from the list of valid qualifiers and associated comments. If other qualifiers not on the list are needed, contact Tina Sanchez to coordinate adding them to the list.

Comments - This is only to be used if a comment associated with the qualifier is not appropriate. needs modification because of an unusual circumstance, or additional clarification is warranted.

Test Methods - Anions_CE, EPA6010, EPA6020, EPA7470/1, EPA8015B, EPA8081, EPA8260, EPA8260-M3, EPA8270, HACH ALK, HACH NO2, HACH NO3, MEKC HE, PCBRISC

Reviewed by: Kevin A Lambert Date: 3/31/98

List of Data Qualifiers used in Data Validation and Associated Comment Responses

Qualifier	Comment
A	Laboratory accuracy and/or bias measurements for the associated Laboratory Control Sample (LCS) do not meet acceptance criteria.
A1	Laboratory accuracy and/or bias measurements for the associated Surrogate Spike do not meet acceptance criteria.
A2	Laboratory accuracy and/or bias measurements for the associated Matrix Spike (MS) do not meet acceptance criteria.
B	Analyte present in laboratory method blank
B1	Analyte present in trip blank.
B2	Analyte present in equipment blank.
B3	Analyte present in continuing calibration blank.
J	The associated value is an estimated quantity. (Note: this qualifier may be used in conjunction with other qualifiers (i.e., A,J)
J1	The method requirements for sample preservation/temperature were not met for the sample analysis. The associated value is an estimated quantity.
J2	The holding time was exceeded for the associated sample analysis. The associated value is an estimated quantity.
P	Laboratory precision measurements for the Laboratory Control Sample and duplicate (LCS/LCSD) do not meet acceptance criteria.
P1	Laboratory precision measurements for the Matrix Spike Sample and associated duplicate (MS/MSD) do not meet acceptance criteria.
P2	Insufficient quality control data to determine laboratory precision.
Q	Quantitation limit reported does not meet Data Quality Objective (DQO) requirements.
R	The data are unusable for their intended purpose (Note: Analyte may or may not be present.)
U	The analyte is a common laboratory contaminant. The associated result is less than ten times the concentration in any blank.
U1	The analyte was also detected in a blank. The associated result is less than five times the concentration in any blank.
UJ	The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

* This is not a definitive list. Other qualifiers are potentially available, see TOP 94-03. Notify Tina Sanchez to revise list.

Updated: March 10, 1998

INORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3—DV3)

Page 1 of 16

SITE OR PROJECT 85

CASE NO. 7216.2206

ANALYTICAL LABORATORY LAS

SAMPLE IDS 033472-001 to 033491-001,

LABORATORY REPORT # L9757

033512-001 to 033514-001,

TASK LEADER ARCOC # 06615

033515-003, -004, 033520-001

NO. OF SAMPLES 26; 24 soil, 2 aqueous

DATA ASSESSMENT SUMMARY

	ICP	AA	MERCURY	CYANIDE
1. HOLDING TIMES	✓	NA	✓	NA
2. CALIBRATIONS	✓		✓	
3. BLANKS	✓		✓	
4. ICS	✓			
5. LCS	✓			
6. DUPLICATE ANALYSIS	✓		✓	
7. MATRIX SPIKE	✓		✓	
8. MSA				
9. SERIAL DILUTION	✓		✓	
10. SAMPLE VERIFICATION	✓		✓	
11. OTHER QC (field dup pair)	J		✓	
12. OVERALL ASSESSMENT	✓	↓	✓	↓

✓ (check mark) — Acceptable

Other — Qualified:

J - Estimate

UJ - Undetected, estimated

R - Unusable (analyte may or may not be present)

NA - Not Applicable

ACTION ITEMS: ① All samples were prepared and analyzed in accordance with the specified method and accepted procedures.
② For Hg Analysis: All QC measures reported within specified control limits. No data is qualified.
AREAS OF CONCERN: ③ For Metal analysis: All QC measures reported were within specified control limits except for one field dup.

REVIEWED BY: Karin A. Lambert

DATE REVIEWED: 3/31/98

INORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3—DV3)

Page 2 of 16

KHL
ACTION ITEMS: pair for lead, an MSD for lead, and MS/MSD for
barium, lead, and silver. All LCS/LCSDs met acceptance
criteria. Therefore due to sample heterogeneity associated
with soil samples, lead results will be "J" coded
for the samples associated with the ~~same~~ field dup pair
033476-001/033477-001. This is consistent with the finding from
the MSD where RPD exceeded ± 20 and ± 35 for tech. review purposes
All other analytes look good in ^{other} field dup, MS/MSD, and LCS/LCSD.
No data is qualified. The MB for the aqueous samples shows
lead is detected above the RDL. However, no data is qualified
in the EB since sample results is $> 5X$ the blank

KHL
AREAS OF CONCERN: concentration.

OVERALL DATA QUALITY ASSESSMENT Data is acceptable. QC
measures are adequate. Due to matrix
interference, the lead results for 033472-001
to 033481-001 will be "J" coded along with appropriate
Qualifiers from Data Validation list

Reviewed By: Karin A. Lambert Date: 3/31/98

INORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3—DV3)

Page 4 of 16

2.0 INSTRUMENT CALIBRATION

2.1 Percent Recovery Criteria

Indicate %Recovery (%R) criteria used to evaluate calibration standards:

Metals: 89.6 - 110.40
Mercury: 89.6 - 110.40
Cyanide: _____
Other: _____

List below the analytes which did not meet %R criteria for initial and continuing calibration standards:

Analysis Date	ICV/CCV #	Analyte	%R	Action	Samples Affected

2.2 Analytical Sequence

Did the laboratory use the proper number of standards for calibration as described in the EPA method? Yes ☐ No ☒

Have initial calibrations been performed at the beginning of each analysis and at the frequency indicated by the EPA method? Yes ☒ No ☐

Have continuing calibration standards been analyzed at the beginning of sample analysis and at a minimum frequency indicated by the EPA method and at the end of the analysis sequence? Yes ☒ No ☐

If no for any of the above, outline deviations and actions taken below:

Reviewed By: Kevin A. Lambert Date: K. H. 3/31/98

INORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3—DV3)

Page 5 of 16

Were the correlation coefficients for the calibration curves for AA, Hg, CN, and other spectrophotometric methods ≥ 0.995 ? (Check calculations performed for calibration curves.) Yes ☐ No ☐ *Not Reported*

If no, list: _____

Date	Analyte	Coefficient	Action	Samples Affected

Check for transcription and calculation errors involving calibration summary forms and raw data. Briefly summarize errors and associated actions when data quality might have been affected.

3.0 BLANK ANALYSIS

3.1 Initial and Continuing Calibration Blanks

Have Initial and Continuing Calibration Blanks (ICB/CCB) been analyzed at the frequency required in the EPA method? Yes ☒ No ☐

If no, summarize problems and resolutions in the narrative report.

List analytes detected in ICB and CCBs below:

NOTE: For soil samples, convert blank values to mg/kg using digestion weights and volumes.

Analysis Date	ICB/CCB No.	Analyte	Conc.	Required Detection Limits	Action Level	Samples Affected

No Target Analytes detected above the RDL

Reviewed By: Karin A. Lambert Date: 3/31/98

INORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3—DV3)

Page 6 of 16

3.2 Method Blank

Was one method blank analyzed for:

Each of 20 samples? Yes ☒ No ☐

Each digestion batch? Yes ☒ No ☐

Each matrix type? Yes ☒ No ☐

Both AA and ICP when both are used for the same analyte? Yes ☐ No ☐ *Not Applicable*
or

At the frequency indicated in the EPA method or QAPjP? Yes ☒ No ☐

NOTE: Method blank is the same as the calibration blank for mercury and for wet chemistry analysis.

List analytes detected in method blank samples below. NOTE: For soil samples, be sure to calculate blank values using digestion weights and volumes.

Preparation Date	Analyte	Conc.	Required Detection Limits	Action Level	Samples Affected
7/17/97	lead	0.0034 mg/l	0.0030 mg/l	No data qualified	
				Sample result is > 5X	
				blank concentration.	

Is concentration in the method blank below the detection limit? Yes ☐ No ☒ *see above, only lead*

Affected samples: _____

Reviewed By: Kevin A. Lambert Date: 3/31/98

INORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3—DV3)

Page 7 of 16

3.3 Field/Rinse/Equipment Blanks

Was a field/equipment blank analyzed as required by the EPA method or QAPjP? Yes ☒ No ☐

List below analytes detected in the field blanks. NOTE: For soil samples, calculate blank values using digestion weights and volumes.

Collection Date	Blank ID	Analyte	Conc.	Required Detection Limits	Action Level	Samples Affected
<i>No target analytes detected above RDL</i>						

4.0 ICP INTERFERENCE CHECK SAMPLE ANALYSIS

Was an ICP interference check sample (ICS) analyzed at the beginning and end of a run or at least twice every 8 hours? (Not required for Ca, Mg, K, and Na) Yes ☒ No ☐

Samples affected: _____

Are the values of the ICS for solution AB within 80-120%R? Yes ☒ No ☐

If no, is the concentration of Al, Ca, Fe, or Mg lower than in ICS? Yes ☐ No ☐ *Not Applicable*

Reviewed By: *Kevin A. Lambert* Date: *3/31/98*

INORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3—DV3)

Page 8 of 16

If no, list below all analytes which did not meet %R criteria and in which the concentration of Al, Ca, Fe, or Mg is higher than in the ICS:

Not Applicable

Date	Analyte	%R	Action	Samples Affected

Are any results > IDL for those analytes which are not present in the ICS solution A? Yes ☐ No ☒

If yes, results >2 (absolute value of the IDL) indicate either a positive or negative interference and must be qualified.

Samples affected: _____

Check for transcription/calculation errors. Briefly summarize errors and associated actions when data quality might have been affected.

5.0 LABORATORY CONTROL SAMPLES (LCS)

Was an LCS analyzed at required frequency? Yes ☒ No ☐

Samples affected: _____

Reviewed By: Kevin A. Lambert Date: 3/31/98

INORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3—DV3)

Page 9 of 16

List below any LCS recoveries not within limits.

Preparation Date	Analyte	%R	Action	Samples Affected

6.0 LABORATORY DUPLICATE ANALYSIS

Were laboratory duplicates analyzed at required frequency? Yes ☒ No ☐

Samples affected: _____

Was laboratory duplicate analysis performed on field or equipment blanks? Yes ☐ No ☒

Samples affected: _____

Is any value for sample duplicate pair $<PQL$ and the other value $>10 \times PQL$? Yes ☐ No ☒

Samples affected: _____

Reviewed By: Kevin A. Lambert Date: 3/31/98

INORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3—DV3)

Page 10 of 16

List below concentrations of any analyte that did not meet criteria for duplicate precision:

Sample ID	Matrix	Preparation Date	Analyte	PQL	RPD	Action	Samples Affected

Check for transcription/calculation errors. Briefly summarize errors and associated actions when data quality might have been affected.

7.0 FIELD DUPLICATE SAMPLE ANALYSIS

Were field duplicates collected at the frequency indicated in the EPA method or QAPjP?

Yes ☒ No ☐

If yes, qualify data associated only with the field duplicate pair. Calculate RPDs for each analyte in which both values are greater than the IDL.

Is any value for sample duplicate < practical quantitation limit (PQL) and other value >10xPQL? Yes ☐ No ☒

Reviewed By: Karin A. Lambert Date: 3/31/98

INORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3—DV3)

Page 11 of 16

Samples affected: _____

List below the analytes that do not meet RPD or PQL criteria. Use the same criteria as those used for laboratory duplicate analysis or criteria specified in EPA method or sampling plan.

Sample ID	Matrix	Collection Date	RPD	Control Limit	Action	Samples Affected
033476-001 033477-001	Soil	6/18/97	135%	±35%	Sample results for associated samples will be "J" coded. The MS/MSD RPD was biased high. The LCS/LCSD RPD were OK. Due to sample heterogeneity, the sample results will be "J" coded.	

Check for transcription/calculation errors. Briefly summarize errors and associated actions when data quality might have been affected.

8.0 MATRIX SPIKE ANALYSIS

NOTE: This matrix spike is a predigestion/predistillation spike.

Was a matrix spike prepared and analyzed at the required frequency? Yes ☒ No ☐

Reviewed By: Kevin A. Lambert Date: 3/31/98

INORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3—DV3)

Page 12 of 16

Were matrix spikes performed at the concentrations specified by the EPA method? Yes ☒ No ☐

Samples affected: _____

Was matrix spike analysis performed on field or equipment blanks? Yes ☐ No ☒

If equipment or field blanks are the only aqueous samples, matrix spike analysis may be performed; however, matrix spike samples must be present for the other matrices.

Samples affected: _____

List below the % recoveries for analytes that did not meet the criteria:

Sample ID	Matrix	Preparation Date	Analyte	%R	Action	Samples Affected
MSD 033472-001	soil	7/16/97	Lead	228 (80-120) 51 (±20)		Only "J" coded samples associated w/ 1st field dup pair. Other field dup pairs & LCS/LCSDs were OK. No data is qualified.
ms/MSD 033473-001	soil	7/17/97	Barium	138/410		LCS/LCSDs + field dup pair met criteria
↓	↓	↓	Lead	319/357		1/0 data qualified.
MSD ↓	↓	↓	Silver	262 (80-120) 90 (±20)		except Lead associated with 1st field dup pair - "J" coded.

Check for transcription/calculation errors. Also check to ensure matrix spike concentrations are not affected by sample dilutions performed. If matrix spike concentrations are diluted below or close to IDL based on sample dilutions performed, use professional judgment in qualifying data. Ensure that the laboratory performed sample dilutions only when necessary as indicated by QA/QC requirements. Briefly summarize errors and associated actions when data quality might have been affected.

Reviewed By: Kevin A. Lambert Date: 3/31/98

INORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3—DV3)

Page 13 of 16

NOTE: If preparation blank spikes are analyzed, evaluate recoveries. These recoveries can indicate whether excursions in matrix spike recovery are caused by sample matrix effects or poor digestion efficiencies and/or problems with matrix spike solution. For example, if matrix spike recovery for selenium is 0% and preparation blank spike recovery for selenium is 92%, this may indicate sample matrix effects.

9.0 FURNACE ATOMIC ABSORPTION ANALYSIS

Not Applicable

Were duplicate injections present for each sample, including required QC analyses (not required if MSA is done)? Yes ☐ No ☐

Samples affected: _____

Were postdigestion spikes analyzed for samples, including QC samples? Yes ☐ No ☐

Were postdigestion spikes analyzed at the required concentration? Yes ☐ No ☐

Samples affected: _____

Was a dilution analyzed for samples with postdigestion spike recovery <40%? Yes ☐ No ☐

Samples affected: _____

MSA Analysis (Method of Standard Additions)—MSA is required when serial dilutions are not within $\pm 10\%$. Was MSA required for any sample but not performed? Yes ☐ No ☐

Are MSA calculations outside the linear range of the calibration curve? Yes ☐ No ☐

Reviewed By: *Kevin A. Lambert* Date: *3/31/98*

INORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3—DV3)

Page 14 of 16

NOTE: Ensure the spiking concentrations used for MSA analysis were at 50–100% and 150% of sample concentration or absorbance.

Samples affected: _____

10.0 SERIAL DILUTION ANALYSIS

NOTE: Serial dilution analysis (ICP) is required only for initial concentrations equal to or greater than 10xIDL.

If applicable, was a serial dilution performed for:

Each 20 samples? Yes ☒ No ☐

Each matrix type? Yes ☒ No ☐

Samples affected: _____

List below results which did not meet criteria of %D <10% for analyte concentrations greater than 50xIDL before dilution:

Analysis Date	Sample ID	Analyte	IDL	%D	Action	Samples Affected
7/17/97 0920	19845-21L	Barium		15.63 (±10)	Sample RERUN at 7/17/97 1023 and barium met criteria No data qualified	

Check for calculation errors and negative interferences.

Reviewed By: Kevin A. Lambert Date: 3/31/98

INORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3—DV3)

Page 15 of 16

11.0 SAMPLE RESULT VERIFICATION

11.1 Verification of Instrumental Parameters

Are instrument detection limits present and verified on a quarterly basis? Yes ☐ No ☐ *Not Applicable*

Are IDLs present for each analyte and each instrument used? Yes ☒ No ☐

Is the IDL greater than the required detection limits for any analyte? Yes ☐ No ☒
(If IDL > required detection limits, flag values less than 5xIDL.)

Samples affected: _____

Are ICP Interelement Correction Factors established and verified annually? Yes ☐ No ☐ *Not Applicable*

Are ICP Linear Ranges established and verified quarterly? Yes ☐ No ☐ *Not Applicable*

If no for any of the above, review problems and resolutions in narrative report. _____

11.2 Reporting Requirements

Were sample results reported down to the PQL? Yes ☒ No ☐

If no, indicate necessary corrections. _____

Were sample results that were analyzed by ICP for Se, Ti, As, or Pb at least 5xIDL? Yes ☒ No ☐

Were sample weights, volumes, and dilutions taken into account when reporting sample results and detection limits? Yes ☐ No ☐ *Not Applicable*

Reviewed By: Kevin A. Lambert Date: 3/31/98

INORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3—DV3)

Page 16 of 16

If no for any of the above, sample results may be inaccurate. Note necessary changes and if errors are present, request resubmittal of laboratory package.

Were any sample results higher than the linear range of calibration curve and not subsequently reanalyzed at the appropriate dilution? Yes ☐ No ☐ *Not Applicable*

Samples affected: _____

11.3 Sample Quantitation

Check a minimum of 10% of positive sample results for transcription calculation errors. Summarize necessary corrections. If errors are large, request resubmittal of laboratory package.

Comments: *Not Applicable*

Approved By: _____

Date: _____

*Task/Project Leader is responsible for approval of data set.

Reviewed By: *Kevin A Lambert* Date: *3/31/98*

Annex 10-C
Site 14 Analytical Discussion

The following discussion is from the SWMU 14 NFA proposal, which describes the nature and extent of contamination in the subsurface soils at Firing Site 2. This is to support evidence that vertical extent of contamination has been defined at SWMU 85, Firing Site 2.

3.5 Site Conceptual Model

3.5.1 Nature and Extent of Contamination

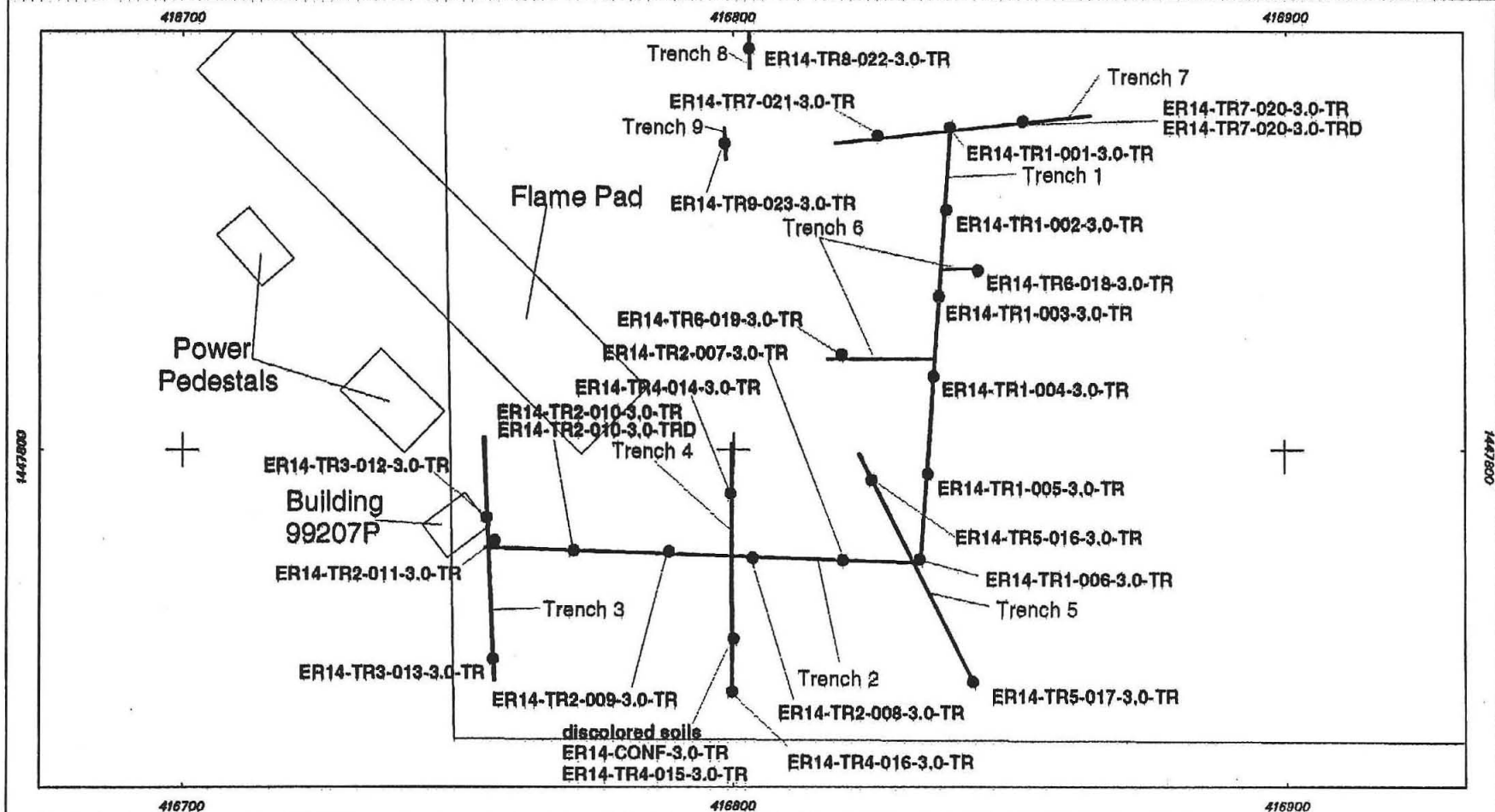
From review of the data collected from the trenching activities performed at SWMU 14, there was one area of discolored soils (approximately 2 cubic feet) that appears to have been buried test material. Also, scattered fragments of glass were encountered on the surface at Trenches 8 and 9. The absence of mercury and HE, the primary COCs in the soil at this site prior to the investigation, indicates the soils were not contaminated by the materials released at SWMU 14.

Although there were no COCs (mercury and HE) detected at SWMU 14, arsenic was slightly over the approved maximum background level, and some gamma activities for uranium-238 and thorium-234 were greater than the approved background levels (see Table 0-1). In addition, mercury and selenium, which were nondetect in all confirmation samples, do not have quantifiable maximum background concentration levels. The MDAs for uranium-235 were slightly higher than background. Only two samples for arsenic were above approved SNL/NM maximum background levels by a maximum difference of 1.69 mg/kg. Because of the low concentration of this constituent and the localized nature of its occurrence, it appears that this is not a contaminant; rather, it is a localized soil anomaly in the immediate area of the sample points.

Although uranium-238 was detected over the approved background level of 1.4 pCi/g in only one sample from the trenches, many of the MDAs for uranium-238 were slightly greater than background. One sample was slightly above the background level for thorium-234 (Table 0-1). Since surface soil contamination at SWMU 14 would be associated with the firing sites at Building 9920, confirmation samples from the surface soils (from the Rust Geotech Inc. VCM) are considered part of SWMU 85, Firing Sites Building 9920. The fact that each of these constituents is confined to one sample provides evidence that the distribution of these elements is limited to the immediate sample area. In addition, the fact that the samples were collected at a depth of 1-foot below the reported bottom of the burial site, is evidence that the vertical and lateral extent of contamination at SWMU 14 has been defined.

It has been previously estimated that a total of 0.56 kg of mercury was associated with the fluorescent tubes used at SWMU 85 (70 mg/tube x 8000 tubes). This is equivalent to 413 ml of mercury (Weast and Selby 1967), or less than 1 pint of mercury used in the test, most of which would be vaporized in the explosive test.

The absence of geophysical and chemical anomalies, and the fact that the total volume of residual mercury remaining from the test would be inconsequential, indicates that the occurrence of contaminated debris is insignificant at SWMU 14.



Legend

- Sample Point
- Trench Location
- ER Site Boundary
- Building/Structure

Sandia National Laboratories, New Mexico
Environmental Geographic Information System

**Figure 3.4.4-1 SWMU 14
Trench & Sample Locations**

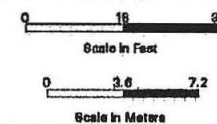


Table 3.4.4-1
Summary of SWMU 14 Confirmatory Soil Sampling Metals Analysis Results, July 1997
(Off-Site Laboratory Only)

Sample Attributes				Metals (EPA 6010/7000)* (mg/kg)							
Sample Location	Record Number ^a	ER Sample ID	Sample Depth (ft)	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver
TR-1	06814	1335-ER14-TR1-001-3.0-TR	3.0	2.83	81.3	ND (0.103)	7.27	5.22	ND (0.101)	ND (0.309)	ND (0.103)
	06814	1335-ER14-TR1-002-3.0-TR	3.0	3.39	79.5	ND (0.104)	8.35	5.92	ND (0.104)	ND (0.311)	ND (0.104)
	06814	1335-ER14-TR1-003-3.0-TR	3.0	3.25	74.7	ND (0.0948)	8.50	5.46	ND (0.107)	ND (0.284)	ND (0.0948)
	06814	1335-ER14-TR1-004-3.0-TR	3.0	3.35	145.	ND (0.105)	9.21	6.02	ND (0.106)	ND (1.57)	ND (0.105)
	06814	1335-ER14-TR1-005-3.0-TR	3.0	3.49	87.1	ND (0.0941)	8.61	6.42	ND (0.107)	ND (0.282)	ND (0.0941)
	06814	1335-ER14-TR1-006-3.0-TR	3.0	3.39	86.1	ND (0.106)	8.28	6.62	ND (0.103)	ND (0.318)	ND (0.106)
TR-2	06814	1335-ER14-TR2-007-3.0-TR	3.0	3.53	86.1	ND (0.0877)	8.62	5.68	ND (0.108)	ND (1.31)	ND (0.0877)
	06814	1335-ER14-TR2-008-3.0-TR	3.0	3.38	81.8	ND (0.0930)	6.73	5.80	ND (0.102)	ND (0.279)	ND (0.0930)
	06814	1335-ER14-TR2-009-3.0-TR	3.0	2.53	55.7	ND (0.0877)	6.69	5.17	ND (0.111)	ND (0.263)	ND (0.0877)
	06814	1335-ER14-TR2-010-3.0-TR	3.0	3.50	180.	ND (0.0938)	9.85	7.04	ND (0.108)	ND (1.41)	ND (0.0938)
	06814	1335-ER14-TR2-010-3.0-TRD	3.0	3.25	54.9	ND (0.105)	8.50	6.39	ND (0.108)	ND (0.315)	ND (0.105)
	06814	1335-ER14-TR2-011-3.0-TR	3.0	3.34	90.2	ND (0.104)	7.06	5.99	ND (0.108)	ND (0.311)	ND (0.104)
TR-3	06814	1335-ER14-TR3-012-3.0-TR	3.0	3.71	91.8	ND (0.108)	7.73	6.53	ND (0.108)	ND (0.323)	ND (0.108)
	06814	1335-ER14-TR3-013-3.0-TR	3.0	2.13	60.7	ND (0.0875)	6.25	4.91	ND (0.101)	ND (0.262)	ND (0.0875)
TR-4	06814	1335-ER14-TR4-014-3.0-TR	3.0	3.61	96.9	ND (0.104)	8.67	6.22	ND (0.109)	ND (0.313)	ND (0.104)
	06814	1335-ER14-TR4-015-3.0-TR	3.0	2.35	63.6	ND (0.0751)	7.35	4.46	ND (0.106)	ND (0.225)	ND (0.0751)
	06814	1335-ER14-TR4-016-3.0-TR	3.0	1.87	75.7	ND (0.0960)	6.43	4.16	ND (0.0995)	ND (0.288)	ND (0.0960)
	06814	1335-ER14-CONF-3.0-TR	3.0	2.50	59.0	ND (0.0880)	8.00	4.50	ND (0.103)	ND (0.260)	ND (0.0958)
TR-5	06814	1335-ER14-TR5-016-3.0-TR	3.0	2.96	76.1	ND (0.0814)	8.75	6.47	ND (0.107)	ND (0.244)	ND (0.0814)
	06814	1335-ER14-TR5-017-3.0-TR	3.0	2.65	56.7	ND (0.0878)	6.67	4.77	ND (0.106)	ND (1.32)	ND (0.0878)
TR-6	06814	1335-ER14-TR6-018-3.0-TR	3.0	2.50	52.5	0.116 J (0.542)	5.14	3.58	ND (0.109)	ND (0.325)	ND (0.108)
	06814	1335-ER14-TR6-019-3.0-TR	3.0	3.47	109.	ND (0.106)	8.26	5.91	ND U,J (0.103)	ND (0.317)	ND (0.106)
TR-7	06814	1335-ER14-TR7-020-3.0-TR	3.0	6.00	66.8	ND (0.0941)	7.81	5.75	ND U,J (0.0924)	ND (0.282)	ND (0.0941)
	06814	1335-ER14-TR7-020-3.0-TRD	3.0	3.21	76.0	ND (0.0938)	8.22	5.40	ND U,J (0.103)	ND (0.281)	ND (0.0938)
	06814	1335-ER14-TR7-021-3.0-TR	3.0	3.42	107.	ND (0.0911)	8.61	5.92	ND U,J (0.103)	ND (0.273)	ND (0.0911)
TR-8	06814	1335-ER14-TR8-022-3.0-TR	3.0	6.09	89.9	ND (0.0939)	9.63	7.44	ND U,J (0.108)	ND (0.282)	ND (0.0939)
TR-9	06814	1335-ER14-TR9-023-3.0-TR	3.0	2.77	141.	ND (0.104)	6.86	5.10	ND U,J (0.106)	ND (0.313)	ND (0.104)

Refer to footnotes at end of table.

Table 3.4.4-1 (Concluded)
Summary of SWMU 14 Confirmatory Soil Sampling Metals Analysis Results, July 1997
(Off-Site Laboratory Only)

Sample Attributes				Metals (EPA 6010/7000) ^a (mg/kg)							
Sample Location	Record Number ^b	ER Sample ID	Sample Depth (ft)	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver
Quality Assurance/Quality Control Samples (all in mg/L)											
NA	06814	1335-ER14-TR1-024-EB	NA	ND (0.00300)	0.00575 J (0.200)	ND (0.00100)	0.00192 J (0.0100)	ND (0.00200)	ND (0.000200)	ND (0.00300)	ND (0.00100)
HRMB Maximum Background Subsurface Soil Concentrations—Southwest Area ^c				4.4	214	0.9	15.9	11.8	<0.1	<1	<1

^aEPA November 1986.

^bChain of custody record.

^cDinwiddie September 24, 1997.

EB = Equipment blank.

EPA = U.S. Environmental Protection Agency.

ER = Environmental Restoration.

ft = Foot (feet).

ID = Identification.

J () = The value reported is less than the contract required detection limit as shown in parenthesis, but greater than or equal to the instrument detection limit.

mg/kg = Milligram(s) per kilogram.

mg/L = Milligram(s) per liter.

NA = Not applicable.

ND () = Not detected at or above the method detection limit, shown in parenthesis.

SNL/NM = Sandia National Laboratories/New Mexico.

SWMU = Solid waste management unit.

SWTA = Southwest Test Area.

TR- = Trench designation within SWMU 14.

TR, TRD = Trench soil sample, duplicate trench soil sample.

UJ = The analyte was analyzed for, but not detected. The associated value is an estimate and may be inaccurate or imprecise.

UTL = Upper tolerance limit.

Table 3.4.4-2
Summary of SWMU 14 Confirmatory Soil Sampling Gamma Spectroscopy Analysis Results, July 1997
(On-Site Laboratory Only)

Sample Attributes				Gamma Spectroscopy Activity (pCi/g)						
Sample Location	Record Number ^a	ER Sample ID	Sample Depth (ft)	Uranium-238	Thorium-234	Thorium-232	Radium-228	Thorium-228	Uranium-235	Cesium-137
TR-1	06817	1335-ER14-TR1-001-3.0-TR	3.0	ND (1.47E+00)	9.47E-01	5.01E-01	6.63E-01	ND (4.07E-01)	ND (2.04E-01)	ND (3.49E-02)
	06817	1335-ER14-TR1-002-3.0-TR	3.0	ND (1.32E+00)	6.46E-01	5.90E-01	6.08E-01	5.88E-01	ND (1.83E-01)	ND (3.29E-02)
	06817	1335-ER14-TR1-003-3.0-TR	3.0	ND (1.24E+00)	7.90E-01	5.23E-01	5.10E-01	4.27E-01	ND (1.72E-01)	ND (3.00E-02)
	06817	1335-ER14-TR1-004-3.0-TR	3.0	ND (1.29E+00)	7.82E-01	6.00E-01	4.63E-01	7.75E-01	ND (1.81E-01)	ND (3.24E-02)
	06815	1335-ER14-TR1-005-3.0-TR	3.0	ND (6.05E-01)	1.00E+00	5.43E-01	6.09E-01	5.51E-01	8.73E-02	ND (2.61E-02)
TR-2	06817	1335-ER14-TR2-006-3.0-TR	3.0	2.03E+00	1.72E+00	6.43E-01	5.40E-01	6.13E-01	ND (1.79E-01)	ND (3.29E-02)
	06817	1335-ER14-TR2-007-3.0-TR	3.0	ND (1.60E+00)	9.07E-01	6.21E-01	6.47E-01	3.77E-01	ND (1.82E-01)	ND (2.60E-02)
	06817	1335-ER14-TR2-008-3.0-TR	3.0	ND (1.66E+00)	1.12E+00	6.30E-01	6.92E-01	5.97E-01	ND (1.86E-01)	ND (2.72E-02)
	06817	1335-ER14-TR2-009-3.0-TR	3.0	ND (1.55E+00)	7.05E-01	6.01E-01	5.11E-01	5.90E-01	ND (1.77E-01)	ND (2.59E-02)
	06815	1335-ER14-TR2-010-3.0-TR	3.0	ND (1.65E+00)	7.82E-01	6.40E-01	5.81E-01	6.37E-01	1.36E-01	ND (2.65E-02)
TR-3	06817	1335-ER14-TR2-010-3.0-TRD	3.0	ND (1.55E+00)	8.66E-01	5.75E-01	6.45E-01	5.51E-01	ND (1.71E-01)	ND (2.39E-02)
	06817	1335-ER14-TR2-011-3.0-TR	3.0	ND (1.46E+00)	5.05E-01	5.99E-01	ND (1.63E-01)	3.70E-01	ND (1.94E-01)	1.22E-02
TR-4	06817	1335-ER14-TR3-012-3.0-TR	3.0	ND (1.42E+00)	ND (5.54E-01)	5.88E-01	5.67E-01	5.82E-01	ND (1.86E-01)	ND (3.58E-02)
	06817	1335-ER14-TR3-013-3.0-TR	3.0	ND (1.40E+00)	1.08E+00	7.48E-01	7.27E-01	4.24E-01	ND (1.99E-01)	ND (3.68E-02)
TR-5	06817	1335-ER14-TR4-014-3.0-TR	3.0	ND (1.49E+00)	1.09E+00	6.91E-01	6.00E-01	6.72E-02	ND (2.02E-01)	ND (3.76E-02)
	06815	1335-ER14-TR4-015-3.0-TR	3.0	ND (1.64E+00)	5.88E-01	5.26E-01	5.75E-01	2.23E-01	ND (1.83E-01)	ND (2.73E-02)
	06817	1335-ER14-TR4-016-3.0-TR	3.0	ND (1.45E+00)	7.28E-01	4.29E-01	5.33E-01	4.73E-01	ND (1.64E-01)	ND (2.48E-02)
	06850	1335-ER14-CONF-3.0-TR	3.0	ND (1.16E+00)	ND (4.57E-01)	6.64E-01	6.61E-01	ND (2.51E-01)	ND (1.65E-01)	ND (3.26E-02)
TR-6	06817	1335-ER14-TR5-016-3.0-TR	3.0	ND (1.31E+00)	7.78E-01	5.61E-01	5.95E-01	4.60E-01	ND (1.81E-01)	ND (3.26E-02)
	06817	1335-ER14-TR5-017-3.0-TR	3.0	ND (1.49E+00)	8.00E-01	5.40E-01	6.52E-01	6.30E-01	ND (1.69E-01)	ND (2.62E-02)
TR-7	06817	1335-ER14-TR6-018-3.0-TR	3.0	ND (1.48E+00)	9.40E-01	5.99E-01	5.23E-01	5.49E-01	ND (1.70E-01)	ND (2.35E-02)
	06817	1335-ER14-TR6-019-3.0-TR	3.0	6.54E-01	8.58E-01	6.00E-01	6.57E-01	6.72E-01	ND (1.69E-01)	ND (2.46E-02)
TR-8	06815	1335-ER14-TR7-020-3.0-TR	3.0	7.87E-01	1.12E+00	6.41E-01	6.64E-01	6.57E-01	ND (1.76E-01)	ND (2.65E-02)
	06817	1335-ER14-TR7-020-3.0-TRD	3.0	ND (1.37E+00)	ND (5.31E-01)	5.79E-01	5.75E-01	3.28E-01	ND (1.87E-01)	ND (3.16E-02)
	06817	1335-ER14-TR7-021-3.0-TR	3.0	8.68E-01	7.99E-01	6.33E-01	6.61E-01	5.96E-01	ND (1.85E-01)	ND (2.60E-02)
TR-9	06815	1335-ER14-TR8-022-3.0-TR	3.0	ND (1.06E+00)	6.65E-01	6.23E-01	6.76E-01	5.89E-01	ND (1.83E-01)	ND (2.65E-02)
TR-9	06817	1335-ER14-TR9-023-3.0-TR	3.0	5.52E-01	8.75E-01	6.54E-01	6.09E-01	6.07E-01	ND (2.19E-01)	ND (3.44E-02)

Refer to footnotes at end of table.

Table 3.4.4-2 (Concluded)
Summary of SWMU 14 Confirmatory Soil Sampling Gamma Spectroscopy Analysis Results, July 1997
(On-Site Laboratory Only)

Sample Attributes				Gamma Spectroscopy Activity (pCi/g)						
Sample Location	Record Number ^a	ER Sample ID	Sample Depth (ft)	Uranium-238	Thorium-234	Thorium-232	Radium-228	Thorium-228	Uranium-235	Cesium-137
Quality Assurance/Quality Control Samples (all in pCi/mL)										
NA	06817	1335-ER14-TR1-024-EB	NA	ND (9.48E-01)	ND (3.12E-01)	ND (1.38E-01)	ND (1.11E-01)	ND (4.66E-01)	ND (1.30E-01)	ND (1.85E-02)
HRMB Maximum Background Subsurface Soil Concentrations—Southwest Area				1.4	1.4	1.01	0.93	0.93 ^c	0.16	0.079

^aChain of custody record.

^bDinwiddie September 24, 1997.

^cBrown January 24, 1998.

EB = Equipment blank.

ER = Environmental Restoration.

ft = Foot (feet).

ID = Identification.

NA = Not applicable.

ND () = Not detected at or above the minimum detectable activity, shown in parenthesis.

pCi/g = Picocurie(s) per gram.

pCi/mL = Picocurie(s) per milliliter.

SNL/NM = Sandia National Laboratories/New Mexico.

SWMU = Solid waste management unit.

SWTA = Southwest Test Area.

TR- = Trench designation within SWMU 14.

TR, TRD = Trench soil sample, duplicate trench soil sample.

UJ = The analyte was analyzed for, but not detected. The associated value is an estimate and may be inaccurate or imprecise.

UTL = Upper tolerance limit.

Table 3.4.4-3
Summary of SWMU 14 Confirmatory Soil Sampling HE Analysis Results, July 1997
(Off-Site Laboratory Only)

Sample Attributes				High Explosives (EPA 8330) ^a (µg/g)					
Sample Location	Record Number	ER Sample ID	Sample Depth (ft)	2,4,6-trinitrotoluene	2,4-dinitrotoluene	2,6-dinitrotoluene	2 Amino, 4,6-dinitrotoluene	4 Amino, 2,6-dinitrotoluene	HMX
TR-1	06814	1335-ER14-TR1-001-3.0-TR	3.0	ND (0.11)	ND (0.16)	ND (0.19)	ND (0.13)	ND (0.055)	ND (0.42)
	06814	1335-ER14-TR1-002-3.0-TR	3.0	ND (0.11)	ND (0.16)	ND (0.19)	ND (0.13)	ND (0.055)	ND (0.42)
	06814	1335-ER14-TR1-003-3.0-TR	3.0	ND (0.11)	ND (0.16)	ND (0.19)	ND (0.13)	ND (0.055)	ND (0.42)
	06814	1335-ER14-TR1-004-3.0-TR	3.0	ND (0.11)	ND (0.16)	ND (0.19)	ND (0.13)	ND (0.055)	ND (0.42)
	06814	1335-ER14-TR1-005-3.0-TR	3.0	ND (0.11)	ND (0.16)	ND (0.19)	ND (0.13)	ND (0.055)	ND (0.42)
TR-2	06814	1335-ER14-TR2-006-3.0-TR	3.0	ND (0.11)	ND (0.16)	ND (0.19)	ND (0.13)	ND (0.055)	ND (0.42)
	06814	1335-ER14-TR2-007-3.0-TR	3.0	ND (0.11)	ND (0.16)	ND (0.19)	ND (0.13)	ND (0.055)	ND (0.42)
	06814	1335-ER14-TR2-008-3.0-TR	3.0	ND (0.11)	ND (0.16)	ND (0.19)	ND (0.13)	ND (0.055)	ND (0.42)
	06814	1335-ER14-TR2-009-3.0-TR	3.0	ND (0.11)	ND (0.16)	ND (0.19)	ND (0.13)	ND (0.055)	ND (0.42)
	06814	1335-ER14-TR2-010-3.0-TR	3.0	ND (0.11)	ND (0.16)	ND (0.19)	ND (0.13)	ND (0.055)	ND (0.42)
TR-3	06814	1335-ER14-TR2-010-3.0-TRD	3.0	ND (0.11)	ND (0.16)	ND (0.19)	ND (0.13)	ND (0.055)	ND (0.42)
	06814	1335-ER14-TR2-011-3.0-TR	3.0	ND (0.11)	ND (0.16)	ND (0.19)	ND (0.13)	ND (0.055)	ND (0.42)
	06814	1335-ER14-TR3-012-3.0-TR	3.0	ND (0.11)	ND (0.16)	ND (0.19)	ND (0.13)	ND (0.055)	ND (0.42)
	06814	1335-ER14-TR3-013-3.0-TR	3.0	ND (0.11)	ND (0.16)	ND (0.19)	ND (0.13)	ND (0.055)	ND (0.42)
	06814	1335-ER14-TR4-014-3.0-TR	3.0	ND (0.11)	ND (0.16)	ND (0.19)	ND (0.13)	ND (0.055)	ND (0.42)
TR-4	06814	1335-ER14-TR4-015-3.0-TR	3.0	ND (0.11)	ND (0.16)	ND (0.19)	ND (0.13)	ND (0.055)	ND (0.42)
	06814	1335-ER14-TR4-016-3.0-TR	3.0	ND (0.11)	ND (0.16)	ND (0.19)	ND (0.13)	ND (0.055)	ND (0.42)
	06814	1335-ER14-TR4-016-3.0-TR	3.0	ND (0.11)	ND (0.16)	ND (0.19)	ND (0.13)	ND (0.055)	ND (0.42)
	06814	1335-TR14-CONF-3.0-TR	3.0	ND (0.11)	ND (0.16)	ND (0.19)	ND (0.13)	ND (0.055)	ND (0.42)
	06814	1335-ER14-TR5-016-3.0-TR	3.0	ND (0.11)	ND (0.16)	ND (0.19)	ND (0.13)	ND (0.055)	ND (0.42)
TR-5	06814	1335-ER14-TR5-017-3.0-TR	3.0	ND (0.11)	ND (0.16)	ND (0.19)	ND (0.13)	ND (0.055)	ND (0.42)
	06814	1335-ER14-TR6-018-3.0-TR	3.0	ND (0.11)	ND (0.16)	ND (0.19)	ND (0.13)	ND (0.055)	ND (0.42)
	06814	1335-ER14-TR6-019-3.0-TR	3.0	ND (0.11)	ND (0.16)	ND (0.19)	ND (0.13)	ND (0.055)	ND (0.42)
	06814	1335-ER14-TR7-020-3.0-TR	3.0	ND (0.11)	ND (0.16)	ND (0.19)	ND (0.13)	ND (0.055)	ND (0.42)
	06814	1335-ER14-TR7-020-3.0-TRD	3.0	ND (0.11)	ND (0.16)	ND (0.19)	ND (0.13)	ND (0.055)	ND (0.42)
TR-6	06814	1335-ER14-TR7-021-3.0-TR	3.0	ND (0.11)	ND (0.16)	ND (0.19)	ND (0.13)	ND (0.055)	ND (0.42)
	06814	1335-ER14-TR8-022-3.0-TR	3.0	ND (0.11)	ND (0.16)	ND (0.19)	ND (0.13)	ND (0.055)	ND (0.42)
	06814	1335-ER14-TR9-023-3.0-TR	3.0	ND (0.11)	ND (0.16)	ND (0.19)	ND (0.13)	ND (0.055)	ND (0.42)
	06814	1335-ER14-TR9-023-3.0-TR	3.0	ND (0.11)	ND (0.16)	ND (0.19)	ND (0.13)	ND (0.055)	ND (0.42)
	06814	1335-ER14-TR9-023-3.0-TR	3.0	ND (0.11)	ND (0.16)	ND (0.19)	ND (0.13)	ND (0.055)	ND (0.42)
Quality Assurance/Quality Control Samples (all in µg/L)									
NA	06814	1335-ER14-TR1-024-EB	NA	ND (0.030)	ND (0.11)	ND (0.070)	ND (0.040)	ND (0.050)	ND (0.080)

Refer to footnotes at end of table.

Table 3.4.4-3 (Continued)
Summary of SWMU 14 Confirmatory Soil Sampling HE Analysis Results, July 1997
(Off-Site Laboratory Only)

Sample Attributes				High Explosives (EPA 8330) ^a (µg/g)		
Sample Location	Record Number	ER Sample ID	Sample Depth (ft)	Nitrobenzene	RDX	TETRYL
TR-1	06814	1335-ER14-TR1-001-3.0-TR	3.0	ND (0.15)	ND (0.19)	ND (0.34)
	06814	1335-ER14-TR1-002-3.0-TR	3.0	ND (0.15)	ND (0.19)	ND (0.34)
	06814	1335-ER14-TR1-003-3.0-TR	3.0	ND (0.15)	ND (0.19)	ND (0.34)
	06814	1335-ER14-TR1-004-3.0-TR	3.0	ND (0.15)	ND (0.19)	ND (0.34)
	06814	1335-ER14-TR1-005-3.0-TR	3.0	ND (0.15)	ND (0.19)	ND (0.34)
	06814	1335-ER14-TR1-006-3.0-TR	3.0	ND (0.15)	ND (0.19)	ND (0.34)
TR-2	06814	1335-ER14-TR2-007-3.0-TR	3.0	ND (0.15)	ND (0.19)	ND (0.34)
	06814	1335-ER14-TR2-008-3.0-TR	3.0	ND (0.15)	ND (0.19)	ND (0.34)
	06814	1335-ER14-TR2-009-3.0-TR	3.0	ND (0.15)	ND (0.19)	ND (0.34)
	06814	1335-ER14-TR2-010-3.0-TR	3.0	ND (0.15)	ND (0.19)	ND (0.34)
	06814	1335-ER14-TR2-010-3.0-TRD	3.0	ND (0.15)	ND (0.19)	ND (0.34)
	06814	1335-ER14-TR2-011-3.0-TR	3.0	ND (0.15)	ND (0.19)	ND (0.34)
TR-3	06814	1335-ER14-TR3-012-3.0-TR	3.0	ND (0.15)	ND (0.19)	ND (0.34)
	06814	1335-ER14-TR3-013-3.0-TR	3.0	ND (0.15)	ND (0.19)	ND (0.34)
TR-4	06814	1335-ER14-TR4-014-3.0-TR	3.0	ND (0.15)	ND (0.19)	ND (0.34)
	06814	1335-ER14-TR4-015-3.0-TR	3.0	ND (0.15)	ND (0.19)	ND (0.34)
	06814	1335-ER14-TR4-016-3.0-TR	3.0	ND (0.15)	ND (0.19)	ND (0.34)
	06814	1335-ER14-CONF-3.0-TR	3.0	ND (0.15)	ND (0.19)	ND (0.34)
TR-5	06814	1335-ER14-TR5-016-3.0-TR	3.0	ND (0.15)	ND (0.19)	ND (0.34)
	06814	1335-ER14-TR5-017-3.0-TR	3.0	ND (0.15)	ND (0.19)	ND (0.34)
TR-6	06814	1335-ER14-TR6-018-3.0-TR	3.0	ND (0.15)	ND (0.19)	ND (0.34)
	06814	1335-ER14-TR6-019-3.0-TR	3.0	ND (0.15)	ND (0.19)	ND (0.34)
TR-7	06814	1335-ER14-TR7-020-3.0-TR	3.0	ND (0.15)	ND (0.19)	ND (0.34)
	06814	1335-ER14-TR7-020-3.0-TRD	3.0	ND (0.15)	ND (0.19)	ND (0.34)
	06814	1335-ER14-TR7-021-3.0-TR	3.0	ND (0.15)	ND (0.19)	ND (0.34)
TR-8	06814	1335-ER14-TR8-022-3.0-TR	3.0	ND (0.15)	ND (0.19)	ND (0.34)
TR-9	06814	1335-ER14-TR9-023-3.0-TR	3.0	ND (0.15)	ND (0.19)	ND (0.34)
Quality Assurance/Quality Control Samples (all in µg/L)						
NA	06814	1335-ER14-TR1-024-EB	NA	ND (0.040)	ND (0.020)	ND (0.040)

Refer to footnotes at end of table.

Table 3.4.4-3 (Concluded)
Summary of SWMU 14 Confirmatory Soil Sampling HE Analysis Results, July 1997
(Off-Site Laboratory Only)

Sample Attributes				High Explosives (EPA 8330) ^a (µg/g)				
Sample Location	Record Number ^b	ER Sample ID	Sample Depth (ft)	1,3-Dinitrobenzene	2-Nitrotoluene	3-Nitrotoluene	4-Nitrotoluene	1,3,5-Trinitrobenzene
TR-1	06814	1335-ER14-TR1-001-3.0-TR	3.0	ND (0.10)	ND (0.070)	ND (0.16)	ND (0.17)	ND (0.070)
	06814	1335-ER14-TR1-002-3.0-TR	3.0	ND (0.10)	ND (0.070)	ND (0.16)	ND (0.17)	ND (0.070)
	06814	1335-ER14-TR1-003-3.0-TR	3.0	ND (0.10)	ND (0.070)	ND (0.16)	ND (0.17)	ND (0.070)
	06814	1335-ER14-TR1-004-3.0-TR	3.0	ND (0.10)	ND (0.070)	ND (0.16)	ND (0.17)	ND (0.070)
	06814	1335-ER14-TR1-005-3.0-TR	3.0	ND (0.10)	ND (0.070)	ND (0.16)	ND (0.17)	ND (0.070)
	06814	1335-ER14-TR1-006-3.0-TR	3.0	ND (0.10)	ND (0.070)	ND (0.16)	ND (0.17)	ND (0.070)
TR-2	06814	1335-ER14-TR2-007-3.0-TR	3.0	ND (0.10)	ND (0.070)	ND (0.16)	ND (0.17)	ND (0.070)
	06814	1335-ER14-TR2-008-3.0-TR	3.0	ND (0.10)	ND (0.070)	ND (0.16)	ND (0.17)	ND (0.070)
	06814	1335-ER14-TR2-009-3.0-TR	3.0	ND (0.10)	ND (0.070)	ND (0.16)	ND (0.17)	ND (0.070)
	06814	1335-ER14-TR2-010-3.0-TR	3.0	ND (0.10)	ND (0.070)	ND (0.16)	ND (0.17)	ND (0.070)
	06814	1335-ER14-TR2-010-3.0-TRD	3.0	ND (0.10)	ND (0.070)	ND (0.16)	ND (0.17)	ND (0.070)
	06814	1335-ER14-TR2-011-3.0-TR	3.0	ND (0.10)	ND (0.070)	ND (0.16)	ND (0.17)	ND (0.070)
TR-3	06814	1335-ER14-TR3-012-3.0-TR	3.0	ND (0.10)	ND (0.070)	ND (0.16)	ND (0.17)	ND (0.070)
	06814	1335-ER14-TR3-013-3.0-TR	3.0	ND (0.10)	ND (0.070)	ND (0.16)	ND (0.17)	ND (0.070)
TR-4	06814	1335-ER14-TR4-014-3.0-TR	3.0	ND (0.10)	ND (0.070)	ND (0.16)	ND (0.17)	ND (0.070)
	06814	1335-ER14-TR4-015-3.0-TR	3.0	ND (0.10)	ND (0.070)	ND (0.16)	ND (0.17)	ND (0.070)
	06814	1335-ER14-TR4-016-3.0-TR	3.0	ND (0.10)	ND (0.070)	ND (0.16)	ND (0.17)	ND (0.070)
	06814	1335-ER14-CONF-3.0-TR	3.0	ND (0.10)	ND (0.070)	ND (0.16)	ND (0.17)	ND (0.070)
TR-5	06814	1335-ER14-TR5-016-3.0-TR	3.0	ND (0.10)	ND (0.070)	ND (0.16)	ND (0.17)	ND (0.070)
	06814	1335-ER14-TR5-017-3.0-TR	3.0	ND (0.10)	ND (0.070)	ND (0.16)	ND (0.17)	ND (0.070)
TR-6	06814	1335-ER14-TR6-018-3.0-TR	3.0	ND (0.10)	ND (0.070)	ND (0.16)	ND (0.17)	ND (0.070)
	06814	1335-ER14-TR6-019-3.0-TR	3.0	ND (0.10)	ND (0.070)	ND (0.16)	ND (0.17)	ND (0.070)
TR-7	06814	1335-ER14-TR7-020-3.0-TR	3.0	ND (0.10)	ND (0.070)	ND (0.16)	ND (0.17)	ND (0.070)
	06814	1335-ER14-TR7-020-3.0-TRD	3.0	ND (0.10)	ND (0.070)	ND (0.16)	ND (0.17)	ND (0.070)
	06814	1335-ER14-TR7-021-3.0-TR	3.0	ND (0.10)	ND (0.070)	ND (0.16)	ND (0.17)	ND (0.070)
TR-8	06814	1335-ER14-TR8-022-3.0-TR	3.0	ND (0.10)	ND (0.070)	ND (0.16)	ND (0.17)	ND (0.070)
TR-9	06814	1335-ER14-TR9-023-3.0-TR	3.0	ND (0.10)	ND (0.070)	ND (0.16)	ND (0.17)	ND (0.070)
Quality Assurance/Quality Control Samples (all in µg/L)								
NA	06814	1335-ER14-TR1-024-EB	NA	ND (0.030)	ND (0.030)	ND (0.020)	ND (0.030)	ND (0.040)

^a EPA November 1986^b Chain of custody record.

EB = Equipment Blank.

EPA = U.S. Environmental Protection Agency.

ER = Environmental Restoration.

ft = Foot (feet).

HE = High explosives.

HMX = 1,3,5,7-tetranitro-1,3,5,7-tetrazacyclooctane.

ID = Identification.

NA = Not applicable.

ND () = Not detected at or above the method detection limit, shown in parenthesis.

RDX = 1,3,5-trinitro-1,3,5-triazacyclohexane.

SWMU = Solid waste management unit.

TETRYL = 2,4,6-trinitrophenylmethylnitramine.

TR- = Trench designation within SWMU 14.

TR, TRD = Trench soil sample, duplicate trench soil sample.

µg/L = Microgram(s) per liter.

µg/g = Microgram(s) per gram.

ANNEX 10-D
Risk Screening Assessment

TABLE OF CONTENTS

I.	Site Description and History	1
II.	Comparison of Results to Data Quality Objectives	2
III.	Determination of Nature, Rate, and Extent of Contamination	4
III.1	Introduction	4
III.2	Nature of Contamination.....	4
III.3	Rate of Contaminant Migration	5
III.4	Extent of Contamination	5
IV.	Comparison of Constituents of Concern to Background Screening Levels	5
V.	Fate and Transport.....	10
VI.	Human Health Risk Assessment Analysis	11
VI.1	Introduction	11
VI.2	Step 1. Site Data	12
VI.3	Step 2. Pathway Identification	12
VI.4	Step 3. COC Screening Procedures.....	13
VI.4.1	Background Screening Procedure.....	13
VI.4.2	Subpart S Screening Procedure	14
VI.5	Step 4. Identification of Toxicological Parameters	14
VI.6	Step 5. Exposure Assessment and Risk Characterization	16
VI.6.1	Exposure Assessment.....	16
VI.6.2	Risk Characterization	17
VI.7	Step 6. Comparison of Risk Values to Numerical Guidelines.....	19
VI.8	Step 7. Uncertainty Discussion.....	19
VI.9	Summary	21
VII.	Ecological Risk Screening Assessment.....	21
VII.1	Introduction	21
VII.2	Scoping Assessment.....	22
VII.2.1	Data Assessment	22
VII.2.2	Bioaccumulation	23
VII.2.3	Fate and Transport Potential	23
VII.2.4	Scoping Risk Management Decision	23
VII.3	Screening Assessment.....	23
VII.3.1	Problem Formulation	24
VII.3.2	Exposure Estimation.....	25
VII.3.3	Ecological Effects Evaluation.....	29
VII.3.4	Risk Characterization	29
VII.3.5	Uncertainty Assessment.....	29
VII.3.6	Risk Interpretation	35
VII.3.7	Screening Assessment Scientific/Management Decision Point.....	35
VIII.	References.....	35

LIST OF TABLES

Table		Page
1	Summary of Sampling Performed to Meet Data Quality Objectives	3
2	Summary of Data Quality Requirements	3
3	Nonradiological COCs for Human Health Risk Assessment at SWMU 85 With Comparison to the Associated SNL/NM Background Screening Value, BCF, Log K_{ow} , and Subpart S Screening Value	6
4	Nonradiological COCs for Ecological Risk Assessment at SWMU 85 with Comparison to the Associated SNL/NM Background Screening Value, BCF, and Log K_{ow}	7
5	Radiological COCs for Human Health Risk Assessment at SWMU 85 with comparison to the Associated SNL/NM Background Screening Value, BCF, and Log K_{ow}	8
6	Radiological COCs for Ecological Risk Assessment at SWMU 85 with Comparison to the Associated SNL/NM Background Screening Value, BCF, and Log K_{ow}	9
7	Summary of Fate and Transport at SWMU 85	11
8	Toxicological Parameter Values for SWMU 85 Nonradiological COCs	15
9	Radiological Toxicological Parameter Values for SWMU 85 COCs Obtained from RESRAD Risk Coefficients	16
10	Risk Assessment Values for SWMU 85 Nonradiological COCs	18
11	Risk Assessment Values for SWMU 85 Nonradiological Background Constituents	18
12	Exposure Factors for Ecological Receptors at SWMU 85	27
13	Transfer Factors Used in Exposure Models for Constituents of Potential Ecological Concern at SWMU 85	28
14	Media Concentrations for Constituents of Potential Ecological Concern at SWMU 85	28
15	Toxicity Benchmarks for Ecological Receptors at SWMU 85	30
14	Hazard Quotients for Ecological Receptors at SWMU 85	31
17	Internal and External Dose Rates for Deer Mice Exposed to Radionuclides at SWMU 85 Sandia National Laboratories, New Mexico	32
18	Internal and External Dose Rates for Burrowing Owls Exposed to Radionuclides at SWMU 85, Sandia National Laboratories, New Mexico	32
19	Hazard Quotients for Ecological Receptors Exposed to Background Concentrations for SWMU 85	34

SWMU 85: RISK SCREENING ASSESSMENT

I. Site Description and History

Solid waste management unit (SWMU) 85 – Firing Site (Building 9920) is located in the Southwest Test Area in the southern part of Kirtland Air Force Base (KAFB), approximately 2.3 miles north of the Isleta Pueblo boundary and 1.3 miles west of Lovelace Road. The site consists of four small separate firing sites west, north, and south of Building 9920 that are included in the draft Operable Unit 1335 Work Plan. The immediate area slopes gently to the west and is graded and clear of vegetation. The surrounding land is covered by desert grasses and cacti.

Four firing site/test areas are associated with SWMU 85. Explosives were limited to 50 pounds or less during testing. Building 9920 was the control room for the firing sites. Firing Site 1 is located immediately west of Building 9920. It is defined by a 20- by 30-foot area adjacent to the building and by a smaller 10- by 10-foot area northwest of the building. Firing Site 2 is a series of tanks and pressure vessels located about 140 feet west of Building 9920. Firing Site 3 is the former location of an inflatable building. The site underwent a risk analysis in September 1997. Firing Site 4 is the location of the Cable Suspension Facility located approximately 1,300 feet northwest of Building 9920.

Firing Site 1 is comprised of six small pits excavated to a depth of 6 to 8 feet. Beryllium disks (approximately 100 grams total) were placed in the pits, and an explosive charge was placed on top of the disks and detonated, propelling the beryllium downward. It is believed that the pit openings were plugged with concrete before the firing tests were conducted. After each test, the pits were covered with approximately 6 inches of soil and were ultimately backfilled.

Firing Site 2 is associated with tests conducted in the late 1970s simulating reactor core meltdown scenarios by submerging molten core material into a large tank (VGES tank) containing water, and observing the reaction. The simulated core material, called corium thermite, was comprised of an alloy of zirconium, nickel oxide, chromium oxide, iron oxide, molybdenum oxide and about 40 kilograms (kg) of depleted uranium (DU). These tests contaminated the soil around the VGES Tank. The core material was deposited in the area and the water was pumped onto the ground. The area was later graded.

An aerosol experiment using 100 grams of cesium iodide was also performed in a tank. This tank was vacuumed afterwards, and approximately 90 percent of the cesium iodide was recovered.

Other types of tests conducted on the surface at either Firing Site 1 or Firing Site 2 involved blowing up small disks of cadmium sulfide (100 grams total), dispersion tests using 10,000 to 11,000 grams of manganese dioxide per shot, and tests using lithium hydride shots of an unknown mass. The specific locations of these tests are unclear but are believed to be in the general areas of Firing Sites 1 and 2.

Firing Site 3 occupies the area known as the “old air building,” which was an inflatable building. A series of eight dispersion tests were conducted within the building. Each test involved a

charge of 47 to 220 grams of DU powder and 0.5 pound of Composition 4 high explosives (HE). The charge was detonated to study the dispersion of DU while the building trapped the emissions. Plastic sheeting was placed on the unpaved floor of the building to capture the dispersed DU. After the test, aerosolized uranium was allowed to settle onto the plastic, which was then rolled up and disposed of in the mixed waste landfill. The inflatable building has since been removed from the site.

The first test program conducted at the Cable Suspension Facility, Firing Site 4, was the SSAGE-2 tests series. A sphere containing approximately 220 grams of DU was detonated using 0.5 pound of C-4 HE. The sphere fragmented into large pieces rather than aerosolizing as planned. Site personnel recovered about 100 grams of the 220 grams of DU from this test. According to site personnel this was the only DU experiment conducted at this facility. Approximately 50 to 100 pounds of baratol, which contains barium nitrate were used in some of the tests at this location. The barium oxide dispersed by the explosion was dispersed into the area and was deposited on the soil in the vicinity of the test area.

Most recent testing primarily involved shock-wave experiments using air detonations of hydrogen. Methyl acetylene-propene-propadiene (MAPP) gas and bromofluoromethane were also used. These tests were performed in the structure (flame pad) immediately west of Firing Site 2. Since the explosives were gases, no residual material remained in the environment. Therefore, the flame pad was not investigated.

II. Comparison of Results to Data Quality Objectives

The confirmatory sampling conducted at SWMU 85 was designed to collect adequate samples in order to:

- Determine whether hazardous waste or hazardous constituents have been released at the site
- Characterize the nature and extent of any releases
- Provide sufficient Level 3 analytical data to support risk screening assessments.

Table 1 summarizes the sample location design for SWMU 85. The source of potential constituents of concern (COC) at SWMU 85 may have been due to explosives tests both on the surface and below ground.

Eight boreholes and 41 surface soil samples including duplicates were collected at SWMU 85. Five of the eight boreholes were sampled as screening samples. The three remaining boreholes and the 41 surface soil samples were confirmatory samples at Level III data quality. The number and location of the samples collected were dependent upon the location and nature of the firing tests performed at SWMU 85.

Table 2 summarizes the analytical methods and data quality requirements necessary (1) to determine whether hazardous waste or hazardous constituents have been released at the site, (2) to characterize the nature and extent of any releases, and (3) provide sufficient Level 3 analytical data to support risk screening assessments.

Table 1
Summary of Sampling Performed to Meet Data Quality Objectives

SWMU 85	Potential COC Source	Area of Site (acres)	Number of sampling locations	Sample Density/Acre	Sampling Location Rationale
Firing Site 1	Debris from subsurface and surface firing tests	0.05	15 surface and 9 subsurface (including duplicates) 3 boreholes (excluding scoping samples)	300	To confirm release of COCs to the environment from firing tests
Firing Site 2	Residue from surface firing tests and releases from VGES tank	0.05	11 surface samples (including duplicates)	220	To confirm release of COCs to the environment
Firing Site 3	Residue from surface firing test (release from air building)	0.1	6 surface samples (including duplicates)	60	To confirm release of COCs to the environment
Firing Site 4	Residue from surface firing test	11	9 surface samples (including duplicates) focused on the center of firing site	0.8	To confirm release of COCs to the environment

SWMU = Solid waste management unit.

Table 2
Summary of Data Quality Requirements

Analytical Requirement	Data Quality Level	LAS and GEL	Radiation Protection Sample Diagnostics Laboratory Department 7713 SNL/NM
RCRA metals plus beryllium EPA Method 6010/7000 ^a	Level 3	50 samples including 8 duplicates	Not applicable
HE compounds EPA Method 8330 ^a	Level 3	50 samples including 8 duplicates	Not applicable
Gamma Spectroscopy	Level 2	Not applicable	53 samples 8 duplicates

^aEPA November 1986.

EPA = U.S. Environmental Protection Agency.

ER = Environmental Restoration.

GEL = General Engineering Laboratory.

HE = High explosive.

LAS = Lockheed Analytical Services.

RCRA = Resource Conservation and Recovery Act.

SNL/NM = Sandia National Laboratories/New Mexico.

A total of 25 locations were sampled at SWMU 85 and analyzed by Sandia National Laboratories/New Mexico (SNL/NM) on-site laboratories. Twenty percent of the samples were sent off site for verification analyses for both Resource Conservation and Recovery Act (RCRA) metals plus beryllium and HE. The method detection limits (MDL) for both on-and off-site analyses were below the background concentration limits for RCRA metals plus beryllium, with only one exception. The MDL used by the off-site laboratory for analysis of some samples for mercury slightly exceeded the <0.1 milligrams per kilogram (mg/kg) background concentration limit.

All gamma spectroscopy data were review by SNL/NM Department 7713 (Radiation Protection Sample Diagnostic Laboratory) according to "Laboratory Data Review Guidelines," Procedure No. RPSD-02-11, Issue No: 02 (SNL/NM July 1996). In addition, all off-site laboratory results were reviewed and verified/validated according to "Data Verification/Validation Level 3—DV-3" in Attachment C of the Technical Operating Procedure 94-03, Rev. 0 (SNL/NM July 1994). The reviews performed confirmed that the data are acceptable for use in the no further action (NFA) proposal for SWMU 85. The data quality objectives for SWMU 85 have been met.

III. Determination of Nature, Rate, and Extent of Contamination

III.1 Introduction

The determination of the nature, rate, and extent of contamination at SWMU 85 was based upon an initial conceptual model validated by confirmatory sampling at the site. The initial conceptual model was developed from historical background information including numerous site inspections, personal interviews, historical photographs, and geophysical and radiological surveys. The data quality objectives (DQO) are contained in the Operable Unit 1335 RCRA Facility Investigation (RFI) Work Plan (SNL/NM March 1996), which was modified in accordance to an agreement between New Mexico Environmental Department (NMED) and SNL/NM Department 6685 (SNL/NM June 1997). The DQOs contained in the RFI work plan identified the sample locations, sample density, sample depth, and analytical requirements. The sample data subsequently used to characterize SWMU 85 were collected in accordance with the rationale and procedures described in the Bullets of Understanding between NMED/DOE OB and DOE/SNL ER (June 11, 1997). The data were subsequently used to develop the final conceptual model for SWMU 85, which is presented in Section 10.5 of the associated NFA proposal. The quality of the data specifically used to determine the nature, rate, and extent of contamination are described below.

III.2 Nature of Contamination

The nature of contamination at SWMU 85 was determined with analytical testing of soil media and the potential for degradation of relevant COCs (Section V). The analytical requirements included RCRA metals plus beryllium, nickel, and mercury to characterize inorganic contamination in the soil. Gamma spectroscopy was used as a general screening analyses and to determine if radiological contaminated soil from SWMU 85. Explosives analyses were performed on the soil samples to determine if explosive residue from the firing testing was present in the soils. These analytes and methods are appropriate to characterize the COCs and potential degradation products associated with historical activities at SWMU 85.

III.3 Rate of Contaminant Migration

The rate of COC migration is dependent predominantly on site meteorological and surface hydrologic processes as described in Section V. Data available from the Site-Wide Hydrogeologic Characterization Project (published annually); numerous SNL/NM air, surface-water, radiological monitoring programs; biological surveys; and other governmental atmospheric monitoring at the Kirtland Air Force Base (KAFB) (i.e., National Oceanographic and Atmospheric Administration) are adequate to characterize the rate of COC migration at SWMU 85.

III.4 Extent of Contamination

Several constituents were identified at SWMU 85. These include arsenic, barium, chromium, nickel, lead, and silver, HMX, and the radiological constituents U-238 and U-235. Mercury, selenium, and cadmium do not have quantified maximum background screening levels, therefore, it is not known whether these constituents exceed background. The surface anomalies at Firing Site 3 (silver) and Firing Site 4 (Ba and U-238) appear to be local variations in the soil quality although one sample at Firing Site 4 showed a low concentration of HMX.

The vertical of contamination at two of the firing sites is defined by the subsurface samples collected from Firing Site 1 and the trench samples from Firing Site 2 (SWMU 14).

The nature and extent of contamination is discussed in greater detail in Section II.5.

In summary, the design of the confirmatory sampling was appropriate and adequate to determine the nature, rate, and extent of contamination.

IV. Comparison of Constituents of Concern to Background Screening Levels

Site history and characterization activities are used to identify potential constituents of concern (COC). The identification of COCs and the sampling to determine the concentration levels of those COCs across the site are described in the SWMU 85 No Further Action (NFA) Proposal. Generally, COCs evaluated in this risk assessment include all detected organics and radioactive contaminants and all inorganic COCs that were analyzed for. Nondetect organics that were not included in this assessment were determined to have sufficiently low detection limits to ensure protection of human health and the environment. If the detection limit of an organic compound was too high (could possibly cause an adverse effect to human health or the environment), the compound was retained. In order to provide conservatism in this risk assessment, the calculation uses only the maximum concentration value of each COC determined for the entire site. The approved Sandia National Laboratories, New Mexico (SNL/NM) maximum background concentration (Dinwiddie September 1997) was selected to provide the background screen in Tables 3, 4, 5, and 6. Human health nonradiological COCs were also compared to SNL/NM proposed Subpart S action levels (Table 3) (IT July 1994).

Chemicals such as iron, magnesium, calcium, potassium, and sodium that are essential nutrients were not included in this risk assessment (EPA 1989). Both radiological and

Table 3
Nonradiological COCs for Human Health Risk Assessment at SWMU 85 with Comparison to the Associated SNL/NM
Background Screening Value, BCF, Log K_{ow} and Subpart S Screening Value

COC Name	Maximum Concentration (mg/kg)	SNL/NM Background Concentration (mg/kg) ^a	Is Maximum COC Concentration Less Than or Equal to the Applicable SNL/NM Background Screening Value?	BCF (maximum aquatic)	Log K _{ow}	Bioaccumulator? ^b (BCF>40, log K _{ow} >4)	Subpart S Screening Value ^c	Is Individual COC less than 1/10 of the Action Level?
Arsenic	4.6	4.4	No	44 ^d	NA	Yes	0.5	No
Barium	400	130	No	170 ^e	NA	Yes	6000	Yes
Beryllium	0.583	0.65	Yes	19 ^d	NA	No	0.2	No
Cadmium	0.399 J	<1	Unknown	64 ^d	NA	Yes	80	Yes
Chromium, total ^f	23 J	15.9	No	16 ^d	NA	No	400	Yes
Lead	380 PJ	11.8	No	49 ^d	NA	Yes	--	--
Mercury	0.0165 J	<0.1	Unknown	5500 ^d	NA	Yes	20	Yes
Nickel	38	11.5	No	47 ^d	NA	Yes	2000	Yes
Selenium	0.81 J	<1	Unknown	800 ^g	NA	Yes	400	Yes
Silver	3	<1	No	0.5 ^d	NA	No	400	Yes
HMX	8.4	NA	NA	--	0.26 ^h	No	--	--

^aFrom Dinwiddie (September 1997), Southwest Test Area.

^bFrom NMED (March 1998).

^cFrom IT (1994).

^dBCF and/or Log K_{ow} from Yanicak (March 1997).

^eBCF from Neumann (1976).

^fAssumed to be chromium VI for Subpart S screening procedure.

^gBioconcentration factor from Callahan et al. (1979).

^hLog K_{ow} from Maxwell and Opresko (1996).

BCF = Bioconcentration factor.

COC = Constituent of concern.

HMX = 1,3,5,7-tetranitro-1,3,5,7-tetrazacyclooctane.

J = Estimated concentration.

K_{ow} = Octanol-water partition coefficient.

Log = Logarithm (base 10).

mg/kg = Milligram(s) per kilogram.

NA = Not applicable.

NMED = New Mexico Environment Department.

PJ = Laboratory precision measurements do not meet acceptance criteria.

SNL/NM = Sandia National Laboratories/New Mexico.

SWMU = Solid waste management unit.

-- = Information not available.

Table 4
Nonradiological COCs for Ecological Risk Assessment at SWMU 85 with Comparison to the Associated
SNL/NM Background Screening Value, BCF, and Log K_{ow}

COC Name	Maximum Concentration (mg/kg)	SNL/NM Background Concentration (mg/kg)^a	Is Maximum COC Concentration Less Than or Equal to the Applicable SNL/NM Background Screening Value?	BCF (maximum aquatic)	Log K_{ow}	Bioaccumulator? (BCF>40, Log K_{ow}>4)
Arsenic	3.94	4.4	Yes	44 ^b	NA	Yes
Barium	400	130	No	170 ^c	NA	Yes
Beryllium	0.583	0.65	Yes	19 ^b	NA	No
Cadmium	0.399 J	<1	Unknown	64 ^b	NA	Yes
Chromium, total	23 J	15.9	No	16 ^b	NA	No
Lead	380 PJ	11.8	No	49 ^b	NA	Yes
Mercury	0.0165 J	<0.1	Unknown	5500 ^b	NA	Yes
Nickel	38	11.5	No	47 ^b	NA	Yes
Selenium	0.81 J	<1	Unknown	800 ^d	NA	Yes
Silver	3	<1	No	0.5 ^b	NA	No
HMX	8.4	NA	NA	--	0.26 ^e	No

^aFrom Dinwiddie (September 1997), Southwest Test Area.

^bBCF from Yanicak (1997).

^cBCF from Neumann (1976).

^dBCF from Callahan et al. (1979).

^eLog K_{ow} from Maxwell and Oresko (1996).

BCF = Bioconcentration factor.

COC = Constituent of concern.

HMX = 1,3,5,7-tetranitro-1,3,5,7-tetrazacyclooctane.

J = Estimated concentration.

K_{ow} = Octanol-water partition coefficient.

Log = Logarithm (base 10).

mg/kg = Milligram(s) per kilogram.

NA = Not applicable.

PJ = Laboratory precision measurements do not meet acceptance criteria.

SNL/NM = Sandia National Laboratories/New Mexico.

SWMU = Solid waste management unit.

-- = Information not available.

Table 5
Radiological COCs for Human Health Risk Assessment at SWMU 85 with Comparison to the Associated SNL/NM
Background Screening Value, BCF, and Log K_{ow}

COC Name	Maximum Concentration (pCi/g)	SNL/NM Background Concentration (pCi/g)^a	Is Maximum COC Concentration Less Than or Equal to the Applicable SNL/NM Background Screening Value?	BCF^b (maximum aquatic)	Bioaccumulator?^b (BCF>40, Log K_{ow}>4)
Cs-137	0.36	0.66	Yes	3000	Yes
Th-232	0.95	1.01	Yes	Not bioconcentrator	No
U-234 ^c	3.3	1.6	No	900 ^d	Yes
U-235	0.54	0.16	No	900 ^d	Yes
U-238	26.7	1.4	No	900 ^d	Yes

^aFrom Dinwiddie (September 1997), Southwest Test Area.

^bBCF from Yanicak (March 1997).

^cU-234 value was calculated using the U-238 concentration and assuming that the U-238 to U-234 ratio was equal to that detected during waste characterization of depleted uranium-contaminated soils generated during the radiological voluntary corrective measures project, where U-234=U-238/8 (Miller June 1998).

^dBCF from Baker and Soldat (1992).

BCF = Bioconcentration factor.

COC = Constituent of concern.

K_{ow} = Octanol-water partition coefficient.

Log = Logarithm (base 10).

pCi/g = Picocurie(s) per gram.

SNL/NM = Sandia National Laboratories/New Mexico.

SWMU = Solid waste management unit.

-- = Information not available.

Table 6
Radiological COCs for Ecological Risk Assessment at SWMU 85 with Comparison to the Associated SNL/NM Background Screening Value, BCF, and Log K_{ow}

COC Name	Maximum Concentration (pCi/g)	SNL/NM Background Concentration (pCi/g)^a	Is Maximum COC Concentration Less Than or Equal to the Applicable SNL/NM Background Screening Value?	BCF^b (maximum aquatic)	Bioaccumulator?^b (BCF>40, Log K_{ow}>4)
Cs-137	0.36	0.66	Yes	3000	Yes
Th-232	0.96	1.01	Yes	Not bioconcentrator	No
U-234 ^c	3.3	1.6	No	900 ^d	Yes
U-235	0.54	0.16	No	900	Yes
U-238	26.7	1.4	No	900	Yes

^aFrom Dinwiddie (September 1997), Southwest Test Area.

^bBCF from Yanicak (March 1997).

^cU-234 value was calculated using the U-238 concentration and assuming that the U-238 to U-234 ratio was equal to that detected during waste characterization of depleted uranium-contaminated soils generated during the radiological voluntary corrective measures project, where U-234=U-238/8 (Miller June 1998).

^dBCF from Baker and Soldat (1992).

BCF = Bioconcentration factor.

COC = Constituent of concern.

K_{ow} = Octanol-water partition coefficient.

Log = Logarithm (base 10).

pCi/g = Picocurie(s) per gram.

SNL/NM = Sandia National Laboratories/New Mexico.

SWMU = Solid waste management unit.

nonradiological COCs are evaluated. The nonradiological COCs evaluated in this risk assessment include inorganics and all high explosives were reported as nondetect.

Table 3 lists the Nonradiological COCs for Human Health Risk Assessment at SWMU 85; Table 4 lists nonradiological COCs for Ecological Risk Assessment. Tables 5 and 6 list Radiological COCs. All tables show the associated approved SNL/NM background concentration values (Dinwiddie September 1997). Discussion of Tables 3 and 5 is provided in Section VI.4. Discussion of Tables 4 and 6 is provided in Section VII.2.

V. Fate and Transport

The primary release of COCs at SWMU 85 was to the surface soil. Wind, water, and biota are natural mechanisms of COC transport from the primary release point. Excavation and removal of soil are potential human-caused mechanisms of transport. Winds can be strong in the open, grassland environment at SWMU 85. Moderate winds can transport soil particles with adsorbed COCs (or COCs in particulate form) as suspended dust, capable of dry or wet deposition. Strong winds may move larger (sand-sized) particles by saltation. Wind erosion is reduced by vegetative cover; however, this site does not have a good vegetative cover.

Water at SWMU 85 is received as precipitation (rain or occasionally snow). The average annual precipitation in this area is about 8 inches (NOAA 1990) and the evapotranspiration value is 95 percent of the total rainfall (Thomson and Smith 1985). Precipitation will either infiltrate or form runoff. Infiltration at the site is enhanced by the nearly flat relief and the sandy nature of the soil (the soil in the area of the site is primarily Tijeras gravelly fine sandy loam [USDA June 1977]). Runoff from the site is probably only significant during intense rainfall events and during extended rainfall periods when soils are near saturation from previous rainfall. Surface runoff in the area of SWMU 85 is to the west, toward an internal drainage basin, but no major surface drainage features occur on the site. Runoff may carry soil particles with adsorbed COCs. The distance of transport will depend on the size of the particle and the velocity of the water (which will generally be low because of the flat terrain).

Water that infiltrates into the soil will continue to percolate through the soil until field capacity is reached. COCs desorbed from the soil particles into the soil solution may be leached into the subsurface soil with this percolation. The effective rooting depths of the soil at SWMU 85 is about 60 inches [USDA 1977], indicating the depth of the system's transient water cycling zone (the dynamic balance between percolation/infiltration and evapotranspiration). Because groundwater at this site is approximately 347 feet below ground surface (bgs), the potential for COCs to reach groundwater through the unsaturated zone above the watertable is very small. As water from the surface evaporates, the direction of COC movement may be reversed with capillary rise of the soil water.

Plant roots can take up COCs that are in the soil solution. Although this may be a passive process, active uptake (i.e., requiring energy expenditure on the part of the plant) or exclusion of some constituents in the soil solution may also take place. COCs taken up by the roots may be transported to the aboveground tissues with the xylem stream. Aboveground tissues can take up adsorbed constituents by contact with dust particles. COCs in the tissue may be consumed by herbivores or eventually returned to the soil as litter. Aboveground litter is capable of transport by wind until consumed by decomposer organisms in the soil. Constituents in plant tissues that are consumed by herbivores may pass through the gut and returned to the soil in

feces (at the site or transported from the site in the herbivore), or absorbed to be held in tissues, metabolized, or excreted. The herbivore may be eaten by a primary carnivore or scavenger and the constituent still held in the consumed tissues will repeat the sequence of absorption, metabolism, excretion, and consumption by higher predators, scavengers, and decomposers. The potential for transport of the constituents within the food chain is dependent upon the mobility of the species that comprise the food chain and the potential for the constituent to be transferred across the links in the food chain.

The COCs at SWMU 85 that are inorganic and elemental in form are not considered to be degradable. Radiological COCs, however, undergo decay to stable isotopes or radioactive daughter elements. Transformations of inorganics may include changes in valence (oxidation/reduction reactions) or incorporation into organic forms. HMX (the only organic COC) is persistent in the environment, but undergoes rapid biotransformation in biota (Maxwell and Opresko 1996).

Table 7 summarizes the fate and transport processes that may occur at SWMU 85. COCs at this site are primarily inorganics (metals and DU) in surface soil. Because this site is disturbed, vegetative cover is low. Therefore, moderate transport of COCs by wind is possible at this site. Transport by surface-water runoff is moderated by the low slope and high infiltration of the soil. Significant leaching into the subsoil is unlikely for most inorganics, and leaching to the groundwater at this site is highly unlikely. The potential for uptake into the food chain is low. Degradation of the inorganic COCs and decay of radiological COCs is expected to be insignificant. Biotransformation of HMX is expected to be significant.

Table 7
Summary of Fate and Transport at SWMU 85

Transport and Fate Mechanism	Existence at Site	Significance
Wind	Yes	Moderate
Surface runoff	Yes	Low
Migration to groundwater	No	None
Food chain uptake	Yes	Low
Transformation/degradation	Yes	Low (inorganics and radionuclides) Moderate to high (HMX)

SWMU = Solid waste management unit.

VI. Human Health Risk Assessment Analysis

VI.1 Introduction

Human health risk assessment of this site includes a number of steps that culminate in a quantitative evaluation of the potential adverse human health effects caused by constituents located at the site. The steps to be discussed include the following:

Step 1. Site data are described that provide information on the potential COCs, as well as the relevant physical characteristics and properties of the site.
Step 2. Potential pathways are identified by which a representative population might be exposed to the COCs.

Step 3. The potential intake of these COCs by the representative population is calculated using a tiered approach. The first component of the tiered approach includes two screening procedures. One screening procedure compares the maximum concentration of the COC to an approved SNL/NM maximum background screening value. COCs that are not eliminated during the first screening procedure are subjected to a second screening procedure that compares the maximum concentration of the COC to the SNL/NM proposed Subpart S action level.
Step 4. Toxicological parameters are identified and referenced for COCs that are not eliminated during the screening steps.
Step 5. Potential toxicity effects (specified as a hazard index [HI]) and cancer risks are calculated for nonradiological COCs and background. For radiological COCs, the incremental total effective dose equivalent (TEDE) and incremental estimated cancer risk are calculated by subtracting applicable background concentrations directly from maximum on-site contaminant values. This background subtraction only occurs when a radiological COC occurs as contamination and exists as a natural background radionuclide.
Step 6. These values are compared with guidelines established by the U.S. Environmental Protection Agency (EPA) and DOE to determine if further evaluation, and potential site clean-up, is required. Nonradiological COC risk values are also compared to background risk so that an incremental risk may be calculated.
Step 7. Uncertainties are discussed in the previous steps.

VI.2 Step 1. Site Data

Section I provides the description and history for SWMU 85. Section II provides a comparison of results to DQOs. Section III provides the determination of the nature, rate and extent of contamination.

VI.3 Step 2. Pathway Identification

SWMU 85 has been designated a future land-use scenario of industrial (DOE and USAF March 1996) (see Appendix 1 for default exposure pathways and parameters). Because of the location and the characteristics of the potential contaminants, the primary pathway for human exposure is considered to be soil ingestion for the nonradiological COCs and, for the radiological COCs, direct gamma exposure. The inhalation pathway for nonradiological COCs is included because of the potential to inhale dust and volatiles for the nonradiological COCs and dust only for the radiological COCs. Soil ingestion is included for the radiological COCs as well. No contamination at depth was determined, and therefore no water pathways to the groundwater are considered. Depth to groundwater at SWMU 85 is approximately 347 feet bgs. Because of the lack of surface water or other significant mechanisms for dermal contact, the dermal exposure pathway is considered not to be significant. No intake routes through plant, meat, or milk ingestion are considered appropriate for the industrial land-use scenario. However, plant uptake is considered for the residential land-use scenario.

Pathway Identification

Nonradiological Constituents	Radiological Constituents
Soil Ingestion	Soil Ingestion
Inhalation (dust and volatiles)	Inhalation (dust)
Plant Uptake (residential only)	Plant uptake (residential only)
	Direct gamma

VI.4 Step 3. COC Screening Procedures

This section discusses Step 3. This step includes the discussion of two screening procedures. The first screening procedure is a comparison of the maximum COC concentration to the approved background screening level. The second screening procedure compares maximum COC concentrations to SNL/NM proposed Subpart S action levels. This second procedure is only applied to COCs that are not eliminated during the first screening procedure.

VI.4.1 Background Screening Procedure

VI.4.1.1 Methodology

Maximum concentrations of COCs were compared to the approved SNL/NM maximum screening level for this area (Dinwiddie September 1997). The approved SNL/NM maximum background concentration was selected to provide the background screen in Table 3 and to be used to calculate risk attributable to background in Table 11. Only the COCs that were above their respective SNL/NM background screening level or COCs that did not have a quantifiable background screening level, were considered in further risk assessment analyses.

For radiological COCs that exceeded the SNL/NM background screening levels, background values were subtracted from the individual maximum radionuclide concentrations. Those that did not exceed these background levels were not carried any further in the risk assessment. This approach is consistent with DOE Order 5400.5, "Radiation Protection of the Public and the Environment" (DOE 1993). Radiological COCs that did not have a background value and were detected above the analytical minimum detectable activity were carried through the risk assessment at their maximum levels. The resultant radiological COCs remaining after this step are referred to as background-adjusted radiological COCs.

VI.4.1.2 Results

Comparison of SWMU 85 data to SNL/NM approved background values (Dinwiddie September 1997) for Human Health risk assessment is presented in Tables 3 and 5. For the nonradiological COCs, six constituents had maximum measured values greater than their respective background screening levels. Three nonradiological COCs did not have quantifiable background concentrations, so it is unknown whether those COCs exceeded background. HMX does not have a background concentration.

The maximum concentration value for lead is 380 PJ milligrams per kilogram (mg/kg). The EPA intentionally does not provide any human health toxicological data on lead, and therefore, no risk parameter values can be calculated. However, EPA guidance for the screening value for lead for an industrial land-use scenario is 2,000 mg/kg (EPA 1996a); for a residential land-use scenario, the EPA screening guidance value is 400 mg/kg (EPA July 1994). The maximum concentration value for lead at this site is less than both screening values, and therefore, lead is eliminated from further consideration in the human health risk assessment.

For the radiological COCs, three constituents had maximum activities greater than their respective background (U-234, U-235, and U-238). These radiological constituents were evaluated using the RESRAD code.

VI.4.2 Subpart S Screening Procedure

VI.4.2.1 Methodology

The maximum concentrations of nonradiological COCs that were not eliminated during the background screening process were compared with action levels (IT July 1994) calculated using methods and equations promulgated in the proposed RCRA Subpart S (EPA 1990) and Risk Assessment Guidance for Superfund (RAGS) (EPA 1989) documentation. Accordingly, all calculations were based upon the assumption that receptor doses from both toxic and potentially carcinogenic compounds result most significantly from ingestion of contaminated soil. Because the samples were all taken from the surface, this assumption is considered valid. If there were ten or fewer COCs and each had a maximum concentration less than one-tenth of the action level, then the site would be judged to pose no significant health hazard to humans. If there were more than ten COCs, the Subpart S screening procedure was eliminated.

VI.4.2.2 Results

Table 3 shows the COCs and the associated proposed Subpart S action level. The table compares the maximum concentration values to 1/10 of the proposed Subpart S action level. This methodology was guidance given to SNL/NM from the EPA (1996a). One COC that failed the initial background screening was above its respective proposed Subpart S action level. Two COCs do not have calculated Subpart S Action Levels. Because of these COCs, the site fails the Subpart S screening criteria and a hazard quotient and excess cancer risk value must be calculated for all the COCs.

Radiological COCs do not have predetermined action levels analogous to proposed Subpart S levels, and therefore this step in the screening process is not performed for radiological COCs.

VI.5 Step 4. Identification of Toxicological Parameters

Tables 8 (nonradiological) and 9 (radiological) show the COCs that have been retained in the risk assessment and the values for the toxicological information available for those COCs. The toxicological values used in Table 8 are from the Integrated Risk Information System (IRIS) (EPA 1998a), Health Effects Assessment Summary Tables (HEAST) (EPA 1997a), and EPA Region 9 (EPA 1996b) and Region 3 (EPA 1997b) databases. Dose conversion factors (DCF) used in determining the excess TEDE values for the individual pathways were the default values provided in the RESRAD computer code as developed in the following documents:

- For ingestion and inhalation, DCFs are taken from Federal Guidance Report No. 11, "Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion" (EPA 1988).

Table 8
Toxicological Parameter Values for SWMU 85 Nonradiological COCs

COC Name	RfD_o (mg/kg-day)	Confidence^a	RfD_{inh} (mg/kg-day)	Confidence^a	SF_o (mg/kg-day)⁻¹	SF_{inh} (mg/kg-day)⁻¹	Cancer Class^b
Arsenic	3E-4 ^c	M	--	--	1.5E+0 ^c	1.5E+1 ^c	A
Barium	7E-2 ^c	M	1.4E-4 ^d	--	--	--	--
Cadmium	5E-4 ^c	H	5.7E-5 ^d	--	--	6.3E+0 ^c	B1
Chromium III	1E+0 ^c	L	5.7E-7 ^e	--	--	--	--
Chromium VI	5E-3 ^c	L	--	--	--	4.2E+1 ^c	A
Mercury	3E-4 ^f	--	8.6E-5 ^c	M	--	--	D
Nickel	2E-2 ^c	M	--	--	--	--	--
Selenium	5E-3 ^c	H	--	--	--	--	D
Silver	5E-3 ^c	L	--	--	--	--	D
HMX	5E-2 ^c	L	5E-2 ^d	--	--	--	D

^aConfidence associated with IRIS (EPA 1998a) database values. Confidence: L = low, M = medium, H = high.

^bEPA weight-of-evidence classification system for carcinogenicity (EPA 1989) taken from IRIS (EPA 1998a):

A - Human carcinogen.

B1 - Probable human carcinogen. Limited human data are available.

B2 - Probable human carcinogen. Indicates sufficient evidence in animals and inadequate or no evidence in humans.

D - Not classifiable as to human carcinogenicity.

^cToxicological parameter values from IRIS electronic database (EPA 1998a).

^dToxicological parameter values from EPA Region 9 electronic database (EPA 1996b).

^eToxicological parameter values from EPA Region 3 electronic database (EPA 1997b).

^fToxicological parameter values from HEAST database (EPA 1997a).

COC = Constituent of concern.

EPA = U.S. Environmental Protection Agency.

HEAST = Health Effects Assessment Summary Tables.

IRIS = Integrated Risk Information System.

mg/kg-day = Milligram(s) per kilogram day.

(mg/kg-day)⁻¹ = Per milligram per kilogram day.

RfD_o = Oral chronic reference dose.

RfD_{inh} = Inhalation chronic reference dose.

SF_o = Oral slope factor.

SF_{inh} = Inhalation slope factor.

SWMU = Solid waste management unit.

-- = Information not available.

Table 9
Radiological Toxicological Parameter Values for SWMU 85 COCs Obtained from
RESRAD Risk Coefficients^a

COC Name	SF_o (1/pCi)	SF_{inh} (1/pCi)	SF_{ev} (g/pCi-yr)	Cancer Class^b
U-238	6.20E-11	1.20E-08	6.60E-08	A
U-235	4.70E-11	1.30E-08	2.70E-07	A
U-234	4.40E-11	1.40E-08	2.10E-11	A

^aFrom Yu et al. (1993a).

^bEPA weight-of-evidence classification system for carcinogenicity (EPA 1989): A - human carcinogen.

COC = Constituent of concern.

EPA = U.S. Environmental Protection Agency.

SF_o = Oral (ingestion) slope factor.

SF_{inh} = Inhalation slope factor.

SF_{ev} = External volume exposure slope factor.

1/pCi = One per picocurie.

g/pCi-yr = Gram(s) per picocurie-year.

SWMU = Solid waste management unit.

- The DCFs for surface contamination (contamination on the surface of the site) were taken from DOE/EH-0070, "External Dose-Rate Conversion Factors for Calculation of Dose to the Public" (DOE 1988).
- The DCFs for volume contamination (exposure to contamination deeper than the immediate surface of the site) were calculated using the methods discussed in "Dose-Rate Conversion Factors for External Exposure to Photon Emitters in Soil" (*Health Physics* 28:193-205) (Kocher 1983), and ANL/EAIS-8, *Data Collection Handbook to Support Modeling the Impacts of Radioactive Material in Soil* (Yu et al. 1993a).

VI.6 Step 5. Exposure Assessment and Risk Characterization

Section VI.6.1 describes the exposure assessment for this risk assessment. Section VI.6.2 provides the risk characterization, including the HI value and the excess cancer risk, for both the potential nonradiological COCs and associated background for industrial and residential land uses. The incremental TEDE and incremental estimated cancer risk are provided for the background-adjusted radiological COCs for both industrial and residential land-uses.

VI.6.1 Exposure Assessment

Appendix 1 shows the equations and parameter input values used in the calculation of intake values and the subsequent HI and excess cancer risk values for the individual exposure pathways. The appendix shows the parameters for both industrial and residential land-use scenarios. The equations for nonradiological COCs are based upon RAGS (EPA 1989). The parameters are based upon information from RAGS (EPA 1989) as well as other EPA guidance documents and reflect the Reasonable Maximum Exposure (RME) approach advocated by RAGS (EPA 1989). For radiological COCs, the coded equations provided in the RESRAD

computer code were used to estimate the incremental TEDE and cancer risk for the individual exposure pathways. Further discussion of this process is provided in *Manual for Implementing Residual Radioactive Material Guidelines Using RESRAD*, Version 5.0 (Yu et al. 1993a).

Although the designated land use scenario is industrial for this site, the risk and TEDE values for a residential land use scenario are also presented. These residential risk and TEDE values are presented only to provide perspective of the potential for risk to human health under the more restrictive land use scenario.

VI.6.2 Risk Characterization

Table 10 shows that for the SWMU 85 nonradiological COCs, the HI value is 0.03, and the excess cancer risk is $2\text{E-}6$ for the designated industrial land-use scenario. The numbers presented included exposure from soil ingestion and dust and volatile inhalation for the nonradiological COCs. Table 11 shows that assuming the maximum background concentrations of the SWMU 85 associated background constituents, the HI is 0.01, and the excess cancer risk is $2\text{E-}6$ for the designated industrial land-use scenario.

For the radiological COCs, contribution from the direct gamma exposure pathway is included. For the industrial land-use scenario, a TEDE was calculated for an industrial office worker who spends a majority of his time indoors and for an industrial worker who evenly splits his time indoors and outdoors on the site. After analyzing these two scenarios, the most conservative is the 50/50 time split. For this industrial land-use scenario, an incremental TEDE of $7.4\text{E-}1$ millirem per year (mrem/yr) results. In accordance with EPA guidance found in OSWER Directive No.9200.4-18 (EPA 1997c), an incremental TEDE of 15 mrem/yr is used for the probable land-use scenario (industrial in this case); the calculated dose value for SWMU 85 for the industrial land use is well below this guideline. The estimated excess cancer risk is $8.3\text{E-}6$.

For the residential land-use scenario nonradioactive COCs, the HI value increases to 1, and the excess cancer risk is $5\text{E-}5$ (Table 10). The numbers presented included exposure from soil ingestion, dust and volatile inhalation, and plant uptake. Although EPA (1991) generally recommends that inhalation not be included in a residential land-use scenario, this pathway is included because of the potential for soil in Albuquerque, New Mexico, to be eroded and, subsequently, for dust to be present in predominantly residential areas. Because of the nature of the local soil, other exposure pathways are not considered (see Appendix 1). Table 11 shows that for the SWMU 85 associated background constituents, the HI is 0.3, and the excess cancer risk is $5\text{E-}5$.

For the radiological COCs, the incremental TEDE for the residential land-use scenario is 2.1 mrem/yr. The guideline being used is an excess TEDE of 75 mrem/yr (SNL/NM February 1998) for a complete loss of institutional controls (residential land use in this case); the calculated dose value for SWMU 85 for the residential land-use is well below this guideline. Consequently, SWMU 85 is eligible for unrestricted radiological release as the residential land-use scenario resulted in an incremental TEDE to the on-site receptor of less than 75 mrem/yr. The estimated excess cancer risk is $2.6\text{E-}5$. The excess cancer risk from the nonradiological COCs and the radiological COCs is not additive, as noted in RAGS (EPA 1989).

Table 10
Risk Assessment Values for SWMU 85 Nonradiological COCs

COC Name	Maximum Concentration (mg/kg)	Industrial Land-Use Scenario ^a		Residential Land-Use Scenario ^a	
		HI	Cancer Risk	HI	Cancer Risk
Arsenic	4.6	0.02	2E-6	0.26	5E-5
Barium	400	0.01	--	0.06	--
Cadmium	0.399 J	0.00	1E-10	0.33	2E-10
Chromium, total ^b	23 J	0.00	5E-8	0.02	9E-8
Mercury	0.0165 J	0.00	--	0.03	--
Nickel	38	0.00	--	0.06	--
Selenium	0.81 J	0.00	--	0.28	--
Silver	3	0.00	--	0.12	--
HMX	8.4	0.00	--	0.00	--
TOTAL		0.03	2E-6	1	5E-5

^aEPA (1989).

^bChromium, total is assumed to be chromium VI (most conservative).

COC = Constituent of concern.

mg/kg = Milligram(s) per kilogram.

EPA = U.S. Environmental Protection Agency.

SWMU = Solid waste management unit.

HI = Hazard index.

-- = Information not available.

J = Estimated concentration.

Table 11
Risk Assessment Values for SWMU 85 Nonradiological Background Constituents

COC Name	Background Concentration ^a (mg/kg)	Industrial Land-Use Scenario ^b		Residential Land-Use Scenario ^b	
		HI	Cancer Risk	HI	Cancer Risk
Arsenic	4.4	0.01	2E-6	0.25	5E-5
Barium	130	0.00	--	0.02	--
Cadmium	<1	--	--	--	--
Chromium, total ^c	15.9	0.00	--	0.01	--
Mercury	<0.1	--	--	--	--
Nickel	11.5	0.00	--	0.02	--
Selenium	<1	--	--	--	--
Silver	<1	--	--	--	--
TOTAL		0.01	2E-6	0.3	5E-5

^aFrom Dinwiddie (September 1997), Southwest Test Area.

^bEPA (1989).

^cChromium, total is assumed to be chromium III (most conservative).

COC = Constituent of concern.

mg/kg = Milligram(s) per kilogram.

EPA = U.S. Environmental Protection Agency.

SWMU = Solid waste management unit.

HI = Hazard index.

-- = Information not available.

J = Estimated concentration.

VI.7 Step 6. Comparison of Risk Values to Numerical Guidelines.

The human health risk assessment analysis considered the evaluation of the potential for adverse health effects for both an industrial land-use scenario (the designated land-use scenario for this site) and a residential land-use scenario.

For the industrial land-use scenario nonradiological COCs, the calculated HI is 0.03 which is significantly less than the numerical guideline of 1 suggested in RAGS (EPA 1989). The excess cancer risk is estimated at $2\text{E-}6$. Guidance from the New Mexico Environment Department (NMED) indicates that excess lifetime risk of developing cancer by an individual must be less than $1\text{E-}6$ for Class A and B carcinogens and less than $1\text{E-}5$ for Class C carcinogens (NMED 1998). The excess cancer risk is driven by arsenic which is a Class A carcinogen. Thus, the total excess cancer risk for this site is above the suggested acceptable risk value of $1\text{E-}6$. This risk assessment also determined risks considering background concentrations of the potential nonradiological COCs for both the industrial and residential land-use scenarios. For nonradiological COCs, assuming the industrial land-use scenario, the HI is 0.01. The excess cancer risk is estimated at $2\text{E-}6$. Incremental risk is determined from subtracting risk associated with background from potential COC risk. These numbers are not rounded before the difference is determined and therefore may appear to be inconsistent with numbers presented in tables and within the text. The incremental HI is 0.02, and the incremental cancer risk is $5\text{E-}8$ for the industrial land-use scenario. These incremental risk calculations indicate insignificant risk to human health from the nonradiological COCs considering an industrial land-use scenario.

For the radiological COCs of the industrial land-use scenario, the incremental TEDE $7.4\text{E-}1$ mrem/yr, which is less than EPA's numerical guideline of 15 mrem/yr. The incremental estimated excess cancer risk is $8.3\text{E-}6$.

For the residential land-use scenario nonradiological COCs, the calculated HI is 1, which is at the numerical guidance. The excess cancer risk is estimated at $5\text{E-}5$. The excess cancer risk is again driven by arsenic which is a Class A carcinogen. Therefore, the total excess cancer risk for this site is above suggested acceptable risk value of $1\text{E-}6$. The HI for associated background for the residential land-use scenario is 0.3. The excess cancer risk is estimated at $5\text{E-}5$. The incremental HI is 0.86, and the incremental cancer risk is $9\text{E-}8$ for the residential land-use scenario. The incremental HI indicates insignificant contribution to human health risk from the COCs considering a residential land-use scenario.

The incremental TEDE for a residential land-use scenario from the radiological components is 2.1 mrem/yr, which is significantly less than the numerical guideline of 75 mrem/yr suggested in SNL/NM RESRAD Input Parameter Assumptions and Justification (SNL/NM February 1998). The estimated excess cancer risk is $2.6\text{E-}5$.

VI.8 Step 7. Uncertainty Discussion

The data used to characterize SWMU 85 were provided by 41 confirmatory, Level III surface samples including duplicates and 9 confirmatory Level III subsurface samples collected at the site. The samples were collected from areas suspected of contamination based upon process knowledge. The total area of contamination of the four sites is as follows:

- Approximately 2,350 square feet for Firing Site 1
- Approximately 2,500 square feet for Firing Site 2
- Approximately 4,700 square feet for Firing Site 3
- Approximately 11 acres for Firing Site 4.

For this size area, 41 surface samples were deemed sufficient to establish whether residues from aboveground testing were detectable. For Firing Site 1, where subsurface testing occurred, a geophysical survey was conducted to detect any subsurface geophysical anomalies indicating the potential occurrence of contaminants. No significant anomalies were delineated. For the subsurface sampling, twenty-nine samples were deemed sufficient to establish whether material from subsurface testing was detectable. The COCs for the site are primarily depleted uranium, metals, specifically chromium and beryllium, and HE residue. The soil samples were analyzed for HE using EPA Method 8330 (EPA November 1986), for the RCRA metals, including beryllium using EPA Method 6010 (EPA November 1986) and for mercury using EPA Method 7471 (EPA November 1986). Radiological activity was measured using gamma spectroscopy. Samples from BH-1, BH-2, BH-3 BH-4, and BH-5 were screening samples collected in 1995, and analyzed at SNL/NM's on-site laboratory at DV-I and DV-II levels. The remaining samples were sent offsite to a CLP laboratory and analyzed at Level III data quality. Radiological analyses were conducted at SNL/NM's in-house laboratory. The data provided by the CLP laboratory and the onsite radiological laboratory is considered definitive data suitable for use in a risk assessment analyses. Screening sample data collected in 1995 were not considered viable data for a risk assessment because of the low level of data quality and, therefore, was not used.

Because of the location, history of the site, and future land-use (DOE and USAF March 1996), there is low uncertainty in the land-use scenario and the potentially affected populations that were considered in making the risk assessment analysis. Because the COCs are found in surface and near-surface soils and because of the location and physical characteristics of the site, there is little uncertainty in the exposure pathways relevant to the analysis.

An RME approach was used to calculate the risk assessment values, which means that the parameter values used in the calculations were conservative and that the calculated intakes are likely overestimates. Maximum measured values of the concentrations of the COCs were used to provide conservative results.

Table 8 shows the uncertainties (confidence) in the nonradiological toxicological parameter values. There is a mixture of estimated values and values from the IRIS (EPA 1998a), HEAST (EPA 1997a), EPA Region 9 (EPA 1998b) and Region 3 (EPA 1997b) databases. Where values are not provided, information is not available from the HEAST (EPA 1997a), IRIS (EPA 1998a), or the EPA regions (EPA 1996a, 1997b). Because of the conservative nature of the RME approach, the uncertainties in the toxicological values are not expected to be of high enough concern to change the conclusion from the risk assessment analysis.

Incremental risk assessment values for the nonradiological COCs are within the Human Health acceptable range for the industrial land-use scenario compared to the established numerical guidance.

For the radiological COCs, the conclusion from the risk assessment is that the potential effects on human health, for both the industrial and residential land-use scenarios, are within guidelines and are a small fraction of the estimated 360 mrem/yr received by the average U.S. population (NCRP 1987).

The overall uncertainty in all of the steps in the risk assessment process is considered insignificant with respect to the conclusion reached.

VI.9 Summary

SWMU 85 has identified COCs consisting of some inorganic, organic, and radiological compounds. Because of the location of the site on KAFB, the designated industrial land-use scenario, and the nature of the contamination, the potential exposure pathways identified for this site included soil ingestion and dust and volatile inhalation for chemical constituents and soil ingestion, inhalation of dust, and direct gamma exposure for radionuclides. Plant uptake was included as an exposure pathway for the residential land-use scenario.

Using conservative assumptions and employing an RME approach to the risk assessment, the calculations for the nonradiological COCs show that for the industrial land-use scenario the HI of 0.03 is significantly less than the accepted numerical guidance from the EPA. The total excess cancer risk of $2\text{E-}6$ is above the acceptable risk value provided by the NMED for an industrial land-use (NMED March 1998). However, the incremental HI is 0.02, and the incremental cancer risk is $5\text{E-}8$ for the industrial land-use scenario. Incremental risk calculations indicate insignificant risk to human health for an industrial land-use scenario.

The incremental TEDE and corresponding estimated cancer risk from the radiological COCs are much less than EPA guidance values; the estimated TEDE is $7.4\text{E-}1$ mrem/yr for the industrial land-use scenario. This value is less than the numerical guidance of 15 mrem/yr in EPA guidance (EPA 1997c). The corresponding incremental estimated cancer risk value is $8.3\text{E-}6$ for the industrial land-use scenario. Furthermore, the incremental TEDE for the residential land-use scenario which results from a complete loss of institutional control is only 2.1 mrem/year with an associated risk of $2.6\text{E-}5$. The guideline for this scenario is 75 mrem/year (SNL/NM February 1998). Therefore, SWMU 85 is eligible for unrestricted radiological release.

The uncertainties associated with the calculations are considered small relative to the conservativeness of the risk assessment analysis. It is therefore concluded that this site does not have potential to affect human health under an industrial land-use scenario.

VII. Ecological Risk Screening Assessment

VII.1 Introduction

This section addresses the ecological risks associated with exposure to constituents of potential ecological concern (COPECs) in soils at SWMU 85 (Burial Site at Building 9920). A component of the NMED Risk-Based Decision Tree is to conduct an ecological screening assessment that

corresponds with that presented in the EPA's Ecological Risk Assessment Guidance for Superfund (EPA 1997d). The current methodology is tiered and contains an initial scoping assessment followed by a more detailed screening assessment. Initial components of NMED's decision tree (a discussion of DQOs, a data assessment, and evaluations of bioaccumulation and fate-and-transport potential) are addressed in the scoping assessment (Section VII.2), with the exception of DQOs which are reviewed in Section II of this document. Following the completion of the scoping assessment, a determination is made as to whether a more detailed examination of potential ecological risk is necessary. If deemed necessary, the scoping assessment proceeds to a screening assessment whereby a more quantitative estimate of ecological risk is conducted. This assessment incorporates conservatism in the estimation of ecological risks; however, ecological relevance and professional judgment are also used as recommended by the EPA (EPA 1998b) to ensure that predicted exposures of selected ecological receptors reasonably reflect those expected to occur at the site.

VII.2 Scoping Assessment

The scoping assessment focuses primarily on the likelihood of exposure of biota at or adjacent to the site to be exposed to constituents associated with site activities. Included in this section are an evaluation of existing data and a comparison of maximum detected concentrations to background concentrations, examination of bioaccumulation potential, and fate and transport potential. A Scoping Risk Management Decision will involve a summary of the scoping results and a determination as to whether further examination of potential ecological impacts is necessary.

VII.2.1 Data Assessment

As indicated in Section IV (Tables 4 and 6), constituents in soil within the 0- to 5-foot depth interval that exceeded background concentrations were as follows:

- Barium
- Cadmium
- Chromium (total)
- Lead
- Mercury
- Nickel
- Selenium
- Silver
- HMX
- U-234
- U-235
- U-238.

VII.2.2 Bioaccumulation

Among the COCs listed in Section VII.2, the following were considered to have bioaccumulation potential in aquatic environments (Section IV):

- Barium
- Cadmium
- Lead
- Mercury
- Nickel
- Selenium.

It should be noted, however, that as directed by the NMED (NMED March 1998), bioaccumulation is exclusively assessed based upon $\log K_{ow}$ values and maximum reported bioconcentration factors (BCF) for aquatic species. Because only aquatic BCFs are used to evaluate the bioaccumulation potential for metals, bioaccumulation in terrestrial species is likely to be overpredicted.

VII.2.3 Fate and Transport Potential

The potential for the COCs to move from the source of contamination to other media or biota is discussed in Section V. As noted in Table 7 (Section V), significant fate and transport may be associated with wind dispersion. Surface-water runoff is expected to be of moderate to low significance. Transformation, degradation, and food-chain uptake are expected to be of low significance for inorganics. Biotransformation of HMX will prevent food-chain uptake from being significant. Migration to groundwater is not anticipated.

VII.2.4 Scoping Risk Management Decision

Based upon information gathered through the scoping assessment, it was concluded that complete ecological pathways may be associated with this SWMU and that COPECs also exist at the site. As a consequence, a screening assessment was deemed necessary to predict the potential level of ecological risk associated with the site.

VII.3 Screening Assessment

As concluded in Section VII.2.4, complete ecological pathways and COPECs are associated with this SWMU. The screening assessment performed for the site involves a quantitative estimate of current ecological risks using exposure models in association with exposure parameters and toxicity information obtained from the literature. The estimation of potential ecological risks is conservative to ensure ecological risks are not underpredicted.

Components within the screening assessment include the following:

- Problem Formulation—sets the stage for the evaluation of potential exposure and risk.

- Exposure Estimation—provides a quantitative estimate of potential exposure.
- Ecological Effects Evaluation—presents benchmarks used to gauge the toxicity of COPECs to specific receptors.
- Risk Characterization—characterizes the ecological risk associated with exposure of the receptors to environmental media at the site.
- Uncertainty Assessment—discusses uncertainties associated with the estimation of exposure and risk.
- Risk Interpretation—evaluates ecological risk in terms of hazard quotients (HQ) and ecological significance.
- Screening Assessment Scientific/Management Decision Point—presents the decision to risk managers based upon the results of the Screening Assessment.

VII.3.1 Problem Formulation

Problem formulation is the initial stage of the screening assessment that provides the introduction to the risk evaluation process. Components that are addressed in this section include a discussion of ecological pathways and the ecological setting, identification of COPECs, and selection of ecological receptors. The conceptual model, ecological food webs, and ecological endpoints (other components commonly addressed in a screening assessment) are presented in the “Predictive Ecological Risk Assessment Methodology for SNL/NM ER [Environmental Restoration] Program” (IT July 1998) and are not duplicated here.

VII.3.1.1 Ecological Pathways and Setting

SWMU 85 is a controlled access, active firing site located east of Technical Area III. The total area of the 4 Firing Sites is 11.2 acres. Complete ecological pathways may exist at this site through the exposure of plants and wildlife to COPECs in surface and subsurface soil. Previous survey results (IT February 1995) show that SWMU 85 is located in a highly disturbed area essentially cleared of natural vegetation. No sensitive species were observed at the site, and none are expected to occur.

Direct uptake of COPECs from soil was assumed to be the major route of exposure for plants, with exposure of plants to wind-blown soil assumed to be minor. Exposure modeling for the wildlife receptors was limited to the food and soil ingestion pathways. Because of the lack of surface water at this site, exposure to COPECs through the ingestion of surface water was considered insignificant. Inhalation and dermal contact were also considered insignificant pathways with respect to ingestion (Sample and Suter 1994). Depth to groundwater is approximately 347 feet but varies in the area of the site because of the complex geology. Groundwater is not expected to be affected by COCs at this site.

VII.3.1.2 COPECs

Tests conducted at SWMU 85 have included numerous explosives tests, some involving beryllium, cadmium, lead, lithium, and DU. Tests involving beryllium were conducted in covered firing pits. Although some of the beryllium was vaporized, much of it may have remained in fragments in the holes. Some cadmium-sulfide experiments were also conducted in front of the building. The site is still active. Current explosives tests are conducted on the ground surface and may release HE residues and metals. The COCs at this site include but are not limited to DU, beryllium, lead, HE, and cadmium sulfide.

This ecological risk assessment is based upon the maximum soil concentrations of the COPECs as measured in surface soil samples. Both radiological and nonradiological COPECs are evaluated. The nonradiological COPECs include both metals and HE. Inorganic analytes were screened against background concentrations, and those that exceeded the approved SNL/NM background screening levels (Dinwiddie September 1997) for the area were considered to be COPECs. HMX was the only organic analyte detected in soil and is included as a COPEC.

In order to provide conservatism in this ecological risk assessment, the exposure models use only the maximum concentration value of each COPEC determined for the entire site as measured in soil samples within the top 5 feet of soil. Both radiological and nonradiological COPECs are evaluated. The COPECs consist of metals and radionuclides that exceeded the approved SNL/NM background screening levels (Dinwiddie September 1997). Chemicals that are essential nutrients such as iron, magnesium, calcium, potassium, and sodium were not included in this risk assessment (EPA 1989). Tables 4 and 6 report the maximum COPEC concentrations.

VII.3.1.3 Ecological Receptors

A nonspecific perennial plant was selected as the receptor to represent plant species at the site (IT July 1998). Vascular plants are the principal primary producers at the site and are key to the diversity and productivity of the wildlife community associate with the site. A deer mouse (*Peromyscus maniculatus*) and burrowing owl (*Speotyto cunicularia*) were used to represent wildlife use. Because of its opportunistic food habits, the deer mouse was used to represent a mammalian herbivore, omnivore, and insectivore. The burrowing owl was selected as the top predator. It is present at SNL/NM and is designated a species of management concern by the U.S. Fish and Wildlife Service in Region 2, which includes the state of New Mexico (USFWS September 1995).

VII.3.2 Exposure Estimation

Direct uptake of COPECs from the soil was considered the only significant route of exposure. Exposure modeling for the wildlife receptors was limited to food and soil ingestion pathways. Inhalation and dermal contact were considered insignificant pathways with respect to ingestion (Sample and Suter 1994). Drinking water was also considered an insignificant pathway because of the lack of surface water at this site. The deer mouse was modeled under three

dietary regimes: as an herbivore (100 percent of its diet as plant material), as an omnivore (50 percent of its diet as plants and 50 percent as soil invertebrates), and an insectivore (100 percent of its diet as soil invertebrates). The burrowing owl was modeled as a strict predator on small mammals (100 percent of its diet as deer mice). Because the exposure in the burrowing owl from a diet consisting of equal parts of herbivorous, omnivorous, and insectivorous mice would be equivalent to the exposure consisting of only omnivorous mice, the diet of the burrowing owl was modeled with intake of omnivorous mice only. Both species were modeled with soil ingestion comprising 2 percent of the total dietary intake. Table 12 presents the species-specific factors used in modeling exposures in the wildlife receptors. Justification for use of the factors presented in this table is described in the ecological risk assessment methodology document (IT July 1998).

Although home range is also included in this table, exposures for this risk assessment were modeled using an area use factor of 1, implying that all food items and soil ingested are from the site being investigated. The maximum measured COPEC concentrations from surface soil samples were used to conservatively estimate potential exposures and risks to plants and wildlife at this site.

For the radiological dose rate calculations, the deer mouse was modeled as an herbivore (100 percent of its diet as plants), and the burrowing owl was modeled as a strict predator on small mammals (100 percent of its diet as deer mice). Both were modeled with soil ingestion comprising 2 percent of the total dietary intake. Receptors are exposed to radiation both internally and externally from U-235, U-238, and U-234. Internal and external dose rates to the deer mouse and burrowing owl are approximated using modified dose rate models from the *Hanford Site Risk Assessment Methodology* (DOE 1995) as presented in the ecological risk assessment methodology document for the SNL/NM ER Program (IT July 1998). Radionuclide-dependent data for the dose rate calculations were obtained from Baker and Soldat (1992). The external dose rate model examines the total-body dose rate to a receptor residing in soil exposed to radionuclides. The soil surrounding the receptor is assumed to be an infinite medium uniformly contaminated with gamma-emitting radionuclides. The external dose rate model is the same for both the deer mouse and the burrowing owl. The internal total-body dose rate model assumes that a fraction of the radionuclide concentration ingested by a receptor is absorbed by the body and concentrated at the center of a spherical body shape. This provides for a conservative estimate for absorbed dose. This concentrated radiation source at the center of the body of the receptor is assumed to be a "point" source. Radiation emitted from this point source is absorbed by the body tissues to contribute to the absorbed dose. Alpha and beta emitters are assumed to transfer 100 percent of their energy to the receptor as they pass through tissues. Gamma emitting radionuclides only transfer a fraction of their energy to the tissues because gamma rays interact less with matter than do beta or alpha emitters. The external and internal dose rate results are summed to calculate a total dose rate caused by exposure to radionuclides in soil.

Table 13 presents the transfer factors used in modeling the concentrations of COPECs through the food chain. Table 14 presents maximum concentrations in soil and derived concentrations in tissues of the various food chain elements that are used to model dietary exposures for each of the wildlife receptors.

Table 12
Exposure Factors for Ecological Receptors at SWMU 85

Receptor Species	Class/Order	Trophic Level	Body Weight (kg) ^a	Food Intake Rate (kg/day) ^b	Dietary Composition ^c	Home Range (acres)
Deer Mouse (<i>Peromyscus maniculatus</i>)	Mammalia/ Rodentia	Herbivore	2.39E-2 ^d	3.72E-3	Plants: 100% (+ Soil at 2% of intake)	2.7E-1 ^e
Deer Mouse (<i>Peromyscus maniculatus</i>)	Mammalia/ Rodentia	Omnivore	2.39E-2 ^d	3.72E-3	Plants: 50% Invertebrates: 50% (+ Soil at 2% of intake)	2.7E-1 ^e
Deer Mouse (<i>Peromyscus maniculatus</i>)	Mammalia/ Rodentia	Insectivore	2.39E-2 ^d	3.72E-3	Invertebrates: 100% (+ Soil at 2% of intake)	2.7E-1 ^e
Burrowing owl (<i>Speotyto cunicularia</i>)	Aves/ Strigiformes	Carnivore	1.55E-1 ^f	1.73E-2	Rodents: 100% (+ Soil at 2% of intake)	3.5E+1 ^g

^aBody weights are in kilograms wet weight.

^bFood intake rates are estimated from the allometric equations presented in Nagy (1987). Units are kilograms dry weight per day.

^cDietary compositions are generalized for modeling purposes. Default soil intake value of 2% of food intake.

^dFrom Silva and Downing (1995).

^eEPA (1993), based upon the average home range measured in semiarid shrubland in Idaho.

^fFrom Dunning (1993).

^gFrom Haug et al. (1993).

EPA = U.S. Environmental Protection Agency.

kg = Kilogram(s).

SWMU = Solid waste management unit.

Table 13
Transfer Factors Used in Exposure Models for
Constituents of Potential Ecological Concern at SWMU 85

Constituent of Potential Ecological Concern	Soil-to-Plant Transfer Factor	Soil-to-Invertebrate Transfer Factor	Food-to-Muscle Transfer Factor
Inorganic			
Barium	1.5E-1 ^a	1.0E+0 ^b	2.0E-4 ^c
Cadmium	5.5E-1 ^a	6.0E-1 ^d	5.5E-4 ^a
Chromium (total)	4.0E-2 ^c	1.3E-1 ^e	3.0E-2 ^c
Lead	9.0E-2 ^c	4.0E-2 ^d	8.0E-4 ^c
Mercury	1.0E+0 ^c	1.0E+0 ^b	2.5E-1 ^a
Nickel	2.0E-1 ^c	3.8E-1 ^e	6.0E-3 ^a
Selenium	5.0E-1 ^c	1.0E+0 ^b	1.0E-1 ^c
Silver	1.0E+0 ^c	2.5E-1 ^d	5.0E-3 ^c
Organic^f			
HMX	2.7E+1	1.4E+1	3.4E-8

^aFrom Baes et al. (1984).^bDefault value.^cFrom NCRP (1989).^dFrom Stafford et al. (1991).^eFrom Ma (1982).

^fSoil-to-plant and soil-to-muscle transfer factors were obtained from equations developed in Travis and Arms (1988). Soil-to-invertebrate transfer factor is from the equation developed in Connell and Markwell (1990).

NCRP = National Council on Radiation Protection and Measurements.

SWMU = Solid waste management unit.

Table 14
Media Concentrations^a for Constituents of
Potential Ecological Concern at SWMU 85

Constituent of Potential Ecological Concern	Soil (maximum)	Plant Foliage ^b	Soil Invertebrate ^b	Deer Mouse Tissues ^c
Inorganic				
Barium	4.0E+2	6.0E+1	4.0E+2	1.5E-1
Cadmium	4.0E-1	2.2E-1	2.4E-1	4.1E-4
Chromium (total)	2.3E+1	9.2E-1	3.0E+0	2.3E-1
Lead	3.8E+2	3.4E+1	1.5E+1	8.1E-2
Mercury	1.7E-2	1.7E-2	1.7E-2	1.4E-2
Nickel	3.8E+1	7.6E+0	1.4E+1	2.2E-1
Selenium	8.1E-1	4.1E-1	8.1E-1	1.3E-1
Silver	3.0E+0	3.0E+0	7.5E-1	3.0E-2
Organic				
HMX	8.4E+0	2.3E+2	1.1E+2	1.8E-5

^aIn milligrams per kilogram. All are based upon dry weight of the media.^bProduct of the soil concentration and the corresponding transfer factor.

^cBased upon the deer mouse with an omnivorous diet. Product of the average concentration in food times the food-to-muscle transfer factor times the wet weight-dry weight conversion factor of 3.125 (from EPA 1993).

EPA = U.S. Environmental Protection Agency.

SWMU = Solid waste management unit.

VII.3.3 Ecological Effects Evaluation

Benchmark toxicity values for the plant and wildlife receptors are presented in Table 15. For plants, the benchmark soil concentrations are based upon the lowest-observed-adverse-effect level (LOAEL). For wildlife, the toxicity benchmarks are based upon the no-observed-adverse-effect level (NOAEL) for chronic oral exposure in a taxonomically similar test species.

Insufficient toxicity information was found to estimate the LOAELs or NOAELs for some COPECs for terrestrial plant life and wildlife receptors, respectively.

The benchmark used for exposure of terrestrial receptors to radiation was 0.1 rad/day. This value has been recommended by the International Atomic Energy Agency (IAEA 1992) for the protection of terrestrial populations. Because plants and insects are less sensitive to radiation than vertebrates (Whicker and Schultz 1982), the dose of 0.1 rad per day should also offer sufficient protection to other components within the terrestrial habitat of SWMU 85.

VII.3.4 Risk Characterization

Maximum soil concentrations and estimated dietary exposures were compared to plant and wildlife benchmark values, respectively. The results of these comparisons are presented in Table 16. HQs are used to quantify the comparison with benchmarks for plants and wildlife exposure.

Analytes with HQs exceeding unity for plants were chromium (total), lead, nickel, and silver. Two analytes, barium and HMX, resulted in HQs greater than 1.0 for all three modeled diets of the deer mouse (i.e., herbivorous, omnivorous, and insectivorous). No ecological risk was predicted for the burrowing owl, although HQs for the burrowing owl could not be determined for silver and HMX. As directed by the NMED, HIs were calculated for each of the receptors. The HI is the sum of chemical specific hazard quotients for all pathways for a given receptor. All ecological receptors had HIs greater than unity except for the owl.

Tables 17 and 18 summarize the internal and external dose rate model results for the three radionuclides. The total radiation dose rate to the deer mouse was predicted to be $3.8\text{E-}4$ rad/day. The total dose rate to the burrowing owl was predicted to be $1.9\text{E-}4$ rad/day. The internal dose rate from exposure to these radionuclides is the primary contributor to the total dose rate in the deer mouse; whereas, the external and internal dose rates were approximately the same in the burrowing owl. The dose rates for the deer mouse and the burrowing owl are considerably less than the benchmark of 0.1 rad/day.

VII.3.5 Uncertainty Assessment

Many uncertainties are associated with the characterization of ecological risks at SWMU 85. These uncertainties result in the use of assumptions in estimating risk that may lead to an overestimation or underestimation of the true risk presented at a site. For this risk assessment, assumptions are made that are more likely to overestimate exposures and risk rather than to underestimate them. These conservative assumptions are used to be more protective of the ecological resources potentially affected by the site. Conservatism incorporated into this risk

Table 15
Toxicity Benchmarks for Ecological Receptors at SWMU 85

		Mammalian NOAELs			Avian NOAELs		
Constituent of Potential Ecological Concern	Plant Benchmark ^{a,b}	Mammalian Test Species ^{c,d}	Test Species NOAEL ^{d,e}	Deer Mouse NOAEL ^{e,f}	Avian Test Species ^d	Test Species NOAEL ^{d,e}	Burrowing Owl NOAEL ^{e,g}
Inorganic							
Barium	500	Rat ^h	5.1	10.5	Chicks	20.8	20.8
Cadmium	3	Rat ⁱ	1.0	1.9	Mallard	1.45	1.45
Chromium (total)	1	Rat	2,737	5,354	Black duck	1.0	1.0
Lead	50	Rat	8.0	15.7	American kestrel	3.85	3.85
Mercury (inorganic)	0.3	Mouse	13.2	14.0	Japanese Quail	0.45	0.045
Mercury (organic)	0.3	Rat	0.032	0.063	Mallard	0.0064	0.0064
Nickel	30	Rat	40	78	Mallard	77.4	77.4
Selenium	1	Rat	0.20	0.39	Screech owl	0.44	0.44
Silver	2	Rat	17.8	34.8	---	---	---
Organic							
HMX	---	Mouse ^{k,l}	3.0 ^k	3.0	---	---	---

^aIn milligrams per kilogram soil.

^bFrom Will and Suter (1995), except where noted.

^cBody weights (in kilograms) for the no-observed-adverse-effect level (NOAEL) conversion are as follows: lab mouse, 0.030; lab rat, 0.350 (except where noted).

^dFrom Sample et al. (1996), except where noted.

^eIn milligrams per kilogram body weight per day.

^fBased upon NOAEL conversion methodology presented in Sample et al. (1996), using a deer mouse body weight of 0.0239 kilogram and a mammalian scaling factor of 0.25.

^gBased upon NOAEL conversion methodology presented in Sample et al. (1996). The avian scaling factor of 0.0 was used, making the NOAEL independent of body weight.

^hBody weight: 0.435 kilogram.

ⁱBody weight: 0.303 kilogram.

^j--- designates insufficient toxicity data.

^kFrom Maxwell and Opresko (1996).

^lBody weight: 0.023 kilogram.

HMX = 1,3,5,7-tetranitro-1,3,5,7-tetrazacyclooctane.

SWMU = Solid waste management unit.

Table 16
Hazard Quotients for Ecological Receptors at SWMU 85

Constituent of Potential Ecological Concern	Plant HQ ^a	Deer Mouse HQ (Herbivorous) ^a	Deer Mouse HQ (Omnivorous) ^a	Deer Mouse HQ (Insectivorous) ^a	Burrowing Owl HQ
Inorganic					
Barium	8.0E-1	1.0E+0	3.5E+0	6.0E+0	4.4E-2
Cadmium	1.3E-1	1.9E-2	2.0E-2	2.1E-2	6.5E-4
Chromium (total)	2.3E+1	4.0E-5	7.0E-5	1.0E-4	7.7E-2
Lead	7.6E+0	4.2E-1	3.2E-1	2.3E-1	2.2E-1
Mercury (inorganic)	5.7E-2	1.9E-4	1.9E-4	1.9E-4	3.4E-3
Mercury (organic)	5.7E-2	4.3E-2	4.3E-2	4.3E-2	2.4E-1
Nickel	1.3E+0	1.7E-2	2.3E-2	3.0E-2	1.4E-3
Selenium	4.1E-1	1.7E-1	2.5E-1	3.3E-1	5.4E-2
Silver	1.5E+0	1.4E-2	8.7E-3	3.6E-3	---
Organic					
HMX	---	1.2E+1	9.0E+0	6.0E+0	---
HI^c					
	3.5E+1	1.4E+1	1.3E+1	1.3E+1	6.4E-1

^a **Bold** text indicates HQ or HI exceeds unity.

^b The HI is the sum of individual HQs. Using the value for organic mercury as a conservative estimate of the HI.

HI = Hazard index.

HMX = 1,3,5,7-tetranitro-1,3,5,7-tetrazacyclooctane.

HQ = Hazard quotient.

SWMU = Solid waste management unit.

--- = Designates insufficient toxicity data available for risk estimation purposes.

Table 17
Internal and External Dose Rates for
Deer Mice Exposed to Radionuclides at SWMU 85,
Sandia National Laboratories, New Mexico

Radionuclide	Maximum Concentration (pCi/g)	Internal Dose (rad/day)	External Dose (rad/day)	Total Dose (rad/day)
U-234 ^a	3.3E+0	3.8E-5	3.7E-7	3.9E-5
U-235	5.4E-1	5.9E-6	8.8E-6	1.5E-5
U-238	2.7E+1	2.6E-4	5.4E-5	3.3E-4
Total		3.1E-4	6.3E-5	3.8E-4

^aThe U-234 value was calculated using the U-238 concentration and assuming that the U-238-to-U-234 ratio was equal to that detected during waste characterization of depleted uranium-contaminated soils generated during the radiological voluntary corrective measures project, where U-234=U-238/78 (Miller June 1998).

pCi/g = Picocurie(s) per gram.

SWMU = Solid waste management unit.

Table 18
Internal and External Dose Rates for
Burrowing Owls Exposed to Radionuclides at SWMU 85,
Sandia National Laboratories, New Mexico

Radionuclide	Maximum Concentration (pCi/g)	Internal Dose (rad/day)	External Dose (rad/day)	Total Dose (rad/day)
U-234 ^a	3.3E+0	1.5E-5	3.7E-7	1.6E-5
U-235	5.4E-1	2.4E-6	8.8E-6	1.1E-5
U-238	2.7E+1	1.1E-4	5.4E-5	1.6E-4
Total		1.3E-4	6.3E-5	1.9E-4

^aThe U-234 value was calculated using the U-238 concentration and assuming that the U-238-to-U-234 ratio was equal to that detected during waste characterization of depleted uranium-contaminated soils generated during the radiological voluntary corrective measures project, where U-234=U-238/78 (Miller June 1998).

pCi/g = Picocurie(s) per gram.

SWMU = Solid waste management unit.

assessment include the use of the maximum measured analyte concentrations to evaluate risk, the use of wildlife toxicity benchmarks based upon NOAEL values, the use of earthworm-based transfer factors for modeling COPECs into soil invertebrates in the absence of insect data, the incorporation of strict herbivorous and strict insectivorous diets for predicting the extreme HQ values for the deer mouse, and the use of 1.0 as the area use factor for wildlife receptors regardless of seasonal use or home range size. Each of these uncertainties which are consistent among each of the ER specific ecological risk assessments is discussed in greater detail in the uncertainty section of the ecological risk assessment methodology document for the Sandia National Laboratories ER Program (IT July 1998).

Uncertainties associated with the estimation of risk to ecological receptors following exposure to U-234, U-235, and U-238 are primarily related to those inherent in the radionuclide-specific data. Radionuclide-dependent data are measured values that have their associated errors, which are typically negligible. The dose rate models used for these calculations are based upon conservative estimates on receptor shape, radiation absorption by body tissues, and intake parameters. The goal is to provide a realistic but conservative estimate of a receptor's exposure to radionuclides in soil, both internally and externally.

One large uncertainty associated with the prediction of ecological risks at this site is the use of the maximum measured soil concentrations to evaluate risk. This results in a conservative scenario that does not necessarily reflect actual site conditions. The assumption of an area use factor of 1.0 is a source of uncertainty for the burrowing owl. Exposure is likely overestimated for this receptor.

In the estimation of ecological risk, background concentrations are included as a component of maximum on-site concentrations. Table 19 illustrates risk estimates associated with exposure of each of the receptors to background concentrations of the metal COPECs. With respect to the plant, an HQ greater than one was obtained for chromium (total). Almost 70 percent of the on-site maximum total chromium concentration was associated with background. HQs greater than unity were also obtained for the omnivorous and insectivorous deer mouse exposed to barium. Almost 33 percent of the on-site maximum barium soil concentration was associated with background. Because of the uncertainties associated with exposure and toxicity, it is unlikely that barium and chromium, with exposure concentrations largely attributable to background, present a significant ecological risk.

Chromium, lead, nickel, and silver were predicted hazardous to plants based upon exposure to maximum soil concentrations. Chromium was detected in 82 percent of the samples collected. Detected concentrations ranged from 5.1 to 23 mg/kg with an average detected concentration of 9.1 mg/kg. Exposure of plants to the overall average chromium concentration on site would still, however, result in an HQ greater than one. Lead was detected in 48 percent of the samples collected. Detected concentrations ranged from 4.58 to 380 mg/kg with an average detected concentration of 35.8 mg/kg. Exposure of plants to the overall average lead concentration on site does not result in an HQ greater than one. Nickel was detected in 65 percent of the samples collected. Detected concentrations ranged from 4.82 to 38 mg/kg with an average detected concentration of 7.0 mg/kg. Exposure of plants to the overall average nickel concentration on site does not result in an HQ greater than one. Silver was detected in 18 percent of the samples collected. Detected concentrations ranged from 0.12 to 13 mg/kg with an average detected concentration of 1.98 mg/kg. Exposure of plants to the overall average silver concentration on site does not result in an HQ greater than one. Based upon

Table 19
Hazard Quotients for Ecological Receptors Exposed to Background Concentrations for SWMU 85

Constituent of Potential Ecological Concern	Plant Hazard Quotient ^a	Deer Mouse Hazard Quotient (Herbivorous)	Deer Mouse Hazard Quotient (Omnivorous) ^a	Deer Mouse Hazard Quotient (Insectivorous) ^a	Burrowing Owl Hazard Quotient
Inorganic					
Barium	2.6E-1	3.3E-1	1.1E+0	2.0E+0	1.4E-2
Cadmium	1.7E-1	2.4E-2	2.5E-2	2.6E-2	8.1E-4
Chromium (total)	1.6E+1	2.8E-5	4.9E-5	6.9E-5	5.3E-2
Lead	2.4E-1	1.3E-2	1.0E-2	7.0E-3	6.9E-3
Mercury (inorganic)	1.7E-1	5.7E-4	5.7E-4	5.7E-4	1.0E-2
Mercury (organic)	1.7E-1	1.3E-1	1.3E-1	1.3E-1	7.1E-1
Nickel	3.8E-1	5.0E-3	7.1E-3	9.2E-3	4.3E-4
Selenium	5.0E-1	8.1E-2	1.5E-1	2.0E-1	3.3E-2
Silver	2.5E-1	2.3E-3	1.4E-3	6.0E-4	--- ^b
Hazard Index ^c	1.7E+1	3.7E-1	1.2E+0	2.0E+0	7.5E-2

^a**Bold text** indicates hazard quotient or hazard index exceeds unity.

^b--- designates insufficient toxicity data available for risk estimation purposes.

^cThe hazard index is the sum of individual hazard quotients. Using the value for organic mercury as a conservative estimate of the hazard index.
 SWMU = Solid waste management unit.

this analysis, vegetation associated with SWMU 85 are not expected to be at risk from exposure to lead, nickel, and silver. Barium was predicted to result in risk to the mouse following exposure to the maximum barium concentration from soil samples from within the 0 to 5 feet depth interval. Barium concentrations within this depth interval ranged from 44 to 400 mg/kg, with an average concentration of 118 mg/kg. Exposure of the owl to the average barium concentration on site would not result in an HQ greater than unity. In the case of HMX, the HQs for the deer mice (ranging from 6.0 to 12.0) are based on the maximum measured soil concentration of 8.4 mg/kg. This was, however, the only detection out of 44 soil samples (within the upper 5 feet of soil). The estimated (average HMX concentration for these samples (based upon one-half the detection limits) is 0.34 mg/kg, which results in a maximum HQ of about 0.5 in the deer mouse.

Based upon this uncertainty analysis, ecological risks at SWMU 85 are expected to be very low. HQs greater than unity were initially predicted, however, closer examination of the exposure assumptions revealed an overestimation of risk primarily attributed to exposure concentration, background risk, quality of analytical data, and the utilization of detection limits as exposure concentrations.

VII.3.6 Risk Interpretation

Ecological risks associated with SWMU 85 were estimated through a screening assessment that incorporates site-specific information when available. Overall, ecological risks to plants are expected to be low because of the fact that predicted risks associated with exposure to chromium (total), lead, nickel, and silver are based upon calculations using maximum measured concentrations. With respect to the deer mouse, risk is also expected to be low. Predicted risk from exposure to barium and HMX was attributed to the use of maximum measured concentrations. Based upon this final analysis, ecological risks associated with SWMU 85 are expected to be insignificant.

VII.3.7 Screening Assessment Scientific/Management Decision Point

Once potential ecological risks associated with the site have been assessed, a decision is made as to whether the site should be recommended for NFA or additional data should be collected to assess actual ecological risk at the site more thoroughly. With respect to this site, ecological risks were predicted to be insignificant. The scientific/management decision is to recommend this site for NFA.

VIII. References

Baes, III, C.F., R.D. Sharp, A.L. Sjoeren, and R.W. Shor, 1984. "A Review and Analysis of Parameters for Assessing Transport of Environmentally Released Radionuclides through Agriculture," ORNL-5786, Oak Ridge National Laboratory, Oak Ridge, Tennessee, pp. 10–11.

Baker, D.A., and J.K. Soldat, 1992. *Methods for Estimating Doses to Organisms from Radioactive Materials Released into the Aquatic Environment*, PNL-8150, Pacific Northwest Laboratory, Richland, Washington, pp. 16–20.

Brown, C.D. (Sandia National Laboratories). Memorandum to D. Jercinovic (IT), "Radiological Data Tables and DU Ratios." January 14, 1998.

Callahan, M.A., M.W. Slimak, N.W. Gabel, I.P. May, C.F. Fowler, J.R. Freed, P. Jennings, R.L. Durfee, F.C. Whitmore, B. Maestri, W.R. Mabey, B.R. Holt, and C. Gould, 1979, "Water-Related Environmental Fate of 129 Priority Pollutants," EPA-440/4-79-029, Office of Water and Waste Management, Office of Water Planning and Standards, U.S. Environmental Protection Agency, Washington, D.C.

Connell, D.W., and R.D. Markwell, 1990. "Bioaccumulation in Soil to Earthworm System," *Chemosphere*, Vol. 20, pp. 91-100.

Dinwiddie, R.S. (New Mexico Environment Department). Letter to M.J. Zamorski (U.S. Department of Energy), "Request for Supplemental Information: Background Concentrations Report, SNL/KAFB," September 24, 1997.

DOE, see U.S. Department of Energy.

Dunning, J.B., 1993. *CRC Handbook of Avian Body Masses*, CRC Press, Boca Raton, Florida.

EPA, see U.S. Environmental Protection Agency.

Haug, E.A, B.A. Millsap, and M.S. Martell, 1993. "*Speotyto cunicularia* Burrowing Owl," In A. Poole and F. Gill (eds.), *The Birds of North America*, No. 61, The Academy of Natural Sciences of Philadelphia.

IAEA, see International Atomic Energy Agency.

International Atomic Energy Agency (IAEA), 1992. "Effects of Ionizing Radiation on Plants and Animals at Levels Implied by Current Radiation Protection Standards," Technical Report Series No. 332, International Atomic Energy Agency, Vienna, Austria.

IT, see IT Corporation.

IT Corporation (IT), July 1994. "Report of Generic Action Level Assistance for the Sandia National Laboratories/New Mexico Environmental Restoration Program," IT Corporation, Albuquerque, New Mexico.

IT Corporation (IT), February 1995. "Sensitive Species Survey Results, Environmental Restoration Project, Sandia National Laboratories/New Mexico," IT Corporation, Albuquerque, New Mexico.

IT Corporation (IT), July 1998. "Predictive Ecological Risk Assessment Methodology, Environmental Restoration Program, Sandia National Laboratories, New Mexico," IT Corporation, Albuquerque, New Mexico.

Kocher, D.C. 1983, "Dose-Rate Conversion Factors for External Exposure to Photon Emitters in Soil," *Health Physics*, Vol. 28, pp. 193-205.

Ma, W.C., 1982. "The Influence of Soil Properties and Worm-related Factors on the Concentration of Heavy Metals in Earthworms," *Pedobiology*, Vol. 24, pp. 109–119.

Maxwell, C.J., and D.M. Opresko, 1996. "Ecological Criteria Document for Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX) (CAS No. 2691-41-0)," Oak Ridge National Laboratory, Oak Ridge, Tennessee.

Nagy, K.A., 1987. "Field Metabolic Rate and Food Requirement Scaling in Mammals and Birds," *Ecological Monographs*, Vol. 57, No. 2, pp. 111–128.

National Council on Radiation Protection and Measurements (NCRP), 1987. "Exposure of the Population in the United States and Canada from Natural Background Radiation," National Council on Radiation Protection and Measurements, Bethesda, Maryland.

National Council on Radiation Protection and Measurements (NCRP), 1989. "Screening Techniques for Determining Compliance with Environmental Standards: Releases of Radionuclides to the Atmosphere," NCRP Commentary No. 3, Revision of January 1989, National Council on Radiation Protection and Measurements, Bethesda, Maryland.

National Oceanographic and Atmospheric Administration (NOAA), 1990. Local Climatological Data, Annual Summary with Comparative data, Albuquerque, New Mexico.

NCRP, see National Council on Radiation Protection and Measurements.

Neumann, G., 1976, "Concentration Factors for Stable Metals and Radionuclides in Fish, Mussels and Crustaceans—a Literature Survey," Report 85-04-24, National Swedish Environmental Protection Board.

New Mexico Environment Department (NMED), March 1998. "RPMP Document Requirement Guide," New Mexico Environment Department, Hazardous and Radioactive Materials Bureau, RCRA Permits Management Program, Santa Fe, New Mexico.

NMED, see New Mexico Environment Department

NOAA, see National Oceanographic and Atmospheric Administration.

Sample, B.E., and G.W. Suter II, 1994. "Estimating Exposure of Terrestrial Wildlife to Contaminants," ES/ER/TM-125, Oak Ridge National Laboratory, Oak Ridge, Tennessee.

Sample, B.E., D.M. Opresko, and G.W. Suter II, 1995. "Toxicological Benchmarks for Wildlife: 1996 Revision," ES/ER/TM-86/R3, Risk Assessment Program, Health Sciences Research Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee.

Sandia National Laboratories/New Mexico (SNL/NM), July 1994. "Verification and Validation of Chemical and Radiological Data," Technical Operating Procedure (TOP) 94-03, Rev. 0, Sandia National Laboratories/New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), March 1996. "RCRA Facility Investigation Work Plan for Operable Unit 1335, Southwest Test Area," Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), June 11, 1997. "Bullets of Understanding between NMED/DOE OB and DOE/SNL ER Project for Sampling and Analysis Plans for ER Sites 14 and 85 OU 1335, Southwest Test Area," Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), July 1997. "OU 1335, ER Site 14, Confirmatory Sampling Plan," prepared by Sandia National Laboratories/New Mexico Environmental Restoration Project, Albuquerque New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), February 1998. "RESRAD Input Parameter Assumptions and Justification," Sandia National Laboratories/New Mexico Environmental Restoration Project, Albuquerque, NM.

Silva, M., and J.A. Downing, 1995. *CRC Handbook of Mammalian Body Masses*, CRC Press, Boca Raton, Florida.

SNL/NM, See Sandia National Laboratories, New Mexico.

Stafford, E.A., J.W. Simmers, R.G. Rhett, and C.P. Brown, 1991. "Interim Report: Collation and Interpretation of Data for Times Beach Confined Disposal Facility, Buffalo, New York," Miscellaneous Paper D-91-17, U.S. Army Corps of Engineers, Buffalo, New York.

Thomson, B.M. and G. J. Smith, 1985. Investigation of Groundwater Contamination Potential at Sandia National Laboratories, Albuquerque, NM, in Proceedings of the Fifth DOE Environmental Protection Information Meeting, Albuquerque, NM, November 6-8, 1984, CONF-841187, pp. 531-540.

Travis, C.C., and A.D. Arms, 1988. "Bioconcentration of Organics in Beef, Milk, and Vegetables," *Environmental Science and Technology*, Vol. 22, No. 3, pp. 271-274.

USDA, see U.S. Department of Agriculture.

U.S. Department of Agriculture (USDA), 1977. "Soil Survey of Bernalillo County and Parts of Sandoval and Valencia Counties, New Mexico," Soil Conservation Service, U.S. Department of the Interior Bureau of Indian Affairs and Bureau of Land Management, and New Mexico Agriculture Experiment Station, U.S. Government Printing Office, Washington, D.C.

U.S. Department of Energy (DOE), 1988. "External Dose-Rate Conversion Factors for Calculation of Dose to the Public," DOE/EH-0070, U.S. Department of Energy, Assistant Secretary for Environment, Safety and Health, Washington, D.C.

U.S. Department of Energy (DOE), 1993. DOE Order 5400.5, "Radiation Protection of the Public and the Environment," 1993.

U.S. Department of Energy (DOE), 1995. "Hanford Site Risk Assessment Methodology," DOE/RL-91-45 (Rev. 3), U.S. Department of Energy, Richland, Washington.

U.S. Department of Energy and United States Air Force (DOE and USAF), March 1996. "Workbook: Future Use Management Area 7," prepared by the Future Use Logistics and Support Working Group in cooperation with U.S. Department of Energy Affiliates and the U.S. Air Force.

U.S. Environmental Protection Agency (EPA), November 1986. "Test Methods for Evaluating Solid Waste," 3rd ed., Update III, SW-846, Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, D.C.

U.S. Environmental Protection Agency (EPA), 1988. "Federal Guidance Report No. 11, Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion," U.S. Environmental Protection Agency, Office of Radiation Programs, Washington, D.C.

U.S. Environmental Protection Agency (EPA), 1989. "Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual," EPA/540-1089/002, U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, D.C.

U.S. Environmental Protection Agency (EPA), July 1990. "Corrective Action for Solid Waste Management Units (SWMU) at Hazardous Waste Management Facilities, Proposed Rule," *Federal Register*, Vol. 55, Title 40, Parts 264, 265, 270, and 271.

U.S. Environmental Protection Agency (EPA), 1991. "Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part B)," U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, D.C.

U.S. Environmental Protection Agency (EPA), 1992. "Framework for Ecological Risk Assessment," EPA/630/R-92/001, U.S. Environmental Protection Agency, Washington, D.C.

U.S. Environmental Protection Agency (EPA), 1993. "Wildlife Exposure Factors Handbook, Volume I of II," EPA/600/R-93/187a, U.S. Environmental Protection Agency, Office of Research and Development, Washington, D.C.

U.S. Environmental Protection Agency (EPA). Memorandum from E. Laws, Assistant Administrator to Region Administrators I-X, "Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Active Facilities," U.S. Environmental Protection Agency, Washington, D.C. July 14, 1994.

U.S. Environmental Protection Agency (EPA), 1996a. Draft Region 6 Superfund Guidance, Adult Lead Cleanup Level, U.S. Environmental Protection Agency, Washington, D.C.

U.S. Environmental Protection Agency (EPA), 1996b. "Region 9 Preliminary Remediation Goals (PRGs) 1996," electronic database maintained by Region 9, U.S. Environmental Protection Agency, San Francisco, California.

U.S. Environmental Protection Agency (EPA), 1997a. "Health Effects Assessment Summary Tables (HEAST), FY 1997 Update," EPA-540-R-97-036, Office of Research and Development and Office of Solid Waste and Emergency Response, Washington, D.C..

U.S. Environmental Protection Agency (EPA), 1997b. "Risk-Based Concentration Table," electronic database maintained by U.S. Environmental Protection Agency, Region 3, Philadelphia, Pennsylvania.

U.S. Environmental Protection Agency (EPA), August 1997c. "Establishment of Cleanup Levels for CERCLA Sites with Radioactive Contamination," OSWER Directive No. 9200-4-18, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response. Washington, D.C.

U.S. Environmental Protection Agency (EPA), 1997d. "Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risks," Interim Final, U.S. Environmental Protection Agency, Washington, D.C.

U.S. Environmental Protection Agency (EPA), 1998a. Integrated Risk Information System (IRIS) electronic database, maintained by the U.S. Environmental Protection Agency.

U.S. Environmental Protection Agency (EPA), 1998b. "Guidelines for Ecological Risk Assessment," EPA/630/R-95/002F, U.S. Environmental Protection Agency, Washington, D.C.

U.S. Department of Fish and Wildlife (USFWS), September 1995. "Migratory Nongame Birds of Management Concern in the United States: The 1995 List," Office of Migratory Bird Management, U.S. Fish and Wildlife Service, Washington, D.C.

USFWS, see U.S. Department of Fish and Wildlife.

U.S. Geological Survey (USGS), 1994. National Geochemical Data Base: National Uranium Resource Evaluation Data for the Contiguous United States, U.S. Geological Survey Digital Data Series Dds-18-A, Washington, D.C.

Whicker, F.W., and V. Schultz, 1982. *Radioecology: Nuclear Energy and the Environment*, Volume II, CRC Press, Boca Raton, Florida.

Will, M.E., and G.W. Suter II, 1995. "Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Terrestrial Plants: 1995 Revision." ES/ER/TM-85/R2, Oak Ridge National Laboratory, Oak Ridge, Tennessee.

Yanicak, S. (Oversight Bureau, Department of Energy, New Mexico Environment Department). Letter to M. Johansen (DOE/AIP/POC Los Alamos National Laboratory), "(Tentative) list of constituents of potential ecological concern (COPECs) which are considered to be bioconcentrators and/or biomagnifiers." March 3, 1997.

Yu, C., A.J. Zielen, J.-J. Cheng, Y.C. Yuan, L.G. Jones, D.J. LePoire, Y.Y. Wang, C.O. Loureiro, E. Gnanapragasam, E. Faillace, A. Wallo III, W.A. Williams, and H. Peterson, 1993a. *Manual for Implementing Residual Radioactive Material Guidelines Using RESRAD*, Version 5.0. Environmental Assessment Division, Argonne National Laboratory, Argonne, Illinois.

Yu, C., C. Loureiro, J.-J. Cheng, L.G. Jones, Y.Y. Wang, Y.P. Chia, and E. Faillace, 1993b. "Data Collection Handbook to Support Modeling the Impacts of Radioactive Material in Soil," ANL/EAIS-8, Argonne National Laboratory, Argonne, Illinois.

Appendix 1

EXPOSURE PATHWAY DISCUSSION FOR CHEMICAL AND RADIONUCLIDE CONTAMINATION

Sandia National Laboratories (SNL/NM) proposes that a default set of exposure routes and associated default parameter values be developed for each future land-use designation being considered for SNL/NM Environmental Restoration (ER) project sites. This default set of exposure scenarios and parameter values would be invoked for risk assessments unless site-specific information suggested other parameter values. Because many SNL/NM solid waste management units (SWMU) have similar types of contamination and physical settings, SNL/NM believes that the risk assessment analyses at these sites can be similar. A default set of exposure scenarios and parameter values will facilitate the risk assessments and subsequent review.

The default exposure routes and parameter values suggested are those that SNL/NM views as resulting in a Reasonable Maximum Exposure (RME) value. Subject to comments and recommendations by the U.S. Environmental Protection Agency (EPA) Region VI and New Mexico Environment Department (NMED), SNL/NM proposes that these default exposure routes and parameter values be used in future risk assessments.

At SNL/NM, all SWMUs exist within the boundaries of the Kirtland Air Force Base (KAFB). Approximately 157 potential waste and release sites have been identified where hazardous, radiological, or mixed materials may have been released to the environment. Evaluation and characterization activities have occurred at all of these sites to varying degrees. Among other documents, the SNL/NM ER draft Environmental Assessment (DOE 1996) presents a summary of the hydrogeology of the sites, the biological resources present and proposed land-use scenarios for the SNL/NM SWMUs. At this time, all SNL/NM SWMUs have been tentatively designated for either industrial or recreational future land use. The NMED has also requested that risk calculations be performed based upon a residential land-use scenario. All three land-use scenarios will be addressed in this document.

The SNL/NM ER project has screened the potential exposure routes and identified default parameter values to be used for calculating potential intake and subsequent hazard index (HI), risk and dose values. The EPA (EPA 1989a) provides a summary of exposure routes that could potentially be of significance at a specific waste site. These potential exposure routes consist of the following:

- Ingestion of contaminated drinking water
- Ingestion of contaminated soil
- Ingestion of contaminated fish and shell fish
- Ingestion of contaminated fruits and vegetables
- Ingestion of contaminated meat, eggs, and dairy products
- Ingestion of contaminated surface water while swimming
- Dermal contact with chemicals in water
- Dermal contact with chemicals in soil
- Inhalation of airborne compounds (vapor phase or particulate)

- External exposure to penetrating radiation (immersion in contaminated air; immersion in contaminated water and exposure from ground surfaces with photon-emitting radionuclides).

Based upon the location of the SNL/NM SWMUs and the characteristics of the surface and subsurface at the sites, we have evaluated these potential exposure routes for different land-use scenarios to determine which should be considered in risk assessment analyses (the last exposure route is pertinent to radionuclides only). At SNL/NM SWMUs, there does not currently occur any consumption of fish, shell fish, fruits, vegetables, meat, eggs, or dairy products that originate on site. Additionally, no potential for swimming in surface water is present due to the high-desert environmental conditions. As documented in the RESRAD computer code manual (ANL 1993), risks resulting from immersion in contaminated air or water are not significant compared to risks from other radiation exposure routes.

For the industrial and recreational land-use scenarios, SNL/NM ER has, therefore, excluded the following four potential exposure routes from further risk assessment evaluations at any SNL/NM SWMU:

- Ingestion of contaminated fish and shell fish
- Ingestion of contaminated fruits and vegetables
- Ingestion of contaminated meat, eggs, and dairy products
- Ingestion of contaminated surface water while swimming.

That part of the exposure pathway for radionuclides related to immersion in contaminated air or water is also eliminated.

For the residential land-use scenario, we will include ingestion of contaminated fruits and vegetables because of the potential for residential gardening.

Based upon this evaluation, for future risk assessments, Table 1 shows the exposure routes that will be considered. Dermal contact is included as a potential exposure pathway in all land use scenarios. However, the potential for dermal exposure to inorganics is not considered significant and will not be included. In general, the dermal exposure pathway is generally considered to not be significant relative to water ingestion and soil ingestion pathways but will be considered for organic components. Because of the lack of toxicological parameter values for this pathway, the inclusion of this exposure pathway into risk assessment calculations may not be possible and may be part of the uncertainty analysis for a site where dermal contact is potentially applicable.

Equations and Default Parameter Values for Identified Exposure Routes

In general, SNL/NM expects that ingestion of compounds in drinking water and soil will be the more significant exposure routes for chemicals; external exposure to radiation may also be significant for radionuclides. All of the above routes will, however, be considered for their appropriate land use scenarios. The general equations for calculating potential intakes via these routes are shown below. The equations are from the Risk Assessment Guidance for Superfund (RAGS): Volume 1 (EPA 1989a, 1991). These general equations also apply to calculating potential intakes for radionuclides. A more in-depth discussion of the equations

Table 1
Exposure Pathways Considered for Various Land Use Scenarios

Industrial	Recreational	Residential
Ingestion of contaminated drinking water	Ingestion of contaminated drinking water	Ingestion of contaminated drinking water
Ingestion of contaminated soil	Ingestion of contaminated soil	Ingestion of contaminated soil
Inhalation of airborne compounds (vapor phase or particulate)	Inhalation of airborne compounds (vapor phase or particulate)	Inhalation of airborne compounds (vapor phase or particulate)
Dermal contact	Dermal contact	Dermal contact
External exposure to penetrating radiation from ground surfaces	External exposure to penetrating radiation from ground surfaces	Ingestion of fruits and vegetables
		External exposure to penetrating radiation from ground surfaces

used in performing radiological pathway analyses with the RESRAD code may be found in the RESRAD Manual (ANL 1993). Also shown are the default values SNL/NM ER suggests for use in RME risk assessment calculations for industrial, recreational, and residential scenarios, based upon EPA and other governmental agency guidance. The pathways and values for chemical contaminants are discussed first, followed by those for radionuclide contaminants. RESRAD input parameters that are left as the default values provided with the code are not discussed. Further information relating to these parameters may be found in the RESRAD Manual (ANL 1993).

Generic Equation for Calculation of Risk Parameter Values

The equation used to calculate the risk parameter values (i.e., hazard quotient/HI, excess cancer risk, or radiation total effective dose equivalent [dose]) is similar for all exposure pathways and is given by:

$$\begin{aligned} \text{Risk (or Dose)} &= \text{Intake} \times \text{Toxicity Effect (either carcinogenic, noncarcinogenic, or radiological)} \\ &= C \times (CR \times EFD/BW/AT) \times \text{Toxicity Effect} \end{aligned} \quad (1)$$

where

- C = contaminant concentration (site specific)
- CR = contact rate for the exposure pathway
- EFD = exposure frequency and duration
- BW = body weight of average exposure individual
- AT = time over which exposure is averaged.

The total risk/dose (either cancer risk or HI) is the sum of the risks/doses for all of the site-specific exposure pathways and contaminants.

The evaluation of the carcinogenic health hazard produces a quantitative estimate for excess cancer risk resulting from the constituents of concern (COC) present at the site. This estimate

is evaluated for determination of further action by comparison of the quantitative estimate with the potentially acceptable risk range of 10^{-4} to 10^{-6} . The evaluation of the noncarcinogenic health hazard produces a quantitative estimate (i.e., the HI) for the toxicity resulting from the COCs present at the site. This estimate is evaluated for determination of further action by comparison of this quantitative estimate with the EPA standard HI of unity (1). The evaluation of the health hazard due to radioactive compounds produces a quantitative estimate of doses resulting from the COCs present at the site.

The specific equations used for the individual exposure pathways can be found in RAGS (EPA 1989a) and the RESRAD Manual (ANL 1993). Table 2 shows the default parameter values suggested for use by SNL/NM at SWMUs, based upon the selected land use scenario. References are given at the end of the table indicating the source for the chosen parameter values. The intention of SNL/NM is to use default values that are consistent with regulatory guidance and consistent with the RME approach. Therefore, the values chosen will, in general, provide a conservative estimate of the actual risk parameter. These parameter values are suggested for use for the various exposure pathways based upon the assumption that a particular site has no unusual characteristics that contradict the default assumptions. For sites for which the assumptions are not valid, the parameter values will be modified and documented.

Summary

SNL/NM proposes the described default exposure routes and parameter values for use in risk assessments at sites that have an industrial, recreational or residential future land-use scenario. There are no current residential land-use designations at SNL/NM ER sites, but this scenario has been requested to be considered by the NMED. For sites designated as industrial or recreational land-use, SNL/NM will provide risk parameter values based upon a residential land-use scenario to indicate the effects of data uncertainty on risk value calculations or in order to potentially mitigate the need for institutional controls or restrictions on SNL/NM ER sites. The parameter values are based upon EPA guidance and supplemented by information from other government sources. The values are generally consistent with those proposed by Los Alamos National Laboratory, with a few minor variations. If these exposure routes and parameters are acceptable, SNL/NM will use them in risk assessments for all sites where the assumptions are consistent with site-specific conditions. All deviations will be documented.

References

ANL, see Argonne National Laboratory.

Argonne National Laboratory (ANL), 1993. *Manual for Implementing Residual Radioactive Material Guidelines Using RESRAD*, Version 5.0, ANL/EAD/LD-2, Argonne National Laboratory, Argonne, IL.

DOE, see U.S. Department of Energy.

EPA, see U.S. Environmental Protection Agency.

Table 2
Default Parameter Values for Various Land Use Scenarios

Parameter	Industrial	Recreational	Residential
General Exposure Parameters			
Exposure frequency (day/yr)	***	***	***
Exposure duration (yr)	30 ^{a,b}	30 ^{a,b}	30 ^{a,b}
Body weight (kg)	70 ^{a,b}	56 ^{a,b}	70 adult ^{a,b} 15 child
Averaging Time (days) for carcinogenic compounds (=70 y x 365 day/yr)	25550 ^a	25550 ^a	25550 ^a
for noncarcinogenic compounds (=ED x 365 day/yr)	10950	10950	10950
Soil Ingestion Pathway			
Ingestion rate	100 mg/day ^c	6.24 g/yr ^d	114 mg-yr/kg-day ^a
Inhalation Pathway			
Inhalation rate (m ³ /yr)	5000 ^{a,b}	146 ^d	5475 ^{a,b,d}
Volatilization factor (m ³ /kg)	chemical specific	chemical specific	chemical specific
Particulate emission factor (m ³ /kg)	1.32E9 ^a	1.32E9 ^a	1.32E9 ^a
Water Ingestion Pathway			
Ingestion rate (L/day)	2 ^{a,b}	2 ^{a,b}	2 ^{a,b}
Food Ingestion Pathway			
Ingestion rate (kg/yr)	NA	NA	138 ^{b,d}
Fraction ingested	NA	NA	0.25 ^{b,d}
Dermal Pathway			
Surface area in water (m ²)	2 ^{b,e}	2 ^{b,e}	2 ^{b,e}
Surface area in soil (m ²)	0.53 ^{b,e}	0.53 ^{b,e}	0.53 ^{b,e}
Permeability coefficient	chemical specific	chemical specific	chemical specific

***The exposure frequencies for the land use scenarios are often integrated into the overall contact rate for specific exposure pathways. When not included, the exposure frequency for the industrial land use scenario is 8 hr/day for 250 day/yr; for the recreational land use, a value of 2 hr/wk for 52 wk/yr is used (EPA 1989b); for a residential land use, all contact rates are given per day for 350 d/y.

^aRAGS, Vol. 1, Part B (EPA 1991).

^bExposure Factors Handbook (EPA 1989b)

^cEPA Region 6 guidance.

^dFor radionuclides, RESRAD (ANL 1993) is used for human health risk calculations; default parameters are consistent with RESRAD guidance.

^eDermal Exposure Assessment (EPA 1992).

U.S. Department of Energy (DOE), 1996. "Environmental Assessment of the Environmental Restoration Project at Sandia National Laboratories/New Mexico," U.S. Department of Energy Kirtland Area Office.

U.S. Environmental Protection Agency (EPA), 1989a. "Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual," EPA/540-1089/002, U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, D.C.

U.S. Environmental Protection Agency (EPA), 1989b. *Exposure Factors Handbook*, EPA/600/8-89/043, U.S. Environmental Protection Agency, Office of Health and Environmental Assessment, Washington, D.C.

U.S. Environmental Protection Agency (EPA), 1991. "Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part B)," EPA/540/R-92/003, U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, D.C.

U.S. Environmental Protection Agency (EPA), 1992. "Dermal Exposure Assessment: Principles and Applications," EPA/600/8-91/011B, U.S. Environmental Protection Agency, Office of Research and Development, Washington, D.C.

U.S. Environmental Protection Agency (EPA), 1996. "Soil Screening Guidance: Technical Background Document," EPA/540/1295/128, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C.



**Statement of Basis
Approval of No Further Action**

January 2000

**Solid Waste Management Unit 85
Operable Unit 1335
Round 11**

RSI Originally Submitted September 1999

Site-Specific Comments

OU 1335

ER Site 85, Firing Site (Building 9920)

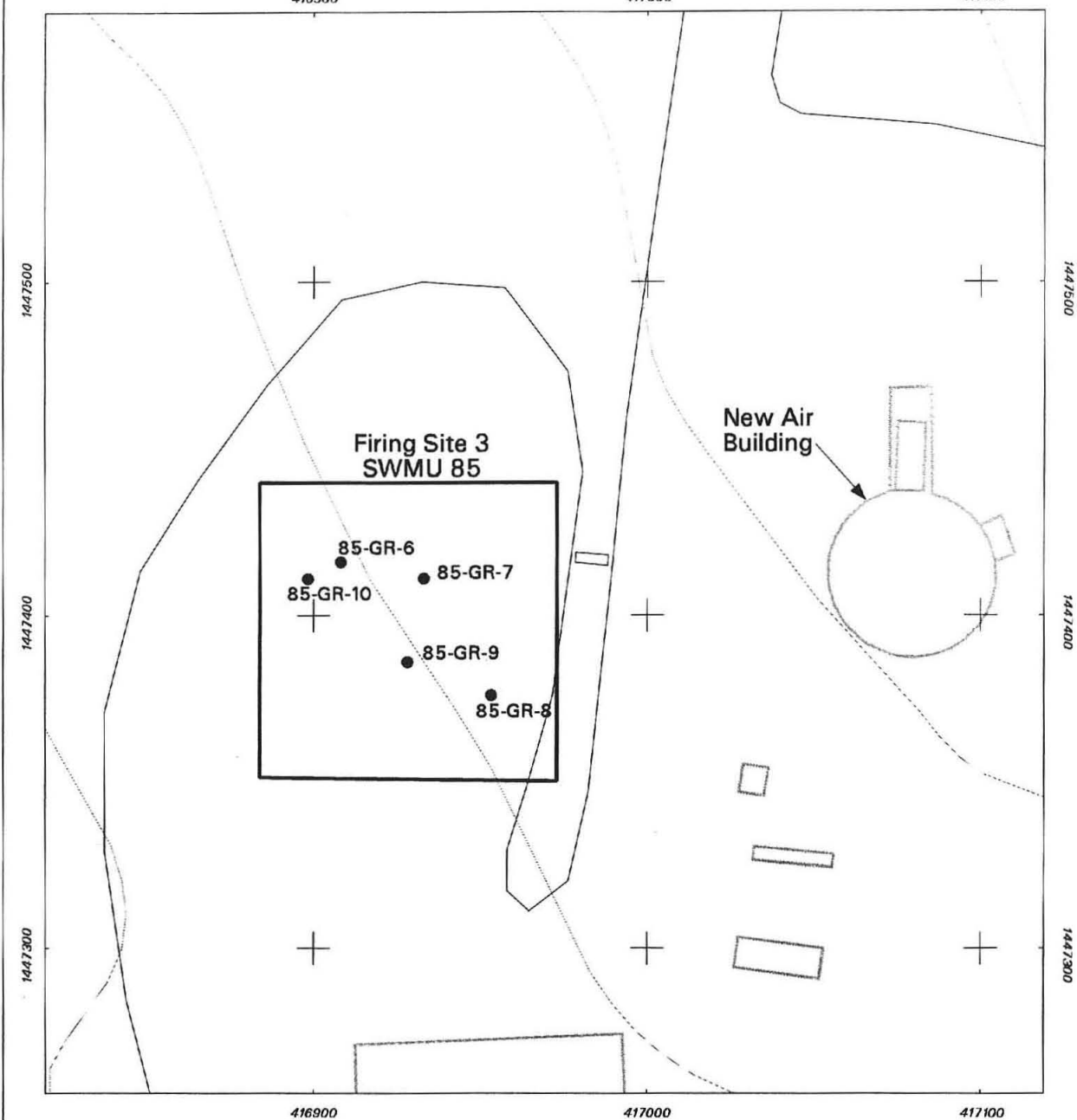
ER Site 85 is appropriate for NFA, pending submittal of the below requested information.

Page 10-35, Figure 10.4.4-2 – There are two locations shown for sample 85-GR-7; none is shown for sample 85-GR-9. Please submit a revised figure with correctly identified sampling locations.

Response: The revised Figure 10.4.4-2 is provided in Attachment A.

ATTACHMENT A

**ER SITE 85
REVISED FIGURE 10.4.4-2**



Legend

- Soil Sample Location
- Road
- - - 2 Foot Contour
- ▭ Building
- ▬ SWMU 85

Figure 10.4.4-2
Soil Sampling Locations at
SWMU 85, Firing Site 3

