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Statement of Basis Approval of No Further Action Volume 17 of 30 January 2000 ER Site 63B Operable Unit 1333 Round 9

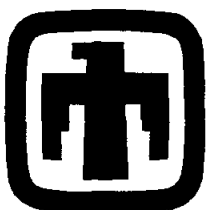
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**Statement of Basis
Approval of No Further Action
Volume 17 of 30**

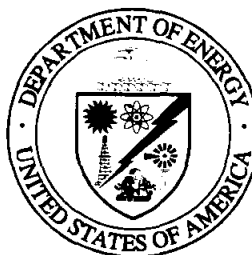
January 2000

**ER Site 63B
Operable Unit 1333
Round 9**

(RCRA Permit No. NM5890110518)

NFA Originally Submitted September 24, 1997

**Environmental
Restoration
Project**



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

NFA

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

January 2000

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NFA Originally Submitted September 24, 1997

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ACRONYMS AND ABBREVIATIONS

bgl	below ground level
CEARP	Comprehensive Environmental Assessment and Response Program
COC	contaminant(s) of concern
DOE	U.S. Department of Energy
DOU	Document of Understanding
EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration
ft	foot (feet)
HE	high explosive(s)
HSWA	Hazardous and Solid Waste Amendments
KAFB	Kirtland Air Force Base
mg/kg	milligram(s) per kilogram
mi	mile(s)
NFA	no further action
NMED	New Mexico Environment Department
OU	operable unit
pCi/g	picocurie(s) per gram
PDSP	Plutonium Dispersal Studies Project
RCRA	Resource Conservation and Recovery Act
SNL/NM	Sandia National Laboratories/New Mexico
UXO	unexploded ordnance
µg/kg	microgram(s) per kilogram
µR/hr	microrentgen(s) per hour

1.0 INTRODUCTION

Sandia National Laboratories/New Mexico (SNL/NM) is proposing a no further action (NFA) decision for Environmental Restoration (ER) Site 63B, Balloon Test Area: Balloon/Helicopter Site, Operable Unit (OU) 1333, based upon confirmatory sampling (NFA Criterion 3 [NMED April 1996]). ER Site 63 is listed in the Hazardous and Solid Waste Amendment (HSWA) Module IV (EPA August 1993) (hereinafter referred to as the HSWA Module IV) of the SNL/NM Resource Conservation and Recovery Act (RCRA) Hazardous Waste Management Facility Permit (NM5890110518) (EPA August 1992). The site was administratively split into two subunits, 63A and 63B, to facilitate site investigation. Site 63B was originally petitioned for an administrative NFA in 1995 (SNL/NM August 1995). The New Mexico Environment Department (NMED) issued a notice of deficiency requesting that screening soil sampling be conducted to further corroborate the interview and site history information (NMED April 28, 1997). This proposal summarizes the analytical results of the requested soil samples.

1.1 Description of ER Site 63B

ER Site 63B (Figure 1-1) is located on land controlled by the U.S. Department of Energy (DOE) and the U.S. Air Force that has been withdrawn from the Bureau of Land Management and permitted to the DOE (SNL/NM July 1994a). Coyote Springs Road provides access to the site (Figure 1-1). ER Site 63B lies on approximately 8 acres at a mean elevation of 6,173 feet (ft) above sea level (SNL/NM April 1995). Immediate topographic relief around the site is less than 100 ft.

ER Site 63B is located on alluvial deposits on a broad flood plain between the confluence of the Lurance and Madera Canyons (Figure 1-1). The composition and thickness of the alluvial deposits at the site are not well-defined (IT April 1993). Seismic surveys conducted in the Lurance Canyon approximately 1 mile (mi) upgradient and downgradient of the site indicated alluvium thickness ranging from 60 to 142 ft, respectively (BGA October 1994). However, alluvium thickness is highly variable in the canyon floors as a result of changes in shallow bedrock lithology or erosional irregularities along the bedrock/alluvium interface. At ER Site 63B, the alluvial deposits form gentle slopes comprised of Tesajo-Millett stony sandy loams that are underlain by igneous and metamorphic Precambrian rocks (USDA June 1977). Measured permeabilities in the Tesajo-Millett unit range from 0.2 to 20 inches per hour (USDA June 1977). Precambrian metamorphic rocks (metarhyolite) are exposed in the low hillslopes adjacent to and beneath the alluvium at this site (IT April 1993).

Sediments observed in the lower Lurance Canyon channel downstream of the site consist of coarse-grained sands, gravels, and cobbles originating from depositional processes in the Sol se Mete, the Madera, and the Lurance Canyons. Alluvium encountered during drilling at the TSA-1 well, located approximately 0.75 mi west of ER Site 63B (Figure 1-1), consists of 57 ft of very coarse sands, pebbles, and cobbles, with minor amounts of clayey sand beds underlain by fractured Precambrian metamorphic rocks (IT May 1994). Drilling logs from the TSA-1 and

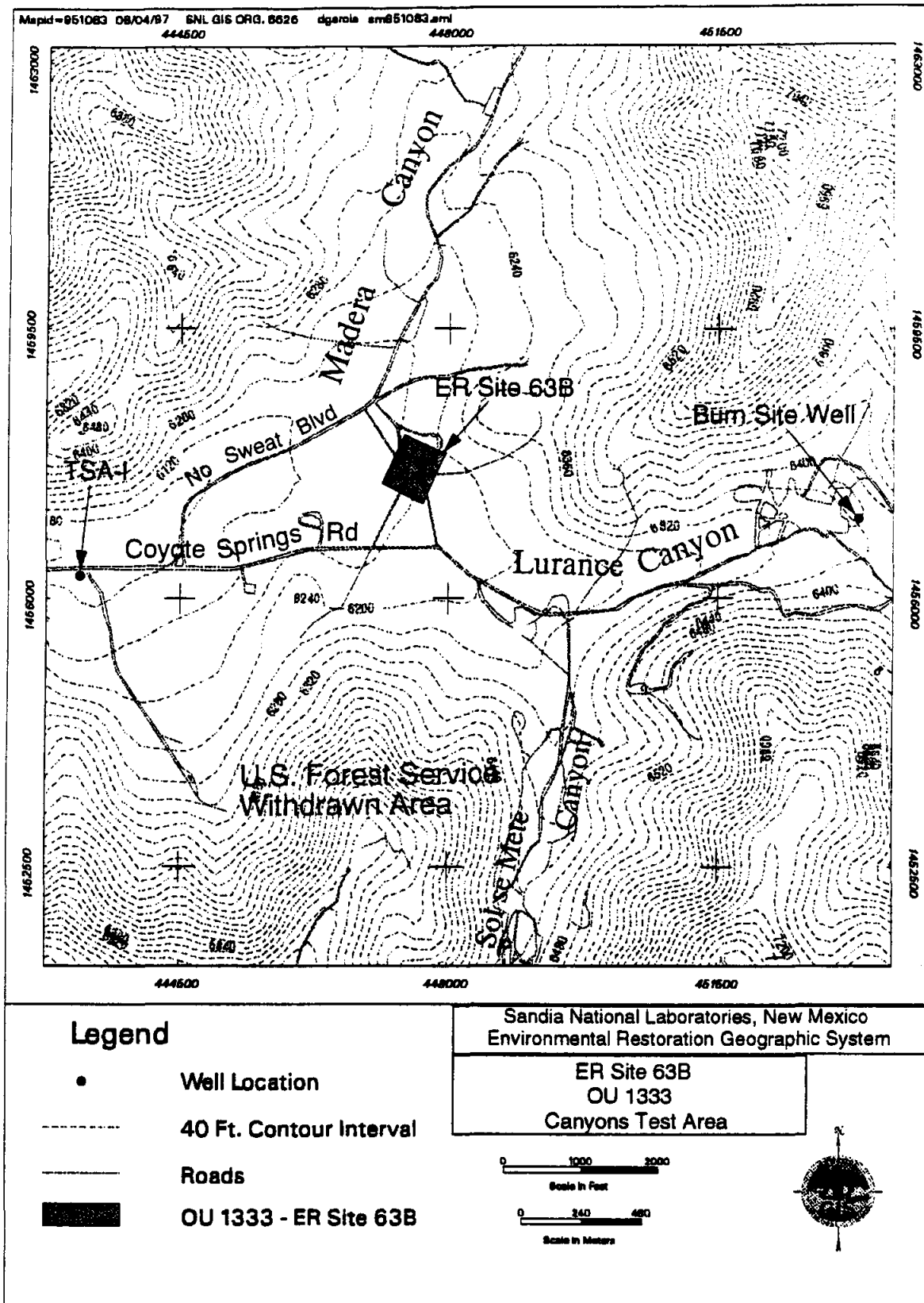


Figure 1-1
Location of ER Site 63B, Balloon Test Area: Balloon/Helicopter Site

Burn Site wells indicate that the first saturated ground-water conditions are encountered in fractured Precambrian bedrock under confined to semiconfined hydraulic conditions. The TSA-1 well encountered permeable saturated fractures in Precambrian rocks at a depth of 180 ft below ground level (bgl). The Burn Site well, located approximately 1 mi east of ER Site 63B (Figure 1-1), also encountered permeable water-bearing fractures in the Precambrian bedrock at a depth of 230 to 350 ft bgl (IT May 1994). Depth to ground water in the fractured Precambrian rocks expected to underlie the alluvial deposits at ER Site 63B is not known, since local ground-water flow may be complicated because of abundant fractures and faults in the area. The local hydraulic gradient between the Burn Site and TSA-1 wells indicates that ground-water flow direction in the Precambrian bedrock is westward (IT May 1994).

For a detailed discussion regarding the local setting of ER Site 63B, refer to Chapter 3.0 of the RCRA Facility Investigation work plan for OU 1333 (SNL/NM September 1995).

1.2 No Further Action Basis

This proposal for a determination of a confirmatory sampling NFA decision was prepared using the criteria presented in Annex B of the ER Document of Understanding (DOU) (NMED April 1996) and is consistent with the HSWA Module IV. Specifically, this proposal presents "information demonstrating that there are no releases of hazardous waste (including hazardous constituents) from solid waste management units . . . at the facility that pose a threat to human health or the environment" (as proposed in the Code of Federal Regulations, Title 40, Part 264.51[a][2] [EPA July 1990]).

This request for an NFA decision for ER Site 63B is based primarily upon archival and survey information and upon confirmatory soil analytical results collected in July 1997 to satisfy the HSWA Module IV requirements.

Review and analysis of all relevant data for ER Site 63B indicate that concentration levels of contaminants of concern (COC) at this site are less than SNL/NM background concentration limits. Therefore, ER Site 63B is proposed for an NFA decision based upon NFA Criterion 3 of the ER DOU (NMED April 1996) supported by confirmatory sampling data demonstrating that no release to the environment has occurred.

2.0 HISTORY OF ER SITE 63B

2.1 Historical Operations

Because different test programs were conducted in separate areas of the site, ER Site 63 has been divided into two subunits for the purpose of preparing these NFA proposals: (1) ER Site 63A, Balloon Test Area: Plutonium Dispersal Studies Project (PDSP) Site and (2) ER Site 63B, Balloon Test Area: Balloon/Helicopter Site (includes tethered-rocket tests). ER Site 63B was used for two distinctly different test series: (1) balloon/helicopter drop tests, and (2) tethered-rocket tests. Table 2-1 presents a chronological summary of testing events at ER Site 63B. Information summarizing ER Site 63A and the PDSP tests conducted at the site are contained in a separate NFA proposal.

Table 2-1
Chronology of Testing Activities at ER Site 63B

Dates	Test Activity	References
1984–1985	Balloon/Helicopter Drop Tests SMART Antitank Weapons	SNL/NM November 1994, SNL/NM [n.d.] (Ref. 63-12), SNL/NM EORC 1995, DOE September 1987
1987–1990	Helicopter Drop Tests Sidearm Antitank Weapon	SNL/NM [n.d.] (Ref. 63-12), SNL/NM [n.d.] (Ref. 63-40), SNL/NM EORC 1995, DOE September 1987
1989–1990	Tethered-Rocket Tests	SNL/NM [n.d.] (Ref. 63-40), SNL/NM EORC 1995

Operations at ER Site 63B were designed to satisfy a demand to perform drop tests of antitank weapons from a height of greater than the 600-ft drop provided by the facilities at ER Site 81 (New Aerial Cable Site) (SNL/NM EORC 1995). This was accomplished through the use of an unmanned hot-air balloon. In August and September of 1984, balloon drop tests were conducted at ER Site 63B. Balloon drop testing at ER Site 63B ceased when the balloon broke free of its tethers in a windstorm and crashed east of the site. After the destruction of the balloon, drop tests at ER Site 63B were performed from a helicopter. Tethered-rocket tests were also performed at ER Site 63B in 1989 and 1990. Sections 2.3.1 and 2.3.2 discuss the available information regarding each of these test types (SNL/NM EORC 1995).

Historical aerial photographs record no activity at ER Site 63B prior to 1983 (USGS June 1975, USGS September 1982, USGS June 1983). Aerial photographs of the site location in 1982 and 1983 show three roads forming a triangular perimeter around the area that is to become ER Site 63B (USGS September 1982, USGS June 1983), but these roads appear to provide access to other areas.

Based upon aerial photograph interpretation, ER Site 63B (Figures 2-1 and 2-2a) was active by September 1984 (USGS September 1984). Site features at this time included a graded square-shaped area dissected by criss-crossing linear features and three tether-line roads separated by 120 degrees of azimuth that radiate outward from a point south of the graded area (SNL/NM August 1994). The formerly graded square-shaped area was used as the balloon drop test area (SNL/NM August 1994) and is located north of the current helicopter drop area (Figure 2-1). The three tether-line roads are still present at the site. Concrete foundations are currently located near each corner of the balloon drop area and are visible in the September 1984 aerial photograph (SNL/NM August 1994). The foundations may have been the mounting points for the former wooden posts that were used to suspend a horizontal net over the area. A field inspection noted a September 1983 date engraved in one of the concrete foundations (SNL/NM August 1994), possibly indicating the initial construction date of ER Site 63B (SNL/NM EORC 1995).

The next phase of activities at ER Site 63B was the construction of the graded helicopter drop area south of the balloon drop area (Figures 2-1 and 2-2b) (SNL/NM August 1994, SNL/NM EORC 1995). The helicopter drop area, still present at the site, is visible on a June 1987 aerial photograph (USGS June 1987). Concrete foundations containing metal poles are located at each corner of the helicopter drop area and were used to suspend a horizontal net over the graded area. Dates engraved in these concrete foundations imply that construction took place from December 1984 to February 1985. The net height was adjusted with an electric winch assembly located approximately 50 ft south of the southeastern corner of the graded area (Figures 2-1 and 2-2c). South of the winch is a 200-ft-long soil berm that trends northeast-southwest. Although the origin of the soil berm is uncertain, it may be related to grading activities at the site.

A May 1991 aerial photograph of ER Site 63B (USGS May 1991) shows two features that are associated with the 1989 and 1990 tethered rocket tests (Section 6.1, SNL/NM EORC 1995): a swivel anchor and a rocket launch rail (SNL/NM August 1994) (Figures 2-1 and 2-2d). Field inspection positively identified these features, which remain at the site (SNL/NM August 1994) (Figure 2-1).

2.1.1 Balloon/Helicopter Drop Tests

The balloon drop area at ER Site 63B was located north of the current helicopter drop area (Figure 2-1) and was used for balloon drop tests conducted for the Department of Defense (DOE September 1987, SNL/NM [n.d.] [Ref. 63-12], SNL/NM August 1994, SNL/NM EORC 1995). Interview records state that hundreds of drop tests took place at ER Site 63B between 1984 and 1990. Initial testing at ER Site 63B used a hot-air balloon to drop SMART antitank weapons from heights of approximately 1,000 to 1,200 ft (DOE September 1987). The position of the balloon was controlled by tether lines attached to three vehicles that differentially moved along three tether-line roads until the balloon was stationed over the target (Figure 2-1) (SNL/NM [n.d.] [Ref. 63-1], SNL/NM EORC 1995). SMART antitank weapons were modified

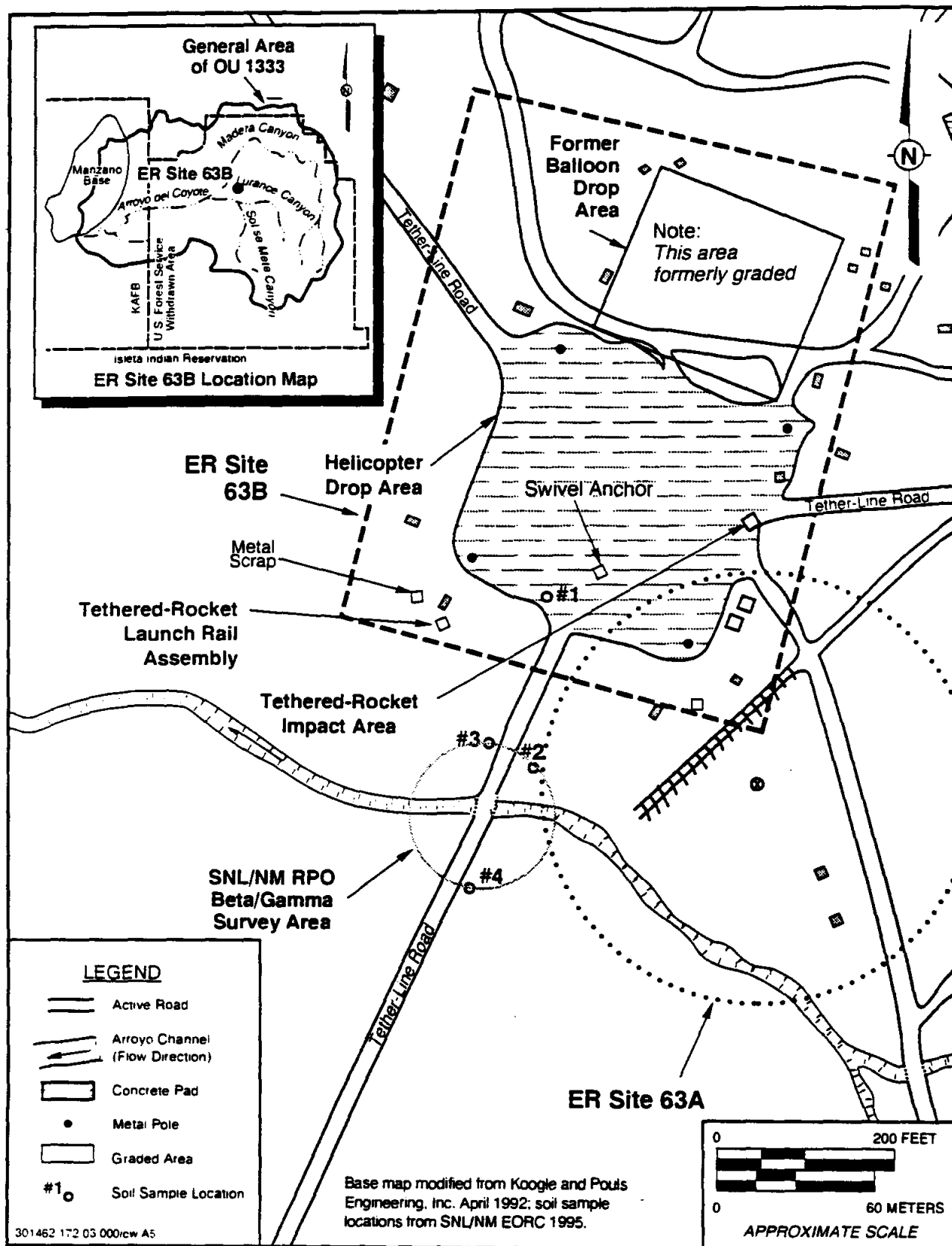


Figure 2-1
Site Map of ER Site 63B, Balloon Test Area: Balloon/Helicopter Site

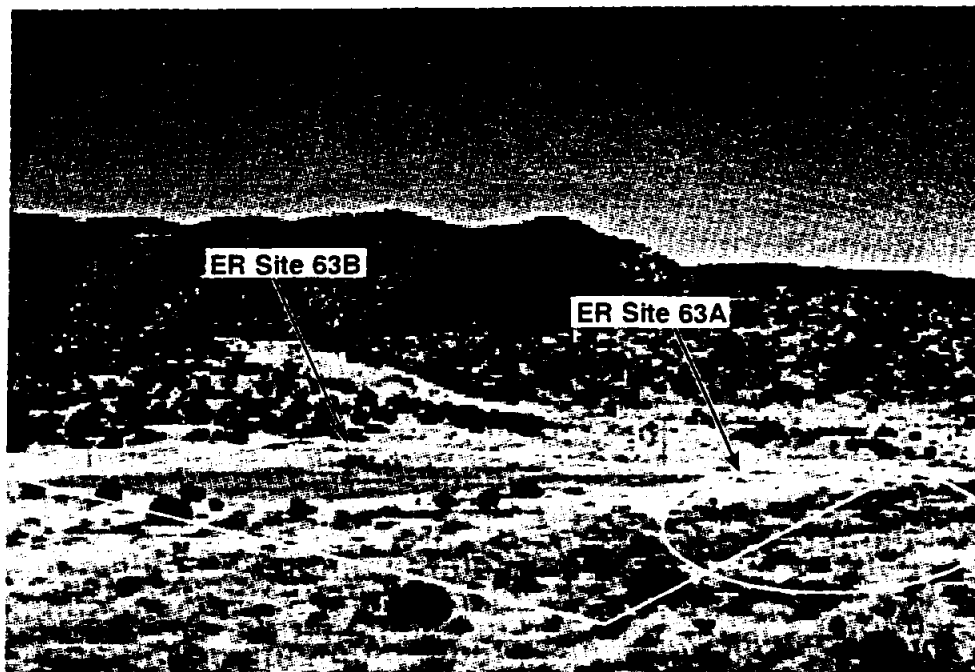


Figure 2-2a.

Photograph of ER Sites 63A and 63B in December 1994. Balloon/helicopter tests were conducted in the graded area at ER Site 63B. ER Site 63A was used to conduct PDSP tests. View is to the east-northeast.

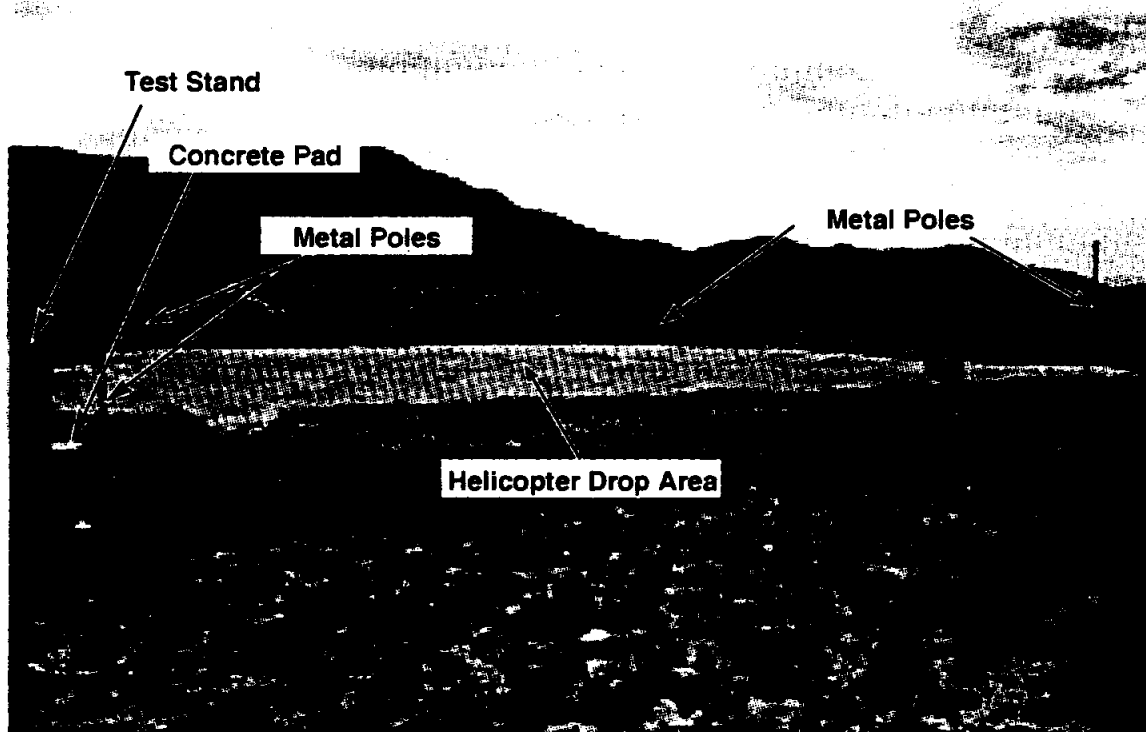


Figure 2-2b.

Photograph of graded, helicopter drop area of ER Site 63B in summer 1994. The four metal poles used to support the net during drop tests are identified. View is to the northwest.

Figure 2-2 ER Sites 63B, Balloon/Helicopter Site, Photographs

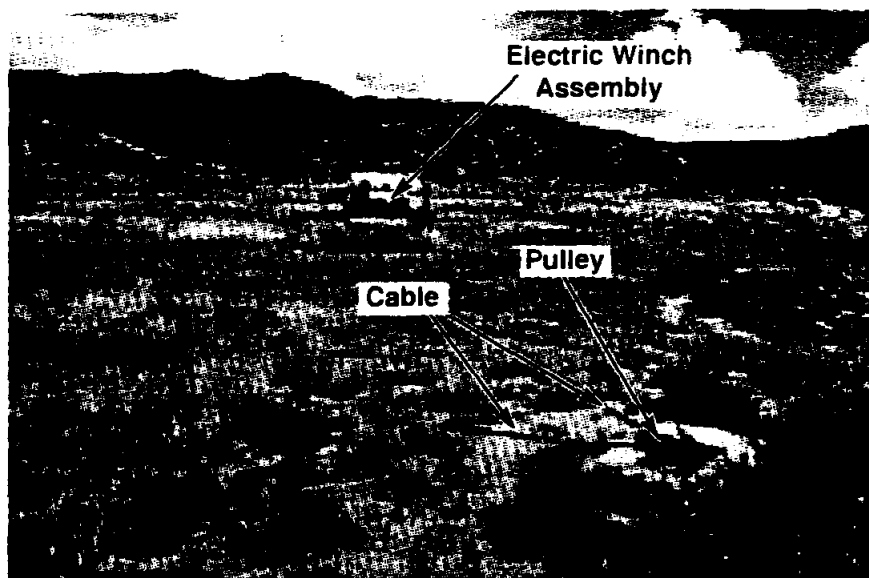


Figure 2-2c.

Photograph (summer 1994) of the electric winch assembly, cable, and one of the pulleys used to adjust the net in the helicopter drop tests performed at ER Site 63B. View is to the east.

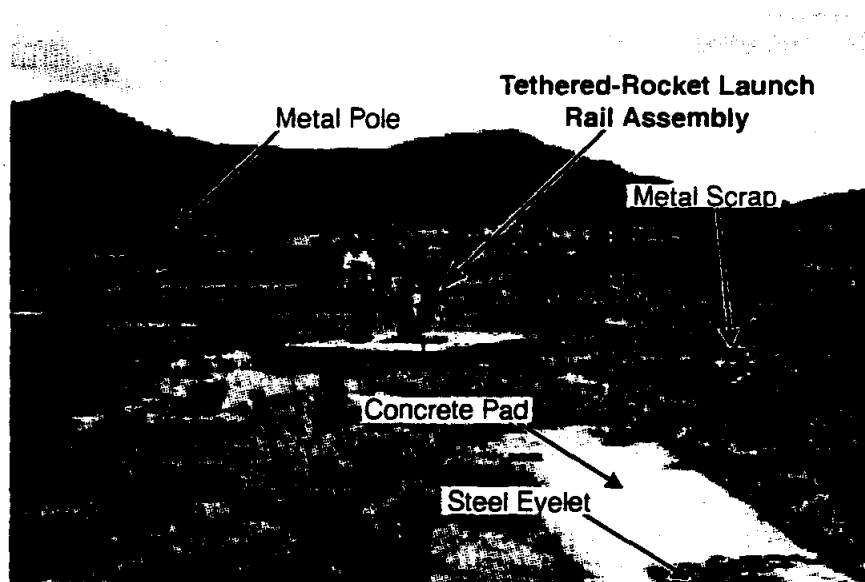


Figure 2-2d.

Photograph (summer 1994) of the rocket launch rail assembly used in the tethered-rocket tests performed at ER Site 63B and concrete pad with steel eyelet. View is to the southwest.

Figure 2-2 ER Site 63B, Balloon/Helicopter Site, Photographs

prior to testing by replacing the warhead with telemetry instruments that used visual recognition to look for targets (SNL/NM [n.d.] [Ref. 63-12], SNL/NM EORC 1995). An unknown number of balloon drop tests were conducted over a 6- to 8-week period in August and September 1984. This test series ended in September 1984, when the balloon broke free of its tethers during a wind storm and crashed east of the site. After the destruction of the balloon, a helicopter was used to conduct the drop tests (SNL/NM [n.d.] [Ref. 63-12], SNL/NM EORC 1995).

Based upon the December 1984 to February 1985 dates engraved into the concrete foundations located at the current helicopter drop area (SNL/NM August 1994), it is assumed that the balloon drop area was succeeded by the current helicopter drop area (Figure 2-1) in early 1985. No available records discuss whether any drop test activities may have occurred between 1985 and 1987.

Test records (Section 6.1) do exist for 46 helicopter drop tests that were conducted between 1987 and 1990 to investigate the effectiveness of a parachute antitank weapon called the Sidearm (DOE September 1987, SNL/NM EORC 1995). The Sidearm weapon, about the size of a coffee can, was made inert prior to testing by replacing the warhead with telemetry instruments (SNL/NM [n.d.] [Ref. 63-12], SNL/NM EORC 1995). A vortex-ring parachute was used to slow the terminal velocity of the unit to 70 ft per second and to make the unit spin and hang at an oblique angle to facilitate searching for targets (i.e., tanks) in a 500-ft-diameter circle. This series of drop tests were concluded in 1990.

Test engineers who conducted the drop tests stated that explosives were never used in the balloon or helicopter drop tests at ER Site 63B and that the inert test units contained no hazardous, radioactive, or explosive components (SNL/NM [n.d.] [Ref. 63-12], SNL/NM EORC 1995).

2.1.2 Tethered-Rocket Tests

Twelve tethered-rocket tests were conducted at the helicopter drop area (Figure 2-1) in 1989 and 1990 (Section 6.1). These were proof-of-concept tests designed to study the high-velocity impact of steel and aluminum materials using HVAR and Zuni rockets. The test unit was mounted on a steeply inclined rocket launch rail assembly (Figure 2-2d) and was tethered to a swivel anchor located approximately 200 ft to the east (Figure 2-1). The tethered rockets were guided by the steeply inclined launch rail for the first 5 to 6 ft of flight and then followed an arcing path to the impact area in the northeastern portion of the graded area (Figure 2-1). No hazardous or radioactive materials were reported to be associated with the tests. However, the exhaust of the HVAR rocket contains a trace amount of lead (Table 2-2). It is not known how many of the 12 tests were conducted with HVAR rockets (SNL/NM EORC 1995).

Zuni and HVAR rocket propellant exhaust is composed primarily of carbon dioxide, carbon monoxide, water, hydrogen, and nitrogen (Table 2-2). Most of these combustion products would disperse as gases and aerosols, with some particulate possibly remaining in the launch pad areas. Because HVAR rocket exhaust contains a trace amount of lead (Table 2-2), small releases of lead may have occurred when this rocket was fired. However, the amount of

Table 2-2
Exhaust Components from Typical Rocket Motors^a

Rocket Motor	Components Expressed as Weight Percent					
	Carbon dioxide	Carbon monoxide	Water	Hydrogen gas	Nitrogen	Other
Zuni	11.6	42.0	21.2	13.2	11.9	0.1 unspecified
HVAR	7.3	44.7	14.1	23.5	9.0	0.7 potassium oxide 0.68 sulfur dioxide 0.07 lead

^aModified from Table 2 in SNL/NM EORC 1995 and Table 12 in DOE September 1992.

residual lead associated with the rocket exhaust at ER Site 63B is believed to be negligible. There are no other COCs in the particulate derived from the rocket propellant exhaust.

2.2 Previous Audits, Inspections, and Findings

ER Site 63 was identified during investigations conducted under the Comprehensive Environmental Assessment and Response Program (CEARP) (DOE September 1987). The CEARP report noted that site operations involved dropping test units from a hot-air balloon, but no residues are expected to exist from these operations. The CEARP report also stated that the balloon test area was used for studying metallic particulate clouds in reference to ER Site 63A and the PDSP tests. These studies used high explosives (HE) to produce fine particles of aluminum, iron, depleted uranium, and cerium. The Comprehensive Environmental Response, Compensation, and Liability Act finding was uncertain for Federal Facility Site Discovery and Identification Findings, Preliminary Assessment, and Preliminary Site Inspection; and insufficient information precluded calculating a Hazard Ranking System score.

3.0 EVALUATION OF RELEVANT EVIDENCE

3.1 Unit Characteristics and Operating Practices

The helicopter drop area (graded area), the three balloon tether-line roads, the four drop test net support poles, the electric winch assembly, metal scrap and a test stand, the tethered-rocket launch rail assembly and swivel anchor, and several concrete pads are the only physical evidence associated with past activities. While the graded area has been maintained free of vegetation through the routine application of herbicide, the site is inactive. Since the discontinuance of herbicide application, vegetation is returning to the graded area. There is no visual evidence of explosives cratering, shrapnel dispersion, or structural damage, indicating that no explosives activities took place at ER Site 63B. This is supported by six historical aerial photographs that show that no other activities or structures were present at ER Site 63B between 1975 and 1991 (SNL/NM August 1994). A partially buried green 55-gallon drum was identified by the NMED's DOE Oversight Bureau located outside the ER Site 63B boundary along the southwest Tethered-Line Road next to the arroyo channel (NMED April 28, 1997). It is unknown whether the drum is associated with previous activities at ER Site 63B.

3.2 Results of SNL/NM ER Project Sampling/Surveys

3.2.1 Summary of Prior Investigations

In preparing to request a confirmatory sampling NFA decision for ER Site 63B, a background study was conducted to collect available and relevant site information. Background information sources included existing records and reports of site activity. Interviews were conducted with SNL/NM staff as well as with contractors familiar with site operational history. The study was completely documented and has provided traceable references that sustain the integrity of this proposal.

The following sources of information, presented in chronological order, were used to evaluate ER Site 63B:

- One preliminary radiological survey conducted in 1993 (SNL/NM EORC 1995)
- Six historical aerial photographs spanning sixteen years (1975–1991) (SNL/NM August 1994)
- An unexploded ordnance (UXO)/HE surface survey (SNL/NM September 1994)
- Surface radiological surveys (RUST Geotech Inc. December 1994)
- Ten interviews with six current and retired facility personnel (SNL/NM EORC 1995)

- Photographs and field notes from numerous site inspections conducted by SNL/NM staff (SNL/NM EORC 1995)
- Scoping soil sampling (SNL/NM October 1995)
- An archaeological/cultural resources survey (SNL/NM March 1996) and a sensitive species survey (IT February 1995)
- Confirmatory soil sampling conducted in July 1997

3.2.2 UXO/HE Survey of ER Site 63B

In October 1993, KAFB Explosive Ordnance Disposal conducted a visual survey for UXO/HE on the ground surface of ER Sites 63A and 63B. Ordnance debris found included one expended igniter and three expended shoulder-fired Redeye or SA-7 missile launch motors (SNL/NM September 1994). These items are probably associated with ongoing KAFB war-game activities.

3.2.3 Summary of Radiological Surveys of ER Site 63B

In December 1993, RUST Geotech Inc. conducted a surface gamma radiation survey at ER Sites 63A and 63B. No areas of gamma activity greater than 30 percent above natural background levels (9 to 13 microroentgens per hour [$\mu\text{R/hr}$]) were measured (RUST Geotech Inc. December 1994).

A May 1993 surface gamma radiation survey conducted by the SNL/NM Radiation Protection Office covered the southwestern portion of ER Site 63B as well as the entry and access roads to the site. The beta/gamma survey was conducted at the site prior to entry of Sitewide Hydrologic Characterization Project personnel conducting arroyo characterization studies at the location. At the time of the arroyo studies (1993), the information available concerning previous testing at ER Site 63B and upgradient from the area surveyed was not as complete as currently available information. All gamma activity was within the background range concentration levels of 8 to 12 $\mu\text{R/hr}$. Four soil samples were collected during the survey and were submitted for gamma spectral analysis. One of the samples was obtained from ER Site 63B (Figure 2-1). The range of activity of uranium-238 and thorium-232 in these samples was 0.6 to 0.9 picocuries per gram (pCi/g) and 0.8 to 1.2 pCi/g, respectively (SNL/NM EORC 1995). These activities lie within the observed background range concentration levels of activity reported for uranium-238 (0.006 to 2.1 pCi/g) and thorium-232 (0.23 to 1.2 pCi/g) in soils present at SNL/NM (IT October 1994).

3.2.4 Summary of Cultural Resources Survey of ER Site 63B

A survey of cultural resources was conducted in 1994 in support of the sitewide Environmental Assessment. ER Site 63 contains a prehistoric surface structure and associated dense scatter of artifacts. The site is thought to be a Coalition Period habitation site (SNL/NM March 1996).

3.2.5 Summary of Sensitive Species Survey of ER Site 63B

A sensitive species survey was conducted at ER Site 63B on June 21, 1994. At the time of the survey, the site had been cleared of vegetation. The vegetated outer perimeter of the site is comprised principally of grassland dominated by blue grama. No sensitive species were found during the survey of ER Site 63B (IT February 1995).

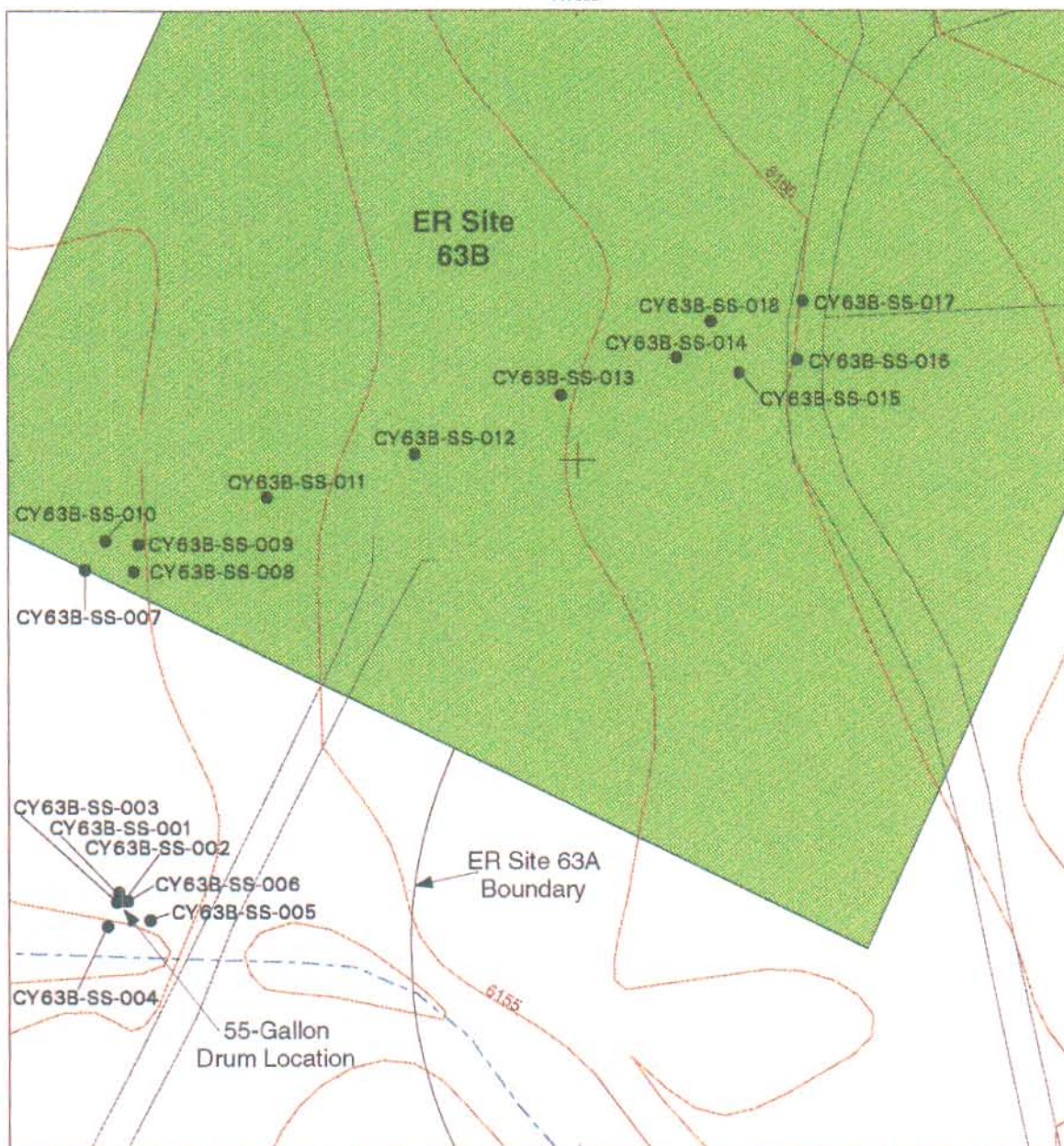
3.2.6 Summary of Confirmatory Sampling of ER Site 63B

Confirmatory soil sampling was conducted at 12 locations at ER Site 63B in July 1997, in accordance with the sampling plan reviewed by the NMED DOE Oversight Bureau (SNL/NM July 1997, NMED DOE OB July 1997a). Four soil samples (CY-63B-SS-007 through CY-63B-SS-010) were collected from the rocket launch area in the southwestern portion of the site. Four soil samples (CY-63B-SS-011 through CY-63B-SS-014) were collected parallel to the length of the northeastward rocket trajectory. Four samples (CY-63B-SS-015 through CY-63B-SS-018) were collected around the perimeter of the rocket impact area. All sample locations are shown on Figure 3-1 and were selected at sites most likely to contain residual lead in the soil from rocket exhaust. The samples were collected from a depth interval of 0 to 0.5 ft using the spade-and-scoop method (SNL/NM January 1995) and were analyzed for lead at an off-site laboratory using U.S. Environmental Protection Agency (EPA) Methods 6010A/3050 (EPA November 1986). Three composited samples (CY-63B-SS-007-010, CY-63B-SS-011-014, and CY-63B-SS-015-018) were also analyzed using gamma spectroscopy to verify radioactivity levels prior to releasing samples to the off-site laboratory (Section 6.1).

Lead concentrations in the surface soil at ER Site 63B range from 8.04 to 12.1 mg/kg, which is below the Canyons' Background study 95th-percentile concentration of 18.9 (IT July 1997). The gamma spectroscopy results are representative of background radionuclide concentrations. All results for uranium and thorium series as well as for Cs-137 were at concentrations less than the background concentration values provided in the Canyons' Background study (NMED DOE OB July 1997b) (Section 6.2). Table 3-1 summarizes all analytical data from the ER Site 63B confirmatory sampling.

Quality Assurance/Quality Control Results

As part of the ER Site 63B confirmatory sampling effort, several quality assurance (QA)/quality control (QC) samples were analyzed at the off-site contracted laboratory. All data were

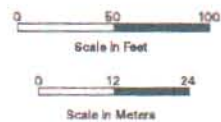


447600

Legend

- Environmental Sample
- Road
- 5 Foot Contour
- Surface Drainage
- OU 1333
ER Site 63B

Figure 3-1
Soil Sampling Locations
at ER Site 63B



Sandia National Laboratories, New Mexico
Environmental Geographic Information System

Table 3-1
Summary of Site 63B Confirmatory Soil Sample Lead Analytical Results, July 1997

Sample Attributes			Lead (EPA Methods 6010A/3050 ^a) (mg/kg)	
Sample Number	ER Sample ID	Depth (ft)	Result	Reporting Limit
028300 ^b	CY-63B-SS-007	0-0.5	13.1	0.481
028512	CY-63B-SS-008	0-0.5	9.21	0.481
030103	CY-63B-SS-009	0-0.5	11.2	0.490
030104	CY-63B-SS-010	0-0.5	12.1	0.476
028513 ^b	CY-63B-SS-011	0-0.5	8.40	0.472
028516	CY-63B-SS-012	0-0.5	8.68	0.481
028528	CY-63B-SS-013	0-0.5	8.55	0.490
028529	CY-63B-SS-014	0-0.5	8.77	0.485
028530 ^b	CY-63B-SS-015	0-0.5	9.13	0.490
028531	CY-63B-SS-016	0-0.5	8.04	0.463
028532	CY-63B-SS-017	0-0.5	10.1	0.490
028533	CY-63B-SS-018	0-0.5	9.00	0.485
Quality Assurance/Quality Control Samples—Soil (mg/kg)				
028514 (duplicate)	CY-63B-SS-011	0-0.5	8.38	0.490
028515 (MS/MSD)	CY-63B-SS-011	0-0.5	8.18	0.481
Canyons Background UTLs/95th-Percentile Concentrations ^c (mg/kg)			18.9	
Quality Assurance/Quality Control Sample—Water (mg/L)				
028535 (equipment blank)	CY-63B-SS-011-EB	NA	0.00363J	0.00500

^a EPA November 1986.

^b Sample analyzed using gamma spectroscopy.

^c IT July 1997.

J - The concentration in the sample was below the reporting limit but equal to or above the effective detection limit.

mg/kg - Milligrams per kilogram.

mg/L - Milligrams per liter.

MS/MSD - Matrix spike/matrix spike duplicate.

NA - Not applicable.

ND - Not detected at the minimum detection limit.

U - The concentration in the sample was below the effective detection limit.

UTL - Upper tolerance limit.

µg/L - Micrograms per liter.

reviewed and verified/validated according to "Data Verification/Validation Level 2—DV-2," in Attachment B of the Technical Operating Procedure 94-03, Rev. 0 (SNL/NM July 1994b). The equipment rinsate blank (CY-63B-SS-011-EB) that checks the sampling equipment decontamination procedure was also analyzed for lead using EPA Methods 6010A/3050 (EPA November 1986) and contained 0.00363 milligrams per liter (mg/L) lead. The J qualifier was below the reporting limit but equal to or greater than the effective detection limit for the analysis. Based on this analysis, the equipment decontamination was conducted appropriately. Laboratory quality control results concurrently analyzed with the samples included laboratory control samples, method blanks, and matrix spikes. Measures for accuracy and precision were within laboratory control limits for all parameters. The method blanks were nondetectable at detection limits listed in the attached analytical report. QC results were in control and are viewed as acceptable.

3.2.7 Drum Removal and Soil Sampling

On June 27, 1997, the partially buried 55-gallon drum was removed from its location near ER Site 63B, sampled for waste characterization, and overpacked for shipment to a permitted off-site facility for final waste disposition (Figure 3-2a). The drum surface was corroded and several areas of soil staining near the drum were recorded (Figure 3-2b). The drum contained approximately 3 gallons of an unknown black liquid. Using the HazCat Chemical Identification System, the liquid was identified as a fuel oil mixture (Rinchem July 1997). Another sample of the mixture was sent to an off-site laboratory for total petroleum hydrocarbon analysis and comparison to a kerosene standard using EPA Method 8015 (EPA November 1986) and gas chromatograph/flame ionization detector, respectively. The sample contained 101,000 mg/kg total petroleum hydrocarbons and did not match the kerosene profile. Based upon the on-site HazCat results and off-site laboratory results, the unknown liquid is probably a diesel fuel mixture. Following drum removal and excavation of approximately 0.25 yard of soil with apparent staining, the soil beneath the former drum location was screened for TPH and VOCs at the on-site laboratory on July 15, 1977, and then sampled on July 24, 1997, to verify clean closure (Figure 3-2c). Soil samples CY-63B-SS-001 through CY-63B-SS-006 were collected in and near the excavation (Figure 3-1) from a depth interval of 0 to 0.5 ft using the spade-and-scoop method (SNL/NM January 1995). The samples were analyzed at an off-site contracted laboratory for volatile organic compounds (VOC) and for total petroleum hydrocarbons (diesel range organics) using EPA Methods 8260 and 8015, respectively (EPA November 1986). All samples contained acetone and methylene chloride ranging from below the reporting limit to a maximum of 70.1 micrograms per kilogram ($\mu\text{g/kg}$) of acetone and 44.4 $\mu\text{g/kg}$ of methylene chloride in sample CY-63B-SS-001. Table 3-2 summarizes all analytical data from confirmatory samples sent to the off-site contracted laboratory. The concentration levels of total petroleum hydrocarbons ranged from 0.435 (CY-63B-SS-002) to 48.4 mg/kg (CY-63B-SS-001, duplicate), all below the New Mexico action level of 100 mg/kg (NMED December 1995).



Figure 3-2a. Photograph of 55-gallon diesel oil drum removed from ER Site 63B in June 1997.



Figure 3-2b. Photograph of 55-gallon diesel oil drum prior to overpacking and removal from ER Site 63B in June 1997.

**Figure 3-2
Site 63B Photographs**



Figure 3-2c. Photograph of soil area beneath 55-gallon diesel oil drum at ER Site 63B. The drum was removed from the site in June 1997.

**Figure 3-2
Site 63B Photographs**

Table 3-2
Summary of Site 63B Drum Removal Confirmatory Soil Sample
Organic Analytical Results, July 1997

Sample Attributes			VOCs (EPA Method 8260 ^a) (µg/kg)		TPH—Diesel Range Organics (EPA Method 8015 ^a) (mg/kg)	
Sample Number	ER Sample ID	Depth (ft)	Acetone	Methylene Chloride	Result	Reporting Limit
033911	CY-63B-SS-001	0-0.5	70.1 TB	44.4 TB	27.3 B	6.49
033913	CY-63B-SS-002	0-0.5	8.92 TB	22.3 TB	0.435 J,B	0.654
033914	CY-63B-SS-003	0-0.5		2.01 J,TB	1.58 B	0.649
033915	CY-63B-SS-004	0-0.5	4.18 J,TB	3.78 J,TB	1.46 B	0.667
033916	CY-63B-SS-005	0-0.5	19.0 TB	23.5 TB	1.80 B	0.660
033917	CY-63B-SS-006	0-0.5	2.49 J,TB	4.02 J,TB	31.8 B	6.47
Quality Assurance/Quality Control Samples—Soil (µg/kg)						
033912	CY-63B-SS-001 (duplicate)	0-0.5	30.8	8.96	48.4 B	6.49
033919	CY-63B-SS-007-TB (trip blank)	NA	76.6	11.5		
			2-butanone	Styrene		
			18.1	1.60 J		
			Toluene			
			1.19 J			
033918	CY-63B-SS-001-EB (equipment blank)	NA			0.0135 J,B	0.0200

^a EPA November 1986.

B - The concentration of the compound is detected in the blank above the effective method detection limit.

J - The concentration in the sample was below the reporting limit but equal to or above the effective detection limit.

mg/kg - Milligrams per kilogram.

mg/L - Milligrams per liter.

NA - Not applicable.

TB - The concentration of the compound is detected in the trip blank above the effective method detection limit.

VOC - Volatile organic compounds.

µg/L - Micrograms per liter.

QA/QC Results

As part of the ER Site 63B clean closure verification effort, several QA/QC samples were collected and analyzed at the off-site contracted laboratory. All data were reviewed and verified/validated according to "Data Verification/Validation Level 2—DV-2," in Attachment B of Technical Operating Procedure 94-03, Rev. 0 (SNL/NM July 1994b). The equipment rinsate blank (CY-63B-SS-001-EB) that checks the sampling equipment decontamination procedure was analyzed for total petroleum hydrocarbons using EPA Method 8015 (EPA November 1986) and contained 0.0135 mg/L with the J qualifier, which indicates that the concentration was below the reporting limit but equal to or greater than the effective detection limit. The low concentration of total petroleum hydrocarbon in the equipment rinsate indicates that the equipment decontamination was conducted adequately. A soil trip blank (CY-63B-SS-007-TB) was shipped with the samples to the off-site laboratory to provide information regarding possible VOCs cross-contamination during shipping and in the laboratory. Detections in this sample included 2-butanone (18.1 µg/kg), acetone (76.6 µg/kg), methylene chloride (11.5 µg/kg), styrene (1.60 µg/kg), and toluene (1.195 µg/kg). Because of these soil trip blank results, the VOCs detections in all the soil samples should be considered nondetects as part of the DV-2 validation process.

3.3 Gaps in Information

There are no records that indicate that hazardous waste or constituents were released or disposed of at ER Site 63B. However, solid rocket propellant containing a trace amount of lead was used at the site. The only potential COC at ER Site 63B would be the trace concentrations of lead from the HVAR rocket propellant exhaust (DOE September 1992, SNL/NM EORC 1995). The confirmatory sampling investigation was developed to address whether any residual lead remains in the surface soil from the tethered rocket test. In addition, the drum removal and sampling addresses potential impacts from the drum at the site. No additional data gaps remain that might affect an NFA decision (Table 3-1).

4.0 RATIONALE FOR A NO FURTHER ACTION DECISION

Based upon process knowledge and field investigation data, an NFA decision is recommended for ER Site 63B for the following reasons:

- No radionuclides were detected during the field-screening program.
- Gamma spectroscopy results were within background activity levels.
- Lead concentration were not detected above the SNL/NM background concentration levels.
- Concentrations of VOCs in soil remaining beneath the formerly buried drum are nondetectable.
- Concentration of residual TPH is below the New Mexico background concentration level.

Based upon the evidence provided above, ER Site 63B is proposed for an NFA decision in conformance with Criterion 3 of the DOU (NMED April 1996), which states that no release to the environment has occurred.

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6.0 ANNEXES

6.1 New Aerial Cable Site Logbook, ER Site 63: Balloon Test Area 1987–1990

This appendix has been compiled to identify the tests conducted at Environmental Restoration (ER) Site 63B, which were recorded in the logbook entitled "Sandia National Laboratories New Cable Site Facility Log" (81-110) and dated October 22, 1986, through November 6, 1994. All information from the logbook is included in this appendix except the following: the R-number, the consultant organization, the test engineer, the laser tracker file, the wind speed and direction, the temperature, the barometric pressure, miscellaneous remarks, and the console operator. Sandia National Laboratories/New Mexico (SNL/NM) staff were consulted to assist in categorizing the tests, which were recorded in the logbook (SNL/NM [n.d.] [Ref. 81-110]). Any tests not identified as belonging to test programs at ER Site 81, New Aerial Cable Site, were assigned to ER Site 63, Balloon/Helicopter Site. SNL/NM staff also assisted in grouping the test programs at ER Site 63 into the following two major test types:

- Parachute/helicopter drop tests
- Tethered rocket tests

Section 2.3 of this proposal provides additional detail on some of these tests.

Reference

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New Aerial Cable Site Logbook—
ER Site 63: Balloon Test Area
(1987 to 1990)

Test Title	Test Number	Year	Day/Month	Number of Tests
Parachute, drop	1136	1987	18 Jun	1
Parachute, drop	1137	1987	18 Jun	1
Parachute, drop	1138	1987	18 Jun	1
Parachute, drop	1139	1987	18 Jun	1
HELO parachute drop	1331	1988	24 May	1
HELO parachute drop	1332	1988	24 May	1
ART, parachute	1531	1988	1 Dec	1
ART, parachute	1532	1988	1 Dec	1
ART, parachute	1533	1988	1 Dec	1
ART, parachute	1534	1988	1 Dec	1
Parachute, F111	1731	1989	27 Oct	1
Parachute, F111	1734	1989	14 Nov	1
Parachute, F111	1735	1989	14 Nov	1
Parachute, F111	1736	1989	14 Nov	1
Parachute, F111	1987	1990	22 Jun	1
Parachute, F111	1988	1990	22 Jun	1
Ram Air Parachute	2003	1990	17 Sep	1
Ram Air Parachute	2004	1990	17 Sep	1
Ram Air Parachute	2005	1990	17 Sep	1
Ram Air Parachute	2006	1990	18 Sep	1
Ram Air Parachute	2007	1990	18 Sep	1
Ram Air Parachute	2008	1990	18 Sep	1
Ram Air Parachute	2009	1990	18 Sep	1
Ram Air Parachute	2010	1990	18 Sep	1
Ram Air Parachute	2011	1990	18 Sep	1
Ram Air Parachute	2012	1990	18 Sep	1
Ram Air Parachute	2013	1990	18 Sep	1
Ram Air Parachute	2014	1990	19 Sep	1
Ram Air Parachute	2015	1990	19 Sep	1

New Aerial Cable Site Logbook— (Continued)
ER Site 63: Balloon Test Area
(1987 to 1990)

Test Title	Test Number	Year	Day/Month	Number of Tests
Ram Air Parachute	2017	1990	19 Sep	1
Ram Air Parachute	2018	1990	20 Sep	1
Ram Air Parachute	2019	1990	20 Sep	1
Ram Air Parachute	2020	1990	20 Sep	1
Ram Air Parachute	2021	1990	20 Sep	1
Ram Air Parachute	2022	1990	20 Sep	1
Ram Air Parachute	2023	1990	20 Sep	1
Ram Air Parachute	2024	1990	21 Sep	1
Ram Air Parachute	2025	1990	21 Sep	1
Ram Air Parachute	2026	1990	21 Sep	1
Ram Air Parachute	2027	1990	21 Sep	1
Ram Air Parachute	2028	1990	21 Sep	1
Ram Air Parachute	2029	1990	21 Sep	1
Ram Air Parachute	2030	1990	21 Sep	1
Ram Air Parachute	2031	1990	21 Sep	1
Ram Air Parachute	2032	1990	21 Sep	1
Tethered Rocket	1650	1989	9 May	1
Tethered Rocket	1651	1989	10 May	1
Tethered Rocket	1652	1989	10 May	1
Tethered Rocket	1653	1989	12 May	1
Tethered Rocket	1778	1990	22 Jan	1
Tethered Rocket	1780	1990	25 Jan	1
Tethered Rocket	1781	1990	6 Feb	1
Tethered Rocket	1782	1990	8 Feb	1
Tethered Rocket	1784	1990	16 Feb	1
Tethered Rocket	1787	1990	1 Mar	1
Tethered Rocket	1790	1990	15 Mar	1
Tethered Rocket	1792	1990	22 Mar	1



Sandia National Laboratories

Operated for the U.S. Department of Energy by
Sandia Corporation

Albuquerque, New Mexico 87185-1132

date: August 6, 1997

to: Devon Jercinovic, MS-1147 (6682)


from: Craig D. Brown (Environmental Dimensions Inc.), MS-1132 (7527)

subject: Review of Radiological Data for ER Site 63B

I have reviewed the gamma spectroscopy data associated with AR/COC 06834. The data consisted of three samples (sample numbers 028300-004, 028513-004, 028530-004,) that were taken for site characterization.

Based on the above review, and assuming that the samples adequately characterize the site, it appears that site characterization samples are representative of background radionuclide concentrations and that no radioactive contamination exists on site. All results for uranium and thorium series, as well as Cs-137, were less than the background values provided in the Canyons area background study.

Please let me know if you have any questions.

Copy to:

MS1147 Sharissa Young (6682)
Correspondence File: 97037.doc

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 7-18-97 12:37:10 PM *

 *
 * Analyzed by: *J 7/18/97* Reviewed by: *SA 7/18/97* *

Customer : S.YOUNG/MAC (6682/SMO)
 Customer Sample ID : 028300-004
 Lab Sample ID : 70124301

Sample Description : MARINELLI SOIL SAMPLE
 Sample Quantity : 694.000 gram
 Sample Date/Time : 7-17-97 10:21:00 AM
 Acquire Start Date/Time : 7-18-97 10:51:57 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	7.73E-01	1.17E+00	1.89E+00
TH-234	Not Detected	-----	5.15E-01
RA-226	1.93E+00	5.89E-01	6.21E-01
PB-214	9.42E-01	1.73E-01	5.63E-02
BI-214	8.76E-01	2.58E-01	5.26E-02
TH-232	8.50E-01	4.57E-01	1.85E-01
RA-228	Not Detected	-----	1.78E-01
AC-228	9.54E-01	2.47E-01	1.21E-01
TH-228	7.07E-01	3.74E-01	4.56E-01
RA-224	8.87E-01	3.48E-01	1.09E-01
PB-212	1.04E+00	1.70E-01	4.64E-02
BI-212	9.73E-01	4.27E-01	3.93E-01
TL-208	8.55E-01	2.12E-01	8.49E-02
U-235	9.11E-02	1.72E-01	2.40E-01
TH-231	Not Detected	-----	9.97E+00
PA-231	Not Detected	-----	1.65E+00
TH-227	Not Detected	-----	4.39E-01
RA-223	Not Detected	-----	1.69E-01
RN-219	Not Detected	-----	4.68E-01
PB-211	Not Detected	-----	1.06E+00
TL-207	Not Detected	-----	1.73E+01
AM-241	Not Detected	-----	2.12E-01
PU-239	Not Detected	-----	4.05E+02
NP-237	Not Detected	-----	3.28E-01
PA-233	Not Detected	-----	6.66E-02
TH-229	Not Detected	-----	2.25E-01

not detected J 7/18/97

[Summary Report] - Sample ID: : 70124301

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	5.12E-02
AG-110m	Not Detected	-----	5.84E-02
BA-133	Not Detected	-----	6.89E-02
BE-7	2.32E-01	1.39E-01	1.76E-01
CD-109	1.13E+00	4.78E-01	7.23E-01
CD-115	Not Detected	-----	1.05E-01
CE-139	Not Detected	-----	3.02E-02
CE-141	Not Detected	-----	5.33E-02
CE-144	Not Detected	-----	2.15E-01
CO-56	Not Detected	-----	4.86E-02
CO-57	Not Detected	-----	2.70E-02
CO-58	Not Detected	-----	4.08E-02
CO-60	Not Detected	-----	4.55E-02
CR-51	Not Detected	-----	2.72E-01
CS-134	Not Detected	-----	5.29E-02
CS-137	2.36E-01	3.65E-01	3.13E-02
EU-152	Not Detected	-----	8.18E-02
EU-154	Not Detected	-----	2.37E-01
EU-155	Not Detected	-----	1.27E-01
FE-59	Not Detected	-----	9.23E-02
GD-153	Not Detected	-----	9.30E-02
HG-203	Not Detected	-----	3.73E-02
I-131	Not Detected	-----	3.71E-02
IR-192	Not Detected	-----	3.25E-02
K-40	1.62E+01	2.54E+00	3.50E-01
MN-52	Not Detected	-----	4.70E-02
MN-54	Not Detected	-----	4.38E-02
MO-99	Not Detected	-----	3.86E-01
NA-22	Not Detected	-----	5.02E-02
NA-24	Not Detected	-----	1.20E-01
NB-95	Not Detected	-----	2.24E-01
ND-147	Not Detected	-----	2.68E-01
NI-57	Not Detected	-----	1.06E-01
PB-210	Not Detected	-----	9.24E+00
RU-103	Not Detected	-----	3.66E-02
RU-106	Not Detected	-----	3.70E-01
SB-122	Not Detected	-----	6.45E-02
SB-124	Not Detected	-----	3.68E-02
SB-125	Not Detected	-----	1.03E-01
SN-113	Not Detected	-----	4.65E-02
SR-85	Not Detected	-----	4.65E-02
TA-182	Not Detected	-----	2.03E-01
TA-183	Not Detected	-----	2.07E-01
TC-99m	Not Detected	-----	4.74E-01
TL-201	Not Detected	-----	1.51E-01
XE-133	Not Detected	-----	1.51E-01
Y-88	Not Detected	-----	3.50E-02
ZN-65	Not Detected	-----	1.39E-01
ZR-95	Not Detected	-----	7.36E-02

not detected 7/18/97

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 7-18-97 12:41:44 PM *

 *
 * Analyzed by: *[Signature]* 7/18/97 Reviewed by: *[Signature]* 7/18/97 *

Customer : S.YOUNG/MAC (6682/SMO)
 Customer Sample ID : 028513-004
 Lab Sample ID : 70124302

Sample Description : MARINELLI SOIL SAMPLE
 Sample Quantity : 721.000 gram
 Sample Date/Time : 7-17-97 10:06:00 AM
 Acquire Start Date/Time : 7-18-97 10:56:33 AM
 Detector Name : LAB04
 Elapsed Live/Real Time : 6000 / 6004 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	9.39E-01	8.75E-01	1.27E+00
TH-234	1.27E+00	3.73E-01	4.54E-01
RA-226	2.09E+00	5.56E-01	5.28E-01
PB-214	8.64E-01	1.44E-01	4.51E-02
BI-214	8.13E-01	1.52E-01	4.22E-02
TH-232	8.69E-01	4.11E-01	1.40E-01
RA-228	1.00E+00	2.60E-01	1.44E-01
AC-228	8.58E-01	2.07E-01	7.80E-02
TH-228	8.75E-01	2.50E-01	4.53E-01
RA-224	9.96E-01	3.37E-01	1.16E-01
PB-212	9.83E-01	1.58E-01	3.75E-02
BI-212	1.18E+00	4.34E-01	2.99E-01
TL-208	8.68E-01	1.78E-01	5.81E-02
U-235	Not Detected	-----	2.14E-01
TH-231	Not Detected	-----	9.74E+00
PA-231	Not Detected	-----	1.41E+00
TH-227	Not Detected	-----	3.62E-01
RA-223	Not Detected	-----	1.65E-01
RN-219	Not Detected	-----	3.63E-01
PB-211	Not Detected	-----	8.27E-01
TL-207	2.86E+00	3.10E+00	5.14E+00
AM-241	Not Detected	-----	2.54E-01
PU-239	Not Detected	-----	3.71E+02
NP-237	Not Detected	-----	2.23E-01
PA-233	Not Detected	-----	5.85E-02
TH-229	Not Detected	-----	2.14E-01

[Summary Report] - Sample ID: : 70124302

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.99E-02
AG-110m	Not Detected	-----	3.18E-02
BA-133	Not Detected	-----	6.92E-02
BE-7	Not Detected	-----	2.55E-01
CD-109	1.44E+00	4.41E-01	7.55E-01
CD-115	Not Detected	-----	8.84E-02
CE-139	Not Detected	-----	2.64E-02
CE-141	Not Detected	-----	4.74E-02
CE-144	Not Detected	-----	2.01E-01
CO-56	Not Detected	-----	2.95E-02
CO-57	Not Detected	-----	2.56E-02
CO-58	Not Detected	-----	2.98E-02
CO-60	Not Detected	-----	3.46E-02
CR-51	Not Detected	-----	2.39E-01
CS-134	Not Detected	-----	4.96E-02
CS-137	1.83E-02	1.37E-02	1.88E-02
EU-152	Not Detected	-----	7.71E-02
EU-154	Not Detected	-----	1.85E-01
EU-155	Not Detected	-----	1.20E-01
FE-59	Not Detected	-----	6.76E-02
GD-153	Not Detected	-----	9.25E-02
HG-203	Not Detected	-----	3.09E-02
I-131	Not Detected	-----	3.03E-02
IR-192	Not Detected	-----	2.75E-02
K-40	1.83E+01	2.76E+00	2.21E-01
MN-52	Not Detected	-----	3.16E-02
MN-54	Not Detected	-----	3.31E-02
MO-99	Not Detected	-----	2.91E-01
NA-22	Not Detected	-----	4.06E-02
NA-24	Not Detected	-----	1.00E-01
NB-95	Not Detected	-----	2.03E-01
ND-147	Not Detected	-----	2.10E-01
NI-57	Not Detected	-----	4.05E-02
PB-210	Not Detected	-----	9.72E+00
RU-103	Not Detected	-----	2.83E-02
RU-106	Not Detected	-----	2.77E-01
SB-122	Not Detected	-----	2.77E-02
SB-124	Not Detected	-----	2.92E-02
SB-125	Not Detected	-----	7.59E-02
SN-113	Not Detected	-----	3.49E-02
SR-85	Not Detected	-----	3.63E-02
TA-182	Not Detected	-----	1.56E-01
TA-183	Not Detected	-----	2.46E-01
TC-99m	Not Detected	-----	4.17E-01
TL-201	Not Detected	-----	1.47E-01
XE-133	Not Detected	-----	1.74E-01
Y-88	Not Detected	-----	2.26E-02
ZN-65	Not Detected	-----	1.05E-01
ZR-95	Not Detected	-----	5.52E-02

not detected 7/18/57

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 7-18-97 12:36:30 PM *

* Analyzed by: *J 7/18/97* Reviewed by: *SA 7/18/97* *

Customer : S.YOUNG/MAC (6682/SMO)
 Customer Sample ID : 028530-004
 Lab Sample ID : 70124303

Sample Description : MARINELLI SOIL SAMPLE
 Sample Quantity : 689.000 gram
 Sample Date/Time : 7-17-97 9:50:00 AM
 Acquire Start Date/Time : 7-18-97 10:52:49 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	1.49E+00	1.07E+00	1.34E+00
TH-234	1.61E+00	4.27E-01	4.53E-01
RA-226	1.61E+00	6.82E-01	5.49E-01
PB-214	9.11E-01	1.55E-01	5.31E-02
BI-214	8.62E-01	1.68E-01	5.72E-02
TH-232	8.61E-01	4.16E-01	1.61E-01
RA-228	9.28E-01	2.83E-01	1.85E-01
AC-228	9.60E-01	4.41E-01	9.67E-02
TH-228	8.97E-01	4.14E-01	4.76E-01
RA-224	1.01E+00	3.54E-01	1.38E-01
PB-212	9.20E-01	1.55E-01	4.50E-02
BI-212	1.18E+00	4.77E-01	3.94E-01
TL-208	8.70E-01	1.87E-01	8.65E-02
U-235	1.61E-01	1.56E-01	2.18E-01
TH-231	2.09E+00	3.22E+00	8.45E+00
PA-231	Not Detected	-----	1.53E+00
TH-227	Not Detected	-----	4.15E-01
RA-223	Not Detected	-----	1.40E-01
RN-219	Not Detected	-----	4.49E-01
PB-211	Not Detected	-----	1.05E+00
TL-207	Not Detected	-----	1.81E+01
AM-241	Not Detected	-----	1.77E-01
PU-239	Not Detected	-----	3.94E+02
NP-237	7.46E-01	1.86E-01	2.23E-01
PA-233	Not Detected	-----	6.61E-02
TH-229	Not Detected	-----	2.04E-01

Not detected J 7/18/97

Not detected J 7/18/97

[Summary Report] - Sample ID: : 70124303

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	5.44E-02
AG-110m	Not Detected	-----	5.03E-02
BA-133	Not Detected	-----	5.78E-02
BE-7	9.80E-02	7.15E-02	1.14E-01
CD-109	Not Detected	-----	1.00E+00
CD-115	Not Detected	-----	1.05E-01
CE-139	Not Detected	-----	2.83E-02
CE-141	Not Detected	-----	4.83E-02
CE-144	Not Detected	-----	2.08E-01
CO-56	Not Detected	-----	4.02E-02
GO-57	Not Detected	-----	2.68E-02
CO-58	Not Detected	-----	4.08E-02
CO-60	Not Detected	-----	4.03E-02
CR-51	Not Detected	-----	2.71E-01
CS-134	Not Detected	-----	6.14E-02
CS-137	1.15E-01	5.08E-02	2.68E-02
EU-152	Not Detected	-----	7.98E-02
EU-154	Not Detected	-----	2.50E-01
EU-155	Not Detected	-----	1.23E-01
FE-59	Not Detected	-----	9.15E-02
GD-153	Not Detected	-----	8.33E-02
HG-203	Not Detected	-----	3.39E-02
I-131	Not Detected	-----	3.63E-02
IR-192	Not Detected	-----	3.14E-02
K-40	1.86E+01	2.86E+00	4.21E-01
MN-52	Not Detected	-----	4.56E-02
MN-54	Not Detected	-----	4.56E-02
MO-99	Not Detected	-----	3.91E-01
NA-22	Not Detected	-----	4.91E-02
NA-24	Not Detected	-----	1.37E-01
NE-95	Not Detected	-----	2.32E-01
ND-147	Not Detected	-----	2.58E-01
NI-57	Not Detected	-----	1.05E-01
PB-210	Not Detected	-----	5.12E+00
RU-103	Not Detected	-----	3.42E-02
RU-106	Not Detected	-----	3.64E-01
SB-122	Not Detected	-----	6.07E-02
SB-124	Not Detected	-----	3.81E-02
SB-125	Not Detected	-----	1.00E-01
SN-113	Not Detected	-----	4.43E-02
SR-85	Not Detected	-----	4.46E-02
TA-162	Not Detected	-----	1.90E-01
TA-183	Not Detected	-----	1.73E-01
TC-99m	Not Detected	-----	4.50E-01
TL-201	Not Detected	-----	1.25E-01
XE-133	Not Detected	-----	1.27E-01
Y-88	Not Detected	-----	3.22E-02
ZN-65	Not Detected	-----	1.31E-01
ZR-95	Not Detected	-----	7.23E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 7-18-97 12:47:38 PM *

* Analyzed by: *J 7/18/97* Reviewed by: *SL 7/18/97* *

 Customer : S.YOUNG/MAC (6682/SMO)
 Customer Sample ID : LAB CONTROL SAMPLE USING CG134
 Lab Sample ID : 70124304

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 : 7-18-97 12:35:37 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	-----	8.75E+03
TH-234	Not Detected	-----	3.45E+03
RA-226	Not Detected	-----	5.92E+03
PB-214	Not Detected	-----	7.71E+02
BI-214	Not Detected	-----	7.27E+02
TH-232	Not Detected	-----	2.31E+03
RA-228	Not Detected	-----	3.36E+03
AC-228	Not Detected	-----	2.02E+03
TH-228	Not Detected	-----	8.22E+04
RA-224	Not Detected	-----	3.76E+03
PB-212	Not Detected	-----	6.22E+03
BI-212	Not Detected	-----	6.38E+04
TL-208	Not Detected	-----	1.26E+04
U-235	Not Detected	-----	1.58E+03
TH-231	Not Detected	-----	5.51E+04
PA-231	Not Detected	-----	1.53E+04
TH-227	Not Detected	-----	2.61E+03
RA-223	Not Detected	-----	1.00E+26
RN-219	Not Detected	-----	6.55E+03
PB-211	Not Detected	-----	1.47E+04
TL-207	Not Detected	-----	2.77E+05
AM-241	8.56E+04	1.45E+04	1.45E+03
PU-239	Not Detected	-----	2.58E+06
NP-237	Not Detected	-----	1.82E+03
PA-233	Not Detected	-----	6.80E+02
TH-229	Not Detected	-----	1.42E+03

[Summary Report] - Sample ID: : 70124304

Nuclide Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
AG-108m	Not Detected		4.22E+02
AG-110m	Not Detected		1.67E+06
BA-133	Not Detected		7.48E+02
BE-7	Not Detected		2.77E+17
CD-109	3.54E+05	1.40E+05	1.61E+05
CD-115	Not Detected		1.00E+26
CE-139	Not Detected		4.81E+07
CE-141	Not Detected		1.00E+26
CE-144	Not Detected		5.51E+05
CO-56	Not Detected		1.74E+12
CO-57	Not Detected		9.61E+04
CO-58	Not Detected		1.08E+13
CO-60	7.72E+04	1.07E+04	4.31E+02
CR-51	Not Detected		1.00E+26
CS-134	Not Detected		3.25E+03
CS-137	6.86E+04	9.21E+03	3.26E+02
EU-152	Not Detected		7.93E+02
EU-154	Not Detected		3.22E+03
EU-155	Not Detected		2.18E+03
FE-59	Not Detected		4.04E+19
GD-153	Not Detected		6.44E+05
HG-203	Not Detected		2.14E+18
I-131	Not Detected		1.00E+26
IR-192	Not Detected		3.10E+12
K-40	Not Detected		1.91E+03
MN-52	Not Detected		1.00E+26
MN-54	Not Detected		1.05E+05
MO-99	Not Detected		1.00E+26
NA-22	Not Detected		1.49E+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		6.85E+04
RU-103	Not Detected		2.60E+21
RU-106	Not Detected		3.34E+05
SB-122	Not Detected		1.00E+26
SB-124	Not Detected		6.10E+14
SB-125	Not Detected		7.20E+03
SN-113	Not Detected		1.26E+09
SR-85	Not Detected		1.02E+14
TA-182	Not Detected		3.96E+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		1.73E+09
ZN-65	Not Detected		1.18E+06
ZR-95	Not Detected		2.36E+14

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

Report Date : 7-18-97 12:48:13 PM
 QA File : C:\GENIEPC\CAMFILES\LCS1.QAF
 Analyst : FCD
 Sample ID : 70124304
 Sample Quantity : 1.00 Each
 Sample Date : 11-01-90 12:00:00 PM
 Measurement Date : 7-18-97 12:35:37 PM
 Elapsed Live Time : 600 seconds
 Elapsed Real Time : 605 seconds

Parameter	Mean	1S Error	New Value	< LU : SD : UD : BS >
AM-241 Activity	8.747E-02	2.713E-03	8.564E-02	< : : : >
CS-137 Activity	6.888E-02	1.662E-03	6.863E-02	< : : : >
CO-60 Activity	7.589E-02	2.989E-03	7.706E-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:  7/18/97

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 7-18-97 1:10:41 PM *

 *
 * Analyzed by: J 7/18/97 Reviewed by: W 7/18/97 *

 Customer : S.YOUNG/MAC (6682/SMO)
 Customer Sample ID : LAB CONTROL SAMPLE USING CG134
 Lab Sample ID : 70124305

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 : 7-18-97 12:58:39 PM
 Detector Name : LAB04
 Elapsed Live/Real Time : 600 / 607 seconds

Comments:

Nuclide Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
U-238	Not Detected	-----	2.34E+04
TH-234	Not Detected	-----	3.45E+03
RA-226	Not Detected	-----	5.63E+03
PB-214	Not Detected	-----	6.75E+02
BI-214	Not Detected	-----	6.07E+02
TH-232	Not Detected	-----	2.10E+03
RA-228	Not Detected	-----	2.53E+03
AC-228	Not Detected	-----	1.52E+03
TH-228	Not Detected	-----	7.40E+04
RA-224	Not Detected	-----	3.32E+03
PB-212	Not Detected	-----	5.27E+03
BI-212	Not Detected	-----	4.65E+04
TL-208	Not Detected	-----	1.01E+04
U-235	Not Detected	-----	1.51E+03
TH-231	Not Detected	-----	5.52E+04
PA-231	Not Detected	-----	1.37E+04
TH-227	Not Detected	-----	2.22E+03
RA-223	Not Detected	-----	1.00E+26
RN-219	Not Detected	-----	5.46E+03
PB-211	Not Detected	-----	1.23E+04
TL-207	Not Detected	-----	2.13E+05
AM-241	8.68E+04	1.46E+04	1.45E+03
PU-239	Not Detected	-----	2.45E+06
NP-237	Not Detected	-----	1.77E+03
PA-233	Not Detected	-----	6.09E+02
TH-229	Not Detected	-----	1.40E+03

[Summary Report] - Sample ID: : 70124305

Nuclide Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
AG-108m	Not Detected		3.15E+02
AG-110m	Not Detected		1.44E+06
BA-133	Not Detected		6.61E+02
BE-7	Not Detected		2.39E+17
CD-109	3.48E+05	3.24E+05	1.55E+05
CD-115	Not Detected		1.00E+26
CE-139	Not Detected		4.52E+07
CE-141	Not Detected		1.00E+26
CE-144	Not Detected		5.41E+05
CO-56	Not Detected		1.32E+12
CO-57	Not Detected		9.43E+04
CO-58	Not Detected		8.48E+12
CO-60	8.02E+04	1.08E+04	4.30E+02
CR-51	Not Detected		1.00E+26
CS-134	Not Detected		2.70E+03
CS-137	7.32E+04	9.73E+03	2.49E+02
EU-152	Not Detected		7.73E+02
EU-154	Not Detected		2.40E+03
EU-155	Not Detected		2.15E+03
FE-59	Not Detected		2.94E+19
GD-153	Not Detected		6.38E+05
HG-203	Not Detected		1.85E+18
I-131	Not Detected		1.00E+26
IR-192	Not Detected		2.80E+12
K-40	1.06E+03	8.99E+02	9.37E+02
MN-52	Not Detected		1.00E+26
MN-54	Not Detected		7.93E+04
MO-99	Not Detected		1.00E+26
NA-22	Not Detected		1.28E+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		8.15E+04
RU-103	Not Detected		2.12E+21
RU-106	Not Detected		2.84E+05
SB-122	Not Detected		1.00E+26
SB-124	Not Detected		5.03E+14
SB-125	Not Detected		5.69E+03
SN-113	Not Detected		1.07E+09
SR-85	Not Detected		8.61E+13
TA-182	Not Detected		2.93E+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		1.45E+09
ZN-65	Not Detected		8.99E+05
ZR-95	Not Detected		1.83E+14

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

Report Date : 7-18-97 1:11:20 PM
 QA File : C:\GENIEPC\CAMFILES\LCS4.QAF
 Analyst : FCD
 Sample ID : 70124305
 Sample Quantity : 1.00 Each
 Sample Date : 11-01-90 12:00:00 PM
 Measurement Date : 7-18-97 12:58:39 PM
 Elapsed Live Time : 600 seconds
 Elapsed Real Time : 607 seconds

Parameter	Mean	1S Error	New Value	< LU : SD : UD : BS >
AM-241 Activity	8.741E-02	7.785E-03	8.681E-02	< : : : >
CS-137 Activity	7.013E-02	1.820E-03	7.319E-02	< :In : : >
CO-60 Activity	7.849E-02	2.753E-03	8.029E-02	< : : : >

ok
7/18/97

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: *7/18/97*

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 7-18-97 12:57:02 PM *

* Analyzed by: *[Signature]* 7/18/97 Reviewed by: *[Signature]* 7/18/97 *

Customer : S. YOUNG/MAC (6682/SMO)
 Customer Sample ID : LAB CONTROL SAMPLE USING CG134
 Lab Sample ID : 70124306

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 : 7-18-97 12:44:34 PM
 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	-----	7.19E+03
TH-234	Not Detected	-----	2.87E+03
RA-226	Not Detected	-----	6.14E+03
PB-214	Not Detected	-----	7.93E+02
BI-214	Not Detected	-----	7.39E+02
TH-232	Not Detected	-----	2.37E+03
RA-228	Not Detected	-----	3.28E+03
AC-228	Not Detected	-----	1.92E+03
TH-228	Not Detected	-----	8.55E+04
RA-224	Not Detected	-----	4.20E+03
PB-212	Not Detected	-----	5.89E+03
BI-212	Not Detected	-----	6.22E+04
TL-208	Not Detected	-----	1.18E+04
U-235	Not Detected	-----	1.45E+03
TH-231	Not Detected	-----	4.35E+04
PA-231	Not Detected	-----	1.47E+04
TH-227	Not Detected	-----	2.49E+03
RA-223	Not Detected	-----	1.00E+26
RN-219	Not Detected	-----	6.52E+03
PB-211	Not Detected	-----	1.45E+04
TL-207	Not Detected	-----	2.60E+05
AM-241	8.82E+04	1.47E+04	1.20E+03
PU-239	Not Detected	-----	2.45E+06
NP-237	Not Detected	-----	1.51E+03
PA-233	Not Detected	-----	6.73E+02
TH-229	Not Detected	-----	1.30E+03

[Summary Report] Sample ID: : 70124306

Nuclide Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
AG-108m	Not Detected	-----	4.20E+02
AG-110m	Not Detected	-----	1.75E+06
BA-133	Not Detected	-----	7.75E+02
BE-7	Not Detected	-----	2.72E+17
CD-109	3.43E+05	1.23E+05	1.39E+05
CD-115	Not Detected	-----	1.00E+26
CE-139	Not Detected	-----	4.85E+07
CE-141	Not Detected	-----	1.00E+26
CE-144	Not Detected	-----	5.42E+05
CO-56	Not Detected	-----	1.72E+12
GO-57	Not Detected	-----	9.06E+04
CO-58	Not Detected	-----	1.10E+13
CO-60	7.88E+04	1.10E+04	4.91E+02
CR-51	Not Detected	-----	1.00E+26
CS-134	Not Detected	-----	3.15E+03
CS-137	7.05E+04	9.42E+03	3.39E+02
EU-152	Not Detected	-----	7.38E+02
EU-154	Not Detected	-----	3.18E+03
EU-155	Not Detected	-----	2.04E+03
FE-59	Not Detected	-----	3.84E+19
GD-153	Not Detected	-----	5.97E+05
HG-203	Not Detected	-----	2.05E+18
I-131	Not Detected	-----	1.00E+26
IR-192	Not Detected	-----	3.10E+12
K-40	Not Detected	-----	1.89E+03
MN-52	Not Detected	-----	1.00E+26
MN-54	Not Detected	-----	1.05E+05
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	-----	4.56E+04
RU-103	Not Detected	-----	2.51E+21
RU-106	Not Detected	-----	3.62E+05
SB-122	Not Detected	-----	1.00E+26
SB-124	Not Detected	-----	5.96E+14
SB-125	Not Detected	-----	6.88E+03
SN-113	Not Detected	-----	1.31E+09
SR-85	Not Detected	-----	9.77E+13
TA-182	Not Detected	-----	3.62E+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	-----	1.50E+09
ZN-65	Not Detected	-----	1.13E+06
ZR-95	Not Detected	-----	2.23E+14

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

Report Date : 7-18-97 12:57:42 PM
 QA File : C:\GENIEPC\CAMFILES\LCS3.QAF
 Analyst : FCD
 Sample ID : 70124306
 Sample Quantity : 1.00 Each
 Sample Date : 11-01-90 12:00:00 PM
 Measurement Date : 7-18-97 12:44:34 PM
 Elapsed Live Time : 600 seconds
 Elapsed Real Time : 607 seconds

Parameter	Mean	1S Error	New Value	< LU : SD : UD : BS >
AM-241 Activity	8.643E-02	7.342E-03	8.824E-02	< : : : >
CS-137 Activity	6.787E-02	1.621E-03	7.051E-02	< (In) : : > ok
CO-60 Activity	7.754E-02	2.693E-03	8.015E-02	< : 7/18/97 : >

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