

1-1-2000

Statement of Basis Approval of No Further Action Volume 25 of 30 January 2000, Solid Waste Management Unit 61A, Operable Unit 1334, 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 25 of 30 January 2000, Solid Waste Management Unit 61A, Operable Unit 1334, Round 11." (2000). https://digitalrepository.unm.edu/snl_complete/199

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 25 of 30**

January 2000

**Solid Waste Management Unit 61A
Operable Unit 1334
Round 11**

(RCRA Permit No. NM5890110518)

NFA Originally Submitted September 15, 1998 (Chapter 8)

**Environmental
Restoration
Project**



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



Sandia National Laboratories

**Statement of Basis
Approval of No Further Action
Volume 25 of 30**

January 2000

**Solid Waste Management Unit 61A
Operable Unit 1334
Round 11**

(RCRA Permit No. NM5890110518)

NFA Originally Submitted September 15, 1998 (Chapter 8)

**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 61A
Operable Unit 1334
Round 11**

NFA Originally Submitted September 15, 1998 (Chapter 8)

8.0 SOLID WASTE MANAGEMENT UNIT 61A, SCHOOLHOUSE MESA TEST SITE: BLAST AREA

8.1 Summary

Sandia National Laboratories/New Mexico (SNL/NM) is proposing a risk-based no further action (NFA) decision for Solid Waste Management Unit (SWMU) 61A, Schoolhouse Mesa Test Site: Blast Area, Operable Unit (OU) 1334. SWMU 61A is an inactive explosives test site located within the former Area Z explosives testing area. Review and analysis of all relevant data for SWMU 61A indicate that concentrations of constituents of concern (COC) at this site are less than applicable risk assessment action levels. Thus, SWMU 61A is proposed for an NFA decision based upon confirmatory sampling data demonstrating that COCs that may have been released from the SWMU into the environment pose an acceptable level of risk under current and projected future land use, as set forth by 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).

8.2 Description and Operational History

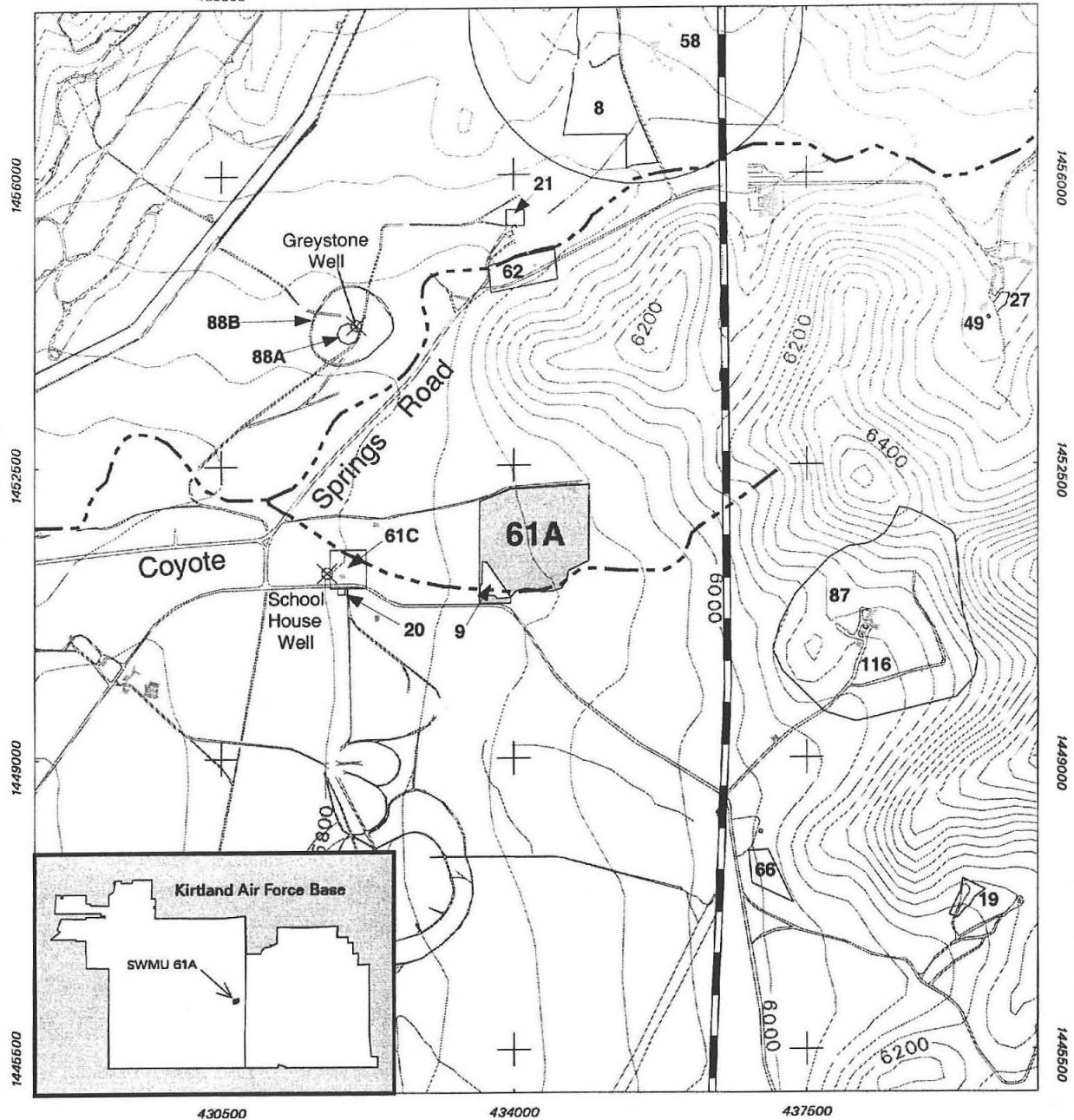
Section 8.2 describes SWMU 61A and discusses its operational history.

8.2.1 Site Description

SWMU 61A, Schoolhouse Mesa Test Site: Blast Area, covers approximately 34 acres (SNL/NM April 1994) on federally owned land controlled by the U.S. Air Force. SWMU 9 (Burial Site/Open Dump), which is located within the boundary of SWMU 61A is being investigated independent of SWMU 61A and will be submitted under a future NFA proposal. SWMU 61A is located on the Schoolhouse Mesa, northeast of Demolition Range Road and south of Coyote Springs Road (Figures 8.2.1-1 and 8.2.1-2). The mean elevation of the site is 5,884 feet above sea level (SNL/NM April 1994).

SWMU 61A contains a previously cleared area, one long low debris mound (Debris Mound 1) located southwest of the cleared area, a second, former debris mound (Debris Mound 2), located northwest of the cleared area, and three concrete blocks (Figures 8.2.1-3 and 8.2.1-4). Both mounds were dismantled during confirmatory sampling (Section 8.4.4.2.3). A small hill lies adjacent to the southern edge of the cleared area. One large metal fragment, identified as a bomb fragment, and numerous metal pieces of aircraft fuselage are scattered on the ground between SWMU 9 and the hill (Figure 8.2.1-4a) (Sandhaus February 1994a). There is a rock mound on top of the hill with a wooden post set in it. Debris Mound 1, 1 to 2 feet high, was located along the northeast base of the hill. Plastic fragments, an old battery, and metal scrap are evident in the debris mound (Sandhaus February 1994a). Aerial photographs indicate that Debris Mound 1 was located along the south edge of the cleared, graded area prior to 1967 (USGS 1967).

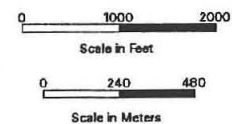
This page intentionally left blank.



Legend

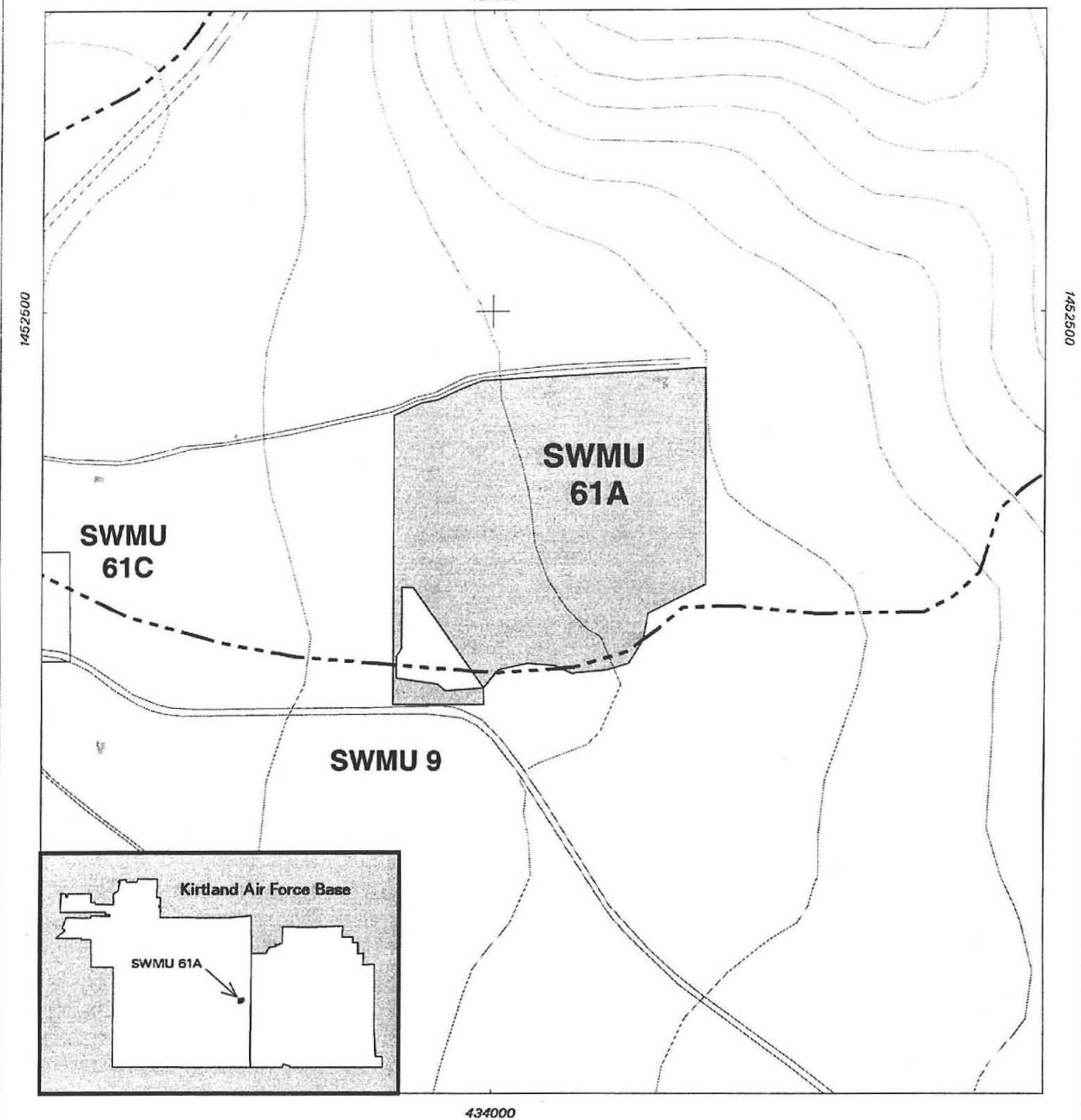
- Monitoring Well
- KAFB Boundary
- Road
- 40 Foot Contour
- Drainage
- SWMU 61A
- Other SWMU Sites
- Building

Figure 8.2.1-1
Location of SWMU 61A
Schoolhouse Mesa Test Site:
Blast Area



Sandia National Laboratories, New Mexico
Environmental Geographic Information System

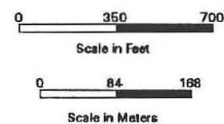
This page intentionally left blank.



Legend

- KAFB Boundary
- Road
- 40 Foot Contour
- Drainage
- SWMU 61A
- Other SWMU Site
- Building

Figure 8.2.1-2
Site Map of SWMU 61A
Schoolhouse Mesa Test Site:
Blast Area



Sandia National Laboratories, New Mexico
Environmental Geographic Information System

This page intentionally left blank.

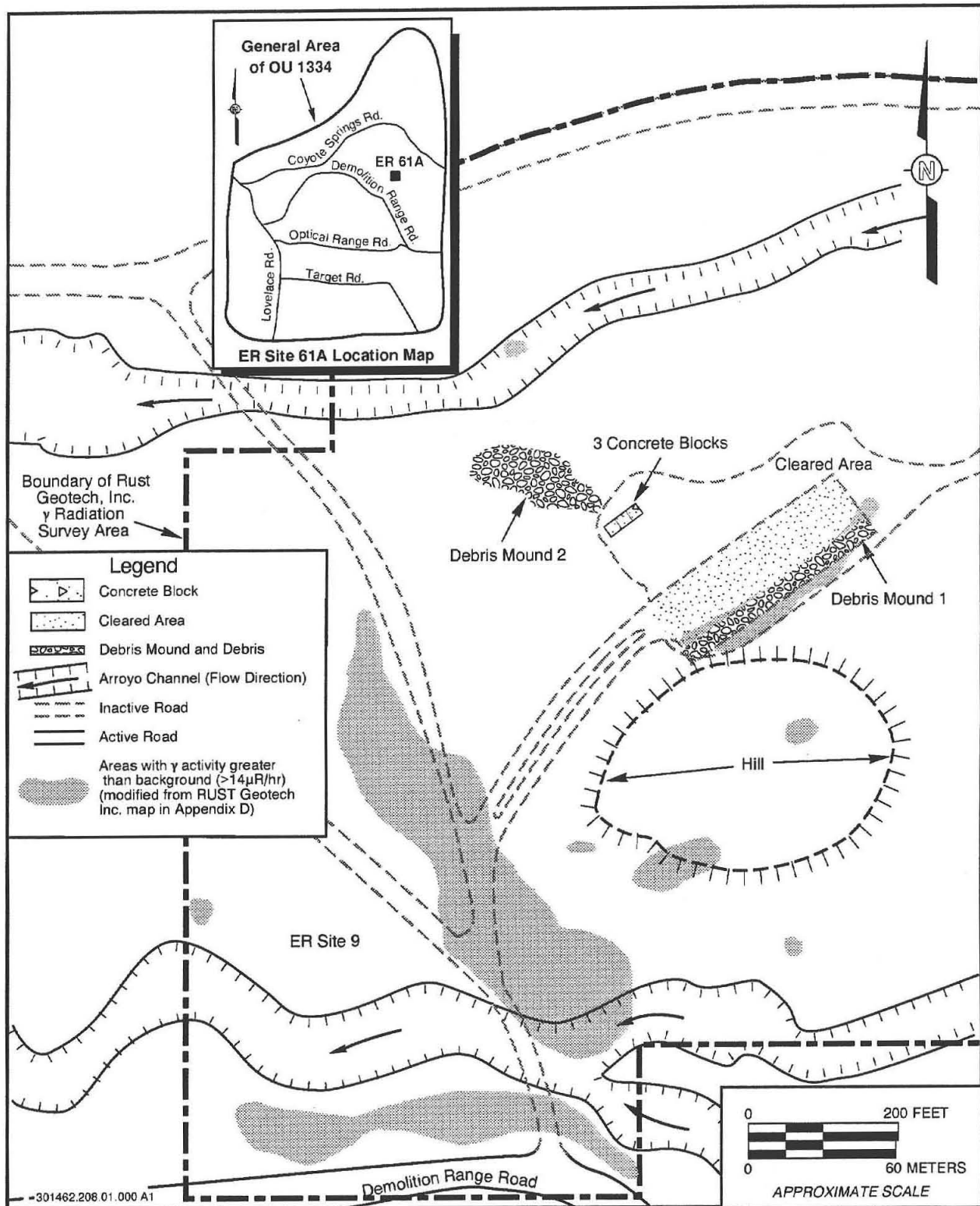


Figure 8.2.1-3
Site Features, SWMU 61A, Schoolhouse Mesa Test Site: Blast Area

This page intentionally left blank.

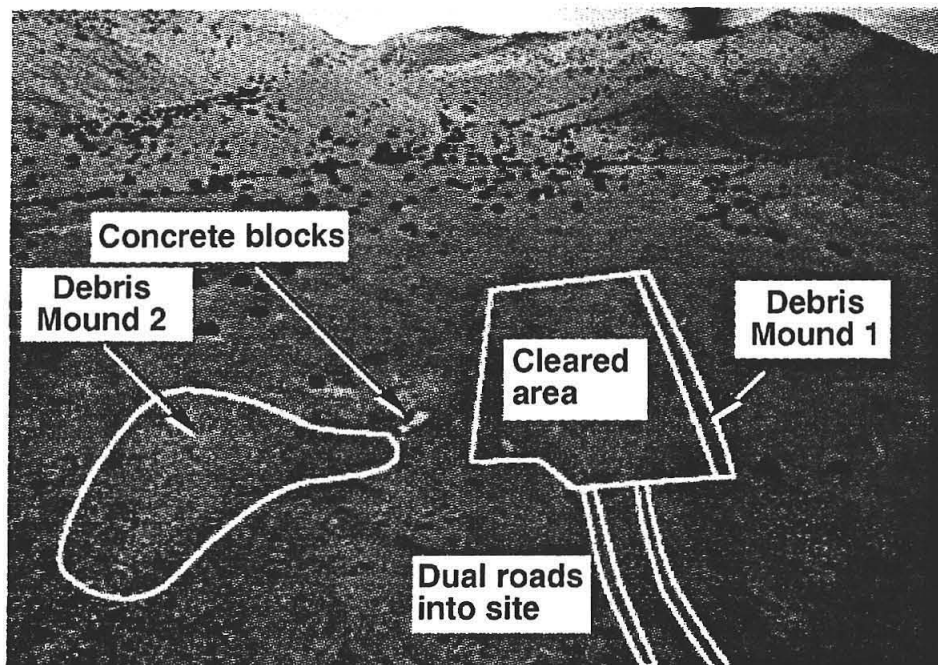


Figure 8.2.1-4a. Low angle aerial photograph of the irregular concrete blocks, cleared area, Debris Mounds 1 and 2, and the dual roads into SWMU 61A. View to the east.



Figure 8.2.1-4b. Reddish-brown high-explosive fragments collected northwest of the concrete blocks, SWMU 61A. The average size of the fragments is less than 1 in. in diameter.

Figure 8.2.1-4 SWMU 61A Photographs

This page intentionally left blank.

Three concrete blocks are located northwest of the hill (Figure 8.2.1-3 and 8.2.1-4a). Each block is irregularly shaped, has a blast pit in the center, and is fractured throughout. These are concrete test cylinders made with aggregate from the local area. Approximately one pound of high explosive (HE) compound fragments (Figure 8.2.1-4b) were found northeast of the concrete blocks (Sandhaus February 1994a). A small surface depression is located in the southwest portion of SWMU 61A near the SWMU 9 boundary. The depression is approximately 10 feet in diameter and 1 foot in depth.

SWMU 61A lies upon the Arroyo del Coyote alluvial fan that is composed of Pleistocene-age fine- to coarse-grained, poorly to moderately sorted sediments ranging in size from clay to boulders (SNL/NM March 1995, IT May 1994). These deposits contain relatively impermeable carbonate-rich soil horizons and impermeable carbonate-cemented horizons that inhibit vertical groundwater flow (SNL/NM March 1995). Based upon the well record for the Schoolhouse Mesa Well, located approximately 0.5 mile west of SWMU 61A (Figure 8.2.1-1), the alluvial fan deposits, less than 100 feet thick unconformably overlie the Madera Formation (SNL/NM March 1995). The Madera Formation consists of predominantly clastic limestone that contains fossiliferous, cherty limestone units, with some interbedded shale, siltstone, sandstone, and pebble conglomerate (Myers and McKay 1970). SWMU 61A is bounded on the west by the Coyote Fault which forms the eastern margin of the Hubbell structural bench, and the SWMU exhibits down-to-the-west displacement. The fault is expressed geomorphically as linear range-front facets, and, as evidenced by the coincidence of the Coyote Springs with the Coyote Fault (0.5 mile north of SWMU 61A), probably influences groundwater pathways from the Manzanita Mountains to the alluvium (SNL/NM March 1995). The Schoolhouse Well is completed in the Madera Formation, and the depth to groundwater is approximately 95 feet below ground surface (bgs) (SNL/NM March 1997). The groundwater recharge is likely precipitation in the Manzanita Mountains infiltrating through fractured bedrock (SNL/NM March 1995). The direction of groundwater flow in the vicinity of SWMU 61A is generally to the west-northwest (SNL/NM March 1997).

SWMU 61A is bounded on the south by an unnamed ephemeral arroyo that is a tributary to the Arroyo del Coyote (Figure 8.2.1-1). The unnamed arroyo drains a small watershed with headwaters in the western face of the Manzanita Mountains. The confluence of the unnamed arroyo with the Arroyo del Coyote is approximately 2,000 feet west of the site. A smaller unnamed arroyo traverses the northern portion of the site and captures the majority of the SWMU 61A surface water within its small watershed. This smaller unnamed arroyo drains into the larger southern boundary arroyo prior to the Arroyo del Coyote confluence (Figure 8.2.1-1). The Arroyo del Coyote ultimately drains into the Tijeras Arroyo, several miles northwest of the site.

For a detailed discussion regarding the local setting at SWMU 61A, refer to the "RCRA [Resource Conservation and Recovery Act] Facility Investigation [RFI] Work Plan for Operable Unit 1334, Central Coyote Test Area" (SNL/NM October 1994).

8.2.2 Operational History

SWMU 61A is located in the former Area Z explosives testing area of the Coyote Test Field (Figure 8.2.2-1). Prior to its use by SNL/NM, the area that comprises the Coyote Test Field was the setting for early homesteads, agriculture, ranching, and recreational activities. Several of the old structures found in the Coyote Test Field were used later for SNL/NM operations. By 1950, the need for large-scale testing (blast-model studies) became apparent and economically

This page intentionally left blank.

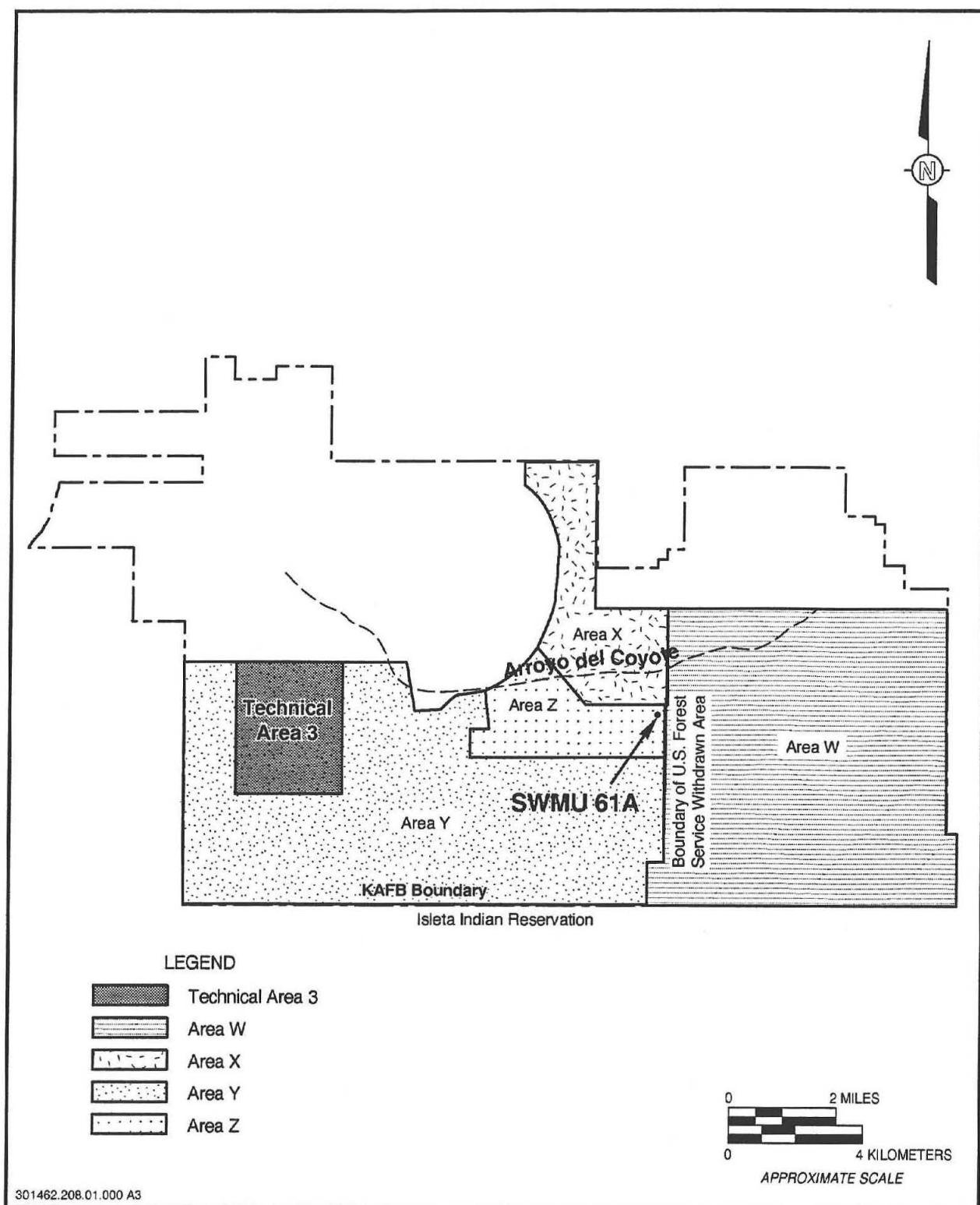


Figure 8.2.2-1
Location of Former Coyote Test Field Areas and SWMU 61A

This page intentionally left blank.

In the mid-1950s, the Atomic Energy Commission requested that the Sandia Corporation (currently SNL/NM) participate in fallout predictions on future full-scale testing operations. In 1956, additional land was requested for these studies and work was begun. In 1957, in an agreement with the Atomic Energy Commission, the Armed Forces Special Weapons Project finally granted the use of Areas X, Y, and Z (Figure 8.2.2-1) (SNL/NM Date [unk]). By 1966, Area W was added to the Coyote Test Field (Figure 8.2.2-1). These four areas, all of which were used for HE tests, covered approximately 32,400 acres. Area W was used for miscellaneous HE tests; Area X, for 15,000-pound HE tests; Area Y, for fallout, seismic, and miscellaneous explosives tests; and Area Z, for 250-pound HE tests (SNL/NM September 1966).

Two aerial photographs (USGS 1961, 1967) indicate that SWMU 61A was in operation after 1961 but before 1967. The dual roads, concrete blocks, and cleared area were first visible in the 1967 aerial photograph (IT April 1994). The site underwent gradual revegetation between 1967 and 1991 (USGS 1991). No test documents describing site-specific testing have been identified by SNL/NM regarding SWMU 61A. This area has been used by U.S. military forces for war games.

8.3 Land Use

This section discusses the current and future projected land use for SWMU 61A.

8.3.1 Current

SWMU 61A is located on federally owned land controlled by the U.S. Air Force within the boundaries of Kirtland Air Force Base (KAFB) (Figure 8.3.1-1).

8.3.2 Future/Proposed

The projected land use for SWMU 61A is industrial (DOE and USAF March 1996).

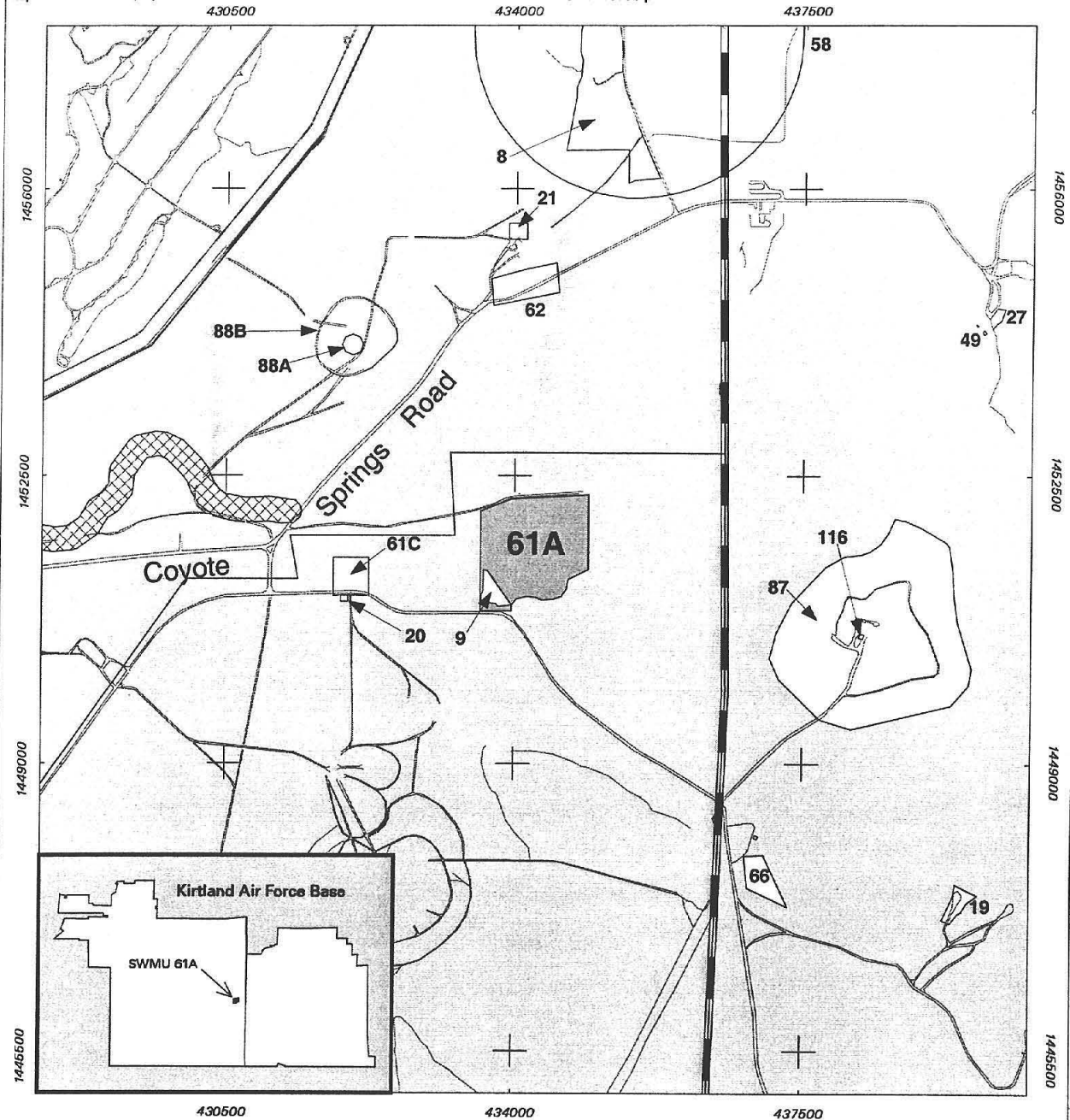
8.4 Investigatory Activities

Three investigations have been performed at SWMU 61A. Section 8.4 describes the SWMU 61A investigatory activities.

8.4.1 Summary

SWMU 61A was initially investigated under the DOE Comprehensive Environmental Assessment and Response Program (CEARP) in the mid-1980s in conformance with the Comprehensive Environmental Response, Compensation and Liability Act (Investigation #1). In 1992 preliminary investigations began that included background information reviews, interviewing, field surveys, and scoping sampling (Investigation #2). From 1995 through 1998 a radiological voluntary corrective measure (VCM) with confirmatory soil sampling was conducted (Investigation #3).

This page intentionally left blank.

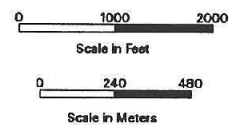


Legend

- KAFB Boundary
- Road
- SWMU 61A
- Other SWMUs
- Recreational Land Use
- Industrial Land Use

Figure 8.3.1-1
SWMU 61A

**Schoolhouse Mesa Test Site: Blast Area
and Associated Land Uses
Within KAFB Boundary and Vicinity**



Sandia National Laboratories, New Mexico
Environmental Geographic Information System

This page intentionally left blank.

8.4.2 Investigation #1—Comprehensive Environmental Assessment and Response Program

8.4.2.1 *Nonsampling Data Collection*

SWMU 61A was identified as the Schoolhouse Mesa Test Site during investigations conducted under the CEARP (DOE September 1987). The CEARP Phase I report documented that Area Z encompassed the mesa near the old schoolhouse (Building 9850) and was used extensively for explosives testing and for weapons destruction tests using depleted uranium (DU) (DOE September 1987).

8.4.2.2 *Sampling Data Collection*

No sampling activities were performed at SWMU 61A as part of the CEARP.

8.4.2.3 *Data Gaps*

A lack of information prevented calculating the Hazard Ranking System (HRS) and Modified HRS migration mode scores. SWMU 61A was not investigated as part of the RCRA facility assessment (EPA April 1987).

8.4.2.4 *Results and Conclusions*

The CEARP finding was uncertain for Federal Facility Site Discovery and identification findings, preliminary assessment, and preliminary site inspection (DOE September 1987).

8.4.3 Investigation #2—SNL/ER Preliminary Investigations

8.4.3.1 *Nonsampling Data Collection*

This section describes the nonsampling data collected at SWMU 61A.

8.4.3.1.1 *Background Review*

A background review was conducted in order to collect available relevant information regarding SWMU 61A. Background information sources included interviews with SNL/NM staff and contractors familiar with the site's operational history and review of existing historical site records and reports. The study was documented completely and has provided traceable references that sustain the integrity of the NFA proposal. Table 8.4.3-1 lists the information sources that were used to assist in this background review.

Table 8.4.3-1
Summary of Background Information Review for SWMU 61A

Information Source	Reference
Technical test reports and project log books	None
Engineering drawings/maps	Basic Information, Reservation Boundary and Ownership (test areas), October 7, 1954
Site inspections (field notes, aerial photograph review, site photographs, radiological, UXO/HE, biological, and cultural resource surveys)	Fritz and Perkins March 1985 Martz May 1985 Bayliss July 1992 Byrd et al. July 1992 Gaither July 1992 Lojek November 1992 Lojek January 1993a Lojek January 1993b Lojek January 1993c Lojek February 1993 Sandhaus February 1994a Lojek March 1994 Young September 1994
Employee interviews, 21 interviews with 11 facility personnel (current and retired)	Gaither and Byrd June 1992 Bayliss July 1992 Byrd et al. July 1992 Gaither July 1992 Lojek December 1992 Lojek January 1993d Lojek January 1993e Lojek January 1993f Lojek January 1993g Cooper and Sandhaus December 1993 Cooper and Sandhaus February 1994 Sandhaus February 1994b Sandhaus February 1994c Lojek and Sandhaus March 1994 Peters March 1994 Sandhaus March 1994 Sandhaus April 1994

HE = High explosive(s).
UXO= Unexploded ordnance.

8.4.3.1.2 UXO/HE Survey

In November 1993, KAFB Explosive Ordnance Disposal personnel conducted a visual survey for the presence of unexploded ordnance (UXO)/HE on the ground surface at SWMU 61A in conjunction with SWMUs 9 and 20. The survey identified one live groundburst simulator, one pound of HE fragments, six smoke grenades, two flare illuminating cartridges, and three 40-millimeter White Star parachute cartridges, all of which were subsequently removed (Young September 1994).

8.4.3.1.3 Radiological Survey(s)

A Phase I survey at SWMU 61A was conducted in conjunction with SWMUs 7, 61C, and 20 during February and April 1994. These surveys covered a total of 39.5 acres of uneven sloped terrain. SWMU 61A surrounds SWMU 9, and all relevant radiological data are considered to be that of SWMU 61A. A gamma scan survey was performed at 10-foot centers (70-percent coverage) over the surface of SWMU 61A and at 6-foot centers (100-percent coverage) over the surface of SWMU 9. Because no radiological anomalies were detected within the eastern portion of the radiological survey grid, the far eastern portion of the SWMU boundary was not surveyed. During this survey, 63 point sources and 11 area sources of gamma activity at 30 percent or more above the natural background of 12 microroentgens per hour ($\mu\text{R/hr}$) were identified at SWMUs 61A and 9. Three of the point source anomalies identified were fragments of oxidized DU (RUST Geotech Inc. December 1994). Figure 8.4.3-1 shows the site, the surface radiological survey boundaries, and the anomalies found during the Phase I survey. Table 8.4.3-2 presents a summary of the highest gamma activity anomalies for both point sources and area sources.

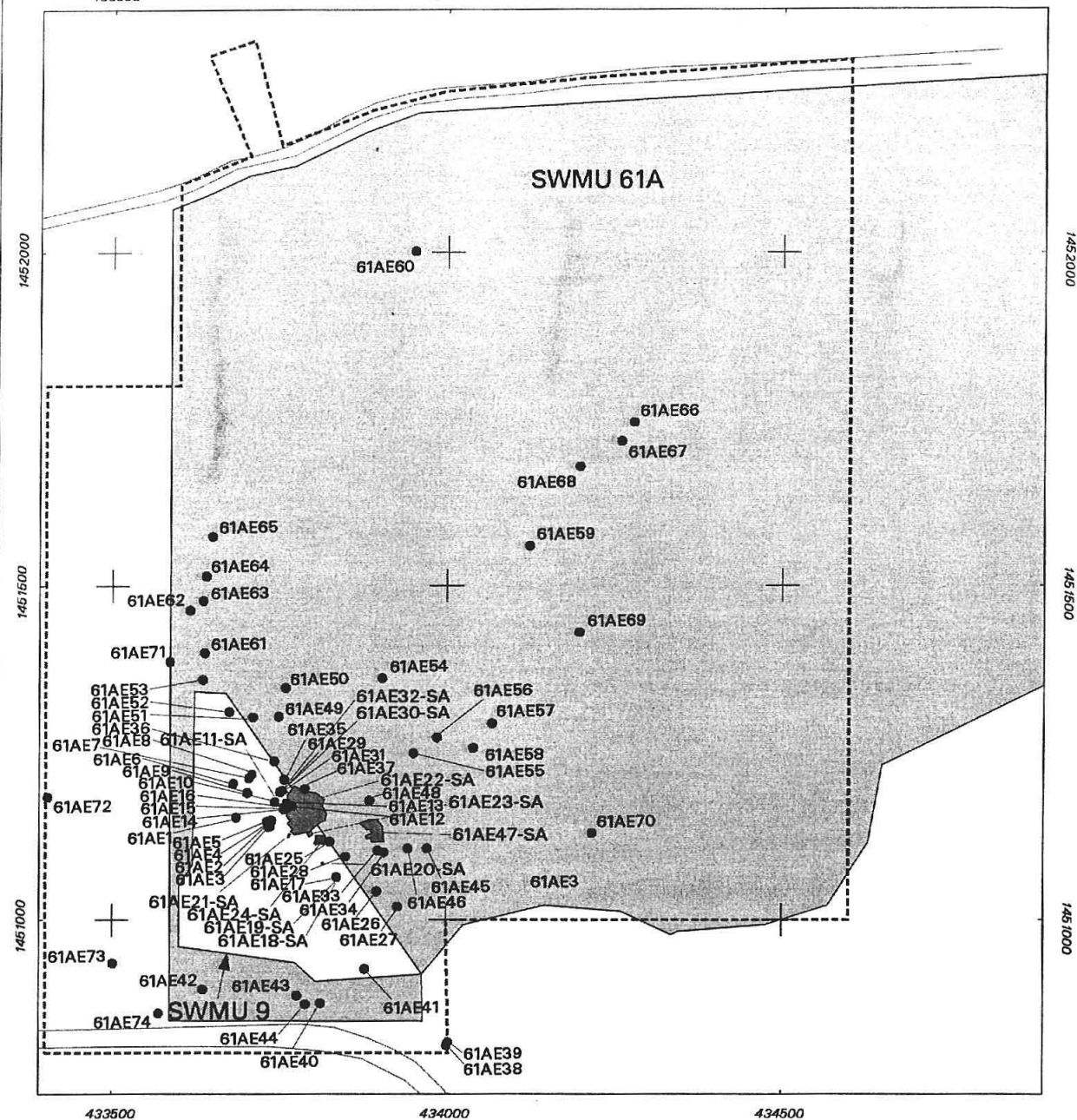
Table 8.4.3-2
Summary of Phase I Radiological Survey
Highest Gamma Activity Anomalies, SWMU 61A

Radiological Anomaly Identification	Gamma Activity ($\mu\text{R/h}$)
Point Source	
61AE39	116
61AE52	72
61AE54	61
61AE55	66
61AE61	50
61AE73	77
Area Source	
61AE11	14-58
61AE22	13-105
61AE47	13-50

$\mu\text{R/h}$ = Microroentgen(s) per hour.

A detailed summary of the surface radiological survey and anomalies found at the site is presented in Section 5.7.1 of the Surface Gamma Radiation Surveys Final Report (RUST Geotech Inc. December 1994).

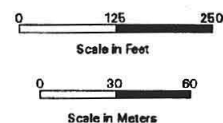
This page intentionally left blank.



Legend

- 61AE74 Point Source Gamma Radiation Anomaly (Elevated relative to site specific background)
- Road
- Rad Survey Boundary
- SWMU 61A - Schoolhouse Mesa Test Site: Blast Site
- Other SWMUs
- 61AE18-SA Area Source Gamma Radiation Anomaly (Elevated relative to site specific background)

Figure 8.4.3-1
Phase I Survey Radiation Anomalies
at SWMU 61A
Schoolhouse Mesa Test Site:
Blast Site



Sandia National Laboratories, New Mexico
Environmental Geographic Information System

This page intentionally left blank.

8.4.3.1.4 Cultural-Resources Survey

A cultural-resources survey of SWMU 61A was conducted as part of the SNL/NM sitewide environmental assessment. A historical site complex, comprised of five cultural resources sites, was identified as the remains of five structures that functioned as habitations or as storage/work areas at or near SWMU 61A (Hoagland and Dello-Russo February 1995).

8.4.3.1.5 Sensitive-Species Survey

A sensitive-species survey was conducted in June 1994 using parallel transects 100 feet apart. The surveyed area is covered principally with grassland vegetation, although some juniper-dominated woodland is found along the northern site boundary. Parts of the area are disturbed from past land use, both historic and recent. A high density of visnagita cacti was found, particularly toward the southern boundary. In addition, a single Wright's pincushion cactus was found near the old homestead site north of the conical hill (IT February 1995).

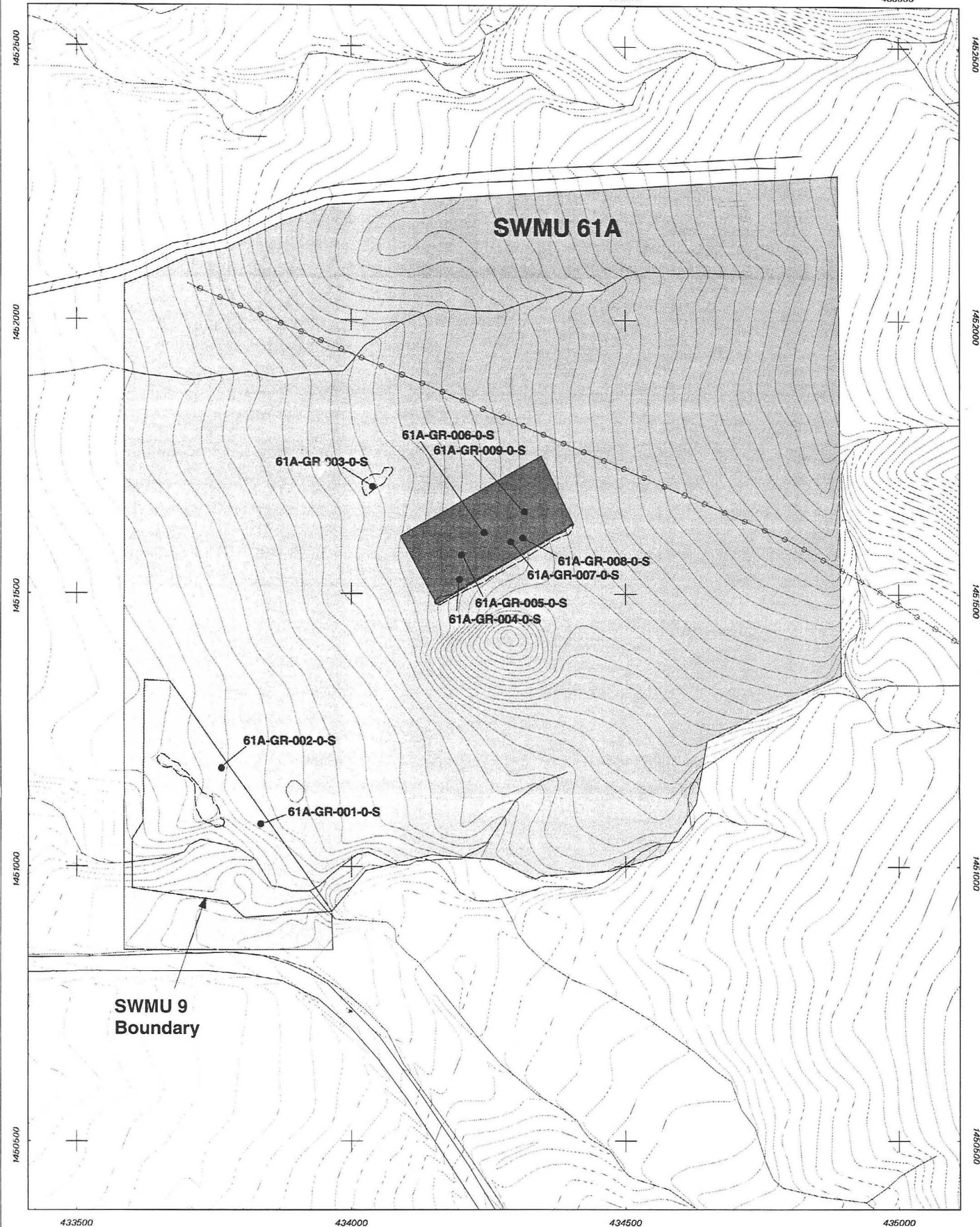
8.4.3.2 Sampling Data Collection

In July 1995, SWMU 61A was investigated as part of a sitewide scoping sampling program. The purpose of this scoping sampling effort was to obtain preliminary analytical data to support the ER Project site ranking and prioritization. Nine surface (i.e., 0 to 6 inches bgs) soil samples were collected from SWMU 61A. Sample collection followed standard SNL/NM sampling procedures and protocol. Two samples (61A-GR-001 and 61A-GR-002) were collected in the vicinity of source anomalies concentrated along the boundary between SWMU 9 and SWMU 61A, as defined by the Phase I radiological survey (Section 8.4.3.1.3). 61A-GR-001 was collected near anomalies 61AE11, 61AE22, 61AE30, and 61AE32. 61A-GR-002 was collected near anomalies 61AE18, 61AE19, and 61AE20. One soil sample was collected from Debris Mound 2 (61A-GR-003). Six soil samples were collected from a random grid within the cleared area (61A-GR-004 through 61A-GR-009) (Figure 8.4.3-2). One duplicate surface soil sample was collected from 61A-GR-002. The Environmental Restoration Chemistry Laboratory (ERCL) analyzed the environmental samples and two sample duplicates for RCRA metals (plus beryllium) using modified EPA Method 6010 (EPA November 1986), for HE using EPA Method 8330 (EPA November 1986), and for total petroleum hydrocarbons (TPH) using an immunoassay method. In addition, the Radiation Protection Sample Diagnostics (RPSD) Laboratory analyzed the samples for gamma-emitting radionuclides using gamma spectroscopy.

8.4.3.3 Data Gaps

Information gathered from process knowledge, reviewing historical site files, and personal interviews aided in identifying the most likely COCs at SWMU 61A and selecting the types of analyses to be performed on soil samples. However, the preliminary scoping sampling data are not adequate to support a risk screening assessment.

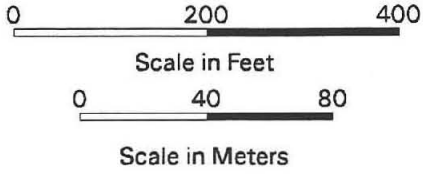
This page intentionally left blank.



Legend

- Soil Sampling Location
- Mound Outline
- - - 5 Ft Contour
- Road
- · - · - Fence
- - - Surface Drainage
- SWMU 61A
- Approx. extent of Cleared Area

Figure 8.4.3-2
Scoping Soil Sample Locations
at SWMU 61A
Schoolhouse Mesa Test Site
Blast Area
June 1995



8.4.3.4 *Results and Conclusions*

Barium concentrations ranged from 35 J to 150 milligrams (mg) per kilogram (/kg), with only one sample exceeding the NMED-approved 130-mg/kg background limit (Dinwiddie September 1997). Seven of the nine soil samples (from the high gamma activity area and the cleared area) yielded lead levels that exceeded the NMED-approved background limit of 11.8 mg/kg (Dinwiddie September 1997); these ranged in concentration from 21J to 360 mg/kg. In two samples (61A-GR-003 [Debris Mound 2] and 61A-GR-009 [cleared area]), chromium and selenium exceeded 12.8 and <1 mg/kg background limits (Dinwiddie September 1997), respectively. In one sample taken from the cleared area (61A-GR-008), mercury exceeded the nonquantified background level of <0.1 mg/kg at a concentration of 1.1 mg/kg. Arsenic, beryllium, cadmium, and silver were not detected; however, the method detection limits (MDL) ranged from 10 mg/kg (silver) to 50 mg/kg (arsenic), exceeding the background limit or the nonquantified background level (cadmium and silver), in most cases. Duplicate metals analytical results were comparable.

No TPH concentrations were detected in any of the samples at the MDL of 10 parts per million. Explosives compounds were detected in sample location 61A-GR-001 (high gamma activity location) and at four locations within the cleared area (61A-GR-004, 61A-GR-005, 61A-GR-006, and 61A-GR-008). At location 61A-GR-001, octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX) and hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX) were detected at concentrations of 2 mg/kg and 10 mg/kg, respectively. Within the cleared area, pentaerythritol tetranitrate concentrations ranged from 1 to 6 mg/kg and HMX ranged from 12 to 17 mg/kg. Because HEs are man-made compounds, there are no background limits against which to compare any concentration detected.

Uranium-235 and uranium-238 were not detected in any samples above the minimum detectable activity (MDA) with the exception of 61A-GR-001 (uranium-238 only) and 61A-GR-002 that were collected at previously identified high gamma activity locations (see Section 8.4.3.2). At both locations, the uranium-238 activity ranged from 27.6 to 51.9 picocuries (pCi) per gram (/g), greatly exceeding the background activity limit of 1.4 pCi/g. The maximum uranium-235 activity in 61A-GR-002 (and duplicate) was 1.11 pCi/g exceeding the background activity limit of 0.18 pCi/g. However, the MDA for all other uranium-235 and uranium-238 analyses exceeded the background activity limit. Thorium-232 and cesium-137 were detected in all samples but at levels below the background activity limits of 1.01 and 0.664 pCi/g, respectively.

8.4.4 *Investigation #3—SNL/NM ER Project Voluntary Corrective Measure and Confirmatory Sampling*

8.4.4.1 *Nonsampling Data Collection*

There are no nonsampling data collection activities associated with Investigation #3 of SWMU 61A.

8.4.4.2 *Sampling Data Collection*

This section discusses the radiological VCM, site-specific background sampling activities, and confirmatory sampling activities at SWMU 61A.

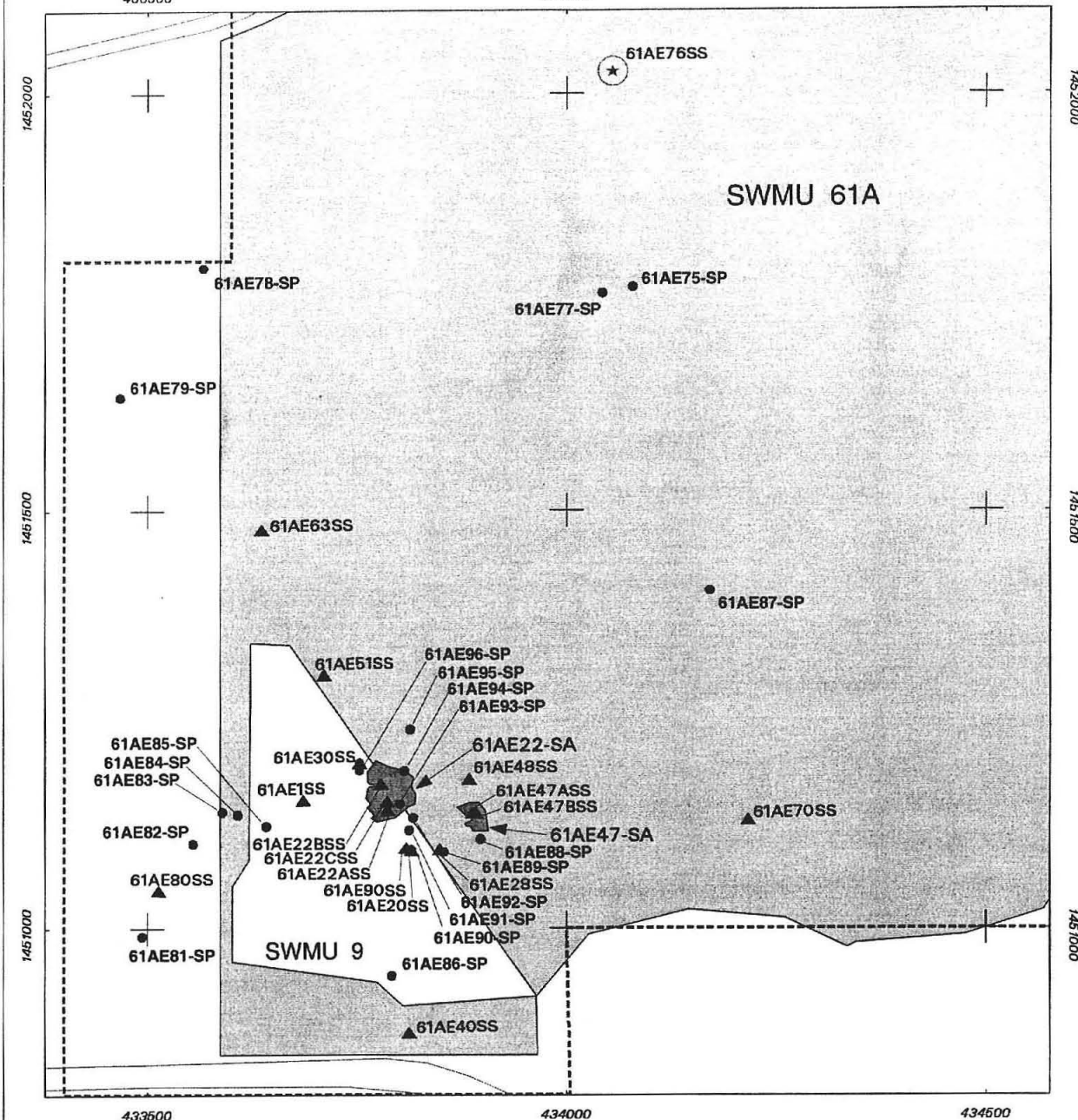
8.4.4.2.1 *Voluntary Corrective Measures Activities*

A radiological VCM was conducted at SWMUs 61A and 9 during March 1995 and February, March, May, July, and October 1996. VCM activities were based upon findings of the Phase I radiological survey performed at SWMU 61A (see Section 8.4.3.1.3). Point sources were removed in March 1995. In February 1996, resurveying (scanning) of SWMU 61A was performed on 6-foot centers (100-percent coverage), and precleanup soil sampling for gamma spectroscopy analysis was conducted on one area source to assess the need for remediation. New point sources identified during the resurveying and original area sources identified during the Phase I survey were remediated in February, March, May, and July 1996. Heavy equipment (backhoe) was used to excavate two large area sources at SWMU 61A (61AE22 and 61AE47) because the lateral and vertical extent of elevated radiation exceeded the capabilities of manual cleanup procedures (Figure 8.4.4-1). The physical depression remaining from the remediation of area source anomaly 61AE47 is referred to as the "previously remediated pit" in subsequent sections of this NFA proposal (see Section 8.4.4.4.6).

Cleanup activities included radiation scanning to verify anomaly location, removal of fragment and/or soil until readings were at levels less than 1.3 times site-specific background, and postcleanup (verification) soil sampling for gamma spectroscopy analysis. Of the sources identified during the Phase I survey, 62 point sources were remediated during the initial cleanup. At one point source location (61AE60), no fragment or visible contamination was observed, and no cleanup was conducted (Figure 8.4.4-2). This location was excavated to bedrock, and the elevated gamma readings were determined to be related to the underlying, naturally occurring geologic material. During subsequent cleanup activity, 11 area sources were remediated.

During resurveying (scanning) of SWMU 61A, 21 new point sources and 1 new area source were identified. Gamma spectroscopy results on the precleanup sample from the new area source (61AE76) indicate that the elevated radiation is related to the underlying, naturally occurring geologic material, and remediation was not required. The new point sources were remediated, along with the 11 original area sources, during subsequent cleanup activity. Figure 8.4.4-1 shows VCM radiation anomalies and verification sampling locations (precleanup and postcleanup).

After the removal of radiologically contaminated soils, 18 postcleanup (verification) samples were collected from areas that exhibited the highest residual gamma radiation readings. Sample collection followed the sampling procedures and protocols described in the "Final Report, Survey and Removal of Radioactive Source Contamination at Environmental Restoration Sites, Sandia National Laboratories/New Mexico" (SNL/NM September 1997). Gamma spectroscopy analysis was performed on these samples to characterize the residual radioactivity remaining in the soil. The radiological COCs were DU (uranium-238, uranium-235), thorium-232, and cesium-137. Table 8.4.4-1 summarizes the postcleanup (verification) samples collected at the sites.



Legend

- Point Source Gamma Radiation Anomaly (Elevated relative to site specific background, SP = Soil Point)
- ★ Pre-cleanup Soil Sample Location (Final determination, no cleanup required, SS = Soil Sample)
- ▲ Post-cleanup (Verification) Soil Sample Location (SS = Soil Sample)
- Rad Survey Boundary
- Road

SWMU 61A - Schoolhouse Mesa Test Site: Blast Site

Other SWMUs

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

Figure 8.4.4-1
VCM Radiation Anomalies and
Surface Soil Sampling Locations
at SWMU 61A - Schoolhouse
Mesa Test Site: Blast Site

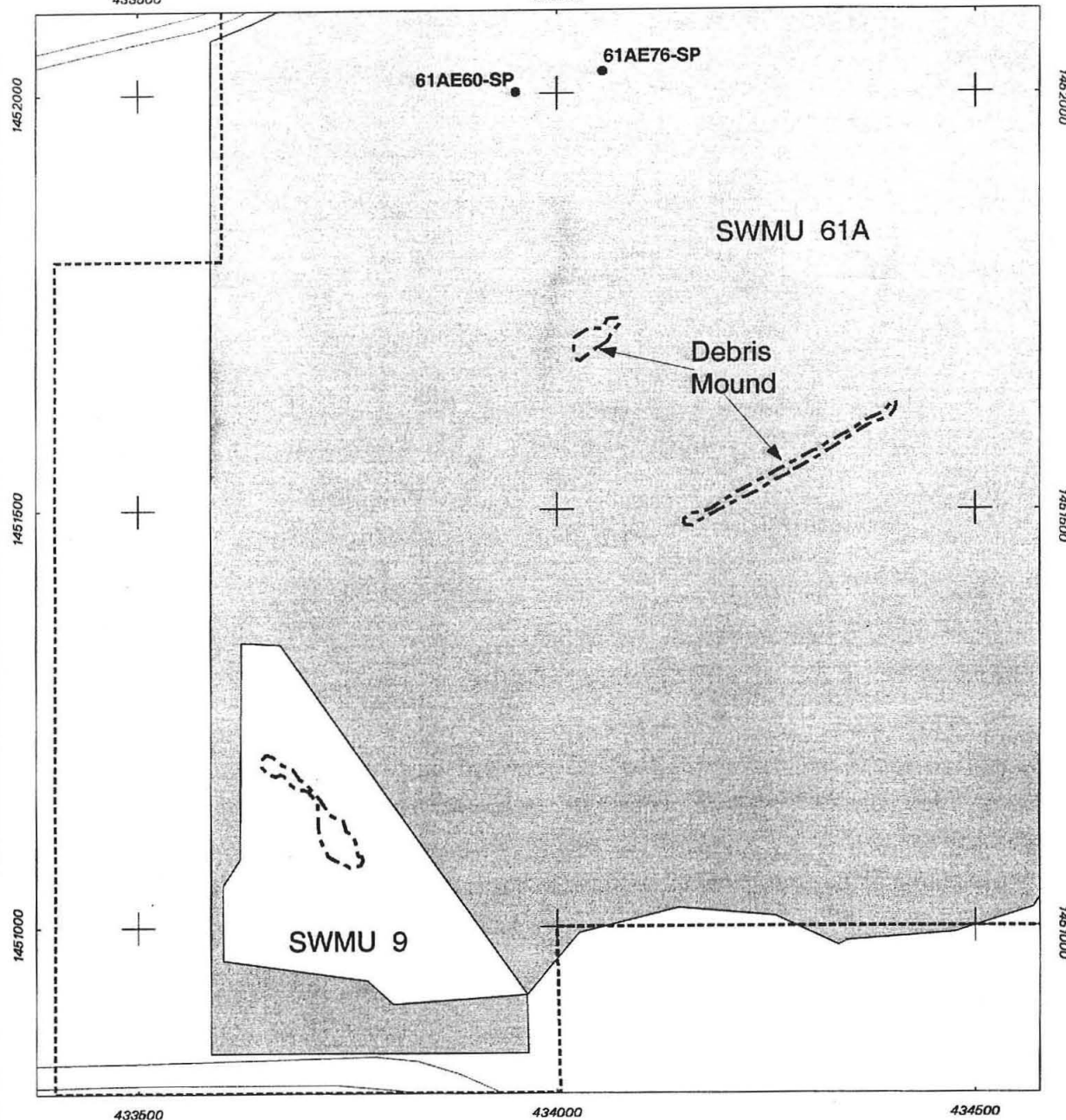
0 100 200
Scale in Feet

0 24 48
Scale in Meters



Sandia National Laboratories, New Mexico
Environmental Geographic Information System

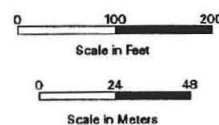
This page intentionally left blank.



Legend

- Point Source Gamma Radiation Anomaly (Elevated relative to site specific background, SP = Soil Point)
- Road
- Rad Survey Boundary
- - - Debris Mound
- SWMU 61A - Schoolhouse Mesa Test Site: Blast Site
- Other SWMUs

Figure 8.4.4-2
Radiation Anomalies Remaining After
Completion of the VCM at SWMU 61A
Schoolhouse Mesa Test Site:
Blast Site



Sandia National Laboratories, New Mexico
Environmental Geographic Information System

This page intentionally left blank.

Table 8.4.4-1
Summary of SWMU 61A Post-VCM Verification Samples Gamma Spectroscopy Analytical Results, March 1995

Sample Attributes			Activity ^a (pCi/g)							
Record Number ^b	ER Sample ID (Figure 8.4.4-1)	Sample Depth (ft)	Uranium-238		Uranium-235		Thorium-232		Cesium-137	
			Result	Error ^c	Result	Error ^c	Result	Error ^c	Result	Error ^c
Point Sources										
500221	61AE1SS	0-0.5	4.18	1.3	ND(0.293)	--	0.626	0.205	0.385	0.0656
500216	61AE28SS	0-0.5	ND(8.08)	--	ND(0.539)	--	0.701	0.234	ND(0.0663)	--
500216	61AE28SD	0-0.5	4.65	2.57	ND(0.574)	--	0.997	0.265	ND(0.0717)	--
600083	61AE40SS	0-0.5	8.28	4.25	0.135	0.150	0.801	0.383	ND(0.0368)	--
500216	61AE48SS	0-0.5	32	7.89	0.848	0.243	1.33	0.485	ND(0.0759)	--
500221	61AE51SS	0-0.5	3.31	1.09	ND(0.322)	--	0.778	0.254	0.065	0.0237
500221	61AE63SS	0-0.5	3.16	1.09	ND(0.303)	--	0.684	0.228	0.0451	0.0192
500221	61AE70SS	0-0.5	7.1	1.79	ND(0.337)	--	0.624	0.207	0.193	0.0393
600083	61AE80SS	0-0.5	5.58	2.73	ND(0.204)	--	0.519	0.255	0.146	0.0272
600083	61AE90SS	0-0.5	12.8	4.38	0.227	0.167	0.613	0.296	0.062	0.0184
Area Sources										
600083	61AE20SS	0-0.5	10.3	3.72	0.339	0.189	0.886	0.424	6.53E-02	0.0201
630157	61AE22ASS	0-0.5	ND(1.95)	--	0.144	0.245	0.715	0.385	ND(0.0506)	--
630157	61AE22BSS	0-0.5	24.5	6.47	0.524	0.134	0.517	0.264	ND(0.0254)	--
630157	61AE22CSS	0-0.5	9.3	3.29	0.265	0.198	0.617	0.331	ND(0.0331)	--
600092	61AE30SS	0-0.5	5.39	3.24	0.160	0.131	0.843	0.395	0.0556	0.0262
630157	61AE47ASS	0-0.5	3.66	1.39	0.117	0.082	0.474	0.247	ND(0.024)	--
630157	61AE47BSS	0-0.5	0.395	0.107	ND(0.227)	--	0.602	0.299	ND(0.0464)	--
Background Soil Activity, Coyote Test Field ^d			1.4 ^e	NA	0.18	NA	1.01 ^e	NA	0.079 ^e	NA

^a Soil Sample results in bold exceed background.

^b Analysis request/chain of custody.

^c Two standard deviations about the mean detected activity.

^d From Dinwiddie September 1997. The minimum background activity between surface and subsurface are reported.

^e Southwest background activities are presented in place of the Coyote Test Field background activities that are not available.

ER = Environmental Restoration.

f = Foot (feet).

ID = Identification.

NA = Not applicable.

ND () = Not detected above the minimum detectable activity, shown in parentheses.

pCi/g = Picocuries per gram.

SWMU = Solid waste management unit.

-- = Error not calculated for nondetectable results.

The cleanup activities produced soil, metal fragment, and protective equipment (PPE) wastes. All waste was containerized in either 30-gallon or 55-gallon drums. A total of 337 waste drums were generated during cleanup activities: 331 soil drums, 2 metal fragment drums, and 4 PPE drums. All waste characterization samples collected passed the TCLP test, and all waste was characterized as "Radioactive—Low Level Only" (SNL/NM September 1997). Disposal of regulated VCM waste was handled by SNL/NM Department 7577 (Waste Operations), which packaged and secured waste drums for transfer to Envirocare of Utah.

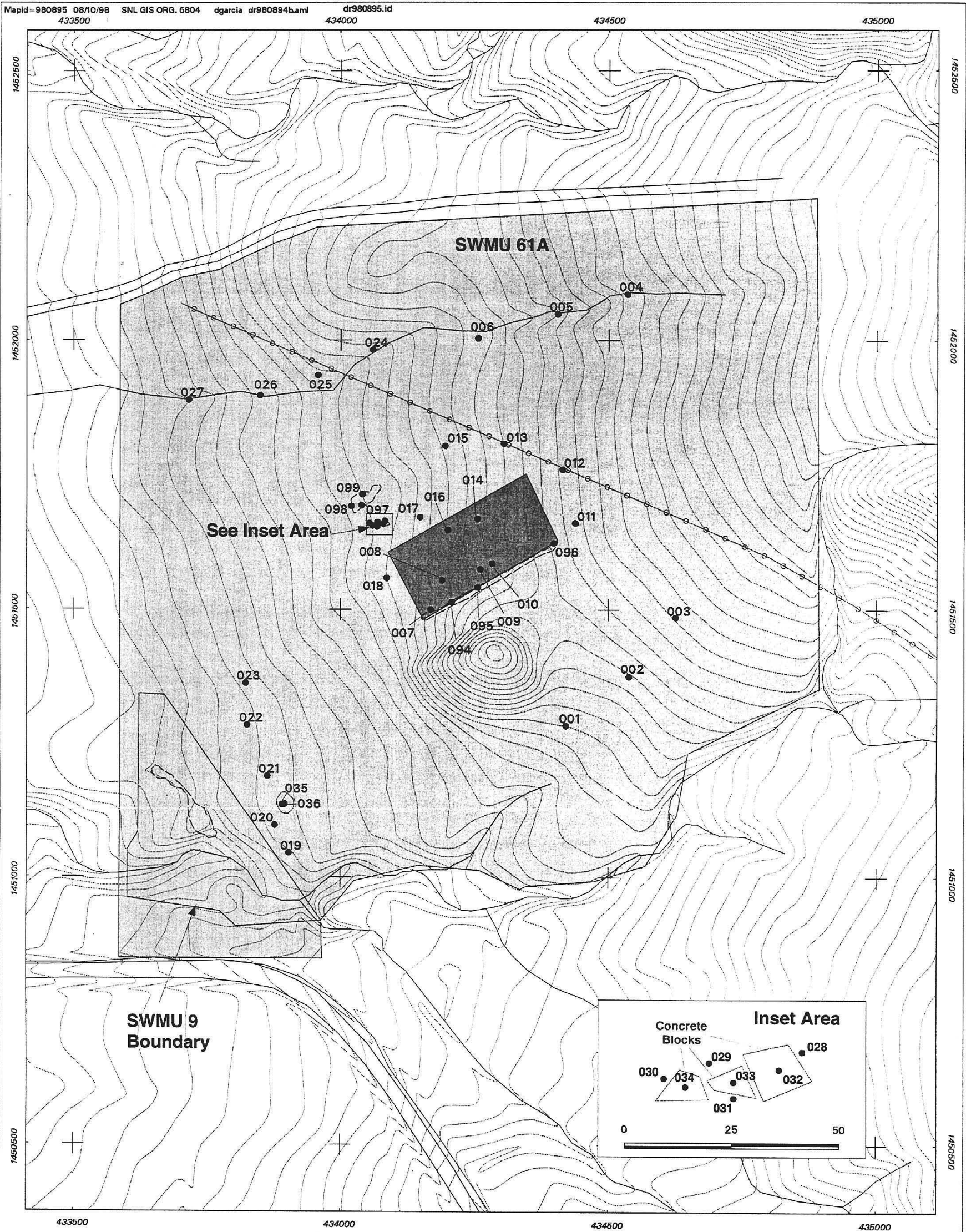
Remediation at SWMU 61A was completed on all 84 point and 12 area sources of gamma activity at 30 percent or greater than the natural background with the exception of two sources (one point source and one area source) related to underlying, naturally occurring geologic material. Figure 8.4.4-1 shows sources remaining after completion of the VCM. The "Final Report, Survey and Removal of Radioactive Source Contamination at Environmental Restoration Sites, Sandia National Laboratories/New Mexico" summarizes the gamma spectroscopy sample verification data (SNL/NM September 1997).

8.4.4.2.2 *Site-Specific Background Sampling*

SNL/NM conducted background soil and arroyo sediment sampling at SWMU 61A to establish site-specific background concentrations and activities for metals and radionuclides. The background sampling activities were performed in accordance with the rationale and procedures described in the OU 1334 RFI work plan (SNL/NM October 1994), as reviewed by the New Mexico Environment Department (NMED) and the EPA. However, pursuant to draft EPA comments on the OU 1334 RFI work plan (EPA November 1995), the sampling depth specified for near-surface samples was redefined to be 0.5 to 1.0 foot bgs (as opposed to 1.5 to 2.0 feet bgs). In addition, the analyses specified for background soil and arroyo sediment samples were expanded to include gross alpha and gross beta, based upon the Request for Supplemental Information (RSI) relating to the OU 1334 RFI work plan (NMED August 1997, SNL/NM November 1997). Sample collection followed the methodology presented in the OU 1334 Work Plan (SNL/NM October 1994). SNL/NM chain-of-custody and sample documentation procedures were followed for all site-specific background samples collected.

In March 1998, surface (from 0 to 0.5 feet bgs) and near-surface (from 0.5 to 1.0 feet bgs) background soil and arroyo sediment samples were collected inside the SWMU 61A boundaries. As specified in the OU 1334 RFI work plan, background soil samples were collected from three locations in the southeastern region of the site, and background arroyo sediment samples were collected from three locations in the upstream region of the northern arroyo channel. Quality assurance (QA)/quality control (QC) samples collected include one duplicate arroyo sediment sample and one equipment rinsate blank. Figure 8.4.4-3 shows the background soil and arroyo sediment sample locations associated with SWMU 61A.

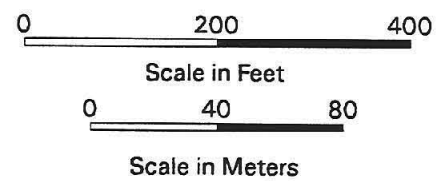
The background soil and arroyo sediment samples collected were analyzed off site for RCRA metals plus beryllium, for isotopic thorium and uranium, and for gross alpha and gross beta activity. The background samples were also analyzed on site for radionuclides by gamma spectroscopy. Core Laboratories Inc. of Aurora, Colorado, analyzed the samples for RCRA metals plus beryllium, using EPA Method 6010/7000 (EPA November 1986), for isotopic thorium and uranium using alpha spectroscopy, and for gross alpha and gross beta activity using EPA Method 900.0 (EPA November 1986). SNL/NM Department 7713, RPSD Laboratory, analyzed the samples on site for radionuclides using gamma spectroscopy (EPA Method 901.1)



Legend

- 001 Soil Sampling Location and Identification
- Mound Outline
- 5 Ft Contour
- Road
- ○ ○ ○ ○ Fence
- Surface Drainage
- SWMU 61A
- Approx. extent of Cleared Area

Figure 8.4.4-3
Confirmatory Soil Sampling Locations
at SWMU 61A Schoolhouse Mesa
Test Site: Blast Area



Sandia National Laboratories, New Mexico
Environmental Geographic Information System

(EPA November 1986). Section 8.4.4.4 presents analytical results for the site-specific background soil and arroyo sediment samples that were collected at SWMU 61A.

8.4.4.2.3 *Confirmatory Sampling*

SNL/NM conducted confirmatory sampling at SWMU 61A in January 1997 and in March and April 1998 to determine whether potential COCs at levels exceeding background limits at the site and/or were sufficient to pose a risk to human health or the environment were present at the site. All sampling activities were performed in accordance with the rationale and procedures described in the OU 1334 RFI work plan (SNL/NM October 1994), as reviewed by the NMED and the EPA. However, minor changes were made to the sampling depths, number of samples, and analyses specified in the OU 1334 RFI work plan to incorporate draft EPA comments on the work plan (EPA November 1995) and the RSI relating to the work plan (NMED August 1997, SNL/NM November 1997). Sample collection followed the methodology presented in the OU 1334 Work Plan (SNL/NM October 1994). SNL/NM chain-of-custody and sample documentation procedures were followed for all confirmatory samples collected.

Confirmatory samples were collected from areas within SWMU 61A where potential releases to the environment could have occurred. These areas include the following:

- Cleared area
- Gamma activity area
- Northern arroyo channel area (downstream portion)
- Concrete block area
- Remediated pit area
- Debris mound areas.

Figure 8.4.4-3 shows the confirmatory sample locations associated with the potentially contaminated areas at SWMU 61A.

In January 1997, confirmatory samples were collected from the two debris mounds (Debris Mounds 1 and 2) to identify contents of the mounds and to determine whether any releases from the mounds have occurred. Samples of the mound contents and the underlying soil were collected from three locations at each mound. During the sampling activities, both mounds were dismantled and found to be comprised mostly of soil with limited amounts of debris. All debris was then separated and removed from the site for disposal.

The debris mounds and underlying soil samples were analyzed on site for RCRA metals plus beryllium, TCLP metals plus mercury (debris mound samples only), volatile organic compounds (VOC), semivolatile organic compounds (SVOC), HE compounds, and gamma-emitting radionuclides. The debris mound samples were also analyzed off site for TCLP VOCs and TCLP SVOCs, isotopic uranium and thorium, gross alpha and gross beta, and tritium. Two debris mound samples were split for verification analysis off site for VOCs and SVOCs, RCRA metals plus beryllium, TCLP metals plus mercury, HE compounds, and gamma-emitting radionuclides. The underlying soil samples were analyzed off site for isotopic uranium and thorium only. The SNL/NM ERCL analyzed the samples for RCRA metals plus beryllium using EPA Method 6020 (EPA November 1986), for TCLP metals plus mercury using EPA Method 1311/3010/6020 (EPA November 1986), for VOCs using EPA Method 8260 (EPA November 1986), for SVOCs using EPA Method 8270 (EPA November 1986), and for HE using micellar

electrokinetic chromatograph. The SNL/NM RPSD Laboratory analyzed all samples on site for gamma-emitting radionuclides using gamma spectroscopy. General Engineering Laboratories (GEL) of Charleston, South Carolina, analyzed samples for VOCs using EPA Method 8260 (EPA November 1986), for SVOCs using EPA Method 8270 (EPA November 1986), for TCLP VOCs using EPA Method 1311/8260 (EPA November 1986), for TCLP SVOCs using EPA Method 1311/8270 (EPA November 1986), for RCRA metals plus beryllium using EPA Method 6010/7000 (EPA November 1986), for TCLP metals plus mercury using EPA Method 1311/6010/7000 (EPA November 1986), for HE using EPA Method 8330 (EPA November 1986), for isotopic uranium using EPI A-011B, for thorium using HASL 300 (GEL-specific procedures), for gross alpha and gross beta using EPA Method 900.0 (EPA November 1986), for tritium using EPA Method 906.0 (EPA November 1986), and for gamma spectroscopy using HASL 300 (GEL-specific procedures).

In March and April 1998, confirmatory samples were collected from the remaining areas at SWMU 61A. Surface (from 0 to 0.5 foot bgs) and near-surface (from 0.5 to 1.0 foot bgs) soil samples were collected at 12 random locations selected from 126 20- by 20-foot cells that comprise a grid pattern covering the cleared area of the site. Surface and near-surface soil samples were also collected from five judgmental locations where anomalous gamma activity measurements were found to be concentrated during the Phase I radiation survey (see Section 8.4.3.1.3). Surface and near-surface arroyo sediment samples were collected from four locations within the northern arroyo channel beginning directly north of the concrete blocks and continuing downstream at intervals of approximately 150 feet. Concrete chip samples and nearby surface and near-surface soil samples were collected from the concrete blocks. One concrete chip sample was collected from each block at the location of the blast pit, and nearby surface and near-surface soil samples were collected from four locations surrounding the concrete blocks. Finally, subsurface soil samples were collected from a pit discovered at SWMU 61A during the radiological VCM conducted at OU 1334 (61AE47) (see Section 8.4.4.2.1). The subsurface samples were collected from two geoprobe boreholes at two depth intervals (approximately 6.5 to 11 feet and 9.5 to 14 feet bgs).

The confirmatory samples collected in March and April 1998 were analyzed off site for RCRA metals plus beryllium, HE compounds, and gross alpha and gross beta activity. In addition, the concrete chip samples were analyzed off site for Target Analyte List (TAL) metals, TCLP metals plus beryllium and mercury, SVOCs, and TCLP SVOCs. All confirmatory samples collected in March and April 1998 were analyzed on site for gamma-emitting radionuclides. Core Laboratories Inc, of Aurora, Colorado, analyzed samples for RCRA metals plus beryllium and TAL metals using EPA Method 6010/7000 (EPA November 1986), for HE compounds using EPA Method 8330 (EPA November 1986), for gross alpha and gross beta using EPA Method 900.0 (EPA November 1986), for TCLP metals plus beryllium and mercury using EPA Method 1311/6010/7000 (EPA November 1986), and for SVOCs using EPA Methods 8270 and 1311/8270, respectively (EPA November 1986). The SNL/NM RPSD Laboratory analyzed the samples on site for gamma-emitting radionuclides using gamma spectroscopy.

8.4.4.3 *Data Gaps*

Analytical data from confirmatory sampling are sufficient to characterize the nature and extent of releases of COCs at the site. There are no further data gaps regarding characterization of SWMU 61A.

8.4.4.4 Results and Conclusions

This section discusses the analytical results for the site-specific background and confirmatory samples that were collected at SWMU 61A as described in Section 8.4.4.2.3. The analytical results are described for samples in the order defined by the sample number within the sample identification (ID) name. For example, CCTA-61A-GR-001-0-0.5-S refers to a sample from the Central Coyote Test Area (CCTA) of SNL/NM within SWMU 61A (61A). The grab sample (GR) was designated number 001 and was collected at a depth interval of 0 to 0.5 foot bgs (0-0.5). Because the sample matrix was soil or sediment, the ID name ends with an S. Other sample matrix descriptors associated with SWMU 61A include D (for debris) and C (for concrete).

8.4.4.4.1 Site-Specific Background Soil and Arroyo Sediment Samples

In March and April 1998, surface and near-surface background soil and arroyo sediment samples were collected from six locations at SWMU 61A. Metal and radionuclide analytical results for the site-specific background soil and arroyo sediment samples are summarized in Tables 8.4.4-2, 8.4.4-3, 8.4.4-4, and 8.4.4-5. The sample locations are shown on Figure 8.4.4-3 and are identified only by the sample number specified within the ER Sample ID name. This section presents the results.

Metals

Table 8.4.4-2 summarizes the metals analysis results for site-specific background soil and arroyo sediment samples from the six locations at SWMU 61A (locations 001 through 006). The site-specific background samples analyzed for metals consisted of three surface and three near-surface soil samples, three surface and three near-surface arroyo sediment samples, and one duplicate soil sample. Although the site-specific background sample results are intended for comparison with other soil and arroyo sediment sample results to identify potential releases at the site, the NMED has approved background metal concentrations in soil for the Coyote Test Field (Dinwiddie September 1997). As a result, site-specific background sample results for metals can be compared to the NMED-approved background metal concentrations.

For silver, cadmium, selenium, and mercury, no quantified background concentration values have been established, and <1 mg/kg is listed as the "HRMB background value." This circumstance arises because the laboratory reporting limits are usually at or less than 1 mg/kg for these metals in soil. Therefore, an absolute concentration less than the reporting limit could not be established and used for maximum background concentrations. This issue is handled two different ways in this NFA proposal. For site characterization purposes, the 1 mg/kg value is used as a benchmark concentration for discussions of possible metal contamination. But for the risk screening purposes, a conservative approach is taken and the maximum metal concentration is carried through the risk assessment, even if that maximum is below the 1 mg/kg nonquantified background value.

The NMED-approved background arsenic concentration of 5.6 mg/kg was slightly exceeded in the surface arroyo sediment sample from location 004 (at 5.87 mg/kg). Concentrations of beryllium slightly exceeded the NMED-approved background concentration of 0.65 mg/kg in the near-surface soil samples from locations 001 and 003 (at 0.832 and 1.10 mg/kg, respectively). Cadmium concentrations slightly exceeded the NMED-approved nonquantified background

Table 8.4.4-2
Summary of SWMU 61A Confirmatory Sampling Metals Analytical Results, January 1997 and March–April 1998

Sample Attributes			Metals (EPA 6010/7000) ^a (mg/kg)								
Record Number ^b	ER Sample ID ^c (Figure 8.4.4-3)	Sample Depth (ft)	Arsenic	Barium	Beryllium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver
Site-Specific Background Soil Samples											
510093	CCTA-61A-GR-001-0-0.5-S	0-0.5	1.77	82.2	0.555	1.21	7.77	8.61	0.0222 J (0.10)	ND(0.000891)	3.09
510093	CCTA-61A-GR-001-0.5-1.0-S	0.5-1	.0283 J (0.5)	122	0.832	1.24	12.0	9.79	0.0453	ND(0.000891)	4.37
510093	CCTA-61A-GR-002-0-0.5-S	0-0.5	4.09	79.2	0.488 J (0.5)	0.859	6.44	9.43	0.0279 J (0.10)	ND(0.000891)	2.48
510093	CCTA-61A-GR-002-0.5-1.0-S	0.5-1	2.55	119	0.506	0.836	5.75	6.04	0.0284 J (0.10)		2.43
510093	CCTA-61A-GR-003-0-0.5-S	0-0.5	4.48	78.1	0.475 J (0.5)	0.861	8.73	8.70	0.0286 J (0.10)	ND(0.000891)	3.45
510093	CCTA-61A-GR-003-0.5-1.0-S	0.5-1	2.14	111	1.10	1.58	14.3	13.6	0.0425	ND(0.000891)	5.38
Site-Specific Background Arroyo Sediment Samples											
510093	CCTA-61A-GR-004-0-0.5-S	0-0.5	5.87	94.7	0.340 J (0.5)	0.614	4.13	9.22	0.0238 J (0.10)	ND(0.000891)	1.84
510093	CCTA-61A-GR-004-0-0.5-DU	0-0.5	2.05	90.5	0.335 J (0.5)	0.769	4.93	8.57	0.0229 J (0.10)	ND(0.000891)	2.07
510093	CCTA-61A-GR-004-0.5-1.0-S	0.5-1	2.69	75.5	0.214 J (0.5)	0.832	3.63	7.39	0.0218 J (0.10)	ND(0.000891)	1.73
510093	CCTA-61A-GR-005-0-0.5-S	0-0.5	1.82	84.7	0.361 J (0.5)	0.649	4.46	7.47	0.0227 J (0.10)	ND(0.000891)	1.87
510093	CCTA-61A-GR-005-0.5-1.0-S	0.5-1	2.08	90.6	0.311 J (0.5)	0.976	4.88	13.0	0.0176 J (0.10)	ND(0.000891)	2.06
510093	CCTA-61A-GR-006-0-0.5-S	0-0.5	1.96	81.8	0.291 J (0.5)	0.707	3.27	9.06	0.0210 J (0.10)	ND(0.000891)	1.67
510093	CCTA-61A-GR-006-0.5-1.0-S	0.5-1	2.15	100	0.216 J (0.5)	0.623	3.01	6.57	0.0235 J (0.10)	ND(0.000891)	ND(0.002914)
Cleared Area Random Soil Samples											
510191	CCTA-61A-GR-007-0-0.5-S	0-0.5	1.59	87.7	0.412 J (0.5)	0.767	8.17	281 ^d	0.0284 J (0.10)	ND(0.000891)	ND(0.002914)
510191	CCTA-61A-GR-007-0-0.5-DU	0-0.5	1.47	89.4	0.246 J (0.5)	0.661	7.94	202	0.0353	0.102 J (0.5)	ND(0.002914)
510191	CCTA-61A-GR-007-0.5-1.0-S	0.5-1	1.95	86.5	0.333 J (0.5)	ND(0.002453)	7.44	17.9 J	0.0363	ND(0.000891)	ND(0.002914)
510191	CCTA-61A-GR-008-0-0.5-S	0-0.5	1.56	65.9	0.276 J (0.5)	0.329 J (0.5)	5.74	13.2 J	0.0207 J (0.10)	ND(0.000891)	ND(0.002914)
510191	CCTA-61A-GR-008-0.5-1.0-S	0.5-1	4.48	148	0.625	ND(0.002453)	10.0	9.94 B J	0.0201 J (0.10)	0.0910 J (0.5)	ND(0.002914)
510191	CCTA-61A-GR-009-0-0.5-S	0-0.5	20.8	100	0.338 J (0.5)	1.02	8.32	104	0.0199 J (0.10)	ND(0.000891)	ND(0.002914)
510191	CCTA-61A-GR-009-0.5-1.0-S	0.5-1	4.14	124	0.788	ND(0.002453)	12.4	16.0 J	0.0395	0.131 J (0.5)	ND(0.002914)
510191	CCTA-61A-GR-010-0-0.5-S	0-0.5	1.93	92.4	0.400 J (0.5)	ND(0.002453)	8.14	35.2 J	0.0331 J (0.10)	ND(0.000891)	ND(0.002914)
510191	CCTA-61A-GR-010-0.5-1.0-S	0.5-1	4.31	83.3	0.553	ND(0.002453)	9.04	7.12 J	0.0563	0.216 J (0.5)	ND(0.002914)
510191	CCTA-61A-GR-011-0-0.5-S	0-0.5	4.09	123	0.711	0.259 J (0.5)	12.0	7.30 J	0.0533	ND(0.000891)	ND(0.002914)
510191	CCTA-61A-GR-011-0.5-1.0-S	0.5-1	6.98	150	0.981	ND(0.002453)	19.8	11.5 J	0.0478	ND(0.000891)	ND(0.002914)
510191	CCTA-61A-GR-012-0-0.5-S	0-0.5	1.81	74.4	0.335 J (0.5)	ND(0.002453)	7.44	11.3 J	0.0352	ND(0.000891)	ND(0.002914)
510191	CCTA-61A-GR-012-0.5-1.0-S	0.5-1	4.87	79.7	0.670	ND(0.002453)	12.0	12.4 J	0.0368	ND(0.000891)	ND(0.002914)
510191	CCTA-61A-GR-013-0-0.5-S	0-0.5	1.74	70.2	0.253 J (0.5)	0.276 J (0.5)	5.66	22.8	0.0239 J (0.10)	0.269 J (0.5)	ND(0.002914)
510191	CCTA-61A-GR-013-0.5-1.0-S	0.5-1	5.50	120	0.496 J (0.5)	0.435 J (0.5)	8.37	6.08 J	0.0432	0.104 J (0.5)	ND(0.002914)

Refer to footnotes at end of table.

Table 8.4.4-2 (Continued)
Summary of SWMU 61A Confirmatory Sampling Metals Analytical Results, January 1997 and March-April 1998

Sample Attributes			Metals (EPA 6010/7000) ^a (mg/kg)								
Record Number ^b	ER Sample ID ^c (Figure 8.4.4-3)	Sample Depth (ft)	Arsenic	Barium	Beryllium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver
510192	CCTA-61A-GR-014-0-0.5-S	0-0.5	2.36	70.9	0.213 J (0.5)	1.44	12.2	3950 J	0.0867	0.155 J (0.5)	ND(0.002914)
510192	CCTA-61A-GR-014-0.5-1.0-S	0.5-1	4.73	75.6	0.756	ND(0.002453)	13.0	80.1 J	0.0498	0.229 J (0.5)	ND(0.002914)
510192	CCTA-61A-GR-015-0-0.5-S	0-0.5	1.55	64.3	0.246 J (0.5)	0.294 J (0.5)	6.72	10.1 J	0.0784	0.163 J (0.5)	ND(0.002914)
510192	CCTA-61A-GR-015-0.5-1.0-S	0.5-1	1.58	62.5	0.250 J (0.5)	ND(0.002453)	5.34	5.24 J	0.0260 J (0.10)	0.164 J (0.5)	ND(0.002914)
510192	CCTA-61A-GR-016-0-0.5-S	0-0.5	2.34	66.2	0.310 J (0.5)	ND(0.002453)	7.96	75.3 J	0.0260 J (0.10)	0.123 J (0.5)	ND(0.002914)
510192	CCTA-61A-GR-016-0-0.5-DU	0-0.5	2.65	55.6	0.319 J (0.5)	ND(0.002453)	7.23	12.8 J	0.0240 J (0.10)	0.161 J (0.5)	ND(0.002914)
510192	CCTA-61A-GR-016-0.5-1.0-S	0.5-1	6.16	109	0.966	0.265 J (0.5)	13.9	11.8 J	0.0530	1.01	ND(0.002914)
510192	CCTA-61A-GR-017-0-0.5-S	0-0.5	1.42	71.9	0.201 J (0.5)	1.48	6.73	83.9 J	0.0215 J (0.10)	0.144 J (0.5)	ND(0.002914)
510192	CCTA-61A-GR-017-0.5-1.0-S	0.5-1	1.64	64.2	0.254 J (0.5)	0.689	5.24	52.3 J	0.0367	ND(0.000891)	ND(0.002914)
510192	CCTA-61A-GR-018-0-0.5-S	0-0.5	2.88	68.8	0.364 J (0.5)	0.854	8.26	66.6 J	0.0401	0.266 J (0.5)	ND(0.002914)
510192	CCTA-61A-GR-018-0.5-1.0-S	0.5-1	1.74	72.6	0.282 J (0.5)	1.38	7.00	172 J	0.0370	0.142 J (0.5)	ND(0.002914)
Gamma Activity Area Judgmental Soil Samples											
510198	CCTA-61A-GR-019-0-0.5-S	0-0.5	3.59	137	0.641	2.93	13.1	9.65 B	0.0516	0.189 J (0.5)	0.342 J (1)
510198	CCTA-61A-GR-019-0-0.5-DU	0-0.5	3.04	141	0.873	3.86	14.8	9.40 B	0.0438	0.202 J (0.5)	1.06
510198	CCTA-61A-GR-019-0.5-1.0-S	0.5-1	2.48	97.6	0.605	2.43	11.2	9.14 B	0.0208 J (0.10)	0.152 J (0.5)	0.696 J (1)
510198	CCTA-61A-GR-020-0-0.5-S	0-0.5	3.64	140	0.501	1.48	5.05	6.54 B	0.0652	0.184 J (0.5)	ND(0.002914)
510198	CCTA-61A-GR-020-0.5-1.0-S	0.5-1	3.08	95.5	0.801	2.88	13.1	9.11 B	0.0273 J (0.10)	0.217 J (0.5)	0.834 J (1)
510198	CCTA-61A-GR-021-0-0.5-S	0-0.5	1.39	97.7	0.565	1.92	9.49	7.76	0.0165 J (0.10)	ND(0.000891)	0.658 J (1)
510198	CCTA-61A-GR-021-0.5-1.0-S	0.5-1	1.74	79.5	0.339 J (0.5)	1.69	5.18	8.49	0.0279 J (0.10)	0.114 J (0.5)	ND(0.002914)
510198	CCTA-61A-GR-022-0-0.5-S	0-0.5	1.26	58.6	0.430 J (0.5)	1.67	6.75	7.95	0.0165 J (0.10)	0.107 J (0.5)	0.440 J (1)
510198	CCTA-61A-GR-022-0.5-1.0-S	0.5-1	1.74	98.5	0.419 J (0.5)	2.14	7.19	6.85	0.0185 J (0.10)	0.122 J (0.5)	ND(0.002914)
510198	CCTA-61A-GR-023-0-0.5-S	0-0.5	8.09	117	0.424 J (0.5)	2.38	5.92	7.12	0.0185 J (0.10)	2.80	0.596 J (1)
510198	CCTA-61A-GR-023-0.5-1.0-S	0.5-1	1.70	94.1	0.334 J (0.5)	1.72	4.89	7.33	0.0157 J (0.10)	ND(0.000891)	ND(0.002914)
Arroyo Sediment Samples											
510198	CCTA-61A-GR-024-0-0.5-S	0-0.5	2.10	149	0.320 J (0.5)	0.462 J (0.5)	5.62	10.2	0.0221 J (0.10)	ND(0.000891)	ND(0.002914)
510198	CCTA-61A-GR-024-0-0.5-DU	0-0.5	1.68	89.9	0.250 J (0.5)	ND(0.002453)	3.31	6.75	0.0214 J (0.10)	0.101 J (0.5)	ND(0.002914)
510198	CCTA-61A-GR-024-0.5-1.0-S	0.5-1	2.35	98.5	0.431 J (0.5)	0.657	6.63	5.35	0.0218 J (0.10)	0.109 J (0.5)	ND(0.002914)
510198	CCTA-61A-GR-025-0-0.5-S	0-0.5	2.19	95.8	0.632	0.349 J (0.5)	8.21	7.53	0.0210 J (0.10)	0.104 J (0.5)	0.354 J (1)
510198	CCTA-61A-GR-025-0.5-1.0-S	0.5-1	2.08	105	0.423 J (0.5)	0.875	7.07	10.7	0.0204 J (0.10)	ND(0.000891)	ND(0.002914)
510198	CCTA-61A-GR-026-0-0.5-S	0-0.5	1.64	104	0.424 J (0.5)	0.838	6.77	8.66	0.0206 J (0.10)	0.0910 J (0.5)	0.332 J (1)
510198	CCTA-61A-GR-026-0.5-1.0-S	0.5-1	3.06	141	0.445 J (0.5)	ND(0.002453)	7.21	6.57	0.0295 J (0.10)	ND(0.000891)	ND(0.002914)
510198	CCTA-61A-GR-027-0-0.5-S	0-0.5	2.34	97.5	0.425 J (0.5)	ND(0.002453)	4.91	11.2	0.0176 J (0.10)	0.115 J (0.5)	ND(0.002914)
510198	CCTA-61A-GR-027-0.5-1.0-S	0.5-1	2.19	102	0.430 J (0.5)	0.769	5.46	8.39	0.0149 J (0.10)	ND(0.000891)	0.528 J (1)
510198	CCTA-61A-GR-027-0.5-1.0-DU	0.5-1	2.57	130	0.445 J (0.5)	0.959	5.92	8.33	0.0357	ND(0.000891)	ND(0.002914)
Concrete Block Area Soil Samples											
510195	CCTA-61A-GR-028-0-0.5-S	0-0.5	1.14	60.7	0.198 J (0.5)	ND(0.002453)	5.99	19.7	0.0209 J (0.10)	0.179 J (0.5)	ND(0.002914)
510195	CCTA-61A-GR-028-0-0.5-DU	0-0.5	1.33	59.0	0.232 J (0.5)	0.691	5.88	0.293	0.00972 J (0.10)	ND(0.000891)	ND(0.002914)
510195	CCTA-61A-GR-028-0.5-1.0-S	0.5-1	1.13	56.9	ND(0.001811)	0.246 J (0.5)	5.15	7.92	0.0218 J (0.10)	ND(0.000891)	ND(0.002914)

Refer to footnotes at end of table.

Table 8.4.4-2 (Continued)
Summary of SWMU 61A Confirmatory Sampling Metals Analytical Results, January 1997 and March–April 1998

Sample Attributes			Metals (EPA 6010/7000)* (mg/kg)								
Record Number ^b	ER Sample ID ^c (Figure 8.4.4-3)	Sample Depth (ft)	Arsenic	Barium	Beryllium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver
510195	CCTA-61A-GR-029-0-0.5-S	0–0.5	1.34	54.2	0.244 J (0.5)	ND(0.002453)	6.64	10.6	0.0208 J (0.10)	ND(0.000891)	0.624 J (1)
510195	CCTA-61A-GR-029-0.5-1.0-S	0.5–1	1.18	65.6	0.230 J (0.5)	ND(0.002453)	8.24	7.11	0.0234 J (0.10)	ND(0.000891)	ND(0.002914)
510195	CCTA-61A-GR-030-0-0.5-S	0–0.5	1.25	62.1	0.258 J (0.5)	ND(0.002453)	7.74	0.169	0.0210 J (0.10)	ND(0.000891)	ND(0.002914)
510195	CCTA-61A-GR-030-0.5-1.0-S	0.5–1	1.58	61.5	0.244 J (0.5)	0.332 J (0.5)	6.93	7.68	0.0356	ND(0.000891)	ND(0.002914)
510195	CCTA-61A-GR-031-0-0.5-S	0–0.5	1.25	65.8	ND(0.001811)	0.396 J (0.5)	5.53	0.492	0.00858 J (0.10)	ND(0.000891)	ND(0.002914)
510195	CCTA-61A-GR-031-0.5-1.0-S	0.5–1	1.36	45.6	ND(0.001811)	ND(0.002453)	7.04	7.82	0.0170 J (0.10)	ND(0.000891)	ND(0.002914)
Remediated Pit Soil Samples											
510196	CCTA-61A-GR-035-6.5-9.5-S	6.5–9.5	2.44	137	0.376 J (0.5)	ND(0.002453)	7.12	4.49	ND(0.000047)	ND(0.000891)	ND(0.002914)
510196	CCTA-61A-GR-035-9.5-13.5-S	9.5–13.5	2.19	101	0.486 J (0.5)	ND(0.002453)	12.0	3.17	0.0616	ND(0.000891)	ND(0.002914)
510196	CCTA-61A-GR-036-7-11-S	7–11	1.73	122	0.361 J (0.5)	ND(0.002453)	8.91	4.00	0.0643	ND(0.000891)	ND(0.002914)
510196	CCTA-61A-GR-036-11-14-S	11–14	2.41	78.3	0.322 J (0.5)	ND(0.002453)	11.5	4.07	0.00810 J (0.10)	ND(0.000891)	0.517 J (1)
Debris Mound Samples											
06128	CCTA-61A-GR-094-D (on-site laboratory) Debris Mound 1	NA	1.8	86	0.41	0.55	12	120	ND(0.035)	ND(0.24)	0.045 J (0.056)
06127	CCTA-61A-GR-094-D (on-site laboratory) Debris Mound 1	NA	2.46	78.3	0.340	1.74	9.52	57.9	0.0164 J (0.0309)	0.341 J (0.490)	ND(0.0212)
06128	CCTA-61A-GR-094-0-0.5-S (on-site laboratory) Debris Mound 1	0–0.5	2.5	95	0.37 B	0.16 J (0.19)	10	9.8	ND(0.035)	0.28 J (0.96)	0.027 J (0.056)
06128	CCTA-61A-GR-095-D (on-site laboratory) Debris Mound 1	NA	1.4	67	0.32 B	6.5	9.8	150	ND(0.035)	ND(0.24)	0.046 J (0.056)
06128	CCTA-61A-GR-095-0-0.5-S (on-site laboratory) Debris Mound 1	0–0.5	3	99	0.44 B	0.085 J (0.19)	5.4	5.8	0.046 J (0.14)	0.38 J (0.96)	0.042 J (0.056)
06128	CCTA-61A-GR-096-D (on-site laboratory) Debris Mound 1	NA	2.1	64	0.3 B	0.2	5.3	17	ND(0.035)	ND(0.24)	0.029 J (0.056)
06128	CCTA-61A-GR-096-0-0.5-S (on-site laboratory) Debris Mound 1	0–0.5	3.3	89	0.57 B	0.11 J (0.19)	9.7	7.6	ND(0.035)	ND(0.24)	0.031 J (0.056)
06128	CCTA-61A-GR-097-D (on-site laboratory) Debris Mound 2	NA	1.6 J (1.9)	62	0.35 B	0.23	6.5	18	ND(0.035)	ND(0.24)	0.048 J (0.056)
06128	CCTA-61A-GR-097-0-0.5-S (on-site laboratory) Debris Mound 2	0–0.5	4.7	160	0.46 B	0.14 J (0.19)	6.7	6.8	ND(0.035)	ND(0.24)	0.038 J (0.056)
06128	CCTA-61A-GR-098-D (on-site laboratory) Debris Mound 2	NA	1.9 J (1.9)	71	0.37 B	0.22	6.2	11	ND(0.035)	ND(0.24)	0.066

Refer to footnotes at end of table.

Table 8.4.4-2 (Concluded)
Summary of SWMU 61A Confirmatory Sampling Metals Analytical Results, January 1997 and March–April 1998

Sample Attributes			Metals (EPA 6010/7000) ^a (mg/kg)								
Record Number ^b	ER Sample ID ^c (Figure 8.4.4-3)	Sample Depth (ft)	Arsenic	Barium	Beryllium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver
06128	CCTA-61A-GR-098-D (duplicate) (on-site laboratory) Debris Mound 2	NA	1.5 J (1.9)	58	0.31 B	0.079 J (0.19)	6	24	ND(0.035)	ND(0.24)	0.054 J (0.056)
06127	CCTA-61A-GR-098-D Debris Mound 2	NA	1.91	72.6	0.340	1.38	8.28	10.6	0.0376	ND(.114)	ND(.0212)
06128	CCTA-61A-GR-098-0-0.5-S (duplicate) (on-site laboratory) Debris Mound 2	0–0.5	3.8	120	0.39	0.1 J (0.19)	5.3	5.6	ND(0.035)	0.56 J (0.96)	0.02 J (0.056)
06128	CCTA-61A-GR-099-D (on-site laboratory) Debris Mound 2	NA	1.5 J (1.9)	56	ND(0.028)	0.58	5	12	ND(0.035)	ND(0.24)	0.025 J (0.056)
06128	CCTA-61A-GR-099-0-0.5-S (on-site laboratory) Debris Mound 2	0–0.5	2.2	82	0.36	0.37	5.6	7.6	ND(0.035)	0.32 J (0.96)	0.021 J (0.056)
Background Soil Concentrations—Coyote Test Field ^a			5.6	130	0.65	<1	12.8	11.8	<0.1	<1	<1
Quality Assurance/Quality Control Samples (all in mg/L)											
510093	CCTA-61A-GR-000-EB	NA	ND(0.000827)	0.00171 J (0.01)	ND(0.001811)	ND(0.002453)	ND(0.003826)	0.00182 J (0.002)	ND(0.000047)	ND(0.000891)	ND(0.002914)
510191	CCTA-61A-GR-000-EB	NA	ND(0.000827)	ND(0.001709)	ND(0.001811)	ND(0.002453)	ND(0.003826)	0.00189 B	ND(0.000047)	ND(0.000891)	ND(0.002914)
510195	CCTA-61A-GR-000-EB	NA	ND(0.000827)	ND(0.001709)	ND(0.001811)	ND(0.002453)	ND(0.003826)	0.00350	ND(0.000047)	ND(0.000891)	ND(0.002914)
510196	CCTA-61A-GR-000-EB	NA	ND(0.000827)	ND(0.001709)	ND(0.001811)	ND(0.002453)	ND(0.003826)	0.00324 J (0.005)	ND(0.000047)	0.00102 J (0.005)	ND(0.002914)
06127	CCTA-61A-GR-000-EB	NA	ND(.00276)	0.000663 J (0.0100)	ND(.000135)	0.000323 J (0.00500)	0.00154 J (0.0100)	0.00206 J (0.00500)	ND (.0001)	ND(.00228)	ND(.000424)

^aEPA November 1986.^bAnalysis request/chain of custody record.^cBold portion of the ER Sample ID corresponds to the sample location specified in Figure 8.4.4-3.^dSoil sample results in bold exceed background.^eFrom Dinwiddle September 1997. The minimum background concentrations between surface and subsurface are reported.

B = Analyte detected in associated blank.

CCTA = Central Coyote Test Area.

D = Debris sample.

DU = Duplicate sample.

EB = Equipment blank.

EPA = U.S. Environmental Protection Agency.

ER = Environmental Restoration.

ft = Foot (feet).

GR = Grab sample.

ID = Identification.

J = Analytical result was qualified as an estimation during data validation.

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

S = Soil sample.

SWMU = Solid waste management unit.

Table 8.4.4-3
Summary of SWMU 61A Confirmatory Sampling Gamma Spectroscopy Analysis, January 1997 and March–April 1998

Sample Attributes			Activity (pCi/g)							
Record Number	ER Sample ID ^b (Figure 8.4.4-3)	Sample Depth (ft)	Uranium-238		Thorium-232		Uranium-235		Cesium-137	
			Result	Error ^c	Result	Error ^c	Result	Error ^c	Result	Error ^c
Site-Specific Background Soil Samples										
510226	CCTA-61A-GR-001-0-0.5-S	0-0.5	ND(1.45E+00)	--	8.06E-01	4.47E-01	ND(2.23E-01)	--	4.30E-01	8.47E-02
510226	CCTA-61A-GR-001-0.5-1.0-S	0.5-1	ND(3.70E+00)	--	9.63E-01	4.63E-01	ND(2.67E-01)	--	1.48E-01	4.00E-02
510226	CCTA-61A-GR-002-0-0.5-S	0-0.5	ND(2.89E+00)	--	7.15E-01	3.68E-01	ND(2.06E-01)	--	1.94E-01	4.88E-02
510226	CCTA-61A-GR-002-0.5-1.0-S	0.5-1	ND(3.00E+00)	--	7.46E-01	3.62E-01	ND(2.12E-01)	--	ND(3.01E-02)	--
510226	CCTA-61A-GR-003-0-0.5-S	0-0.5	ND(2.85E+00)	--	6.96E-01	3.32E-01	ND(2.08E-01)	--	3.59E-02	2.30E-02
510226	CCTA-61A-GR-003-0.5-1.0-S	0.5-1	ND(3.32E+00)	--	9.12E-01	4.46E-01	ND(2.45E-01)	--	ND(3.37E-02)	--
Site-Specific Background Arroyo Sediment Samples										
510226	CCTA-61A-GR-004-0-0.5-S	0-0.5	ND(3.16E+00)	--	6.38E-01	3.12E-01	ND(2.37E-01)	--	2.72E-01	5.30E-02
510226	CCTA-61A-GR-004-0-0.5-DU	0-0.5	ND(1.50E+00)	--	8.10E-01	4.19E-01	ND(2.10E-01)	--	2.11E-01	7.38E-02
510226	CCTA-61A-GR-004-0.5-1.0-S	0.5-1	ND(1.33E+00)	--	5.87E-01	2.96E-01	ND(1.88E-01)	--	4.13E-01	7.37E-02
510226	CCTA-61A-GR-005-0-0.5-S	0-0.5	ND(1.53E+00)	--	6.46E-01	3.67E-01	ND(2.12E-01)	--	1.66E-01	5.63E-02
510226	CCTA-61A-GR-005-0.5-1.0-S	0.5-1	ND(1.30E+00)	--	7.17E-01	6.80E-01	ND(1.95E-01)	--	2.68E-01	6.01E-02
510226	CCTA-61A-GR-006-0-0.5-S	0-0.5	ND(1.52E+00)	--	6.61E-01	3.24E-01	ND(1.67E-01)	--	2.34E-01	4.49E-02
510226	CCTA-61A-GR-006-0.5-1.0-S	0.5-1	8.54E-01	6.90E-01	6.85E-01	3.35E-01	ND(1.77E-01)	--	2.21E-01	4.67E-02
Cleared Area Random Soil Samples										
510229	CCTA-61A-GR-007-0-0.5-S	0-0.5	ND(1.61E+00)	--	7.89E-01	3.80E-01	ND(1.79E-01)	--	3.00E-01	6.07E-02
510229	CCTA-61A-GR-007-0-0.5-DU	0-0.5	ND(1.63E+00)	--	8.26E-01	4.11E-01	ND(2.12E-01)	--	3.43E-01	6.74E-02
510229	CCTA-61A-GR-007-0.5-1.0-S	0.5-1	ND(1.20E+00)	--	6.21E-01	3.27E-01	ND(1.80E-01)	--	1.92E-01	5.64E-02
510229	CCTA-61A-GR-008-0-0.5-S	0-0.5	ND(3.23E+00)	--	7.18E-01	3.53E-01	ND(2.29E-01)	--	8.95E-02	2.84E-02
510229	CCTA-61A-GR-008-0.5-1.0-S	0.5-1	6.70E-01	7.95E-01	7.66E-01	3.73E-01	ND(1.87E-01)	--	8.96E-03	1.74E-02
510229	CCTA-61A-GR-009-0-0.5-S	0-0.5	6.58E-01	6.02E-01	7.64E-01	3.74E-01	ND(1.99E-01)	--	2.93E-01	6.66E-02
510229	CCTA-61A-GR-009-0.5-1.0-S	0.5-1	ND(1.66E+00)	--	9.12E-01	4.48E-01	ND(1.91E-01)	--	1.54E-02	2.13E-02
510229	CCTA-61A-GR-010-0-0.5-S	0-0.5	ND(3.28E+00)	--	1.01E+00	4.72E-01	ND(2.42E-01)	--	2.87E-02	1.83E-02
510229	CCTA-61A-GR-010-0.5-1.0-S	0.5-1	ND(1.34E+00)	--	1.02E+00 ^d	4.95E-01	ND(2.02E-01)	--	ND(5.11E-02)	--
510229	CCTA-61A-GR-011-0-0.5-S	0-0.5	ND(1.66E+00)	--	9.06E-01	4.09E-01	ND(1.87E-01)	--	1.11E-01	2.96E-02
510229	CCTA-61A-GR-011-0.5-1.0-S	0.5-1	ND(3.65E+00)	--	9.76E-01	4.60E-01	ND(2.59E-01)	--	ND(3.44E-02)	--
510229	CCTA-61A-GR-012-0-0.5-S	0-0.5	5.10E-01	5.41E-01	7.19E-01	3.49E-01	ND(1.86E-01)	--	3.47E-01	6.91E-02
510229	CCTA-61A-GR-012-0.5-1.0-S	0.5-1	6.13E-01	5.78E-01	8.26E-01	6.11E-01	ND(1.85E-01)	--	2.69E-01	5.71E-02
510229	CCTA-61A-GR-013-0-0.5-S	0-0.5	5.52E-01	5.91E-01	7.88E-01	3.78E-01	ND(2.01E-01)	--	1.57E-01	4.95E-02
510229	CCTA-61A-GR-013-0.5-1.0-S	0.5-1	ND(3.13E+00)	--	7.93E-01	3.77E-01	ND(2.23E-01)	--	1.73E-02	2.57E-02

Refer to footnotes at end of table.

Table 8.4.4-3 (Continued)
Summary of SWMU 61A Confirmatory Sampling Gamma Spectroscopy Analysis, January 1997 and March-April 1998

Sample Attributes			Activity (pCi/g)							
Record Number	ER Sample ID ^b (Figure 8.4.4-3)	Sample Depth (ft)	Uranium-238		Thorium-232		Uranium-235		Cesium-137	
			Result	Error ^c	Result	Error ^c	Result	Error ^c	Result	Error ^c
510193	CCTA-61A-GR-014-0-0.5-S	0-0.5	ND(3.06E+00)	--	6.82E-01	3.44E-01	ND(2.25E-01)	--	4.86E-01	7.80E-02
510193	CCTA-61A-GR-014-0.5-1.0-S	0.5-1	ND(3.15E+00)	--	9.00E-01	4.21E-01	ND(2.31E-01)	--	2.28E-02	1.58E-02
510193	CCTA-61A-GR-015-0-0.5-S	0-0.5	ND(3.14E+00)	--	7.11E-01	3.87E-01	ND(2.35E-01)	--	3.62E-01	1.60E-01
510193	CCTA-61A-GR-015-0.5-1.0-S	0.5-1	ND(3.12E+00)	--	7.49E-01	3.82E-01	ND(2.32E-01)	--	1.46E-01	2.14E-01
510193	CCTA-61A-GR-016-0-0.5-S	0-0.5	ND(3.56E+00)	--	9.92E-01	4.93E-01	ND(2.58E-01)	--	ND(3.46E-02)	--
510193	CCTA-61A-GR-016-0-0.5-DU	0-0.5	ND(3.43E+00)	--	9.81E-01	4.55E-01	ND(2.43E-01)	--	5.72E-02	2.06E-02
510193	CCTA-61A-GR-016-0.5-1.0-S	0.5-1	ND(3.63E+00)	--	1.07E+00	8.07E-01	ND(2.67E-01)	--	ND(3.63E-02)	--
510193	CCTA-61A-GR-017-0-0.5-S	0-0.5	ND(3.14E+00)	--	7.44E-01	3.78E-01	ND(2.30E-01)	--	4.66E-01	8.19E-02
510193	CCTA-61A-GR-017-0.5-1.0-S	0.5-1	ND(2.95E+00)	--	6.72E-01	3.60E-01	ND(2.19E-01)	--	5.27E-01	8.54E-02
510193	CCTA-61A-GR-018-0-0.5-S	0-0.5	ND(3.14E+00)	--	7.79E-01	8.95E-01	ND(2.29E-01)	--	5.37E-01	8.55E-02
510193	CCTA-61A-GR-018-0.5-1.0-S	0.5-1	ND(3.28E+00)	--	7.67E-01	3.68E-01	ND(2.34E-01)	--	6.20E-01	9.58E-02
Gamma Activity Area Judgmental Soil Samples										
510199	CCTA-61A-GR-019-0-0.5-S	0-0.5	4.15E+00	1.83E+00	7.94E-01	3.69E-01	ND(2.22E-01)	--	9.31E-02	4.01E-02
510199	CCTA-61A-GR-019-0-0.5-DU	0-0.5	3.06E+00	1.39E+00	8.80E-01	4.53E-01	ND(2.14E-01)	--	4.58E-02	3.02E-02
510199	CCTA-61A-GR-019-0.5-1.0-S	0.5-1	1.18E+00	8.03E-01	7.81E-01	3.95E-01	ND(1.88E-01)	--	ND(3.66E-02)	--
510199	CCTA-61A-GR-020-0-0.5-S	0-0.5	3.27E+00	1.43E+00	9.85E-01	4.83E-01	2.27E-01	7.01E-02	1.37E-01	4.61E-02
510199	CCTA-61A-GR-020-0.5-1.0-S	0.5-1	2.29E+00	2.21E+00	9.48E-01	4.89E-01	ND(2.24E-01)	--	5.72E-02	6.19E-02
510199	CCTA-61A-GR-021-0-0.5-S	0-0.5	2.62E+00	2.10E+00	8.71E-01	4.30E-01	ND(2.25E-01)	--	1.22E-01	4.55E-02
510199	CCTA-61A-GR-021-0.5-1.0-S	0.5-1	1.14E+00	9.13E-01	2.66E-01	1.95E-01	ND(1.55E-01)	--	3.20E-02	1.80E-02
510199	CCTA-61A-GR-022-0-0.5-S	0-0.5	ND(3.23E+00)	--	7.17E-01	3.84E-01	ND(2.34E-01)	--	7.65E-01	1.18E-01
510199	CCTA-61A-GR-022-0.5-1.0-S	0.5-1	ND(2.78E+00)	--	6.56E-01	3.48E-01	ND(2.03E-01)	--	4.05E-02	1.86E-02
510199	CCTA-61A-GR-023-0-0.5-S	0-0.5	ND(3.16E+00)	--	7.86E-01	3.74E-01	ND(2.29E-01)	--	2.26E-01	4.99E-02
510199	CCTA-61A-GR-023-0.5-1.0-S	0.5-1	ND(2.90E+00)	--	6.39E-01	3.07E-01	ND(2.14E-01)	--	4.06E-02	2.82E-02
Arroyo Sediment Samples										
510199	CCTA-61A-GR-024-0-0.5-S	0-0.5	2.28E+00	1.74E+00	8.41E-01	7.77E-01	ND(2.33E-01)	--	4.26E-01	1.28E-01
510199	CCTA-61A-GR-024-0-0.5-DU	0-0.5	ND(2.09E+00)	--	6.84E-01	3.27E-01	ND(2.12E-01)	--	3.82E-01	1.21E-01
510199	CCTA-61A-GR-024-0.5-1.0-S	0.5-1	ND(2.72E+00)	--	5.89E-01	3.18E-01	ND(2.02E-01)	--	2.08E-02	1.87E-02
510199	CCTA-61A-GR-025-0-0.5-S	0-0.5	ND(1.78E+00)	--	6.98E-01	3.68E-01	ND(1.97E-01)	--	6.70E-01	1.07E-01
510199	CCTA-61A-GR-025-0.5-1.0-S	0.5-1	1.54E+00	8.48E-01	7.06E-01	3.76E-01	ND(2.04E-01)	--	2.55E-01	6.86E-02
510199	CCTA-61A-GR-026-0-0.5-S	0-0.5	ND(7.09E-01)	--	7.55E-01	3.75E-01	ND(1.81E-01)	--	3.70E-01	6.22E-02
510199	CCTA-61A-GR-026-0.5-1.0-S	0.5-1	ND(1.13E+00)	--	7.41E-01	7.59E-01	ND(1.75E-01)	--	6.01E-02	3.19E-02
510199	CCTA-61A-GR-027-0-0.5-S	0-0.5	ND(1.62E+00)	--	7.30E-01	3.74E-01	ND(1.84E-01)	--	1.75E-01	4.26E-02
510199	CCTA-61A-GR-027-0.5-1.0-S	0.5-1	ND(1.23E+00)	--	6.94E-01	3.72E-01	ND(1.93E-01)	--	2.52E-01	5.48E-02
510199	CCTA-61A-GR-027-0.5-1.0-DU	0.5-1	5.33E-01	5.65E-01	6.17E-01	3.18E-01	ND(1.76E-01)	--	2.32E-01	4.76E-02
Concrete Block Area Samples										
510231	CCTA-61A-GR-028-0-0.5-S	0-0.5	ND(2.19E+00)	--	8.73E-01	4.35E-01	ND(2.41E-01)	--	5.79E-01	1.12E-01
510231	CCTA-61A-GR-028-0-0.5-DU	0-0.5	ND(2.18E+00)	--	8.09E-01	4.09E-01	ND(2.44E-01)	--	6.00E-01	9.86E-02

Refer to footnotes at end of table.

Table 8.4.4-3 (Continued)
Summary of SWMU 61A Confirmatory Sampling Gamma Spectroscopy Analysis, January 1997 and March–April 1998

Sample Attributes			Activity (pCi/g)							
Record Number	ER Sample ID ^b (Figure 8.4.4-3)	Sample Depth (ft)	Uranium-238		Thorium-232		Uranium-235		Cesium-137	
			Result	Error ^c	Result	Error ^c	Result	Error ^c	Result	Error ^c
510231	CCTA-61A-GR-028-0.5-1.0-S	0.5-1	ND(1.79E+00)	--	6.98E-01	3.78E-01	ND(2.35E-01)	--	1.21E-01	7.08E-02
510231	CCTA-61A-GR-029-0.0-0.5-S	0-0.5	ND(1.62E+00)	--	6.84E-01	3.59E-01	ND(1.79E-01)	--	5.49E-01	8.56E-02
510231	CCTA-61A-GR-029-0.5-1-S	0.5-1	ND(1.39E+00)	--	7.31E-01	3.82E-01	ND(1.92E-01)	--	1.10E-01	3.05E-02
510231	CCTA-61A-GR-030-0.0-0.5-S	0-0.5	6.16E-01	8.58E-01	7.79E-01	3.79E-01	ND(1.93E-01)	--	4.32E-01	7.45E-02
510231	CCTA-61A-GR-030-0.5-1.0-S	0.5-1	ND(1.49E+00)	--	7.71E-01	3.78E-01	ND(2.05E-01)	--	7.12E-02	2.48E-02
510231	CCTA-61A-GR-031-0.0-0.5-S	0-0.5	ND(1.85E+00)	--	7.49E-01	3.71E-01	ND(2.10E-01)	--	5.02E-01	8.16E-02
510231	CCTA-61A-GR-031-0.5-1-S	0.5-1	ND(1.51E+00)	--	7.92E-01	3.96E-01	ND(2.11E-01)	--	2.82E-02	1.84E-02
510231	CCTA-61A-GR-032-C	NA	ND(1.84E+00)	--	6.77E-01	3.73E-01	ND(2.00E-01)	--	9.05E-02	4.91E-02
510231	CCTA-61A-GR-033-C	NA	ND(1.37E+00)	--	5.16E-01	2.64E-01	ND(2.01E-01)	--	6.56E-02	2.89E-02
510231	CCTA-61A-GR-034-C	NA	ND(1.67E+00)	--	5.22E-01	2.77E-01	ND(1.88E-01)	--	7.28E-02	2.78E-02
Remediated Pit Soil Samples										
510435	CCTA-61A-GR-035-6.5-9.5-S	6.5-9.5	ND(2.95E+00)	--	6.62E-01	3.53E-01	ND(2.15E-01)	--	ND(2.91E-02)	--
510435	CCTA-61A-GR-035-9.5-13.5-S	9.5-13.5	ND(3.02E+00)	--	6.30E-01	3.08E-01	ND(2.18E-01)	--	ND(3.09E-02)	--
510435	CCTA-61A-GR-036-7-11-S	7-11	3.65E+00	3.99E+00	6.09E-01	2.94E-01	ND(2.14E-01)	--	ND(2.81E-02)	--
510435	CCTA-61A-GR-036-11-14-S	11-14	ND(3.02E+00)	--	7.19E-01	5.03E-01	ND(2.26E-01)	--	ND(2.98E-02)	--
Debris Mound Samples										
06129	CCTA-61A-GR-094-D Debris Mound 1	NA	ND(2.76E+00)	--	5.34E-01	2.65E-01	ND(1.92E-01)	--	1.67E-01	3.97E-02
06127	CCTA-61A-GR-094-D (off-site laboratory) Debris Mound 1	NA	1.23	1.07	0.887	0.132	0.116	0.0948	0.422	0.0861
06129	CCTA-61A-GR-094-0.0-0.5-S Debris Mound 1	0-0.5	ND(2.80E+00)	--	5.63E-01	2.91E-01	ND(1.95E-01)	--	ND(2.90E-02)	--
06129	CCTA-61A-GR-095-D Debris Mound 1	NA	ND(3.35E+00)	--	5.72E-01	3.06E-01	ND(2.28E-01)	--	ND(2.53E-02)	--
06129	CCTA-61A-GR-095-0.0-0.5-S Debris Mound 1	0-0.5	ND(2.77E+00)	--	ND(1.13E-01)	--	ND(1.86E-01)	--	ND(2.70E-02)	--
06129	CCTA-61A-GR-096-D Debris Mound 1	NA	ND(2.72E+00)	--	6.74E-01	3.20E-01	ND(1.91E-01)	--	2.77E-01	3.73E-01
06129	CCTA-61A-GR-096-0.0-0.5-S Debris Mound 1	0-0.5	ND(3.02E+00)	--	7.29E-01	3.88E-01	ND(2.03E-01)	--	ND(3.01E-02)	--
06129	CCTA-61A-GR-097-D Debris Mound 2	NA	ND(3.14E+00)	--	5.92E-01	2.92E-01	ND(2.19E-01)	--	1.79E-01	4.48E-02
06129	CCTA-61A-GR-097-0.0-0.5-S Debris Mound 2	0-0.5	ND(2.98E+00)	--	6.18E-01	3.33E-01	ND(2.06E-01)	--	ND(3.13E-02)	--
06129	CCTA-61A-GR-098-D Debris Mound 2	NA	ND(1.19E+00)	--	6.36E-01	3.12E-01	ND(1.62E-01)	--	1.50E-01	3.69E-02
06129	CCTA-61A-GR-098-D (duplicate) Debris Mound 2	NA	ND(1.36E+00)	--	6.53E-01	3.31E-01	ND(1.84E-01)	--	2.25E-01	5.70E-02
06127	CCTA-61A-GR-098-D (off-site laboratory) Debris Mound 2	NA	1.43	1.09	0.950	0.13	ND(0.0551)	--	0.271	0.0613
06129	CCTA-61A-GR-098-0.0-0.5-S Debris Mound 2	0-0.5	ND(1.18E+00)	--	5.20E-01	2.63E-01	ND(1.60E-01)	--	ND(3.31E-02)	--
06129	CCTA-61A-GR-098-0.0-0.5-S (duplicate) Debris Mound 2	0-0.5	ND(9.06E-01)	--	5.95E-01	3.09E-01	ND(1.77E-01)	--	ND(3.67E-02)	--
06129	CCTA-61A-GR-099-D Debris Mound 2	NA	ND(1.22E+00)	--	6.16E-01	3.07E-01	ND(1.70E-01)	--	2.05E-01	2.64E-01
06129	CCTA-61A-GR-099-0.0-0.5-S Debris Mound 2	0-0.5	ND(1.22E+00)	--	6.87E-01	3.54E-01	ND(1.64E-01)	--	1.96E-01	1.06E-01

Refer to footnotes at end of table.

Table 8.4.4-3 (Concluded)
Summary of SWMU 61A Confirmatory Sampling Gamma Spectroscopy Analysis, January 1997 and March–April 1998

Sample Attributes			Activity (pCi/g)							
Record Number ^a	ER Sample ID ^b (Figure 8.4.4-3)	Sample Depth (ft)	Uranium-238		Thorium-232		Uranium-235		Cesium-137	
			Result	Error ^c	Result	Error ^c	Result	Error ^c	Result	Error ^c
Background Soil Activities, Coyote Test Field ^d			1.4 ^f	NA	1.01 ^f	NA	0.18	NA	0.079 ^{f,g}	NA
Quality Assurance/Quality Control Samples (all in pCi/mL)										
510226	CCTA-61A-GR-000-EB	NA	ND(9.21E-01)	--	ND(1.36E-01)	--	ND(1.24E-01)	--	ND(2.13E-02)	--
510229	CCTA-61A-GR-000-EB	NA	ND(8.23E-01)	--	ND(1.60E-01)	--	ND(1.45E-01)	--	ND(3.14E-01)	--
510231	CCTA-61A-GR-000-EB	NA	ND(8.03E-01)	--	ND(1.54E-01)	--	ND(1.32E-01)	--	ND(2.76E-02)	--
510435	CCTA-61A-GR-000-EB	NA	ND(1.77E+00)	--	ND(1.49E-01)	--	ND(1.57E-01)	--	ND(2.33E-02)	--
06129	CCTA-61A-GR-000-EB	NA	ND(7.47E-01)	--	ND(1.41E-01)	--	ND(1.27E-01)	--	ND(2.26E-02)	--
06127	CCTA-61A-GR-000-EB (off-site laboratory)	NA	ND(0.0758 ^h)	--	ND(0.00298 ^h)	--	ND(0.0115 ^h)	--	ND(0.00181 ^h)	--

^aAnalysis request/chain of custody record.

^bBold portion of the ER Sample ID corresponds to the sample location specified in Figure 8.4.4-3.

^cTwo standard deviations above the mean detected activity.

^dSoil sample results in bold exceed background.

^eFrom Dinwiddie September 1997. The minimum background activity between surface and subsurface are reported.

^fSouthwest background activities are presented in place of Coyote Test Field background activities that are not available.

^gThe more conservative, lower subsurface background soil concentration for cesium-137 is used as a benchmark for consistency with current risk screening assessment methodology.

^hReported value was converted from pCi/L to pCi/mL.

C = Concrete sample.
 CCTA = Central Coyote Test Area.
 D = Debris sample.
 DU = Duplicate sample.
 EB = Equipment blank.
 ER = Environmental Restoration.
 ft = Foot (feet).
 GR = Grab sample.
 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.
 S = Soil sample.
 SNL/NM = Sandia National Laboratories, New Mexico.
 SWMU = Solid waste management unit.
 -- = Error not calculated for nondetectable results.

Table 8.4.4-4
Summary of SWMU 61A Confirmatory Sampling Gross Alpha and Beta Analysis,
January 1997 and March–April 1998
(Off-Site Laboratory)

Sample Attributes			Activity (pCi/g)			
Record Number ^a	ER Sample ID ^b (Figure 8.4.4-3)	Sample Depth (ft)	Gross Alpha		Gross Beta	
			Result	Error ^c	Result	Error ^c
Site-Specific Background Soil Samples						
510093	CCTA-61A-GR-001-0-0.5-S	0-0.5	15.6	2.76	33.6	2.61
510093	CCTA-61A-GR-001-0.5-1.0-S	0.5-1	19.8	2.97	29.3	2.55
510093	CCTA-61A-GR-002-0-0.5-S	0-0.5	13.2	2.64	24.4	2.47
510093	CCTA-61A-GR-002-0.5-1.0-S	0.5-1	14.4	2.70	21.9	2.43
510093	CCTA-61A-GR-003-0-0.5-S	0-0.5	9.91	3.24	32.3	3.43
510093	CCTA-61A-GR-003-0.5-1.0-S	0.5-1	17.5	2.86	26.9	2.51
Site-Specific Background Arroyo Sediment Samples						
510093	CCTA-61A-GR-004-0-0.5-S	0-0.5	12.6	2.60	27.4	2.52
510093	CCTA-61A-GR-004-0-0.5-DU	0-0.5	11.8	2.56	29.8	2.56
510093	CCTA-61A-GR-004-0.5-1.0-S	0.5-1	11.6	2.54	37.3	2.67
510093	CCTA-61A-GR-005-0-0.5-S	0-0.5	13.1	2.69	35.3	2.62
510093	CCTA-61A-GR-005-0.5-1.0-S	0.5-1	13.7	2.73	28.7	2.52
510093	CCTA-61A-GR-006-0-0.5-S	0-0.5	12.6	2.66	29.3	2.53
510093	CCTA-61A-GR-006-0.5-1.0-S	0.5-1	10.8	2.57	29.6	2.53
Cleared Area Random Soil Samples						
510191	CCTA-61A-GR-007-0-0.5-S	0-0.5	9.59	3.15	35.3 J	2.48
510191	CCTA-61A-GR-007-0-0.5-DU	0-0.5	6.32	3.00	27.4 J	2.34
510191	CCTA-61A-GR-007-0.5-1.0-S	0.5-1	7.93	3.07	26.5 J	2.33
510191	CCTA-61A-GR-008-0-0.5-S	0-0.5	11.1	3.22	25.6 J	2.31
510191	CCTA-61A-GR-008-0.5-1.0-S	0.5-1	9.95	3.17	29.8 J	2.38
510191	CCTA-61A-GR-009-0-0.5-S	0-0.5	11.7	3.24	34.0 J	2.46
510191	CCTA-61A-GR-009-0.5-1.0-S	0.5-1	6.89	3.03	31.3 J	2.41
510191	CCTA-61A-GR-010-0-0.5-S	0-0.5	6.58	3.01	29.6 J	2.38
510191	CCTA-61A-GR-010-0.5-1.0-S	0.5-1	11.0	3.21	25.3 J	2.31
510191	CCTA-61A-GR-011-0-0.5-S	0-0.5	12.2	8.64	42.2 J	6.85
510191	CCTA-61A-GR-011-0.5-1.0-S	0.5-1	8.14	3.08	49.8 J	2.71
510191	CCTA-61A-GR-012-0-0.5-S	0-0.5	9.95	3.17	35.0 J	2.47
510191	CCTA-61A-GR-012-0.5-1.0-S	0.5-1	4.98	2.93	28.0 J	2.35
510191	CCTA-61A-GR-013-0-0.5-S	0-0.5	4.82	2.93	35.6 J	2.48
510191	CCTA-61A-GR-013-0.5-1.0-S	0.5-1	6.17	2.99	44.7 J	2.57
510192	CCTA-61A-GR-014-0-0.5-S	0-0.5	1.35	4.33	21.5	3.84
510192	CCTA-61A-GR-014-0.5-1.0-S	0.5-1	10.0	4.95	30.0	4.05
510192	CCTA-61A-GR-015-0-0.5-S	0-0.5	5.36	4.62	21.9	3.85
510192	CCTA-61A-GR-015-0.5-1.0-S	0.5-1	10.0	4.95	23.0	3.88
510192	CCTA-61A-GR-016-0-0.5-S	0-0.5	7.44	4.77	25.8	3.95
510192	CCTA-61A-GR-016-0-0.5-DU	0-0.5	7.96	4.81	34.4	4.15
510192	CCTA-61A-GR-016-0.5-1.0-S	0.5-1	18.0	5.46	27.8	3.99
510192	CCTA-61A-GR-017-0-0.5-S	0-0.5	9.88	4.94	21.6	3.85
510192	CCTA-61A-GR-017-0.5-1.0-S	0.5-1	8.32	4.83	25.0	3.93
510192	CCTA-61A-GR-018-0-0.5-S	0-0.5	10.9	5.01	28.4	4.01
510192	CCTA-61A-GR-018-0.5-1.0-S	0.5-1	4.46	4.69	23.9	3.87
Gamma Activity Area Judgmental Soil Samples						
510198	CCTA-61A-GR-019-0-0.5-S	0-0.5	10.7	2.77	38.8	2.43
510198	CCTA-61A-GR-019-0-0.5-DU	0-0.5	12.4	2.86	34.0	2.35
510198	CCTA-61A-GR-019-0.5-1.0-S	0.5-1	9.69	2.72	30.5	2.29
510198	CCTA-61A-GR-020-0-0.5-S	0-0.5	12.5	2.86	44.4	2.52
510198	CCTA-61A-GR-020-0.5-1.0-S	0.5-1	15.4	3.00	40.2	2.52
510198	CCTA-61A-GR-021-0-0.5-S	0-0.5	13.1	2.89	36.2	2.45
510198	CCTA-61A-GR-021-0.5-1.0-S	0.5-1	11.0	2.79	29.5	2.33
510198	CCTA-61A-GR-022-0-0.5-S	0-0.5	11.7	2.82	36.4	2.45

Refer to footnotes at end of table.

Table 8.4.4-4 (Concluded)
Summary of SWMU 61A Confirmatory Sampling Gross Alpha and Beta Analysis,
January 1997 and March–April 1998
(Off-Site Laboratory)

Sample Attributes			Activity (pCi/g)			
Record Number ^a	ER Sample ID ^b (Figure 8.4.4-3)	Sample Depth (ft)	Gross Alpha		Gross Beta	
			Result	Error ^c	Result	Error ^c
510198	CCTA-61A-GR-022-0.5-1.0-S	0.5–1	9.33	2.70	37.6	2.47
510198	CCTA-61A-GR-023-0-0.5-S	0–0.5	9.49	2.71	34.4	2.36
510198	CCTA-61A-GR-023-0.5-1.0-S	0.5–1	7.96	2.63	33.5	2.36
Arroyo Sediment Samples						
510198	CCTA-61A-GR-024-0-0.5-S	0–0.5	8.95	2.69	35.8	2.40
510198	CCTA-61A-GR-024-0-0.5-DU	0–0.5	8.17	2.64	32.8	2.35
510198	CCTA-61A-GR-024-0.5-1.0-S	0.5–1	7.39	2.60	31.3	2.32
510198	CCTA-61A-GR-025-0-0.5-S	0–0.5	12.2	2.85	44.6 J	2.54
510198	CCTA-61A-GR-025-0.5-1.0-S	0.5–1	10.4	2.76	45.8 J	2.56
510198	CCTA-61A-GR-026-0-0.5-S	0–0.5	12.3	2.86	33.8 J	2.37
510198	CCTA-61A-GR-026-0.5-1.0-S	0.5–1	10.4	2.76	31.3 J	2.32
510198	CCTA-61A-GR-027-0-0.5-S	0–0.5	11.4	2.81	37.0 J	2.42
510198	CCTA-61A-GR-027-0-0.5-S	0.5–1	7.44	2.60	38.6 J	2.45
510198	CCTA-61A-GR-027-0.5-1.0-DU	0.5–1	11.1	2.58	31.6 J	2.56
Concrete Block Area Samples						
510195	CCTA-61A-GR-028-0-0.5-S	0–0.5	10.9	2.55	48.3	2.65
510195	CCTA-61A-GR-028-0-0.5-DU	0–0.5	15.0	2.77	36.3	2.47
510195	CCTA-61A-GR-028-0.5-1.0-S	0.5–1	9.02	2.45	27.1	2.31
510195	CCTA-61A-GR-029-0-0.5-S	0–0.5	10.0	2.50	29.2	2.35
510195	CCTA-61A-GR-029-0.5-1-S	0.5–1	12.2	2.62	33.1	2.41
510195	CCTA-61A-GR-030-0-0.5-S	0–0.5	11.6	2.59	41.0	2.54
510195	CCTA-61A-GR-030-0.5-1.0-S	0.5–1	9.85	2.49	28.5	2.34
510195	CCTA-61A-GR-031-0-0.5-S	0–0.5	13.7	2.71	27.8	2.32
510195	CCTA-61A-GR-031-0.5-1-S	0.5–1	11.1	2.57	33.4	2.42
510195	CCTA-61A-GR-032-C	NA	5.91	2.26	16.5	2.18
510195	CCTA-61A-GR-033-C	NA	5.44	2.23	14.1	2.14
510195	CCTA-61A-GR-034-C	NA	10.4	2.52	15.9	2.17
Remediated Pit Soil Samples						
510196	CCTA-61A-GR-035-6.5-9.5-S	6.5–9.5	5.86	2.98	30.5	2.34
510196	CCTA-61A-GR-035-9.5-13.5-S	9.5–13.5	4.10	2.89	27.8	2.29
510196	CCTA-61A-GR-036-7-11-S	7–11	22.0	3.67	43.1	2.54
510196	CCTA-61A-GR-036-11-14-S	11–14	5.49	2.96	31.5	2.35
Debris Mound Samples						
06127	CCTA-61A-GR-094-D Debris Mound 1	NA	11.4	2.29	24.1	2.78
06127	CCTA-61A-GR-095-D Debris Mound 1	NA	10.8	2.19	22.2	2.58
06127	CCTA-61A-GR-096-D Debris Mound 1	NA	15.9	2.54	26.5	2.5
06127	CCTA-61A-GR-097-D Debris Mound 2	NA	39.0	3.97	35.7	3.07
06127	CCTA-61A-GR-098-D Debris Mound 2	NA	8.46	2.14	23.6	2.61
06127	CCTA-61A-GR-098-D (duplicate) Debris Mound 2	NA	11.1	2.21	24.1	2.55
06127	CCTA-61A-GR-099-D Debris Mound 2	NA	11.1	2.35	28.9	2.59
Quality Assurance/Quality Control Samples (all in pCi/L)						
510093	CCTA-61A-GR-000-EB	NA	ND (0.340)	0.200	ND (0.760)	0.410
510191	CCTA-61A-GR-000-EB	NA	0.160	0.260	1.71	0.460
510195	CCTA-61A-GR-000-EB	NA	0.100	0.250	ND (0.720)	0.430
510196	CCTA-61A-GR-000-EB	NA	ND (0.420)	0.250	2.22	0.480
06127	CCTA-61A-GR-000-EB	NA	ND (2.00)	0.566	ND (0.732)	0.775

^aAnalysis request/chain of custody record.

^bBold portion of the ER Sample ID corresponds to the sample location specified in Figure 8.4.4-3.

^cTwo standard deviations about the mean detected activity.

C = Concrete sample. ft = Foot (feet).
CCTA = Central Coyote Test Area. GR = Grab sample.
D = Debris sample. ID = Identification.
DU = Duplicate sample. J = Analytical result was qualified as an
EB = Equipment blank. estimation during data validation.
ER = Environmental Restoration. NA = Not applicable.

ND () = Not detected at or above the minimum
detectable activity, shown in parenthesis.
pCi/g = Picocurie(s) per gram.
pCi/L = Picocurie(s) per liter.
S = Soil sample.
SWMU = Solid waste management unit.

Table 8.4.4-5
Summary of SWMU 61A Confirmatory Sampling Thorium and Uranium Isotopic Analysis,
January 1997 and March–April 1998
(Off-Site Laboratory)

Sample Attributes			Activity (pCi/g)											
Record Number ^a	ER Sample ID ^b (Figure 8.4.4-3)	Sample Depth (ft)	Thorium-228		Thorium-230		Thorium-232		Uranium-233/234		Uranium-235		Uranium-238	
			Result	Error ^c	Result	Error ^c	Result	Error ^c	Result	Error ^c	Result	Error ^c	Result	Error ^c
Site-Specific Background Soil Samples														
510093	CCTA-61A-GR-001-0-0.5-S	0-0.5	0.600	0.390	1.41	0.410	0.600	0.240	0.660	0.150	0.0300	0.0400	0.540	0.170
510093	CCTA-61A-GR-001-0.5-1.0-S	0.5-1	1.05	1.96	1.18	0.380	1.13	0.360	0.710	1.69	0.0800	0.0600	0.770	0.210
510093	CCTA-61A-GR-002-0-0.5-S	0-0.5	0.790	0.280	1.07	0.330	1.00	0.310	0.490	0.140	0.0500	0.0500	0.450	0.150
510093	CCTA-61A-GR-002-0.5-1.0-S	0.5-1	0.800	0.230	0.940	0.280	1.08	0.290	0.420	0.180	0.0700	0.0600	0.500	0.170
510093	CCTA-61A-GR-003-0-0.5-S	0-0.5	0.730	0.350	1.09	0.310	0.900	0.270	0.460	0.230	0.0500	0.0500	0.680	0.200
510093	CCTA-61A-GR-003-0.5-1.0-S	0.5-1	1.03	0.280	1.01	0.340	0.860	0.290	0.670	0.100	0.0400	0.0500	0.570	0.180
Site-Specific Background Arroyo Sediment Samples														
510093	CCTA-61A-GR-004-0-0.5-S	0-0.5	0.840	0.380	1.91	0.550	0.590	0.250	0.320	0.180	0.0100	0.0300	0.560	0.180
510093	CCTA-61A-GR-004-0-0.5-DU	0-0.5	0.990	0.210	2.03	0.510	0.950	0.310	0.430	0.150	0.0600	0.0600	0.660	0.190
510093	CCTA-61A-GR-004-0.5-1.0-S	0.5-1	0.660	0.340	0.690	0.220	0.740	0.220	0.430	0.190	0.110	0.0900	0.600	0.200
510093	CCTA-61A-GR-005-0-0.5-S	0-0.5	1.01	0.240	1.45	0.410	1.06	0.330	0.470	0.160	0.0300	0.0400	0.570	0.170
510093	CCTA-61A-GR-005-0.5-1.0-S	0.5-1	0.740	0.260	1.51	0.420	0.960	0.310	0.480	0.130	0.0400	0.0400	0.480	0.160
510093	CCTA-61A-GR-006-0-0.5-S	0-0.5	0.680	0.240	1.19	0.340	0.810	0.260	0.400	0.140	0.0500	0.0600	0.400	0.150
510093	CCTA-61A-GR-006-0.5-1.0-S	0.5-1	0.690	0.0100	0.920	0.280	0.980	0.290	0.370	0.0100	0.0100	0.0300	0.450	0.150
Debris Mound Samples														
06127	CCTA-61A-GR-094-D Debris Mound 1	NA	0.705	0.335	0.676	0.273	0.688	0.273	0.620	0.115	0.0247	0.0269	0.774	0.132
06127	CCTA-61A-GR-094-0-0.5-S Debris Mound 1	0-0.5	1.45	0.777	1.44	0.659	0.775	0.454	0.532	0.097	0.0191	0.0175	0.525	0.0962
06127	CCTA-61A-GR-095-D Debris Mound 1	NA	1.77	0.496	1.64	0.446	0.819	0.295	0.584	0.103	0.0490	0.0265	0.910	0.136
06127	CCTA-61A-GR-095-0-0.5-S Debris Mound 1	0-0.5	0.791	0.503	0.507	0.344	0.927	0.462	0.415	0.0946	0.0221	0.0227	0.493	0.103
06127	CCTA-61A-GR-096-D Debris Mound 1	NA	1.65	0.503	0.877	0.321	0.577	0.248	0.627	0.109	0.0215	0.0198	0.808	0.128
06127	CCTA-61A-GR-096-0-0.5-S Debris Mound 1	0-0.5	1.37	0.423	0.897	0.314	1.18	0.364	0.603	0.111	0.0356	0.0258	0.631	0.114
06127	CCTA-61A-GR-097-D Debris Mound 2	NA	1.66	0.929	0.896	0.554	0.664	0.481	0.565	0.11	0.0482	0.0297	0.594	0.113
06127	CCTA-61A-GR-097-0-0.5-S Debris Mound 2	0-0.5	0.661	0.848	1.06	0.615	1.06	0.652	0.541	0.0927	0.0320	0.0206	0.504	0.0888

Refer to footnotes at end of table.

Table 8.4.4-5 (Concluded)
Summary of SWMU 61A Confirmatory Sampling Thorium and Uranium Isotopic Analysis,
January 1997 and March–April 1998
(Off-Site Laboratory)

Sample Attributes			Activity (pCi/g)											
Record Number ^a	ER Sample ID ^b (Figure 8.4.4-3)	Sample Depth (ft)	Thorium-228		Thorium-230		Thorium-232		Uranium-233/234		Uranium-235		Uranium-238	
			Result	Error ^c	Result	Error ^c	Result	Error ^c	Result	Error ^c	Result	Error ^c	Result	Error ^c
06127	CCTA-61A-GR-098-D Debris Mound 2	NA	1.26	0.575	2.20	0.719	1.30	0.505	0.473	0.0963	0.0310	0.026	0.638	0.114
06127	CCTA-61A-GR-098-D (duplicate) Debris Mound 2	NA	1.68	0.922	0.576	0.438	0.749	0.475	0.535	0.099	0.0390	0.0305	0.627	0.108
06127	CCTA-61A-GR-098-0-0.5-S Debris Mound 2	0-0.5	1.37	0.431	0.701	0.268	0.897	0.307	0.559	0.091	0.0166	0.0205	0.573	0.0922
06127	CCTA-61A-GR-098-0-0.5-S (duplicate) Debris Mound 2	0-0.5	1.28	0.533	0.860	0.382	0.763	0.349	0.461	0.0828	0.0349	0.0216	0.553	0.092
06127	CCTA-61A-GR-099-D Debris Mound 2	NA	1.26	0.712	0.945	0.493	0.590	0.406	0.587	0.107	0.0310	0.0258	0.593	0.108
06127	CCTA-61A-GR-099-0-0.5-S Debris Mound 2	0-0.5	1.04	0.338	0.688	0.238	1.06	0.308	0.528	0.0979	0.0228	0.0227	0.695	0.116
Background Soil Activities, Coyote Test Field ^d			Not Available	NA	Not Available	NA	1.01 ^e	NA	1.6 ^e	NA	0.18	NA	1.4 ^e	NA
Quality Assurance/Quality Control Samples (all in pCi/L)														
510093	CCTA-61A-GR-000-EB	NA	0.00	0.0600	1.96	0.830	0.0900	0.200	0.290	0.670	0.110	0.130	0.290	0.190
06127	CCTA-61A-GR-000-EB	NA	0.246	0.215	0.131	0.135	ND (0.219)	--	ND (0.0395)	--	ND (0.0431)	--	ND (0.0491)	--

^aAnalysis request/chain of custody record.

^bBold portion of the ER Sample ID corresponds to the sample location specified in Figure 8.4.4-3.

^cTwo standard deviations about the mean detected activity.

^dFrom Dinwiddie September 1997.

^eSouthwest background activities are presented in place of Coyote Test Field background activities that are not available.

CCTA = Central Coyote Test Area.
D = Debris sample.
DU = Duplicate sample.
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/L = Picocurie(s) per liter.
S = Soil sample.
SWMU = Solid waste management unit.
-- = Error not calculated for nondetectable results.

value of <1 mg/kg in the surface and near-surface soil samples from location 001 (at 1.21 and 1.24 mg/kg, respectively), in the near-surface soil sample from location 003 (at 1.58 mg/kg), and in the near-surface arroyo sediment sample from location 005 (at 0.976 mg/kg). The NMED-approved background chromium concentration of 12.8 mg/kg was slightly exceeded in the near-surface soil sample from location 003 (at 14.3 mg/kg). Lead concentrations slightly exceeded the NMED-approved nonquantified background value of 11.5 mg/kg in the near-surface soil sample from location 003 (at 13.6 mg/kg) and in the near-surface arroyo sediment sample collected from location 005 (at 13.0 mg/kg). Silver concentrations exceeded the NMED-approved nonquantified background value of <1 mg/kg in all the site-specific background samples except the near-surface arroyo sediment sample from location 006. The silver concentrations above the NMED-approved nonquantified background value ranged from 2.43 to 5.38 mg/kg in the soil samples and from 1.73 to 2.07 mg/kg in the arroyo sediment samples.

Barium concentrations in the site-specific soil and arroyo sediment samples did not exceed the corresponding NMED-approved background limit of 130 mg/kg. The maximum barium concentration was 122 mg/kg. Mercury and selenium were not detected above the nonquantified background values of <0.1 and <1 mg/kg, respectively. The maximum concentration of mercury was 0.0453 mg/kg. No selenium was detected above the MDL of 0.000891 mg/kg. The presence of metals at site-specific background locations indicate that the natural variation of some constituents slightly exceed NMED-approved background concentrations.

Radionuclides

Table 8.4.4-3 summarizes the gamma spectroscopy analysis results for site-specific background soil and arroyo sediment samples collected from the six locations at SWMU 61A (locations 001 through 006). Annex 8-B contains complete results for the gamma spectroscopy analyses of site-specific background samples. The samples analyzed using gamma spectroscopy consist of three surface and three near-surface soil samples, three surface and three near-surface arroyo sediment samples, and one duplicate soil sample. Similar to the metals results, site-specific background sample results for radionuclides can be compared to the NMED-approved background radionuclides activities (Dinwiddie September 1997). However, it should be noted that Coyote Test Field background activities for uranium-238, thorium-232, and cesium-137 have not been established, and Table 8.4.4-3 presents NMED-approved Southwest Test Area background activities for comparison purposes.

The gamma spectroscopy results for site-specific background soil and arroyo sediment samples show uranium-238 or uranium-235 was either not detected above the MDA or was not detected above background. However, the MDA associated with no-detection results for uranium-238 and uranium-235 exceeded the associated NMED-approved background activities in most instances. As a result, no comparison to the NMED-approved background activities for uranium-238 and uranium-235 is applicable. The gamma activity from thorium-232 did not exceed the corresponding NMED-approved background activity in any site-specific background samples from SWMU 61A. However, the gamma activity from cesium-137 exceeded the NMED-approved subsurface background of activity 0.079 pCi/g in all site-specific background samples collected except for the near-surface soil sample from location 002 and the surface and near-surface soil samples from location 003. The lower cesium-137 subsurface background activity (0.079 pCi/g) is used for a benchmark for comparison in order to be consistent with current SNL/NM risk screening assessment methodology.

Table 8.4.4-4 summarizes the gross alpha and gross beta analysis results for site-specific background soil and arroyo sediment samples from the six locations at SWMU 61A (locations 001 through 006). The results indicate that site-specific background soil activities range from 9.91 to 19.8 pCi/g for gross alpha and from 21.9 to 33.6 pCi/g for gross beta, and site-specific background arroyo sediment activities range from 10.8 to 13.7 pCi/g for gross alpha and from 27.4 to 37.3 pCi/g for gross beta.

Table 8.4.4-5 summarizes the isotopic uranium and thorium analysis results for site-specific background soil and arroyo sediment samples collected from the six locations at SWMU 61A (locations 001 through 006). Although thorium-228 and thorium-230 were detected using isotopic analysis, no NMED-approved background activities are established for these isotopes. Thorium-228 activity ranged from 0.600 to 1.05 pCi/g in soil and from 0.660 to 1.01 pCi/g in arroyo sediment. Thorium-230 activity ranged from 0.940 to 1.41 pCi/g in soil and from 0.690 to 2.03 pCi/g in arroyo sediment. Thorium-232 activity slightly exceeded the NMED-approved 1.01 pCi/g background activity in the near-surface soil sample from location 001 (at 1.13 pCi/g), in the near-surface soil samples from location 002 (at 1.08 pCi/g), and in the surface arroyo sediment sample from location 005 (at 1.06 pCi/g). No uranium isotope activities were detected above the corresponding NMED-approved background activities. The presence of radionuclides at site-specific background locations indicate the natural variation of some constituents slightly exceed NMED-approved background concentrations.

8.4.4.4.2 Cleared Area Soil Samples

In March and April 1998, surface and near-surface soil samples were collected from 12 random locations selected from a grid pattern (126 20- by 20-foot cells) covering the cleared area of SWMU 61A. Tables 8.4.4-2, 8.4.4-3, 8.4.4-4, and 8.4.4-6 summarize metal, radionuclide, and HE analytical results for the cleared area soil samples. Figure 8.4.4-3 shows the sample locations, which are identified only by the sample number specified within the ER Sample ID name. This section discusses these results.

Metals

Table 8.4.4-2 summarizes the metals analysis results for soil samples collected from the 12 random locations at the cleared area of SWMU 61A (locations 007 through 018). The cleared area soil samples analyzed for metals consisted of 12 surface and 12 near-surface soil samples, and 2 duplicate surface soil samples. For silver, cadmium, selenium, and mercury, no quantified background concentration values have been established, and <1 mg/kg is listed as the "HRMB background value." This circumstance arises because the laboratory reporting limits are usually at or less than 1 mg/kg for these metals in soil. Therefore, an absolute concentration less than the reporting limit could not be established and used for maximum background concentrations. This issue is handled two different ways in this NFA proposal. For site characterization purposes, the 1 mg/kg value is used as a benchmark concentration for discussions of possible metal contamination. But for the risk screening purposes, a conservative approach is taken and the maximum metal concentration is carried through the risk assessment, even if that maximum is below the 1 mg/kg nonquantified background value.

Table 8.4.4-6
Summary of SWMU 61A Confirmatory Sampling HE Analytical Results, January 1997 and March–April 1998

Sample Attributes			Explosives, Methods (EPA 8330) ^a (µg/kg)						
Record Number ^b	ER Sample ID ^c (Figure 8.4.4-3)	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)
Cleared Area Random Soil Samples									
510191	CCTA-61A-GR-007-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510191	CCTA-61A-GR-007-0-0.5-DU	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510191	CCTA-61A-GR-007-0.5-1.0-S	0.5-1	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510191	CCTA-61A-GR-008-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510191	CCTA-61A-GR-008-0.5-1.0-S	0.5-1	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510191	CCTA-61A-GR-009-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510191	CCTA-61A-GR-009-0.5-1.0-S	0.5-1	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510191	CCTA-61A-GR-010-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510191	CCTA-61A-GR-010-0.5-1.0-S	0.5-1	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510191	CCTA-61A-GR-011-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510191	CCTA-61A-GR-011-0.5-1.0-S	0.5-1	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510191	CCTA-61A-GR-012-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510191	CCTA-61A-GR-012-0.5-1.0-S	0.5-1	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510191	CCTA-61A-GR-013-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510191	CCTA-61A-GR-013-0.5-1.0-S	0.5-1	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510192	CCTA-61A-GR-014-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510192	CCTA-61A-GR-014-0.5-1.0-S	0.5-1	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510192	CCTA-61A-GR-015-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510192	CCTA-61A-GR-015-0.5-1.0-S	0.5-1	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510192	CCTA-61A-GR-016-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510192	CCTA-61A-GR-016-0-0.5-DU	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510192	CCTA-61A-GR-016-0.5-1.0-S	0.5-1	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510192	CCTA-61A-GR-017-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510192	CCTA-61A-GR-017-0.5-1.0-S	0.5-1	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510192	CCTA-61A-GR-018-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510192	CCTA-61A-GR-018-0.5-1.0-S	0.5-1	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
Gamma Activity Area Judgmental Soil Samples									
510198	CCTA-61A-GR-019-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510198	CCTA-61A-GR-019-0-0.5-DU	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510198	CCTA-61A-GR-019-0.5-1.0-S	0.5-1	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)

Refer to footnotes at end of table.

Table 8.4.4-6 (Continued)
Summary of SWMU 61A Confirmatory Sampling HE Analytical Results, January 1997 and March–April 1998

Sample Attributes			Explosives, Methods (EPA 8330) ^a (µg/kg)							
Record Number	ER Sample ID ^c (Figure 8.4.4-3)	Sample Depth (ft)	p-Nitrotoluene (4)	Nitrobenzene	1,3-Dinitrobenzene	1,3,5-Trinitrobenzene	RDX	Tetryl	HMX	Pentaerythritol Tetranitrate
Cleared Area Random Soil Samples										
510191	CCTA-61A-GR-007-0-0.5-S	0-0.5	ND (31)	ND (9.0)	ND (16)	ND (32)	ND (31)	ND (94)	320 ^d	NT
510191	CCTA-61A-GR-007-0-0.5-DU	0-0.5	ND (31)	ND (9.0)	ND (16)	ND (32)	ND (31)	ND (94)	140 J (250)	NT
510191	CCTA-61A-GR-007-0.5-1.0-S	0.5-1	ND (31)	ND (9.0)	ND (16)	ND (32)	32 J (250)	ND (94)	49 J (250)	NT
510191	CCTA-61A-GR-008-0-0.5-S	0-0.5	ND (31)	ND (9.0)	ND (16)	ND (32)	ND (31)	ND (94)	66 J (250)	NT
510191	CCTA-61A-GR-008-0.5-1.0-S	0.5-1	ND (31)	ND (9.0)	ND (16)	ND (32)	ND (31)	ND (94)	ND (24)	NT
510191	CCTA-61A-GR-009-0-0.5-S	0-0.5	ND (31)	ND (9.0)	ND (16)	ND (32)	140 J (260)	ND (94)	170 J (260)	NT
510191	CCTA-61A-GR-009-0.5-1.0-S	0.5-1	ND (31)	ND (9.0)	ND (16)	ND (32)	170 J (300)	ND (94)	ND (24)	NT
510191	CCTA-61A-GR-010-0-0.5-S	0-0.5	ND (31)	ND (9.0)	ND (16)	ND (32)	ND (31)	ND (94)	ND (24)	NT
510191	CCTA-61A-GR-010-0.5-1.0-S	0.5-1	ND (31)	ND (9.0)	ND (16)	ND (32)	ND (31)	ND (94)	ND (24)	NT
510191	CCTA-61A-GR-011-0-0.5-S	0-0.5	ND (31)	ND (9.0)	ND (16)	ND (32)	ND (31)	ND (94)	ND (24)	NT
510191	CCTA-61A-GR-011-0.5-1.0-S	0.5-1	ND (31)	ND (9.0)	ND (16)	ND (32)	200 J (300)	ND (94)	170 J (300)	NT
510191	CCTA-61A-GR-012-0-0.5-S	0-0.5	ND (31)	ND (9.0)	ND (16)	ND (32)	ND (31)	ND (94)	110 J (280)	NT
510191	CCTA-61A-GR-012-0.5-1.0-S	0.5-1	ND (31)	ND (9.0)	ND (16)	ND (32)	ND (31)	ND (94)	ND (24)	NT
510191	CCTA-61A-GR-013-0-0.5-S	0-0.5	ND (31)	ND (9.0)	ND (16)	ND (32)	ND (31)	ND (94)	120 J (270)	NT
510191	CCTA-61A-GR-013-0.5-1.0-S	0.5-1	ND (31)	ND (9.0)	ND (16)	ND (32)	ND (31)	ND (94)	ND (24)	NT
510192	CCTA-61A-GR-014-0-0.5-S	0-0.5	ND (31)	ND (9.0)	ND (16)	ND (32)	210 J (270)	ND (94)	170 J (270)	NT
510192	CCTA-61A-GR-014-0.5-1.0-S	0.5-1	ND (31)	ND (9.0)	ND (16)	ND (32)	ND (31)	ND (94)	380	NT
510192	CCTA-61A-GR-015-0-0.5-S	0-0.5	ND (31)	ND (9.0)	ND (16)	ND (32)	ND (31)	ND (94)	ND (24)	NT
510192	CCTA-61A-GR-015-0.5-1.0-S	0.5-1	ND (31)	ND (9.0)	ND (16)	ND (32)	140 J (280)	ND (94)	140 J (280)	NT
510192	CCTA-61A-GR-016-0-0.5-S	0-0.5	ND (31)	ND (9.0)	ND (16)	ND (32)	ND (31)	ND (94)	ND (24)	NT
510192	CCTA-61A-GR-016-0-0.5-DU	0-0.5	ND (31)	ND (9.0)	ND (16)	ND (32)	ND (31)	ND (94)	ND (24)	NT
510192	CCTA-61A-GR-016-0.5-1.0-S	0.5-1	ND (31)	ND (9.0)	ND (16)	ND (32)	160 J (310)	ND (94)	ND (24)	NT
510192	CCTA-61A-GR-017-0-0.5-S	0-0.5	ND (31)	ND (9.0)	ND (16)	ND (32)	ND (31)	ND (94)	ND (24)	NT
510192	CCTA-61A-GR-017-0.5-1.0-S	0.5-1	ND (31)	ND (9.0)	ND (16)	ND (32)	ND (31)	ND (94)	ND (24)	NT
510192	CCTA-61A-GR-018-0-0.5-S	0-0.5	ND (31)	ND (9.0)	ND (16)	ND (32)	ND (31)	ND (94)	ND (24)	NT
510192	CCTA-61A-GR-018-0.5-1.0-S	0.5-1	ND (31)	ND (9.0)	ND (16)	ND (32)	160 J (280)	ND (94)	ND (24)	NT
Gamma Activity Area Judgmental Soil Samples										
510198	CCTA-61A-GR-019-0-0.5-S	0-0.5	ND (31)	ND (9.0)	ND (16)	ND (32)	ND (31)	ND (94)	ND (24)	NT
510198	CCTA-61A-GR-019-0-0.5-DU	0-0.5	ND (31)	ND (9.0)	ND (16)	ND (32)	ND (31)	ND (94)	ND (24)	NT
510198	CCTA-61A-GR-019-0.5-1.0-S	0.5-1	ND (31)	ND (9.0)	ND (16)	ND (32)	ND (31)	ND (94)	ND (24)	NT

Refer to footnotes at end of table.

Table 8.4.4-6 (Continued)
Summary of SWMU 61A Confirmatory Sampling HE Analytical Results, January 1997 and March–April 1998

Sample Attributes			Explosives, Methods (EPA 8330) ^a (µg/kg)						
Record Number ^b	ER Sample ID ^c (Figure 8.4.4-3)	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)
510198	CCTA-61A-GR-020-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510198	CCTA-61A-GR-020-0.5-1.0-S	0.5-1	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510198	CCTA-61A-GR-021-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510198	CCTA-61A-GR-021-0.5-1.0-S	0.5-1	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510198	CCTA-61A-GR-022-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510198	CCTA-61A-GR-022-0.5-1.0-S	0.5-1	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510198	CCTA-61A-GR-023-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510198	CCTA-61A-GR-023-0.5-1.0-S	0.5-1	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
Arroyo Sediment Samples									
510198	CCTA-61A-GR-024-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510198	CCTA-61A-GR-024-0-0.5-DU	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510198	CCTA-61A-GR-024-0.5-1.0-S	0.5-1	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510198	CCTA-61A-GR-025-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510198	CCTA-61A-GR-025-0.5-1.0-S	0.5-1	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510198	CCTA-61A-GR-026-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510198	CCTA-61A-GR-026-0.5-1.0-S	0.5-1	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510198	CCTA-61A-GR-027-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510198	CCTA-61A-GR-027-0.5-1.0-S	0.5-1	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510198	CCTA-61A-GR-027-0.5-1.0-DU	0.5-1	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
Concrete Block Area Samples									
510195	CCTA-61A-GR-028-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510195	CCTA-61A-GR-028-0-0.5-DU	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510195	CCTA-61A-GR-028-0.5-1.0-S	0.5-1	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510195	CCTA-61A-GR-029-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510195	CCTA-61A-GR-029-0.5-1.0-S	0.5-1	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510195	CCTA-61A-GR-030-0-0.5-S	0-0.5	ND (19) UJ	ND (17) UJ	ND (17) UJ	ND (17) UJ	ND (79) UJ	ND (41) UJ	ND (30) UJ
510195	CCTA-61A-GR-030-0.5-1.0-S	0.5-1	ND (19) UJ	ND (17) UJ	ND (17) UJ	ND (17) UJ	ND (79) UJ	ND (41) UJ	ND (30) UJ
510195	CCTA-61A-GR-031-0-0.5-S	0-0.5	ND (19) UJ	ND (17) UJ	ND (17) UJ	ND (17) UJ	ND (79) UJ	ND (41) UJ	ND (30) UJ
510195	CCTA-61A-GR-031-0.5-1.0-S	0.5-1	ND (19) UJ	ND (17) UJ	ND (17) UJ	ND (17) UJ	ND (79) UJ	ND (41) UJ	ND (30) UJ

Refer to footnotes at end of table.

Table 8.4.4-6 (Continued)
Summary of SWMU 61A Confirmatory Sampling HE Analytical Results, January 1997 and March-April 1998

Sample Attributes			Explosives, Methods (EPA 8330) ^a (µg/kg)							
Record Number ^b	ER Sample ID ^c (Figure 8.4.4-3)	Sample Depth (ft)	p-Nitrotoluene (4)	Nitrobenzene	1,3-Dinitrobenzene	1,3,5-Trinitrobenzene	RDX	Tetryl	HMX	Pentaerythritol Tetranitrate
510198	CCTA-61A-GR-020-0-0.5-S	0-0.5	ND (31)	ND (9.0)	ND (16)	ND (32)	ND (31)	ND (94)	ND (24)	NT
510198	CCTA-61A-GR-020-0.5-1.0-S	0.5-1	ND (31)	ND (9.0)	ND (16)	ND (32)	ND (31)	ND (94)	ND (24)	NT
510198	CCTA-61A-GR-021-0-0.5-S	0-0.5	ND (31)	ND (9.0)	ND (16)	ND (32)	830	ND (94)	2000 J	NT
510198	CCTA-61A-GR-021-0.5-1.0-S	0.5-1	ND (31)	ND (9.0)	ND (16)	ND (32)	ND (31)	ND (94)	ND (24)	NT
510198	CCTA-61A-GR-022-0-0.5-S	0-0.5	ND (31)	ND (9.0)	ND (16)	ND (32)	ND (31)	ND (94)	ND (24)	NT
510198	CCTA-61A-GR-022-0.5-1.0-S	0.5-1	ND (31)	ND (9.0)	ND (16)	ND (32)	ND (31)	ND (94)	ND (24)	NT
510198	CCTA-61A-GR-023-0-0.5-S	0-0.5	ND (31)	ND (9.0)	ND (16)	ND (32)	ND (31)	ND (94)	ND (24)	NT
510198	CCTA-61A-GR-023-0.5-1.0-S	0.5-1	ND (31)	ND (9.0)	ND (16)	ND (32)	ND (31)	ND (94)	ND (24)	NT
Arroyo Sediment Samples										
510198	CCTA-61A-GR-024-0-0.5-S	0-0.5	ND (31)	ND (9.0)	ND (16)	ND (32)	ND (31)	ND (94)	ND (24)	NT
510198	CCTA-61A-GR-024-0-0.5-DU	0-0.5	ND (31)	ND (9.0)	ND (16)	ND (32)	ND (31)	ND (94)	ND (24)	NT
510198	CCTA-61A-GR-024-0.5-1.0-S	0.5-1	ND (31)	ND (9.0)	ND (16)	ND (32)	ND (31)	ND (94)	ND (24)	NT
510198	CCTA-61A-GR-025-0-0.5-S	0-0.5	ND (31)	ND (9.0)	ND (16)	ND (32)	ND (31)	ND (94)	ND (24)	NT
510198	CCTA-61A-GR-025-0.5-1.0-S	0.5-1	ND (31)	ND (9.0)	ND (16)	ND (32)	ND (31)	ND (94)	ND (24)	NT
510198	CCTA-61A-GR-026-0-0.5-S	0-0.5	ND (31)	ND (9.0)	ND (16)	ND (32)	ND (31)	ND (94)	ND (24)	NT
510198	CCTA-61A-GR-026-0.5-1.0-S	0.5-1	ND (31)	ND (9.0)	ND (16)	ND (32)	ND (31)	ND (94)	ND (24)	NT
510198	CCTA-61A-GR-027-0-0.5-S	0-0.5	ND (31)	ND (9.0)	ND (16)	ND (32)	ND (31)	ND (94)	ND (24)	NT
510198	CCTA-61A-GR-027-0.5-1.0-S	0.5-1	ND (31)	ND (9.0)	ND (16)	ND (32)	ND (31)	ND (94)	ND (24)	NT
510198	CCTA-61A-GR-027-0.5-1.0-DU	0.5-1	ND (31)	ND (9.0)	ND (16)	ND (32)	ND (31)	ND (94)	ND (24)	NT
Concrete Block Area Samples										
510195	CCTA-61A-GR-028-0-0.5-S	0-0.5	ND (31)	ND (9.0)	ND (16)	ND (32)	1400	ND (94)	ND (24)	NT
510195	CCTA-61A-GR-028-0-0.5-DU	0-0.5	ND (31)	ND (9.0)	ND (16)	ND (32)	600	ND (94)	ND (24)	NT
510195	CCTA-61A-GR-028-0.5-1.0-S	0.5-1	ND (31)	ND (9.0)	ND (16)	ND (32)	ND (31)	ND (94)	ND (24)	NT
510195	CCTA-61A-GR-029-0-0.5-S	0-0.5	ND (31)	ND (9.0)	ND (16)	ND (32)	ND (31)	ND (94)	ND (24)	NT
510195	CCTA-61A-GR-029-0.5-1.0-S	0.5-1	ND (31)	ND (9.0)	ND (16)	ND (32)	150 J (280)	ND (94)	ND (24)	NT
510195	CCTA-61A-GR-030-0-0.5-S	0-0.5	ND (31) UJ	ND (9.0) UJ	ND (16) UJ	ND (32) UJ	ND (31) UJ	ND (94) UJ	ND (24) UJ	NT
510195	CCTA-61A-GR-030-0.5-1.0-S	0.5-1	ND (31) UJ	ND (9.0) UJ	ND (16) UJ	ND (32) UJ	ND (31) UJ	ND (94) UJ	ND (24) UJ	NT
510195	CCTA-61A-GR-031-0-0.5-S	0-0.5	ND (31) UJ	ND (9.0) UJ	ND (16) UJ	ND (32) UJ	150 J (270) UJ	ND (94) UJ	ND (24) UJ	NT
510195	CCTA-61A-GR-031-0.5-1.0-S	0.5-1	ND (31) UJ	ND (9.0) UJ	ND (16) UJ	ND (32) UJ	ND (31) UJ	ND (94) UJ	ND (24) UJ	NT

Refer to footnotes at end of table.

Table 8.4.4-6 (Continued)
Summary of SWMU 61A Confirmatory Sampling HE Analytical Results, January 1997 and March-April 1998

Sample Attributes			Explosives, Methods (EPA 8330) ^a (µg/kg)						
Record Number ^b	ER Sample ID ^c (Figure 8.4.4-3)	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)
510195	CCTA-61A-GR-032-C	NA	ND (19) UJ	ND (17) UJ	ND (17) UJ	ND (17) UJ	ND (79) UJ	ND (41) UJ	ND (30) UJ
510195	CCTA-61A-GR-033-C	NA	ND (19) UJ	ND (17) UJ	ND (17) UJ	ND (17) UJ	ND (79) UJ	ND (41) UJ	ND (30) UJ
510195	CCTA-61A-GR-034-C	NA	ND (19) UJ	ND (17) UJ	ND (17) UJ	ND (17) UJ	ND (79) UJ	ND (41) UJ	ND (30) UJ
Remediated Pit Soil Samples									
510196	CCTA-61A-GR-035-6.5-9.5-S	6.5-9.5	ND (19) UJ	ND (17) UJ	ND (17) UJ	ND (17) UJ	ND (79) UJ	ND (41) UJ	ND (30) UJ
510196	CCTA-61A-GR-035-9.5-13.5-S	9.5-13.5	ND (19) UJ	ND (17) UJ	ND (17) UJ	ND (17) UJ	ND (79) UJ	ND (41) UJ	ND (30) UJ
510196	CCTA-61A-GR-036-7-11-S	7-11	ND (19) UJ	ND (17) UJ	ND (17) UJ	ND (17) UJ	ND (79) UJ	ND (41) UJ	ND (30) UJ
510196	CCTA-61A-GR-036-11-14-S	11-14	ND (19) UJ	ND (17) UJ	ND (17) UJ	ND (17) UJ	ND (79) UJ	ND (41) UJ	ND (30) UJ
Debris Mound Samples									
06128	CCTA-61A-GR-094-D (on-site laboratory) Debris Mound #1	NA	ND (120) ^d	ND (120) ^d	ND (120) ^d	NT	NT	ND (90) ^d	ND (100) ^d
06127	CCTA-61A-GR-094-D (on-site laboratory) Debris Mound #1	NA	ND (5.67)	ND (6.18)	ND (6.48)	ND (6.6)	ND (5.45)	ND (7.83)	ND (11.1)
06128	CCTA-61A-GR-094-0-0.5-S (on-site laboratory) Debris Mound #1	0-0.5	ND (120) ^d	ND (120) ^d	ND (120) ^d	NT	NT	ND (90) ^d	ND (100) ^d
06128	CCTA-61A-GR-095-D (on-site laboratory) Debris Mound #1	NA	ND (120) ^d	ND (120) ^d	ND (120) ^d	NT	NT	ND (90) ^d	ND (100) ^d
06128	CCTA-61A-GR-095-0-0.5-S (on-site laboratory) Debris Mound #1	0-0.5	ND (120) ^d	ND (120) ^d	ND (120) ^d	NT	NT	ND (90) ^d	ND (100) ^d
06128	CCTA-61A-GR-096-D (on-site laboratory) Debris Mound #1	NA	ND (120) ^d	ND (120) ^d	ND (120) ^d	NT	NT	ND (90) ^d	ND (100) ^d
06128	CCTA-61A-GR-096-0-0.5-S (on-site laboratory) Debris Mound #1	0-0.5	ND (120) ^d	ND (120) ^d	ND (120) ^d	NT	NT	ND (90) ^d	ND (100) ^d
06128	CCTA-61A-GR-097-D (on-site laboratory) Debris Mound #2	NA	ND (120) ^d	ND (120) ^d	ND (120) ^d	NT	NT	ND (90) ^d	ND (100) ^d
06128	CCTA-61A-GR-097-0-0.5-S (on-site laboratory) Debris Mound #2	0-0.5	ND (120) ^d	ND (120) ^d	ND (120) ^d	NT	NT	ND (90) ^d	ND (100) ^d
06128	CCTA-61A-GR-098-D (duplicate) (on-site laboratory) Debris Mound 2	NA	ND (120) ^d	ND (120) ^d	ND (120) ^d	NT	NT	ND (90) ^d	ND (100) ^d
06127	CCTA-61A-GR-098-D (on-site laboratory) Debris Mound 2	NA	ND (5.67)	ND (6.18)	ND (6.48)	ND (6.6)	ND (5.45)	ND (7.83)	ND (11.1)
06128	CCTA-61A-GR-098-0-0.5-S (on-site laboratory) Debris Mound 2	0-0.5	ND (120) ^d	ND (120) ^d	ND (120) ^d	NT	NT	ND (90) ^d	ND (100) ^d

Refer to footnotes at end of table.

Table 8.4.4-6 (Continued)
Summary of SWMU 61A Confirmatory Sampling HE Analytical Results, January 1997 and March–April 1998

Sample Attributes			Explosives, Methods (EPA 8330) ^a (µg/kg)							
Record Number ^b	ER Sample ID ^c (Figure 8.4.4-3)	Sample Depth (ft)	p-Nitrotoluene (4)	Nitrobenzene	1,3-Dinitrobenzene	1,3,5-Trinitrobenzene	RDX	Tetryl	HMX	Pentaerythritol Tetranitrate
510195	CCTA-61A-GR-032-C	NA	ND (31) UJ	ND (9.0) UJ	ND (16) UJ	ND (32) UJ	140 J (260) UJ	ND (94) UJ	ND (24) UJ	NT
510195	CCTA-61A-GR-033-C	NA	ND (31) UJ	ND (9.0) UJ	ND (16) UJ	ND (32) UJ	160 J (270) UJ	ND (94) UJ	ND (24) UJ	NT
510195	CCTA-61A-GR-034-C	NA	ND (31) UJ	ND (9.0) UJ	ND (16) UJ	ND (32) UJ	ND (31) UJ	ND (94) UJ	ND (24) UJ	NT
Remediated Pit Soil Samples										
510196	CCTA-61A-GR-035-6.5-9.5-S	6.5–9.5	ND (31) UJ	ND (9.0) UJ	ND (16) UJ	ND (32) UJ	ND (31) UJ	ND (94) UJ	ND (24) UJ	NT
510196	CCTA-61A-GR-035-9.5-13.5-S	9.5–13.5	ND (31) UJ	ND (9.0) UJ	ND (16) UJ	ND (32) UJ	ND (31) UJ	ND (94) UJ	ND (24) UJ	NT
510196	CCTA-61A-GR-036-7-11-S	7–11	ND (31) UJ	ND (9.0) UJ	ND (16) UJ	ND (32) UJ	ND (31) UJ	ND (94) UJ	ND (24) UJ	NT
510196	CCTA-61A-GR-036-11-14-S	11–14	ND (31) UJ	ND (9.0) UJ	ND (16) UJ	ND (32) UJ	ND (31) UJ	ND (94) UJ	ND (24) UJ	NT
Debris Mound Samples										
06128	CCTA-61A-GR-094-D (on-site laboratory) Debris Mound 1	NA	ND (100 ^b)	NT	NT	NT	ND (110 ^b)	NT	ND (150 ^b)	ND (70 ^b)
06127	CCTA-61A-GR-094-D (on-site laboratory) Debris Mound 1	NA	ND (10.6)	ND (5.21)	ND (4.05)	ND (6.62)	ND (9.71)	ND (7.55)	2960	NT
06128	CCTA-61A-GR-094-0-0.5-S (on-site laboratory) Debris Mound 1	0–0.5	ND (100 ^b)	NT	NT	NT	ND (110 ^b)	NT	220 ^b J (800 ^b)	ND (70 ^b)
06128	CCTA-61A-GR-095-D (on-site laboratory) Debris Mound 1	NA	ND (100 ^b)	NT	NT	NT	ND (110 ^b)	NT	ND (150 ^b)	ND (70 ^b)
06128	CCTA-61A-GR-095-0-0.5-S (on-site laboratory) Debris Mound 1	0–0.5	ND (100 ^b)	NT	NT	NT	ND (110 ^b)	NT	ND (150 ^b)	ND (70 ^b)
06128	CCTA-61A-GR-096-D (on-site laboratory) Debris Mound 1	NA	ND (100 ^b)	NT	NT	NT	ND (110 ^b)	NT	ND (150 ^b)	ND (70 ^b)
06128	CCTA-61A-GR-096-0-0.5-S (on-site laboratory) Debris Mound 1	0–0.5	ND (100 ^b)	NT	NT	NT	ND (110 ^b)	NT	ND (150 ^b)	ND (70 ^b)
06128	CCTA-61A-GR-097-D (on-site laboratory) Debris Mound 2	NA	ND (100 ^b)	NT	NT	NT	ND (110 ^b)	NT	ND (150 ^b)	ND (70 ^b)
06128	CCTA-61A-GR-097-0-0.5-S (on-site laboratory) Debris Mound 2	0–0.5	ND (100 ^b)	NT	NT	NT	ND (110 ^b)	NT	ND (150 ^b)	ND (70 ^b)
06128	CCTA-61A-GR-098-D (on-site laboratory) Debris Mound 2	NA	ND (100 ^b)	NT	NT	NT	ND (110 ^b)	NT	ND (150 ^b)	ND (70 ^b)
06128	CCTA-61A-GR-098-D (duplicate) (on-site laboratory) Debris Mound 2	NA	ND (100 ^b)	NT	NT	NT	ND (110 ^b)	NT	ND (150 ^b)	ND (70 ^b)
06127	CCTA-61A-GR-098-D (on-site laboratory) Debris Mound 2	NA	ND (10.6)	ND (5.21)	ND (4.05)	ND (6.62)	ND (9.71)	ND (7.55)	ND (5.27)	NT
06128	CCTA-61A-GR-098-0-0.5-S (on-site laboratory) Debris Mound 2	0–0.5	ND (100 ^b)	NT	NT	NT	ND (110 ^b)	NT	ND (150 ^b)	ND (70 ^b)

Refer to footnotes at end of table.

Table 8.4.4-6 (Continued)
Summary of SWMU 61A Confirmatory Sampling HE Analytical Results, January 1997 and March–April 1998

Sample Attributes			Explosives, Methods (EPA 8330) ^a (µg/kg)						
Record Number ^b	ER Sample ID ^c (Figure 8.4.4-3)	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)
06128	CCTA-61A-GR-098-0-0.5-S (duplicate) (on-site laboratory) Debris Mound 2	0-0.5	ND (120 ^a)	ND (120 ^a)	ND (120 ^a)	NT	NT	ND (90 ^a)	ND (100 ^a)
06128	CCTA-61A-GR-099-D (on-site laboratory) Debris Mound 2	NA	ND (120 ^a)	ND (120 ^a)	ND (120 ^a)	NT	NT	ND (90 ^a)	ND (100 ^a)
06128	CCTA-61A-GR-099-0-0.5-S (on-site laboratory) Debris Mound 2	0-0.5	ND (120 ^a)	ND (120 ^a)	ND (120 ^a)	NT	NT	ND (90 ^a)	ND (100 ^a)
Quality Assurance/Quality Control Sample (µg/L)									
510191	CCTA-61A-GR-000-EB	NA	ND (0.11) R	ND (0.10) R	ND (0.13) R	ND (0.14) R	ND (0.16) R	ND (0.16) R	ND (0.39) R
510195	CCTA-61A-GR-000-EB	NA	ND (0.11) UJ	ND (0.10) UJ	ND (0.13) UJ	ND (0.14) UJ	ND (0.16) UJ	ND (0.16) UJ	ND (0.39) UJ
510093	CCTA-61A-GR-000-EB	NA	ND (0.11) R	ND (0.10) R	ND (0.13) R	ND (0.14) R	ND (0.16) R	ND (0.16) R	ND (0.39) R
510196	CCTA-61A-GR-000-EB	NA	ND (0.11)	ND (0.10)	ND (0.13)	ND (0.14)	ND (0.16)	ND (0.16)	ND (0.39)
06127	CCTA-61A-GR-000-EB	NA	ND (.0293)	ND (.0137)	ND (.0425)	ND (.0186)	ND (.0195)	ND (.0238)	ND (.0312)
06128	CCTA-61A-GR-000-EB	NA	ND (14 ^a)	ND (14 ^a)	ND (14 ^a)	NT	NT	ND (11 ^a)	ND (12 ^a)

Refer to footnotes at end of table.

Table 8.4.4-6 (Concluded)
Summary of SWMU 61A Confirmatory Sampling HE Analytical Results, January 1997 and March–April 1998

Sample Attributes			Explosives, Methods (EPA 8330) ^a (µg/kg)							
Record Number ^b	ER Sample ID ^c (Figure 8.4.4-3)	Sample Depth (ft)	p-Nitrotoluene (4)	Nitrobenzene	1,3-Dinitrobenzene	1,3,5-Trinitrobenzene	RDX	Tetryl	HMX	Pentaerythritol Tetranitrate
06128	CCTA-61A-GR-098-0-0.5-S (duplicate) (on-site laboratory) Debris Mound 2	0–0.5	ND (100 ^d)	NT	NT	NT	ND (110 ^d)	NT	ND (150 ^d)	ND (70 ^d)
06128	CCTA-61A-GR-099-D (on-site laboratory) Debris Mound 2	NA	ND (100 ^d)	NT	NT	NT	ND (110 ^d)	NT	ND (150 ^d)	ND (70 ^d)
06128	CCTA-61A-GR-099-0-0.5-S (on-site laboratory) Debris Mound 2	0–0.5	ND (100 ^d)	NT	NT	NT	ND (110 ^d)	NT	ND (150 ^d)	ND (70 ^d)
Quality Assurance/Quality Control Samples (µg/L)										
510191	CCTA-61A-GR-000-EB	NA	ND (0.19) R	ND (0.12) R	ND (0.11) R	0.06 J (0.5) R	0.05 J (0.5) R	ND (0.18) R	0.027 J (0.5) R	NT
510195	CCTA-61A-GR-000-EB	NA	ND (0.19) UJ	ND (0.12) UJ	ND (0.11) UJ	ND (0.32) UJ	ND (0.12) UJ	ND (0.18) UJ	0.13 J (0.5) UJ	NT
510093	CCTA-61A-GR-000-EB	NA	ND (0.19) R	ND (0.12) R	ND (0.11) R	ND (0.32) R	0.17 J (0.5) R	ND (0.18) R	ND (0.095) R	NT
510196	CCTA-61A-GR-000-EB	NA	ND (0.19)	ND (0.12)	ND (0.11)	ND (0.32)	ND (0.12)	ND (0.18)	0.10 J (0.5)	NT
06127	CCTA-61A-GR-000-EB	NA	ND (.0335)	ND (.0161)	ND (.0202)	ND (.0206)	ND (.0185)	ND (.0215)	ND (.0459)	NT
06128	CCTA-61A-GR-000-EB (on-site laboratory)	NA	ND (12 ^d)	NT	NT	NT	ND (13 ^d)	NT	ND (18 ^d)	ND (8.4 ^d)

^aEPA November 1986.

^bAnalysis request/chain of custody

^cBold portion of the ER Sample ID corresponds to the sample location specified in Figure 8.4.4-3.

^dValues in bold represent detected HE compounds.

^eResult was converted from milligrams per kilogram to µg/kg or from milligrams per liter to µg/L.

C = Concrete sample.

CCTA = Central Coyote Test Area.

D = Debris sample.

DU = Duplicate sample.

EB = Equipment blank.

EPA = U.S. Environmental Protection Agency.

ER = Environmental Restoration.

ft = Foot (feet).

GR = Grab sample.

HE = High explosives.

HMX = Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine.

ID = Identification

J = Analytical result was qualified as an estimation during data validation.

J () = The reported value is greater than or equal to the method detection limit (MDL) but is less than the practical quantitation limit, shown in parenthesis.

NA = Not applicable.

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

NT = Not tested.

R = Analytical result was rejected during data validation.

RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine.

Tetryl = Methyl-2,4,6-trinitrophenyl nitramine.

µg/kg = Microgram(s) per kilogram.

µg/L = Microgram(s) per liter.

S = Soil sample.

SWMU = Solid waste management unit.

U = Analytical result was qualified as a nondetect during data validation.

The NMED-approved background arsenic concentration of 5.6 mg/kg was exceeded in the surface soil sample from location 009 (at 20.8 mg/kg) and in the near-surface soil samples from locations 011 and 016 (at 6.98 and 6.16 mg/kg, respectively). Concentrations of barium slightly exceeded the NMED-approved background concentration of 130 mg/kg in the near-surface soil samples from locations 008 and 011 (at 148 and 150 mg/kg, respectively). Concentrations of beryllium slightly exceeded the NMED-approved background concentration of 0.65 mg/kg in the near-surface soil sample from location 009 (at 0.788 mg/kg), the surface and near-surface soil samples from location 011 (at 0.711 and 0.981 mg/kg, respectively), in the near-surface soil samples from locations 012 and 014 (at 0.670 and 0.756 mg/kg, respectively), and in the surface soil sample from location 016 (at 0.966 mg/kg). Cadmium concentrations slightly exceed the NMED-approved nonquantified background value of <1 mg/kg in the surface soil sample from location 009 (at 1.02 mg/kg), in the near-surface soil sample from location 014 (at 1.44 mg/kg), in the surface soil sample from location 017 (at 1.48 mg/kg), and in the near-surface soil sample from location 018 (at 1.38 mg/kg). The NMED-approved background chromium concentration of 12.8 mg/kg was slightly exceeded in the near-surface soil samples from locations 011, 014, and 016 (at 19.8, 13.0, and 13.9 mg/kg, respectively).

Lead concentrations exceeded the NMED-approved background concentration of 11.5 mg/kg in the majority of the soil samples collected at the cleared area of SWMU 61A. Lead concentrations were below background in both the surface and near-surface soil samples collected from locations 011 and 015. The concentrations of lead that exceeded background ranged from 11.8 J to 281 mg/kg with one sample location (014) showing a concentration of 3,950 J mg/kg in the surface sample (most likely because of the presence of a lead fragment).

The concentration of selenium slightly exceeded the NMED-approved nonquantified background value of <1 mg/kg in the near surface sample from location 016 (at 1.01 mg/kg). Mercury and silver concentrations did not exceed the associated NMED-approved nonquantified background values of <0.1 and <1 mg/kg, respectively. The maximum concentration of mercury is 0.0867 mg/kg. The maximum concentration of selenium is 0.269 J mg/kg in any of the cleared area soil samples.

Radionuclides

Table 8.4.4-3 summarizes the gamma spectroscopy analysis results for soil samples collected from the 12 random sample locations at the cleared area of SWMU 61A (locations 007 through 018). Annex 8-B contains complete results for the gamma spectroscopy analyses of cleared area soil samples. The cleared area soil samples that were analyzed using gamma spectroscopy consisted of 12 surface and 12 near-surface soil samples, and 2 duplicate surface soil samples. Although NMED-approved background radionuclides activities are presented in Table 8.4.4-3, it should be noted that Coyote Test Field background activities for uranium-238, thorium-232, and cesium-137 have not been established, and NMED-approved Southwest Test Area background activities are used for comparison purposes.

The gamma spectroscopy results for the cleared area soil samples show that uranium-238 and uranium-235 were either not detected above the MDA or not detected above background. However, the MDA associated with no-detection results for uranium-238 and uranium-235 exceeded the associated NMED-approved background activities in most instances. As a result, no comparison to the NMED-approved background activities for uranium-238 and uranium-235 is applicable. The gamma activity from thorium-232 slightly exceeded the NMED-approved

background activity of 1.01 pCi/g in the near-surface soil samples from locations 010 and 016 (at 1.02E+00 and 1.07E+00 pCi/g, respectively). The gamma activity from cesium-137 exceeded the NMED-approved subsurface background activity (0.079 pCi/g) in the majority of samples collected at the cleared area of SWMU 61A. The cesium-137 activities above background ranged from 8.95E-02 to 6.20E-01 pCi/g. The lower cesium-137 subsurface background activity (0.079 pCi/g) is used for a benchmark for comparison in order to be consistent with current SNL/NM risk screening assessment methodology.

Table 8.4.4-4 summarizes the gross alpha and gross beta analysis results for soil samples collected from the 12 random sample locations at the cleared area of SWMU 61A (locations 007 through 018). The results indicate surface and near-surface soil activities ranged from 1.35 to 18.0 pCi/g for gross alpha and from 21.5 to 49.8 pCi/g for gross beta. Gross alpha and gross beta analytical results were all within the same order-of-magnitude range as the site-specific background soil activities of 9.91 to 19.8 pCi/g for gross alpha and 21.9 to 33.6 pCi/g for gross beta (see Section 8.4.4.4.1).

High Explosives

Table 8.4.4-6 summarizes the HE analysis results for soil samples collected from the 12 random sample locations at the cleared area of SWMU 61A (locations 007 through 018). The cleared area soil samples analyzed for HE compounds consisted of 12 surface, 12 near-surface soil samples, and 2 duplicate surface soil samples. Because there are no applicable background concentrations for HE compounds in soil, any detectable concentrations of HE compounds are considered to be an indication of potential contamination.

Only two HE compounds were detected in the soil samples collected from the cleared area of SWMU 61A. RDX was detected at seven sample locations (007, 009, 011, 014, 015, 016, and 018), ranging in concentrations from 32 J to 210 J $\mu\text{g/kg}$. RDX was detected only in the surface soil sample from location 014. RDX was detected in both the surface and near-surface soil sample at location 009. At sample locations 007, 011, 015, 016, and 018, RDX was detected in the near-surface soil samples only. Similarly, HMX was detected at eight sample locations (007, 008, 009, 011, 012, 013, 014, and 015), ranging in concentrations from 49 J to 380 $\mu\text{g/kg}$. HMX was detected in both surface and near-surface samples from locations 007 and 014. HMX was detected only in surface samples from locations 008, 009, 012, and 013. Conversely, HMX was detected only in the subsurface samples from locations 011 and 015.

8.4.4.4.3 Gamma Activity Area Soil Samples

In March and April 1998, surface and near-surface soil samples were collected from five judgmental locations based upon the area where anomalous gamma activity measurements were found to be concentrated during the Phase I Surface Radiation Survey conducted at SWMU 61A (see Section 8.4.3.1.3). Tables 8.4.4-2, 8.4.4-3, 8.4.4-4, and 8.4.4-6 summarize metal, radionuclide, and HE analytical results for the Highest Measured Gamma Activity Area soil samples. Figure 8.4.4-3 shows the sample locations, which are identified only by the sample number specified within the ER Sample ID name. This section discusses these results.

Metals

Table 8.4.4-2 summarizes the metals analysis results for soil samples from the five judgmental locations at SWMU 61A (locations 019 through 023). The judgmental soil samples analyzed for metals consist of five surface and five near-surface soil samples and one duplicate surface soil sample. For silver, cadmium, selenium, and mercury, no quantified background concentration values have been established, and <1 mg/kg is listed as the "HRMB background value." This circumstance arises because the laboratory reporting limits are usually at or less than 1 mg/kg for these metals in soil. Therefore, an absolute concentration less than the reporting limit could not be established and used for maximum background concentrations. This issue is handled two different ways in this NFA proposal. For site characterization purposes, the 1 mg/kg value is used as a benchmark concentration for discussions of possible metal contamination. But for the risk screening purposes, a conservative approach is taken and the maximum metal concentration is carried through the risk assessment, even if that maximum is below the 1 mg/kg nonquantified background value.

The NMED-approved background arsenic concentration of 5.6 mg/kg was exceeded only in the surface soil sample from location 023 (at 8.09 mg/kg). Concentrations of barium slightly exceeded the NMED-approved background concentration of 130 mg/kg in the surface soil samples from locations 019 (plus the duplicate) and 020 (at 137, 141, and 140 mg/kg, respectively). Concentrations of beryllium slightly exceeded the NMED-approved background concentration of 0.65 mg/kg in the duplicate surface soil sample from location 019 (at 0.873 mg/kg) and in the near-surface soil sample from location 020 (at 0.801 mg/kg). Cadmium concentrations exceed the NMED-approved nonquantified background value of <1 mg/kg in all the surface and near-surface soil samples from the gamma activity area at SWMU 61A. The concentrations of cadmium ranged from 1.48 to 3.86 mg/kg. The NMED-approved background chromium concentration of 12.8 mg/kg was slightly exceeded in the surface soil sample (and duplicate) from location 019 (at 13.1 and 14.8 mg/kg, respectively), and in the near-surface soil sample from locations 021 (at 13.1 mg/kg). Lead concentrations did not exceed the associated NMED-approved background concentration limits in any of the soil samples from the gamma activity area at SWMU 61A, nor were any mercury concentrations above the NMED-approved nonquantified background value in these samples. The concentration of selenium exceeded the NMED-approved nonquantified background value of <1 mg/kg in only one sample from location 023 (at 2.80 mg/kg, near-surface). Similarly, the concentration of silver slightly exceeded the associated NMED-approved nonquantified background value of <1 in only one sample from location 019 (at 1.06 mg/kg, surface soil duplicate).

Radionuclides

Table 8.4.4-3 summarizes the gamma spectroscopy analysis results for soil samples collected from the five judgmental sample locations at SWMU 61A (locations 019 through 023). Annex 8-B contains complete results for the gamma spectroscopy analyses of gamma activity area soil samples. The judgmental soil samples analyzed using gamma spectroscopy consisted of five surface and five near-surface soil samples and one duplicate surface soil sample. Although NMED-approved background radionuclides activities are presented in Table 8.4.4-3, it should be noted that Coyote Test Field background activities for uranium-238, thorium-232, and cesium-137 have not been established, and NMED-approved Southwest Test Area background activities are used for comparison purposes.

Gamma spectroscopy results for the judgmental soil samples showed that uranium-238 exceeded the NMED-approved background activity of 1.4 pCi/g in the surface soil samples from locations 019 (plus the duplicate) and 021 (at 4.15E+00, 3.06E+00, and 2.62E+00 pCi/g, respectively), as well as the surface and near-surface samples from location 020 (at 3.27E+00 and 2.29E+00 pCi/g, respectively). Uranium-235 activity exceeded the NMED approved background activity of 0.18 pCi/g in only one surface sample from location 020 (at 2.27E-01 pCi/g). However, the MDA associated with no-detection results for uranium-238 and uranium-235 exceeded the associated NMED-approved background activities in most instances. As a result, no comparison to the NMED-approved background activities for uranium-238 and uranium-235 for those samples is applicable. The gamma activity from thorium-232 did not exceed the NMED-approved background activity of 1.01 pCi/g in the judgmental samples collected at SWMU 61A. The gamma activity from cesium-137 exceeded the NMED-approved subsurface background activity (0.079 pCi/g) in the surface soil samples from all five judgmental sample locations at SWMU 61A. The cesium-137 activities above background ranged from 9.31E-02 to 7.65E-01 pCi/g. The lower cesium-137 subsurface background activity (0.079 pCi/g) is used for a benchmark for comparison to be consistent with current SNL/NM risk screening assessment methodology.

Table 8.4.4-4 summarizes the gross alpha and gross beta analysis results for soil samples from the five judgmental sample locations at SWMU 61A (locations 019 through 023). The results indicated that surface and near-surface soil activities ranged from 7.96 to 15.4 pCi/g for gross alpha and from 29.5 to 44.4 pCi/g for gross beta. Gross alpha and gross beta analytical results were all within the same order-of-magnitude range as the site-specific background soil activities of 9.91 to 19.8 pCi/g for gross alpha and 21.9 to 33.6 pCi/g for gross beta (see Section 8.4.4.4.1).

High Explosives

Table 8.4.4-6 summarizes the HE analysis results for soil samples from the five judgmental sample locations at SWMU 61A (locations 019 through 023). The judgmental soil samples analyzed for HE compounds consist of five surface and five near-surface soil samples and one duplicate surface soil sample. Because there are no applicable background concentrations for HE compounds in soil, any detectable concentrations of HE compounds are considered to be an indication of potential contamination.

Only two HE compounds were detected in the soil samples from the gamma activity area at SWMU 61A. RDX and HMX were detected in only one surface soil sample from location 021. The concentration of RDX was 830 µg/kg and the concentration of HMX was 2,000 J µg/kg.

8.4.4.4.4 Arroyo Sediment Samples

In March and April 1998, surface and near-surface arroyo sediment samples were collected from four locations within the northern arroyo channel beginning directly north of the concrete blocks and continuing downstream at intervals of approximately 150 feet. Tables 8.4.4-2, 8.4.4-3, 8.4.4-4, and 8.4.4-6 summarize metal, radionuclide, and HE analytical results for the arroyo sediment samples. Figure 8.4.4-3 shows the arroyo sediment sample locations identified

only by the sample number specified within the ER Sample ID name. This section discusses these results.

Metals

Table 8.4.4-2 summarizes the metals analysis results for arroyo sediment samples from the four locations within the northern arroyo channel at SWMU 61A (locations 024 through 027). The arroyo samples analyzed for metals consisted of four surface and four near-surface sediment samples and two duplicate sediment samples (one surface and one near-surface). For silver, cadmium, selenium, and mercury, no quantified background concentration values have been established, and <1 mg/kg is listed as the "HRMB background value." This circumstance arises because the laboratory reporting limits are usually at or less than 1 mg/kg for these metals in soil. Therefore, an absolute concentration less than the reporting limit could not be established and used for maximum background concentrations. This issue is handled two different ways in this NFA proposal. For site characterization purposes, the 1 mg/kg value is used as a benchmark concentration for discussions of possible metal contamination. But for the risk screening purposes, a conservative approach is taken and the maximum metal concentration is carried through the risk assessment, even if that maximum is below the 1 mg/kg nonquantified background value.

Arsenic, beryllium, cadmium, chromium, lead, mercury, selenium, and silver concentrations in all the arroyo sediment samples that were collected were below the associated NMED-approved background concentration limits or the respective NMED-approved nonquantified background values (cadmium, mercury, selenium, and silver). However, barium concentrations slightly exceeded the NMED-approved background concentration of 130 mg/kg in the surface sediment sample from location 024 (at 149 mg/kg) and the near-surface sediment sample from location 026 (at 141 mg/kg).

Radionuclides

Table 8.4.4-3 summarizes the gamma spectroscopy analysis results for arroyo sediment samples from the four locations within the northern arroyo channel at SWMU 61A (locations 024 through 027). Annex 8-B contains complete results for the gamma spectroscopy analyses of arroyo sediment samples. The arroyo samples analyzed using gamma spectroscopy consisted of four surface and four near-surface sediment samples and two duplicate sediment samples (one surface and one near-surface). Table 8.4.4-4 presents NMED-approved background radionuclides activities, but it should be noted that Coyote Test Field background activities for uranium-238, thorium-232, and cesium-137 have not been established, and NMED-approved Southwest Test Area background activities are used for comparison purposes.

Gamma spectroscopy results for the arroyo sediment samples show that uranium-238 exceeded the NMED-approved background activity of 1.4 pCi/g in the surface sediment sample from locations 024 (at 2.28E+00 pCi/g), as well as in the near-surface sediment sample from location 025 (at 1.54E+00 pCi/g). The remaining gamma spectroscopy results for uranium-238 were either not detected above the MDA or not detected above the background activity limit. No uranium-235 activity was detected in the arroyo sediment samples. However, the MDA associated with no-detection results for uranium-238 and uranium-235 exceeded the associated NMED-approved background activities in most instances. As a result, no comparison to the

NMED-approved background activities for uranium-238 and uranium-235 for those samples is applicable. The gamma activity from thorium-232 did not exceed the NMED-approved background activity of 1.01 pCi/g in the arroyo sediment samples collected at SWMU 61A. The gamma activity from cesium-137 exceeded the NMED-approved subsurface background activity (at 0.079 pCi/g) in all but two near-surface sediment samples from locations 024 and 026. The cesium-137 activities above background ranged from 1.75E-01 to 6.70E-01 pCi/g. The lower cesium-137 subsurface background activity (0.079 pCi/g) is used for a benchmark for comparison to be consistent with current SNL/NM risk screening assessment methodology.

Table 8.4.4-4 summarizes the gross alpha and gross beta analysis results for arroyo sediment samples from the four locations within the northern arroyo channel at SWMU 61A (locations 024 through 027). The results indicate that surface and near-surface sediment activities ranged from 7.39 to 12.3 pCi/g for gross alpha and from 31.3 to 45.8 J pCi/g for gross beta. Gross alpha and gross beta analytical results were all within the same order-of-magnitude range as the site-specific background sediment activities of 10.8 to 13.7 pCi/g for gross alpha and 27.4 to 37.3 pCi/g for gross beta (see Section 8.4.4.4.1).

High Explosives

Table 8.4.4-6 summarizes the HE analysis results for arroyo sediment samples from the four sample locations within the northern arroyo channel at SWMU 61A (locations 024 through 027). The arroyo samples analyzed for HE compounds consisted of four surface and four near-surface sediment samples and two duplicate sediment samples (one surface and one near surface). Because there are no applicable background concentrations for HE compounds in arroyo sediments, any detectable concentrations of HE compounds are considered to be an indication of potential contamination. However, no HE compounds were detected in the arroyo sediment samples collected at SWMU 61A.

8.4.4.4.5 Concrete Block Area Samples

In March and April 1998, judgmental concrete chip samples and nearby surface and near-surface soil samples were collected from the concrete block area at SWMU 61A. One concrete chip sample was collected from each of the three blocks at the location of the blast pit. In addition, nearby surface and near-surface soil samples were collected at four locations surrounding the concrete block area. Tables 8.4.4-2, 8.4.4-3, 8.4.4-4, and 8.4.4-6 through 8.4.4-11 summarize metal, radionuclide, HE, and SVOC analytical results for the concrete block area samples. Figure 8.4.4-3 shows the sample locations identified only by the sample number specified within the ER Sample ID name. This section discusses these results.

Metals

Table 8.4.4-2 summarizes the metals analysis results for surface and near-surface soil samples collected from the four locations surrounding the concrete block area at SWMU 61A (locations 028 through 031). The concrete block area soil samples that were analyzed for metals consisted of four surface and four near-surface soil samples and one duplicate surface

Table 8.4.4-7
Summary of SWMU 61A Confirmatory Sampling TAL Metals Analytical Results, March–April 1998
(Off-Site Laboratory)

Sample Attributes			Metals (EPA 6010/7000) ^a (mg/kg)										
Record Number ^b	ER Sample ID ^c (Figure 8.4.4-3)	Sample Depth (ft)	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron
Concrete Block Samples													
510195	CCTA-61A-GR-032-C	NA	7660	0.975	6.50	132	0.340 J (0.5)	ND (0.002453)	97700	9.28	7.31	51.3	8960
510195	CCTA-61A-GR-033-C	NA	7320	ND (0.002298)	3.24	112	0.229 J (0.5)	0.369 J (0.5)	113000	7.71	2.48 J (3)	18.6	7420
510195	CCTA-61A-GR-034-C	NA	6120	ND (0.002298)	2.72	83.6	0.191 J (0.5)	ND (0.002453)	104000	4.04	1.96 J (3)	10.2	6410
Quality Assurance/Quality Control Sample (mg/L)													
510195	CCTA-61A-GR-000-EB	NA	0.0472 J (0.5)	ND (0.002298)	ND (0.000827)	ND (0.001709)	ND (0.001811)	ND (0.002453)	0.123	ND (0.003826)	ND (0.003725)	ND (0.002113)	0.0419

Refer to footnotes at end of table.

Table 8.4.4-7 (Concluded)
Summary of SWMU 61A Confirmatory TAL Metals Analytical Results, March–April 1998
(Off-Site Laboratory)

Sample Attributes			Metals (EPA 6010/7000) ^a (mg/kg)											
Record Number ^b	ER Sample ID ^c (Figure 8.4.4-3)	Sample Depth (ft)	Lead	Magnesium	Manganese	Mercury	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
Concrete Block Samples														
510195	CCTA-61A-GR-032-C	NA	43.9 B	2870	197	0.00920 J (0.10)	4.33	488	0.116 J (0.5)	0.767 J (1)	371	ND (0.001164)	17.5	284 B
510195	CCTA-61A-GR-033-C	NA	9.85 B	2430	209	0.0175 J (0.10)	6.90	871	0.180 J (0.5)	ND (0.002914)	410	ND (0.001164)	14.5	45.5 B
510195	CCTA-61A-GR-034-C	NA	9.84 B	2070	196	0.0102 J (0.10)	4.47	1000	ND (0.000891)	ND (0.002914)	315	ND (0.001164)	10.5	41.8 B
Quality Assurance/Quality Control Sample (mg/L)														
510195	CCTA-61A-GR-000-EB	NA	0.00350	ND (0.067902)	ND (0.002014)	ND (0.000047)	ND (0.012834)	2.95 J (5)	ND (0.000891)	ND (0.002914)	0.848 J (1)	ND (0.001164)	ND (0.006021)	0.0559

^aEPA November 1986.

^bAnalysis request/chain of custody record.

^cBold portion of the ER Sample ID corresponds to the sample location specified in Figure 8.4.4-3.

B = Analyte detected in associated blank.

C = Concrete.

CCTA = Central Coyote Test Area.

EB = Equipment blank.

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 method detection limit (MDL) but is less than the practical quantitation limit, shown in parentheses.

mg/kg = Milligram(s) per kilogram.

mg/L = Milligram(s) per liter.

NA = Not applicable.

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

SWMU = Solid waste management unit.

TAL = Target analyte list.

Table 8.4.4-8
Summary of SWMU 61A Confirmatory Sampling TCLP Metals Analytical Results, January 1997 and March–April 1998

Sample Attributes			Metals (EPA 1311/6010/7000) ^a (mg/L)								
Record Number ^b	ER Sample ID ^c (Figure 8.4.4-3)	Sample Depth (ft)	Arsenic	Barium	Beryllium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver
Concrete Block Samples											
510195	CCTA-61A-GR-032-C (off-site laboratory)	NA	ND (0.033079)	0.694	ND (0.001811)	ND (0.002453)	ND (0.003826)	ND (0.024842)	ND (0.000047)	ND (0.054874)	0.0846
510195	CCTA-61A-GR-033-C (off-site laboratory)	NA	ND (0.033079)	0.420	ND (0.001811)	ND (0.002453)	ND (0.003826)	ND (0.024842)	ND (0.000047)	ND (0.054874)	ND (0.002914)
510195	CCTA-61A-GR-034-C (off-site laboratory)	NA	ND (0.033079)	0.532	ND (0.001811)	ND (0.002453)	ND (0.003826)	ND (0.024842)	ND (0.000047)	0.0737 J (0.1)	ND (0.002914)
Debris Samples											
06128	CCTA-61A-GR-094-D Debris Mound 1	NA	ND (0.005)	1.4	NT	0.0065	ND (0.018)	0.12	ND (0.00016)	ND (0.005)	ND (0.00024)
06127	CCTA-61A-GR-094-D (off-site laboratory) Debris Mound 1	NA	0.00558 J (0.0100)	1.18 B	NT	0.00575	0.00192 J (0.0100)	0.128	ND (.0001)	0.00463 J (0.00500)	ND (.000424)
06128	CCTA-61A-GR-095-D Debris Mound 1	NA	0.0056 J (0.020)	1.3	NT	0.092	0.021 J (0.072)	0.064	0.0002 J (0.00064)	ND (0.005)	ND (0.00024)
06128	CCTA-61A-GR-096-D Debris Mound 1	NA	ND (0.005)	0.9	NT	ND (0.0008)	ND (0.018)	0.0056	0.00017 J (0.00064)	ND (0.005)	ND (0.00024)
06128	CCTA-61A-GR-097-D Debris Mound 2	NA	ND(0.005)	0.79	NT	ND (0.0008)	ND (0.018)	ND (0.0011)	ND (0.00016)	ND (0.005)	ND (0.00024)
06127	CCTA-61A-GR-097-D (off-site laboratory) Debris Mound 2	NA	0.00363 J (0.0100)	0.554 B	NT	0.000784 J (0.00500)	0.00113 J (0.0100)	0.00285 J (0.00500)	ND (.0001)	0.00503	ND (.000424)
06128	CCTA-61A-GR-098-D Debris Mound 2	NA	ND (0.005)	1.1	NT	ND (0.0008)	ND (0.018)	0.0014 J (0.0044)	ND (0.00016)	ND (0.005)	ND (0.00024)
06128	CCTA-61A-GR-098-D (duplicate) Debris Mound 2	NA	ND (0.005)	0.96	NT	ND (0.0008)	0.074	0.0016 J (0.0044)	ND (0.00016)	ND (0.005)	ND (0.00024)
06128	CCTA-61A-GR-099-D Debris Mound 2	NA	0.0056 J (0.02)	0.94	NT	0.0039	0.078	0.0024 J (0.0044)	ND (0.00016)	ND (0.005)	ND (0.00024)
Maximum Concentration of Contaminants for the Toxicity Characteristic (mg/L) ^d			5.0	100.0	NA	1.0	5.0	5.0	0.2	1.0	5.0

^aEPA November 1986.^bAnalysis request/chain of custody record.^cBold portion of the ER Sample ID corresponds to the sample location specified in Figure 8.4.4-3.^d40 CFR Part 261.24.

B = Analyte detected in associated blank.

C = Concrete sample.

CCTA = Central Coyote Test Area.

D = Debris sample.

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 method detection limit (MDL) but is less than the practical quantitation limit for COCs 510195 and 06128 or the contract required detection limit for COC 06127, shown in parenthesis.

mg/L = Milligram(s) per liter.

NA = Not applicable.

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

NT = Not tested.

SWMU = Solid waste management unit.

TCLP = Toxicity characteristic leaching procedure.

Table 8.4.4-9
Summary of SWMU 61A Confirmatory Sampling SVOC Analytical Results,
January 1997 and March–April 1998

Sample Attributes			SVOCs (EPA Method 8270)* (µg/kg)		
Record Number ^b	ER Sample ID ^c (Figure 8.4.4-3)	Sample Depth (ft)	Bis(2-ethylhexyl) phthalate	2,4-Dinitrotoluene	Pentachlorophenol
Concrete Block Samples					
510195	CCTA-61A-GR-032-C (off-site laboratory)	NA	ND (0.6) UJ	ND (0.7) UJ	ND (2.3) UJ
510195	CCTA-61A-GR-033-C (off-site laboratory)	NA	ND (0.6) UJ	ND (0.7) UJ	ND (2.3) UJ
510195	CCTA-61A-GR-034-C (off-site laboratory)	NA	ND (0.6) UJ	ND (0.7) UJ	ND (2.3) UJ
Debris Mound Samples					
06128	CCTA-61A-GR-094-D Debris Mound 1	NA	ND (250)	ND (30)	ND (30)
06127	CCTA-61A-GR-094-D (off-site laboratory) Debris Mound 1	NA	272 J (167)^d	ND (167)	ND (167)
06128	CCTA-61A-GR-094-0-0.5-S Debris Mound 1	0–0.5	ND (250)	ND (30)	ND (30)
06128	CCTA-61A-GR-095-D Debris Mound 1	NA	260 J (1000)	ND (30)	58 J (120)
06128	CCTA-61A-GR-095-0-0.5-S Debris Mound 1	0–0.5	ND (250)	ND (30)	ND (30)
06128	CCTA-61A-GR-096-D Debris Mound 1	NA	ND (250)	ND (30)	ND (30)
06128	CCTA-61A-GR-096-0-0.5-S Debris Mound 1	0–0.5	ND (250)	ND (30)	ND (30)
06128	CCTA-61A-GR-097-D Debris Mound 2	NA	ND (250)	ND (30)	ND (30)
06128	CCTA-61A-GR-097-0-0.5-S Debris Mound 2	0–0.5	ND (250)	ND (30)	230
06128	CCTA-61A-GR-098-D Debris Mound 2	NA	ND (250)	ND (30)	ND (30)
06128	CCTA-61A-GR-098-D (duplicate) Debris Mound 2	NA	440 J (1000)	34 J (120)	ND (30)
06127	CCTA-61A-GR-098-D (off-site laboratory) Debris Mound 2	NA	ND (167)	ND (167)	ND (167)
06128	CCTA-61A-GR-098-0-0.5-S Debris Mound 2	0–0.5	290 J (1000)	ND (30)	ND (30)
06128	CCTA-61A-GR-098-0-0.5-S (duplicate) Debris Mound 2	0–0.5	ND (250)	ND (30)	ND (30)
06127	CCTA-61A-GR-098-0-0.5-S (off-site laboratory) Debris Mound 2	0–0.5	ND (167)	ND (167)	ND (167)
06128	CCTA-61A-GR-099-D Debris Mound 2	NA	ND (280)	ND (33)	ND (33)
06128	CCTA-61A-GR-099-0-0.5-S Debris Mound 2	0–0.5	ND (250)	ND (30)	ND (30)
Quality Assurance/Quality Control Samples (all in µg/L)					
510195	CCTA-61A-GR-000-EB (off-site laboratory)	NA	2.0 J (10)	ND (0.5)	ND (3.7)
06128	CCTA-61A-GR-000-EB	NA	ND (5)	ND (0.5)	ND (0.5)

Refer to footnotes at end of table.

Table 8.4.4-9 (Concluded)
Summary of SWMU 61A Confirmatory Sampling SVOC Analytical Results,
January 1997 and March–April 1998

Sample Attributes			SVOCs (EPA Method 8270) ^a (µg/kg)		
Record Number ^b	ER Sample ID ^c (Figure 8.4.4-3)	Sample Depth (ft)	Bis(2-ethylhexyl) phthalate	2,4-Dinitrotoluene	Pentachlorophenol
06127	CCTA-61A-GR-000-EB (off-site laboratory)	NA	ND (5)	ND (5)	ND (5)

^aEPA November 1986.

^bAnalysis request/chain of custody record (AR/COC).

^cBold portion of the ER Sample ID corresponds to the sample location specified in Figure 8.4.4-3.

^dValues in bold represent detected SVOCs.

CCTA = Central Coyote Test Area.

C = Concrete sample.

D = Debris sample.

EB = Equipment blank.

EPA = U.S. Environmental Protection Agency.

ER = Environmental Restoration.

ft = Foot (feet).

GR = Grab sample.

ID = Identification.

J = Analytical result was qualified as an estimation during data validation.

J () = The reported value is greater than or equal to the method detection limit (MDL) but is less than the practical quantitation limit for AR/COC 06128 and AR/COC 510195 analyses, or the contract required detection limit for AR/COC 06127 analyses, shown in parenthesis.

µg/kg = Microgram(s) per kilogram.

µg/L = Microgram(s) per liter.

NA = Not applicable.

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

S = Soil sample.

SWMU = Solid waste management unit.

SVOC = Semivolatile organic compound.

U = Analytical results was qualified as a nondetect during data validation.

Table 8.4.4-10
Summary of SVOC Analytical Detection Limits
Used for SWMU 61A Soil Sampling, January 1997 and March 1998

Analyte	MDL (µg/kg)
1,2,4-Trichlorobenzene	0.5-167
1,2-Dichlorobenzene	0.5-167
1,3-Dichlorobenzene	0.5-167
1,4-Dichlorobenzene	0.6-167
2,4,5-Trichlorophenol	0.8-167
2,4,6-Trichlorophenol	0.6-167
2,4-Dichlorophenol	0.3-167
2,4-Dimethylphenol	0.5-167
2,4-Dinitrophenol	1.1-660
2,4-Dinitrotoluene	0.7-167
2,6-Dinitrotoluene	0.6-167
2-Chloronaphthalene	0.7-167
2-Chlorophenol	0.4-167
2-Methyl-4,6-dinitrophenol	0.7-660
2-Methylnaphthalene	0.5-167
2-Methylphenol	0.5-167
2-Nitroaniline	0.6-167
2-Nitrophenol	0.5-167
3-Methylphenol	30-167
3,3-Dichlorobenzidine	0.7-833
3-Nitroaniline	0.6-200
4-Bromophenyl phenyl ether	0.6-167
4-Chloro-3-methylphenol	0.5-167
4-Chloroaniline	0.5-200
4-Chlorophenyl phenyl ether	0.6-167
4-Methylphenol	0.6-30
4-Nitroaniline	0.6-167
4-Nitrophenol	0.6-333
Acenaphthene	0.6-167
Acenaphthylene	0.5-167
Aniline	30
Anthracene	0.6-167
Benzidine	0.4
Benzo(a)anthracene	0.5-167
Benzo(a)pyrene	0.7-167
Benzo(b)fluoranthene	0.9-167
Benzo(g,h,i)perylene	1.6-167
Benzo(k)fluoranthene	0.8-167
Benzoic Acid	0.5-333
Benzyl Alcohol	0.6-167
Bis(2-chloroethoxy) methane	0.3-167
Bis(2-chloroethyl) ether	0.6-167
Bis(2-chloroisopropyl) ether	0.6-167
Bis(2-ethylhexyl)phthalate	0.6-250
Butylbenzylphthalate	0.5-250

Refer to footnotes at end of table.

Table 8.4.4-10 (Concluded)
Summary of Semivolatile Organic Compound Analytical Detection Limits
Used for SWMU 61A Soil Sampling, January 1997 and March 1998

Analyte	MDL (µg/kg)
Carbazole	30
Chrysene	0.5-167
Dibenzo(a,h)anthracene	1.8-167
Dibenzofuran	0.5-167
Diethylphthalate	0.7-250
Dimethylphthalate	0.5-250
Di-n-butylphthalate	0.5-250
Di-n-octylphthalate	0.6-250
Fluoranthene	0.6-167
Fluorene	0.7-167
Hexachlorobenzene	0.5-167
Hexachlorobutadiene	0.5-167
Hexachlorocyclopentadiene	2.0-167
Hexachloroethane	0.8-167
Indeno(1,2,3-cd)pyrene	1.7-167
Isophorone	0.5-167
Naphthalene	0.5-167
Nitrobenzene	0.5-167
N-Nitroso-di-n-propylamine	0.7-167
N-Nitrosodiphenylamine	0.6-167
Pentachlorophenol	2.3-167
Phenanthrene	0.6-167
Phenol	0.5-167
Pyrene	0.6-167

µg/kg = Microgram(s) per kilogram.

MDL = Method detection limit.

SVOC = Semivolatile organic compound.

SWMU = Solid waste management unit.

Table 8.4.4-11
Summary of SWMU 61A TCLP SVOC Analytical Detection Limits,
January 1997 and March–April 1998
(Off-Site Laboratory)

Analyte	MDL (µg/L)
1,4-Dichlorobenzene	1.3
2,4,5-Trichlorophenol	0.9–5
2,4,6-Trichlorophenol	2.3–5
2,4-Dinitrotoluene	0.5–5
2-Methylphenol	1.0–5
3-Methylphenol	3.0–5
4-Methylphenol	3.0–5
Hexachlorobenzene	0.9–5
Hexachlorobutadiene	0.9–5
Hexachloroethane	1.1–5
Nitrobenzene	1.0–5
Pentachlorophenol	3.7–5
Pyridine	1.4–5

µg/L = Microgram(s) per liter.
 MDL = Method detection limit.
 SWMU = Solid waste management unit.
 SVOC = Semivolatile organic compound.
 TCLP = Toxicity characteristic leaching procedure.

soil sample. For silver, cadmium, selenium, and mercury, no quantified background concentration values have been established, and <1 mg/kg is listed as the "HRMB background value." This circumstance arises because the laboratory reporting limits are usually at or less than 1 mg/kg for these metals in soil. Therefore, an absolute concentration less than the reporting limit could not be established and used for maximum background concentrations. This issue is handled two different ways in this NFA proposal. For site characterization purposes, the 1 mg/kg value is used as a benchmark concentration for discussions of possible metal contamination. But for the risk screening purposes, a conservative approach is taken and the maximum metal concentration is carried through the risk assessment, even if that maximum is below the 1 mg/kg nonquantified background value.

Arsenic, barium, beryllium, cadmium, chromium, mercury, selenium, and silver concentrations in all the surface and near-surface soil samples that were collected from within the concrete block area of SWMU 61A were below the associated NMED-approved background concentration limits or NMED-approved nonquantified background values (cadmium, mercury, selenium, and silver). However, lead concentrations slightly exceeded the NMED-approved background concentration of 11.8 mg/kg in the surface soil sample from location 028 (at 19.7 mg/kg).

Table 8.4.4-7 summarizes the metals analysis results for the concrete chip samples that were collected from each of the three concrete blocks at SWMU 61A (locations 032 through 034). One concrete chip sample from each concrete block was analyzed for TAL metals. Although no benchmark metal concentrations in concrete exist for comparison, variability of the sample results is apparent in the concentrations of antimony, arsenic, chromium, cobalt, copper, lead, potassium, and zinc. However, Table 8.4.4-8 summarizes the TCLP metals analysis results for the concrete chip samples, and no metals were extractable at concentrations that would trigger a RCRA characteristic hazardous waste designation of the concrete blocks.

Radionuclides

Table 8.4.4-3 summarizes the gamma spectroscopy analysis results for surface and near-surface soil samples from the four locations surrounding the concrete block area and the concrete chip samples from each of the three concrete blocks (at locations 028 through 034). Annex 8-B contains complete results for the gamma spectroscopy analyses of concrete block area soil and concrete samples. The concrete block area samples analyzed using gamma spectroscopy consisted of four surface and four near-surface soil samples, three concrete chip samples, and one duplicate surface soil sample. Table 8.4.4-3 presents NMED-approved background radionuclides activities, but it should be noted that Coyote Test Field background activities for uranium-238, thorium-232, and cesium-137 have not been established, and NMED-approved Southwest Test Area background activities are used for comparison purposes. In addition, no background comparisons are applicable to the concrete chip samples (from locations 032, 033, and 034).

The gamma spectroscopy results for the concrete block area soil samples show that uranium-238 and uranium-235 were either not detected above the MDA or not detected above background. However, the MDA associated with no-detection results for uranium-238 and uranium-235 exceed the associated NMED-approved background activities in most instances. As a result, no comparison to the NMED-approved background activities for uranium-238 and uranium-235 is applicable. The gamma activity from thorium-232 did not exceed the NMED-approved background activity of 1.01 pCi/g in the soil samples collected from concrete block

area of SWMU 61A. The gamma activity from cesium-137 exceeded the NMED-approved subsurface background activity (0.079 pCi/g) in the majority of soil samples collected at the concrete block area of SWMU 61A. The cesium-137 activities above background in soil ranged from 1.10E-01 to 6.00E-01 pCi/g. The lower cesium-137 subsurface background activity (0.079 pCi/g) is used for a benchmark for comparison to be consistent with current SNL/NM risk screening assessment methodology.

Although no benchmark gamma activities in concrete exist for comparison to the concrete chip sample results, the gamma activities vary little among the three samples. In addition, gamma activities in the concrete chip samples are not elevated relative to the gamma activities in the soil samples.

Table 8.4.4-4 summarizes the gross alpha and gross beta analysis results for surface and near-surface soil samples collected from the four locations surrounding the concrete block area and the concrete chip samples collected from each of the three concrete blocks (locations 028 through 034). The results indicate surface and near-surface soil activities ranged from 9.02 to 15.0 pCi/g for gross alpha and from 27.1 to 48.3 pCi/g for gross beta. Gross alpha and gross beta analytical results were all within the same order-of-magnitude range as the site-specific background soil activities of 9.91 to 19.8 pCi/g for gross alpha and 21.9 to 33.6 pCi/g for gross beta (see Section 8.4.4.4.1).

As for gamma spectroscopy, no benchmark gross alpha and gross beta activities in concrete exist for comparison to the concrete chip sample results. However, minimal variability in the results is obtained for the three concrete chip samples. In addition, gross alpha and gross beta activities in the concrete chip samples are lower relative to the gross alpha and gross beta activities in the soil samples.

High Explosives

Table 8.4.4-6 summarizes the HE analysis results for surface and near-surface soil samples collected from the four locations surrounding the concrete block area and concrete chip samples collected from each of the three concrete blocks (locations 028 through 034). The concrete block area samples analyzed for HE compounds consist of four surface and four near-surface soil samples, three concrete chip samples, and one duplicate surface soil sample. Because there are no applicable background concentrations for HE compounds in soil or concrete, any detectable concentrations of HE compounds are considered to be an indication of potential contamination.

Only one HE compound was detected in the soil samples that were collected from the concrete block area at SWMU 61A. RDX was detected in the surface soil sample (plus the duplicate) collected from location 028 (at 1,400 and 600 µg/kg, respectively) and in the near-surface soil sample collected from location 029 (at 150 J µg/kg). RDX was also detected in the surface soil sample collected from location 031, but the analytical results were qualified as nondetect during data validation (see Annex 8-C for data validation qualification details). Similarly, RDX was detected in the concrete chip samples collected from locations 032 and 033, but the analytical results were also qualified as nondetect during data validation (see Annex 8-C for data validation qualification details). No other HE compounds were detected in the samples collected from the concrete block area of SWMU 61A.

Semivolatile Organic Compounds

Table 8.4.4-9 summarizes the SVOC analysis results for the concrete chip samples collected from each of the three concrete blocks at SWMU 61A (locations 032 through 034). One concrete chip sample from each concrete block was analyzed for TAL SVOCs. Because there are no benchmark SVOC concentrations in concrete for comparison, any detectable concentrations of SVOCs are considered to be an indication of potential contamination. However, no SVOCs were detected in the concrete chip samples collected from SWMU 61A. Table 8.4.4-10 presents the MDLs used in the SVOC analysis performed on the concrete chip samples.

A TCLP SVOC analysis was also performed on the concrete chip samples. The analytical results indicated no detectable concentrations of SVOCs were extractable from the samples. Table 8.4.4-11 presents the MDLs used in the TCLP SVOC analysis performed on the concrete chip samples.

8.4.4.4.6 Remediated Pit Soil Samples

In March and April 1998, four subsurface soil samples were collected from a pit discovered at SWMU 61A during the radiological VCM conducted at OU 1334 (61AE47) (see Section 8.4.4.2.1). Although the pit was backfilled following remediation, subsurface samples were collected from two geoprobe boreholes at two depth intervals (approximately 6.5 to 11 feet and 9.5 to 14 feet) to verify that no additional contamination was present. These depth intervals exceed the original excavation depth associated with remediating area source anomaly 61AE47 (see Section 8.4.4.2.1). Tables 8.4.4-2, 8.4.4-3, 8.4.4-4, and 8.4.4-6 summarize metal, radionuclide, and HE analytical results for the subsurface soil samples. Figure 8.4.4-3 shows the sample locations, which are identified only by the sample number specified within the ER Sample ID name.

For silver, cadmium, selenium, and mercury, no quantified background concentration values have been established, and <1 mg/kg is listed as the "HRMB background value." This circumstance arises because the laboratory reporting limits are usually at or less than 1 mg/kg for these metals in soil. Therefore, an absolute concentration less than the reporting limit could not be established and used for maximum background concentrations. This issue is handled two different ways in this NFA proposal. For site characterization purposes, the 1 mg/kg value is used as a benchmark concentration for discussions of possible metal contamination. But for the risk screening purposes, a conservative approach is taken and the maximum metal concentration is carried through the risk assessment, even if that maximum is below the 1 mg/kg nonquantified background value. This section discusses these results.

Metals

Table 8.4.4-2 summarizes the metals analysis results for subsurface soil samples collected from the previously remediated pit at SWMU 61A (locations 035 and 036). The pit samples analyzed for metals consist of four subsurface soil samples. Analytical results indicate that arsenic, beryllium, cadmium, chromium, lead, mercury, selenium, and silver concentrations in the four subsurface soil samples collected are below the associated NMED-approved background concentration limits or the NMED-approved nonquantified background values (cadmium,

mercury, selenium, and silver). However, barium concentrations slightly exceeded the NMED-approved background concentration of 130 mg/kg in the subsurface soil sample from location 035 at a depth interval of 6.5 to 9.5 feet bgs (at 137 mg/kg).

Radionuclides

Table 8.4.4-3 summarizes the gamma spectroscopy analysis results for subsurface soil samples collected from the previously remediated pit at SWMU 61A (locations 035 through 036). Annex 8-B contains complete results for the gamma spectroscopy analyses of subsurface soil samples collected from the pit. The pit area samples analyzed using gamma spectroscopy consist of four subsurface soil samples. Table 8.4.4-3 presents NMED-approved background radionuclides activities, but it should be noted that Coyote Test Field background activities for uranium-238, thorium-232, and cesium-137 have not been established and NMED-approved Southwest Test Area background activities are used for comparison purposes.

Gamma spectroscopy results for the pit area samples show that uranium-238 exceeded the NMED-approved background activity of 1.4 pCi/g in the subsurface soil sample from location 036 at a depth interval of 7 to 11 feet bgs (at 3.65E+00 pCi/g). Gamma activity from uranium-238 in the remaining subsurface samples was not detectable. Gamma activity from uranium-235 was not detectable in any of the subsurface samples collected from the pit. However, the MDA associated with no-detection results for uranium-238 and uranium-235 exceeded the associated NMED-approved background activities in all instances. As a result, no comparison to the NMED-approved background activities for uranium-238 and uranium-235 for those samples is applicable. The gamma activity from thorium-232 did not exceed the NMED-approved background activity of 1.01 pCi/g in the subsurface soil samples collected from the pit. Similarly, gamma activity from cesium-137 also did not exceed the NMED-approved subsurface background activity of 0.079 pCi/g in the subsurface soil samples collected from the pit.

Table 8.4.4-4 summarizes the gross alpha and gross beta analysis results for subsurface soil samples collected from the previously remediated pit at SWMU 61A (locations 035 through 036). The results indicate that subsurface soil activities ranged from 4.10 to 22.0 pCi/g for gross alpha and from 27.8 to 43.1 pCi/g for gross beta. No site-specific background gross alpha and gross beta activities were developed for subsurface soil at SWMU 61A. However, the subsurface gross alpha and gross beta analytical results were all within the same order-of-magnitude range as the site-specific background surface and near-surface soil activities of 9.91 to 19.8 pCi/g for gross alpha and 21.9 to 33.6 pCi/g for gross beta (see Section 8.4.4.4.1).

High Explosives

Table 8.4.4-6 summarizes the HE analysis results for subsurface soil samples collected from the previously remediated pit at SWMU 61A (locations 035 through 036). The pit area samples analyzed for HE compounds consist of four subsurface soil samples. Because there are no applicable background concentrations for HE compounds in soil, any detectable concentrations of HE compounds are considered to be an indication of potential contamination. However, no HE compounds were detected in the subsurface soils that were collected from the pit.

8.4.4.4.7 Debris Mound Samples

In January 1997, judgmental debris samples and underlying soil samples were collected from three locations in each of the two debris mounds at SWMU 61A. Tables 8.4.4-2 through 8.4.4-6, and Tables 8.4.4-8 through 8.4.4-16 summarize metal, radionuclide, HE, SVOC, and VOC analytical results for the debris mound samples. Figure 8.4.4-3 shows the sample locations, which are identified only by the sample number specified within the ER Sample ID name.

For silver, cadmium, selenium, and mercury, no quantified background concentration values have been established, and <1 mg/kg is listed as the "HRMB background value." This circumstance arises because the laboratory reporting limits are usually at or less than 1 mg/kg for these metals in soil. Therefore, an absolute concentration less than the reporting limit could not be established and used for maximum background concentrations. This issue is handled two different ways in this NFA proposal. For site characterization purposes, the 1 mg/kg value is used as a benchmark concentration for discussions of possible metal contamination. But for the risk screening purposes, a conservative approach is taken and the maximum metal concentration is carried through the risk assessment, even if that maximum is below the 1 mg/kg nonquantified background value. This section discusses these results.

Metals

Table 8.4.4-2 summarizes the metals analysis results for debris and underlying soil samples collected from the three locations in each of the two debris mounds at SWMU 61A (locations 094 through 099). The debris mound samples that were analyzed for metals consisted of six debris samples, six surface soil samples, one duplicate debris sample, one duplicate surface soil samples, and two split debris samples. Although no benchmark metal concentrations for debris exist, the debris sample results will be compared to background soil concentrations because of the high soil content in each debris sample that was collected.

Barium concentrations exceeded the NMED-approved background concentration limit of 130 mg/kg in the underlying soil sample from location 097 (at 160 mg/kg). No other metals were detected in the underlying soils above the background concentration limits. Cadmium concentrations exceeded the NMED-approved nonquantified background values limit of <1 mg/kg in the debris samples from locations 094 (split sample only), 095, and 098 (split sample only) (at 1.74, 6.5, and 1.38 mg/kg, respectively). However, cadmium was not detected above NMED-approved nonquantified background value in the debris samples from locations 094 and 098 (including the duplicate) that were analyzed on site. Lead concentrations exceeded the NMED-approved background concentration limit of 11.8 mg/kg in the debris samples from locations 094 (including the split), 095, 096, 098 (duplicate only), and 099 (at 120, 57.9, 17, 150, 24, and 12 mg/kg, respectively). However, lead was not detected above the background concentration limit in the debris samples from location 098 (including the duplicate) that were analyzed on site.

Table 8.4.4-8 summarizes the TCLP metals analysis results for the debris samples, and no metals were extractable at concentrations that would trigger a RCRA characteristic hazardous waste designation of the debris material in either mound at SWMU 61A.

Table 8.4.4-12
Summary of SWMU 61A Confirmatory Sampling Tritium
Analytical Results, January 1997
(Off-Site Laboratory)

Sample Attributes			Activity (pCi/L)	Activity (pCi/g)	
Record Number ^a	ER Sample ID ^b (Figure 8.4.4-3)	Sample Depth (ft)	Tritium (EPA 906.0) ^c		
			Result	Error ^d	Result ^e
Debris Mound Samples					
06127	CCTA-61A-GR-094-D Debris Mound 1	NA	1570	157	0.09
06127	CCTA-61A-GR-095-D Debris Mound 1	NA	1840	168	0.12
06127	CCTA-61A-GR-096-D Debris Mound 1	NA	1230	131	0.08
06127	CCTA-61A-GR-097-D Debris Mound 2	NA	920	114	0.06
06127	CCTA-61A-GR-098-D Debris Mound 2	NA	1520	149	0.10
06127	CCTA-61A-GR-098-D (duplicate) Debris Mound 2	NA	1570	150	0.10
06127	CCTA-61A-GR-099-D Debris Mound 2	NA	1070	140	0.07
Quality Assurance/Quality Control Sample					
06127	CCTA-61A-GR-000-EB	NA	ND (201)	--	NA

^aAnalysis request/chain of custody.

^bBold portion of the ER Sample ID corresponds to the sample location specified in Figure 8.4.4-3.

^cEPA November 1986.

^dTwo standard deviations about the mean detected activity.

^eActivity in pCi/L converted to pCi/g assuming a soil density of 1.5 g per cubic centimeter, a sample mass of 500 g, and the percent moisture as determined by the analytical laboratory.

CCTA = Central Coyote Test Area.

D = Debris sample

ft = Foot (feet).

ER = Environmental Restoration.

GR = Grab sample.

ID = Identification.

NA = Not applicable.

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

pCi/g = Picocurie(s) per gram.

pCi/L = Picocurie(s) per liter.

SWMU = Solid waste management unit.

EB = Equipment blank.

-- = Error not calculated for nondetectable results.

Table 8.4.4-13
Summary of SWMU 61A Confirmatory Sampling VOC Analytical Results, Debris Mounds,
January 1997

Sample Attributes			VOCs (EPA Method 8260A) ^a (µg/kg)		
Record Number ^b	ER Sample ID ^c (Figure 8.4.4-3)	Sample Depth (ft)	Acetone	Methylene Chloride	Toluene
Debris Mound Samples					
06128	CCTA-61A-GR-094-D Debris Mound 1	NA	ND(5)	ND(1)	1.1 J (4) ^d
06127	CCTA-61A-GR-094-D (off-site laboratory) Debris Mound 1	NA	ND(2)	ND(1)	ND(1)
06128	CCTA-61A-GR-094-0-0.5-S Debris Mound 1	0-0.5	ND(5)	ND(1)	ND(1)
06128	CCTA-61A-GR-095-D Debris Mound 1	NA	ND(5)	ND(1)	ND(1)
06128	CCTA-61A-GR-095-0-0.5-S Debris Mound 1	0-0.5	ND(5)	ND(1)	ND(1)
06128	CCTA-61A-GR-096-D Debris Mound 1	NA	ND(5)	ND(1)	ND(1)
06128	CCTA-61A-GR-096-0-0.5-S Debris Mound 1	0-0.5	ND(5)	ND(1)	ND(1)
06128	CCTA-61A-GR-097-D Debris Mound 2	NA	7.5 J (20) U	ND(1)	ND(1)
06128	CCTA-61A-GR-097-0-0.5-S Debris Mound 2	0-0.5	ND(5)	ND(1)	ND(1)
06128	CCTA-61A-GR-098-D Debris Mound 2	NA	ND(5)	ND(1)	ND(1)
06128	CCTA-61A-GR-098-D (duplicate) Debris Mound 2	NA	ND(5)	ND(1)	ND(1)
06127	CCTA-61A-GR-098-D (off-site laboratory) Debris Mound 2	NA	ND(2)	5.63 U	ND(1)
06128	CCTA-61A-GR-098-0-0.5-S Debris Mound 2	0-0.5	ND(5)	ND(1)	ND(1)
06128	CCTA-61A-GR-098-0-0.5-S (duplicate) Debris Mound 2	0-0.5	ND(5)	ND(1)	ND(1)
06128	CCTA-61A-GR-099-D Debris Mound 2	NA	ND(5)	ND(1)	ND(1)
06128	CCTA-61A-GR-099-0-0.5-S Debris Mound 2	0-0.5	ND(5)	ND(1)	2.5 J (4)
Quality Assurance/Quality Control Samples (all in µg/L)					
06128	CCTA-61A-GR-000-TB	NA	ND(5)	ND(1)	ND(0.5)
06128	CCTA-61A-GR-000-EB	NA	6.6 J (20)	ND(1)	ND(0.5)
06127	CCTA-61A-GR-000-TB (off-site laboratory)	NA	224 J (1000)	3930	ND(1)
06127	CCTA-61A-GR-000-EB (off-site laboratory)	NA	2.85 J (10.0)	ND(1)	ND(1)

^aEPA November 1986.

^bAnalysis request/chain of custody record.

^cBold portion of the ER Sample ID corresponds to the sample location specified in Figure 8.4.4-3.

^dValues in bold represent detected VOCs.

CCTA = Central Coyote Test Area.
D = Debris sample.
EB = Equipment blank.
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 method detection limit (MDL) but is less than the practical quantitation limit for on-site laboratory analyses or the contract required detection limit for off-site laboratory analyses, shown in parenthesis.

µg/kg = Microgram(s) per kilogram.

µg/L = Microgram(s) per liter.

NA = Not applicable.

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

TB = Trip blank.

S = Soil sample.

SWMU = Solid waste management unit.

U = Analytical result was qualified as a nondetect due to blank contamination.

VOC = Volatile organic compound.

Table 8.4.4-14
Summary of VOC Analytical Detection Limits
Used for SWMU 61A Grid Soil Sampling, January 1997

Analyte	MDL (µg/kg)
Acetone	2-5
Benzene	1
Bromoform	1-5
Bromomethane	1
2-Butanone	2-5
Carbon Disulfide	2-5
Carbon Tetrachloride	1
Chlorobenzene	1
Chlorodibromomethane	1
Chloroethane	1
Chloroform	1
Chloromethane	1
Dichlorobromomethane	1
1,1 -Dichloroethane	1
1,2 -Dichloroethane	1
1,1 -Dichloroethene	1-5
Cis-1,2-Dichloroethene	1
Trans-1,2-Dichloroethene	1
1,2-Dichloropropane	1
Cis-1,3-Dichloropropene	1
Trans-1,3-Dichloropropene	1
Ethylbenzene	1
2-Hexanone	2-5
4-Methyl-2-pentanone	2-5
Methylene Chloride	1
Styrene	1
1,1,2,2-Tetrachloroethane	1
Tetrachloroethene	1
Toluene	1
1,1,1-Trichloroethane	1
1,1,2-Trichloroethane	1
Trichloroethene	1
Vinyl Acetate	2
Vinyl Chloride	1-5
O-Xylene	1
P/M-Xylene	2
Xylenes (total)	3

MDL = Method detection limit.
µg/kg = Microgram(s) per kilogram.
SWMU = Solid waste management unit.
VOC = Volatile organic compound.

Table 8.4.4-15
Summary of SWMU 61A Confirmatory Sampling TCLP VOC Analytical Results, Debris Mounds,
January 1997
(Off-Site Laboratory)

Sample Attributes			TCLP VOC (EPA Method 1311/8260) ^a (µg/L)
Record Number ^b	ER Sample ID ^c (Figure 8.4.4-3)	Sample Depth (ft)	Benzene
Debris Mound Samples			
06127	CCTA-61A-GR- 094 -D Debris Mound 1	NA	ND (1)
06127	CCTA-61A-GR- 095 -D Debris Mound 1	NA	ND (1)
06127	CCTA-61A-GR- 096 -D Debris Mound 1	NA	ND (1)
06127	CCTA-61A-GR- 097 -D Debris Mound 2	NA	ND (1)
06127	CCTA-61A-GR- 098 -D Debris Mound 2	NA	ND (1)
06127	CCTA-61A-GR- 098 -D (duplicate) Debris Mound 2	NA	ND (1)
06127	CCTA-61A-GR- 099 -D Debris Mound 2	NA	34.0
Maximum Concentration of Contaminants for the Toxicity Characteristic ^d			500 ^e

^aEPA November 1986.

^bAnalysis request/chain of custody record.

^cBold portion of the ER Sample ID corresponds to the sample location specified in Figure 8.4.4-3.

^d40 CFR Part 261.24.

^eReported value was converted from 0.5 milligram per liter (mg/L) to 500 µg/L.

CCTA = Central Coyote Test Area
 D = Debris sample.
 EPA = U.S. Environmental Protection Agency.
 ER = Environmental Restoration.
 ft = Foot (feet).
 GR = Grab sample.
 ID = Identification.
 MDL = Method detection limit.
 µg/L = Microgram(s) per liter.
 NA = Not applicable.
 ND () = Not detected above the MDL, shown in parenthesis.
 SWMU = Solid waste management unit.
 TCLP = Toxicity characteristic leaching procedure.
 VOC = Volatile organic compound.

Table 8.4.4-16
Summary of SWMU 61A TCLP VOC Analytical Detection Limits,
January 1997
(Off-Site Laboratory)

Analyte	MDL (µg/L)
1,1-Dichloroethylene	1
1,2-Dichloroethane	1
1,4-Dichlorobenzene	1
2-Butanone	2
Benzene	1
Carbon Tetrachloride	1
Chlorobenzene	1
Chloroform	1
Tetrachloroethylene	1
Trichloroethylene	1
Vinyl chloride	1

MDL = Method detection limit.
µg/L = Microgram(s) per liter.
SWMU = Solid waste management unit.
TCLP = Toxicity characteristic leaching procedure.
VOC = Volatile organic compound.

Radionuclides

Table 8.4.4-3 summarizes the gamma spectroscopy analysis results for debris and underlying soil samples from the three locations in each of the two debris mounds at SWMU 61A (locations 094 through 099). Annex 8-B contains complete results for the gamma spectroscopy analyses of debris and underlying soil samples. The Debris Mound samples analyzed using gamma spectroscopy consisted of six debris samples, six underlying soil samples, one duplicate debris sample, one duplicate underlying soil sample, and two split debris samples. Table 8.4.4-4 presents NMED-approved background radionuclides activities, but it should be noted that Coyote Test Field background activities for uranium-238, thorium-232, and cesium-137 have not been established, and NMED-approved Southwest Test Area background activities are used for comparison purposes. Similar to the discussion for metals presented above, the debris sample results will be compared to background soil activities because of the high soil content in each debris sample that was collected.

The gamma spectroscopy results for the underlying soil samples show that uranium-238 and uranium-235 were not detected above the MDAs. However, the MDAs associated with no-detection results for uranium-238 and uranium-235 exceeded the associated NMED-approved background activities in most instances. As a result, no comparison to the NMED-approved background activities for uranium-238 and uranium-235 in the underlying soil samples is applicable. The gamma activity from thorium-232 did not exceed the NMED-approved background activity of 1.01 pCi/g in the underlying soil samples that were collected from either debris mound. The gamma activity from cesium-137 exceeded the NMED-approved 0.079 pCi/g background activity in only one underlying soil sample from location 099 (at 1.96E-01).

The gamma spectroscopy results for the debris samples show that uranium-238 slightly exceeded the NMED-approved background activity of 1.4 pCi/g at location 098 (split sample only) (at 1.43 pCi/g). However, the debris sample (plus the duplicate) collected from location 098 and analyzed on site did not exceed the background limit for uranium-238. Gamma activity from uranium-238 was either not detected above the MDA or not detected above background in the remaining debris samples. Gamma activity from uranium-235 was either not detected above the MDA or not detected above the background activity limit in all the debris samples. However, the MDAs associated with no-detection results for uranium-238 and uranium-235 exceeded the associated NMED-approved background activities in most instances. As a result, comparison to the NMED-approved background activities for uranium-238 and uranium-235 is not applicable in such instances. The gamma activity from thorium-232 did not exceed the NMED-approved background activity of 1.01 pCi/g in the debris samples collected from either mound. The gamma activity from cesium-137 exceeded the NMED-approved subsurface background activity of 0.079 pCi/g in all the debris samples collected, except from location 095, where cesium-137 was not detected with an MDA of 2.53E-02 pCi/g. The lower cesium-137 subsurface background activity is used as a benchmark for comparison to be consistent with the current SNL/NM risk screening assessment methodology.

Table 8.4.4-4 summarizes the gross alpha and gross beta analysis results for debris samples collected from the three locations at each debris mound (locations 094 through 099). The Debris Mound samples that were analyzed for gross alpha and gross beta consist of six debris samples and one duplicate debris sample. Underlying soil samples were not analyzed for gross alpha and gross beta activity.

The results indicate that debris sample activities ranged from 8.46 to 39.0 pCi/g for gross alpha and from 22.2 to 35.7 pCi/g for gross beta. As for gamma spectroscopy, gross alpha and gross beta results for the debris samples will be compared to background soil activities because of the high soil content in each debris sample that was collected. As a result, gross alpha and gross beta analytical results for the debris samples were all within the same order-of-magnitude range as the site-specific background soil activities of 13.2 to 19.8 pCi/g for gross alpha and 21.9 to 33.6 pCi/g for gross beta (see Section 8.4.4.4.1).

Table 8.4.4-5 summarizes the isotopic uranium and thorium analysis results for debris and underlying soil samples from the three locations at each debris mound (locations 094 through 099). The debris mound samples that were analyzed for isotopic uranium and thorium consist of six debris samples, six underlying soil samples, one duplicate debris sample, and one duplicate underlying soil sample. Although thorium-228 and thorium-230 were detected using isotopic analysis, no NMED-approved background activities are established for these isotopes. Thorium-228 activity ranged from 0.661 to 1.45 pCi/g in the underlying soil and from 0.705 to 1.77 pCi/g in the debris. Thorium-230 activity ranged from 0.507 to 1.44 pCi/g in the underlying soil and from 0.576 to 2.20 pCi/g in the debris.

Thorium-232 activity slightly exceeded the NMED-approved 1.01 pCi/g background activity in the underlying soil samples from locations 096, 097, and 099 (at 1.18, 1.06, and 1.06 pCi/g, respectively). Thorium-232 activity exceeded the NMED-approved background activity limit in the debris sample from location 098 (at 1.30 pCi/g) but not in the duplicate debris sample from that location. No uranium isotope activities were detected above the corresponding NMED-approved background activities in the underlying soil or debris samples.

Table 8.4.4-12 summarizes the tritium analysis results for debris samples collected from three locations at each debris mound (locations 094 through 099). Tritium was detected in each debris sample ranging from 920 pCi/L to 1,840 pCi/L. Assuming a constant sample volume and density and using the sample moisture content determined at the laboratory, tritium activity in pCi/g ranged from 0.06 to 0.12.

High Explosives

Table 8.4.4-6 summarizes the HE analysis results for debris and underlying soil samples collected from three locations at each debris mound (locations 094 through 099). The debris and underlying soil samples that were analyzed for HE compounds consist of six debris samples, six underlying soil samples, one duplicate debris sample, one duplicate underlying soil sample, and two split debris samples. Because there are no applicable background concentrations for HE compounds in soil or debris, any detectable concentrations of HE compounds are considered to be an indication of potential contamination.

Only one HE compound was detected in the samples collected from the debris mounds at SWMU 61A. HMX was detected in the debris sample split collected from location 094 (at 2,960 µg/kg) and the underlying soil sample from location 094 (at 220 µg/kg). However, HMX was not detected in the debris sample from location 094 that was analyzed on site. No other HE compounds were detected in the debris or underlying soil samples.

Semivolatile Organic Compounds

Table 8.4.4-9 summarizes the SVOC analysis results for debris and underlying soil samples collected from three locations at each debris mound (locations 094 through 099). The debris and underlying soil samples analyzed for SVOCs consist of six debris samples, six underlying soil samples, one duplicate debris sample, one duplicate underlying soil sample, two split debris samples, and one split underlying soil sample. Because there are no background SVOC concentrations in soil or benchmark SVOC concentrations in debris for comparison, any detectable concentrations of SVOCs are considered to be an indication of potential contamination.

Bis(2-ethylhexyl)phthalate, 2,4-dinitrotoluene, and pentachlorophenol were the only SVOCs detected in the debris samples from the debris mounds at SWMU 61A. Bis(2-ethylhexyl)phthalate was detected in debris samples from locations 094 (split sample only), 095, and 098 (duplicate sample only) (at 272 J, 260 J, and 440 J $\mu\text{g/kg}$, respectively). 2,4-dinitrotoluene was detected in the debris sample duplicate from location 098 (at 34 J $\mu\text{g/kg}$) but not detected in the corresponding primary sample or split sample from the same location. Pentachlorophenol was detected in the debris sample from location 095 (at 58 J $\mu\text{g/kg}$). No other SVOCs were detected in the debris samples.

Bis(2-ethylhexyl)phthalate and pentachlorophenol were the only SVOCs detected in the underlying soil samples from Debris Mound 2 at SWMU 61A. Bis(2-ethylhexyl)phthalate was detected in the underlying soil sample from location 098 (at 290 J $\mu\text{g/kg}$) but not in the sample duplicate or split from the same location. Pentachlorophenol was detected in the underlying soil sample from location 097 (at 230 $\mu\text{g/kg}$). No other SVOCs were detected in the underlying soil samples from Debris Mound 2. No SVOCs were detected in the underlying soil samples from Debris Mound 1.

Table 8.4.4-10 presents the MDLs that were used in the SVOC analysis performed on the debris and underlying soil samples.

A TCLP SVOC analysis was also performed on the debris samples. The analytical results indicated that no detected concentrations of SVOCs were extractable from the samples. Table 8.4.4-11 presents the MDLs used in the TCLP SVOC analysis that were performed on the debris.

Volatile Organic Compounds

Table 8.4.4-13 summarizes the VOC analysis results for debris and underlying soil samples collected from three locations at each debris mound (locations 094 through 099). The debris and underlying soil samples that were analyzed for VOCs consisted of six debris samples, six underlying soil samples, one duplicate debris sample, one duplicate underlying soil sample, and two split debris samples. Because there are no background VOC concentrations in soil or benchmark VOC concentrations in debris for comparison, any detected concentrations of VOCs are considered to be an indication of potential contamination.

Toluene was the only VOC detected in the debris samples from the debris mounds at SWMU 61A. Toluene was detected in the debris sample from location 094 (Debris Mound 1)

(at 1.1 J µg/kg) but was not detected in the corresponding split sample from the same location. No other VOCs were detected in the debris samples.

Toluene was the only VOC detected in the underlying soil samples from the Debris Mound 2 at SWMU 61A. Toluene was detected in the underlying soil sample from location 099 (at 2.5 J µg/kg).

Table 8.4.4-14 presents the MDLs used in the VOC analysis that was performed on the debris and underlying soil samples.

A TCLP VOC analysis was also performed on the debris samples. Table 8.4.4-15 summarizes the TCLP VOC analysis results for debris samples collected from three locations at each debris mound (locations 094 through 099). The debris samples that were analyzed for TCLP VOCs consisted of six debris samples and one duplicate debris sample. Benzene was the only VOC detected in the TCLP analysis. The analytical results indicate benzene was detected in only one debris sample collected from location 099 (at 34.0 µg/L). No other VOCs were extractable from the samples. Table 8.4.4-16 presents the MDLs used in the TCLP VOC analysis that was performed on the debris samples.

8.4.4.4.8 *Quality Assurance/Quality Control Results*

This section describes of the data quality assessment results for the soil sample analyses.

Metals

Table 8.4.4-2 presents results of the analysis for metals QA/QC samples that were collected during the confirmatory sampling program at SWMU 61A. The QA/QC samples that were collected consisted of five equipment blanks. All five QA/QC samples were analyzed off site for metals. Concentrations of barium were detected in equipment blank sample CCTA-61A-000-EB for analysis request/chain-of-custody (AR/COC) records 510093 and 06127. Similarly, concentrations of cadmium and chromium were detected in the equipment blank sample CCTA-61A-000-EB for AR/COC record 06127. Detectable concentrations of lead were reported in all five equipment blank samples. Concentrations of selenium were also detected in the equipment blank sample CCTA-61A-000-EB for AR/COC record 510196.

To assess the precision of sampling procedures, eight samples were collected and analyzed for metals in replicate either off site or on site. Table 8.4.4-17 presents relative percent differences (RPD) that were calculated from the data. Because of the number of no-detection results, RPDs could not be calculated for all metals in all sample pairs. RPDs for arsenic ranged from 7.8 to 22.2 percent, with the exception of the sample pair from location 004 (which was 96.5 percent) and location 098 (which was not calculated). RPDs for barium ranged from 1.9 to 24.1 percent, with the exception of the sample pair from location 024 (which was 49.5 percent). RPDs for beryllium were 30.6 and 17.6 percent for the sample pairs from locations 019 and 098, respectively. However, RPDs for beryllium could not be calculated for the other six sample pairs. RPDs for cadmium ranged from 14.8 to 27.4 percent, with the exception of the sample pairs from locations 016, 024, 028, and 098 (which were not calculated). RPDs for chromium ranged from 1.9 to 17.7 percent, with the exception of the sample pair from location 024 (which was 51.7 percent). RPDs for lead ranged from 0.7 to 194.1 percent. RPDs for lead were below

Table 8.4.4-17
Summary of SWMU 61A RCRA Metals Relative Percent Difference Results, January 1997 and March–April 1998

Sample Attributes			Relative Percent Difference								
Record Number ^a	ER Sample ID (Figure 8.4.4-3)	Sample Depth (ft)	Arsenic	Barium	Beryllium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver
510093	CCTA-61A-GR- 004 -0-0.5-S CCTA-61A-GR- 004 -0-0.5-DU (off-site laboratory)	0-0.5	96.5	4.5	NC	22.4	17.7	7.3	NC	NC	11.8
510191	CCTA-61A-GR- 007 -0-0.5-S CCTA-61A-GR- 007 -0-0.5-DU (off-site laboratory)	0-0.5	7.8	1.9	NC	14.8	2.9	32.7	NC	NC	NC
510192	CCTA-61A-GR- 016 -0-0.5-S CCTA-61A-GR- 016 -0-0.5-DU (off-site laboratory)	0-0.5	12.4	17.4	NC	NC	9.6	141.9	NC	NC	NC
510198	CCTA-61A-GR- 019 -0-0.5-S CCTA-61A-GR- 019 -0-0.5-DU (off-site laboratory)	0-0.5	16.6	2.9	30.6	27.4	12.2	40.7	16.4	NC	NC
510198	CCTA-61A-GR- 024 -0-0.5-S CCTA-61A-GR- 024 -0-0.5-DU (off-site laboratory)	0-0.5	22.2	49.5	NC	NC	51.7	40.7	NC	NC	NC
510198	CCTA-61A-GR- 027 -0-0.5-S CCTA-61A-GR- 027 -0-0.5-DU (off-site laboratory)	0.5-1	16.0	24.1	NC	22.0	8.1	0.7	NC	NC	NC
510195	CCTA-61A-GR- 028 -0-0.5-S CCTA-61A-GR- 028 -0-0.5-DU (off-site laboratory)	0-0.5	15.4	2.8	NC	NC	1.9	194.1	NC	NC	NC
06128	CCTA-61A-GR- 098 -D CCTA-61A-GR- 098 -D (on-site laboratory)	NA	NC	20.2	17.6	NC	3.3	74.3	NC	NC	NC

^aAnalysis request/chain of custody.

^bBold portion of the ER Sample ID corresponds to the sample location specified in Figure 8.4.4-3.

CCTA = Central Coyote Test Area.

D = Debris.

DU = Duplicate sample.

ER = Environmental Restoration.

ft = Foot (feet).

GR = Grab sample.

ID = Identification.

NA = Not applicable.

NC = Not calculated for estimated values or nondetected results.

S = Soil sample.

SWMU = Solid waste management unit.

25 percent in only two sample pairs. Only one sample pair had detectable and nonestimated mercury concentrations, and the corresponding RPD is 16.4 percent. No RPDs could be calculated for selenium. Only one sample pair had detectable and nonestimated silver concentrations, and the corresponding RPD is 11.8 percent. With the exception of lead, the RPDs presented in Table 3.4.4-7 are typical of data for uncontaminated soil and are therefore acceptable. The high RPDs calculated for lead are likely because of the presence of lead fragments that were not evenly distributed in the sample fractions analyzed.

Two of the debris samples (from locations 094 and 098) were also split and analyzed for metals off site. Comparisons between the off- and on-site results show general agreement for arsenic, barium, beryllium, chromium, mercury, and selenium. However, cadmium was detected at notably higher levels in the off-site analyses, lead was detected at notably lower levels in the off-site analyses (in the sample from location 094 only), and silver was detected at notably lower levels in the off-site analyses.

Radionuclides

No QA/QC samples were collected for radionuclide analysis. However, nine samples were collected and analyzed in replicate on site (Table 8.4.4-3). The results obtained for the sample duplicate pairs are consistent. Two of the debris samples (from locations 094 and 098) were also split and analyzed using gamma spectroscopy off site. The results obtained in the off-site analysis are generally higher. However, comparisons are limited because of no-detection activities and dissimilar MDAs.

High Explosives

Table 8.4.4-6 presents results of the analysis for HE QA/QC samples that were collected during the confirmatory sampling program at SWMU 61A. Six equipment blank QA/QC samples were collected and analyzed for HE compounds. Five equipment blank samples were analyzed off site and one equipment blank sample was analyzed on site. Detected concentrations of 1,3,5-trinitrobenzene were reported in sample CCTA-61A-000-EB for AR/COC record 510191 that was analyzed off site; however, the result was rejected during data validation (see Annex 8-C). Concentrations of RDX were detected in samples CCTA-61A-000-EB for AR/COC records 510191 and 510093 that were analyzed off site; however, the results were rejected during data validation (see Annex 8-C). HMX was detected in samples CCTA-61A-000-EB for AR/COC records 510191, 510195, and 510196 that were analyzed off site; however, the result for AR/COC record 510191 was rejected during data validation (see Annex 8-C).

To assess the precision of soil sampling procedures, eight samples were collected and analyzed for HE compounds in replicate either off site or on site. As discussed previously, only two HE compounds were detected in samples that were collected at SWMU 61A; therefore, the majority of results for the sample pairs were nondetections or estimated values. An RPD could only be calculated for RDX in one sample pair (from location 028). The corresponding RPD for RDX is 80 percent.

Two of the debris samples (from locations 094 and 098) were also split and analyzed for HE compounds off site. Comparisons between the off- and on-site results show general agreement, with one exception. HMX was not detected in the on-site analysis of the debris

sample from location 094. However, HMX was detected at 2,960 µg/kg in the off-site analysis of the debris split sample from the same location.

Semivolatile Organic Compounds

Table 8.4.4-9 presents results of the analysis for SVOC QA/QC samples that were collected during the confirmatory sampling program at SWMU 61A. Three equipment blank QA/QC samples were collected and analyzed for SVOCs. Two samples were analyzed off site and one sample was analyzed on site. Bis(2-ethylhexyl)phthalate was detected in sample CCTA-61A-000-EB for AR/COC record 510191 that was analyzed off site. No other SVOCs were detected in the QA/QC samples that were collected during confirmatory sampling at SWMU 61A.

To assess the precision of soil sampling procedures, one debris sample and one underlying soil sample from location 098 were analyzed for SVOCs in replicate on site. However, no RPDs could be calculated for SVOC because of nondetections or estimated results.

Two of the debris samples (from locations 094 and 098) were also split and analyzed for SVOCs off site. Comparisons between the off- and on-site results show general agreement.

Volatile Organic Compounds

Table 8.4.4-13 presents results of the analysis for VOC QA/QC samples that were collected during the confirmatory sampling program at SWMU 61A. Two equipment blank and two trip blank QA/QC samples were collected and analyzed for VOCs. One equipment blank and one trip blank were analyzed off site, and one equipment blank and one trip blank were analyzed on site. Concentrations of acetone were detected in both equipment blank samples as well as in the trip blank analyzed off site. Methylene chloride was detected in the trip blank analyzed off site. No other VOCs were detected in the QA/QC samples that were collected during confirmatory sampling at SWMU 61A.

To assess the precision of soil sampling procedures, one debris sample and one underlying soil sample from location 098 were analyzed for VOCs in replicate on site. However, no RPDs could be calculated for VOC because of no-detection results.

Two of the debris samples (from locations 094 and 098) were also split and analyzed for VOCs off site. Comparisons between the off- and on-site results show general agreement. However, methylene chloride was detected in the debris split sample from location 098 but was not detected in the associated sample (plus the duplicate) that were analyzed on site.

8.4.4.4.9 Data Validation

The SNL/NM RPSD Laboratory reviewed all gamma spectroscopy results according to "Laboratory Data Review Guidelines," Procedure No. RPSD-02-11, Issue No. 2 (SNL/NM July 1996). All on-site nonradiological laboratory results were 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 1994). In addition, all off-site laboratory results were reviewed and verified/validated according to "Data Verification/Validation Level 3-DV3" in Attachment C of the Technical Operating Procedure 94-03, Rev. 0 (SNL/NM July 1994).

Annex 8-C contains off-site data validation reports. The verification/validation process confirmed that the data are acceptable for use in this NFA proposal for SWMU 61A.

8.5 Site Conceptual Model

The site conceptual model for SWMU 61A is based upon the residual COCs identified in the soil samples from the surface and near-surface of the Schoolhouse Mesa Test Site subsequent to a radiological VCM. This section summarizes the nature and extent of contamination and the environmental fate of COCs.

8.5.1 Nature and Extent of Contamination

The COCs detected at SWMU 61A are metals, radionuclides, explosives compounds, VOCs, and SVOCs that were dispersed in the shrapnel of explosives tests conducted at the site. Metal and radionuclide COCs were determined by comparing sample results to background concentrations and activities established for the Coyote Test Field Area (Dinwiddie September 1997). Any metal or radionuclide found to exceed background in any sample was considered a potential COC for the site. Because the MDAs for certain uranium-235 and uranium-238 analyses exceeded background activity limits (see Section 8.4.4.4), no-detection sample results were also considered in identifying potential COCs. As a result, the MDA was used for comparison to background. Metal COCs included arsenic, barium, beryllium, cadmium, chromium, lead, selenium, and silver. Radionuclide COCs included uranium-235, uranium-238; and HE COCs included HMX and RDX. SVOC COCs included bis(2-ethylhexyl)phthalate and pentachlorophenol, and VOC COCs included only toluene. Table 8.5.1-1 summarizes the COCs and the sample locations where metals and radionuclides exceeded background. As a result, concrete samples are not considered.

Confirmatory samples were collected from areas within SWMU 61A where potential releases to the environment could have occurred. Only the environmental (or soil) samples are considered relevant in developing the site conceptual model. Although concrete samples are not considered in the site conceptual model development, the debris samples are primarily soil and therefore are included. As a result, twelve environmental samples were collected from the soil within and underlying the two debris mounds. Twelve surface and twelve near-surface environmental samples were from within the cleared area. Five surface and five near-surface environmental samples were collected from the area where anomalous gamma activity measurements were found to be concentrated during the Phase I radiation survey. Four surface and four near-surface arroyo environmental samples were collected from the northern arroyo channel. Four surface and four near-surface environmental samples were collected from near the concrete blocks. Finally, four subsurface environmental samples were collected from the remediated pit at SWMU 61A.

Metal COCs exceeded the NMED-approved maximum background concentration limits or the NMED-approved nonquantified background values primarily in the surface and near-surface soil at the cleared area and the areas of highest measured gamma activity. Elsewhere at SWMU 61A, the metal COCs that exceeded background limits occur as isolated "hot spots" with no particular COC associations or correlation to particular locations or areas that could be delineated as contaminated. Elevated lead concentrations occurred at the majority of the sample locations within the cleared area. All other occurrences of metal COCs detected above either the quantified limits or nonquantified background levels in the cleared area were

Table 8.5.1-1
Summary of COCs for SWMU 61A

COC Type	Number of Samples	COCs Greater Than Background	Maximum Background Limit/ Coyote Test Field ^a (mg/kg except where noted)	Maximum Concentration (mg/kg except where noted)	Average Concentration ^b (mg/kg except where noted)	Sampling Locations Where Background Concentration Exceeded ^c
Metals	65 environmental; 8 duplicates 2 splits	As	5.6	20.8	2.75	CCTA-61A-GR-009-0-0.5-S CCTA-61A-GR-011-0.5-1.0-S CCTA-61A-GR-016-0.5-1.0-S CCTA-61A-GR-023-0-0.5-S
		Ba	130	160	90.3	CCTA-61A-GR-008-0.5-1.0-S CCTA-61A-GR-011-0.5-1.0-S CCTA-61A-GR-019-0-0.5-S CCTA-61A-GR-019-0-0.5-DU CCTA-61A-GR-020-0-0.5-S CCTA-61A-GR-024-0-0.5-S CCTA-61A-GR-026-0.5-1.0-S CCTA-61A-GR-035-6.5-9.5-S CCTA-61A-GR-097-0-0.5-S
		Be	0.65	0.981	0.40	CCTA-61A-GR-009-0.5-1.0-S CCTA-61A-GR-011-0-0.5-S CCTA-61A-GR-011-0.5-1.0-S CCTA-61A-GR-012-0.5-1.0-S CCTA-61A-GR-014-0.5-1.0-S CCTA-61A-GR-016-0.5-1.0-S CCTA-61A-GR-019-0-0.5-DU CCTA-61A-GR-020-0.5-1.0-S

Refer to footnotes at end of table.

Table 8.5.1-1 (Continued)
Summary of COCs for SWMU 61A

COC Type	Number of Samples	COCs Greater Than Background	Maximum Background Limit/ Coyote Test Field ^a (mg/kg except where noted)	Maximum Concentration (mg/kg except where noted)	Average Concentration ^b (mg/kg except where noted)	Sampling Locations Where Background Concentration Exceeded ^c
Metals (continued)		Cd	<1	6.5	0.74	CCTA-61A-GR-009-0-0.5-S CCTA-61A-GR-014-0-0.5-S CCTA-61A-GR-017-0-0.5-S CCTA-61A-GR-018-0.5-1.0-S CCTA-61A-GR-019-0-0.5-S CCTA-61A-GR-019-0-0.5-DU CCTA-61A-GR-019-0.5-1.0-S CCTA-61A-GR-020-0-0.5-S CCTA-61A-GR-020-0.5-1.0-S CCTA-61A-GR-021-0-0.5-S CCTA-61A-GR-021-0.5-1.0-S CCTA-61A-GR-022-0-0.5-S CCTA-61A-GR-022-0.5-1.0-S CCTA-61A-GR-023-0-0.5-S CCTA-61A-GR-023-0.5-1.0-S CCTA-61A-GR-094-D CCTA-61A-GR-095-D CCTA-61A-GR-098-D
		Cr	12.8	19.8	8.10	CCTA-61A-GR-011-0.5-1.0-S CCTA-61A-GR-014-0.5-1.0-S CCTA-61A-GR-016-0.5-1.0-S CCTA-61A-GR-019-0-0.5-S CCTA-61A-GR-019-0-0.5-DU CCTA-61A-GR-020-0.5-1.0-S

Refer to footnotes at end of table.

Table 8.5.1-1 (Continued)
Summary of COCs for SWMU 61A

COC Type	Number of Samples	COCs Greater Than Background	Maximum Background Limit/ Coyote Test Field ^a (mg/kg except where noted)	Maximum Concentration (mg/kg except where noted)	Average Concentration ^b (mg/kg except where noted)	Sampling Locations Where Background Concentration Exceeded ^c
Metals (continued)		Pb	11.8	3950	80.57	CCTA-61A-GR-007-0-0.5-S CCTA-61A-GR-007-0-0.5-DU CCTA-61A-GR-007-0.5-1.0-S CCTA-61A-GR-008-0-0.5-S CCTA-61A-GR-009-0-0.5-S CCTA-61A-GR-009-0.5-1.0-S CCTA-61A-GR-010-0-0.5-S CCTA-61A-GR-012-0.5-1.0-S CCTA-61A-GR-013-0-0.5-S CCTA-61A-GR-014-0-0.5-S CCTA-61A-GR-014-0.5-1.0-S CCTA-61A-GR-016-0-0.5-S CCTA-61A-GR-016-0-0.5-DU CCTA-61A-GR-016-0.5-1.0-S CCTA-61A-GR-017-0-0.5-S CCTA-61A-GR-017-0.5-1.0-S CCTA-61A-GR-018-0-0.5-S CCTA-61A-GR-018-0.5-1.0-S CCTA-61A-GR-028-0-0.5-S CCTA-61A-GR-094-D (plus split) CCTA-61A-GR-095-D CCTA-61A-GR-096-D CCTA-61A-GR-097-D CCTA-61A-GR-098-D (duplicate) CCTA-61A-GR-099-D
		Hg	<0.1	0.0867	0.0289	(All samples below nonquantified background value)
		Se	<1	2.80	0.17	CCTA-61A-GR-016-0.5-1.0-S CCTA-61A-GR-023-0-0.5-S
		Ag	<1	1.06	0.10	CCTA-61A-GR-019-0-0.5-DU

Refer to footnotes at end of table.

Table 8.5.1-1 (Continued)
Summary of COCs for SWMU 61A

COC Type	Number of Samples	COCs Greater Than Background	Maximum Background Limit/ Coyote Test Field ^a (mg/kg except where noted)	Maximum Concentration (mg/kg except where noted)	Average Concentration ^b (mg/kg except where noted)	Sampling Locations Where Background Concentration Exceeded ^c
Radionuclides	82 environmental; 9 duplicates 2 splits (Includes Post-VCM verification samples)	U-238	1.4 pCi/g	32 pCi/g	Not Calculated ^d	CCTA-61A-GR-019-0-0.5-S CCTA-61A-GR-019-0-0.5-DU CCTA-61A-GR-020-0-0.5-S CCTA-61A-GR-020-0.5-1.0-S CCTA-61A-GR-021-0-0.5-S CCTA-61A-GR-024-0-0.5-S CCTA-61A-GR-025-0.5-1.0-S CCTA-61A-GR-036-7-11-S Plus an additional 45 samples with nondetect results where the MDA exceeds background. Plus all Post-VCM verification sample locations (except 61AE47BSS)
		Th-232	1.01 pCi/g	1.33 pCi/g	Not Calculated ^d	61AE48SS CCTA-61A-GR-010-0.5-1.0-S CCTA-61A-GR-016-0.5-1.0-S
		U-235	0.18 pCi/g	0.848 pCi/g	Not Calculated ^d	CCTA-61A-GR-020-0-0.5-S 61AE48SS 61AE90SS 61AE20SS 61AE22BSS 61AE22CSS Plus an additional 70 samples with nondetect results where the MDA exceeds background

Refer to footnotes at end of table.

Table 8.5.1-1 (Continued)
Summary of COCs for SWMU 61A

COC Type	Number of Samples	COCs Greater Than Background	Maximum Background Limit/ Coyote Test Field ^a (mg/kg except where noted)	Maximum Concentration (mg/kg except where noted)	Average Concentration ^b (mg/kg except where noted)	Sampling Locations Where Background Concentration Exceeded ^c
Radionuclides (continued)		Cs-137	0.079 pCi/g	0.765 pCi/g	Not Calculated ^d	CCTA-61A-GR-007-0-0.5-S CCTA-61A-GR-007-0-0.5-DU CCTA-61A-GR-007-0.5-1.0-S CCTA-61A-GR-008-0-0.5-S CCTA-61A-GR-009-0-0.5-S CCTA-61A-GR-011-0-0.5-S CCTA-61A-GR-012-0-0.5-S CCTA-61A-GR-012-0.5-1.0-S CCTA-61A-GR-013-0-1.5-S CCTA-61A-GR-014-0-0.5-S CCTA-61A-GR-015-0-0.5-S CCTA-61A-GR-015-0.5-1.0-S CCTA-61A-GR-017-0-0.5-S CCTA-61A-GR-017-0.5-1.0-S CCTA-61A-GR-018-0-0.5-S CCTA-61A-GR-018-0.5-1.0-S CCTA-61A-GR-019-0-0.5-S CCTA-61A-GR-020-0-0.5-S CCTA-61A-GR-021-0-0.5-S CCTA-61A-GR-022-0-0.5-S CCTA-61A-GR-023-0-0.5-S CCTA-61A-GR-024-0-0.5-S CCTA-61A-GR-024-0-0.5-DU CCTA-61A-GR-025-0-0.5-S CCTA-61A-GR-025-0.5-1.0-S CCTA-61A-GR-026-0-0.5-S CCTA-61A-GR-027-0-0.5-S CCTA-61A-GR-027-0.5-1.0-S CCTA-61A-GR-027-0.5-1.0-DU CCTA-61A-GR-028-0-0.5-S CCTA-61A-GR-028-0-0.5-DU CCTA-61A-GR-028-0.5-1.0-S CCTA-61A-GR-029-0-0.5-S CCTA-61A-GR-029-0.5-1.0-S CCTA-61A-GR-030-0-0.5-S CCTA-61A-GR-031-0-0.5-S CCTA-61A-GR-099-0-0.5-S Plus all debris samples (except CCTA-61A-GR-095-D) 61AE1SS 61AE70SS 61AE80SS

Refer to footnotes at end of table.

Table 8.5.1-1 (Continued)
Summary of COCs for SWMU 61A

COC Type	Number of Samples	COCs Greater Than Background	Maximum Background Limit/ Coyote Test Field ^a (mg/kg except where noted)	Maximum Concentration (mg/kg except where noted)	Average Concentration ^b (mg/kg except where noted)	Sampling Locations Where Background Concentration Exceeded ^c
High Explosives	66 environmental; 8 duplicates 2 splits	RDX	NA	1400 µg/kg	96.8 µg/kg	CCTA-61A-GR-007-0.5-1.0-S CCTA-61A-GR-009-0.5-1.0-S CCTA-61A-GR-011-0.5-1.0-S CCTA-61A-GR-014-0.5-1.0-S CCTA-61A-GR-015-0.5-1.0-S CCTA-61A-GR-016-0.5-1.0-S CCTA-61A-GR-018-0.5-1.0-S CCTA-61A-GR-021-0.5-1.0-S CCTA-61A-GR-028-0.5-1.0-S CCTA-61A-GR-028-0.5-DU CCTA-61A-GR-029-0.5-1.0-S
		HMX	NA	2960 µg/kg	131.9 µg/kg	CCTA-61A-GR-007-0.5-1.0-S CCTA-61A-GR-007-0.5-1.0-DU CCTA-61A-GR-007-0.5-1.0-S CCTA-61A-GR-008-0.5-1.0-S CCTA-61A-GR-009-0.5-1.0-S CCTA-61A-GR-011-0.5-1.0-S CCTA-61A-GR-012-0.5-1.0-S CCTA-61A-GR-013-0.5-1.0-S CCTA-61A-GR-014-0.5-1.0-S CCTA-61A-GR-015-0.5-1.0-S CCTA-61A-GR-021-0.5-1.0-S CCTA-61A-GR-094-0.5-1.0-S CCTA-61A-GR-094-D (split)
Volatile Organic Compounds	12 environmental 2 duplicate 2 splits	Toluene	NA	2.5 J µg/kg	1.1 µg/kg	CCTA-61A-GR-099-0.5-1.0-S CCTA-61A-GR-094-D
Semivolatile Organic Compounds 12 environmental	12 environmental 2 duplicate 3 splits	Bis(2-ethylhexyl) phthalate	NA	440 J µg/kg	257 µg/kg	CCTA-61A-GR-098-0.5-1.0-S CCTA-61A-094-D (split) CCTA-61A-095-D CCTA-61A-098-D (duplicate)
		2,4-Dinitrotoluene	NA	34 J µg/kg	54.6 µg/kg	CCTA-61A-GR-098-D
		Pentachlorophenol	NA	230 µg/kg	67.8 µg/kg	CCTA-61A-GR-097-0.5-1.0-S CCTA-61A-GR-095-D

Refer to footnotes at end of table.

Table 8.5.1-1 (Concluded)
Summary of COCs for SWMU 61A

^aFrom Dinwiddie September 1997.

^bAverage concentration includes all samples. For nondetectable results, the detection limit is used to calculate the average.

^cIncludes samples with nondetect results where the MDL or MDA exceeds the approved background limit.

^dAn average minimum detectable activity is not calculated because of the variability in instrument counting error and the number of reported nondetectable activities.

CCTA = Central Coyote Test Area.

COC = Constituent of concern.

D = Debris sample.

DU = Duplicate sample.

GR = Grab sample.

HMX = Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine.

MDA = Minimum detectable activities.

MDL = Minimum detection limit.

µg/kg = Microgram(s) per kilogram.

mg/kg = Milligram(s) per kilogram.

NA = Not applicable.

pCi/g = Picocurie(s) per gram.

RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine.

S = Soil sample.

SWMU = Solid waste management unit.

VCM = Voluntary corrective measure.

infrequent and at slightly elevated concentrations. Similarly, elevated cadmium concentrations relative to the NMED-approved nonquantified background value occurred at all the sample locations within the gamma activity area. All other occurrences of metal COCs detected above background in the areas of high gamma activity were infrequent and at slightly elevated concentrations. With the exception of the cleared area, where grading activities may have disturbed near-surface soils, no metal COCs are anticipated below the ground surface because the release mechanism was essentially atmospheric fallout resulting in surficial deposition of test material shrapnel.

Radionuclide COCs exceeded the maximum background activity limits primarily in the surface and near-surface soil at the gamma activity area. However, cesium-137 was elevated in the majority of samples from SWMU 61A because of comparisons with the background subsurface activity limit. Elsewhere at SWMU 61A, the radionuclide COCs that exceeded background limits occurred as isolated "hot spots" with no particular COC associations or correlation to particular locations or areas that could be delineated as contaminated. In almost all cases, the radionuclide COCs were only slightly elevated above the maximum background activity limits specified for the Coyote Test Field (Dinwiddie September 1997). With the exception of the previously remediated pit, no radionuclide COCs are anticipated bgs because the release mechanism was essentially atmospheric fallout resulting in surficial deposition of test material shrapnel.

HE COCs were detected primarily in the surface and near-surface soil at the cleared area and the concrete block area. Both RDX and HMX were detected at the cleared area; however, only RDX was detected at the concrete block area. Elsewhere at SWMU 61A, the HE COCs occurred at isolated "hot spots" with no particular COC associations or correlation to particular locations or areas that could be delineated as contaminated. The HE COCs were mostly detected at low concentrations, often qualified as estimated values because the concentrations were below the practical quantitation limits. However, higher HE COC concentrations were detected at one sample location within the gamma activity area and at one sample location within the concrete block area. With the exception of the cleared area, where grading activities may have disturbed near-surface soils, no HE COCs are anticipated bgs because the release mechanism was essentially atmospheric fallout resulting in surficial deposition of test material shrapnel.

VOC and SVOC analyses were limited to the debris mounds and the soil samples underlying the debris mounds at SWMU 61A. The results indicated that low concentrations of bis(2-ethylhexyl)phthalate, pentachlorophenol, and toluene were detected in only one sample from three different locations. As a result, VOC and SVOC COCs occurred as isolated "hot spots," and no particular association or correlation to particular locations or areas could be delineated as contaminated. Based upon the low concentrations of VOCs and SVOCs in the debris mounds themselves and the low concentrations of VOCs and SVOCs in the soil directly underlying the debris mounds, the downward migration of these organic compounds in the subsurface is unlikely.

8.5.2 Environmental Fate

The primary source of COCs for SWMU 61A was general explosives tests that had been conducted on weapons and HE-containing devices at the site (Figure 8.5.2-1). The primary release mechanism was detonation and subsequent atmospheric fallout of test material shrapnel from the explosives test activities.

This page intentionally left blank.

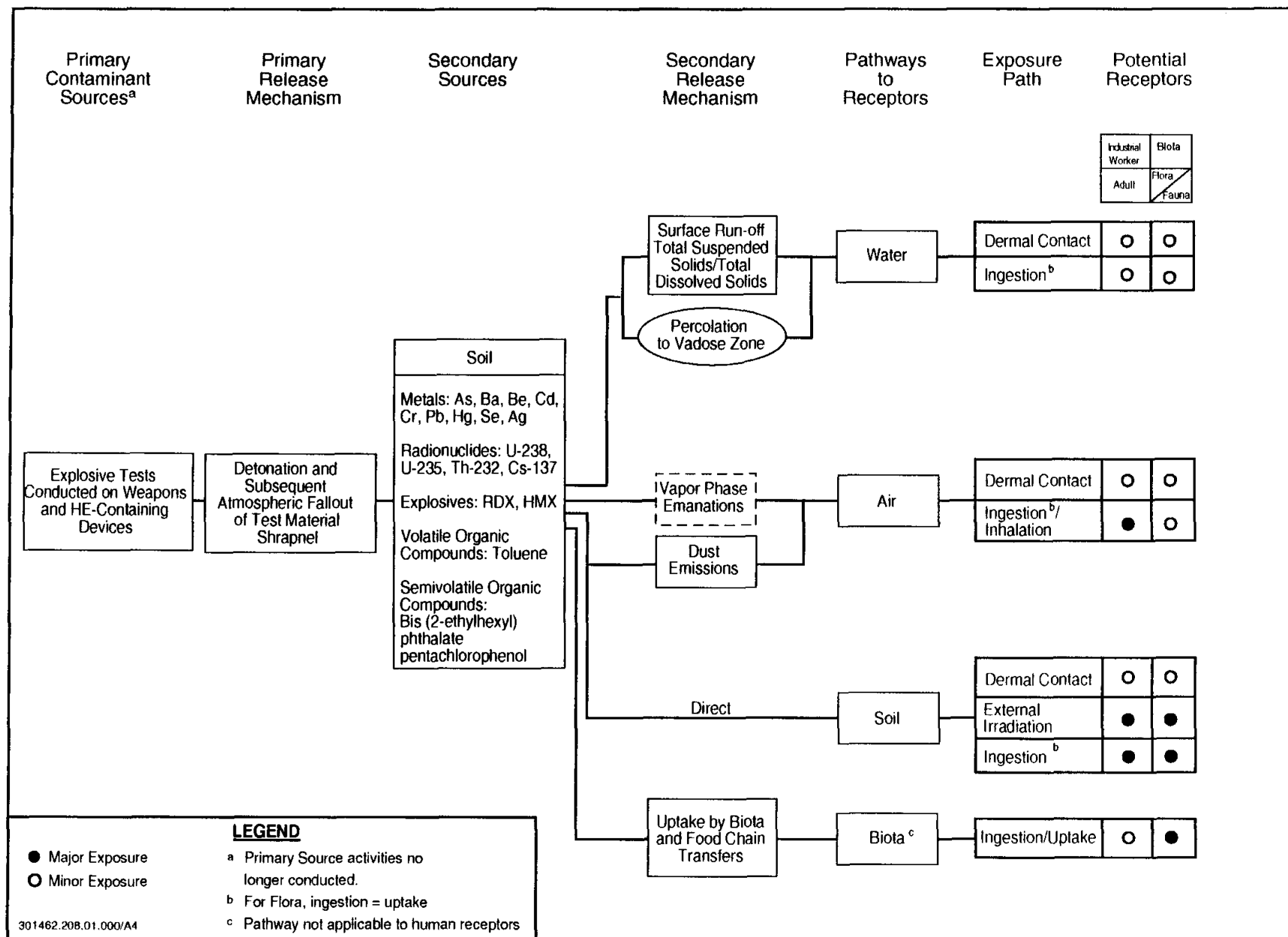


Figure 8.5.2-1

Conceptual Model Flow Diagram for SWMU 61A, Schoolhouse Mesa Test Site: Blast Site

This page intentionally left blank.

Table 8.5.1-1 summarizes potential COCs for SWMU 61A. Based upon the nature and extent of contamination at the site (Section 8.5.1), the cleared area contains primarily metal and HE COCs in surface and near-surface soil, the gamma activity area contains primarily metal and radionuclide COCs in surface and near-surface soil, and the concrete block area contains primarily HE COCs in surface and near-surface soil. All other occurrences of COCs at SWMU 61A are infrequent. The majority of COCs occur at low concentrations or at concentrations slightly above background limits, with several notable exceptions. Lead is significantly elevated at several sample locations in the cleared area, and cadmium is elevated at all sample locations in the areas of highest measured gamma activity. Uranium-238 is elevated at all sample locations in Debris Mound 1. High concentrations of RDX occur at one sample location in the gamma activity area and at two locations in the concrete block area.

Because the Schoolhouse Mesa Test Site is no longer active, only secondary sources of COCs remain at the site in the form of residual metals, radionuclides, HE compounds, VOCs, and SVOCs in the surface and near-surface soils. The secondary release mechanisms at SWMU 61A are suspension and/or dissolution of COCs in surface-water runoff and percolation to the vadose zone, direct contact with soil (radionuclides only), VOC vapor emanations, dust emissions, and uptake of COCs in the soil by biota (Figure 8.5.2-1). The depth to groundwater at the site is approximately 95 feet bgs and the vadose zone is comprised of relatively impermeable carbonate-rich soil horizons and impermeable carbonate-cemented horizons (SNL/NM March 1995). In addition, high partitioning coefficients and low mobility in the transporting medium would enhance dilution of the COC concentrations. As a result, the nature and extent of COCs, as defined in this NFA proposal, does not make groundwater a viable contaminant pathway. The pathways to receptors are surface water, soil water, air, and soil. Biota are also a pathway through food chain transfers. Annex 8-D, Section V, provides additional discussion of the fate and transport of COCs at SWMU 61A.

The current land use for SWMU 61A is industrial. The future land use for SWMU 61A is also industrial (DOE and USAF March 1996); therefore, the potential human receptor at the site is an industrial worker. For all applicable pathways, the exposure route for the industrial worker is dermal contact, external irradiation, and ingestion/inhalation. Ingestion of soil, external irradiation from soil, and ingestion/inhalation of air are considered the major exposure routes for the industrial worker. Potential biota receptors include flora and fauna at the site. Direct ingestion of soil is considered the major exposure route for biota, in addition to the ingestion of COCs through food chain transfers or the direct uptake of COCs. Annex 8-D, Section V, provides additional discussion of the exposure routes and receptors at SWMU 61A.

8.6 Site Assessments

The site assessment process for SWMU 61A includes risk screening assessments followed by risk baseline assessments (as required) for both human health and ecological risk. This section briefly summarizes the site assessment results. Annex 8-D provides detailed descriptions of the assessment.

8.6.1 Summary

The site assessment concludes that SWMU 61A does not have potential to affect human health under an industrial land-use scenario. After considering the uncertainties associated with the

available data and modeling assumptions, ecological risks associated with SWMU 61A were found to be low. Section 8.6.2 describes the site screening assessments and Annex 8-D provides details of the site assessment.

8.6.2 Screening Assessments

Risk screening assessments were performed for both human health risk and ecological risk for SWMU 61A. This section summarizes the risk screening assessments.

8.6.2.1 Human Health

SWMU 61A has been recommended for industrial land-use (DOE and USAF March 1996). Annex 8-D provides a complete discussion of the risk assessment process, results, and uncertainties. Because COCs are present in concentrations or activities greater than background levels, it was necessary to perform a health risk assessment analysis for the site. Besides COC metals, this assessment included any VOCs or SVOCs detected above their reporting limits and any radionuclide compounds detected either above background levels and/or MDAs. The risk assessment process evaluates quantitatively the potential adverse human health effects caused by COCs in the site's soil. The Risk Screening Assessment Report calculated the hazard index (HI) and excess cancer risk for an industrial 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 61A nonradiological COCs is 0.08 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 0.06. The total excess cancer risk for SWMU 61A nonradiological COCs is $1\text{E-}5$ for an industrial land-use setting, which is above the acceptable risk value provided by the NMED (NMED March 1998). Guidance from the NMED indicates that excess lifetime risk of developing cancer by an individual must be less than $1\text{E-}6$ for Classes A and B carcinogens and less than $1\text{E-}5$ for Class C carcinogens. The incremental cancer risk for SWMU 61A is $7\text{E-}6$. The excess cancer risk is driven by arsenic. If the mean for arsenic (2.88 mg/kg) is used in the risk calculations instead of the maximum concentration (20.8 mg/kg), the incremental cancer risk is $1\text{E-}7$, which is below NMED guidelines. Because the site has been adequately characterized, the mean is more representative of actual average arsenic concentrations upon which risk should be calculated. Therefore, under the more realistic approach, SWMU 61A does not pose significant risk to human health under industrial land use.

The incremental total effective dose equivalent for radionuclides for an industrial land-use setting for SWMU 61A is 2.1 millirems per year (mrem/yr), which is significantly less than 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 $2.45\text{E-}5$ for an 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 Screening Assessment Report (Annex 8-D). The report concludes that SWMU 61A does not have potential to affect human health under an industrial land-use scenario.

8.6.2.2 *Ecological*

An ecological screening assessment that corresponds with the screening procedures in the EPA's Ecological Risk Assessment Guidance for Superfund (EPA 1997) was performed as set forth by the NMED Risk-Based Decision Tree (NMED March 1998). An early step in the evaluation is comparing COC concentrations and identifying potentially bioaccumulative constituents (see Annex 8-D, Sections III, VI, VII.2, and VII.3). This methodology also requires developing a site conceptual model and a food web model as well as selecting ecological receptors. Each of these items is presented in the "Predictive Ecological Risk Assessment Methodology for SNL/NM ER Program, Sandia National Laboratories/New Mexico" (IT July 1998) and will not be duplicated here. The screen also includes estimations of exposure and ecological risk.

Tables 14, 15, 16, and 17 of Annex 8-D present the results of the ecological risk assessment screen. 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 attributable primarily to exposure concentration (maximum COC concentration was used in the estimating risk), exposure setting (area use factors of one were assumed), background risk, and using detection limits as exposure concentrations. Based upon an evaluation of these uncertainties, ecological risks associated with this site are expected to be low.

8.6.3 Baseline Risk Assessments

This section discusses the baseline risk assessments for human health and ecological risk.

8.6.3.1 *Human Health*

Based upon the fact that human health results of the screening assessment summarized in Section 8.6.2.1 indicate that SWMU 61A does not have potential to affect human health under an industrial land-use setting, a baseline human health risk assessment is not required for SWMU 61A.

8.6.3.2 *Ecological*

Based upon the fact that ecological results of the screening assessment summarized in Section 8.6.2.2 indicate that SWMU 61A has low ecological risk, a baseline ecological risk assessment is not required for SWMU 61A.

8.6.4 Other Applicable Assessments

No other applicable assessments have been conducted at SWMU 61A.

8.7 No Further Action Proposal

8.7.1 Rationale

Based upon field investigation data and the human health risk assessment analysis, an NFA is being recommended for SWMU 61A for the following reason: No COCs (metals and radionuclides) were present in concentrations considered hazardous to human health for an industrial land-use scenario.

8.7.2 Criterion

Based upon the evidence provided above, SWMU 61A is proposed for an NFA decision in conformance with Criterion 5 (NMED March 1998), which states that "The SWMU/AOC has been characterized or remediated in accordance with current 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

Bayliss, L., July 1992. Notes from Environmental Restoration Site Tour and Interviews, July 3, 1992," Field Notes (unpublished), Sandia National Laboratories, New Mexico.

Byrd, C., K. Gaither, D. Fate, H. Oldewage, L. Bayliss, and C. Foster, July 1992. Environmental Restoration Site Tour and Interview Transcript, Field notes (unpublished), Sandia National Laboratories, Albuquerque, New Mexico.

CFR, see Code of Federal Regulations.

Code of Federal Regulations (CFR), Title 40, Part 261.24. Toxicity Characteristic, U.S. Environmental Protection Agency, Washington, D.C.

Cooper, T. (IT) and D. Sandhaus (Excel). Interview conducted for the Environmental Restoration Project, Department 7585, Interview (unpublished), ER7585/1334/061/INT/95-035, Sandia National Laboratories, New Mexico. December 7, 1993.

Cooper, T. (IT) and D. Sandhaus (Excel). Interview conducted for the Environmental Restoration Project, Department 7585, Interview (unpublished), ER7585/1334/061/INT/95-036, Sandia National Laboratories, New Mexico. February 4, 1994.

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.

Fritz, L.S. and B. Perkins, March 1985. "Field Survey of Sandia National Laboratories, Albuquerque, March 18–20, 1985," Unpublished CEARP files, Sandia National Laboratories, Albuquerque, New Mexico.

Gaither, K., July 1992. Site Tour and Interview Notes for ER Sites, July 23, 1992, Field Notes (unpublished), Sandia National Laboratories, New Mexico.

Gaither, K. and C. Byrd (SNL/NM). Interview conducted for the Environmental Restoration Project, Department 7585, Interview (unpublished), Sandia National Laboratories, Albuquerque, New Mexico, June 16, 1992.

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.

IT, see IT Corporation.

IT Corporation (IT), April 1994. "Image Interpretation of the Central Coyote Test Area Operable Unit 1334," IT Corporation, Albuquerque, New Mexico.

IT Corporation (IT), May 1994. "Hydrogeology of the Central Coyote Test Area OU 1334," 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), March 1996. "Background Concentrations of Constituents of Concern to the Sandia National Laboratories/New Mexico Environmental Restoration Project and the Kirtland Air Force Base Installation Restoration Program," prepared by 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.

Lojek, C., November 1992. Field Activity Log, "Site Visit, Schoolhouse Mesa Test Site, November 20, 1992," Field Notes (unpublished), Sandia National Laboratories, Albuquerque, New Mexico.

Lojek, C (IT). Interview conducted for the Environmental Restoration Project, Department 7585, Interview (unpublished), ER7585/1334/061/INT/94-002, Sandia National Laboratories, New Mexico. December 16, 1992.

Lojek, C., January 1993a. Field Activity Log, "NMED Site Visit to Schoolhouse Mesa Test Site, ADS 1293, January 6, 1993," Field Notes (unpublished) Sandia National Laboratories, Albuquerque, New Mexico.

Lojek, C., January 1993b. Field Activity Log, "Field Mapping of Schoolhouse Mesa Test Site Features, January 20, 1993," Field Notes (unpublished), Sandia National Laboratories, Albuquerque, New Mexico.

Lojek, C., January 1993c. Field Activity Log, "Tour of North and South Coyote Test Field, January 27, 1993," Field Notes (unpublished), Sandia National Laboratories, Albuquerque, New Mexico.

Lojek, C. (SNL/NM). Interview conducted for the Environmental Restoration Project, Department 7585, Interview (unpublished), ER7585/1334/061/INT/94-001, Sandia National Laboratories, New Mexico. January 7, 1993d.

Lojek, C. (SNL/NM). Interview conducted for the Environmental Restoration Project, Department 7585, Interview (unpublished), ER7585/1334/061/INT/95-013, Sandia National Laboratories, New Mexico. January 8, 1993e.

Lojek, C. (SNL/NM). Interview conducted for the Environmental Restoration Project, Department 7585, Interview (unpublished), ER7585/1334/061/INT/95-010, Sandia National Laboratories, New Mexico. January 12, 1993f.

Lojek, C. (SNL/NM). Interview conducted for the Environmental Restoration Project, Department 7585, Interview (unpublished), ER7585/1334/061/INT/95-006, Sandia National Laboratories, New Mexico. January 12, 1993g.

Lojek, C. (SNL/NM). February 1993. Final Activity Log, "Radiological Survey of Arroyo Dump and Interior of Schoolhouse, February 12, 1993," Field Notes (unpublished), Sandia National Laboratories, Albuquerque, New Mexico.

Lojek, C. (SNL/NM) and D. Sandhaus (Excel). Memorandum to File, "Meeting with Dick Jones on Friday, February 25, 1994," Environmental Restoration Project, Department 7585, Memorandum (unpublished), Sandia National Laboratories, New Mexico. March 7, 1994.

Lojek, C. Memorandum to OU 1334 File, "Schoolhouse Mesa Walkover with C. Lojek and D. Sandhaus, February 25, 1994," Memorandum (unpublished), Sandia National Laboratories, Albuquerque, New Mexico. March 9, 1994.

Martz, M.K. (Roy F. Weston). Memorandum to Sandia National Laboratories CEARP File, Sandia National Laboratories, Albuquerque, New Mexico. May 14, 1985.

Myers, D.A., and E.J. McKay, 1970. "Geologic Map of the Mount Washington Quadrangle, Bernalillo and Valencia Counties, New Mexico, Scale 1:24,000," Map No. GQ-886, U.S. Department of the Interior, United States Geological Survey, Washington, D.C.

New Mexico Environment Department (NMED), August 1997. "Request for Supplemental Information (RSI) on the Sandia National Laboratories RCRA Facility Investigation Work Plan for Operable Unit 1334, Central Coyote Test Area," New Mexico Environment Department, Santa Fe, New Mexico.

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.

NMED, see New Mexico Environment Department.

Peters, K. (IT) and Sandhaus D. (Excel). Interview conducted for the Environmental Restoration Project, Department 7585, Interview (unpublished), ER7585/1334/061/INT/94-004, Sandia National Laboratories, New Mexico. March 7, 1994.

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.

Sandhaus, D. Memorandum to C. Lojek (SNL/NM), "Reconnaissance for High Explosives (HE) at East Schoolhouse Mesa," Sandia National Laboratories, Albuquerque, New Mexico. February 14, 1994a.

Sandhaus, D. (Excel). Interview conducted for the Environmental Restoration Project, Department 7585, Interview (unpublished), ER7585/1334/061/INT/95-037, Sandia National Laboratories, New Mexico. February 8, 1994b.

Sandhaus, D. (Excel). Interview conducted for the Environmental Restoration Project, Department 7585, Interview (unpublished), ER7585/1334/061/INT/95-038, Sandia National Laboratories, New Mexico. February 22, 1994c.

Sandhaus, D. (Excel). Interview conducted for the Environmental Restoration Project, Department 7585, Interview (unpublished), ER7585/1334/061/INT/95-040, Sandia National Laboratories, New Mexico. March 10, 1994.

Sandhaus, D. (Excel). Interview conducted for the Environmental Restoration Project, Department 7585, Interview (unpublished), ER7585/1334/061/INT/95-041, Sandia National Laboratories, New Mexico. April 7, 1994.

Sandia National Laboratories/New Mexico (SNL/NM), Date [unk]. Coyote Canyon Test Site, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), September 1966. Building and Facilities Data, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), April 1994. "Mean Elevation and Acreage Computation Report, Canyons Test Area—ADS 1334," Environmental Restoration Department, GIS Group, Sandia National Laboratories, Albuquerque, New Mexico.

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, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), October 1994. "RCRA Facility Investigation Work Plan for Operable Unit 1334, Central Coyote Test Area," Environmental Restoration Project, 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, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), July 1996. "Laboratory Data Review Guidelines," Radiation Protection Sample Diagnostics Procedure No. RPSD-02-11, Issue 02, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), March 1997. "Groundwater Protection Program Calendar Year 1996 Annual Groundwater Monitoring Report, Sandia National Laboratories/New Mexico," Sandia National Laboratories, 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), November 1997. "Response to Request for Supplemental Information on the RCRA Facility Investigation Work Plan for Operable Unit 1334, Central Coyote Test Area," 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.

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. 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), November 1995. "Comments on the OU 1334 Central Coyote Test Area RFI Work Plan, Sandia National Laboratories," Region 6, U.S. Environmental Protection Agency, Dallas, Texas.

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.

USGS, see U.S. Geological Survey.

U.S. Geological Survey (USGS), 1961 Aerial Photograph, EJA-2-135, Albuquerque, New Mexico.

U.S. Geological Survey (USGS), 1967. Aerial Photograph, VGUB(Mt)-2-85, Albuquerque, New Mexico.

U.S. Geological Survey (USGS), 1991. Aerial Photograph, NAPP-3534-182, Albuquerque, New Mexico.

Young, M. (SNL/NM). Memorandum to Distribution, "Unexploded Ordnance (UXO)/High Explosives (HE) Survey Report," Sandia National Laboratories, Albuquerque, New Mexico. September 1, 1994.

ANNEX 8-A
Scoping Sampling Analytical Result Summaries

Summary of Soil Sampling Results at ER Site 61A
VOC Field Screening, TPH, Explosives, and Metals
June 16, 1995

ER Sample ID: Sample Location: Sample Depth: Medium:	61A-GR-001-0-S Rad Anomaly Near Site 9 0-6" Soil	61A-GR-002-0-S Rad Anomaly Near Site 9 0-6" Soil	61A-GR-002-0-SD Rad Anomaly Near Site 9 0-6" Soil	61A-GR-003-0-S Debris Mound NW of Concrete Blocks 0-6" Soil	61A-GR-004-0-S Random Grid Area 0-6" Soil
Volatile Organics (ppm) Field Screening Results (PID)	0	0	0	0	0
Volatile Organics (ug/kg) (EPA Method 8240) ^a	NA	NA	NA	NA	NA
Total Petroleum Hydrocarbons (ppm) (Immunoassay)	ND	ND	ND	ND	ND
Semivolatile Organics (ug/kg) (EPA Method 8270) ^a	NA	NA	NA	NA	NA
Explosives (mg/kg) (EPA Method 8330) ^a					
TNT	ND	ND	ND	ND	ND
RDX	10	ND	ND	ND	ND
HMX	2	ND	ND	ND	ND
PETN	ND	ND	ND	ND	1
NG	ND	ND	ND	ND	ND
Metals (mg/kg) (Modified EPA Method 6010) ^a					
Arsenic	ND	ND	ND	ND	ND
Barium	70	36 J	69	150	47
Beryllium	ND	ND	ND	ND	ND
Cadmium	ND	ND	ND	ND	ND
Chromium	ND	ND	ND	16 J	ND
Lead	66	170	160	ND	27
Mercury	ND	ND	ND	ND	ND
Selenium	ND	ND	ND	80 J	ND
Silver	ND	ND	ND	ND	ND

^aEPA November 1986. ND = None detected.

NA = Not analyzed. J = Estimated value less than quantitation limit.

mg/kg = milligram(s) per kilogram.

ug/kg = microgram(s) per kilogram.

TPH = total petroleum hydrocarbons.

VOCs = volatile organic compounds.

Summary of Soil Sampling Results at ER Site 61A
VOC Field Screening, TPH, Explosives, and Metals
June 16, 1995

ER Sample ID: Sample Location: Sample Depth: Medium:	61A-GR-005-0-S Random Grid Area 0-6" Soil	61A-GR-006-0-S Random Grid Area 0-6" Soil	61A-GR-007-0-S Random Grid Area 0-6" Soil	61A-GR-008-0-S Random Grid Area 0-6" Soil	61A-GR-009-0-S Random Grid Area 0-6" Soil
Volatile Organics (ppm) Field Screening Results (PID)	0	0	0	0	0
Volatile Organics (ug/kg) (EPA Method 8240) ^a	NA	NA	NA	NA	NA
Total Petroleum Hydrocarbons (ppm) (Immunoassay)	ND	ND	ND	ND	ND
Semivolatile Organics (ug/kg) (EPA Method 8270) ^a	NA	NA	NA	NA	NA
Explosives (mg/kg) (EPA Method 8330) ^a					
TNT	ND	ND	ND	ND	ND
RDX	ND	ND	ND	ND	ND
HMX	17	13	ND	12	ND
PETN	6	2	ND	ND	ND
NG	ND	ND	ND	ND	ND
Metals (mg/kg) (Modified EPA Method 6010) ^a					
Arsenic	ND	ND	ND	ND	ND
Barium	35 J	67	41	44	76
Beryllium	ND	ND	ND	ND	ND
Cadmium	ND	ND	ND	ND	ND
Chromium	ND	ND	ND	ND	16 J
Lead	62	360	21 J	83	25 J
Mercury	ND	ND	ND	1.1	ND
Selenium	ND	ND	ND	ND	41 J
Silver	ND	ND	ND	ND	ND

^aEPA November 1986.
NA = Not analyzed.

ND = None detected.
J = Estimated value less than quantitation limit.

mg/kg = milligram(s) per kilogram.
µg/kg = microgram(s) per kilogram.

TPH = total petroleum hydrocarbons.
VOCs = volatile organic compounds.

Summary of Soil Sampling at ER Site 61A
Radioactivity Field Screening and Radionuclides
June 16, 1995

ER Sample ID: Sample Location: Sample Depth: Medium:	61A-GR-001-0-S Rad Anomaly Near Site 9 0-6" Soil	61A-GR-002-0-S Rad Anomaly Near Site 9 0-6" Soil	61A-GR-002-0-SD Rad Anomaly Near Site 9 0-6" Soil	61A-GR-003-0-S Debris Mound NW of Concrete Blocks 0-6" Soil	61A-GR-004-0-S Random Grid Area 0-6" Soil
Radioactivity (cpm)					
Field Screening Results (a)					
Beta-Gamma (ASP-1/HP260)	80	80	80	80	80
Radionuclides (pCi/g) (Gamma Spectrometry)					
Uranium-238	27.6	32.4	51.9	ND	ND
Thorium-234	25.9	29.5	53.2	0.994	ND
Uranium-234	ND	43.3	69	ND	ND
Radium-226	10	14.1	23.4	1.41	0.858
Lead-214	0.639	0.582	0.767	0.56	0.57
Bismuth-214	0.528	0.48	0.473	0.502	0.466
Lead-210	ND	ND	ND	ND	ND
Thorium-232	0.787	0.771	0.974	0.677	0.657
Radium-228	0.876	0.882	1.06	0.739	0.687
Actinium-228	1.08	0.895	ND	0.737	ND
Thorium-228	0.583	0.689	ND	ND	ND
Radium-224	1.77	1.52	1.91	1.53	1.6
Lead-212	0.865	0.911	0.964	0.771	0.805
Bismuth-212	0.999	0.804	ND	1.11	0.696
Thallium-208	0.777	0.76	0.695	0.665	0.697
Uranium-235	ND	0.887	1.11	ND	ND
Cesium-137	0.141	0.216	0.408	0.149	0.221
Potassium-40	22.8	21	23.2	19.5	17.5

cpm = counts per minute

ND = None detected above the minimum detectable activity

pCi/g = picocuries per gram

Summary of Soil Sampling at ER Site 61A
Radioactivity Field Screening and Radionuclides
June 16, 1995

ER Sample ID: Sample Location: Sample Depth: Medium:	61A-GR-005-0-S Random Grid Area 0-6" Soil	61A-GR-006-0-S Random Grid Area 0-6" Soil	61A-GR-007-0-S Random Grid Area 0-6" Soil	61A-GR-008-0-S Random Grid Area 0-6" Soil	61A-GR-009-0-S Random Grid Area 0-6" Soil
Radioactivity (cpm)					
Field Screening Results (a)					
Beta-Gamma (ASP-1/HP260)	80	80	80	80	80
Radionuclides (pCi/g) (Gamma Spectrometry)					
Uranium-238	ND	ND	ND	ND	ND
Thorium-234	ND	ND	ND	ND	ND
Uranium-234	ND	ND	ND	ND	ND
Radium-226	1.3	1.74	1.43	0.625	0.627
Lead-214	0.455	0.629	0.622	0.649	0.661
Bismuth-214	0.392	0.533	0.579	0.573	0.562
Lead-210	ND	ND	ND	ND	ND
Thorium-232	0.722	0.53	0.638	0.857	0.94
Radium-228	0.681	0.945	0.865	0.868	0.827
Actinium-228	0.793	1.02	0.924	ND	ND
Thorium-228	ND	0.829	0.713	0.908	0.736
Radium-224	1.7	1.66	1.52	1.98	ND
Lead-212	0.653	0.891	0.821	0.858	0.834
Bismuth-212	0.724	0.998	1.25	0.995	0.998
Thallium-208	0.683	0.738	0.683	0.768	0.718
Uranium-235	ND	ND	ND	ND	ND
Cesium-137	0.209	0.376	0.296	0.599	0.249
Potassium-40	23.1	20.2	21.2	22.1	22.1

cpm = counts per minute
ND = None detected above the minimum detectable activity
pCi/g = picocuries per gram

ANNEX 8-B
Gamma Spectroscopy Results

ANALYSIS REQUEST AND CHAIN OF CUSTODY

P 1 OF 5

AR/COC- 06127

Internal Lab

Batch No.

SF 2011-12-08-201

Dept. No./Mail Stop: 6605 / 114B
 Project/Task Manager: AAJ / PAVLETICH
 Project Name: CONT. CRITE. TEST AREA 61A
 Record Center Code: ER/1334 61A/DAT
 Logbook Ref No.: D151
 Service Order No.: CF0376

Date Samples Shipped: 1/28/97
 Carrier/Flight No.: 700385
 Lab Contact: EDIE KENT
 Lab Destination: GEL
 SMO Contact/Phone: DOUG SALMI 894-3110
 Send Report to SMO: KATHY BECKER

Contract No.: AT-2100ACase No.: 0034 PMHAP

SMO Authorization: [Signature]
 Bill to: Santa National Laboratories
 Supplier Services Department
 P.O. Box 5800 MS 0154
 Albuquerque, NM 87185-0154

Parameter & Method Requested

Location										Tech Area		N/A	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Reference LOV (available at SMO)					TCLP VOC - 8260 SVOC - 8270	TCLP Metals + Hg	PbAs Metals + Hg	VOC 8260	SVOC 8270	HF	Isotopic Uranium	Isotopic Thorium	Gross α, β	Tritium	Gamma Spectrometry		
Building										Room		Sample No. - Fraction				ER Sample ID or Sample Location Detail	Sample Matrix	Container		Preser- vative												Sample Collection Method	Sample Type
																		Type	Volume														
0	3	2	5	2	3	-	0	0	1	CCTA- 61A-CR-094-D	N/A	61A	1/28/97 1200	S	AG	500ml	4°C	G	SA	X													
						-	0	0	2												X												
						-	0	0	3						A	250ml						X											
						-	0	0	4						4V	120ml								X									
						-	0	0	5						AG	500ml									X								
						-	0	0	6						AG	250ml										X							
						-	0	0	7																		X						
						-	0	0	8																			X					
						-	0	0	9																				X				
						-	0	1	0																					X			
																															X		

RMMA ☒ Yes ☐ No Ref. No. _____Sample Disposal ☐ Return to Client ☒ Disposal by labTurnaround Time ☒ Normal ☐ Rush Required Report Date _____

Sample Team Members: Name Joe Pavletich Signature [Signature] Init JP Company/Organization/Phone 6605 / 6605 / 291-2479

Special Instructions/QC Requirements

SEND RAW DATA PACKAGE
AS SEPARATE REPORT

Released by COC 06127

Abnormal Conditions on Receipt
[Signature]
[Signature]
[Signature]

1. Relinquished by <u>[Signature]</u> Org. <u>6605</u> Date <u>1-30-97</u> Time <u>1547</u>	4. Relinquished by _____ Org. _____ Date _____ Time _____
1. Received by <u>C. Hoffman</u> Org. <u>7528</u> Date <u>1-30-97</u> Time <u>1547</u>	4. Received by _____ Org. _____ Date _____ Time _____
2. Relinquished by <u>[Signature]</u> Org. <u>7528</u> Date <u>1-31-97</u> Time <u>1400</u>	5. Relinquished by _____ Org. _____ Date _____ Time _____
2. Received by <u>[Signature]</u> Org. <u>60EL</u> Date <u>2-3-97</u> Time <u>08:00</u>	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

CTN 1

718C-708-C08:001

GEN. ENGINEERING

FEB. -06 97 (THU) 13:01

ANALYSIS REQUEST AND CHAIN OF CUSTODY

2 OF 5

AR/COC-06127

SF 10 JD (9-94)

Project Name: <u>CENT. COYOTE TEST AREA 61A</u> Project/Task Manager: <u>AM / PAVLENCH</u> Case No.: <u>8034.2061A0</u>										Parameter & Method Requested												
Location		Tech Area <u>N/A</u>		Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Reference LOV (available at SMO)					TCLP VOL - B260 SVOL - B270	TCLP METALS + Hg	RCA Metals + Pb	VOL B260	SVOL B270	HFE	ISOTOPE URANIUM	ISOTOPE THORIUM	GROSS α, β	TRITIUM	GAMA SPE-70
Building <u>N/A</u>	Room <u>N/A</u>	Sample No. - Fraction	ER Sample ID or Sample Location Detail				Sample Matrix	Container Type	Volume	Preservative	Sample Collection Method											
✓	032523	-D14	CLTA-61A-GR-094-D	N/A	61A	1-28-97 1200	S	AG	250ml	4°C	G	SA										
✓	032524	-D01	CLTA-61A-GR-094-D-0.5-S	0-0.5		1115		A									X					
✓		-D02						A										X				
✓	032525	-D01	CLTA-61A-GR-095-D	N/A		1240			500ml				X									
✓		-D02						A	250ml								X					
✓		-D03						A										X				
✓		-D04						A											X			
✓		-D05							1L											X		
✓	032526	-D01	CLTA-61A-GR-095-D-0.5-S	0-0.5		1430			250ml								X					
✓		-D02						A										X				
✓	032527	-D01	CLTA-61A-GR-096-D	N/A		1255		AG	500ml				X									
✓		-D02						A	250ml								X					
✓		-D03																X				
✓		-D04																	X			
✓		-D05						G	1L											X		
✓	032528	-D01	CLTA-61A-GR-096-D-0.5-S	0-0.5		1440		AG	250ml								X					
✓		-D02						A														
✓	032529	-D01	CLTA-61A-GR-097-D	N/A		1305			500ml				X									

Abnormal Conditions on Receipt

LAB USE

Recipient Initials

E - To Accompany Samples, Laboratory Copy

BLUE - To Accompany Samples, Return to SMO

N - SMO Suspense Copy

PINK - Field Copy

P. 014

TEL: 803-852-5812

GEN. ENGINEERING

FEB. -06' 97 (THU) 13:26

ANALYSIS REQUEST AND CHAIN OF CUSTODY

PAGE 3 OF 5

AR/COC-1 06127

SF 1 JD (3-94)

Project Name: CENT. COAST TEST AREA 61AProject/Task Manager: AMS / PAVLETICHCase No.: 0034.206140

Location		Tech Area	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Reference LOV (available at SMO)					Parameter & Method Requested													
Building	Room	Sample No. - Fraction				ER Sample ID or Sample Location Detail	Sample Matrix	Type	Volume	Preservative	Sample Collection Method	Sample Type	TCLP VOL - 8260	TCLP SVOC - 8270	TOP METALS + 49	REEP METALS + 8c	VOL 8210	SVOC - 8270	HE	ISOTOPIC URANIUM	ISOTOPIC THORIUM	GROSS α, β	TRITIUM	GAMMA
		032529-0002	61A-GR-017-D	N/A	61A	1/20/97	1205	S	AG	500ml	4°C	G	SA	X										
		-0003							A	250							X							
		-0004							A									X						
		-0005							AG											X				
		-0006							G	1L											X			
		032530-0001	61A-GR-017-D-05-S	0-0.5			1440			250ml							X							
		-0002							A									X						
		032531-0001	61A-GR-018-D	N/A			1530		A	500ml				X										
		-0002							A				DU	X										
		-0003								250ml			SA		X									
		-0004											DU		X									
		-0004								120ml			SA			X								
		-0005							A	250ml						X								
		-0006								500ml (500ml)						X								
		-0007								250ml								X						
		-0008							A				DU					X						
		-0009							A				SA						X					
		-0010							A				DU						X					

Abnormal Conditions on Receipt

Recipient Initials

WHITE - To Accompany Samples, Laboratory Copy

BLUE - To Accompany Samples, Return to SMO

YELLOW - SMO Suspense Copy

PINK - Field Copy

P. 013

TEL: 803-852-5812

GEN. ENGINEERING

FEB. -06' 97 (THU) 13:27

P. 016

SF 20 D (9-94)

TEL: 803-852-5812

FEB. -06' 97 (THU) 13:28 GEN. ENGINEERING

Project Name: <u>CATLIN COYOTE TEST AREA 61A</u> Project/Task Manager: <u>AAS/PAVLENOH</u> Case No.: <u>BB34-2061A0</u>														
Location										Reference LOV (available at SMO)				
Tech Area <u>N/A</u>														
Building <u>N/A</u> Room <u>N/A</u>														
Sample No. - Fraction										ER Sample ID or Sample Location Detail				
Beginning Depth in Ft.										ER Site No.				
Date/Time Collected										Sample Matrix				
Container										Preservative				
Type										Sample Collection Method				
Volume										Sample Type				
032531	-011	1	CETA-61A-GR-090-D	N/A	61A	1/10/77	1330	S	AG	200ml	42	G	SA	
	-012	2											DU	
	-013	3							G	1L			SA	
	-014	4							G	1L			DU	
	-015	5								500ml			SA	
032532	-001	1	CETA-61A-GR-090-D-0.5-S	0-0.5			1500			250ml				X
	-002	2												
	-003	3											DU	
	-004	4											SA	
	-005	5											DU	
032533	-001	1	CETA-61A-GR-099-D	N/A			1355			500ml			SA	X
	-002	2								250ml				
	-003	3												X
	-004	4												
	-005	5							G	1L				
032534	-001	1	CETA-61A-GR-099-D-0.5-S	0-0.5			1517		AG	250ml				X
	-002	2												
	-003	3												
	-004	4												
	-005	5												
032535	-001	1	CETA-61A-GR-000-TB	N/A			1000	DIW	G	3 x 40ml	HCl	N/A	TB	X

Abnormal Conditions on Receipt

Recipient Initials

LAB USE

TE - To Accompany Samples, Laboratory Copy

BLUE - To Accompany Samples, Return to SMO

W - SMO Suspense Copy

PINK - Field Copy

ANALYSIS REQUEST AND CHAIN OF CUSTODY

SF 206, JUD 9-94)

AR/COC- 06127

5 OF 5

Project Name: CENT. COMTE TEX AREA 61A Project/Task Manager: AA3 / PANLETICH Case No.: ED34, 2061A0

Location		Tech Area	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Reference LOV (available at SMO)					
Building	Room					Sample Matrix	Type	Volume	Preservative	Sample Collection Method	Sample Type
032536	-001	CCTA-61A-GR-000-EB	N/A	61A	1-28-97 1015	DIW	G	3x 40ml	HCl	G	EB
	-002						AG	2x 1L	4% ²		
	-003						↓	4x 1L	↓		
	-004						P	1L	HNO ₃		
	-005							2L			
	-006										
	-007										
	-008							1L	4% ²		
	-009							2L	HNO ₃		

Parameter & Method Requested

BCRA METALS + BE

VOC 6210

SVOC 6230

HE

ISOTOPE URANIUM

ISOTOPE THORIUM

GROSS α, β

TETRUM

GAMMA SPECTROSCOPY

Abnormal Conditions on Receipt

Recipient Initials

WHITE - To Accompany Samples, Laboratory Copy

BLUE - To Accompany Samples, Return to SMO

YELLOW - SMO Suspense Copy

PINK - Field Copy

P. 017

TEL: 803-852-5812

FEB. -06' 97 (THU) 13:29 GEN. ENGINEERING



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 Salmi
Project Description: RFP #AJ2480A

cc: SNLS00396

Report Date: February 27, 1997

Page 1 of 3

Sample ID : 032523-010 CCTA 61A-GR-094-D
Lab ID : 9702008-61
Matrix : SOIL
Date Collected : 01/28/97
Date Received : 02/01/97
Priority : Routine
Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological											
min PHA - 43 items											
Accuracy, Actinium-228		0.202			pCi/g		SCM	02/23/97	1659	97683	1
Accuracy, Americium-241		0.0648			pCi/g						
Accuracy, Cerium-144		0.0931			pCi/g						
Accuracy, Cesium-134		0.0164			pCi/g						
Accuracy, Cesium-137		0.0861			pCi/g						
Accuracy, Chromium-51		0.224			pCi/g						
Accuracy, Cobalt-60		0.0194			pCi/g						
Accuracy, Iron-59		0.0531			pCi/g						
Accuracy, Lead-212		0.136			pCi/g						
Accuracy, Lead-214		0.143			pCi/g						
Accuracy, Potassium-40		2.53			pCi/g						
Accuracy, Radium-226		0.142			pCi/g						
Accuracy, Radium-228		0.202			pCi/g						
Accuracy, Ruthenium-103		0.0243			pCi/g						
Accuracy, Ruthenium-106		0.151			pCi/g						
Accuracy, Thorium-231		0.155			pCi/g						
Accuracy, Thorium-232		0.132			pCi/g						
Accuracy, Thorium-234		1.07			pCi/g						
Accuracy, Uranium-235		0.0948			pCi/g						
Accuracy, Uranium-238		1.07			pCi/g						
Accuracy, Yttrium-88		0.0147			pCi/g						
Accuracy, Zirconium-95		0.0384			pCi/g						
Actinium-228		1.11	+/- 0.202	0.0401	0.106	pCi/g	1.0				
Americium-241	U	-0.00562	+/- 0.0648	0.0292	0.103	pCi/g	1.0				
Cerium-144	U	0.0276	+/- 0.0931	0.0482	0.162	pCi/g	1.0				
Cesium-134	U	0.00200	+/- 0.0164	0.00815	0.0258	pCi/g	1.0				
Cesium-137		0.422	+/- 0.0861	0.00882	0.0325	pCi/g	1.0				

PO Box 30712 • Charleston, SC 29417 • 2040 Savage Road • 29407

(803) 556-8171 • Fax (803) 766-1178

Printed on recycled paper



9702008-61

1134



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 Salmi

Project Description: RFP #AJ2480A

cc: SNLS00396

Report Date: February 27, 1997

Page 2 of 3

Sample ID : 032523-010 CCTA 61A-GR-094-D

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Chromium-51	U	0.0278 +/- 0.224	0.114	0.378	pCi/g	1.0					
Cobalt-60	U	0.00674 +/- 0.0194	0.00898	0.0362	pCi/g	1.0	SCM	02/23/97	1659	97683	1
Iron-59	U	0.0137 +/- 0.0531	0.0222	0.0934	pCi/g	1.0					
Lead-212		0.910 +/- 0.136	0.0166	0.0435	pCi/g	1.0					
Lead-214		0.817 +/- 0.143	0.0164	0.0521	pCi/g	1.0					
Potassium-40		21.7 +/- 2.53	0.137	0.247	pCi/g	1.0					
Radium-226		0.672 +/- 0.142	0.0202	0.0534	pCi/g	1.0					
Radium-228		1.11 +/- 0.202	0.0401	0.106	pCi/g	1.0					
Ruthenium-103	U	-0.0235 +/- 0.0243	0.0111	0.0403	pCi/g	1.0					
Ruthenium-106	U	0.0371 +/- 0.151	0.0883	0.272	pCi/g	1.0					
Thorium-231	U	0.00 +/- 0.155	0.0400	0.166	pCi/g	1.0					
Thorium-232		0.887 +/- 0.132	0.0162	0.0424	pCi/g	1.0					
Thorium-234		1.23 +/- 1.07	0.295	0.930	pCi/g	1.0					
Uranium-235		0.116 +/- 0.0948	0.0521	0.165	pCi/g	1.0					
Uranium-238		1.23 +/- 1.07	0.295	0.930	pCi/g	1.0					
Zirconium-95		0.0181 +/- 0.0384	0.0165	0.0694	pCi/g	1.0					

M = Method

Method-Description

M 1

HASL 300

GEL Laboratory Certifications

EPI Laboratory Certifications

1135

PO Box 30712 • Charleston, SC 29417 • 2040 Savage Road • 29407

(803) 556-8171 • Fax (803) 766-1178

9702008-61

 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 87185-0854
Contact: Mr. Doug Salmi
Project Description: RFP #AJ2480A

cc: SNLS00396

Report Date: February 27, 1997

Page 1 of 3

Sample ID : 032531-015 CCTA 61A-GR-098-D
Lab ID : 9702008-62
Matrix : SOIL
Date Collected : 01/28/97
Date Received : 02/01/97
Priority : Routine
Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological											
mma PHA - 43 items											
Accuracy, Actinium-228		0.215			pCi/g		SCM	02/23/97	1700	97683	1
Accuracy, Americium-241		0.0704			pCi/g						
Accuracy, Cerium-144		0.0919			pCi/g						
Accuracy, Cesium-134		0.0186			pCi/g						
Accuracy, Cesium-137		0.0613			pCi/g						
Accuracy, Chromium-51		0.233			pCi/g						
Accuracy, Cobalt-60		0.0219			pCi/g						
Accuracy, Iron-59		0.0665			pCi/g						
Accuracy, Lead-212		0.134			pCi/g						
Accuracy, Lead-214		0.135			pCi/g						
Accuracy, Potassium-40		2.59			pCi/g						
Accuracy, Radium-226		0.121			pCi/g						
Accuracy, Radium-228		0.215			pCi/g						
Accuracy, Ruthenium-103		0.0255			pCi/g						
Accuracy, Ruthenium-106		0.183			pCi/g						
Accuracy, Thorium-231		0.192			pCi/g						
Accuracy, Thorium-232		0.130			pCi/g						
Accuracy, Thorium-234		1.09			pCi/g						
Accuracy, Uranium-235		0.0914			pCi/g						
Accuracy, Uranium-238		1.09			pCi/g						
Accuracy, Yttrium-88		0.0148			pCi/g						
Accuracy, Zirconium-95		0.0411			pCi/g						
Actinium-228		0.968	+/- 0.215	0.0420	0.110	1.0					
Americium-241		0.0373	+/- 0.0704	0.0308	0.109	1.0					
Cerium-144	U	-0.00608	+/- 0.0919	0.0506	0.161	1.0					
Cesium-134	U	-0.00730	+/- 0.0186	0.00839	0.0274	1.0					
Cesium-137		0.271	+/- 0.0613	0.00910	0.0315	1.0					

PO Box 30712 • Charleston, SC 29417 • 2040 Savage Road • 29407

(803) 556-8171 • Fax (803) 766-1178



Printed on recycled paper.



9702008-62

1137



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 Salmi
Project Description: RFP #AJ2480A

cc: SNLS00396

Report Date: February 27, 1997

Page 2 of 3

Sample ID		: 032531-015 CCTA 61A-GR-098-D									
Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch M
Chromium-51	U	0.0837	+/- 0.233	0.121	0.398	pCi/g	1.0				
Cobalt-60	U	-0.0115	+/- 0.0219	0.00962	0.0367	pCi/g	1.0	SCM	02/23/97	1700	97683 1
Iron-59	U	-0.0400	+/- 0.0665	0.0235	0.0957	pCi/g	1.0				
Lead-212		0.975	+/- 0.134	0.0178	0.0492	pCi/g	1.0				
Lead-214		0.827	+/- 0.135	0.0173	0.0569	pCi/g	1.0				
Potassium-40		24.8	+/- 2.59	0.146	0.285	pCi/g	1.0				
Radium-226		0.700	+/- 0.121	0.0209	0.0539	pCi/g	1.0				
Radium-228		0.968	+/- 0.215	0.0420	0.110	pCi/g	1.0				
Ruthenium-103	U	-0.00307	+/- 0.0255	0.0114	0.0393	pCi/g	1.0				
Ruthenium-106	U	0.0503	+/- 0.183	0.0909	0.286	pCi/g	1.0				
Thorium-231	U	0.00	+/- 0.192	0.0427	0.174	pCi/g	1.0				
Thorium-232		0.950	+/- 0.13	0.0174	0.0475	pCi/g	1.0				
Thorium-234		1.43	+/- 1.09	0.307	0.867	pCi/g	1.0				
Uranium-235	U	0.0257	+/- 0.0914	0.0551	0.161	pCi/g	1.0				
Uranium-238		1.43	+/- 1.09	0.307	0.867	pCi/g	1.0				
Zirconium-95		0.0495	+/- 0.0411	0.0171	0.0757	pCi/g	1.0				

M = Method	Method-Description
M 1	HASL 300

GEL Laboratory Certifications

EPI Laboratory Certifications

1138

PO Box 30712 • Charleston, SC 29417 • 2040 Savage Road • 29407

9702008-62

(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 87185-0854
Contact: Mr. Doug Salmi
Project Description: RFP #AJ2480A

cc: SNLS00396

Report Date: February 28, 1997

Page 1 of 3

Sample ID : 032536-009 CCTA 61A-GR-000-EB
Lab ID : 9702008-72
Matrix : AQUEOUS
Date Collected : 01/28/97
Date Received : 02/01/97
Priority : Routine
Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological											
Gamma PHA - 43 items											
Accuracy, Actinium-228		7.12			pCi/L		SCM	02/24/97	1646	98015	1
Accuracy, Americium-241		9.27			pCi/L						
Accuracy, Cerium-144		26.0			pCi/L						
Accuracy, Cesium-134		1.83			pCi/L						
Accuracy, Cesium-137		1.84			pCi/L						
Accuracy, Chromium-51		28.1			pCi/L						
Accuracy, Cobalt-60		1.79			pCi/L						
Accuracy, Iron-59		4.68			pCi/L						
Accuracy, Lead-212		5.32			pCi/L						
Accuracy, Lead-214		4.19			pCi/L						
Accuracy, Potassium-40		21.2			pCi/L						
Accuracy, Radium-226		4.91			pCi/L						
Accuracy, Radium-228		7.12			pCi/L						
Accuracy, Ruthenium-103		2.72			pCi/L						
Accuracy, Ruthenium-106		17.0			pCi/L						
Accuracy, Thorium-231		10.5			pCi/L						
Accuracy, Thorium-232		5.18			pCi/L						
Accuracy, Thorium-234		104			pCi/L						
Accuracy, Uranium-235		26.7			pCi/L						
Accuracy, Uranium-238		104			pCi/L						
Accuracy, Yttrium-88		2.91			pCi/L						
Accuracy, Zirconium-95		3.97			pCi/L						
Actinium-228	U	6.62	+/- 7.12	6.83	14.3	pCi/L	1.0				
Americium-241	U	1.94	+/- 9.27	8.50	17.0	pCi/L	1.0				
Cerium-144	U	0.00	+/- 26	11.3	21.9	pCi/L	1.0				
Cesium-134	U	-0.490	+/- 1.83	1.64	3.26	pCi/L	1.0				
Cesium-137	U	-0.931	+/- 1.84	1.81	3.19	pCi/L	1.0				

1143

PO Box 30712 • Charleston, SC 29417 • 2040 Savage Road • 29407

(803) 556-8171 • Fax (803) 766-1178

Printed on recycled paper



9702008-72



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 Salmi
Project Description: RFP #AJ2480A

cc: SNLS00396

Report Date: February 28, 1997

Page 2 of 3

Sample ID : 032536-009 CCTA 61A-GR-000-EB

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Chromium-51	U	-6.57 +/- 28.1	22.9	47.6	pCi/L	1.0					
Cobalt-60	U	-0.147 +/- 1.79	1.50	3.45	pCi/L	1.0	SCM	02/24/97	1646	98015	1
Iron-59	U	-2.61 +/- 4.68	4.38	7.79	pCi/L	1.0					
Lead-212	U	1.61 +/- 5.32	3.07	6.63	pCi/L	1.0					
Lead-214		4.81 +/- 4.19	3.75	7.80	pCi/L	1.0					
Potassium-40		30.1 +/- 21.2	17.0	47.1	pCi/L	1.0					
Radium-226	U	0.715 +/- 4.91	3.44	7.88	pCi/L	1.0					
Radium-228	U	6.62 +/- 7.12	6.83	14.3	pCi/L	1.0					
Ruthenium-103	U	-0.351 +/- 2.72	2.71	4.95	pCi/L	1.0					
Ruthenium-106	U	-0.982 +/- 17	12.7	31.1	pCi/L	1.0					
Thorium-231	U	-3.20 +/- 10.5	8.70	17.7	pCi/L	1.0					
Thorium-232	U	1.57 +/- 5.18	2.98	6.44	pCi/L	1.0					
Thorium-234	U	52.1 +/- 104	75.8	133	pCi/L	1.0					
Uranium-235	U	3.14 +/- 26.7	11.5	23.9	pCi/L	1.0					
Uranium-238	U	52.1 +/- 104	75.8	133	pCi/L	1.0					
Zirconium-95	U	-0.328 +/- 3.97	3.73	7.25	pCi/L	1.0					

M = Method

Method-Description

M 1

EPI A-013

GEL Laboratory Certifications

EPI Laboratory Certifications

PO Box 30712 • Charleston, SC 29417 • 2040 Savage Road • 29407

1149

9702008-72

(803) 556-8171 • Fax (803) 766-1178

Printed on recycled paper

ANALYSIS REQUEST AND CHAIN OF CUSTODY

PAGE 1 OF 2

Internal Lab

Batch No. 700137

AR/COC-06129

SF 2001-COC (6-95)

Dept. No./Mail Stop: 6685 / 1148		Date Samples Shipped: _____		Contract No.: _____		Parameter & Method Requested													
Project/Task Manager: AAS / PAVLETICH		Carrier/Waybill No.: _____		Case No. 5834 2061AD		<div style="writing-mode: vertical-rl; transform: rotate(180deg);">SAMMA SPEL</div>													
Project Name: CENT. COYOTE TEST AREA 61A		Lab Contact: FERNANDO DOMINGUEZ		SMO Authorization: _____															
Record Center Code: ER/1334 61A / DAT		Lab Destination: 7715		Bill to: Sandia National Laboratories															
Logbook Ref No: 0151		SMO Contact/Phone: DON SALMI B44-3110		Supplier Services Department															
Service Order No.: 8834. 2061AD		Send Report to SMO: KATHY BECKER		P.O. Box 5800 MS 0154		Albuquerque, NM 87185-0154													
Location		Tech Area N/A		Reference LOV (available at SMO)															
Building N/A Room N/A		Beginning Depth in Ft.		ER Site No.		Date/Time Collected		Sample Matrix		Container		Preservative		Sample Collection Method		Sample Type		Lab Sample ID	
Sample No. - Fraction		ER Sample ID or Sample Location Detail																	
032523-013		CCTA-61A-GR-094-D		N/A		61A		1/28/97		S		P		500ml		4°C		G SA X	
032524-005		CCTA-61A-GR-094-D-0.5-S		D-0.5				1415										X	
032525-009		CCTA-61A-GR-095-D		N/A				1240										X	
032526-005		CCTA-61A-GR-095-D-0.5-S		D-0.5				1430										X	
032527-009		CCTA-61A-GR-096-D		N/A				1255										X	
032528-005		CCTA-61A-GR-096-D-0.5-S		D-0.5				1440										X	
032529-010		CCTA-61A-GR-097-D		N/A				1305										X	
032530-005		CCTA-61A-GR-097-D-0.5-S		D-0.5				1440										X	
032531-012		CCTA-61A-GR-098-D		N/A				1330										X	
032531-023		↓		↓		↓		↓		↓		↓		↓		DU		X	
RMMA <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Ref. No. _____				Sample Tracking				Special Instructions/QC Requirements				Abnormal Conditions on Receipt							
Sample Disposal <input checked="" type="checkbox"/> Return to Client <input type="checkbox"/> Disposal by lab				Date Entered (mm/dd/yy) _____				RELEASES AR/COC ± D6127 OFF SITE				1 ± D6128 ON SITE							
Turnaround Time <input type="checkbox"/> Normal <input checked="" type="checkbox"/> Rush Required Report Date _____				QC Init. _____				FAX RESULTS TO CRAIG BROWN AT 204-2616, & CALL AT 204-2107											
Sample Team Members		Name		Signature		Init		Company/Organization/Phone											
		JOE PAVLETICH		Joe Pavletich		JP		GRAM / 6685 / 284-2179											
1. Relinquished by		Org. 6685		Date 1-29-97		Time 0915		4. Relinquished by		Org. SMO 7578		Date 2/6/97		Time 0815					
1. Received by		Org. SMO 7578		Date 1-29-97		Time 0915		4. Received by		Org. 6685		Date 2/6/97		Time 0815					
2. Relinquished by		Org. SMO 7578		Date 1/29/97		Time 1430		5. Relinquished by		Org.		Date		Time					
2. Received by		Org. 7578		Date 1/29/97		Time 1430		5. Received by		Org.		Date		Time					
3. Relinquished by		Org. 7578		Date 1/30/97		Time 1318		6. Relinquished by		Org.		Date		Time					
3. Received by		Org. SMO 7578		Date 1/30/97		Time 1318		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

PAGE 2 OF 2

AR/COC-	06129
---------	-------

Parameter & Method Requested

[illegible]



Sandia National Laboratories
Radiation Protection Sample Diagnostics

Sample Analysis Request Form

Page 1 of 2

To be completed by Customer

Shaded areas are for RPSD use only

Customer: <u>AAS / PAVLETICH</u>	Hazards/Special Instructions: <u>RELEASES AIR COL # D612B & D6129</u> <u>FAX RESULTS TO CRAIG BROWN</u> <u>AT 284-2616</u> <u>AND CALL AT 284-2107</u> <u>RUSH</u>	Batch Log Number: _____	<input type="checkbox"/> Gamma Spec <input type="checkbox"/> H-3 <input type="checkbox"/> Alpha/Beta <input type="checkbox"/> Alpha Spec <input type="checkbox"/> Total U <input type="checkbox"/> Other
Organization: <u>46BS</u>		Logged By: _____	
Project Location: <u>CCTA - Site 61A</u>		Analysis Type: _____	
Phone: <u>284-2479</u>		LIMS Login: _____	
Date Results Needed: <u>ASAP</u>		Results Faxed: _____	
Suspect Isotopes: <u>U, Th</u>		Sample Disposal: _____	
Other Information: _____			

Customer Sample ID	Sample Type	Date/Time Collected	Sample Volume	Requested Analysis	RPSD Sample ID	Rad Scan CPM	Sample Weight	Remarks
032523-013	SA	1-28-97 1000	500ml	GAMMA SPEC				
032524-005		1415						
032525-009		1200						
032526-005		1430						
032527-009		1255						
032528-005		1440						
032529-010		1305						
032530-005		1440						
032531-022		1330						
032531-023		1330						
032532-010		1500						
032532-011		1500						
032533-009		1335						
032534-005	✓	✓ 1517	✓	✓				

Relinquished by <u>Joe Paster</u>	Date <u>1-29-97</u>	Time <u>0915</u>	Received by <u>[Signature]</u>	Date <u>1-29-97</u>	Time <u>0915</u>
Relinquished by _____	Date _____	Time _____	Received by _____	Date _____	Time _____
Relinquished by _____	Date _____	Time _____	Received by _____	Date _____	Time _____
Relinquished by _____	Date _____	Time _____	Received by _____	Date _____	Time _____

To be completed by Customer

Shaded areas are for RPSD use only

Customer: AAS/PAVLETCH
Organization: GLBBS
Project Location: CCTA - Site 61A
Phone: 284-2479
Date Results Needed: ASAP
Suspect Isotopes: V, Th
Other Information:

Hazards/Special Instructions:

RUSH

Batch Log Number:

Logged By:

Analysis Type

LIMS Login

Results Faxed

Sample Disposal

- ☐ Gamma Spec
- ☐ H-3
- ☐ Alpha/Beta
- ☐ Alpha Spec
- ☐ Total U
- ☐ Other

[illegible]Relinquished by for [Signature]

Date 1-25-57

Time 0915-

Received by

Date 1-29-97

Time 09/3

Relinquished by

Date _____

Time

Received by _____

Date _____

Time

Relinquished by

Date _____

Time

Received by _____

Date _____

Time

Relinquished by

Date _____

Time

Received by _____

Date _____

•

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 1-29-97 12:43:54 PM *

 * Analyzed by: *ASJ 1/30/97* Reviewed by: *[Signature] 1/30/97* *

Customer : AAS/PAVLETICH (6685)
 Customer Sample ID : 032523-013
 Lab Sample ID : 70013701

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 843.000 gram
 Sample Date/Time : 1-28-97 12:00:00 AM
 Acquire Start Date/Time : 1-29-97 10:54:07 AM
 Detector Name : LAB02
 Elapsed Live/Real Time : 6000 / 6003 seconds

INFORMATION ONLY

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	2.76E+00
TH-234	8.68E-01	4.08E-01	4.63E-01
RA-226	9.57E-01	5.70E-01	4.71E-01
PB-214	4.12E-01	7.80E-02	3.57E-02
BI-214	4.12E-01	8.75E-02	3.97E-02
TH-232	5.34E-01	2.65E-01	1.15E-01
RA-228	6.24E-01	2.02E-01	1.19E-01
AC-228	6.18E-01	1.69E-01	5.82E-02
TH-228	5.05E-01	4.45E-01	3.59E-01
RA-224	5.43E-01	1.87E-01	6.43E-02
PB-212	5.74E-01	1.00E-01	3.13E-02
BI-212	6.14E-01	5.98E-01	2.32E-01
TL-208	5.29E-01	3.54E-01	5.16E-02
U-235	1.29E-01	1.49E-01	1.92E-01
TH-231	Not Detected	-----	2.21E+00
PA-231	Not Detected	-----	1.13E+00
TH-227	Not Detected	-----	2.89E-01
RA-223	Not Detected	-----	1.59E-01
RN-219	Not Detected	-----	3.11E-01
PB-211	Not Detected	-----	7.25E-01
TL-207	Not Detected	-----	1.09E+01
AM-241	Not Detected	-----	4.48E-01
PU-239	Not Detected	-----	3.62E+02
NP-237	3.29E-01	1.37E-01	2.20E-01
PA-233	Not Detected	-----	4.68E-02
TH-229	Not Detected	-----	2.26E-01

not detected ASJ 1/30/97

not detected [Signature] 1/30/97

[Summary Report] - Sample ID: : 70013701

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.20E-02
AG-110m	Not Detected	-----	3.88E-02
BA-133	Not Detected	-----	4.60E-02
BE-7	Not Detected	-----	2.04E-01
CD-109	Not Detected	-----	7.57E-01
CD-115	Not Detected	-----	7.98E-02
CE-139	Not Detected	-----	2.45E-02
CE-141	Not Detected	-----	4.39E-02
CE-144	Not Detected	-----	1.93E-01
CO-56	Not Detected	-----	1.98E-02
CO-57	Not Detected	-----	2.64E-02
CO-58	Not Detected	-----	2.47E-02
CO-60	Not Detected	-----	2.92E-02
CR-51	Not Detected	-----	1.86E-01
CS-134	Not Detected	-----	3.85E-02
CS-137	1.67E-01	3.97E-02	1.95E-02
EU-152	Not Detected	-----	2.02E-01
EU-154	Not Detected	-----	1.45E-01
EU-155	Not Detected	-----	1.16E-01
FE-59	Not Detected	-----	5.94E-02
GD-153	Not Detected	-----	9.18E-02
HG-203	Not Detected	-----	2.31E-02
I-131	Not Detected	-----	2.44E-02
IR-192	Not Detected	-----	2.23E-02
K-40	1.43E+01	2.07E+00	1.87E-01
MN-52	Not Detected	-----	2.75E-02
MN-54	Not Detected	-----	1.51E-02
MO-99	Not Detected	-----	2.86E-01
NA-22	Not Detected	-----	3.24E-02
NA-24	Not Detected	-----	1.35E-01
NB-95	Not Detected	-----	1.77E-01
ND-147	Not Detected	-----	1.75E-01
NI-57	5.71E-02	4.04E-02	3.84E-02
RU-103	Not Detected	-----	2.25E-02
RU-106	Not Detected	-----	2.22E-01
SB-122	Not Detected	-----	4.45E-02
SB-124	Not Detected	-----	2.57E-02
SB-125	Not Detected	-----	6.98E-02
SR-85	Not Detected	-----	3.05E-02
TA-182	Not Detected	-----	1.19E-01
TA-183	Not Detected	-----	4.68E-01
TC-99m	Not Detected	-----	1.31E+00
TL-201	Not Detected	-----	1.82E-01
XE-133	Not Detected	-----	1.60E-01
Y-88	Not Detected	-----	2.03E-02
ZN-65	Not Detected	-----	7.65E-02
ZR-95	Not Detected	-----	4.81E-02

Not detected 12/13/97

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 1-29-97 2:35:42 PM *

 *
 * Analyzed by: *MS* 1/30/97 Reviewed by: *[Signature]* 1/30/97 *

Customer : AAS/PAVLETICH (6685)
 Customer Sample ID : 032524-005
 Lab Sample ID : 70013702

 Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 796.000 gram
 Sample Date/Time : 1-28-97 2:15:00 PM
 Acquire Start Date/Time : 1-29-97 12:46:39 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	-----	2.80E+00
TH-234	8.24E-01	3.97E-01	4.34E-01
RA-226	1.14E+00	5.36E-01	4.36E-01
PB-214	4.26E-01	8.61E-02	3.65E-02
BI-214	Not Detected	-----	3.72E-02
TH-232	5.63E-01	2.91E-01	1.13E-01
RA-228	5.61E-01	2.19E-01	1.25E-01
AC-228	6.24E-01	3.81E-01	6.12E-02
TH-228	Not Detected	-----	3.77E-01
RA-224	6.39E-01	3.37E-01	8.06E-02
PB-212	6.15E-01	1.50E-01	3.33E-02
BI-212	6.01E-01	2.94E-01	2.47E-01
TL-208	5.85E-01	1.21E-01	4.82E-02
U-235	Not Detected	-----	1.95E-01
TH-231	Not Detected	-----	2.19E+00
PA-231	Not Detected	-----	1.19E+00
TH-227	Not Detected	-----	2.99E-01
RA-223	Not Detected	-----	1.56E-01
RN-219	Not Detected	-----	3.21E-01
PB-211	Not Detected	-----	7.38E-01
TL-207	Not Detected	-----	1.10E+01
AM-241	Not Detected	-----	4.46E-01
PU-239	Not Detected	-----	3.66E+02
NP-237	2.91E-01	1.24E-01	2.25E-01 <i>not detected MS 1/30/97</i>
PA-233	Not Detected	-----	4.79E-02
TH-229	Not Detected	-----	2.33E-01

[Summary Report] - Sample ID: : 70013702

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.18E-02
AG-110m	Not Detected	-----	2.59E-02
BA-133	Not Detected	-----	4.75E-02
BE-7	Not Detected	-----	1.93E-01
CD-109	Not Detected	-----	7.75E-01
CD-115	Not Detected	-----	7.05E-02
CE-139	Not Detected	-----	2.42E-02
CE-141	Not Detected	-----	4.43E-02
CE-144	Not Detected	-----	1.96E-01
CO-56	Not Detected	-----	2.90E-02
CO-57	Not Detected	-----	2.61E-02
CO-58	Not Detected	-----	2.46E-02
CO-60	Not Detected	-----	2.86E-02
CR-51	Not Detected	-----	1.91E-01
CS-134	Not Detected	-----	3.89E-02
CS-137	Not Detected	-----	2.90E-02
EU-152	Not Detected	-----	2.02E-01
EU-154	Not Detected	-----	1.44E-01
EU-155	Not Detected	-----	1.12E-01
FE-59	Not Detected	-----	6.08E-02
GD-153	Not Detected	-----	9.18E-02
HG-203	Not Detected	-----	2.41E-02
I-131	Not Detected	-----	2.51E-02
IR-192	Not Detected	-----	2.24E-02
K-40	1.43E+01	2.10E+00	1.95E-01
MN-52	Not Detected	-----	2.52E-02
MN-54	Not Detected	-----	2.75E-02
MO-99	Not Detected	-----	2.67E-01
NA-22	Not Detected	-----	3.39E-02
NA-24	Not Detected	-----	7.58E-02
NB-95	Not Detected	-----	1.65E-01
ND-147	Not Detected	-----	1.66E-01
NI-57	5.11E-02	3.71E-02	3.07E-02
RU-103	Not Detected	-----	2.31E-02
RU-106	Not Detected	-----	2.26E-01
SB-122	Not Detected	-----	4.14E-02
SB-124	Not Detected	-----	2.61E-02
SB-125	Not Detected	-----	6.75E-02
SR-85	Not Detected	-----	3.03E-02
TA-182	Not Detected	-----	1.28E-01
TA-183	Not Detected	-----	4.36E-01
TC-99m	Not Detected	-----	3.32E-01
TL-201	Not Detected	-----	1.59E-01
XE-133	Not Detected	-----	1.35E-01
Y-88	Not Detected	-----	2.16E-02
ZN-65	Not Detected	-----	8.47E-02
ZR-95	Not Detected	-----	4.92E-02

not detected 1/30/97

```

*****
*                               Sandia National Laboratories                               *
*   Radiation Protection Sample Diagnostics Program [881 Laboratory]                     *
*                               1-29-97  4:27:15 PM                                   *
*****
*
* Analyzed by: AS 1/30/97           Reviewed by: [Signature] 1/30/97
*****
Customer      : AAS/PAVLETICH (6685)
Customer Sample ID : 032525-009
Lab Sample ID  : 70013703

```

```

Sample Description      : MARINELLI SOLID SAMPLE
Sample Quantity        : 667.000 gram
Sample Date/Time       : 1-28-97 12:40:00 PM
Acquire Start Date/Time : 1-29-97 2:38:25 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	-----	3.35E+00
TH-234	7.01E-01	4.05E-01	5.73E-01
RA-226	1.07E+00	4.37E-01	5.34E-01
PB-214	5.09E-01	9.63E-02	4.40E-02
BI-214	4.53E-01	1.49E-01	4.65E-02
TH-232	5.72E-01	3.06E-01	1.38E-01
RA-228	7.70E-01	3.26E-01	1.52E-01
AC-228	6.92E-01	1.79E-01	7.33E-02
TH-228	4.97E-01	2.05E-01	4.85E-01
RA-224	6.77E-01	2.20E-01	7.61E-02
PB-212	6.57E-01	2.87E-01	3.68E-02
BI-212	6.16E-01	2.95E-01	2.96E-01
TL-208	6.50E-01	1.58E-01	5.93E-02
U-235	Not Detected	-----	2.28E-01
TH-231	Not Detected	-----	2.66E+00
PA-231	Not Detected	-----	1.41E+00
TH-227	Not Detected	-----	3.48E-01
RA-223	Not Detected	-----	1.89E-01
RN-219	3.27E-01	3.51E-01	4.00E-01
PB-211	Not Detected	-----	9.34E-01
TL-207	Not Detected	-----	1.27E+01
AM-241	Not Detected	-----	5.36E-01
PU-239	Not Detected	-----	4.35E+02
NP-237	Not Detected	-----	3.76E-01
PA-233	Not Detected	-----	5.99E-02
TH-229	Not Detected	-----	2.77E-01

not detected AS 1/30/97

[Summary Report] - Sample ID: : 70013703

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.87E-02
AG-110m	Not Detected	-----	5.56E-02
BA-133	Not Detected	-----	5.67E-02
BE-7	Not Detected	-----	2.44E-01
CD-109	Not Detected	-----	6.32E-01
CD-115	Not Detected	-----	8.65E-02
CE-139	Not Detected	-----	2.88E-02
CE-141	Not Detected	-----	5.24E-02
CE-144	Not Detected	-----	2.31E-01
CO-56	Not Detected	-----	3.54E-02
CO-57	Not Detected	-----	3.07E-02
CO-58	Not Detected	-----	2.89E-02
CO-60	Not Detected	-----	3.78E-02
CR-51	Not Detected	-----	2.32E-01
CS-134	Not Detected	-----	4.68E-02
CS-137	Not Detected	-----	2.53E-02
EU-152	Not Detected	-----	2.41E-01
EU-154	Not Detected	-----	1.74E-01
EU-155	Not Detected	-----	1.35E-01
FE-59	Not Detected	-----	6.99E-02
GD-153	Not Detected	-----	1.10E-01
HG-203	Not Detected	-----	2.85E-02
I-131	Not Detected	-----	3.06E-02
IR-192	Not Detected	-----	2.83E-02
K-40	1.78E+01	2.60E+00	2.22E-01
MN-52	Not Detected	-----	3.33E-02
MN-54	Not Detected	-----	3.21E-02
MO-99	Not Detected	-----	3.23E-01
NA-22	Not Detected	-----	4.27E-02
NA-24	Not Detected	-----	1.10E-01
NB-95	Not Detected	-----	1.98E-01
ND-147	Not Detected	-----	2.06E-01
NI-57	Not Detected	-----	7.75E-02
RU-103	Not Detected	-----	2.87E-02
RU-106	Not Detected	-----	2.75E-01
SB-122	Not Detected	-----	5.36E-02
SB-124	Not Detected	-----	3.22E-02
SB-125	Not Detected	-----	8.41E-02
SR-85	Not Detected	-----	3.67E-02
TA-182	Not Detected	-----	1.45E-01
TA-183	Not Detected	-----	5.34E-01
TC-99m	Not Detected	-----	5.70E-01
TL-201	Not Detected	-----	2.00E-01
XE-133	Not Detected	-----	1.69E-01
Y-88	Not Detected	-----	2.51E-02
ZN-65	Not Detected	-----	9.62E-02
ZR-95	Not Detected	-----	5.83E-02

 Sandia National Laboratories
 Radiation Protection Sample Diagnostics Program [881 Laboratory]
 1-29-97 6:18:36 PM

Analyzed by: *ASJ 1/30/97* Reviewed by: *[Signature] 1/30/97*

Customer : AAS/PAVLETICH (6685)
 Customer Sample ID : 032526-005
 Lab Sample ID : 70013704

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 789.000 gram
 Sample Date/Time : 1-28-97 2:30:00 PM
 Acquire Start Date/Time : 1-29-97 4:29:50 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	-----	2.77E+00
TH-234	3.77E-01	1.47E-01	4.08E-01
RA-226	1.06E+00	5.22E-01	4.04E-01
PB-214	3.71E-01	1.30E-01	3.56E-02
BI-214	3.53E-01	7.36E-02	3.69E-02
TH-232	Not Detected	-----	1.13E-01
RA-228	6.19E-01	1.86E-01	1.04E-01
AC-228	6.11E-01	5.21E-01	6.68E-02
TH-228	5.50E-01	2.11E-01	4.00E-01
RA-224	6.94E-01	2.48E-01	6.25E-02
PB-212	5.97E-01	1.08E-01	3.06E-02
BI-212	6.43E-01	3.31E-01	2.38E-01
TL-208	4.93E-01	1.10E-01	5.22E-02
U-235	Not Detected	-----	1.86E-01
TH-231	Not Detected	-----	2.20E+00
PA-231	Not Detected	-----	1.17E+00
TH-227	Not Detected	-----	2.96E-01
RA-223	Not Detected	-----	1.53E-01
RN-219	Not Detected	-----	3.02E-01
PB-211	Not Detected	-----	7.10E-01
TL-207	Not Detected	-----	1.13E+01
AM-241	Not Detected	-----	4.33E-01
PU-239	Not Detected	-----	3.52E+02
NP-237	Not Detected	-----	3.04E-01
PA-233	Not Detected	-----	4.62E-02
TH-229	Not Detected	-----	2.28E-01

[Summary Report] - Sample ID: : 70013704

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.22E-02
AG-110m	Not Detected	-----	2.47E-02
BA-133	Not Detected	-----	4.55E-02
BE-7	Not Detected	-----	1.95E-01
CD-109	Not Detected	-----	1.04E+00
CD-115	Not Detected	-----	7.12E-02
CE-139	Not Detected	-----	2.41E-02
CE-141	Not Detected	-----	4.26E-02
CE-144	Not Detected	-----	1.93E-01
CO-56	Not Detected	-----	1.87E-02
CO-57	Not Detected	-----	2.60E-02
CO-58	Not Detected	-----	2.40E-02
CO-60	Not Detected	-----	2.74E-02
CR-51	Not Detected	-----	1.81E-01
CS-134	Not Detected	-----	3.79E-02
CS-137	Not Detected	-----	2.70E-02
EU-152	Not Detected	-----	2.05E-01
EU-154	Not Detected	-----	1.46E-01
EU-155	Not Detected	-----	1.12E-01
FE-59	Not Detected	-----	5.58E-02
GD-153	Not Detected	-----	8.90E-02
HG-203	Not Detected	-----	2.34E-02
I-131	Not Detected	-----	2.44E-02
IR-192	Not Detected	-----	2.17E-02
K-40	1.23E+01	1.85E+00	1.77E-01
MN-52	Not Detected	-----	2.78E-02
MN-54	Not Detected	-----	2.85E-02
MO-99	Not Detected	-----	2.56E-01
NA-22	Not Detected	-----	3.08E-02
NA-24	Not Detected	-----	9.47E-02
NB-95	Not Detected	-----	1.69E-01
ND-147	Not Detected	-----	1.68E-01
NI-57	Not Detected	-----	6.17E-02
RU-103	Not Detected	-----	2.13E-02
RU-106	Not Detected	-----	2.30E-01
SB-122	Not Detected	-----	4.12E-02
SB-124	Not Detected	-----	2.51E-02
SB-125	Not Detected	-----	6.74E-02
SR-85	Not Detected	-----	2.98E-02
TA-182	Not Detected	-----	1.13E-01
TA-183	Not Detected	-----	4.36E-01
TC-99m	Not Detected	-----	4.69E-01
TL-201	Not Detected	-----	1.68E-01
XE-133	Not Detected	-----	1.40E-01
Y-88	Not Detected	-----	2.16E-02
ZN-65	Not Detected	-----	7.56E-02
ZR-95	Not Detected	-----	4.58E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 1-29-97 8:10:42 PM *

 *
 * Analyzed by: *AS* 1/30/97 Reviewed by: *[Signature]* 1/30/97 *

Customer : AAS/PAVLETICH (6685)
 Customer Sample ID : 032527-009
 Lab Sample ID : 70013705

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 973.000 gram
 Sample Date/Time : 1-28-97 12:55:00 PM
 Acquire Start Date/Time : 1-29-97 6:21:12 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	-----	2.72E+00
TH-234	1.38E+00	4.92E-01	4.89E-01
RA-226	9.75E-01	4.81E-01	4.36E-01
PB-214	4.47E-01	8.80E-02	3.32E-02
BI-214	4.23E-01	1.04E-01	3.54E-02
TH-232	6.74E-01	3.20E-01	1.11E-01
RA-228	6.08E-01	2.15E-01	1.19E-01
AC-228	7.01E-01	1.73E-01	6.54E-02
TH-228	6.95E-01	2.27E-01	3.78E-01
RA-224	7.55E-01	2.28E-01	5.70E-02
PB-212	6.54E-01	1.32E-01	3.08E-02
BI-212	8.51E-01	3.66E-01	2.55E-01
TL-208	6.24E-01	3.85E-01	4.92E-02
U-235	Not Detected	-----	1.91E-01
TH-231	Not Detected	-----	2.17E+00
PA-231	Not Detected	-----	1.16E+00
TH-227	Not Detected	-----	2.83E-01
RA-223	Not Detected	-----	1.55E-01
RN-219	Not Detected	-----	3.08E-01
PB-211	Not Detected	-----	7.18E-01
TL-207	Not Detected	-----	1.04E+01
AM-241	Not Detected	-----	4.43E-01
PU-239	Not Detected	-----	3.64E+02
NP-237	Not Detected	-----	2.43E-01
PA-233	Not Detected	-----	4.58E-02
TH-229	Not Detected	-----	2.30E-01

[Summary Report] - Sample ID: : 70013705

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.15E-02
AG-110m	Not Detected	-----	4.23E-02
BA-133	Not Detected	-----	4.47E-02
BE-7	Not Detected	-----	1.95E-01
CD-109	1.54E+00	5.48E-01	8.36E-01 <i>not detected 1/13/97</i>
CD-115	Not Detected	-----	7.41E-02
CE-139	Not Detected	-----	2.41E-02
CE-141	Not Detected	-----	4.44E-02
CE-144	Not Detected	-----	1.93E-01
CO-56	Not Detected	-----	1.77E-02
CO-57	Not Detected	-----	2.65E-02
CO-58	Not Detected	-----	2.45E-02
CO-60	Not Detected	-----	2.86E-02
CR-51	Not Detected	-----	1.88E-01
CS-134	Not Detected	-----	3.65E-02
CS-137	2.77E-01	3.73E-01	1.88E-02
EU-152	Not Detected	-----	1.87E-01
EU-154	Not Detected	-----	1.42E-01
EU-155	Not Detected	-----	1.12E-01
FE-59	Not Detected	-----	5.70E-02
GD-153	Not Detected	-----	9.14E-02
HG-203	Not Detected	-----	2.34E-02
I-131	Not Detected	-----	2.41E-02
IR-192	Not Detected	-----	2.21E-02
K-40	1.68E+01	2.39E+00	1.83E-01
MN-52	Not Detected	-----	2.55E-02
MN-54	1.41E-02	8.28E-02	1.31E-02 <i>not detected 1/13/97</i>
MO-99	Not Detected	-----	2.53E-01
NA-22	Not Detected	-----	3.18E-02
NA-24	Not Detected	-----	1.04E-01
NB-95	Not Detected	-----	1.66E-01
ND-147	Not Detected	-----	1.62E-01
NI-57	5.19E-02	8.01E-02	3.44E-02 <i>not detected 1/13/97</i>
RU-103	Not Detected	-----	2.25E-02
RU-106	Not Detected	-----	2.20E-01
SB-122	Not Detected	-----	4.28E-02
SB-124	Not Detected	-----	2.40E-02
SB-125	Not Detected	-----	6.62E-02
SR-85	Not Detected	-----	2.83E-02
TA-182	Not Detected	-----	1.14E-01
TA-183	Not Detected	-----	4.48E-01
TC-99m	Not Detected	-----	7.03E-01
TL-201	Not Detected	-----	1.69E-01
XE-133	Not Detected	-----	1.43E-01
Y-88	Not Detected	-----	2.00E-02
ZN-65	Not Detected	-----	7.65E-02
ZR-95	Not Detected	-----	4.54E-02

```

*****
Sandia National Laboratories
Radiation Protection Sample Diagnostics Program [881 Laboratory]
1-29-97 9:56:17 PM
*****
Analyzed by: ASD/1/30/97 Reviewed by: [Signature] 1/30/97
*****
Customer : AAS/PAVLETICH (6685)
Customer Sample ID : 032528-005
Lab Sample ID : 70013706

```

```

Sample Description : MARINELLI SOLID SAMPLE
Sample Quantity : 846.000 gram
Sample Date/Time : 1-28-97 2:40:00 PM
Acquire Start Date/Time : 1-29-97 8:13:27 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	-----	3.02E+00
TH-234	9.83E-01	3.62E-01	4.76E-01
RA-226	1.38E+00	5.04E-01	4.72E-01
PB-214	5.07E-01	1.03E-01	3.84E-02
BI-214	4.69E-01	9.06E-02	3.69E-02
TH-232	7.29E-01	3.88E-01	1.17E-01
RA-228	7.83E-01	2.30E-01	1.24E-01
AC-228	6.99E-01	2.66E-01	6.87E-02
TH-228	7.56E-01	2.23E-01	4.01E-01
RA-224	7.78E-01	2.99E-01	5.74E-02
PB-212	7.81E-01	1.31E-01	3.33E-02
BI-212	7.22E-01	3.58E-01	2.94E-01
TL-208	7.12E-01	1.32E-01	4.71E-02
U-235	Not Detected	-----	2.03E-01
TH-231	Not Detected	-----	2.31E+00
PA-231	Not Detected	-----	1.27E+00
TH-227	Not Detected	-----	3.23E-01
RA-223	Not Detected	-----	1.65E-01
RN-219	Not Detected	-----	3.30E-01
PB-211	Not Detected	-----	7.63E-01
TL-207	Not Detected	-----	1.10E+01
AM-241	Not Detected	-----	4.78E-01
PU-239	Not Detected	-----	3.86E+02
NP-237	Not Detected	-----	2.08E-01
PA-233	Not Detected	-----	4.94E-02
TH-229	Not Detected	-----	2.47E-01

[Summary Report] - Sample ID: : 70013706

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.47E-02
AG-110m	Not Detected	-----	2.71E-02
BA-133	Not Detected	-----	4.88E-02
BE-7	Not Detected	-----	2.04E-01
CD-109	1.29E+00	4.52E-01	7.17E-01 <i>not detected 2/11/30/97</i>
CD-115	Not Detected	-----	8.20E-02
CE-139	Not Detected	-----	2.49E-02
CE-141	Not Detected	-----	4.74E-02
CE-144	Not Detected	-----	2.08E-01
CO-56	Not Detected	-----	2.01E-02
CO-57	Not Detected	-----	2.82E-02
CO-58	Not Detected	-----	2.53E-02
CO-60	Not Detected	-----	3.05E-02
CR-51	Not Detected	-----	2.03E-01
CS-134	Not Detected	-----	4.06E-02
CS-137	Not Detected	-----	3.01E-02
EU-152	Not Detected	-----	2.08E-01
EU-154	Not Detected	-----	1.56E-01
EU-155	Not Detected	-----	1.19E-01
FE-59	Not Detected	-----	5.95E-02
GD-153	Not Detected	-----	9.63E-02
HG-203	Not Detected	-----	2.51E-02
I-131	Not Detected	-----	2.54E-02
IR-192	Not Detected	-----	2.37E-02
K-40	1.61E+01	2.29E+00	1.89E-01
MN-52	Not Detected	-----	3.04E-02
MN-54	Not Detected	-----	2.95E-02
MO-99	Not Detected	-----	2.89E-01
NA-22	Not Detected	-----	3.54E-02
NA-24	Not Detected	-----	1.10E-01
NB-95	Not Detected	-----	1.89E-01
ND-147	Not Detected	-----	1.68E-01
NI-57	6.64E-02	4.99E-02	3.59E-02 <i>not detected 2/11/30/97</i>
RU-103	Not Detected	-----	2.26E-02
RU-106	Not Detected	-----	2.32E-01
SB-122	Not Detected	-----	4.52E-02
SB-124	Not Detected	-----	2.74E-02
SB-125	Not Detected	-----	6.98E-02
SR-85	Not Detected	-----	3.09E-02
TA-182	Not Detected	-----	1.25E-01
TA-183	Not Detected	-----	4.89E-01
TC-99m	Not Detected	-----	7.58E-01
TL-201	Not Detected	-----	1.82E-01
XE-133	Not Detected	-----	1.50E-01
Y-88	Not Detected	-----	2.12E-02
ZN-65	Not Detected	-----	8.29E-02
ZR-95	Not Detected	-----	4.76E-02

 Sandia National Laboratories
 Radiation Protection Sample Diagnostics Program [881 Laboratory]
 1-29-97 11:41:21 PM

Analyzed by: *[Signature]* 1/30/97 Reviewed by: *[Signature]* 1/30/97

 Customer : AAS/PAVLETICH (6685)
 Customer Sample ID : 032529-010
 Lab Sample ID : 70013707

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 750.000 gram
 Sample Date/Time : 1-28-97 1:05:00 PM
 Acquire Start Date/Time : 1-29-97 9:58:33 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	-----	3.14E+00
TH-234	6.20E-01	3.53E-01	4.70E-01
RA-226	1.21E+00	4.50E-01	5.18E-01
PB-214	4.72E-01	1.01E-01	3.86E-02
BI-214	4.30E-01	9.32E-02	4.21E-02
TH-232	5.92E-01	2.92E-01	1.22E-01
RA-228	Not Detected	-----	1.28E-01
AC-228	6.94E-01	1.71E-01	7.63E-02
TH-228	5.21E-01	1.99E-01	4.22E-01
RA-224	6.29E-01	2.03E-01	6.87E-02
PB-212	6.34E-01	1.17E-01	3.72E-02
BI-212	7.67E-01	3.92E-01	2.40E-01
TL-208	5.98E-01	1.24E-01	5.53E-02
U-235	Not Detected	-----	2.19E-01
TH-231	Not Detected	-----	2.49E+00
PA-231	Not Detected	-----	1.33E+00
TH-227	Not Detected	-----	3.28E-01
RA-223	Not Detected	-----	1.78E-01
RN-219	Not Detected	-----	3.60E-01
PB-211	Not Detected	-----	8.21E-01
TL-207	Not Detected	-----	1.29E+01
AM-241	Not Detected	-----	5.00E-01
PU-239	Not Detected	-----	4.06E+02
NP-237	2.35E-01	1.86E-01	2.31E-01
PA-233	Not Detected	-----	5.32E-02
TH-229	Not Detected	-----	2.62E-01

not detected 1/30/97

[Summary Report] - Sample ID: : 70013707

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.63E-02
AG-110m	Not Detected	-----	4.24E-02
BA-133	Not Detected	-----	5.08E-02
BE-7	Not Detected	-----	2.24E-01
CD-109	Not Detected	-----	1.17E+00
CD-115	Not Detected	-----	8.77E-02
CE-139	Not Detected	-----	2.64E-02
CE-141	Not Detected	-----	5.03E-02
CE-144	Not Detected	-----	2.20E-01
CO-56	Not Detected	-----	2.13E-02
CO-57	Not Detected	-----	2.93E-02
CO-58	Not Detected	-----	2.83E-02
CO-60	Not Detected	-----	3.20E-02
CR-51	Not Detected	-----	2.07E-01
CS-134	Not Detected	-----	4.29E-02
CS-137	1.79E-01	4.48E-02	2.22E-02
EU-152	Not Detected	-----	2.32E-01
EU-154	Not Detected	-----	1.65E-01
EU-155	Not Detected	-----	1.28E-01
FE-59	Not Detected	-----	6.64E-02
GD-153	Not Detected	-----	1.02E-01
HG-203	Not Detected	-----	2.63E-02
I-131	Not Detected	-----	2.91E-02
IR-192	Not Detected	-----	2.47E-02
K-40	1.90E+01	2.70E+00	2.36E-01
MN-52	Not Detected	-----	3.10E-02
MN-54	Not Detected	-----	1.32E-02
MO-99	Not Detected	-----	3.21E-01
NA-22	Not Detected	-----	3.98E-02
NA-24	Not Detected	-----	1.46E-01
NB-95	Not Detected	-----	1.98E-01
ND-147	Not Detected	-----	1.85E-01
NI-57	Not Detected	-----	8.02E-02
RU-103	Not Detected	-----	2.54E-02
RU-106	Not Detected	-----	2.52E-01
SB-122	Not Detected	-----	5.24E-02
SB-124	Not Detected	-----	2.92E-02
SB-125	Not Detected	-----	7.88E-02
SR-85	Not Detected	-----	3.35E-02
TA-182	Not Detected	-----	1.34E-01
TA-183	Not Detected	-----	5.18E-01
TC-99m	Not Detected	-----	1.18E+00
TL-201	Not Detected	-----	2.02E-01
XE-133	Not Detected	-----	1.73E-01
Y-88	Not Detected	-----	2.22E-02
ZN-65	Not Detected	-----	9.43E-02
ZR-95	Not Detected	-----	5.30E-02

 Sandia National Laboratories
 Radiation Protection Sample Diagnostics Program [881 Laboratory]
 1-30-97 1:26:17 AM

Analyzed by: *MS/1/30/97* Reviewed by: *[Signature] 1/30/97*

 Customer : AAS/PAVLETICH (6685)
 Customer Sample ID : 032530-005
 Lab Sample ID : 70013708

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 734.000 gram
 Sample Date/Time : 1-28-97 2:48:00 PM
 Acquire Start Date/Time : 1-29-97 11:43:32 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	-----	2.98E+00
TH-234	7.98E-01	3.37E-01	4.84E-01
RA-226	1.10E+00	5.15E-01	4.23E-01
PB-214	4.58E-01	9.71E-02	4.13E-02
BI-214	4.10E-01	8.60E-02	4.03E-02
TH-232	6.18E-01	3.33E-01	1.15E-01
RA-228	6.54E-01	2.15E-01	1.36E-01
AC-228	6.83E-01	1.64E-01	6.47E-02
TH-228	6.63E-01	6.84E-01	3.97E-01
RA-224	6.28E-01	2.06E-01	6.20E-02
PB-212	6.25E-01	1.17E-01	3.57E-02
BI-212	7.49E-01	3.54E-01	2.35E-01
TL-208	5.57E-01	1.16E-01	5.52E-02
U-235	Not Detected	-----	2.06E-01
TH-231	Not Detected	-----	2.28E+00
PA-231	Not Detected	-----	1.23E+00
TH-227	Not Detected	-----	3.19E-01
RA-223	Not Detected	-----	1.67E-01
RN-219	2.81E-01	3.02E-01	3.46E-01 <i>not detected MS/1/30/97</i>
PB-211	Not Detected	-----	8.09E-01
TL-207	Not Detected	-----	1.14E+01
AM-241	Not Detected	-----	4.68E-01
PU-239	Not Detected	-----	3.90E+02
NP-237	Not Detected	-----	2.13E-01
PA-233	Not Detected	-----	5.14E-02
TH-229	Not Detected	-----	2.46E-01

[Summary Report] - Sample ID: : 70013708

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.47E-02
AG-110m	Not Detected	-----	2.72E-02
BA-133	Not Detected	-----	5.15E-02
BE-7	Not Detected	-----	2.08E-01
CD-109	9.79E-01	5.79E-01	7.33E-01 <i>not detected 2/13/97</i>
CD-115	Not Detected	-----	8.51E-02
CE-139	Not Detected	-----	2.53E-02
CE-141	Not Detected	-----	4.75E-02
CE-144	Not Detected	-----	2.05E-01
CO-56	Not Detected	-----	3.17E-02
CO-57	Not Detected	-----	2.81E-02
CO-58	Not Detected	-----	2.66E-02
CO-60	Not Detected	-----	3.16E-02
CR-51	Not Detected	-----	2.06E-01
CS-134	Not Detected	-----	4.13E-02
CS-137	Not Detected	-----	3.13E-02
EU-152	Not Detected	-----	2.17E-01
EU-154	Not Detected	-----	1.56E-01
EU-155	Not Detected	-----	5.87E-02
FE-59	Not Detected	-----	6.30E-02
GD-153	Not Detected	-----	9.65E-02
HG-203	Not Detected	-----	2.52E-02
I-131	Not Detected	-----	2.60E-02
IR-192	Not Detected	-----	2.41E-02
K-40	1.43E+01	2.07E+00	1.98E-01
MN-52	Not Detected	-----	2.85E-02
MN-54	Not Detected	-----	2.96E-02
MO-99	Not Detected	-----	3.01E-01
NA-22	Not Detected	-----	3.66E-02
NA-24	Not Detected	-----	1.37E-01
NB-95	Not Detected	-----	1.93E-01
ND-147	Not Detected	-----	1.78E-01
NI-57	4.55E-02	5.37E-02	4.76E-02 <i>not detected 2/13/97</i>
RU-103	Not Detected	-----	2.45E-02
RU-106	Not Detected	-----	2.48E-01
SB-122	Not Detected	-----	4.96E-02
SB-124	Not Detected	-----	2.74E-02
SB-125	Not Detected	-----	7.15E-02
SR-85	Not Detected	-----	3.27E-02
TA-182	Not Detected	-----	1.35E-01
TA-183	Not Detected	-----	4.92E-01
TC-99m	Not Detected	-----	1.11E+00
TL-201	Not Detected	-----	1.90E-01
XE-133	Not Detected	-----	1.59E-01
Y-88	Not Detected	-----	2.42E-02
ZN-65	Not Detected	-----	8.84E-02
ZR-95	Not Detected	-----	4.82E-02

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program [881 Laboratory]
1-29-97 1:07:47 PM

Analyzed by: *JS 1/30/97* Reviewed by: *JS 1/30/97*

Customer : AAS/PAVLETICH (6685)
Customer Sample ID : 032531-022
Lab Sample ID : 70013709

Sample Description : MARINELLI SOLID SAMPLE
Sample Quantity : 871.000 gram
Sample Date/Time : 1-28-97 1:30:00 PM
Acquire Start Date/Time : 1-29-97 11:19:55 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	-----	1.19E+00
TH-234	6.26E-01	2.96E-01	3.99E-01
RA-226	1.12E+00	5.74E-01	5.18E-01
PB-214	4.49E-01	8.96E-02	4.29E-02
BI-214	4.20E-01	1.07E-01	4.43E-02
TH-232	6.36E-01	3.12E-01	1.31E-01
RA-228	6.30E-01	2.70E-01	1.44E-01
AC-228	6.37E-01	9.88E-01	8.44E-02
TH-228	2.91E-01	2.16E-01	3.86E-01
RA-224	5.99E-01	2.81E-01	7.37E-02
PB-212	6.37E-01	1.18E-01	3.42E-02
BI-212	7.35E-01	3.24E-01	3.06E-01
TL-208	5.70E-01	1.01E+00	6.52E-02
U-235	Not Detected	-----	1.62E-01
TH-231	Not Detected	-----	1.62E+00
PA-231	Not Detected	-----	1.23E+00
TH-227	Not Detected	-----	2.84E-01
RA-223	Not Detected	-----	1.17E-01
RN-219	3.22E-01	2.60E-01	3.40E-01
PB-211	Not Detected	-----	7.66E-01
TL-207	Not Detected	-----	1.41E+01
AM-241	Not Detected	-----	1.58E-01
PU-239	Not Detected	-----	3.02E+02
NP-237	Not Detected	-----	2.32E-01
PA-233	Not Detected	-----	4.90E-02
TH-229	Not Detected	-----	1.83E-01

not detected JS 1/30/97

[Summary Report] - Sample ID: : 70013709

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-110m	Not Detected	-----	4.15E-02
BA-133	Not Detected	-----	3.57E-02
BE-7	Not Detected	-----	2.24E-01
CD-109	Not Detected	-----	5.76E-01
CD-115	Not Detected	-----	7.51E-02
CE-139	Not Detected	-----	2.31E-02
CE-141	Not Detected	-----	3.69E-02
CE-144	Not Detected	-----	1.62E-01
CO-56	Not Detected	-----	3.26E-02
CO-57	Not Detected	-----	2.11E-02
CO-58	Not Detected	-----	3.13E-02
CO-60	Not Detected	-----	3.54E-02
CR-51	Not Detected	-----	1.94E-01
CS-134	Not Detected	-----	3.50E-02
CS-137	1.50E-01	3.69E-02	2.22E-02
EU-152	Not Detected	-----	2.31E-01
EU-154	Not Detected	-----	1.64E-01
EU-155	Not Detected	-----	9.12E-02
FE-59	Not Detected	-----	7.50E-02
GD-153	Not Detected	-----	7.01E-02
HG-203	Not Detected	-----	2.55E-02
I-131	Not Detected	-----	2.53E-02
IR-192	Not Detected	-----	2.30E-02
K-40	1.72E+01	2.54E+00	2.45E-01
MN-54	Not Detected	-----	1.91E-02
MO-99	Not Detected	-----	2.81E-01
NA-22	Not Detected	-----	4.24E-02
NA-24	Not Detected	-----	8.06E-02
NB-95	Not Detected	-----	1.30E-01
ND-147	Not Detected	-----	1.82E-01
NI-57	Not Detected	-----	6.75E-02
RU-103	Not Detected	-----	2.45E-02
RU-106	Not Detected	-----	2.63E-01
SB-122	Not Detected	-----	4.64E-02
SB-124	Not Detected	-----	2.79E-02
SB-125	Not Detected	-----	7.45E-02
SR-85	Not Detected	-----	3.43E-02
TA-182	Not Detected	-----	1.45E-01
TA-183	Not Detected	-----	1.52E-01
TC-99m	Not Detected	-----	2.46E-01
TL-201	Not Detected	-----	8.08E-02
XE-133	Not Detected	-----	9.51E-02
Y-88	Not Detected	-----	2.27E-02
ZN-65	Not Detected	-----	9.74E-02
ZR-95	Not Detected	-----	5.37E-02

 Sandia National Laboratories
 Radiation Protection Sample Diagnostics Program [881 Laboratory]
 1-29-97 2:58:25 PM

Analyzed by: *YJ 1/30/97* Reviewed by: *[Signature] 1/30/97*

Customer : AAS/PAVLETICH (6685)
 Customer Sample ID : 032531-023
 Lab Sample ID : 70013710

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 741.000 gram
 Sample Date/Time : 1-28-97 1:30:00 PM
 Acquire Start Date/Time : 1-29-97 1:10:36 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	-----	1.36E+00
TH-234	9.64E-01	3.34E-01	4.52E-01
RA-226	1.35E+00	4.98E-01	5.10E-01
PB-214	4.74E-01	2.00E-01	5.01E-02
BI-214	4.87E-01	2.08E-01	5.00E-02
TH-232	6.53E-01	3.31E-01	1.52E-01
RA-228	7.90E-01	2.93E-01	1.59E-01
AC-228	6.46E-01	1.69E-01	9.25E-02
TH-228	6.05E-01	9.80E-01	5.08E-01
RA-224	8.13E-01	2.70E-01	9.87E-02
PB-212	6.87E-01	1.24E-01	4.05E-02
BI-212	7.27E-01	3.32E-01	3.46E-01
TL-208	6.83E-01	8.68E-01	6.93E-02
U-235	Not Detected	-----	1.84E-01
TH-231	Not Detected	-----	1.82E+00
PA-231	Not Detected	-----	1.39E+00
TH-227	Not Detected	-----	3.16E-01
RA-223	Not Detected	-----	1.33E-01
RN-219	Not Detected	-----	3.69E-01
PB-211	Not Detected	-----	8.37E-01
TL-207	Not Detected	-----	1.49E+01
AM-241	Not Detected	-----	1.75E-01
PU-239	Not Detected	-----	3.44E+02
NP-237	Not Detected	-----	2.59E-01
PA-233	Not Detected	-----	5.63E-02
TH-229	Not Detected	-----	2.01E-01

[Summary Report] - Sample ID: : 70013710

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-110m	Not Detected	-----	5.10E-02
BA-133	Not Detected	-----	4.19E-02
BE-7	Not Detected	-----	2.59E-01
CD-109	Not Detected	-----	8.81E-01
CD-115	Not Detected	-----	8.71E-02
CE-139	Not Detected	-----	2.50E-02
CE-141	Not Detected	-----	4.25E-02
CE-144	Not Detected	-----	1.74E-01
CO-56	Not Detected	-----	3.45E-02
CO-57	Not Detected	-----	2.30E-02
CO-58	Not Detected	-----	3.64E-02
CO-60	Not Detected	-----	4.39E-02
CR-51	Not Detected	-----	2.27E-01
CS-134	Not Detected	-----	3.97E-02
CS-137	2.25E-01	5.70E-02	2.93E-02
EU-152	Not Detected	-----	2.44E-01
EU-154	Not Detected	-----	1.95E-01
EU-155	Not Detected	-----	1.05E-01
FE-59	Not Detected	-----	8.37E-02
GD-153	Not Detected	-----	7.64E-02
HG-203	Not Detected	-----	2.89E-02
I-131	Not Detected	-----	2.98E-02
IR-192	Not Detected	-----	2.62E-02
K-40	1.92E+01	2.89E+00	2.65E-01
MN-54	Not Detected	-----	3.75E-02
MO-99	Not Detected	-----	3.71E-01
NA-22	Not Detected	-----	5.10E-02
NA-24	Not Detected	-----	1.05E-01
NB-95	Not Detected	-----	1.47E-01
ND-147	Not Detected	-----	2.07E-01
NI-57	Not Detected	-----	7.24E-02
RU-103	Not Detected	-----	2.90E-02
RU-106	Not Detected	-----	2.80E-01
SB-122	Not Detected	-----	3.49E-02
SB-124	Not Detected	-----	3.10E-02
SB-125	Not Detected	-----	8.77E-02
SR-85	Not Detected	-----	3.87E-02
TA-182	Not Detected	-----	1.70E-01
TA-183	Not Detected	-----	1.71E-01
TC-99m	Not Detected	-----	3.49E-01
TL-201	Not Detected	-----	9.44E-02
XE-133	Not Detected	-----	1.10E-01
Y-88	Not Detected	-----	3.07E-02
ZN-65	Not Detected	-----	1.13E-01
ZR-95	Not Detected	-----	6.60E-02

 Sandia National Laboratories
 Radiation Protection Sample Diagnostics Program [881 Laboratory]
 1-29-97 4:49:00 PM

Analyzed by: *JS 1/30/97* Reviewed by: *[Signature] 1/30/97*

Customer : AAS/PAVLETICH (6685)
 Customer Sample ID : 032532-010
 Lab Sample ID : 70013711

 Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 665.000 gram
 Sample Date/Time : 1-28-97 3:00:00 PM
 Acquire Start Date/Time : 1-29-97 3:01:16 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	-----	9.06E-01
TH-234	Not Detected	-----	5.76E-01
RA-226	1.34E+00	1.11E+00	5.20E-01
PB-214	4.88E-01	1.19E-01	5.10E-02
BI-214	4.42E-01	2.99E-01	5.36E-02
TH-232	5.95E-01	3.09E-01	1.59E-01
RA-228	7.12E-01	2.54E-01	2.02E-01
AC-228	6.37E-01	2.04E-01	9.99E-02
TH-228	4.87E-01	3.81E-01	5.19E-01
RA-224	7.85E-01	4.61E-01	8.83E-02
PB-212	7.07E-01	1.40E-01	4.20E-02
BI-212	Not Detected	-----	3.75E-01
TL-208	6.11E-01	5.69E-01	6.95E-02
U-235	Not Detected	-----	1.77E-01
TH-231	Not Detected	-----	1.82E+00
PA-231	Not Detected	-----	1.37E+00
TH-227	Not Detected	-----	3.32E-01
RA-223	Not Detected	-----	1.34E-01
RN-219	2.47E-01	2.79E-01	3.68E-01
PB-211	Not Detected	-----	7.90E-01
TL-207	Not Detected	-----	1.60E+01
AM-241	Not Detected	-----	1.72E-01
PU-239	Not Detected	-----	3.38E+02
NP-237	Not Detected	-----	2.66E-01
PA-233	Not Detected	-----	5.57E-02
TH-229	Not Detected	-----	2.08E-01

not detected JS 1/30/97

[Summary Report] - Sample ID: : 70013711

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-110m	Not Detected	-----	3.21E-02
BA-133	Not Detected	-----	4.35E-02
BE-7	Not Detected	-----	2.55E-01
CD-109	Not Detected	-----	9.23E-01
CD-115	Not Detected	-----	9.14E-02
CE-139	Not Detected	-----	2.63E-02
CE-141	Not Detected	-----	4.14E-02
CE-144	Not Detected	-----	1.78E-01
CO-56	Not Detected	-----	3.15E-02
CO-57	Not Detected	-----	2.37E-02
CO-58	Not Detected	-----	3.44E-02
CO-60	Not Detected	-----	4.12E-02
CR-51	Not Detected	-----	2.30E-01
CS-134	Not Detected	-----	4.03E-02
CS-137	Not Detected	-----	3.67E-02
EU-152	Not Detected	-----	2.73E-01
EU-154	Not Detected	-----	1.93E-01
EU-155	Not Detected	-----	1.02E-01
FE-59	Not Detected	-----	8.58E-02
GD-153	Not Detected	-----	7.79E-02
HG-203	Not Detected	-----	2.99E-02
I-131	Not Detected	-----	3.01E-02
IR-192	Not Detected	-----	2.69E-02
K-40	1.61E+01	2.59E+00	3.30E-01
MN-54	Not Detected	-----	4.08E-02
MO-99	Not Detected	-----	3.62E-01
NA-22	Not Detected	-----	4.81E-02
NA-24	Not Detected	-----	1.11E-01
NB-95	Not Detected	-----	1.54E-01
ND-147	Not Detected	-----	2.25E-01
NI-57	Not Detected	-----	8.08E-02
RU-103	Not Detected	-----	2.93E-02
RU-106	Not Detected	-----	3.05E-01
SB-122	Not Detected	-----	5.59E-02
SB-124	Not Detected	-----	3.20E-02
SB-125	Not Detected	-----	8.65E-02
SR-85	Not Detected	-----	3.90E-02
TA-182	Not Detected	-----	1.72E-01
TA-183	Not Detected	-----	1.68E-01
TC-99m	Not Detected	-----	3.62E-01
TL-201	Not Detected	-----	9.33E-02
XE-133	Not Detected	-----	1.09E-01
Y-88	Not Detected	-----	2.72E-02
ZN-65	Not Detected	-----	1.15E-01
ZR-95	Not Detected	-----	6.45E-02

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program [881 Laboratory]
1-29-97 6:35:57 PM

Analyzed by: *MS 1/30/97*

Reviewed by: *[Signature] 1/30/97*

Customer : AAS/PAVLETICH (6685)
Customer Sample ID : 032532-011
Lab Sample ID : 70013712

Sample Description : MARINELLI SOLID SAMPLE
Sample Quantity : 815.000 gram
Sample Date/Time : 1-28-97 3:00:00 PM
Acquire Start Date/Time : 1-29-97 4:51:48 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	-----	1.18E+00
TH-234	Not Detected	-----	4.91E-01
RA-226	1.18E+00	4.88E-01	4.67E-01
PB-214	4.62E-01	1.16E-01	4.39E-02
BI-214	3.97E-01	8.94E-02	4.62E-02
TH-232	5.20E-01	2.63E-01	1.38E-01
RA-228	6.50E-01	1.92E-01	1.46E-01
AC-228	6.16E-01	1.92E-01	8.36E-02
TH-228	Not Detected	-----	4.41E-01
RA-224	6.38E-01	2.83E-01	8.12E-02
PB-212	6.35E-01	1.24E-01	3.37E-02
BI-212	Not Detected	-----	5.38E-01
TL-208	5.92E-01	4.91E-01	6.52E-02
U-235	Not Detected	-----	1.60E-01
TH-231	Not Detected	-----	1.60E+00
PA-231	Not Detected	-----	1.18E+00
TH-227	Not Detected	-----	2.87E-01
RA-223	Not Detected	-----	1.15E-01
RN-219	Not Detected	-----	3.27E-01
PB-211	Not Detected	-----	7.52E-01
TL-207	Not Detected	-----	1.31E+01
AM-241	Not Detected	-----	1.52E-01
PU-239	Not Detected	-----	3.03E+02
NP-237	Not Detected	-----	2.28E-01
PA-233	Not Detected	-----	4.92E-02
TH-229	Not Detected	-----	1.79E-01

[Summary Report] - Sample ID: : 70013712

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-110m	Not Detected	-----	2.89E-02
BA-133	Not Detected	-----	3.55E-02
BE-7	Not Detected	-----	2.24E-01
CD-109	Not Detected	-----	5.76E-01
CD-115	Not Detected	-----	7.72E-02
CE-139	Not Detected	-----	2.23E-02
CE-141	Not Detected	-----	3.67E-02
CE-144	Not Detected	-----	1.60E-01
CO-56	Not Detected	-----	3.33E-02
CO-57	Not Detected	-----	2.08E-02
CO-58	Not Detected	-----	2.94E-02
CO-60	Not Detected	-----	3.64E-02
CR-51	Not Detected	-----	1.94E-01
CS-134	Not Detected	-----	3.64E-02
CS-137	Not Detected	-----	3.31E-02
EU-152	Not Detected	-----	2.43E-01
EU-154	Not Detected	-----	1.67E-01
EU-155	Not Detected	-----	9.11E-02
FE-59	Not Detected	-----	7.25E-02
GD-153	Not Detected	-----	6.83E-02
HG-203	Not Detected	-----	2.56E-02
I-131	Not Detected	-----	2.57E-02
IR-192	Not Detected	-----	2.28E-02
K-40	1.37E+01	2.18E+00	2.55E-01
MN-54	Not Detected	-----	3.36E-02
MO-99	Not Detected	-----	3.05E-01
NA-22	Not Detected	-----	4.21E-02
NA-24	Not Detected	-----	9.65E-02
NB-95	Not Detected	-----	1.35E-01
ND-147	Not Detected	-----	1.98E-01
NI-57	Not Detected	-----	7.88E-02
RU-103	Not Detected	-----	2.63E-02
RU-106	Not Detected	-----	2.62E-01
SB-122	Not Detected	-----	4.83E-02
SB-124	Not Detected	-----	2.80E-02
SB-125	Not Detected	-----	6.71E-02
SR-85	Not Detected	-----	3.35E-02
TA-182	Not Detected	-----	1.43E-01
TA-183	Not Detected	-----	1.51E-01
TC-99m	Not Detected	-----	3.88E-01
TL-201	Not Detected	-----	8.51E-02
XE-133	Not Detected	-----	9.87E-02
Y-88	Not Detected	-----	2.98E-02
ZN-65	Not Detected	-----	9.52E-02
ZR-95	Not Detected	-----	5.60E-02

 Sandia National Laboratories
 Radiation Protection Sample Diagnostics Program [881 Laboratory]
 1-29-97 8:20:54 PM

Analyzed by: *YH* 1/30/97 Reviewed by: *[Signature]* 1/30/97

 Customer : AAS/PAVLETICH (6685)
 Customer Sample ID : 032533-009
 Lab Sample ID : 70013713

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 821.000 gram
 Sample Date/Time : 1-28-97 1:55:00 PM
 Acquire Start Date/Time : 1-29-97 6:38:22 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	-----	1.22E+00
TH-234	5.93E-01	3.12E-01	4.16E-01
RA-226	1.32E+00	4.31E-01	4.40E-01
PB-214	4.55E-01	2.33E-01	4.41E-02
BI-214	4.07E-01	1.67E-01	4.87E-02
TH-232	6.16E-01	3.07E-01	1.37E-01
RA-228	7.00E-01	2.05E-01	1.43E-01
AC-228	Not Detected	-----	9.63E-02
TH-228	6.94E-01	3.55E-01	4.06E-01
RA-224	7.07E-01	2.72E-01	7.84E-02
PB-212	6.42E-01	1.21E-01	3.61E-02
BI-212	6.70E-01	3.37E-01	2.96E-01
TL-208	6.37E-01	4.19E-01	6.17E-02
U-235	Not Detected	-----	1.70E-01
TH-231	Not Detected	-----	1.68E+00
PA-231	Not Detected	-----	1.24E+00
TH-227	Not Detected	-----	2.90E-01
RA-223	Not Detected	-----	1.23E-01
RN-219	Not Detected	-----	3.53E-01
PB-211	Not Detected	-----	7.89E-01
TL-207	Not Detected	-----	1.39E+01
AM-241	Not Detected	-----	1.62E-01
PU-239	Not Detected	-----	3.09E+02
NP-237	Not Detected	-----	2.47E-01
PA-233	Not Detected	-----	5.19E-02
TH-229	Not Detected	-----	1.88E-01

[Summary Report] - Sample ID: : 70013713

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-110m	Not Detected	-----	4.59E-02
BA-133	Not Detected	-----	3.78E-02
BE-7	Not Detected	-----	2.39E-01
CD-109	Not Detected	-----	8.43E-01
CD-115	Not Detected	-----	8.60E-02
CE-139	Not Detected	-----	2.39E-02
CE-141	Not Detected	-----	3.98E-02
CE-144	Not Detected	-----	1.65E-01
CO-56	Not Detected	-----	3.39E-02
CO-57	Not Detected	-----	2.16E-02
CO-58	Not Detected	-----	3.15E-02
CO-60	Not Detected	-----	3.77E-02
CR-51	Not Detected	-----	2.06E-01
CS-134	Not Detected	-----	3.68E-02
CS-137	2.05E-01	2.64E-01	2.61E-02
EU-152	Not Detected	-----	2.31E-01
EU-154	Not Detected	-----	1.69E-01
EU-155	Not Detected	-----	9.33E-02
FE-59	Not Detected	-----	7.65E-02
GD-153	Not Detected	-----	7.09E-02
HG-203	Not Detected	-----	2.66E-02
I-131	Not Detected	-----	2.76E-02
IR-192	Not Detected	-----	2.47E-02
K-40	1.72E+01	2.58E+00	2.59E-01
MN-54	Not Detected	-----	3.42E-02
MO-99	Not Detected	-----	3.49E-01
NA-22	Not Detected	-----	4.28E-02
NA-24	Not Detected	-----	1.08E-01
NB-95	Not Detected	-----	1.38E-01
ND-147	Not Detected	-----	1.97E-01
NI-57	Not Detected	-----	7.73E-02
RU-103	Not Detected	-----	2.66E-02
RU-106	Not Detected	-----	2.69E-01
SB-122	Not Detected	-----	5.24E-02
SB-124	Not Detected	-----	2.88E-02
SB-125	Not Detected	-----	7.57E-02
SR-85	Not Detected	-----	3.65E-02
TA-182	Not Detected	-----	1.52E-01
TA-183	Not Detected	-----	1.63E-01
TC-99m	Not Detected	-----	5.64E-01
TL-201	Not Detected	-----	8.99E-02
XE-133	Not Detected	-----	1.10E-01
Y-88	Not Detected	-----	2.56E-02
ZN-65	Not Detected	-----	9.91E-02
ZR-95	Not Detected	-----	5.86E-02

Sandia National Laboratories *
Radiation Protection Sample Diagnostics Program [881 Laboratory] *
1-29-97 10:05:52 PM *

Analyzed by: *WJ 1/30/97* Reviewed by: *[Signature] 1/30/97* *

Customer : AAS/PAVLETICH (6685)
Customer Sample ID : 032534-005
Lab Sample ID : 70013714

Sample Description : MARINELLI SOLID SAMPLE
Sample Quantity : 878.000 gram
Sample Date/Time : 1-28-97 3:17:00 PM
Acquire Start Date/Time : 1-29-97 8:23:17 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	Not Detected	-----	1.22E+00
TH-234	8.44E-01	2.64E-01	3.73E-01
RA-226	1.39E+00	7.66E-01	5.51E-01
PB-214	5.29E-01	1.23E-01	4.69E-02
BI-214	4.84E-01	1.06E-01	4.34E-02
TH-232	6.87E-01	3.54E-01	1.33E-01
RA-228	6.97E-01	1.04E+00	1.53E-01
AC-228	7.20E-01	7.58E-01	9.08E-02
TH-228	6.82E-01	3.57E-01	4.63E-01
RA-224	6.46E-01	2.73E-01	8.77E-02
PB-212	7.43E-01	1.75E-01	3.51E-02
BI-212	8.40E-01	4.03E-01	2.93E-01
TL-208	6.91E-01	1.51E-01	6.60E-02
U-235	Not Detected	-----	1.64E-01
TH-231	Not Detected	-----	1.63E+00
PA-231	Not Detected	-----	1.26E+00
TH-227	Not Detected	-----	3.00E-01
RA-223	Not Detected	-----	1.18E-01
RN-219	2.26E-01	2.73E-01	3.52E-01
PB-211	Not Detected	-----	7.60E-01
TL-207	Not Detected	-----	1.36E+01
AM-241	Not Detected	-----	1.57E-01
PU-239	Not Detected	-----	3.11E+02
NP-237	Not Detected	-----	2.35E-01
PA-233	Not Detected	-----	5.15E-02
TH-229	Not Detected	-----	1.86E-01

not detected WJ 1/30/97

[Summary Report] - Sample ID: : 70013714

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-110m	Not Detected	-----	4.44E-02
BA-133	Not Detected	-----	3.78E-02
BE-7	Not Detected	-----	2.41E-01
CD-109	Not Detected	-----	8.14E-01
CD-115	Not Detected	-----	8.71E-02
CE-139	Not Detected	-----	2.33E-02
CE-141	Not Detected	-----	3.81E-02
CE-144	Not Detected	-----	1.63E-01
CO-56	Not Detected	-----	3.47E-02
CO-57	Not Detected	-----	2.17E-02
CO-58	Not Detected	-----	3.14E-02
CO-60	Not Detected	-----	4.24E-02
CR-51	Not Detected	-----	2.02E-01
CS-134	Not Detected	-----	3.63E-02
CS-137	1.96E-01	1.06E-01	2.40E-02
EU-152	Not Detected	-----	2.36E-01
EU-154	Not Detected	-----	1.70E-01
EU-155	Not Detected	-----	9.34E-02
FE-59	Not Detected	-----	7.76E-02
GD-153	Not Detected	-----	7.17E-02
HG-203	Not Detected	-----	2.58E-02
I-131	Not Detected	-----	2.80E-02
IR-192	Not Detected	-----	2.42E-02
K-40	1.78E+01	2.69E+00	2.50E-01
MN-54	1.55E-02	2.73E-02	2.01E-02
MO-99	Not Detected	-----	3.33E-01
NA-22	Not Detected	-----	4.30E-02
NA-24	Not Detected	-----	1.17E-01
NB-95	Not Detected	-----	1.45E-01
ND-147	Not Detected	-----	2.03E-01
NI-57	Not Detected	-----	7.85E-02
RU-103	Not Detected	-----	2.61E-02
RU-106	Not Detected	-----	2.75E-01
SB-122	Not Detected	-----	5.19E-02
SB-124	Not Detected	-----	2.83E-02
SB-125	Not Detected	-----	7.71E-02
SR-85	Not Detected	-----	3.45E-02
TA-182	Not Detected	-----	1.51E-01
TA-183	Not Detected	-----	1.58E-01
TC-99m	Not Detected	-----	5.96E-01
TL-201	Not Detected	-----	8.73E-02
XE-133	Not Detected	-----	1.08E-01
Y-88	Not Detected	-----	2.83E-02
ZN-65	Not Detected	-----	1.00E-01
ZR-95	Not Detected	-----	5.79E-02

not detected *JS, 12c/97*

 Sandia National Laboratories
 Radiation Protection Sample Diagnostics Program [881 Laboratory]
 1-29-97 11:50:29 PM

Analyzed by: *XJ 1/30/97* Reviewed by: *[Signature] 1/30/97*

Customer : AAS/PAVLETICH (6685)
 Customer Sample ID : 032536-014
 Lab Sample ID : 70013715

Sample Description : MARINELLI LIQUID SAMPLE
 Sample Quantity : 500.000 mL
 Sample Date/Time : 1-28-97 10:15:00 AM
 Acquire Start Date/Time : 1-29-97 10:08:42 PM
 Detector Name : LAB01
 Lapsed Live/Real Time : 6000 / 6001 seconds

Comments:

Nuclide Name	Activity (pCi/mL)	2-sigma Error	MDA (pCi/mL)
U-238	Not Detected	-----	7.47E-01
TH-234	Not Detected	-----	3.12E-01
RA-226	Not Detected	-----	3.15E-01
PB-214	Not Detected	-----	4.84E-02
BI-214	Not Detected	-----	4.95E-02
TH-232	Not Detected	-----	1.41E-01
RA-228	Not Detected	-----	1.16E-01
AC-228	Not Detected	-----	9.51E-02
TH-228	Not Detected	-----	4.59E-01
RA-224	Not Detected	-----	1.16E-01
PB-212	Not Detected	-----	3.54E-02
BI-212	Not Detected	-----	3.00E-01
TL-208	Not Detected	-----	7.16E-02
U-235	Not Detected	-----	1.27E-01
TH-231	Not Detected	-----	9.68E-01
PA-231	Not Detected	-----	9.80E-01
TH-227	Not Detected	-----	1.41E-01
RA-223	Not Detected	-----	7.07E-02
RN-219	Not Detected	-----	2.56E-01
PB-211	Not Detected	-----	5.80E-01
TL-207	Not Detected	-----	9.11E+00
AM-241	Not Detected	-----	1.05E-01
PU-239	Not Detected	-----	2.23E+02
NP-237	Not Detected	-----	1.24E-01
PA-233	Not Detected	-----	4.14E-02
TH-229	Not Detected	-----	1.22E-01

[Summary Report] - Sample ID: : 70013715

Nuclide Name	Activity (pCi/mL)	2-sigma Error	MDA (pCi/mL)
AG-110m	Not Detected	-----	2.09E-02
BA-133	Not Detected	-----	2.72E-02
BE-7	Not Detected	-----	1.71E-01
CD-109	Not Detected	-----	4.12E-01
CD-115	Not Detected	-----	5.40E-02
CE-139	Not Detected	-----	1.67E-02
CE-141	Not Detected	-----	2.90E-02
CE-144	Not Detected	-----	1.11E-01
CO-56	Not Detected	-----	3.28E-02
CO-57	Not Detected	-----	1.54E-02
CO-58	Not Detected	-----	2.47E-02
CO-60	Not Detected	-----	2.54E-02
CR-51	Not Detected	-----	1.59E-01
CS-134	Not Detected	-----	2.42E-02
CS-137	Not Detected	-----	2.26E-02
EU-152	Not Detected	-----	1.88E-01
EU-154	Not Detected	-----	1.20E-01
EU-155	Not Detected	-----	6.26E-02
FE-59	Not Detected	-----	3.95E-02
GD-153	Not Detected	-----	4.66E-02
HG-203	Not Detected	-----	1.97E-02
I-131	Not Detected	-----	2.20E-02
IR-192	Not Detected	-----	1.85E-02
K-40	Not Detected	-----	3.47E-01
MN-54	Not Detected	-----	2.34E-02
MO-99	Not Detected	-----	2.34E-01
NA-22	Not Detected	-----	2.66E-02
NA-24	Not Detected	-----	1.36E-01
NB-95	Not Detected	-----	8.47E-02
ND-147	Not Detected	-----	1.43E-01
NI-57	Not Detected	-----	6.69E-02
RU-103	Not Detected	-----	2.19E-02
RU-106	Not Detected	-----	1.90E-01
SB-122	Not Detected	-----	4.46E-02
SB-124	Not Detected	-----	2.27E-02
SB-125	Not Detected	-----	5.81E-02
SR-85	Not Detected	-----	3.07E-02
TA-182	Not Detected	-----	7.37E-02
TA-183	Not Detected	-----	1.11E-01
TC-99m	Not Detected	-----	1.02E+00
TL-201	Not Detected	-----	5.56E-02
XE-133	Not Detected	-----	6.65E-02
Y-88	Not Detected	-----	2.66E-02
ZN-65	Not Detected	-----	5.48E-02
ZR-95	Not Detected	-----	3.96E-02

 Sandia National Laboratories
 Radiation Protection Sample Diagnostics Program [881 Laboratory]
 1-30-97 7:19:22 AM

Analyzed by: *JS* 1/30/97 Reviewed by: *[Signature]* 1/30/97

Customer : AAS/PAVLETICH (6685)
 Customer Sample ID : LAB CONTROL SAMPLE USING CG134
 Lab Sample ID : 70013716

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 : 1-30-97 7:03:45 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	-----	8.33E+03
TH-234	Not Detected	-----	3.24E+03
RA-226	Not Detected	-----	5.89E+03
PB-214	Not Detected	-----	7.16E+02
BI-214	Not Detected	-----	6.93E+02
TH-232	Not Detected	-----	2.21E+03
RA-228	Not Detected	-----	3.25E+03
AC-228	Not Detected	-----	1.89E+03
TH-228	Not Detected	-----	6.66E+04
RA-224	Not Detected	-----	7.26E+02
PB-212	Not Detected	-----	4.79E+03
BI-212	Not Detected	-----	5.05E+04
TL-208	Not Detected	-----	9.64E+03
U-235	Not Detected	-----	1.45E+03
TH-231	Not Detected	-----	1.17E+04
PA-231	Not Detected	-----	1.46E+04
TH-227	Not Detected	-----	2.42E+03
RA-223	Not Detected	-----	1.00E+26
RN-219	Not Detected	-----	5.91E+03
PB-211	Not Detected	-----	1.34E+04
TL-207	Not Detected	-----	2.56E+05
AM-241	8.85E+04	1.45E+04	1.54E+03
PU-239	Not Detected	-----	2.56E+06
NP-237	Not Detected	-----	1.70E+03
PA-233	Not Detected	-----	6.24E+02
TH-229	Not Detected	-----	1.45E+03

[Summary Report] - Sample ID: : 70013716

Nuclide Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
AG-110m	Not Detected		9.40E+05
BA-133	Not Detected		6.49E+02
BE-7	Not Detected		2.85E+16
CD-109	3.44E+05	1.48E+05	1.47E+05
CD-115	Not Detected		1.00E+26
CE-139	Not Detected		2.07E+07
CE-141	Not Detected		1.00E+26
CE-144	Not Detected		3.76E+05
CO-56	Not Detected		3.59E+11
CO-57	Not Detected		6.34E+04
CO-58	Not Detected		2.02E+12
CO-60	7.28E+04	9.91E+03	4.08E+02
CR-51	Not Detected		1.00E+26
CS-134	Not Detected		2.61E+03
CS-137	6.65E+04	8.87E+03	3.27E+02
EU-152	Not Detected		4.21E+03
EU-154	Not Detected		2.88E+03
EU-155	Not Detected		1.90E+03
FE-59	Not Detected		2.77E+18
GD-153	Not Detected		3.84E+05
HG-203	Not Detected		1.54E+17
I-131	Not Detected		1.00E+26
IR-192	Not Detected		5.80E+11
K-40	Not Detected		1.51E+03
MN-54	Not Detected		7.05E+04
MO-99	Not Detected		1.00E+26
NA-22	Not Detected		1.27E+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		1.13E+20
RU-106	Not Detected		2.33E+05
SB-122	Not Detected		1.00E+26
SB-124	Not Detected		8.16E+13
SB-125	Not Detected		5.52E+03
SR-85	Not Detected		1.53E+13
TA-182	Not Detected		1.34E+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		5.41E+08
ZN-65	Not Detected		6.99E+05
ZR-95	Not Detected		3.61E+13

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
Quality Assurance Report

Report Date : 1-30-97 7:20:24 AM
A File : C:\GENIEPC\CAMFILES\LCS1.QAF
Analyst : FCD
Sample ID : 70013716
Sample Quantity : 1.00 Each
Sample Date : 11-01-90 12:00:00 PM
Measurement Date : 1-30-97 7:03:45 AM
Elapsed Live Time : 600 seconds
Elapsed Real Time : 605 seconds

Parameter	Mean	1S Error	New Value	< LU : SD : UD : BS >
AM-241 Activity	8.780E-02	2.713E-03	8.852E-02	< : : : >
CS-137 Activity	6.888E-02	1.668E-03	6.645E-02	< In : : : >
CO-60 Activity	7.563E-02	3.095E-03	7.284E-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: WJ 1/30/97

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 1-30-97 7:33:50 AM *

 *
 * Analyzed by: *YHJ* 11/30/97 Reviewed by: *[Signature]* 11/30/97 *

Customer : AAS/PAVLETICH (6685)
 Customer Sample ID : LAB CONTROL SAMPLE USING CG134
 Lab Sample ID : 70013717

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 : 1-30-97 7:17:12 AM
 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	-----	2.17E+04
TH-234	Not Detected	-----	4.75E+03
RA-226	Not Detected	-----	6.19E+03
PB-214	Not Detected	-----	6.28E+02
BI-214	Not Detected	-----	5.94E+02
TH-232	Not Detected	-----	1.99E+03
RA-228	6.37E+02	7.32E+02	1.15E+03
AC-228	Not Detected	-----	1.55E+03
TH-228	Not Detected	-----	6.06E+04
RA-224	Not Detected	-----	1.15E+03
PB-212	Not Detected	-----	4.65E+03
BI-212	Not Detected	-----	4.17E+04
TL-208	Not Detected	-----	8.61E+03
U-235	Not Detected	-----	1.74E+03
TH-231	Not Detected	-----	1.76E+04
PA-231	Not Detected	-----	1.33E+04
TH-227	Not Detected	-----	2.35E+03
RA-223	Not Detected	-----	1.00E+26
RN-219	Not Detected	-----	5.24E+03
PB-211	Not Detected	-----	1.18E+04
TL-207	Not Detected	-----	2.09E+05
AM-241	9.08E+04	1.57E+04	3.79E+03
PU-239	Not Detected	-----	3.33E+06
NP-237	Not Detected	-----	2.44E+03
PA-233	Not Detected	-----	5.66E+02
TH-229	Not Detected	-----	2.05E+03

[Summary Report] - Sample ID: : 70013717

Nuclide Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
AG-108m	Not Detected	-----	3.28E+02
AG-110m	Not Detected	-----	8.48E+05
BA-133	Not Detected	-----	5.74E+02
BE-7	Not Detected	-----	2.42E+16
CD-109	Not Detected	-----	1.82E+05
CD-115	Not Detected	-----	1.00E+26
CE-139	Not Detected	-----	2.24E+07
CE-141	Not Detected	-----	1.00E+26
CE-144	Not Detected	-----	4.70E+05
CO-56	Not Detected	-----	2.99E+11
CO-57	Not Detected	-----	8.26E+04
CO-58	Not Detected	-----	1.65E+12
CO-60	7.37E+04	9.83E+03	2.95E+02
CR-51	Not Detected	-----	1.00E+26
CS-134	Not Detected	-----	2.33E+03
CS-137	6.72E+04	8.76E+03	2.55E+02
EU-152	Not Detected	-----	3.42E+03
EU-154	Not Detected	-----	2.39E+03
EU-155	Not Detected	-----	2.56E+03
FE-59	Not Detected	-----	2.23E+18
GD-153	Not Detected	-----	5.49E+05
HG-203	Not Detected	-----	1.37E+17
I-131	Not Detected	-----	1.00E+26
IR-192	Not Detected	-----	5.29E+11
K-40	Not Detected	-----	1.45E+03
MN-52	Not Detected	-----	1.00E+26
MN-54	Not Detected	-----	5.64E+04
MO-99	Not Detected	-----	1.00E+26
NA-22	Not Detected	-----	1.11E+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	-----	1.01E+20
RU-106	Not Detected	-----	2.06E+05
SB-122	Not Detected	-----	1.00E+26
SB-124	Not Detected	-----	7.33E+13
SB-125	Not Detected	-----	5.01E+03
SR-85	Not Detected	-----	1.34E+13
TA-182	Not Detected	-----	1.17E+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	-----	4.36E+08
ZN-65	Not Detected	-----	5.87E+05
ZR-95	Not Detected	-----	3.04E+13

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

Report Date : 1-30-97 7:35:01 AM
 QA File : C:\GENIEPC\CAMFILES\LCS2.QAF
 Analyst : FCD
 Sample ID : 70013717
 Sample Quantity : 1.00 Each
 Sample Date : 11-01-90 12:00:00 PM
 Measurement Date : 1-30-97 7:17:12 AM
 Elapsed Live Time : 600 seconds
 Elapsed Real Time : 605 seconds

Parameter	Mean	1S Error	New Value	< LU : SD : UD : BS >
AM-241 Activity	9.232E-02	3.891E-03	9.083E-02	< : : : >
CS-137 Activity	6.823E-02	1.927E-03	6.722E-02	< : : : >
CO-60 Activity	7.478E-02	1.499E-03	7.354E-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: 11/30/97

ANALYSIS REQUEST AND CHAIN OF CUSTODY

PAGE 1 OF 2

AR/COC- 510193

SF 2001-COC (5-97)
Supersedes 15-30-99

Internal Lab

Batch No.

800523

SAR/WR No.

Dept. No./Mail Stop: 6134 / 1148
 Project/Task Manager: AAR / PAULENCH
 Project Name: CCTA-61A
 Record Center Code: 621334/61A/PAT
 Logbook Ref No: 0151
 Service Order No.: CPO216

Date Sample Shipped: 5-25-98
 Carrier/Vol: 1552
 Lab Contact: FERNANDO DOMINGUEZ
 Lab Destination: 775
 SMO Contact/Phone: SALMI 844-3410
 Send Report to SMO: WENDY PAULENCH

Contract No: 12/A

Case No: 775, 22000

SMO Authorization: [Signature]
 Bill to: Sandia National Laboratories
 Supplier Services
 Department
 P.O. Box 5800 MS 0154

Parameter & Method Requested

Location										Tech Area		Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Reference LOV (available at SMO)						Gamma SPE	Lab Sample ID																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
Building										Room					Sample Matrix	Container		Preser- vative	Sample Collection Method	Sample Type																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
Sample No. - Fraction										ER Sample ID or Sample Location Detail						Type	Volume																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
036775-001	CCTA-61A-2A-04-0-0.5-3										0-0.5	61A	5-24-95 1045	Soil	P	500ml	4°C	G	SA	X																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	

RMMA ☒ Yes ☐ No Ref. No.Sample Disposal ☒ Return to Client ☐ Disposal by labTurnaround Time ☐ Normal ☒ Rush Required Report Date

Sample Team Members: Name: JAR PAULENCH Signature: JAR PAULENCH Init: JP Company/Organization/Phone: 609M/6134/254-2475

Sample Tracking: SMO USE
 Date Entered: mm/dd/yy
 Entered by:

Special Instructions/QC Requirements

RELEASES COC # 510192

Abnormal Condition Receipt

RUSH

Org. 6134 Date 5-25-98 Time 1552
 Org. SMO 7578 Date 3-25-98 Time 1552
 Org. SMO 7578 Date 3-25-98 Time 1616
 Org. SMO 7578 Date 3-25-98 Time 1616
 Org. 7578 Date 3-30-98 Time 1440
 Org. 7578 SMO Date 3-30-98 Time 1440

4. Relinquished by
 4. Received by
 5. Relinquished by
 5. Received by
 6. Relinquished by
 6. Received by

Org. Date Time
 Org. Date Time
 Org. Date Time
 Org. Date Time
 Org. Date Time
 Org. Date Time

samples, BLUE- To Accompany Samples, YELLOW- SMO Suspense Copy
 Return to SMO

PINK- Field Copy

EQUIPMENT BLANK
 ON CDC 510229

ANALYSIS REQUEST AND CHAIN OF CUSTODY CONTINUATION FORM

PAGE 2 OF 2

AR/COC-	510193
---------	--------

BATCH # 800523

[illegible]

Abnormal Conditions on Receipt

**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] *
 * 3-26-98 7:06:05 PM *

 *
 * Analyzed by: *WJ 3/30/98* Reviewed by: *KA 3/30/98* *

Customer : C.AAS/D.BISWELL (6134/SMO)
 Customer Sample ID : 036775-001
 Lab Sample ID : 80052301

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 900.000 gram
 Sample Date/Time : 3-24-98 10:45:00 AM
 Acquire Start Date/Time : 3-26-98 5:22:31 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	-----	3.06E+00
TH-234	Not Detected	-----	7.06E-01
RA-226	1.28E+00	6.57E-01	4.90E-01
PB-214	5.38E-01	2.33E-01	4.39E-02
BI-214	4.93E-01	1.81E-01	4.01E-02
PB-210	Not Detected	-----	3.27E+01
TH-232	6.82E-01	3.44E-01	1.29E-01
RA-228	7.11E-01	1.86E-01	1.39E-01
AC-228	8.16E-01	1.77E-01	7.72E-02
TH-228	7.01E-01	7.96E-01	4.34E-01
RA-224	8.23E-01	2.38E-01	5.92E-02
PB-212	7.53E-01	1.26E-01	3.63E-02
BI-212	7.41E-01	2.97E-01	2.64E-01
TL-208	6.95E-01	1.35E-01	6.37E-02
U-235	1.52E-01	1.93E-01	2.25E-01
TH-231	Not Detected	-----	2.12E+00
PA-231	Not Detected	-----	3.64E+00
TH-227	Not Detected	-----	3.13E-01
RA-223	Not Detected	-----	2.10E-01
RN-219	Not Detected	-----	3.52E-01
PB-211	Not Detected	-----	7.95E-01
TL-207	Not Detected	-----	1.12E+01
AM-241	Not Detected	-----	4.28E-01
PU-239	Not Detected	-----	4.06E+02
NP-237	Not Detected	-----	2.41E-01
PA-233	Not Detected	-----	5.13E-02
TH-229	Not Detected	-----	2.31E-01

Not detected XJ 3/30/98

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.56E-02
AG-110m	Not Detected	-----	5.88E-02
AM-243	Not Detected	-----	8.83E-02
BA-133	Not Detected	-----	5.69E-02
BE-7	Not Detected	-----	2.42E-01
CD-109	Not Detected	-----	8.20E-01
CD-115	Not Detected	-----	1.19E-01
CE-139	Not Detected	-----	2.72E-02
CE-141	Not Detected	-----	5.06E-02
CE-144	Not Detected	-----	2.21E-01
CO-56	Not Detected	-----	3.09E-02
CO-57	Not Detected	-----	2.81E-02
CO-58	Not Detected	-----	2.91E-02
CO-60	Not Detected	-----	3.31E-02
CR-51	Not Detected	-----	2.20E-01
CS-134	Not Detected	-----	4.04E-02
CS-137	4.86E-01	7.80E-02	2.02E-02
EU-152	Not Detected	-----	8.44E-02
EU-154	Not Detected	-----	1.64E-01
EU-155	Not Detected	-----	1.37E-01
FE-59	Not Detected	-----	6.73E-02
GD-153	Not Detected	-----	9.86E-02
HG-203	Not Detected	-----	3.04E-02
I-131	Not Detected	-----	3.19E-02
IR-192	Not Detected	-----	2.51E-02
K-40	1.87E+01	2.69E+00	2.29E-01
KR-85	Not Detected	-----	7.46E+00
MN-52	Not Detected	-----	3.41E-02
MN-54	Not Detected	-----	3.14E-02
MO-99	Not Detected	-----	3.66E-01
NA-22	Not Detected	-----	3.74E-02
NA-24	Not Detected	-----	3.51E-01
NE-95	Not Detected	-----	2.24E-01
ND-147	Not Detected	-----	2.13E-01
NI-57	Not Detected	-----	1.19E-01
NP-239	Not Detected	-----	1.23E-01
RU-103	Not Detected	-----	2.71E-02
RU-106	Not Detected	-----	2.59E-01
SB-122	Not Detected	-----	6.15E-02
SB-124	Not Detected	-----	2.77E-02
SB-125	Not Detected	-----	7.64E-02
SN-113	Not Detected	-----	3.42E-02
TA-182	Not Detected	-----	1.31E-01
TA-183	Not Detected	-----	4.98E-01
TC-99m	Not Detected	-----	1.56E+01
TL-201	Not Detected	-----	2.85E-01
XE-133	Not Detected	-----	2.72E-01
Y-88	Not Detected	-----	2.44E-02
ZN-65	Not Detected	-----	9.02E-02
ZR-95	Not Detected	-----	5.21E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-30-98 11:44:26 AM *

 *
 * Analyzed by: *KAT 3/30/98* Reviewed by: *WJ 3/30/98* *

Customer : C.AAS/D.BISWELL (6134/SMO)
 Customer Sample ID : 036776-001
 Lab Sample ID : 80052302

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 913.000 gram
 Sample Date/Time : 3-24-98 10:50:00 AM.
 Acquire Start Date/Time : 3-26-98 7:08:18 PM
 Detector Name : LAB02
 Elapsed Live/Real Time : 6000 / 6004 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	3.15E+00
TH-234	1.41E+00	4.37E-01	5.92E-01
RA-226	1.47E+00	5.10E-01	4.82E-01
PB-214	6.53E-01	1.12E-01	4.11E-02
BI-214	6.02E-01	1.20E-01	4.43E-02
PB-210	Not Detected	-----	3.21E+01
TH-232	9.00E-01	4.21E-01	1.32E-01
RA-228	9.81E-01	2.25E-01	1.32E-01
AC-228	9.60E-01	7.33E-01	7.07E-02
TH-228	7.19E-01	2.36E-01	4.88E-01
RA-224	8.02E-01	2.23E-01	6.52E-02
PB-212	9.44E-01	1.58E-01	3.56E-02
BI-212	1.03E+00	3.56E-01	2.98E-01
TL-208	8.33E-01	1.55E-01	6.18E-02
U-235	Not Detected	-----	2.31E-01
TH-231	Not Detected	-----	2.15E+00
PA-231	Not Detected	-----	3.61E+00
TH-227	Not Detected	-----	3.35E-01
RA-223	Not Detected	-----	2.09E-01
RN-219	Not Detected	-----	3.47E-01
PB-211	Not Detected	-----	7.94E-01
TL-207	Not Detected	-----	1.26E+01
AM-241	Not Detected	-----	4.42E-01
PU-239	Not Detected	-----	4.22E+02
NP-237	5.78E-01	1.83E-01	2.64E-01
PA-233	Not Detected	-----	5.26E-02
TH-229	Not Detected	-----	2.33E-01

NOT DETECTED KAT 3/30/98

[Summary Report] - Sample ID: : 80052302

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.90E-02
AG-110m	Not Detected	-----	2.94E-02
AM-243	Not Detected	-----	9.35E-02
BA-133	Not Detected	-----	5.83E-02
BE-7	Not Detected	-----	2.33E-01
CD-109	Not Detected	-----	8.97E-01
CD-115	Not Detected	-----	1.28E-01
CE-139	Not Detected	-----	2.77E-02
CE-141	Not Detected	-----	5.24E-02
CE-144	Not Detected	-----	2.34E-01
CO-56	Not Detected	-----	3.09E-02
CO-57	Not Detected	-----	2.86E-02
CO-58	Not Detected	-----	2.89E-02
CO-60	Not Detected	-----	3.34E-02
CR-51	Not Detected	-----	2.24E-01
CS-134	Not Detected	-----	4.26E-02
CS-137	2.28E-02	1.58E-02	1.85E-02
EU-152	Not Detected	-----	8.57E-02
EU-154	Not Detected	-----	1.80E-01
EU-155	Not Detected	-----	1.41E-01
FE-59	Not Detected	-----	6.61E-02
GD-153	Not Detected	-----	9.82E-02
HG-203	Not Detected	-----	3.02E-02
I-131	Not Detected	-----	3.11E-02
IR-192	Not Detected	-----	2.61E-02
K-40	1.97E+01	2.81E+00	2.28E-01
KR-85	Not Detected	-----	7.59E+00
MN-52	Not Detected	-----	3.36E-02
MN-54	Not Detected	-----	3.21E-02
MO-99	Not Detected	-----	3.89E-01
NA-22	Not Detected	-----	4.02E-02
NA-24	Not Detected	-----	4.08E-01
NB-95	Not Detected	-----	2.43E-01
ND-147	Not Detected	-----	2.14E-01
NI-57	Not Detected	-----	6.98E-02
NP-239	Not Detected	-----	1.28E-01
RU-103	Not Detected	-----	2.71E-02
RU-106	Not Detected	-----	2.66E-01
SB-122	Not Detected	-----	6.47E-02
SB-124	Not Detected	-----	2.78E-02
SB-125	Not Detected	-----	7.30E-02
SN-113	Not Detected	-----	3.51E-02
TA-182	Not Detected	-----	1.37E-01
TA-183	Not Detected	-----	5.19E-01
TC-99m	Not Detected	-----	1.97E+01
TL-201	Not Detected	-----	2.93E-01
XE-133	2.07E-01	9.69E-02	2.74E-01
Y-88	Not Detected	-----	2.31E-02
ZN-65	Not Detected	-----	9.36E-02
ZR-95	Not Detected	-----	5.29E-02

Not detected 3/30/73

 * Sandia National Laboratories
 * Radiation Protection Sample Diagnostics Program [881 Laboratory]
 * 3-30-98 12:16:39 PM
 *
 * Analyzed by: *KA 3/30/98* Reviewed by: *SW 3/30/98*

Customer : C.AAS/D.BISWELL (6134/SMO)
 Customer Sample ID : 036777-001
 Lab Sample ID : 80052303

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 796.000 gram
 Sample Date/Time : 3-24-98 11:00:00 AM
 Acquire Start Date/Time : 3-26-98 8:54:07 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	-----	3.14E+00
TH-234	1.32E+00	5.23E-01	5.78E-01
RA-226	1.19E+00	6.58E-01	5.28E-01
PB-214	Not Detected	-----	4.28E-02
BI-214	5.24E-01	1.16E-01	4.54E-02
PB-210	Not Detected	-----	3.38E+01
TH-232	7.11E-01	3.87E-01	1.50E-01
RA-228	7.35E-01	2.41E-01	1.47E-01
AC-228	7.28E-01	1.77E-01	8.03E-02
TH-228	6.11E-01	2.30E-01	4.86E-01
RA-224	7.92E-01	2.65E-01	6.99E-02
PB-212	7.55E-01	1.40E-01	4.01E-02
BI-212	8.53E-01	5.30E-01	8.14E-01
TL-208	6.68E-01	1.44E-01	6.04E-02
U-235	Not Detected	-----	2.35E-01
TH-231	Not Detected	-----	2.17E+00
PA-231	Not Detected	-----	3.81E+00
TH-227	Not Detected	-----	3.33E-01
RA-223	Not Detected	-----	2.19E-01
RN-219	Not Detected	-----	3.73E-01
PB-211	Not Detected	-----	8.59E-01
TL-207	Not Detected	-----	1.30E+01
AM-241	Not Detected	-----	4.53E-01
PU-239	Not Detected	-----	4.33E+02
NP-237	4.80E-01	1.70E-01	2.98E-01
PA-233	Not Detected	-----	5.58E-02
TH-229	Not Detected	-----	2.46E-01

NOT DETECTED *KA 3/30/98*

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected		3.94E-02
AG-110m	Not Detected		5.67E-02
AM-243	Not Detected		9.14E-02
BA-133	Not Detected		5.98E-02
BE-7	Not Detected		2.58E-01
CD-109	Not Detected		1.01E+00
CD-115	Not Detected		1.36E-01
CE-139	Not Detected		2.89E-02
CE-141	Not Detected		5.36E-02
CE-144	Not Detected		2.36E-01
CO-56	Not Detected		3.44E-02
CO-57	Not Detected		2.97E-02
CO-58	Not Detected		3.12E-02
CO-60	Not Detected		3.59E-02
CR-51	Not Detected		2.37E-01
CS-134	Not Detected		4.36E-02
CS-137	3.62E-01	1.60E-01	2.19E-02
EU-152	Not Detected		8.92E-02
EU-154	Not Detected		1.82E-01
EU-155	Not Detected		1.49E-01
FE-59	Not Detected		6.83E-02
GD-153	Not Detected		1.03E-01
HG-203	Not Detected		3.13E-02
I-131	Not Detected		3.56E-02
IR-192	Not Detected		2.70E-02
K-40	1.94E+01	2.84E+00	2.38E-01
KR-85	Not Detected		8.00E+00
MN-52	Not Detected		3.70E-02
MN-54	Not Detected		3.28E-02
MO-99	Not Detected		4.10E-01
NA-22	Not Detected		4.16E-02
NA-24	Not Detected		4.69E-01
NB-95	Not Detected		2.45E-01
ND-147	Not Detected		2.24E-01
NI-57	Not Detected		6.96E-02
NP-239	Not Detected		1.34E-01
RU-103	Not Detected		3.00E-02
RU-106	Not Detected		2.89E-01
SB-122	Not Detected		7.21E-02
SB-124	Not Detected		2.97E-02
SB-125	Not Detected		8.15E-02
SN-113	Not Detected		3.73E-02
TA-182	Not Detected		1.38E-01
TA-183	Not Detected		5.40E-01
TC-99m	Not Detected		2.40E+01
TL-201	Not Detected		3.12E-01
XE-133	Not Detected		2.97E-01
Y-88	Not Detected		2.52E-02
ZN-65	Not Detected		9.39E-02
ZR-95	Not Detected		5.69E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-27-98 12:23:10 AM *

 *
 * Analyzed by: *W 3/30/98* Reviewed by: *KE 3/30/98* *

Customer : C.AAS/D.BISWELL (6134/SMO)
 Customer Sample ID : 036778-001
 Lab Sample ID : 80052304

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 816.000 gram
 Sample Date/Time : 3-24-98 11:05:00 AM
 Acquire Start Date/Time : 3-26-98 10:39:42 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	-----	3.12E+00
TH-234	1.12E+00	4.20E-01	5.81E-01
RA-226	1.36E+00	3.97E-01	5.39E-01
PB-214	5.26E-01	4.90E-01	4.64E-02
BI-214	5.02E-01	1.14E-01	4.50E-02
PB-210	Not Detected	-----	3.28E+01
TH-232	7.49E-01	3.82E-01	1.31E-01
RA-228	7.54E-01	2.49E-01	1.48E-01
AC-228	8.00E-01	3.19E-01	8.52E-02
TH-228	6.00E-01	1.75E-01	4.94E-01
RA-224	8.21E-01	2.42E-01	7.01E-02
PB-212	7.37E-01	1.23E-01	3.69E-02
BI-212	8.35E-01	4.06E-01	2.87E-01
TL-208	6.92E-01	2.53E-01	6.02E-02
U-235	Not Detected	-----	2.32E-01
TH-231	Not Detected	-----	2.13E+00
PA-231	Not Detected	-----	3.67E+00
TH-227	Not Detected	-----	3.27E-01
RA-223	Not Detected	-----	2.17E-01
RN-219	Not Detected	-----	3.59E-01
PB-211	Not Detected	-----	8.16E-01
TL-207	Not Detected	-----	1.30E+01
AM-241	Not Detected	-----	4.38E-01
PU-239	Not Detected	-----	4.16E+02
NP-237	4.62E-01	1.70E-01	2.58E-01
PA-233	Not Detected	-----	5.50E-02
TH-229	Not Detected	-----	2.40E-01

not detected 3/30/98

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.80E-02
AG-110m	Not Detected	-----	4.15E-02
AM-243	Not Detected	-----	8.59E-02
BA-133	Not Detected	-----	5.86E-02
BE-7	Not Detected	-----	2.50E-01
CD-109	Not Detected	-----	8.52E-01
CD-115	Not Detected	-----	1.35E-01
CE-139	Not Detected	-----	2.85E-02
CE-141	Not Detected	-----	5.35E-02
CE-144	Not Detected	-----	2.32E-01
CO-56	Not Detected	-----	3.44E-02
CO-57	Not Detected	-----	2.88E-02
CO-58	Not Detected	-----	3.15E-02
CO-60	Not Detected	-----	3.50E-02
CR-51	Not Detected	-----	2.31E-01
CS-134	Not Detected	-----	4.29E-02
CS-137	1.46E-01	2.14E-01	2.08E-02
EU-152	Not Detected	-----	8.63E-02
EU-154	Not Detected	-----	1.75E-01
EU-155	Not Detected	-----	1.39E-01
FE-59	Not Detected	-----	7.27E-02
GD-153	Not Detected	-----	1.02E-01
HG-203	Not Detected	-----	3.14E-02
I-131	Not Detected	-----	3.34E-02
IR-192	Not Detected	-----	2.62E-02
K-40	2.04E+01	2.94E+00	2.36E-01
KR-85	Not Detected	-----	7.80E+00
MN-52	Not Detected	-----	3.45E-02
MN-54	Not Detected	-----	3.36E-02
MO-99	Not Detected	-----	4.20E-01
NA-22	Not Detected	-----	4.12E-02
NA-24	Not Detected	-----	4.82E-01
NE-95	Not Detected	-----	2.44E-01
ND-147	Not Detected	-----	2.20E-01
NI-57	Not Detected	-----	7.60E-02
NP-239	Not Detected	-----	1.25E-01
RU-103	Not Detected	-----	2.79E-02
RU-106	Not Detected	-----	2.74E-01
SB-122	Not Detected	-----	6.95E-02
SB-124	Not Detected	-----	2.97E-02
SB-125	Not Detected	-----	7.64E-02
SN-113	Not Detected	-----	3.38E-02
TA-182	Not Detected	-----	1.35E-01
TA-183	Not Detected	-----	5.32E-01
TC-99m	Not Detected	-----	2.90E+01
TL-201	Not Detected	-----	3.07E-01
XE-133	Not Detected	-----	3.01E-01
Y-88	Not Detected	-----	2.41E-02
ZN-65	Not Detected	-----	9.17E-02
ZR-95	Not Detected	-----	5.53E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-27-98 2:08:42 AM *

 *
 * Analyzed by: *AM 3/30/98* Reviewed by: *KA 3/30/98* *

Customer : C.AAS/D.BISWELL (6134/SMO)
 Customer Sample ID : 036779-001
 Lab Sample ID : 80052305

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 758.000 gram
 Sample Date/Time : 3-24-98 11:10:00 AM
 Acquire Start Date/Time : 3-27-98 12:25:22 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	-----	3.56E+00
TH-234	1.55E+00	4.77E-01	6.42E-01
RA-226	1.58E+00	5.57E-01	5.70E-01
PB-214	7.41E-01	6.91E-01	4.70E-02
BI-214	6.47E-01	1.28E-01	5.02E-02
PB-210	Not Detected	-----	3.74E+01
TH-232	9.92E-01	4.93E-01	1.51E-01
RA-228	1.12E+00	3.02E-01	1.49E-01
AC-228	1.06E+00	4.08E-01	7.85E-02
TH-228	1.08E+00	2.94E-01	4.92E-01
RA-224	1.02E+00	3.02E-01	7.30E-02
PB-212	1.02E+00	1.70E-01	4.18E-02
BI-212	1.32E+00	5.28E-01	2.95E-01
TL-208	9.63E-01	1.81E-01	7.23E-02
U-235	Not Detected	-----	2.58E-01
TH-231	Not Detected	-----	2.42E+00
PA-231	Not Detected	-----	4.18E+00
TH-227	Not Detected	-----	3.81E-01
RA-223	Not Detected	-----	2.44E-01
RN-219	Not Detected	-----	3.67E-01
PB-211	Not Detected	-----	8.41E-01
TL-207	Not Detected	-----	1.41E+01
AM-241	Not Detected	-----	5.05E-01
PU-239	Not Detected	-----	4.72E+02
NP-237	Not Detected	-----	2.79E-01
PA-233	Not Detected	-----	5.82E-02
TH-229	Not Detected	-----	2.68E-01

[Summary Report] - Sample ID: : 80052305

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.29E-02
AG-110m	Not Detected	-----	3.21E-02
AM-243	Not Detected	-----	1.09E-01
BA-133	Not Detected	-----	6.76E-02
BE-7	Not Detected	-----	2.73E-01
CD-109	2.32E+00	6.94E-01	9.48E-01
CD-115	Not Detected	-----	1.57E-01
CE-139	Not Detected	-----	3.09E-02
CE-141	Not Detected	-----	5.89E-02
CE-144	Not Detected	-----	2.55E-01
CO-56	Not Detected	-----	3.78E-02
CO-57	Not Detected	-----	3.24E-02
CO-58	Not Detected	-----	3.36E-02
CO-60	Not Detected	-----	3.76E-02
CR-51	Not Detected	-----	2.50E-01
CS-134	Not Detected	-----	4.82E-02
CS-137	Not Detected	-----	3.46E-02
EU-152	Not Detected	-----	9.73E-02
EU-154	Not Detected	-----	1.99E-01
EU-155	Not Detected	-----	1.57E-01
FE-59	Not Detected	-----	7.43E-02
GD-153	Not Detected	-----	1.12E-01
HG-203	Not Detected	-----	3.40E-02
I-131	Not Detected	-----	3.72E-02
IR-192	Not Detected	-----	2.84E-02
K-40	1.81E+01	2.62E+00	2.58E-01
KR-85	Not Detected	-----	8.77E+00
MN-52	Not Detected	-----	4.15E-02
MN-54	Not Detected	-----	3.62E-02
MO-99	Not Detected	-----	4.67E-01
NA-22	Not Detected	-----	4.19E-02
NA-24	Not Detected	-----	5.65E-01
NB-95	Not Detected	-----	2.88E-01
ND-147	Not Detected	-----	2.52E-01
NI-57	Not Detected	-----	8.54E-02
NP-239	Not Detected	-----	1.41E-01
RU-103	Not Detected	-----	3.12E-02
RU-106	Not Detected	-----	3.15E-01
SB-122	Not Detected	-----	7.94E-02
SB-124	Not Detected	-----	3.16E-02
SB-125	Not Detected	-----	8.48E-02
SN-113	Not Detected	-----	3.84E-02
TA-182	Not Detected	-----	1.57E-01
TA-183	Not Detected	-----	6.16E-01
TC-99m	Not Detected	-----	3.93E+01
TL-201	Not Detected	-----	3.46E-01
XE-133	Not Detected	-----	3.42E-01
Y-88	Not Detected	-----	2.75E-02
ZN-65	Not Detected	-----	1.07E-01
ZR-95	Not Detected	-----	6.22E-02

not detected 3/20/98

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-27-98 3:54:30 AM *

 *
 * Analyzed by: *JS 3/30/98* Reviewed by: *KA 3/30/98* *

Customer : C.AAS/D.BISWELL (6134/SMO)
 Customer Sample ID : 036780-001
 Lab Sample ID : 80052306

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 838.000 gram
 Sample Date/Time : 3-24-98 11:10:00 AM
 Acquire Start Date/Time : 3-27-98 2:10:53 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	-----	3.43E+00
TH-234	1.35E+00	4.43E-01	6.11E-01
RA-226	1.78E+00	8.47E-01	6.24E-01
PB-214	7.27E-01	1.21E-01	4.67E-02
BI-214	6.48E-01	6.00E-01	4.57E-02
PB-210	Not Detected	-----	3.39E+01
TH-232	9.81E-01	4.55E-01	1.22E-01
RA-228	9.95E-01	2.74E-01	1.47E-01
AC-228	9.53E-01	2.01E-01	7.95E-02
TH-228	9.90E-01	2.72E-01	4.45E-01
RA-224	9.96E-01	2.92E-01	7.04E-02
PB-212	9.41E-01	8.14E-01	4.19E-02
BI-212	1.03E+00	4.06E-01	3.05E-01
TL-208	9.07E-01	1.79E-01	7.09E-02
U-235	Not Detected	-----	2.43E-01
TH-231	Not Detected	-----	2.30E+00
PA-231	Not Detected	-----	3.77E+00
TH-227	Not Detected	-----	3.58E-01
RA-223	Not Detected	-----	2.33E-01
RN-219	Not Detected	-----	3.76E-01
PB-211	Not Detected	-----	8.37E-01
TL-207	Not Detected	-----	1.28E+01
AM-241	Not Detected	-----	4.85E-01
FU-239	Not Detected	-----	4.48E+02
NP-237	6.11E-01	1.98E-01	3.04E-01
PA-233	Not Detected	-----	5.75E-02
TH-229	Not Detected	-----	2.59E-01

Not detected JS 3/30/98

[Summary Report] - Sample ID: : 80052306

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.04E-02
AG-110m	Not Detected	-----	3.54E-02
AM-243	Not Detected	-----	1.00E-01
BA-133	Not Detected	-----	6.43E-02
BE-7	Not Detected	-----	2.50E-01
CD-109	Not Detected	-----	1.03E+00
CD-115	Not Detected	-----	1.51E-01
CE-139	Not Detected	-----	3.02E-02
CE-141	Not Detected	-----	5.57E-02
CE-144	Not Detected	-----	2.44E-01
CO-56	Not Detected	-----	3.62E-02
CO-57	Not Detected	-----	3.02E-02
CO-58	Not Detected	-----	3.19E-02
CO-60	Not Detected	-----	3.51E-02
CR-51	Not Detected	-----	2.44E-01
CS-134	Not Detected	-----	4.44E-02
CS-137	5.72E-02	2.06E-02	1.94E-02
EU-152	Not Detected	-----	9.05E-02
EU-154	Not Detected	-----	1.86E-01
EU-155	Not Detected	-----	1.50E-01
FE-59	Not Detected	-----	7.08E-02
GD-153	Not Detected	-----	1.06E-01
HG-203	Not Detected	-----	3.21E-02
I-131	Not Detected	-----	3.52E-02
IR-192	Not Detected	-----	2.80E-02
K-40	1.96E+01	2.81E+00	2.31E-01
KR-85	Not Detected	-----	8.25E+00
MN-52	Not Detected	-----	3.92E-02
MN-54	Not Detected	-----	2.24E-02
MO-99	Not Detected	-----	4.54E-01
NA-22	Not Detected	-----	4.16E-02
NA-24	Not Detected	-----	6.15E-01
NB-95	Not Detected	-----	2.75E-01
ND-147	Not Detected	-----	2.26E-01
NI-57	Not Detected	-----	1.49E-01
NP-239	Not Detected	-----	1.33E-01
RU-103	Not Detected	-----	2.88E-02
RU-106	Not Detected	-----	2.80E-01
SB-122	Not Detected	-----	7.45E-02
SB-124	Not Detected	-----	2.86E-02
SB-125	Not Detected	-----	8.03E-02
SN-113	Not Detected	-----	3.71E-02
TA-182	Not Detected	-----	1.46E-01
TA-183	Not Detected	-----	5.90E-01
TC-99m	Not Detected	-----	4.60E+01
TL-201	Not Detected	-----	3.35E-01
XE-133	Not Detected	-----	3.43E-01
Y-88	Not Detected	-----	2.33E-02
ZN-65	Not Detected	-----	9.92E-02
ZR-95	Not Detected	-----	5.90E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-27-98 5:40:30 AM *

 * Analyzed by: *WJ 3/30/98* Reviewed by: *S.B. Ebara 3/30/98* *

Customer : C.AAS/D.BISWELL (6134/SMO)
 Customer Sample ID : 036781-001
 Lab Sample ID : 80052307

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 666.000 gram
 Sample Date/Time : 3-24-98 11:15:00 AM
 Acquire Start Date/Time : 3-27-98 3:56:49 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	-----	3.63E+00
TH-234	1.21E+00	4.52E-01	6.00E-01
RA-226	1.55E+00	6.69E-01	5.83E-01
PB-214	5.80E-01	9.02E-01	4.72E-02
BI-214	5.40E-01	1.27E-01	5.16E-02
PB-210	Not Detected	-----	3.76E+01
TH-232	1.07E+00	8.07E-01	1.64E-01
RA-228	1.06E+00	4.70E-01	1.43E-01
AC-228	1.09E+00	1.75E-01	8.78E-02
TH-228	8.90E-01	2.94E-01	5.41E-01
RA-224	1.10E+00	3.58E-01	9.04E-02
PB-212	1.01E+00	3.00E-01	4.41E-02
BI-212	1.21E+00	5.49E-01	3.43E-01
TL-208	9.87E-01	1.88E-01	7.60E-02
U-235	Not Detected	-----	2.67E-01
TH-231	Not Detected	-----	2.50E+00
PA-231	Not Detected	-----	4.26E+00
TH-227	Not Detected	-----	4.05E-01
RA-223	Not Detected	-----	2.61E-01
RN-219	Not Detected	-----	4.11E-01
PB-211	Not Detected	-----	9.13E-01
TL-207	Not Detected	-----	1.40E+01
AM-241	Not Detected	-----	5.24E-01
PU-239	Not Detected	-----	4.93E+02
NP-237	4.15E-01	1.68E-01	3.13E-01
PA-233	Not Detected	-----	6.44E-02
TH-229	Not Detected	-----	2.80E-01

not detected 3/30/98

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.42E-02
AG-110m	Not Detected	-----	3.44E-02
AM-243	Not Detected	-----	1.06E-01
BA-133	Not Detected	-----	6.57E-02
BE-7	Not Detected	-----	2.89E-01
CD-109	Not Detected	-----	1.06E+00
CD-115	Not Detected	-----	1.76E-01
CE-139	Not Detected	-----	3.17E-02
CE-141	Not Detected	-----	6.10E-02
CE-144	Not Detected	-----	2.69E-01
CO-56	Not Detected	-----	3.91E-02
CO-57	Not Detected	-----	3.26E-02
CO-58	Not Detected	-----	3.37E-02
CO-60	Not Detected	-----	3.49E-02
CR-51	Not Detected	-----	2.65E-01
CS-134	Not Detected	-----	4.86E-02
CS-137	Not Detected	-----	3.63E-02
EU-152	Not Detected	-----	9.78E-02
EU-154	Not Detected	-----	2.04E-01
EU-155	Not Detected	-----	1.20E-01
FE-59	Not Detected	-----	7.66E-02
GD-153	Not Detected	-----	1.17E-01
HG-203	Not Detected	-----	3.56E-02
I-131	Not Detected	-----	3.84E-02
IR-192	Not Detected	-----	2.99E-02
K-40	1.68E+01	2.54E+00	2.78E-01
KR-85	Not Detected	-----	9.26E+00
MN-52	Not Detected	-----	4.32E-02
MN-54	Not Detected	-----	3.81E-02
MO-99	Not Detected	-----	4.98E-01
NA-22	Not Detected	-----	4.53E-02
NA-24	Not Detected	-----	7.28E-01
NB-95	Not Detected	-----	3.14E-01
ND-147	Not Detected	-----	2.61E-01
NI-57	Not Detected	-----	8.89E-02
NP-239	Not Detected	-----	1.47E-01
RU-103	Not Detected	-----	3.14E-02
RU-106	Not Detected	-----	3.11E-01
SB-122	Not Detected	-----	5.23E-02
SB-124	Not Detected	-----	3.43E-02
SB-125	Not Detected	-----	8.71E-02
SN-113	Not Detected	-----	4.13E-02
TA-182	Not Detected	-----	1.51E-01
TA-183	Not Detected	-----	6.53E-01
TC-99m	Not Detected	-----	5.98E+01
TL-201	Not Detected	-----	3.76E-01
XE-133	Not Detected	-----	3.63E-01
Y-88	Not Detected	-----	2.83E-02
ZN-65	Not Detected	-----	1.03E-01
ZR-95	Not Detected	-----	6.54E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-30-98 12:47:46 PM *

 *
 * Analyzed by: *JA 3/30/98* Reviewed by: *AS 3/30/98* *

Customer : C.AAS/D.BISWELL (6134/SMO)
 Customer Sample ID : 036782-001
 Lab Sample ID : 80052308

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 856.000 gram
 Sample Date/Time : 3-24-98 11:25:00 AM
 Acquire Start Date/Time : 3-27-98 5:42:43 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	-----	3.14E+00
TH-234	1.29E+00	5.08E-01	5.71E-01
RA-226	1.42E+00	7.15E-01	4.79E-01
PB-214	Not Detected	-----	4.31E-02
BI-214	5.31E-01	2.38E-01	4.43E-02
PB-210	Not Detected	-----	3.38E+01
TH-232	7.44E-01	3.78E-01	1.39E-01
RA-228	1.03E+00	2.28E-01	2.44E-01
AC-228	7.93E-01	1.86E-01	7.91E-02
TH-228	8.20E-01	5.00E-01	4.41E-01
RA-224	7.42E-01	2.38E-01	6.27E-02
PB-212	7.19E-01	1.23E-01	3.95E-02
BI-212	9.00E-01	3.72E-01	2.42E-01
TL-208	6.99E-01	1.31E-01	5.98E-02
U-235	Not Detected	-----	2.30E-01
TH-231	Not Detected	-----	2.24E+00
PA-231	Not Detected	-----	3.78E+00
TH-227	Not Detected	-----	3.20E-01
RA-223	Not Detected	-----	2.22E-01
RN-219	Not Detected	-----	3.68E-01
PB-211	Not Detected	-----	8.44E-01
TL-207	Not Detected	-----	1.24E+01
AM-241	Not Detected	-----	4.51E-01
PU-239	Not Detected	-----	4.19E+02
NP-237	Not Detected	-----	2.59E-01
PA-233	Not Detected	-----	5.47E-02
TH-229	Not Detected	-----	2.34E-01

[Summary Report] - Sample ID: : 80052308

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.63E-02
AG-110m	Not Detected	-----	5.95E-02
AM-243	Not Detected	-----	8.60E-02
BA-133	Not Detected	-----	5.73E-02
BE-7	8.20E-02	1.45E-02	3.44E-02
CD-109	1.51E+00	5.43E-01	8.79E-01
CD-115	Not Detected	-----	1.46E-01
CE-139	Not Detected	-----	2.87E-02
CE-141	Not Detected	-----	5.21E-02
CE-144	Not Detected	-----	2.31E-01
CO-56	Not Detected	-----	3.26E-02
CO-57	Not Detected	-----	2.95E-02
CO-58	Not Detected	-----	3.01E-02
CO-60	Not Detected	-----	3.30E-02
CR-51	Not Detected	-----	2.36E-01
CS-134	Not Detected	-----	4.08E-02
CS-137	4.66E-01	8.19E-02	2.12E-02
EU-152	Not Detected	-----	8.85E-02
EU-154	Not Detected	-----	1.68E-01
EU-155	Not Detected	-----	1.42E-01
FE-59	Not Detected	-----	7.01E-02
GD-153	Not Detected	-----	9.86E-02
HG-203	Not Detected	-----	3.12E-02
I-131	Not Detected	-----	3.43E-02
IR-192	Not Detected	-----	2.69E-02
K-40	2.01E+01	3.84E+00	2.18E-01
KR-85	Not Detected	-----	7.90E+00
MN-52	Not Detected	-----	3.84E-02
MN-54	Not Detected	-----	3.32E-02
MO-99	Not Detected	-----	4.41E-01
NA-22	Not Detected	-----	3.80E-02
NA-24	Not Detected	-----	6.62E-01
NB-95	Not Detected	-----	2.52E-01
ND-147	Not Detected	-----	2.27E-01
NI-57	Not Detected	-----	8.84E-02
NP-239	Not Detected	-----	1.27E-01
RU-103	Not Detected	-----	2.85E-02
RU-106	Not Detected	-----	2.79E-01
SB-122	Not Detected	-----	7.38E-02
SB-124	Not Detected	-----	2.83E-02
SB-125	Not Detected	-----	7.82E-02
SN-113	Not Detected	-----	3.70E-02
TA-182	Not Detected	-----	1.40E-01
TA-183	Not Detected	-----	5.67E-01
TC-99m	Not Detected	-----	6.32E+01
TL-201	Not Detected	-----	3.28E-01
XE-133	Not Detected	-----	3.27E-01
Y-88	Not Detected	-----	2.40E-02
ZN-65	Not Detected	-----	9.50E-02
ZR-95	Not Detected	-----	5.24E-02

NOT DETECTED KK 3/23/98
NOT DETECTED KK 3/22/99

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-27-98 9:12:26 AM *

 * Analyzed by: WJ3/30/98 Reviewed by: S.B. Eburn 3/30/98 *

Customer : C.AAS/D.BISWELL (6134/SMO)
 Customer Sample ID : 036783-001
 Lab Sample ID : 80052309

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 948.000 gram
 Sample Date/Time : 3-24-98 11:30:00 AM
 Acquire Start Date/Time : 3-27-98 7:28:49 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	-----	2.95E+00
TH-234	1.33E+00	6.60E-01	5.89E-01
RA-226	1.34E+00	5.54E-01	4.63E-01
PB-214	5.26E-01	9.01E-02	4.27E-02
BI-214	4.75E-01	1.19E-01	3.91E-02
PB-210	Not Detected	-----	3.07E+01
TH-232	6.72E-01	3.60E-01	1.49E-01
RA-228	7.44E-01	2.42E-01	1.32E-01
AC-228	7.96E-01	2.98E-01	6.79E-02
TH-228	6.59E-01	2.20E-01	4.56E-01
RA-224	8.01E-01	2.23E-01	6.13E-02
PB-212	7.53E-01	1.33E-01	3.57E-02
BI-212	7.92E-01	3.36E-01	2.74E-01
TL-208	6.58E-01	1.31E-01	6.14E-02
U-235	Not Detected	-----	2.19E-01
TH-231	Not Detected	-----	2.04E+00
PA-231	Not Detected	-----	3.50E+00
TH-227	Not Detected	-----	3.03E-01
RA-223	Not Detected	-----	2.11E-01
RN-219	Not Detected	-----	3.38E-01
PB-211	Not Detected	-----	7.81E-01
TL-207	Not Detected	-----	1.20E+01
AM-241	Not Detected	-----	4.32E-01
PU-239	Not Detected	-----	3.98E+02
NP-237	Not Detected	-----	2.94E-01
PA-233	Not Detected	-----	5.27E-02
TH-229	Not Detected	-----	2.31E-01

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.49E-02
AG-110m	Not Detected	-----	5.93E-02
AM-243	Not Detected	-----	8.30E-02
BA-133	Not Detected	-----	5.36E-02
BE-7	Not Detected	-----	2.44E-01
CD-109	1.64E+00	8.18E-01	1.00E+00
CD-115	Not Detected	-----	1.39E-01
CE-139	Not Detected	-----	2.66E-02
CE-141	Not Detected	-----	4.97E-02
CE-144	Not Detected	-----	2.22E-01
CO-56	Not Detected	-----	3.10E-02
CO-57	Not Detected	-----	2.83E-02
CO-58	Not Detected	-----	2.71E-02
CO-60	Not Detected	-----	3.00E-02
CR-51	Not Detected	-----	2.18E-01
CS-134	Not Detected	-----	3.83E-02
CS-137	5.27E-01	8.45E-02	2.09E-02
EU-152	Not Detected	-----	8.47E-02
EU-154	Not Detected	-----	1.61E-01
EU-155	Not Detected	-----	1.33E-01
FE-59	Not Detected	-----	6.28E-02
GD-153	Not Detected	-----	9.53E-02
HG-203	Not Detected	-----	2.91E-02
I-131	Not Detected	-----	3.31E-02
IR-192	Not Detected	-----	2.46E-02
K-40	1.93E+01	2.79E+00	1.92E-01
KR-85	Not Detected	-----	7.35E+00
MN-52	Not Detected	-----	3.44E-02
MN-54	Not Detected	-----	2.89E-02
MO-99	Not Detected	-----	4.10E-01
NA-22	Not Detected	-----	3.55E-02
NA-24	Not Detected	-----	6.09E-01
NB-95	Not Detected	-----	2.42E-01
ND-147	Not Detected	-----	2.11E-01
NI-57	Not Detected	-----	8.50E-02
NP-239	Not Detected	-----	1.19E-01
RU-103	Not Detected	-----	2.70E-02
RU-106	Not Detected	-----	2.63E-01
SB-122	Not Detected	-----	7.16E-02
SB-124	Not Detected	-----	2.75E-02
SB-125	Not Detected	-----	7.48E-02
SN-113	Not Detected	-----	3.41E-02
TA-182	Not Detected	-----	1.28E-01
TA-183	Not Detected	-----	5.45E-01
TC-99m	Not Detected	-----	7.27E+01
TL-201	Not Detected	-----	3.12E-01
XE-133	Not Detected	-----	3.20E-01
Y-88	Not Detected	-----	2.12E-02
ZN-65	Not Detected	-----	8.61E-02
ZR-95	Not Detected	-----	4.92E-02

Not detected 5/30/98

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-27-98 10:57:31 AM *

 *
 * Analyzed by: YD 3/30/98 Reviewed by: S.B. Ebara 3/30/98 *

Customer : C.AAS/D.BISWELL (6134/SMO)
 Customer Sample ID : 036784-001
 Lab Sample ID : 80052310

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 904.000 gram
 Sample Date/Time : 3-24-98 11:35:00 AM
 Acquire Start Date/Time : 3-27-98 9:14:39 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	-----	3.14E+00
TH-234	1.27E+00	4.60E-01	5.58E-01
RA-226	1.72E+00	1.10E+00	6.59E-01
PB-214	6.00E-01	1.21E-01	4.33E-02
BI-214	5.22E-01	9.69E-02	4.25E-02
PB-210	Not Detected	-----	3.35E+01
TH-232	7.79E-01	8.95E-01	1.34E-01
RA-228	7.76E-01	2.49E-01	1.39E-01
AC-228	7.99E-01	3.04E-01	7.75E-02
TH-228	7.53E-01	2.31E-01	4.52E-01
RA-224	7.85E-01	2.24E-01	6.25E-02
PB-212	7.91E-01	1.29E-01	3.84E-02
BI-212	9.28E-01	5.13E-01	3.05E-01
TL-208	7.04E-01	2.13E-01	6.33E-02
U-235	Not Detected	-----	2.29E-01
TH-231	Not Detected	-----	2.21E+00
PA-231	Not Detected	-----	3.65E+00
TH-227	Not Detected	-----	3.20E-01
RA-223	Not Detected	-----	2.20E-01
RN-219	Not Detected	-----	3.69E-01
PB-211	Not Detected	-----	8.21E-01
TL-207	Not Detected	-----	1.23E+01
AM-241	Not Detected	-----	4.46E-01
PU-239	Not Detected	-----	4.27E+02
NP-237	Not Detected	-----	2.81E-01
PA-233	Not Detected	-----	5.53E-02
TH-229	Not Detected	-----	2.45E-01

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.63E-02
AG-110m	Not Detected	-----	6.17E-02
AM-243	Not Detected	-----	9.15E-02
BA-133	Not Detected	-----	5.69E-02
BE-7	Not Detected	-----	2.52E-01
CD-109	Not Detected	-----	9.55E-01
CD-115	Not Detected	-----	1.52E-01
CE-139	Not Detected	-----	2.82E-02
CE-141	Not Detected	-----	5.26E-02
CE-144	Not Detected	-----	2.34E-01
CO-56	Not Detected	-----	3.10E-02
CO-57	Not Detected	-----	2.87E-02
CO-58	Not Detected	-----	3.00E-02
CO-60	Not Detected	-----	3.26E-02
CR-51	Not Detected	-----	2.34E-01
CS-134	Not Detected	-----	4.03E-02
CS-137	5.37E-01	8.55E-02	2.17E-02
EU-152	Not Detected	-----	8.60E-02
EU-154	Not Detected	-----	1.67E-01
EU-155	Not Detected	-----	1.40E-01
FE-59	Not Detected	-----	6.62E-02
GD-153	Not Detected	-----	1.01E-01
HG-203	Not Detected	-----	3.11E-02
I-131	Not Detected	-----	3.42E-02
IR-192	Not Detected	-----	2.64E-02
K-40	1.89E+01	2.75E+00	2.21E-01
KR-85	Not Detected	-----	7.71E+00
MN-52	Not Detected	-----	3.67E-02
MN-54	Not Detected	-----	2.98E-02
MO-99	Not Detected	-----	4.37E-01
NA-22	Not Detected	-----	3.80E-02
NA-24	Not Detected	-----	7.15E-01
NB-95	Not Detected	-----	2.59E-01
ND-147	Not Detected	-----	2.19E-01
NI-57	Not Detected	-----	1.55E-01
NP-239	Not Detected	-----	1.26E-01
RU-103	Not Detected	-----	2.91E-02
RU-106	Not Detected	-----	2.66E-01
SB-122	2.55E-02	2.61E-02	4.02E-02
SB-124	Not Detected	-----	2.82E-02
SB-125	Not Detected	-----	8.02E-02
SN-113	Not Detected	-----	3.54E-02
TA-182	Not Detected	-----	1.31E-01
TA-183	Not Detected	-----	5.64E-01
TC-99m	Not Detected	-----	9.31E+01
TL-201	Not Detected	-----	3.36E-01
XE-133	Not Detected	-----	3.35E-01
Y-88	Not Detected	-----	2.31E-02
ZN-65	Not Detected	-----	8.81E-02
ZR-95	Not Detected	-----	5.34E-02

Not detected 12/30/92

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-30-98 1:03:16 PM *

 *
 * Analyzed by: *KA 3/24/98* Reviewed by: *DA 3/30/98* *

Customer : C.AAS/D.BISWELL (6134/SMO)
 Customer Sample ID : 036785-001
 Lab Sample ID : 80052311

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 854.000 gram
 Sample Date/Time : 3-24-98 11:40:00 AM
 Acquire Start Date/Time : 3-27-98 10:59:46 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	-----	3.28E+00
TH-234	1.08E+00	5.17E-01	6.05E-01
RA-226	1.52E+00	5.62E-01	4.89E-01
PB-214	5.53E-01	1.07E-01	4.62E-02
BI-214	5.29E-01	1.18E-01	4.36E-02
PB-210	Not Detected	-----	3.40E+01
TH-232	7.67E-01	3.68E-01	1.41E-01
RA-228	7.48E-01	5.13E-01	1.44E-01
AC-228	7.67E-01	1.90E-01	7.80E-02
TH-228	8.81E-01	3.13E-01	4.67E-01
RA-224	8.15E-01	2.68E-01	6.13E-02
PB-212	8.21E-01	1.37E-01	3.92E-02
BI-212	6.60E-01	2.92E-01	2.93E-01
TL-208	6.76E-01	2.09E-01	6.25E-02
U-235	Not Detected	-----	2.34E-01
TH-231	Not Detected	-----	2.28E+00
PA-231	Not Detected	-----	3.79E+00
TH-227	Not Detected	-----	3.34E-01
RA-223	Not Detected	-----	2.26E-01
RN-219	Not Detected	-----	3.63E-01
PB-211	Not Detected	-----	8.26E-01
TL-207	Not Detected	-----	1.21E+01
AM-241	Not Detected	-----	4.70E-01
PU-239	Not Detected	-----	4.38E+02
NP-237	Not Detected	-----	2.91E-01
PA-233	Not Detected	-----	5.68E-02
TH-229	Not Detected	-----	2.49E-01

[Summary Report] - Sample ID: : 80052311

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.70E-02
AG-110m	Not Detected	-----	6.67E-02
AM-243	Not Detected	-----	9.71E-02
BA-133	Not Detected	-----	5.93E-02
BE-7	Not Detected	-----	2.69E-01
CD-109	1.49E+00	5.74E-01	5.90E-01
CD-115	Not Detected	-----	1.60E-01
CE-139	Not Detected	-----	2.88E-02
CE-141	Not Detected	-----	5.40E-02
CE-144	Not Detected	-----	2.39E-01
CO-56	Not Detected	-----	3.39E-02
CO-57	Not Detected	-----	2.98E-02
CO-58	Not Detected	-----	2.91E-02
CO-60	Not Detected	-----	3.35E-02
CR-51	Not Detected	-----	2.44E-01
CS-134	Not Detected	-----	4.17E-02
CS-137	6.20E-01	9.58E-02	2.23E-02
EU-152	Not Detected	-----	8.92E-02
EU-154	Not Detected	-----	1.71E-01
EU-155	Not Detected	-----	1.45E-01
FE-59	Not Detected	-----	6.57E-02
GD-153	Not Detected	-----	1.04E-01
HG-203	Not Detected	-----	3.18E-02
I-131	Not Detected	-----	3.67E-02
IR-192	Not Detected	-----	2.75E-02
K-40	1.90E+01	2.80E+00	2.32E-01
KR-85	Not Detected	-----	7.87E+00
MN-52	Not Detected	-----	3.99E-02
MN-54	Not Detected	-----	3.40E-02
MO-99	Not Detected	-----	4.59E-01
NA-22	Not Detected	-----	4.00E-02
NA-24	Not Detected	-----	7.87E-01
NE-95	Not Detected	-----	2.73E-01
ND-147	Not Detected	-----	2.30E-01
NI-57	Not Detected	-----	9.75E-02
NP-239	Not Detected	-----	1.31E-01
RU-103	Not Detected	-----	3.11E-02
RU-106	Not Detected	-----	2.72E-01
SB-122	Not Detected	-----	7.90E-02
SB-124	Not Detected	-----	2.82E-02
SB-125	Not Detected	-----	8.06E-02
SN-113	Not Detected	-----	3.56E-02
TA-182	Not Detected	-----	1.37E-01
TA-183	Not Detected	-----	6.03E-01
TC-99m	Not Detected	-----	1.13E+02
TL-201	Not Detected	-----	3.44E-01
XE-133	Not Detected	-----	3.52E-01
Y-88	Not Detected	-----	2.41E-02
ZN-65	Not Detected	-----	9.09E-02
ZR-95	Not Detected	-----	5.20E-02

Not Detected! 3/30/98

PAGE 4 C

AR/COC-1 5000

Project Name: *CCPA - 2014*

Project/Task Manager: AA- / . Adv. Proj.

Case No.: 775.170500.

[illegible]

Abnormal Conditions on Receipt

Recipient Initials

WHIT 10 Accompany Samples,
Laboratory Copy

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

YELLOW

MO Suspense Copy

PINK- Field Copy

 * Sandia National Laboratories
 * Radiation Protection Sample Diagnostics Program [881 Laboratory]
 * 3-24-98 6:28:49 PM
 *
 * Analyzed by: *[Signature]* 3/25/98 Reviewed by: *[Signature]* 3/25/98

Customer : C.AAS/D.BISWELL (6134/SMO)
 Customer Sample ID : 036738-001
 Lab Sample ID : 80050801

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 758.000 gram
 Sample Date/Time : 3-23-98 2:05:00 PM-
 Acquire Start Date/Time : 3-24-98 4:45:50 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	4.15E+00	1.83E+00	1.52E+00
TH-234	4.82E+00	1.06E+00	4.90E-01
RA-226	2.09E+00	8.73E-01	6.28E-01
PB-214	5.66E-01	1.06E-01	4.67E-02
BI-214	5.54E-01	1.32E-01	5.44E-02
PB-210	Not Detected	-----	8.36E+00
TH-232	7.94E-01	3.69E-01	1.57E-01
RA-228	7.75E-01	2.31E-01	1.72E-01
AC-228	8.00E-01	2.19E-01	9.11E-02
TH-228	8.56E-01	4.12E-01	4.81E-01
RA-224	7.78E-01	2.95E-01	9.23E-02
PB-212	7.93E-01	2.62E-01	4.06E-02
BI-212	1.03E+00	4.39E-01	3.64E-01
TL-208	7.78E-01	1.71E-01	7.56E-02
U-235	1.63E-01	2.01E-01	2.22E-01
TH-231	Not Detected	-----	2.34E+00
PA-231	Not Detected	-----	3.65E+00
TH-227	Not Detected	-----	3.75E-01
RA-223	Not Detected	-----	1.65E-01
RN-219	Not Detected	-----	4.03E-01
PB-211	Not Detected	-----	9.19E-01
TL-207	Not Detected	-----	1.44E+01
AM-241	Not Detected	-----	2.09E-01
PU-239	Not Detected	-----	3.69E+02
NP-237	6.98E-01	1.65E-01	2.36E-01
PA-233	Not Detected	-----	5.91E-02
TH-229	Not Detected	-----	2.19E-01

not detected 3/25/98

not detected 3/25/98

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.61E-02
AG-110m	Not Detected	-----	4.11E-02
AM-243	Not Detected	-----	6.68E-02
BA-133	Not Detected	-----	5.61E-02
BE-7	1.38E-01	2.38E-01	1.82E-01
CD-109	Not Detected	-----	1.07E+00
CD-115	Not Detected	-----	9.83E-02
CE-139	Not Detected	-----	2.78E-02
CE-141	Not Detected	-----	4.98E-02
CE-144	Not Detected	-----	2.03E-01
CO-56	Not Detected	-----	3.83E-02
CO-57	Not Detected	-----	2.61E-02
CO-58	Not Detected	-----	3.62E-02
CO-60	Not Detected	-----	4.28E-02
CR-51	Not Detected	-----	2.50E-01
CS-134	Not Detected	-----	4.36E-02
CS-137	9.31E-02	4.01E-02	2.48E-02
EU-152	Not Detected	-----	7.90E-02
EU-154	Not Detected	-----	2.15E-01
EU-155	Not Detected	-----	1.20E-01
FE-59	Not Detected	-----	8.71E-02
GD-153	Not Detected	-----	8.87E-02
HG-203	Not Detected	-----	3.24E-02
I-131	Not Detected	-----	3.41E-02
IR-192	Not Detected	-----	2.88E-02
K-40	1.65E+01	2.86E+00	3.14E-01
KR-85	Not Detected	-----	9.47E+00
MN-52	Not Detected	-----	4.10E-02
MN-54	Not Detected	-----	3.79E-02
MO-99	Not Detected	-----	3.65E-01
NA-22	Not Detected	-----	4.98E-02
NA-24	Not Detected	-----	1.31E-01
NB-95	Not Detected	-----	1.97E-01
ND-147	Not Detected	-----	2.35E-01
NI-57	Not Detected	-----	9.12E-02
NP-239	Not Detected	-----	1.09E-01
RU-103	Not Detected	-----	3.33E-02
RU-106	Not Detected	-----	3.21E-01
SB-122	Not Detected	-----	5.91E-02
SB-124	Not Detected	-----	3.30E-02
SB-125	Not Detected	-----	9.16E-02
SN-113	Not Detected	-----	4.04E-02
TA-182	Not Detected	-----	1.76E-01
TA-183	Not Detected	-----	2.07E-01
TC-99m	Not Detected	-----	6.02E-01
TL-201	Not Detected	-----	1.50E-01
XE-133	Not Detected	-----	1.51E-01
Y-88	Not Detected	-----	3.32E-02
ZN-65	Not Detected	-----	1.17E-01
ZR-95	Not Detected	-----	6.51E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-24-98 8:17:36 PM *

 *
 * Analyzed by: *J 3/25/98* Reviewed by: *KS 3/25/98* *

Customer : C.AAS/D.BISWELL (6134/SMO)
 Customer Sample ID : 036739-001
 Lab Sample ID : 80050802

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 765.000 gram
 Sample Date/Time : 3-23-98 2:05:00 PM-
 Acquire Start Date/Time : 3-24-98 6:31:45 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	3.06E+00	1.39E+00	1.56E+00
TH-234	4.33E+00	1.02E+00	4.82E-01
RA-226	1.66E+00	5.31E-01	5.22E-01
PB-214	5.45E-01	1.03E-01	4.89E-02
BI-214	5.02E-01	1.19E-01	5.58E-02
PB-210	Not Detected	-----	8.08E+00
TH-232	8.80E-01	4.53E-01	1.57E-01
RA-228	8.30E-01	3.31E-01	1.75E-01
AC-228	7.36E-01	1.87E-01	9.98E-02
TH-228	7.70E-01	4.17E-01	5.04E-01
RA-224	7.72E-01	2.93E-01	7.84E-02
PB-212	7.67E-01	2.15E-01	3.90E-02
BI-212	8.81E-01	4.06E-01	3.47E-01
TL-208	7.51E-01	1.76E-01	7.83E-02
U-235	Not Detected	-----	2.14E-01
TH-231	Not Detected	-----	2.27E+00
PA-231	Not Detected	-----	3.59E+00
TH-227	Not Detected	-----	3.67E-01
RA-223	Not Detected	-----	1.61E-01
RN-219	Not Detected	-----	3.97E-01
PB-211	Not Detected	-----	9.09E-01
TL-207	Not Detected	-----	1.59E+01
AM-241	Not Detected	-----	2.00E-01
PU-239	Not Detected	-----	3.59E+02
NP-237	5.15E-01	1.63E-01	1.95E-01
PA-233	Not Detected	-----	5.47E-02
TH-229	Not Detected	-----	2.14E-01

not Detected
J 3/25/98

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.56E-02
AG-110m	Not Detected	-----	3.67E-02
AM-243	Not Detected	-----	5.57E-02
BA-133	Not Detected	-----	5.43E-02
BE-7	Not Detected	-----	2.47E-01
CD-109	Not Detected	-----	1.01E+00
CD-115	Not Detected	-----	9.99E-02
CE-139	Not Detected	-----	2.60E-02
CE-141	Not Detected	-----	4.69E-02
CE-144	Not Detected	-----	1.95E-01
CO-56	Not Detected	-----	3.84E-02
CO-57	Not Detected	-----	2.44E-02
CO-58	Not Detected	-----	3.50E-02
CO-60	Not Detected	-----	4.23E-02
CR-51	Not Detected	-----	2.38E-01
CS-134	Not Detected	-----	4.14E-02
CS-137	4.58E-02	3.02E-02	2.30E-02
EU-152	Not Detected	-----	7.31E-02
EU-154	Not Detected	-----	2.13E-01
EU-155	Not Detected	-----	1.16E-01
FE-59	Not Detected	-----	8.30E-02
GD-153	Not Detected	-----	8.83E-02
HG-203	Not Detected	-----	3.11E-02
I-131	Not Detected	-----	3.16E-02
IR-192	Not Detected	-----	2.75E-02
K-40	1.52E+01	2.46E+00	2.91E-01
KR-85	Not Detected	-----	8.92E+00
MN-52	Not Detected	-----	3.93E-02
MN-54	Not Detected	-----	3.66E-02
MO-99	Not Detected	-----	3.59E-01
NA-22	Not Detected	-----	4.74E-02
NA-24	Not Detected	-----	1.39E-01
NB-95	Not Detected	-----	1.96E-01
ND-147	Not Detected	-----	2.30E-01
NI-57	Not Detected	-----	9.16E-02
NP-239	Not Detected	-----	1.05E-01
RU-103	Not Detected	-----	3.05E-02
RU-106	Not Detected	-----	3.03E-01
SB-122	Not Detected	-----	5.54E-02
SB-124	Not Detected	-----	3.19E-02
SB-125	Not Detected	-----	8.73E-02
SN-113	Not Detected	-----	3.85E-02
TA-182	Not Detected	-----	1.66E-01
TA-183	Not Detected	-----	2.01E-01
TC-99m	Not Detected	-----	7.48E-01
TL-201	Not Detected	-----	1.49E-01
XE-133	Not Detected	-----	1.56E-01
Y-88	Not Detected	-----	3.21E-02
ZN-65	Not Detected	-----	1.14E-01
ZR-95	Not Detected	-----	6.58E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-25-98 9:23:47 AM *

 *
 * Analyzed by: *[Signature]* 3/25/98 Reviewed by: *[Signature]* 3/25/98 *

Customer : C.AAS/D.BISWELL (6134/SMO)
 Customer Sample ID : 036740-001
 Lab Sample ID : 80050803

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 888.000 gram
 Sample Date/Time : 3-23-98 2:10:00 PM-
 Acquire Start Date/Time : 3-25-98 7:40:54 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	1.18E+00	8.03E-01	1.06E+00
TH-234	1.10E+00	4.09E-01	3.96E-01
RA-226	1.22E+00	5.13E-01	5.24E-01
PB-214	4.83E-01	1.03E-01	4.41E-02
BI-214	4.49E-01	1.03E-01	4.49E-02
PB-210	Not Detected	-----	7.00E+00
TH-232	7.81E-01	3.95E-01	1.44E-01
RA-228	7.06E-01	6.74E-01	1.39E-01
AC-228	6.58E-01	1.78E-01	8.58E-02
TH-228	7.17E-01	3.47E-01	4.22E-01
RA-224	8.64E-01	3.05E-01	6.37E-02
PB-212	6.88E-01	1.18E-01	3.18E-02
BI-212	7.69E-01	3.32E-01	3.28E-01
TL-208	6.85E-01	1.45E-01	6.62E-02
U-235	1.61E-01	1.71E-01	1.88E-01
TH-231	Not Detected	-----	1.95E+00
PA-231	Not Detected	-----	3.02E+00
TH-227	Not Detected	-----	3.22E-01
RA-223	Not Detected	-----	1.38E-01
RN-219	Not Detected	-----	3.55E-01
PB-211	Not Detected	-----	7.82E-01
TL-207	Not Detected	-----	1.37E+01
AM-241	Not Detected	-----	1.67E-01
PU-239	Not Detected	-----	3.09E+02
NP-237	4.44E-01	1.75E-01	1.80E-01
PA-233	Not Detected	-----	4.93E-02
TH-229	Not Detected	-----	1.77E-01

not detected 3/25/98

not detected 3/25/98

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.07E-02
AG-110m	Not Detected	-----	3.05E-02
AM-243	Not Detected	-----	5.13E-02
BA-133	Not Detected	-----	4.58E-02
BE-7	Not Detected	-----	2.25E-01
CD-109	Not Detected	-----	8.62E-01
CD-115	Not Detected	-----	1.04E-01
CE-139	Not Detected	-----	2.25E-02
CE-141	Not Detected	-----	4.20E-02
CE-144	Not Detected	-----	1.67E-01
CO-56	Not Detected	-----	3.49E-02
CO-57	Not Detected	-----	2.17E-02
CO-58	Not Detected	-----	2.98E-02
CO-60	Not Detected	-----	3.54E-02
CR-51	Not Detected	-----	2.07E-01
CS-134	Not Detected	-----	3.65E-02
CS-137	Not Detected	-----	3.66E-02
EU-152	Not Detected	-----	6.47E-02
EU-154	Not Detected	-----	1.91E-01
EU-155	Not Detected	-----	1.00E-01
FE-59	Not Detected	-----	7.87E-02
GD-153	Not Detected	-----	7.17E-02
HG-203	Not Detected	-----	2.75E-02
I-131	Not Detected	-----	2.98E-02
IR-192	Not Detected	-----	2.36E-02
K-40	1.51E+01	2.35E+00	2.26E-01
KR-85	Not Detected	-----	7.62E+00
MN-52	Not Detected	-----	3.57E-02
MN-54	Not Detected	-----	3.41E-02
MO-99	Not Detected	-----	3.66E-01
NA-22	Not Detected	-----	4.30E-02
NA-24	Not Detected	-----	2.29E-01
NB-95	Not Detected	-----	1.91E-01
ND-147	Not Detected	-----	2.13E-01
NI-57	Not Detected	-----	1.06E-01
NP-239	Not Detected	-----	8.95E-02
RU-103	Not Detected	-----	2.76E-02
RU-106	Not Detected	-----	2.73E-01
SB-122	Not Detected	-----	5.54E-02
SB-124	Not Detected	-----	2.94E-02
SB-125	Not Detected	-----	7.75E-02
SN-113	Not Detected	-----	3.36E-02
TA-182	Not Detected	-----	1.48E-01
TA-183	Not Detected	-----	1.80E-01
TC-99m	Not Detected	-----	2.86E+00
TL-201	Not Detected	-----	1.42E-01
XE-133	Not Detected	-----	1.54E-01
Y-88	Not Detected	-----	2.57E-02
ZN-65	Not Detected	-----	1.00E-01
ZR-95	Not Detected	-----	5.72E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-25-98 1:44:36 PM *

 * Analyzed by: *J 3/25/98* Reviewed by: *KA 3/25/98* *

Customer : C.AAS/D.BISWELL (6134/SMO)
 Customer Sample ID : 036741-001
 Lab Sample ID : 80050804

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 777.000 gram
 Sample Date/Time : 3-23-98 2:20:00 PM.
 Acquire Start Date/Time : 3-25-98 9:26:15 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	3.27E+00	1.43E+00	1.54E+00
TH-234	3.57E+00	8.18E-01	5.33E-01
RA-226	Not Detected	-----	5.68E-01
PB-214	6.44E-01	1.31E-01	5.16E-02
BI-214	6.01E-01	1.22E-01	5.32E-02
PB-210	Not Detected	-----	8.22E+00
TH-232	9.85E-01	4.83E-01	1.85E-01
RA-228	9.66E-01	3.50E-01	1.69E-01
AC-228	1.01E+00	2.48E-01	1.02E-01
TH-228	9.44E-01	2.92E-01	5.25E-01
RA-224	1.05E+00	3.58E-01	9.78E-02
PB-212	9.62E-01	1.57E-01	4.19E-02
BI-212	8.10E-01	3.70E-01	3.67E-01
TL-208	8.60E-01	2.76E-01	8.26E-02
U-235	2.27E-01	7.01E-02	2.04E-01
TH-231	Not Detected	-----	2.39E+00
PA-231	Not Detected	-----	3.74E+00
TH-227	Not Detected	-----	3.96E-01
RA-223	Not Detected	-----	1.71E-01
RN-219	Not Detected	-----	4.30E-01
PB-211	Not Detected	-----	9.75E-01
TL-207	Not Detected	-----	1.65E+01
AM-241	Not Detected	-----	2.04E-01
PU-239	Not Detected	-----	3.86E+02
NP-237	6.15E-01	1.56E-01	2.23E-01
PA-233	Not Detected	-----	6.12E-02
TH-229	Not Detected	-----	2.17E-01

Not Detected J 3/25/98

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.84E-02
AG-110m	Not Detected	-----	4.62E-02
AM-243	Not Detected	-----	6.41E-02
BA-133	Not Detected	-----	5.76E-02
BE-7	Not Detected	-----	2.82E-01
CD-109	Not Detected	-----	1.07E+00
CD-115	Not Detected	-----	1.31E-01
CE-139	Not Detected	-----	2.76E-02
CE-141	Not Detected	-----	5.16E-02
CE-144	Not Detected	-----	2.04E-01
CO-56	Not Detected	-----	4.05E-02
CO-57	Not Detected	-----	2.65E-02
CO-58	Not Detected	-----	3.70E-02
CO-60	Not Detected	-----	4.24E-02
CR-51	Not Detected	-----	2.56E-01
CS-134	Not Detected	-----	4.42E-02
CS-137	1.37E-01	4.61E-02	2.84E-02
EU-152	Not Detected	-----	7.97E-02
EU-154	Not Detected	-----	2.26E-01
EU-155	Not Detected	-----	1.21E-01
FE-59	Not Detected	-----	9.25E-02
GD-153	Not Detected	-----	9.18E-02
HG-203	Not Detected	-----	3.40E-02
I-131	Not Detected	-----	3.51E-02
IR-192	Not Detected	-----	2.85E-02
K-40	1.88E+01	2.89E+00	2.47E-01
KR-85	Not Detected	-----	9.28E+00
MN-52	Not Detected	-----	4.50E-02
MN-54	Not Detected	-----	4.09E-02
MO-99	Not Detected	-----	4.37E-01
NA-22	Not Detected	-----	4.84E-02
NA-24	Not Detected	-----	2.95E-01
NB-95	Not Detected	-----	2.37E-01
ND-147	Not Detected	-----	2.58E-01
NI-57	Not Detected	-----	1.33E-01
NP-239	Not Detected	-----	1.11E-01
RU-103	Not Detected	-----	3.38E-02
RU-106	Not Detected	-----	3.13E-01
SB-122	Not Detected	-----	7.36E-02
SB-124	Not Detected	-----	3.38E-02
SB-125	Not Detected	-----	9.36E-02
SN-113	Not Detected	-----	4.05E-02
TA-182	Not Detected	-----	1.63E-01
TA-183	Not Detected	-----	2.23E-01
TC-99m	Not Detected	-----	4.14E+00
TL-201	Not Detected	-----	1.80E-01
XE-133	Not Detected	-----	1.88E-01
Y-88	Not Detected	-----	3.18E-02
ZN-65	Not Detected	-----	1.17E-01
ZR-95	Not Detected	-----	6.42E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-25-98 1:00:30 PM *

 *
 * Analyzed by: *[Signature]* 3/25/98 Reviewed by: *[Signature]* 3/25/98 *

Customer : C.AAS/D.BISWELL (6134/SMO)
 Customer Sample ID : 036742-001
 Lab Sample ID : 80050805

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 775.000 gram
 Sample Date/Time : 3-23-98 2:25:00 PM.
 Acquire Start Date/Time : 3-25-98 11:14:37 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	2.29E+00	2.21E+00	1.57E+00
TH-234	1.92E+00	6.39E-01	4.96E-01
RA-226	1.82E+00	5.61E-01	5.81E-01
PB-214	5.91E-01	1.33E-01	4.92E-02
BI-214	5.56E-01	6.31E-01	5.87E-02
PB-210	Not Detected	-----	8.17E+00
TH-232	9.48E-01	4.89E-01	1.69E-01
RA-228	7.68E-01	2.38E-01	1.92E-01
AC-228	9.74E-01	3.51E-01	1.00E-01
TH-228	1.05E+00	5.54E-01	4.43E-01
RA-224	1.05E+00	3.63E-01	8.54E-02
PB-212	9.16E-01	1.61E-01	4.09E-02
BI-212	1.14E+00	4.07E-01	3.28E-01
TL-208	8.06E-01	1.62E-01	8.21E-02
U-235	2.24E-01	2.04E-01	2.24E-01
TH-231	Not Detected	-----	2.28E+00
PA-231	Not Detected	-----	3.63E+00
TH-227	Not Detected	-----	3.90E-01
RA-223	Not Detected	-----	1.39E-01
RN-219	Not Detected	-----	4.25E-01
PB-211	Not Detected	-----	9.52E-01
TL-207	Not Detected	-----	1.63E+01
AM-241	Not Detected	-----	1.95E-01
PU-239	Not Detected	-----	3.68E+02
NP-237	5.31E-01	1.58E-01	2.37E-01
PA-233	Not Detected	-----	6.05E-02
TH-229	Not Detected	-----	2.03E-01

not detected *[Signature]* 3/25/98

not detected *[Signature]* 3/25/98

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.69E-02
AG-110m	Not Detected	-----	3.81E-02
AM-243	Not Detected	-----	6.47E-02
BA-133	Not Detected	-----	5.53E-02
BE-7	Not Detected	-----	2.75E-01
CD-109	Not Detected	-----	1.05E+00
CD-115	Not Detected	-----	1.30E-01
CE-139	Not Detected	-----	2.74E-02
CE-141	Not Detected	-----	5.03E-02
CE-144	Not Detected	-----	2.00E-01
CO-56	Not Detected	-----	4.09E-02
CO-57	Not Detected	-----	2.56E-02
CO-58	Not Detected	-----	3.84E-02
CO-60	Not Detected	-----	4.16E-02
CR-51	Not Detected	-----	2.51E-01
CS-134	Not Detected	-----	4.38E-02
CS-137	5.72E-02	6.19E-02	2.37E-02
EU-152	Not Detected	-----	7.67E-02
EU-154	Not Detected	-----	2.19E-01
EU-155	Not Detected	-----	1.20E-01
FE-59	Not Detected	-----	9.19E-02
GD-153	Not Detected	-----	8.54E-02
HG-203	Not Detected	-----	3.32E-02
I-131	Not Detected	-----	3.50E-02
IR-192	Not Detected	-----	2.83E-02
K-40	1.85E+01	2.84E+00	2.63E-01
KR-85	Not Detected	-----	9.51E+00
MN-52	Not Detected	-----	4.16E-02
MN-54	Not Detected	-----	3.93E-02
MO-99	Not Detected	-----	4.41E-01
NA-22	Not Detected	-----	4.82E-02
NA-24	Not Detected	-----	3.36E-01
NB-95	Not Detected	-----	2.36E-01
ND-147	Not Detected	-----	2.46E-01
NI-57	Not Detected	-----	1.30E-01
NP-239	Not Detected	-----	1.07E-01
RU-103	Not Detected	-----	3.30E-02
RU-106	Not Detected	-----	2.93E-01
SB-122	Not Detected	-----	7.45E-02
SB-124	Not Detected	-----	3.45E-02
SB-125	Not Detected	-----	9.24E-02
SN-113	Not Detected	-----	4.12E-02
TA-182	Not Detected	-----	1.75E-01
TA-183	Not Detected	-----	2.15E-01
TC-99m	Not Detected	-----	5.03E+00
TL-201	Not Detected	-----	1.71E-01
XE-133	Not Detected	-----	8.98E-02
Y-88	Not Detected	-----	2.83E-02
ZN-65	Not Detected	-----	1.21E-01
ZR-95	Not Detected	-----	7.04E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-25-98 6:35:58 PM *

* Analyzed by: *[Signature]* 3/25/98 Reviewed by: *

 Customer : C.AAS/D.BISWELL (6134/SMO)
 Customer Sample ID : 036743-001
 Lab Sample ID : 80050806

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 756.000 gram
 Sample Date/Time : 3-23-98 2:40:00 PM
 Acquire Start Date/Time : 3-25-98 1:03:15 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	2.62E+00	2.10E+00	3.23E+00
TH-234	2.41E+00	6.15E-01	5.50E-01
RA-226	1.73E+00	5.94E-01	6.20E-01
PE-214	6.42E-01	1.16E-01	4.78E-02
BI-214	5.96E-01	1.36E-01	5.25E-02
PB-210	Not Detected	-----	8.40E+00
TH-232	8.71E-01	4.30E-01	1.64E-01
RA-228	8.67E-01	2.57E-01	1.93E-01
AC-228	8.33E-01	2.12E-01	9.63E-02
TH-228	7.18E-01	2.86E-01	5.00E-01
RA-224	9.09E-01	3.69E-01	9.63E-02
PE-212	8.69E-01	1.45E-01	4.03E-02
BI-212	9.89E-01	3.85E-01	3.64E-01
TL-208	7.60E-01	1.58E-01	8.52E-02
U-235	Not Detected	-----	2.25E-01
TH-231	Not Detected	-----	2.40E+00
PA-231	Not Detected	-----	3.73E+00
TH-227	Not Detected	-----	3.95E-01
RA-223	Not Detected	-----	1.72E-01
RN-219	Not Detected	-----	4.41E-01
PB-211	Not Detected	-----	1.00E+00
TL-207	Not Detected	-----	1.63E+01
AM-241	Not Detected	-----	2.07E-01
PU-239	Not Detected	-----	3.76E+02
NP-237	6.02E-01	1.75E-01	2.44E-01
PA-233	Not Detected	-----	6.21E-02
TH-229	Not Detected	-----	2.16E-01

not detected *[Signature]* 3/25/98

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.89E-02
AG-110m	Not Detected	-----	4.63E-02
AM-243	Not Detected	-----	6.33E-02
BA-133	Not Detected	-----	5.92E-02
BE-7	Not Detected	-----	2.91E-01
CD-109	Not Detected	-----	1.06E+00
CD-115	Not Detected	-----	1.34E-01
CE-139	Not Detected	-----	2.82E-02
CE-141	Not Detected	-----	5.16E-02
CE-144	Not Detected	-----	2.06E-01
CO-56	Not Detected	-----	4.11E-02
CO-57	Not Detected	-----	2.56E-02
CO-58	Not Detected	-----	3.65E-02
CO-60	Not Detected	-----	4.57E-02
CR-51	Not Detected	-----	2.55E-01
CS-134	Not Detected	-----	4.41E-02
CS-137	1.22E-01	4.55E-02	2.60E-02
EU-152	Not Detected	-----	7.62E-02
EU-154	Not Detected	-----	2.30E-01
EU-155	Not Detected	-----	1.23E-01
FE-59	Not Detected	-----	8.72E-02
GD-153	Not Detected	-----	9.11E-02
HG-203	Not Detected	-----	3.36E-02
I-131	Not Detected	-----	3.65E-02
IR-192	Not Detected	-----	2.93E-02
K-40	2.02E+01	3.09E+00	2.87E-01
KR-85	Not Detected	-----	1.00E+01
MN-52	Not Detected	-----	4.52E-02
MN-54	Not Detected	-----	4.08E-02
MO-99	Not Detected	-----	4.80E-01
NA-22	Not Detected	-----	5.43E-02
NA-24	Not Detected	-----	3.55E-01
NB-95	Not Detected	-----	2.42E-01
ND-147	Not Detected	-----	2.66E-01
NI-57	Not Detected	-----	1.43E-01
NP-239	Not Detected	-----	1.08E-01
RU-103	Not Detected	-----	3.31E-02
RU-106	Not Detected	-----	3.23E-01
SB-122	Not Detected	-----	7.20E-02
SB-124	Not Detected	-----	3.42E-02
SB-125	Not Detected	-----	9.34E-02
SN-113	Not Detected	-----	4.21E-02
TA-182	Not Detected	-----	1.86E-01
TA-183	Not Detected	-----	2.30E-01
TC-99m	Not Detected	-----	6.11E+00
TL-201	Not Detected	-----	1.85E-01
XE-133	Not Detected	-----	1.95E-01
Y-88	Not Detected	-----	3.38E-02
ZN-65	Not Detected	-----	1.27E-01
ZR-95	Not Detected	-----	6.98E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-25-98 4:33:43 PM *

 *
 * Analyzed by: *[Signature]* 3/25/98 Reviewed by: *[Signature]* 3/25/98 *

 Customer : C.AAS/D.BISWELL (6134/SMO)
 Customer Sample ID : 036744-001
 Lab Sample ID : 80050807

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 781.000 gram
 Sample Date/Time : 3-23-98 2:45:00 PM.
 Acquire Start Date/Time : 3-25-98 2:48:48 PM
 Detector Name : LAB01
 Elapsed Live/Real Time : 6000 / 6001 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	1.14E+00	9.13E-01	1.02E+00
TH-234	7.94E-01	3.29E-01	3.43E-01
RA-226	5.06E-01	3.60E-01	4.21E-01
PB-214	1.96E-01	8.15E-02	3.62E-02
BI-214	Not Detected	-----	7.29E-02
PB-210	Not Detected	-----	5.89E+00
TH-232	2.66E-01	1.95E-01	1.20E-01
RA-228	Not Detected	-----	1.27E-01
AC-228	Not Detected	-----	1.55E-01
TH-228	3.42E-01	2.94E-01	3.11E-01
RA-224	2.15E-01	1.35E-01	9.70E-02
PB-212	2.63E-01	5.70E-02	3.02E-02
BI-212	4.61E-01	2.36E-01	2.36E-01
TL-208	2.33E-01	7.54E-02	6.11E-02
U-235	Not Detected	-----	1.55E-01
TH-231	Not Detected	-----	1.60E+00
PA-231	Not Detected	-----	2.43E+00
TH-227	Not Detected	-----	2.37E-01
RA-223	Not Detected	-----	1.08E-01
RN-219	3.46E-01	2.56E-01	3.11E-01
PB-211	Not Detected	-----	6.81E-01
TL-207	Not Detected	-----	1.08E+01
AM-241	Not Detected	-----	1.28E-01
PU-239	Not Detected	-----	2.46E+02
NP-237	Not Detected	-----	1.93E-01
PA-233	Not Detected	-----	4.46E-02
TH-229	Not Detected	-----	1.40E-01

not detected
[Signature] 3/25/98

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected		2.91E-02
AG-110m	Not Detected		2.86E-02
AM-243	Not Detected		3.81E-02
BA-133	Not Detected		3.68E-02
BE-7	Not Detected		1.98E-01
CD-109	Not Detected		6.53E-01
CD-115	Not Detected		8.68E-02
CE-139	Not Detected		1.88E-02
CE-141	Not Detected		3.45E-02
CE-144	Not Detected		1.33E-01
CO-56	Not Detected		3.11E-02
CO-57	Not Detected		1.69E-02
CO-58	Not Detected		2.49E-02
CO-60	Not Detected		2.98E-02
CR-51	Not Detected		1.70E-01
CS-134	Not Detected		2.84E-02
CS-137	3.20E-02	1.80E-02	1.97E-02
EU-152	Not Detected		5.09E-02
EU-154	Not Detected		1.36E-01
EU-155	Not Detected		7.90E-02
FE-59	Not Detected		5.17E-02
GD-153	Not Detected		5.96E-02
HG-203	Not Detected		2.37E-02
I-131	Not Detected		2.59E-02
IR-192	Not Detected		2.05E-02
K-40	6.18E+00	1.51E+00	2.17E-01
KR-85	Not Detected		6.75E+00
MN-52	Not Detected		3.24E-02
MN-54	Not Detected		2.74E-02
MO-99	Not Detected		3.13E-01
NA-22	Not Detected		3.13E-02
NA-24	Not Detected		2.45E-01
NB-95	Not Detected		1.51E-01
ND-147	Not Detected		1.73E-01
NI-57	Not Detected		1.00E-01
NP-239	Not Detected		7.11E-02
RU-103	Not Detected		2.36E-02
RU-106	Not Detected		2.20E-01
SB-122	Not Detected		5.18E-02
SB-124	Not Detected		2.55E-02
SB-125	Not Detected		6.95E-02
SN-113	Not Detected		3.00E-02
TA-182	Not Detected		1.16E-01
TA-183	Not Detected		1.44E-01
TC-99m	Not Detected		5.04E+00
TL-201	Not Detected		1.24E-01
XE-133	Not Detected		1.27E-01
Y-88	Not Detected		2.29E-02
ZN-65	Not Detected		7.60E-02
ZR-95	Not Detected		4.15E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-24-98 6:36:02 PM *

 *
 * Analyzed by: *[Signature]* 3/25/98 Reviewed by: *[Signature]* 3/25/98 *

Customer : C.AAS/D.BISWELL (6134/SMO)
 Customer Sample ID : 036745-001
 Lab Sample ID : 80050808

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 866.000 gram
 Sample Date/Time : 3-23-98 2:50:00 PM
 Acquire Start Date/Time : 3-24-98 4:52:18 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	-----	3.23E+00
TH-234	2.29E+00	6.07E-01	6.11E-01
RA-226	1.92E+00	1.09E+00	5.50E-01
PB-214	5.54E-01	1.03E-01	4.69E-02
BI-214	5.17E-01	1.22E-01	3.93E-02
PB-210	Not Detected	-----	3.31E+01
TH-232	7.17E-01	3.84E-01	1.33E-01
RA-228	8.13E-01	2.04E-01	1.41E-01
AC-228	7.84E-01	1.74E-01	7.47E-02
TH-228	7.42E-01	2.40E-01	4.84E-01
RA-224	8.45E-01	2.65E-01	6.27E-02
PB-212	7.32E-01	1.29E-01	3.95E-02
BI-212	9.22E-01	6.45E-01	3.10E-01
TL-208	7.01E-01	1.62E-01	6.55E-02
U-235	Not Detected	-----	2.34E-01
TH-231	Not Detected	-----	2.23E+00
PA-231	Not Detected	-----	3.68E+00
TH-227	Not Detected	-----	3.23E-01
RA-223	Not Detected	-----	2.01E-01
RN-219	Not Detected	-----	3.63E-01
PB-211	Not Detected	-----	8.27E-01
TL-207	Not Detected	-----	1.25E+01
AM-241	Not Detected	-----	4.59E-01
PU-239	Not Detected	-----	4.29E+02
NP-237	Not Detected	-----	2.53E-01
PA-233	Not Detected	-----	5.78E-02
TH-229	Not Detected	-----	2.41E-01

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.69E-02
AG-110m	Not Detected	-----	7.16E-02
AM-243	Not Detected	-----	9.42E-02
BA-133	Not Detected	-----	5.82E-02
BE-7	2.59E-01	1.38E-01	1.62E-01
CD-109	Not Detected	-----	8.58E-01
CD-115	Not Detected	-----	8.64E-02
CE-139	Not Detected	-----	2.83E-02
CE-141	Not Detected	-----	5.14E-02
CE-144	Not Detected	-----	2.34E-01
CO-56	Not Detected	-----	3.23E-02
CO-57	Not Detected	-----	2.90E-02
CO-58	Not Detected	-----	2.88E-02
CO-60	Not Detected	-----	3.44E-02
CR-51	Not Detected	-----	2.26E-01
CS-134	Not Detected	-----	4.20E-02
CS-137	7.65E-01	1.18E-01	2.04E-02
EU-152	Not Detected	-----	8.74E-02
EU-154	Not Detected	-----	1.70E-01
EU-155	1.01E-02	1.56E-01	6.06E-02
FE-59	Not Detected	-----	6.32E-02
GD-153	Not Detected	-----	1.01E-01
HG-203	Not Detected	-----	3.08E-02
I-131	Not Detected	-----	3.04E-02
IR-192	Not Detected	-----	2.70E-02
K-40	1.95E+01	2.82E+00	2.27E-01
KR-85	Not Detected	-----	7.88E+00
MN-52	Not Detected	-----	2.90E-02
MN-54	Not Detected	-----	3.00E-02
MO-99	Not Detected	-----	2.78E-01
NA-22	Not Detected	-----	3.99E-02
NA-24	Not Detected	-----	9.52E-02
NB-95	Not Detected	-----	1.84E-01
ND-147	Not Detected	-----	2.07E-01
NI-57	Not Detected	-----	7.13E-02
NP-239	Not Detected	-----	1.30E-01
RU-103	Not Detected	-----	2.82E-02
RU-106	Not Detected	-----	2.74E-01
SB-122	Not Detected	-----	4.90E-02
SB-124	Not Detected	-----	2.75E-02
SB-125	Not Detected	-----	8.22E-02
SN-113	Not Detected	-----	3.64E-02
TA-182	Not Detected	-----	1.28E-01
TA-183	Not Detected	-----	4.52E-01
TC-99m	Not Detected	-----	6.20E-01
TL-201	Not Detected	-----	2.23E-01
XE-133	Not Detected	-----	1.95E-01
Y-88	Not Detected	-----	2.33E-02
ZN-65	Not Detected	-----	8.89E-02
ZR-95	Not Detected	-----	5.29E-02

not detected
3/25/58

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-25-98 10:07:23 AM *

 *
 * Analyzed by: *J 3/25/98* Reviewed by: *K 3/25/98* *

Customer : C.AAS/D.BISWELL (6134/SMO)
 Customer Sample ID : 036746-001
 Lab Sample ID : 80050809

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 974.000 gram
 Sample Date/Time : 3-23-98 2:55:00 PM
 Acquire Start Date/Time : 3-24-98 6:38:37 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	-----	2.78E+00
TH-234	1.07E+00	3.68E-01	4.79E-01
RA-226	1.31E+00	5.74E-01	4.83E-01
PE-214	5.11E-01	9.68E-02	3.95E-02
EI-214	4.68E-01	9.31E-02	3.80E-02
PE-210	Not Detected	-----	2.87E+01
TH-232	6.56E-01	3.48E-01	1.27E-01
RA-228	7.61E-01	2.42E-01	1.33E-01
AC-228	7.27E-01	1.94E-01	6.35E-02
TH-228	7.10E-01	2.16E-01	3.67E-01
RA-224	7.28E-01	2.04E-01	4.94E-02
PE-212	6.97E-01	1.43E-01	3.55E-02
EI-212	7.03E-01	3.01E-01	2.85E-01
TL-208	6.23E-01	1.42E-01	5.51E-02
U-235	Not Detected	-----	2.03E-01
TH-231	Not Detected	-----	1.91E+00
PA-231	Not Detected	-----	3.20E+00
TH-227	Not Detected	-----	2.90E-01
RA-223	Not Detected	-----	1.77E-01
RN-219	Not Detected	-----	3.10E-01
PE-211	Not Detected	-----	7.09E-01
TL-207	Not Detected	-----	1.14E+01
AM-241	Not Detected	-----	3.96E-01
FU-239	Not Detected	-----	3.78E+02
NP-237	1.60E-01	1.55E-01	2.28E-01
PA-233	Not Detected	-----	4.78E-02
TH-229	Not Detected	-----	2.13E-01

not detected
J 3/25/98

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
-----	-----	-----	-----
AG-108m	Not Detected	-----	3.33E-02
AG-110m	Not Detected	-----	2.84E-02
AM-243	Not Detected	-----	8.10E-02
BA-133	Not Detected	-----	5.05E-02
BE-7	Not Detected	-----	2.07E-01
CD-109	Not Detected	-----	7.75E-01
CD-115	Not Detected	-----	7.59E-02
CE-139	Not Detected	-----	2.42E-02
CE-141	Not Detected	-----	4.47E-02
CE-144	Not Detected	-----	2.02E-01
CO-56	Not Detected	-----	2.96E-02
CO-57	Not Detected	-----	2.56E-02
CO-58	Not Detected	-----	2.67E-02
CO-60	Not Detected	-----	2.78E-02
CR-51	Not Detected	-----	1.93E-01
CS-134	Not Detected	-----	3.77E-02
CS-137	4.05E-02	1.86E-02	1.81E-02
EU-152	Not Detected	-----	7.70E-02
EU-154	Not Detected	-----	1.53E-01
EU-155	Not Detected	-----	1.28E-01
FE-59	Not Detected	-----	6.05E-02
GD-153	Not Detected	-----	9.09E-02
HG-203	Not Detected	-----	2.64E-02
I-131	Not Detected	-----	2.63E-02
IR-192	Not Detected	-----	2.27E-02
K-40	1.87E+01	2.67E+00	1.94E-01
KR-85	Not Detected	-----	6.55E+00
MN-52	Not Detected	-----	2.77E-02
MN-54	Not Detected	-----	2.85E-02
MO-99	Not Detected	-----	2.60E-01
NA-22	Not Detected	-----	3.48E-02
NA-24	Not Detected	-----	9.60E-02
NB-95	Not Detected	-----	1.68E-01
ND-147	Not Detected	-----	1.74E-01
NI-57	Not Detected	-----	3.42E-02
NP-239	Not Detected	-----	1.15E-01
RU-103	Not Detected	-----	2.31E-02
RU-106	Not Detected	-----	2.45E-01
SB-122	Not Detected	-----	4.41E-02
SB-124	Not Detected	-----	2.53E-02
SB-125	Not Detected	-----	6.63E-02
SN-113	Not Detected	-----	3.02E-02
TA-182	Not Detected	-----	1.21E-01
TA-183	Not Detected	-----	4.00E-01
TC-99m	Not Detected	-----	6.52E-01
TL-201	Not Detected	-----	1.97E-01
XE-133	Not Detected	-----	1.72E-01
Y-88	Not Detected	-----	1.97E-02
ZN-65	Not Detected	-----	8.34E-02
ZR-95	Not Detected	-----	4.67E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-24-98 10:13:35 PM *

 *
 * Analyzed by: *[Signature]* 3/25/98 Reviewed by: *[Signature]* 3/25/98 *

Customer : C.AAS/D.BISWELL (6134/SMO)
 Customer Sample ID : 036747-001
 Lab Sample ID : 80050810

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 812.000 gram
 Sample Date/Time : 3-23-98 3:00:00 PM
 Acquire Start Date/Time : 3-24-98 8:30:52 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	-----	3.16E+00
TH-234	Not Detected	-----	7.45E-01
RA-226	1.27E+00	4.97E-01	4.86E-01
PB-214	5.98E-01	1.04E-01	4.28E-02
BI-214	4.74E-01	9.76E-02	4.38E-02
PB-210	Not Detected	-----	3.27E+01
TH-232	7.86E-01	3.74E-01	1.42E-01
RA-228	7.74E-01	2.09E-01	1.32E-01
AC-228	6.77E-01	1.62E-01	7.79E-02
TH-228	6.31E-01	2.44E-01	4.60E-01
RA-224	7.51E-01	2.30E-01	7.00E-02
PB-212	7.15E-01	8.02E-01	3.88E-02
BI-212	8.50E-01	3.81E-01	2.64E-01
TL-208	7.05E-01	8.23E-01	6.24E-02
U-235	Not Detected	-----	2.29E-01
TH-231	Not Detected	-----	2.19E+00
PA-231	Not Detected	-----	3.83E+00
TH-227	Not Detected	-----	3.24E-01
RA-223	Not Detected	-----	1.98E-01
RN-219	Not Detected	-----	3.61E-01
PB-211	Not Detected	-----	7.91E-01
TL-207	Not Detected	-----	1.29E+01
AM-241	Not Detected	-----	4.51E-01
PU-239	Not Detected	-----	4.29E+02
NP-237	Not Detected	-----	2.42E-01
PA-233	Not Detected	-----	5.48E-02
TH-229	Not Detected	-----	2.42E-01

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.86E-02
AG-110m	Not Detected	-----	4.68E-02
AM-243	Not Detected	-----	8.98E-02
BA-133	Not Detected	-----	5.88E-02
BE-7	Not Detected	-----	2.47E-01
CD-109	Not Detected	-----	8.22E-01
CD-115	Not Detected	-----	9.30E-02
CE-139	Not Detected	-----	2.78E-02
CE-141	Not Detected	-----	5.10E-02
CE-144	Not Detected	-----	2.34E-01
CO-56	Not Detected	-----	3.39E-02
CO-57	Not Detected	-----	2.86E-02
CO-58	Not Detected	-----	3.01E-02
CO-60	Not Detected	-----	3.53E-02
CR-51	Not Detected	-----	2.32E-01
CS-134	Not Detected	-----	4.17E-02
CS-137	2.26E-01	4.99E-02	2.12E-02
EU-152	Not Detected	-----	8.60E-02
EU-154	Not Detected	-----	1.77E-01
EU-155	Not Detected	-----	1.44E-01
FE-59	Not Detected	-----	7.04E-02
GD-153	Not Detected	-----	9.98E-02
HG-203	Not Detected	-----	3.06E-02
I-131	Not Detected	-----	3.01E-02
IR-192	Not Detected	-----	2.64E-02
K-40	2.01E+01	2.91E+00	2.39E-01
KR-85	Not Detected	-----	7.99E+00
MN-52	Not Detected	-----	3.03E-02
MN-54	Not Detected	-----	3.32E-02
MO-99	Not Detected	-----	2.99E-01
NA-22	Not Detected	-----	3.99E-02
NA-24	Not Detected	-----	1.20E-01
NB-95	Not Detected	-----	1.90E-01
ND-147	Not Detected	-----	1.98E-01
NI-57	Not Detected	-----	7.39E-02
NP-239	Not Detected	-----	1.30E-01
RU-103	Not Detected	-----	2.83E-02
RU-106	Not Detected	-----	2.78E-01
SB-122	Not Detected	-----	5.14E-02
SB-124	Not Detected	-----	2.84E-02
SB-125	Not Detected	-----	7.92E-02
SN-113	Not Detected	-----	3.69E-02
TA-182	Not Detected	-----	1.38E-01
TA-183	Not Detected	-----	4.56E-01
TC-99m	Not Detected	-----	8.94E-01
TL-201	Not Detected	-----	2.28E-01
XE-133	Not Detected	-----	1.98E-01
Y-88	Not Detected	-----	2.54E-02
ZN-65	Not Detected	-----	9.54E-02
ZR-95	Not Detected	-----	5.60E-02

 * Sandia National Laboratories
 * Radiation Protection Sample Diagnostics Program [881 Laboratory]
 * 3-25-98 2:23:32 PM
 *
 * Analyzed by: *J 3/25/98* Reviewed by: *KG 3/25/98*

 Customer : C.AAS/D.BISWELL (6134/SMO)
 Customer Sample ID : 036748-001
 Lab Sample ID : 80050811

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 885.000 gram
 Sample Date/Time : 3-23-98 3:05:00 PM
 Acquire Start Date/Time : 3-24-98 10:15:44 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	-----	2.90E+00
TH-234	9.34E-01	3.49E-01	5.22E-01
RA-226	1.45E+00	6.80E-01	5.23E-01
PB-214	4.77E-01	8.54E-02	3.92E-02
BI-214	4.47E-01	9.44E-02	3.95E-02
PB-210	Not Detected	-----	2.97E+01
TH-232	6.39E-01	3.07E-01	1.14E-01
RA-228	6.80E-01	2.14E-01	1.39E-01
AC-228	7.66E-01	1.72E-01	6.33E-02
TH-228	9.29E-01	2.89E-01	4.17E-01
RA-224	6.78E-01	2.23E-01	7.10E-02
PB-212	6.99E-01	1.25E-01	3.64E-02
BI-212	7.98E-01	3.67E-01	2.95E-01
TL-208	6.55E-01	1.27E-01	5.76E-02
U-235	1.65E-01	1.83E-01	2.14E-01
TH-231	Not Detected	-----	1.99E+00
PA-231	Not Detected	-----	3.38E+00
TH-227	Not Detected	-----	3.04E-01
RA-223	Not Detected	-----	1.87E-01
RN-219	Not Detected	-----	3.22E-01
PB-211	Not Detected	-----	7.11E-01
TL-207	Not Detected	-----	1.18E+01
AM-241	Not Detected	-----	4.26E-01
PU-239	Not Detected	-----	3.96E+02
NP-237	5.03E-01	1.67E-01	2.62E-01
PA-233	Not Detected	-----	4.78E-02
TH-229	Not Detected	-----	2.21E-01

Not detected J 3/25/98

Not detected J 3/25/98

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.52E-02
AG-110m	Not Detected	-----	3.08E-02
AM-243	Not Detected	-----	8.45E-02
BA-133	Not Detected	-----	5.30E-02
BE-7	Not Detected	-----	2.15E-01
CD-109	Not Detected	-----	8.88E-01
CD-115	Not Detected	-----	8.30E-02
CE-139	Not Detected	-----	2.50E-02
CE-141	Not Detected	-----	4.71E-02
CE-144	Not Detected	-----	2.16E-01
CO-56	Not Detected	-----	3.07E-02
CO-57	Not Detected	-----	2.61E-02
CO-58	Not Detected	-----	2.69E-02
CO-60	Not Detected	-----	2.98E-02
CR-51	Not Detected	-----	2.02E-01
CS-134	Not Detected	-----	3.83E-02
CS-137	4.06E-02	2.82E-02	1.94E-02
EU-152	Not Detected	-----	7.86E-02
EU-154	Not Detected	-----	1.63E-01
EU-155	Not Detected	-----	7.79E-02
FE-59	Not Detected	-----	6.08E-02
GD-153	Not Detected	-----	9.32E-02
HG-203	Not Detected	-----	2.74E-02
I-131	Not Detected	-----	2.70E-02
IR-192	Not Detected	-----	2.33E-02
K-40	1.68E+01	2.43E+00	2.20E-01
KR-85	Not Detected	-----	7.27E+00
MN-52	Not Detected	-----	2.97E-02
MN-54	Not Detected	-----	3.05E-02
MO-99	Not Detected	-----	2.89E-01
NA-22	Not Detected	-----	3.48E-02
NA-24	Not Detected	-----	1.25E-01
NB-95	Not Detected	-----	1.80E-01
ND-147	Not Detected	-----	1.80E-01
NI-57	Not Detected	-----	3.82E-02
NP-239	Not Detected	-----	1.18E-01
RU-103	Not Detected	-----	2.57E-02
RU-106	Not Detected	-----	2.42E-01
SB-122	Not Detected	-----	4.71E-02
SB-124	Not Detected	-----	2.57E-02
SB-125	Not Detected	-----	6.99E-02
SN-113	Not Detected	-----	3.30E-02
TA-182	Not Detected	-----	1.27E-01
TA-183	Not Detected	-----	4.31E-01
TC-99m	Not Detected	-----	1.02E+00
TL-201	Not Detected	-----	2.14E-01
XE-133	Not Detected	-----	1.92E-01
Y-88	Not Detected	-----	2.00E-02
ZN-65	Not Detected	-----	8.56E-02
ZR-95	Not Detected	-----	4.96E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-25-98 2:46:04 PM *

 *
 * Analyzed by: *[Signature]* 3/25/98 Reviewed by: *[Signature]* 3/25/98 *

Customer : C.AAS/D.BISWELL (6134/SMO)
 Customer Sample ID : 036749-001
 Lab Sample ID : 80050812

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 796.000 gram
 Sample Date/Time : 3-23-98 1:00:00 PM.
 Acquire Start Date/Time : 3-25-98 10:22:40 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	2.28E+00	1.74E+00	2.18E+00
TH-234	1.05E+00	4.12E-01	5.53E-01
RA-226	1.25E+00	4.82E-01	5.26E-01
PB-214	5.09E-01	1.06E-01	4.72E-02
BI-214	4.51E-01	1.02E-01	4.54E-02
PB-210	Not Detected	-----	3.37E+01
TH-232	8.41E-01	7.77E-01	1.45E-01
RA-228	7.14E-01	1.91E-01	1.28E-01
AC-228	7.43E-01	1.91E-01	7.58E-02
TH-228	6.78E-01	2.38E-01	4.72E-01
RA-224	8.32E-01	2.50E-01	6.03E-02
PB-212	7.19E-01	1.34E-01	3.96E-02
BI-212	6.67E-01	3.66E-01	3.01E-01
TL-208	7.20E-01	1.51E-01	6.19E-02
U-235	Not Detected	-----	2.33E-01
TH-231	Not Detected	-----	2.25E+00
PA-231	Not Detected	-----	3.74E+00
TH-227	Not Detected	-----	3.28E-01
RA-223	Not Detected	-----	2.13E-01
RN-219	Not Detected	-----	3.72E-01
PB-211	Not Detected	-----	8.26E-01
TL-207	Not Detected	-----	1.29E+01
AM-241	Not Detected	-----	4.50E-01
PU-239	Not Detected	-----	4.21E+02
NP-237	Not Detected	-----	2.81E-01
PA-233	Not Detected	-----	5.61E-02
TH-229	Not Detected	-----	2.44E-01

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.80E-02
AG-110m	Not Detected	-----	5.87E-02
AM-243	Not Detected	-----	8.77E-02
BA-133	Not Detected	-----	5.93E-02
BE-7	2.46E-01	1.97E-01	1.81E-01
CD-109	1.06E+00	4.92E-01	9.54E-01
CD-115	Not Detected	-----	1.17E-01
CE-139	Not Detected	-----	2.79E-02
CE-141	Not Detected	-----	5.18E-02
CE-144	Not Detected	-----	2.29E-01
CO-56	Not Detected	-----	3.32E-02
CO-57	Not Detected	-----	2.87E-02
CO-58	Not Detected	-----	3.00E-02
CO-60	Not Detected	-----	3.29E-02
CR-51	Not Detected	-----	2.31E-01
CS-134	Not Detected	-----	4.18E-02
CS-137	4.26E-01	1.28E-01	2.12E-02
EU-152	Not Detected	-----	8.61E-02
EU-154	Not Detected	-----	1.76E-01
EU-155	Not Detected	-----	1.42E-01
FE-59	Not Detected	-----	7.05E-02
GD-153	Not Detected	-----	1.01E-01
HG-203	Not Detected	-----	3.07E-02
I-131	Not Detected	-----	3.34E-02
IR-192	Not Detected	-----	2.67E-02
K-40	1.83E+01	2.67E+00	2.40E-01
KR-85	Not Detected	-----	7.99E+00
MN-52	Not Detected	-----	3.20E-02
MN-54	Not Detected	-----	3.24E-02
MO-99	Not Detected	-----	3.54E-01
NA-22	Not Detected	-----	3.85E-02
NA-24	Not Detected	-----	2.47E-01
NB-95	Not Detected	-----	2.19E-01
ND-147	Not Detected	-----	2.15E-01
NI-57	Not Detected	-----	9.78E-02
NP-239	Not Detected	-----	1.29E-01
RU-103	Not Detected	-----	3.00E-02
RU-106	Not Detected	-----	2.74E-01
SB-122	Not Detected	-----	6.02E-02
SB-124	Not Detected	-----	2.81E-02
SB-125	Not Detected	-----	8.09E-02
SN-113	Not Detected	-----	3.70E-02
TA-182	Not Detected	-----	1.44E-01
TA-183	Not Detected	-----	5.03E-01
TC-99m	Not Detected	-----	5.66E+00
TL-201	Not Detected	-----	2.63E-01
XE-133	Not Detected	-----	2.51E-01
Y-88	Not Detected	-----	2.25E-02
ZN-65	Not Detected	-----	9.76E-02
ZR-95	Not Detected	-----	5.25E-02

not detected
3/25/98

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-25-98 7:03:03 PM *

 *
 * Analyzed by: *[Signature]* 3/25/98 Reviewed by: *[Signature]* 3/25/98 *

Customer : C.AAS/D.BISWELL (6134/SMO)
 Customer Sample ID : 036750-001
 Lab Sample ID : 80050813

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 893.000 gram
 Sample Date/Time : 3-23-98 1:00:00 PM-
 Acquire Start Date/Time : 3-25-98 12:08:52 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	-----	2.90E+00
TH-234	8.32E-01	4.34E-01	5.40E-01
RA-226	1.02E+00	4.38E-01	4.73E-01
PB-214	4.82E-01	9.10E-02	4.23E-02
BI-214	4.40E-01	1.02E-01	4.03E-02
PB-210	Not Detected	-----	3.05E+01
TH-232	6.84E-01	3.27E-01	1.24E-01
RA-228	6.92E-01	7.63E-01	1.33E-01
AC-228	6.58E-01	2.46E-01	7.00E-02
TH-228	6.77E-01	1.23E-01	4.16E-01
RA-224	6.73E-01	2.13E-01	6.87E-02
PB-212	6.70E-01	1.17E-01	3.50E-02
BI-212	7.95E-01	5.41E-01	2.51E-01
TL-208	6.36E-01	1.38E-01	6.00E-02
U-235	Not Detected	-----	2.12E-01
TH-231	Not Detected	-----	2.00E+00
PA-231	Not Detected	-----	3.38E+00
TH-227	Not Detected	-----	3.00E-01
RA-223	Not Detected	-----	1.94E-01
RN-219	Not Detected	-----	3.27E-01
PB-211	Not Detected	-----	7.39E-01
TL-207	Not Detected	-----	1.12E+01
AM-241	Not Detected	-----	4.19E-01
PU-239	Not Detected	-----	3.89E+02
NP-237	Not Detected	-----	2.61E-01
PA-233	Not Detected	-----	5.15E-02
TH-229	Not Detected	-----	2.23E-01

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.32E-02
AG-110m	Not Detected	-----	5.34E-02
AM-243	Not Detected	-----	7.76E-02
BA-133	Not Detected	-----	5.33E-02
BE-7	Not Detected	-----	2.33E-01
CD-109	1.26E+00	5.26E-01	8.88E-01
CD-115	Not Detected	-----	1.06E-01
CE-139	Not Detected	-----	2.64E-02
CE-141	Not Detected	-----	4.79E-02
CE-144	Not Detected	-----	2.14E-01
CO-56	Not Detected	-----	3.08E-02
CO-57	Not Detected	-----	2.66E-02
CO-58	Not Detected	-----	2.70E-02
CO-60	Not Detected	-----	3.08E-02
CR-51	Not Detected	-----	2.14E-01
CS-134	Not Detected	-----	3.89E-02
CS-137	3.82E-01	1.21E-01	1.98E-02
EU-152	Not Detected	-----	8.00E-02
EU-154	Not Detected	-----	1.53E-01
EU-155	Not Detected	-----	1.31E-01
FE-59	Not Detected	-----	6.30E-02
GD-153	Not Detected	-----	9.34E-02
HG-203	Not Detected	-----	2.92E-02
I-131	Not Detected	-----	2.97E-02
IR-192	Not Detected	-----	2.42E-02
K-40	1.76E+01	2.55E+00	2.11E-01
KR-85	Not Detected	-----	7.18E+00
MN-52	Not Detected	-----	3.17E-02
MN-54	Not Detected	-----	2.90E-02
MO-99	Not Detected	-----	3.33E-01
NA-22	Not Detected	-----	3.74E-02
NA-24	Not Detected	-----	2.61E-01
NB-95	Not Detected	-----	2.03E-01
ND-147	Not Detected	-----	1.90E-01
NI-57	Not Detected	-----	1.02E-01
NP-239	Not Detected	-----	1.18E-01
RU-103	Not Detected	-----	2.71E-02
RU-106	Not Detected	-----	2.53E-01
SB-122	Not Detected	-----	5.85E-02
SB-124	Not Detected	-----	2.71E-02
SB-125	Not Detected	-----	7.35E-02
SN-113	Not Detected	-----	3.33E-02
TA-182	Not Detected	-----	1.23E-01
TA-183	Not Detected	-----	4.70E-01
TC-99m	Not Detected	-----	6.36E+00
TL-201	Not Detected	-----	2.50E-01
XE-133	Not Detected	-----	2.33E-01
Y-88	Not Detected	-----	2.36E-02
ZN-65	Not Detected	-----	8.59E-02
ZR-95	Not Detected	-----	4.66E-02

Not Detected 7/25/88

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-25-98 3:36:46 PM *

 * Analyzed by: *[Signature]* 3/25/98 Reviewed by: *[Signature]* *

 Customer : C.AAS/D.BISWELL (6134/SMO)
 Customer Sample ID : 036751-001
 Lab Sample ID : 80050814

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 897.000 gram
 Sample Date/Time : 3-23-98 1:05:00 PM
 Acquire Start Date/Time : 3-25-98 1:53:31 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	-----	2.72E+00
TH-234	7.65E-01	3.17E-01	4.82E-01
RA-226	1.20E+00	4.54E-01	4.54E-01
PB-214	4.58E-01	8.80E-01	3.59E-02
BI-214	4.02E-01	8.77E-02	4.06E-02
PB-210	Not Detected	-----	2.85E+01
TH-232	5.89E-01	3.18E-01	1.12E-01
RA-228	6.54E-01	1.66E-01	1.17E-01
AC-228	6.72E-01	1.60E-01	6.94E-02
TH-228	4.85E-01	1.82E-01	4.12E-01
RA-224	6.43E-01	1.92E-01	6.14E-02
PB-212	6.47E-01	1.07E-01	3.39E-02
BI-212	7.10E-01	2.64E-01	2.35E-01
TL-208	5.92E-01	1.54E-01	5.50E-02
U-235	Not Detected	-----	2.02E-01
TH-231	Not Detected	-----	1.94E+00
PA-231	Not Detected	-----	3.23E+00
TH-227	Not Detected	-----	2.88E-01
RA-223	Not Detected	-----	1.85E-01
RN-219	Not Detected	-----	3.05E-01
PB-211	Not Detected	-----	6.81E-01
TL-207	Not Detected	-----	1.11E+01
AM-241	Not Detected	-----	3.97E-01
PU-239	Not Detected	-----	3.73E+02
NP-237	Not Detected	-----	3.22E-01
PA-233	Not Detected	-----	4.74E-02
TH-229	Not Detected	-----	2.16E-01

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.24E-02
AG-110m	Not Detected	-----	2.76E-02
AM-243	Not Detected	-----	7.52E-02
BA-133	Not Detected	-----	5.14E-02
BE-7	Not Detected	-----	2.12E-01
CD-109	1.20E+00	4.61E-01	8.19E-01
CD-115	Not Detected	-----	1.01E-01
CE-139	Not Detected	-----	2.46E-02
CE-141	Not Detected	-----	4.54E-02
CE-144	Not Detected	-----	2.04E-01
CO-56	Not Detected	-----	3.13E-02
CO-57	Not Detected	-----	2.52E-02
CO-58	Not Detected	-----	2.69E-02
CO-60	Not Detected	-----	3.06E-02
CR-51	Not Detected	-----	2.04E-01
CS-134	Not Detected	-----	3.68E-02
CS-137	2.08E-02	1.87E-02	1.69E-02
EU-152	Not Detected	-----	7.56E-02
EU-154	Not Detected	-----	1.50E-01
EU-155	Not Detected	-----	1.23E-01
FE-59	Not Detected	-----	6.16E-02
GD-153	Not Detected	-----	8.96E-02
HG-203	Not Detected	-----	2.67E-02
I-131	Not Detected	-----	2.82E-02
IR-192	Not Detected	-----	2.31E-02
K-40	1.60E+01	2.33E+00	2.22E-01
KR-85	Not Detected	-----	6.86E+00
MN-52	Not Detected	-----	3.01E-02
MN-54	Not Detected	-----	2.93E-02
MO-99	Not Detected	-----	3.33E-01
NA-22	Not Detected	-----	3.51E-02
NA-24	Not Detected	-----	2.62E-01
NE-95	Not Detected	-----	1.97E-01
ND-147	Not Detected	-----	1.82E-01
NI-57	Not Detected	-----	9.86E-02
NP-239	Not Detected	-----	1.12E-01
RU-103	Not Detected	-----	2.43E-02
RU-106	Not Detected	-----	2.31E-01
SB-122	Not Detected	-----	5.32E-02
SB-124	Not Detected	-----	2.54E-02
SB-125	Not Detected	-----	6.98E-02
SN-113	Not Detected	-----	3.10E-02
TA-182	Not Detected	-----	1.16E-01
TA-183	Not Detected	-----	4.50E-01
TC-99m	Not Detected	-----	7.34E+00
TL-201	Not Detected	-----	2.49E-01
XE-133	Not Detected	-----	2.28E-01
Y-88	Not Detected	-----	1.80E-02
ZN-65	Not Detected	-----	8.28E-02
ZR-95	Not Detected	-----	4.67E-02

*not detected**3/25/78*

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-25-98 12:07:19 PM *

 *
 * Analyzed by: *[Signature]* 3/25/98 Reviewed by: *[Signature]* 3/25/98 *

 Customer : C.AAS/D.BISWELL (6134/SMO)
 Customer Sample ID : 036752-001
 Lab Sample ID : 80050815

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 725.000 gram
 Sample Date/Time : 3-23-98 1:15:00 PM.
 Acquire Start Date/Time : 3-25-98 10:23:27 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	Not Detected	-----	1.78E+00
TH-234	1.17E+00	3.75E-01	4.37E-01
RA-226	1.52E+00	5.00E-01	5.44E-01
PB-214	6.67E-01	1.19E-01	4.91E-02
BI-214	7.07E-01	1.40E-01	4.17E-02
PB-210	5.71E+00	1.04E+00	5.53E+00
TH-232	6.98E-01	3.68E-01	1.45E-01
RA-228	7.97E-01	2.76E-01	1.43E-01
AC-228	7.94E-01	2.79E-01	7.80E-02
TH-228	6.61E-01	2.24E-01	4.84E-01
RA-224	8.11E-01	2.79E-01	1.52E-01
PB-212	7.80E-01	1.30E-01	3.50E-02
BI-212	7.54E-01	3.99E-01	2.92E-01
TL-208	7.36E-01	1.69E-01	6.21E-02
U-235	Not Detected	-----	1.97E-01
TH-231	1.22E+00	2.60E-00	2.23E+00
PA-231	Not Detected	-----	3.64E+00
TH-227	Not Detected	-----	3.38E-01
RA-223	Not Detected	-----	1.68E-01
RN-219	Not Detected	-----	3.71E-01
PB-211	Not Detected	-----	8.40E-01
TL-207	Not Detected	-----	1.26E+01
AM-241	Not Detected	-----	2.19E-01
PU-239	Not Detected	-----	3.62E+02
NP-237	Not Detected	-----	2.13E-01
PA-233	Not Detected	-----	5.94E-02
TH-229	Not Detected	-----	2.09E-01

not detected *[Signature]* 3/25/98

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.80E-02
AG-110m	Not Detected	-----	6.95E-02
AM-243	Not Detected	-----	5.00E-02
BA-133	Not Detected	-----	6.32E-02
BE-7	Not Detected	-----	2.52E-01
CD-109	2.15E+00	6.75E-01	7.24E-01
CD-115	Not Detected	-----	1.14E-01
CE-139	Not Detected	-----	2.66E-02
CE-141	Not Detected	-----	4.42E-02
CE-144	Not Detected	-----	1.99E-01
CO-56	Not Detected	-----	2.89E-02
CO-57	Not Detected	-----	2.53E-02
CO-58	Not Detected	-----	2.99E-02
CO-60	Not Detected	-----	3.47E-02
CR-51	Not Detected	-----	2.43E-01
CS-134	Not Detected	-----	4.67E-02
CS-137	6.70E-01	1.07E-01	2.15E-02
EU-152	Not Detected	-----	7.64E-02
EU-154	Not Detected	-----	1.76E-01
EU-155	Not Detected	-----	1.21E-01
FE-59	Not Detected	-----	6.91E-02
GD-153	Not Detected	-----	8.65E-02
HG-203	Not Detected	-----	3.02E-02
I-131	Not Detected	-----	3.37E-02
IR-192	Not Detected	-----	2.82E-02
K-40	1.92E+01	2.86E+00	2.17E-01
KR-85	Not Detected	-----	7.90E+00
MN-52	Not Detected	-----	3.41E-02
MN-54	Not Detected	-----	3.26E-02
MO-99	Not Detected	-----	3.52E-01
NA-22	Not Detected	-----	3.93E-02
NA-24	Not Detected	-----	2.41E-01
NB-95	Not Detected	-----	2.23E-01
ND-147	Not Detected	-----	2.19E-01
NI-57	Not Detected	-----	1.11E-01
NP-239	Not Detected	-----	1.08E-01
RU-103	Not Detected	-----	3.08E-02
RU-106	Not Detected	-----	2.71E-01
SB-122	Not Detected	-----	6.05E-02
SB-124	Not Detected	-----	2.91E-02
SB-125	Not Detected	-----	8.45E-02
SN-113	Not Detected	-----	3.90E-02
TA-182	Not Detected	-----	1.50E-01
TA-183	Not Detected	-----	2.42E-01
TC-99m	Not Detected	-----	4.69E+00
TL-201	Not Detected	-----	1.76E-01
XE-133	Not Detected	-----	2.01E-01
Y-88	Not Detected	-----	2.35E-02
ZN-65	Not Detected	-----	1.00E-01
ZR-95	Not Detected	-----	5.10E-02

not detected J 3/25/98

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-25-98 12:18:57 PM *

 *
 * Analyzed by: *J 3/25/98* Reviewed by: *KE 3/26/98* *

 Customer : C.AAS/D.BISWELL (6134/SMO)
 Customer Sample ID : 036753-001
 Lab Sample ID : 80050816

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 745.000 gram
 Sample Date/Time : 3-23-98 1:20:00 PM
 Acquire Start Date/Time : 3-25-98 10:35:33 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	1.54E+00	8.48E-01	1.09E+00
TH-234	1.21E+00	3.93E-01	4.47E-01
RA-226	1.52E+00	8.42E-01	5.69E-01
PB-214	6.05E-01	1.24E-01	5.04E-02
BI-214	5.45E-01	9.69E-02	5.36E-02
PB-210	Not Detected	-----	4.44E+00
TH-232	7.06E-01	3.76E-01	1.70E-01
RA-228	6.80E-01	2.91E-01	1.82E-01
AC-228	8.00E-01	2.14E-01	9.89E-02
TH-228	6.03E-01	2.82E-01	5.23E-01
RA-224	7.08E-01	7.24E-01	1.03E-01
PB-212	7.71E-01	1.30E-01	4.05E-02
BI-212	9.26E-01	1.51E+00	3.81E-01
TL-208	7.21E-01	2.37E-01	6.43E-02
U-235	Not Detected	-----	2.04E-01
TH-231	Not Detected	-----	2.23E+00
PA-231	Not Detected	-----	3.91E+00
TH-227	Not Detected	-----	3.68E-01
RA-223	Not Detected	-----	1.42E-01
RN-219	Not Detected	-----	4.20E-01
PB-211	Not Detected	-----	9.34E-01
TL-207	Not Detected	-----	1.57E+01
AM-241	Not Detected	-----	1.54E-01
PU-239	Not Detected	-----	3.35E+02
NP-237	Not Detected	-----	2.70E-01
PA-233	Not Detected	-----	6.48E-02
TH-229	Not Detected	-----	1.88E-01

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.53E-02
AG-110m	Not Detected	-----	5.90E-02
AM-243	Not Detected	-----	5.72E-02
BA-133	Not Detected	-----	6.52E-02
BE-7	Not Detected	-----	2.81E-01
CD-109	2.14E+00	6.94E-01	6.72E-01
CD-115	Not Detected	-----	1.25E-01
CE-139	Not Detected	-----	2.72E-02
CE-141	Not Detected	-----	4.58E-02
CE-144	Not Detected	-----	1.97E-01
CO-56	Not Detected	-----	3.54E-02
CO-57	Not Detected	-----	2.40E-02
CO-58	Not Detected	-----	3.73E-02
CO-60	Not Detected	-----	4.43E-02
CR-51	Not Detected	-----	2.66E-01
CS-134	Not Detected	-----	5.43E-02
CS-137	2.55E-01	6.86E-02	2.74E-02
EU-152	Not Detected	-----	7.18E-02
EU-154	Not Detected	-----	2.10E-01
EU-155	Not Detected	-----	1.08E-01
FE-59	Not Detected	-----	8.58E-02
GD-153	Not Detected	-----	7.73E-02
HG-203	Not Detected	-----	3.24E-02
I-131	Not Detected	-----	3.47E-02
IR-192	Not Detected	-----	3.05E-02
K-40	1.92E+01	3.00E+00	3.08E-01
KR-85	Not Detected	-----	8.88E+00
MN-52	Not Detected	-----	4.65E-02
MN-54	Not Detected	-----	3.94E-02
MO-99	Not Detected	-----	4.26E-01
NA-22	Not Detected	-----	5.10E-02
NA-24	Not Detected	-----	3.32E-01
NB-95	Not Detected	-----	2.30E-01
ND-147	Not Detected	-----	2.34E-01
NI-57	Not Detected	-----	1.40E-01
NP-239	Not Detected	-----	9.72E-02
RU-103	Not Detected	-----	1.68E-02
RU-106	Not Detected	-----	3.33E-01
SB-122	Not Detected	-----	7.70E-02
SB-124	Not Detected	-----	3.62E-02
SB-125	Not Detected	-----	9.08E-02
SN-113	Not Detected	-----	4.05E-02
TA-182	Not Detected	-----	1.71E-01
TA-183	Not Detected	-----	1.68E-01
TC-99m	Not Detected	-----	4.77E+00
TL-201	Not Detected	-----	1.33E-01
XE-133	Not Detected	-----	1.45E-01
Y-88	Not Detected	-----	3.00E-02
ZN-65	Not Detected	-----	1.13E-01
ZR-95	Not Detected	-----	6.83E-02

not detected 3/25/58

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-25-98 1:49:10 PM *

* Analyzed by: *[Signature]* 3/25/98 Reviewed by: *[Signature]* 3/26/98

Customer : C.AAS/D.BISWELL (6134/SMO)
 Customer Sample ID : 036754-001
 Lab Sample ID : 80050817

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 825.000 gram
 Sample Date/Time : 3-23-98 1:25:00 PM.
 Acquire Start Date/Time : 3-25-98 12:05:29 PM
 Detector Name : LAB04
 Elapsed Live/Real Time : 6000 / 6004 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	7.09E-01
TH-234	7.78E-01	3.16E-01	4.21E-01
RA-226	1.07E+00	3.67E-01	3.98E-01
PB-214	5.36E-01	9.59E-02	3.83E-02
BI-214	4.95E-01	9.27E-02	3.41E-02
PB-210	Not Detected	-----	8.67E+00
TH-232	7.55E-01	3.75E-01	1.29E-01
RA-228	6.03E-01	2.22E-01	1.22E-01
AC-228	7.76E-01	1.68E-01	6.18E-02
TH-228	7.37E-01	2.34E-01	4.26E-01
RA-224	7.65E-01	2.75E-01	1.34E-01
PB-212	7.05E-01	1.16E-01	3.27E-02
BI-212	8.56E-01	4.18E-01	2.80E-01
TL-208	6.58E-01	1.30E-01	5.57E-02
U-235	1.10E-01	1.56E-01	1.81E-01
TH-231	Not Detected	-----	1.96E+00
PA-231	Not Detected	-----	3.24E+00
TH-227	Not Detected	-----	2.98E-01
RA-223	Not Detected	-----	1.45E-01
FN-219	Not Detected	-----	3.31E-01
PB-211	Not Detected	-----	7.57E-01
TL-207	Not Detected	-----	1.17E+01
AM-241	Not Detected	-----	2.01E-01
PU-239	Not Detected	-----	3.20E+02
NP-237	Not Detected	-----	1.60E-01
PA-233	Not Detected	-----	5.24E-02
TH-229	Not Detected	-----	1.86E-01

Not Detected *[Signature]* 3/25/98

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.41E-02
AG-110m	Not Detected	-----	5.19E-02
AM-243	Not Detected	-----	4.97E-02
BA-133	Not Detected	-----	5.35E-02
BE-7	1.83E-01	1.07E-01	1.38E-01
CD-109	1.53E-00	5.62E-01	5.44E-01
CD-115	Not Detected	-----	1.04E-01
CE-139	Not Detected	-----	2.36E-02
CE-141	Not Detected	-----	4.05E-02
CE-144	Not Detected	-----	1.75E-01
CO-56	Not Detected	-----	2.70E-02
CO-57	Not Detected	-----	2.24E-02
CO-58	Not Detected	-----	2.59E-02
CO-60	Not Detected	-----	3.08E-02
CR-51	Not Detected	-----	2.11E-01
CS-134	Not Detected	-----	3.91E-02
CS-137	3.70E-01	6.22E-02	1.97E-02
EU-152	Not Detected	-----	6.70E-02
EU-154	Not Detected	-----	1.56E-01
EU-155	Not Detected	-----	1.06E-01
FE-59	Not Detected	-----	5.96E-02
GD-153	Not Detected	-----	7.74E-02
HG-203	Not Detected	-----	2.68E-02
I-131	Not Detected	-----	2.89E-02
IR-192	Not Detected	-----	2.45E-02
K-40	1.84E+01	2.67E+00	1.89E-01
KR-85	Not Detected	-----	7.07E+00
MN-52	Not Detected	-----	3.18E-02
MN-54	Not Detected	-----	2.86E-02
MO-99	Not Detected	-----	3.16E-01
NA-22	Not Detected	-----	3.42E-02
NA-24	Not Detected	-----	2.35E-01
NB-95	Not Detected	-----	2.00E-01
ND-147	Not Detected	-----	2.01E-01
NI-57	Not Detected	-----	9.86E-02
NP-239	Not Detected	-----	9.49E-02
RU-103	Not Detected	-----	2.56E-02
RU-106	Not Detected	-----	2.49E-01
SB-122	Not Detected	-----	5.40E-02
SB-124	Not Detected	-----	2.66E-02
SB-125	Not Detected	-----	7.04E-02
SN-113	Not Detected	-----	3.31E-02
TA-182	Not Detected	-----	1.27E-01
TA-183	Not Detected	-----	2.23E-01
TC-99m	Not Detected	-----	5.07E+00
TL-201	Not Detected	-----	1.61E-01
XE-133	Not Detected	-----	1.81E-01
Y-88	Not Detected	-----	2.09E-02
ZN-65	Not Detected	-----	8.82E-02
ZR-95	Not Detected	-----	4.72E-02

not detected
3/25/88

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-25-98 2:03:50 PM *

 *
 * Analyzed by: *[Signature]* 3/25/98 Reviewed by: *[Signature]* *

 Customer : C.AAS/D.BISWELL (6134/SMO)
 Customer Sample ID : 036755-001
 Lab Sample ID : 80050818

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 935.000 gram
 Sample Date/Time : 3-23-98 1:30:00 PM-
 Acquire Start Date/Time : 3-25-98 12:20:20 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	-----	1.13E+00
TH-234	1.21E+00	4.01E-01	3.53E-01
RA-226	1.50E+00	5.55E-01	4.42E-01
PB-214	5.05E-01	1.41E-01	4.08E-02
BI-214	5.11E-01	1.17E-01	4.41E-02
PB-210	Not Detected	-----	3.78E+00
TH-232	7.41E-01	7.59E-01	1.22E-01
RA-228	7.05E-01	2.94E-01	1.48E-01
AC-228	6.95E-01	2.05E-01	8.37E-02
TH-228	6.45E-01	3.43E-01	4.06E-01
RA-224	6.14E-01	2.38E-01	7.23E-02
PB-212	6.85E-01	1.13E-01	3.26E-02
BI-212	6.11E-01	3.39E-01	3.05E-01
TL-208	6.57E-01	2.73E-01	5.81E-02
U-235	Not Detected	-----	1.75E-01
TH-231	Not Detected	-----	1.93E+00
PA-231	Not Detected	-----	3.07E+00
TH-227	Not Detected	-----	3.05E-01
RA-223	Not Detected	-----	1.19E-01
RN-219	Not Detected	-----	3.53E-01
PB-211	Not Detected	-----	8.05E-01
TL-207	Not Detected	-----	1.36E+01
AM-241	Not Detected	-----	1.33E-01
PU-239	Not Detected	-----	2.90E+02
NP-237	Not Detected	-----	2.25E-01
PA-233	Not Detected	-----	5.17E-02
TH-229	Not Detected	-----	1.62E-01

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.66E-02
AG-110m	Not Detected	-----	3.48E-02
AM-243	Not Detected	-----	4.70E-02
BA-133	Not Detected	-----	5.34E-02
BE-7	Not Detected	-----	2.27E-01
CD-109	1.63E+00	5.81E-01	4.78E-01
CD-115	Not Detected	-----	1.08E-01
CE-139	Not Detected	-----	2.28E-02
CE-141	Not Detected	-----	4.00E-02
CE-144	Not Detected	-----	1.69E-01
CO-56	Not Detected	-----	2.95E-02
CO-57	Not Detected	-----	2.03E-02
CO-58	Not Detected	-----	3.09E-02
CO-60	Not Detected	-----	3.70E-02
CR-51	Not Detected	-----	2.16E-01
CS-134	Not Detected	-----	4.64E-02
CS-137	6.01E-02	3.19E-02	2.16E-02
EU-152	Not Detected	-----	6.07E-02
EU-154	Not Detected	-----	1.69E-01
EU-155	Not Detected	-----	9.28E-02
FE-59	Not Detected	-----	7.30E-02
GD-153	Not Detected	-----	6.70E-02
HG-203	Not Detected	-----	2.65E-02
I-131	Not Detected	-----	2.92E-02
IR-192	Not Detected	-----	2.49E-02
K-40	1.64E+01	2.49E+00	2.48E-01
KR-85	Not Detected	-----	7.62E+00
MN-52	Not Detected	-----	3.49E-02
MN-54	Not Detected	-----	3.16E-02
MO-99	Not Detected	-----	3.64E-01
NA-22	Not Detected	-----	4.09E-02
NA-24	Not Detected	-----	2.73E-01
NB-95	Not Detected	-----	1.92E-01
ND-147	Not Detected	-----	2.04E-01
NI-57	Not Detected	-----	1.19E-01
NP-239	Not Detected	-----	8.44E-02
RU-103	Not Detected	-----	2.67E-02
RU-106	Not Detected	-----	2.64E-01
SB-122	Not Detected	-----	6.02E-02
SB-124	Not Detected	-----	3.06E-02
SB-125	Not Detected	-----	7.38E-02
SN-113	Not Detected	-----	3.35E-02
TA-182	Not Detected	-----	1.38E-01
TA-183	Not Detected	-----	1.48E-01
TC-99m	Not Detected	-----	5.01E+00
TL-201	Not Detected	-----	1.16E-01
XE-133	Not Detected	-----	1.27E-01
Y-88	Not Detected	-----	2.42E-02
ZN-65	Not Detected	-----	9.61E-02
ZR-95	Not Detected	-----	5.49E-02

Not detected
3/25/55

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-25-98 3:30:22 PM *

 *
 * Analyzed by: *[Signature]* 3/25/98 Reviewed by: *[Signature]* *

Customer : C.AAS/D.BISWELL (6134/SMO)
 Customer Sample ID : 036756-001
 Lab Sample ID : 80050819

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 798.000 gram
 Sample Date/Time : 3-23-98 1:45:00 PM-
 Acquire Start Date/Time : 3-25-98 1:47:28 PM
 Detector Name : LAB04
 Elapsed Live/Real Time : 6000 / 6004 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	1.62E+00
TH-234	8.20E-01	3.57E-01	3.67E-01
RA-226	1.17E+00	9.36E-01	5.49E-01
PB-214	5.52E-01	2.23E-01	4.00E-02
BI-214	5.74E-01	1.11E-01	3.96E-02
PB-210	Not Detected	-----	8.99E+00
TH-232	7.30E-01	3.74E-01	1.35E-01
RA-228	6.45E-01	2.18E-01	1.48E-01
AC-228	6.97E-01	1.57E-01	6.92E-02
TH-228	6.36E-01	2.02E-01	4.05E-01
RA-224	6.53E-01	2.27E-01	1.38E-01
PB-212	7.10E-01	1.21E-01	3.28E-02
BI-212	8.97E-01	3.61E-01	2.60E-01
TL-208	6.07E-01	1.98E-01	5.93E-02
U-235	Not Detected	-----	1.84E-01
TH-231	Not Detected	-----	1.94E+00
PA-231	Not Detected	-----	3.24E+00
TH-227	Not Detected	-----	3.02E-01
RA-223	Not Detected	-----	1.49E-01
RN-219	Not Detected	-----	3.44E-01
PB-211	Not Detected	-----	7.79E-01
TL-207	Not Detected	-----	1.31E+01
AM-241	Not Detected	-----	2.01E-01
PU-239	Not Detected	-----	3.25E+02
NP-237	2.93E-01	1.23E-01	1.88E-01
PA-233	Not Detected	-----	5.29E-02
TH-229	Not Detected	-----	1.84E-01

not detected *[Signature]* 3/25/98

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected		3.55E-02
AG-110m	Not Detected		4.21E-02
AM-243	Not Detected		4.72E-02
BA-133	Not Detected		5.58E-02
BE-7	Not Detected		2.21E-01
CD-109	Not Detected		6.37E-01
CD-115	Not Detected		1.06E-01
CE-139	Not Detected		2.37E-02
CE-141	Not Detected		4.17E-02
CE-144	Not Detected		1.79E-01
CO-56	Not Detected		2.87E-02
CO-57	Not Detected		2.25E-02
CO-58	Not Detected		2.85E-02
CO-60	Not Detected		3.13E-02
CR-51	Not Detected		2.23E-01
CS-134	Not Detected		4.25E-02
CS-137	1.75E-01	4.26E-02	2.19E-02
EU-152	Not Detected		6.74E-02
EU-154	Not Detected		1.64E-01
EU-155	Not Detected		1.07E-01
FE-59	Not Detected		7.10E-02
GD-153	Not Detected		7.69E-02
HG-203	Not Detected		2.80E-02
I-131	Not Detected		3.09E-02
IR-192	Not Detected		2.49E-02
K-40	2.22E+01	3.20E+00	1.95E-01
KR-85	Not Detected		7.18E+00
MN-52	Not Detected		3.34E-02
MN-54	Not Detected		3.06E-02
MO-99	Not Detected		3.44E-01
NA-22	Not Detected		3.98E-02
NA-24	Not Detected		2.42E-01
NB-95	Not Detected		2.04E-01
ND-147	Not Detected		1.99E-01
NI-57	Not Detected		9.86E-02
NP-239	Not Detected		9.74E-02
RU-103	Not Detected		2.74E-02
RU-106	Not Detected		2.49E-01
SB-122	Not Detected		5.99E-02
SB-124	Not Detected		2.79E-02
SB-125	Not Detected		7.21E-02
SN-113	Not Detected		3.37E-02
TA-182	Not Detected		1.36E-01
TA-183	Not Detected		2.26E-01
TC-99m	Not Detected		6.09E+00
TL-201	Not Detected		1.65E-01
XE-133	Not Detected		1.87E-01
Y-88	Not Detected		2.31E-02
ZN-65	Not Detected		9.37E-02
ZR-95	Not Detected		5.06E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-25-98 3:48:02 PM *

* Analyzed by: *J* 3/25/98 Reviewed by: *Ka 3/25/98* *

Customer : C.AAS/D.BISWELL (6134/SMO)
 Customer Sample ID : 036757-001
 Lab Sample ID : 80050820

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 869.000 gram
 Sample Date/Time : 3-23-98 1:50:00 PM
 Acquire Start Date/Time : 3-25-98 2:05:19 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	-----	1.23E+00
TH-234	8.43E-01	3.02E-01	3.76E-01
RA-226	1.39E+00	6.34E-01	4.70E-01
PB-214	6.55E-01	1.18E-01	4.76E-02
BI-214	6.60E-01	1.38E-01	4.63E-02
PB-210	Not Detected	-----	4.08E+00
TH-232	6.94E-01	3.72E-01	1.48E-01
RA-228	6.99E-01	3.33E-01	1.78E-01
AC-228	7.03E-01	3.10E-01	9.81E-02
TH-228	4.32E-01	2.42E-01	4.38E-01
RA-224	7.85E-01	3.09E-01	6.85E-02
PB-212	6.78E-01	1.14E-01	3.62E-02
BI-212	6.08E-01	4.52E-01	3.36E-01
TL-208	6.39E-01	1.50E-01	6.68E-02
U-235	1.89E-01	1.59E-01	1.93E-01
TH-231	Not Detected	-----	2.08E+00
PA-231	Not Detected	-----	3.49E+00
TH-227	Not Detected	-----	3.24E-01
RA-223	Not Detected	-----	1.32E-01
RN-219	Not Detected	-----	3.90E-01
PB-211	Not Detected	-----	9.28E-01
TL-207	Not Detected	-----	1.51E+01
AM-241	Not Detected	-----	1.46E-01
PU-239	Not Detected	-----	3.19E+02
NP-237	Not Detected	-----	2.39E-01
PA-233	Not Detected	-----	5.70E-02
TH-229	Not Detected	-----	1.76E-01

not detected J 3/25/98

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.01E-02
AG-110m	Not Detected	-----	5.44E-02
AM-243	Not Detected	-----	4.25E-02
BA-133	Not Detected	-----	6.27E-02
BE-7	Not Detected	-----	2.53E-01
CD-109	2.22E+00	5.06E-01	5.93E-01
CD-115	Not Detected	-----	1.21E-01
CE-139	Not Detected	-----	2.57E-02
CE-141	Not Detected	-----	4.33E-02
CE-144	Not Detected	-----	1.87E-01
CO-56	Not Detected	-----	3.50E-02
CO-57	Not Detected	-----	2.18E-02
CO-58	Not Detected	-----	3.42E-02
CO-60	Not Detected	-----	4.30E-02
CR-51	Not Detected	-----	2.40E-01
CS-134	Not Detected	-----	5.18E-02
CS-137	2.52E-01	5.48E-02	2.55E-02
EU-152	Not Detected	-----	6.49E-02
EU-154	Not Detected	-----	1.87E-01
EU-155	Not Detected	-----	1.01E-01
FE-59	Not Detected	-----	7.87E-02
GD-153	Not Detected	-----	7.17E-02
HG-203	Not Detected	-----	3.04E-02
I-131	Not Detected	-----	3.48E-02
IR-192	Not Detected	-----	2.71E-02
K-40	1.99E+01	2.99E+00	2.50E-01
KR-85	Not Detected	-----	8.14E+00
MN-52	Not Detected	-----	4.37E-02
MN-54	Not Detected	-----	3.73E-02
MO-99	Not Detected	-----	3.98E-01
NA-22	Not Detected	-----	4.61E-02
NA-24	Not Detected	-----	3.35E-01
NB-95	Not Detected	-----	2.08E-01
ND-147	Not Detected	-----	2.20E-01
NI-57	Not Detected	-----	1.31E-01
NP-239	Not Detected	-----	9.21E-02
RU-103	Not Detected	-----	2.99E-02
RU-106	Not Detected	-----	2.95E-01
SB-122	Not Detected	-----	6.75E-02
SB-124	Not Detected	-----	3.28E-02
SB-125	Not Detected	-----	9.10E-02
SN-113	Not Detected	-----	3.78E-02
TA-182	Not Detected	-----	1.67E-01
TA-183	Not Detected	-----	1.61E-01
TC-99m	Not Detected	-----	6.28E+00
TL-201	Not Detected	-----	1.26E-01
XE-133	Not Detected	-----	1.43E-01
Y-88	Not Detected	-----	2.90E-02
ZN-65	Not Detected	-----	1.14E-01
ZR-95	Not Detected	-----	6.02E-02

Not Detected
3/25/98

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-25-98 5:41:20 PM *

* Analyzed by: *[Signature]* 3/25/98 Reviewed by: *[Signature]* 3/26/98 *

 Customer : C.AAS/D.BISWELL (6134/SMO)
 Customer Sample ID : 036758-001
 Lab Sample ID : 80050821

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 856.000 gram
 Sample Date/Time : 3-23-98 1:50:00 PM.
 Acquire Start Date/Time : 3-25-98 3:55:10 PM
 Detector Name : LAB04
 Elapsed Live/Real Time : 6000 / 6004 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	5.33E-01	5.65E-01	9.28E-01
TH-234	7.84E-01	2.84E-01	3.75E-01
RA-226	1.11E+00	4.42E-01	4.50E-01
PB-214	5.66E-01	9.74E-02	3.84E-02
BI-214	6.55E-01	1.14E-01	3.54E-02
PB-210	Not Detected	-----	8.39E+00
TH-232	6.17E-01	3.18E-01	1.19E-01
RA-228	7.10E-01	2.17E-01	1.37E-01
AC-228	6.40E-01	1.56E-01	7.18E-02
TH-228	7.61E-01	2.29E-01	4.16E-01
RA-224	7.55E-01	4.04E-01	1.29E-01
PB-212	6.70E-01	1.11E-01	3.26E-02
BI-212	7.29E-01	2.57E-01	2.46E-01
TL-208	6.44E-01	1.23E-01	5.57E-02
U-235	Not Detected	-----	1.76E-01
TH-231	Not Detected	-----	1.92E+00
PA-231	Not Detected	-----	3.23E+00
TH-227	Not Detected	-----	2.92E-01
RA-223	Not Detected	-----	1.50E-01
RN-219	Not Detected	-----	3.24E-01
PB-211	Not Detected	-----	7.31E-01
TL-207	Not Detected	-----	1.17E+01
AM-241	Not Detected	-----	1.96E-01
PU-239	Not Detected	-----	3.18E+02
NP-237	3.23E-01	1.23E-01	1.77E-01
PA-233	Not Detected	-----	5.07E-02
TH-229	Not Detected	-----	1.84E-01

not detected 3/25/98

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected		3.52E-02
AG-110m	Not Detected		4.33E-02
AM-243	Not Detected		5.29E-02
BA-133	Not Detected		5.42E-02
BE-7	Not Detected		2.12E-01
CD-109	Not Detected		6.03E-01
CD-115	Not Detected		1.06E-01
CE-139	Not Detected		2.33E-02
CE-141	Not Detected		3.98E-02
CE-144	Not Detected		1.74E-01
CO-56	Not Detected		2.87E-02
CO-57	Not Detected		2.27E-02
CO-58	Not Detected		2.57E-02
CO-60	Not Detected		3.26E-02
CR-51	Not Detected		2.12E-01
CS-134	Not Detected		4.18E-02
CS-137	2.32E-01	4.76E-02	1.89E-02
EU-152	Not Detected		6.78E-02
EU-154	Not Detected		1.62E-01
EU-155	Not Detected		1.06E-01
FE-59	Not Detected		6.40E-02
GD-153	Not Detected		7.63E-02
HG-203	Not Detected		2.72E-02
I-131	Not Detected		2.88E-02
IR-192	Not Detected		2.36E-02
K-40	2.22E+01	3.15E+00	1.86E-01
KR-85	Not Detected		6.91E+00
MN-52	Not Detected		3.27E-02
MN-54	Not Detected		2.85E-02
MO-99	Not Detected		3.41E-01
NA-22	Not Detected		3.69E-02
NA-24	Not Detected		2.72E-01
NB-95	Not Detected		2.01E-01
ND-147	Not Detected		1.96E-01
NI-57	Not Detected		1.11E-01
NP-239	Not Detected		9.50E-02
RU-103	Not Detected		2.64E-02
RU-106	Not Detected		2.42E-01
SB-122	Not Detected		5.81E-02
SB-124	Not Detected		2.58E-02
SB-125	Not Detected		7.20E-02
SN-113	Not Detected		3.29E-02
TA-182	Not Detected		1.36E-01
TA-183	Not Detected		2.23E-01
TC-99m	Not Detected		7.40E+00
TL-201	Not Detected		1.63E-01
XE-133	Not Detected		1.92E-01
Y-88	Not Detected		2.15E-02
ZN-65	Not Detected		9.01E-02
ZR-95	Not Detected		4.93E-02

PAGE 1 OF 2

SF 2001-COC (5-97)
Supplement (6-95) issue

Batch No.

SAR/WR No.

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

BLUE- To Accompany Samples,
Return to SMO

YELLOW- SMO Suspense Copy

PINK- Field Copy

ANALYSIS REQUEST AND CHAIN OF CUSTODY CONTINUATION FORM

PAGE 2 OF 2

SF 2001-COD (12-96)
Superseded (10-94) issue

AR/COC- 510226

Parameter & Method Requested

Project Name: CCTA-61A										Project/Task Manager: AAS / PAVLETCH										Case No.: 7215.220500																																																																																																																							
Location										Tech Area: N/A										Reference LOV (available at SMO)																																																																																																																							
Building: Room:																																																																																																																																											
Sample No. - Fraction										ER Sample ID or Sample Location Detail										Beginning Depth in Ft.										ER Site No.										Date/Time Collected										Sample Matrix										Container										Preservative										Sample Collection Method										Sample Type										Lab Sample ID																																							
036735-001										CCTA-61A-ER-005-0.5-1.0-S										0.5-1										61A										3-23-98 1100										SDI										P										SDW										4°L										G										SA										X																													
736-001										006-0-0.5-S										0-0.5																																																																																																																							
737-001										006-0.5-1.0-S										0.5-1																																																																																																																							
759-009										000-EB										N/A																																																																																																																							

Abnormal Conditions on Receipt

Recipient Initials

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



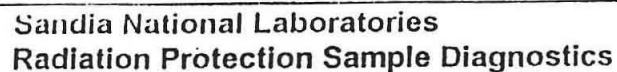
To be completed by Customer

Shaded areas are for RPSD use only

Customer: <u>AMS / PAULETICH</u>	Hazards/Special Instructions: <u>RUSH</u> <u>RESULTS NEEDED FOR SAMPLE RELEASE</u> <u>OFFSITE.</u> <u>FAX RESULTS TO</u> <u>MARK MILLER C 284-2616</u>	Batch Log Number: _____	<input type="checkbox"/> Gamma Spec <input type="checkbox"/> H-3 <input type="checkbox"/> Alpha/Beta <input type="checkbox"/> Alpha Spec <input type="checkbox"/> Total U <input type="checkbox"/> Other
Organization: <u>6134</u>		Logged By: _____	
Project Location: <u>CCTA - 61A</u>		Analysis Type: _____	
Phone: <u>284-2479</u>			
Date Results Needed: <u>* RUSH *</u>			
Suspect Isotopes: <u>DU, Th</u>			
Case Number: <u>7215. 220500</u>			

Customer Sample ID	Sample Type	Date/Time Collected	Sample Quantity	Requested Analysis	RPSD Sample ID	Screen cpm	Sample Mass	Remarks / Aliquot Amount
036725-001	SOIL	3-23-98 0955	500ML	GAMMA SPEC				
036726-001		1000						
036727-001		1005						
036728-001		1010						
036729-001		1020						
036730-001		1025						
036731-001		1030						
036732-001		1						
036733-001		1035						
036734-001		1055						
036735-001		1100						
036736-001		1110						
036737-001		1115						

Relinquished by _____	Date _____	Received by _____	Date _____
Relinquished by _____	Date _____	Received by _____	Date _____
Relinquished by _____	Date _____	Received by _____	Date _____
Relinquished by _____	Date _____	Received by _____	Date _____



To be completed by Customer

Shaded areas are for RPSD use only

[illegible]

Relinquished by _____	Date _____	Received by _____	Date _____
Relinquished by _____	Date _____	Received by _____	Date _____
Relinquished by _____	Date _____	Received by _____	Date _____
Relinquished by _____	Date _____	Received by _____	Date _____



Sandia National Laboratories
Radiation Protection Sample Diagnostics

Sample Analysis Request Form
Page 1 of 2

To be completed by Customer

Shaded areas are for RPSD use only

Customer: <u>ANL / PANLETICH</u>	Hazards/Special Instructions: <u>RUSH</u> <u>RESULTS NEEDED FOR SAMPLE RELEASE</u> <u>OFFSITE.</u> <u>FAX RESULTS TO</u> <u>MARK MILLER @ 284-2616</u> <u>CoC 510226</u>	Batch Log Number: <u>800509</u>
Organization: <u>6034</u>		Logged By: <u>7012</u>
Project Location: <u>CCTA-61A</u>		Analysis Type: <input checked="" type="checkbox"/> Gamma Spec <input type="checkbox"/> H-3 <input type="checkbox"/> Alpha/Beta <input type="checkbox"/> Alpha Spec <input type="checkbox"/> Total U <input type="checkbox"/> Other
Phone: <u>284-2479</u>		
Date Results Needed: <u>* RUSH *</u>		
Suspect Isotopes: <u>DU, TH</u>		
Case Number: <u>7215.220500</u>		

Customer Sample ID	Sample Type	Date/Time Collected	Sample Quantity	Requested Analysis	RPSD Sample ID	Screen cpm	Sample Mass	Remarks / Aliquot Amount
036725-001	SOIL	3-23-98 0955	500mL	GAMMA SPEC	01	<300	70.3g	
036726-001		1000			02		70.5g	
036727-001		1005			03		96.6g	
036728-001		1010			04		85.1g	
036729-001		1020			05		99.2g	
036730-001		1025			06		71.5g	
036731-001		1030			07		77.7g	
036732-001		1			08		75.4g	
036733-001		1035			09		89.5g	
036734-001		1055			10		73.4g	
036735-001		1100			11		76.3g	
036736-001		1110			12		86.1g	
036737-001		1115			13	<300	93.7g	

Relinquished by <u>[Signature]</u>	Date <u>3/24/98</u>	Received by <u>[Signature]</u>	Date <u>3/24/98</u>
Relinquished by <u>[Signature]</u>	Date <u>3/27/98</u>	Received by <u>[Signature]</u>	Date <u>3/27/98</u>
Relinquished by _____	Date _____	Received by _____	Date _____
Relinquished by _____	Date _____	Received by _____	Date _____



Sandia National Laboratories
Radiation Protection Sample Diagnostics

Sample Analysis Request Form
Page 1 of 2

To be completed by Customer

Shaded areas are for RPSD use only

Customer: <u>ANG / PANLETICH</u>	Hazards/Special Instructions: <u>RUSH</u> <u>RESULTS NEEDED FOR SAMPLE RELEASE</u> <u>OFFSITE.</u> <u>FAX RESULTS TO</u> <u>MARK MILLER @ 284-2616</u> <u>COC 510226</u>	Batch Log Number: <u>800509</u>
Organization: <u>6134</u>		Logged By: <u>JW</u>
Project Location: <u>CCTA - 61A</u>		Analysis Type: <input checked="" type="checkbox"/> Gamma Spec <input type="checkbox"/> H-3 <input type="checkbox"/> Alpha/Beta <input type="checkbox"/> Alpha Spec <input type="checkbox"/> Total U <input type="checkbox"/> Other
Phone: <u>284-2479</u>		
Date Results Needed: <u>* RUSH *</u>		
Suspect Isotopes: <u>DU, TH</u>		
Case Number: <u>7215.220500</u>		

Customer Sample ID	Sample Type	Date/Time Collected	Sample Quantity	Requested Analysis	RPSD Sample ID	Screen cpm	Sample Mass	Remarks / Aliquot Amount
036759-009	DIW SOLID BULK	3/23/90 0935	500ml	GAMMA SPEC	14	<300	N/A	
LCS	—	1/10/90	—	γ spec	15	N/A	N/A	

Relinquished by _____	Date _____	Received by _____	Date _____
Relinquished by _____	Date _____	Received by _____	Date _____
Relinquished by _____	Date _____	Received by _____	Date _____
Relinquished by _____	Date _____	Received by _____	Date _____

PAGE 1 OF 2

SF 2001-COC (5-97)
Supercules (6-95) issue

Batch No. 800509

SAR/WR No.

AR/COC- 510226

[illegible]

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

BLUE- To Accompany Samples,
Return to SMO

YELLOW- SMO Suspense Copy

PINK- Field Copy

SF 2001-COD (12-96)
Supersedes (10-94) issue

AR/COC- 510226

BATCH # 800509

[illegible]

Abnormal Conditions on Receipt

Accompany Samples,

DW- SMO Suspense Copy

PINK- Field Copy

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-25-98 6:04:55 PM *

* Analyzed by: *[Signature]* 3/26/98 Reviewed by: *[Signature]* 3/26/98 *

Customer : C.AAS/D.BISWELL (6134/SMO)
 Customer Sample ID : 036725-001
 Lab Sample ID : 80050901

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 703.000 gram
 Sample Date/Time : 3-23-98 9:55:00 AM
 Acquire Start Date/Time : 3-25-98 4:15:18 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	-----	1.45E+00
TH-234	1.42E+00	4.80E-01	4.46E-01
RA-226	1.80E+00	5.57E-01	5.67E-01
PB-214	6.87E-01	1.27E-01	5.22E-02
BI-214	6.47E-01	3.23E-01	5.61E-02
PB-210	Not Detected	-----	5.03E+00
TH-232	8.06E-01	4.47E-01	1.64E-01
RA-228	9.00E-01	3.28E-01	1.72E-01
AC-228	9.33E-01	2.39E-01	9.99E-02
TH-228	8.27E-01	7.76E-01	5.78E-01
RA-224	8.77E-01	3.07E-01	1.12E-01
PB-212	8.56E-01	2.04E-01	4.38E-02
BI-212	6.83E-01	4.39E-01	3.39E-01
TL-208	8.16E-01	1.76E-01	8.20E-02
U-235	Not Detected	-----	2.23E-01
TH-231	Not Detected	-----	2.39E+00
PA-231	Not Detected	-----	4.04E+00
TH-227	Not Detected	-----	3.89E-01
RA-223	Not Detected	-----	1.61E-01
RN-219	Not Detected	-----	4.71E-01
PB-211	Not Detected	-----	1.07E+00
TL-207	Not Detected	-----	1.74E+01
AM-241	Not Detected	-----	1.70E-01
PU-239	Not Detected	-----	3.72E+02
NP-237	Not Detected	-----	2.95E-01
PA-233	Not Detected	-----	7.01E-02
TH-229	Not Detected	-----	2.04E-01

[Summary Report] - Sample ID: : 80050901

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.56E-02
AG-110m	Not Detected	-----	7.31E-02
AM-243	Not Detected	-----	5.79E-02
BA-133	Not Detected	-----	7.37E-02
BE-7	3.70E-01	2.53E-01	2.24E-01
CD-109	2.35E+00	6.24E-01	7.04E-01
CD-115	Not Detected	-----	1.56E-01
CE-139	Not Detected	-----	2.99E-02
CE-141	Not Detected	-----	5.13E-02
CE-144	Not Detected	-----	2.17E-01
CO-56	Not Detected	-----	4.18E-02
CO-57	Not Detected	-----	2.51E-02
CO-58	Not Detected	-----	3.90E-02
CO-60	Not Detected	-----	4.61E-02
CR-51	Not Detected	-----	2.93E-01
CS-134	Not Detected	-----	5.76E-02
CS-137	4.30E-01	8.47E-02	2.92E-02
EU-152	Not Detected	-----	7.60E-02
EU-154	Not Detected	-----	2.11E-01
EU-155	Not Detected	-----	1.16E-01
FE-59	Not Detected	-----	9.41E-02
GD-153	Not Detected	-----	8.54E-02
HG-203	Not Detected	-----	3.41E-02
I-131	Not Detected	-----	3.98E-02
IR-192	Not Detected	-----	3.36E-02
K-40	2.07E+01	3.20E+00	3.21E-01
KR-85	Not Detected	-----	1.02E+01
MN-52	Not Detected	-----	4.86E-02
MN-54	Not Detected	-----	4.09E-02
MO-99	Not Detected	-----	5.04E-01
NA-22	Not Detected	-----	5.26E-02
NA-24	Not Detected	-----	5.59E-01
NB-95	Not Detected	-----	2.55E-01
ND-147	Not Detected	-----	2.57E-01
NI-57	Not Detected	-----	1.82E-01
NP-239	Not Detected	-----	1.06E-01
RU-103	Not Detected	-----	3.50E-02
RU-106	Not Detected	-----	3.64E-01
SB-122	Not Detected	-----	9.04E-02
SB-124	Not Detected	-----	3.76E-02
SB-125	Not Detected	-----	9.96E-02
SN-113	Not Detected	-----	4.57E-02
TA-182	Not Detected	-----	1.83E-01
TA-183	Not Detected	-----	1.96E-01
TC-99m	Not Detected	-----	1.50E+01
TL-201	Not Detected	-----	1.55E-01
XE-133	Not Detected	-----	1.85E-01
Y-88	Not Detected	-----	3.72E-02
ZN-65	Not Detected	-----	1.22E-01
ZR-95	Not Detected	-----	7.22E-02

Not detected 3/26/98

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-26-98 12:21:11 PM *

* Analyzed by: *[Signature]* 3/26/98 Reviewed by: *[Signature]* 3/26/98 *

Customer : C.AAS/D.BISWELL (6134/SMO)
 Customer Sample ID : 036726-001
 Lab Sample ID : 80050902

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 705.000 gram
 Sample Date/Time : 3-23-98 10:00:00 AM
 Acquire Start Date/Time : 3-25-98 5:11:40 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	-----	3.70E+00
TH-234	1.20E+00	4.26E-01	5.94E-01
RA-226	1.90E+00	8.89E-01	5.91E-01
PB-214	6.95E-01	1.26E-01	4.91E-02
BI-214	5.83E-01	1.36E-01	5.16E-02
PB-210	Not Detected	-----	3.86E+01
TH-232	9.63E-01	4.63E-01	1.64E-01
RA-228	1.02E+00	2.61E-01	1.54E-01
AC-228	1.06E+00	2.33E-01	8.66E-02
TH-228	7.75E-01	2.56E-01	4.98E-01
RA-224	9.46E-01	2.75E-01	8.78E-02
PB-212	9.64E-01	1.60E-01	4.34E-02
BI-212	9.15E-01	3.64E-01	3.45E-01
TL-208	8.70E-01	1.88E-01	7.47E-02
U-235	Not Detected	-----	2.67E-01
TH-231	Not Detected	-----	2.45E+00
PA-231	Not Detected	-----	4.21E+00
TH-227	Not Detected	-----	3.87E-01
RA-223	Not Detected	-----	2.47E-01
RN-219	Not Detected	-----	4.05E-01
PB-211	Not Detected	-----	9.06E-01
TL-207	Not Detected	-----	1.43E+01
AM-241	Not Detected	-----	5.27E-01
PU-239	Not Detected	-----	4.88E+02
NP-237	Not Detected	-----	2.66E-01
PA-233	Not Detected	-----	6.28E-02
TH-229	Not Detected	-----	2.74E-01

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.31E-02
AG-110m	Not Detected	-----	4.73E-02
AM-243	Not Detected	-----	1.10E-01
BA-133	Not Detected	-----	6.95E-02
BE-7	Not Detected	-----	2.90E-01
CD-109	2.17E+00	6.83E-01	9.03E-01
CD-115	Not Detected	-----	1.51E-01
CE-139	Not Detected	-----	3.20E-02
CE-141	Not Detected	-----	5.96E-02
CE-144	Not Detected	-----	2.66E-01
CO-56	Not Detected	-----	3.85E-02
CO-57	Not Detected	-----	3.36E-02
CO-58	Not Detected	-----	3.40E-02
CO-60	Not Detected	-----	3.94E-02
CR-51	Not Detected	-----	2.61E-01
CS-134	Not Detected	-----	4.96E-02
CS-137	1.48E-01	4.00E-02	2.58E-02
EU-152	Not Detected	-----	1.01E-01
EU-154	Not Detected	-----	1.98E-01
EU-155	Not Detected	-----	1.62E-01
FE-59	Not Detected	-----	7.88E-02
GD-153	Not Detected	-----	1.15E-01
HG-203	Not Detected	-----	3.51E-02
I-131	Not Detected	-----	3.76E-02
IR-192	Not Detected	-----	3.02E-02
K-40	1.95E+01	2.84E+00	2.69E-01
KR-85	Not Detected	-----	9.00E+00
MN-52	Not Detected	-----	4.07E-02
MN-54	Not Detected	-----	3.91E-02
MO-99	Not Detected	-----	4.63E-01
NA-22	Not Detected	-----	4.65E-02
NA-24	Not Detected	-----	4.66E-01
NB-95	Not Detected	-----	2.78E-01
ND-147	Not Detected	-----	2.46E-01
NI-57	Not Detected	-----	1.45E-01
NP-239	Not Detected	-----	1.45E-01
RU-103	Not Detected	-----	3.31E-02
RU-106	Not Detected	-----	3.07E-01
SB-122	Not Detected	-----	7.93E-02
SB-124	Not Detected	-----	3.36E-02
SB-125	Not Detected	-----	8.75E-02
SN-113	Not Detected	-----	4.02E-02
TA-182	Not Detected	-----	1.59E-01
TA-183	Not Detected	-----	6.11E-01
TC-99m	Not Detected	-----	2.05E+01
TL-201	Not Detected	-----	3.31E-01
XE-133	Not Detected	-----	3.28E-01
Y-88	Not Detected	-----	2.85E-02
ZN-65	Not Detected	-----	1.08E-01
ZR-95	Not Detected	-----	6.03E-02

Not detected 7/26/98

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-25-98 8:42:18 PM *

* Analyzed by: *[Signature]* 3/26/98 Reviewed by: *[Signature]* 3/26/98 *

Customer : C.AAS/D.BISWELL (6134/SMO)
 Customer Sample ID : 036727-001
 Lab Sample ID : 80050903

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 966.000 gram
 Sample Date/Time : 3-23-98 10:05:00 AM
 Acquire Start Date/Time : 3-25-98 6:59:26 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	-----	2.89E+00
TH-234	1.29E+00	7.33E-01	5.65E-01
RA-226	1.23E+00	5.55E-01	4.69E-01
PB-214	5.02E-01	8.87E-02	3.86E-02
BI-214	4.71E-01	9.59E-02	3.79E-02
PB-210	Not Detected	-----	2.89E+01
TH-232	7.15E-01	3.68E-01	1.22E-01
RA-228	6.78E-01	1.77E-01	1.23E-01
AC-228	7.92E-01	1.97E-01	6.77E-02
TH-228	6.94E-01	2.19E-01	4.20E-01
RA-224	7.49E-01	2.20E-01	6.16E-02
PB-212	7.73E-01	1.68E-01	3.42E-02
BI-212	6.28E-01	4.01E-01	2.46E-01
TL-208	7.05E-01	5.40E-01	5.77E-02
U-235	Not Detected	-----	2.06E-01
TH-231	Not Detected	-----	1.94E+00
PA-231	Not Detected	-----	3.29E+00
TH-227	Not Detected	-----	3.03E-01
RA-223	Not Detected	-----	1.92E-01
RN-219	Not Detected	-----	3.17E-01
PB-211	Not Detected	-----	7.34E-01
TL-207	Not Detected	-----	1.12E+01
AM-241	Not Detected	-----	4.11E-01
PU-239	Not Detected	-----	3.83E+02
NP-237	Not Detected	-----	3.22E-01
PA-233	Not Detected	-----	4.91E-02
TH-229	Not Detected	-----	2.22E-01

[Summary Report] - Sample ID: : 80050903

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.31E-02
AG-110m	Not Detected	-----	4.05E-02
AM-243	Not Detected	-----	7.17E-02
BA-133	Not Detected	-----	5.12E-02
BE-7	Not Detected	-----	2.20E-01
CD-109	Not Detected	-----	9.36E-01
CD-115	Not Detected	-----	1.17E-01
CE-139	Not Detected	-----	2.53E-02
CE-141	Not Detected	-----	4.69E-02
CE-144	Not Detected	-----	2.12E-01
CO-56	Not Detected	-----	2.90E-02
CO-57	Not Detected	-----	2.65E-02
CO-58	Not Detected	-----	2.69E-02
CO-60	Not Detected	-----	2.87E-02
CR-51	Not Detected	-----	2.02E-01
CS-134	Not Detected	-----	3.75E-02
CS-137	1.94E-01	4.88E-02	2.00E-02
EU-152	Not Detected	-----	7.96E-02
EU-154	Not Detected	-----	1.53E-01
EU-155	Not Detected	-----	1.29E-01
FE-59	Not Detected	-----	5.96E-02
GD-153	Not Detected	-----	9.12E-02
HG-203	Not Detected	-----	2.73E-02
I-131	Not Detected	-----	2.99E-02
IR-192	Not Detected	-----	2.35E-02
K-40	1.74E+01	2.53E+00	1.90E-01
KR-85	Not Detected	-----	6.99E+00
MN-52	Not Detected	-----	3.30E-02
MN-54	Not Detected	-----	2.84E-02
MO-99	Not Detected	-----	3.71E-01
NA-22	Not Detected	-----	3.56E-02
NA-24	Not Detected	-----	3.64E-01
NB-95	Not Detected	-----	2.21E-01
ND-147	Not Detected	-----	1.95E-01
NI-57	Not Detected	-----	1.08E-01
NP-239	Not Detected	-----	1.15E-01
RU-103	Not Detected	-----	2.57E-02
RU-106	Not Detected	-----	2.47E-01
SB-122	Not Detected	-----	5.95E-02
SB-124	Not Detected	-----	2.46E-02
SB-125	Not Detected	-----	6.70E-02
SN-113	Not Detected	-----	3.15E-02
TA-182	Not Detected	-----	1.22E-01
TA-183	Not Detected	-----	4.84E-01
TC-99m	Not Detected	-----	1.90E+01
TL-201	Not Detected	-----	2.66E-01
XE-133	Not Detected	-----	2.60E-01
Y-88	Not Detected	-----	2.03E-02
ZN-65	Not Detected	-----	8.53E-02
ZR-95	Not Detected	-----	4.83E-02

```

*****
*                               Sandia National Laboratories                               *
*   Radiation Protection Sample Diagnostics Program [881 Laboratory]                   *
*                               3-26-98 12:42:39 PM                                   *
*****
*
* Analyzed by: J 3/26/98 Reviewed by: KS 3/26/98
*****
Customer      : C.AAS/D.BISWELL (6134/SMO)
Customer Sample ID : 036728-001
Lab Sample ID  : 80050904

```

```

Sample Description      : MARINELLI SOLID SAMPLE
Sample Quantity        : 851.000 gram
Sample Date/Time       : 3-23-98 10:10:00 AM
Acquire Start Date/Time : 3-25-98 8:44:27 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	-----	3.00E+00
TH-234	1.06E+00	4.55E-01	5.30E-01
RA-226	1.45E+00	9.05E-01	5.64E-01
PB-214	4.92E-01	2.10E-01	4.01E-02
BI-214	4.20E-01	8.61E-02	4.04E-02
PB-210	Not Detected	-----	3.01E+01
TH-232	7.46E-01	3.62E-01	1.29E-01
RA-228	7.64E-01	2.40E-01	1.36E-01
AC-228	6.94E-01	1.63E-01	7.20E-02
TH-228	6.59E-01	2.07E-01	3.91E-01
RA-224	7.68E-01	2.31E-01	6.99E-02
PB-212	7.48E-01	1.16E-01	3.42E-02
BI-212	8.85E-01	5.55E-01	2.66E-01
TL-208	6.81E-01	1.29E-01	6.17E-02
U-235	Not Detected	-----	2.12E-01
TH-231	Not Detected	-----	2.01E+00
PA-231	Not Detected	-----	3.44E+00
TH-227	Not Detected	-----	3.12E-01
RA-223	Not Detected	-----	2.09E-01
RN-219	Not Detected	-----	3.23E-01
PB-211	Not Detected	-----	7.46E-01
TL-207	Not Detected	-----	1.17E+01
AM-241	Not Detected	-----	4.23E-01
PU-239	Not Detected	-----	3.90E+02
NP-237	4.45E-01	1.91E-01	2.52E-01
PA-233	Not Detected	-----	5.11E-02
TH-229	Not Detected	-----	2.24E-01

[Summary Report] - Sample ID: : 80050904

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.47E-02
AG-110m	Not Detected	-----	2.86E-02
AM-243	Not Detected	-----	8.96E-02
BA-133	Not Detected	-----	5.36E-02
BE-7	Not Detected	-----	2.20E-01
CD-109	Not Detected	-----	8.56E-01
CD-115	Not Detected	-----	1.25E-01
CE-139	Not Detected	-----	2.65E-02
CE-141	Not Detected	-----	4.79E-02
CE-144	Not Detected	-----	2.18E-01
CO-56	Not Detected	-----	3.22E-02
CO-57	Not Detected	-----	2.69E-02
CO-58	Not Detected	-----	2.90E-02
CO-60	Not Detected	-----	3.19E-02
CR-51	Not Detected	-----	2.18E-01
CS-134	Not Detected	-----	3.89E-02
CS-137	Not Detected	-----	3.01E-02
EU-152	Not Detected	-----	8.06E-02
EU-154	Not Detected	-----	1.59E-01
EU-155	Not Detected	-----	1.35E-01
FE-59	Not Detected	-----	6.53E-02
GD-153	Not Detected	-----	9.51E-02
HG-203	Not Detected	-----	2.86E-02
I-131	Not Detected	-----	3.08E-02
IR-192	Not Detected	-----	2.50E-02
K-40	1.74E+01	2.53E+00	2.14E-01
KR-85	Not Detected	-----	7.57E+00
MN-52	Not Detected	-----	3.36E-02
MN-54	Not Detected	-----	3.16E-02
MO-99	Not Detected	-----	3.80E-01
NA-22	Not Detected	-----	3.61E-02
NA-24	Not Detected	-----	4.35E-01
NB-95	Not Detected	-----	2.30E-01
ND-147	Not Detected	-----	1.97E-01
NI-57	Not Detected	-----	7.07E-02
NP-239	Not Detected	-----	1.21E-01
RU-103	Not Detected	-----	2.62E-02
RU-106	Not Detected	-----	2.65E-01
SB-122	Not Detected	-----	6.29E-02
SB-124	Not Detected	-----	2.63E-02
SB-125	Not Detected	-----	7.22E-02
SN-113	Not Detected	-----	3.35E-02
TA-182	Not Detected	-----	1.29E-01
TA-183	Not Detected	-----	5.03E-01
TC-99m	Not Detected	-----	2.39E+01
TL-201	Not Detected	-----	2.81E-01
XE-133	Not Detected	-----	2.87E-01
Y-88	Not Detected	-----	2.19E-02
ZN-65	Not Detected	-----	8.66E-02
ZR-95	Not Detected	-----	5.27E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-26-98 12:19:09 AM *

 *
 * Analyzed by: *[Signature]* 3/26/98 Reviewed by: *[Signature]* 3/26/98 *

Customer : C.AAS/D.BISWELL (6134/SMO)
 Customer Sample ID : 036729-001
 Lab Sample ID : 80050905

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 992.000 gram
 Sample Date/Time : 3-23-98 10:20:00 AM
 Acquire Start Date/Time : 3-25-98 10:36:17 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	-----	2.85E+00
TH-234	9.80E-01	3.56E-01	5.35E-01
RA-226	1.53E+00	1.88E+00	5.28E-01
PB-214	5.34E-01	1.08E-01	3.95E-02
BI-214	5.28E-01	3.07E-01	3.88E-02
PB-210	Not Detected	-----	3.01E+01
TH-232	6.96E-01	3.32E-01	1.17E-01
RA-228	8.14E-01	2.22E-01	1.17E-01
AC-228	7.22E-01	1.84E-01	7.43E-02
TH-228	6.28E-01	2.06E-01	4.04E-01
RA-224	7.82E-01	2.22E-01	4.50E-02
PB-212	7.61E-01	1.27E-01	3.44E-02
BI-212	7.40E-01	3.76E-01	2.84E-01
TL-208	6.65E-01	1.29E-01	5.53E-02
U-235	Not Detected	-----	2.08E-01
TH-231	Not Detected	-----	1.94E+00
PA-231	Not Detected	-----	3.28E+00
TH-227	Not Detected	-----	2.95E-01
RA-223	Not Detected	-----	2.01E-01
RN-219	Not Detected	-----	3.08E-01
PB-211	Not Detected	-----	6.93E-01
TL-207	Not Detected	-----	1.12E+01
AM-241	Not Detected	-----	4.11E-01
PU-239	Not Detected	-----	3.85E+02
NP-237	Not Detected	-----	2.62E-01
PA-233	Not Detected	-----	4.92E-02
TH-229	Not Detected	-----	2.23E-01

[Summary Report] - Sample ID: : 80050905

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.47E-02
AG-110m	Not Detected	-----	2.91E-02
AM-243	Not Detected	-----	9.20E-02
BA-133	Not Detected	-----	5.18E-02
BE-7	Not Detected	-----	2.16E-01
CD-109	1.61E+00	6.56E-01	8.90E-01
CD-115	Not Detected	-----	1.20E-01
CE-139	Not Detected	-----	2.56E-02
CE-141	Not Detected	-----	4.71E-02
CE-144	Not Detected	-----	2.08E-01
CO-56	Not Detected	-----	3.00E-02
CO-57	Not Detected	-----	2.62E-02
CO-58	Not Detected	-----	2.67E-02
CO-60	Not Detected	-----	3.02E-02
CR-51	Not Detected	-----	2.03E-01
CS-134	Not Detected	-----	3.84E-02
CS-137	3.59E-02	2.30E-02	1.76E-02
EU-152	Not Detected	-----	7.85E-02
EU-154	Not Detected	-----	1.60E-01
EU-155	Not Detected	-----	1.31E-01
FE-59	Not Detected	-----	5.95E-02
GD-153	Not Detected	-----	9.48E-02
HG-203	Not Detected	-----	2.75E-02
I-131	Not Detected	-----	2.92E-02
IR-192	Not Detected	-----	2.36E-02
K-40	1.95E+01	2.80E+00	1.94E-01
KR-85	Not Detected	-----	6.98E+00
MN-52	Not Detected	-----	3.18E-02
MN-54	Not Detected	-----	1.40E-02
MO-99	Not Detected	-----	3.76E-01
NA-22	Not Detected	-----	3.57E-02
NA-24	Not Detected	-----	4.62E-01
NB-95	Not Detected	-----	2.21E-01
ND-147	Not Detected	-----	1.91E-01
NI-57	Not Detected	-----	1.21E-01
NP-239	Not Detected	-----	1.17E-01
RU-103	Not Detected	-----	2.41E-02
RU-106	Not Detected	-----	2.45E-01
SB-122	Not Detected	-----	6.15E-02
SB-124	Not Detected	-----	2.57E-02
SB-125	Not Detected	-----	6.72E-02
SN-113	Not Detected	-----	3.03E-02
TA-182	Not Detected	-----	1.22E-01
TA-183	Not Detected	-----	4.97E-01
TC-99m	Not Detected	-----	2.86E+01
TL-201	Not Detected	-----	2.76E-01
XE-133	Not Detected	-----	2.77E-01
Y-88	Not Detected	-----	1.93E-02
ZN-65	Not Detected	-----	8.50E-02
ZR-95	Not Detected	-----	4.81E-02

not detected 7/3/26/98

 * Sandia National Laboratories
 * Radiation Protection Sample Diagnostics Program [881 Laboratory]
 * 3-26-98 2:04:12 AM

 *
 * Analyzed by: *J 3/26/98* Reviewed by: *K. J. J. 3/26/98*

 Customer : C.AAS/D.BISWELL (6134/SMO)
 Customer Sample ID : 036730-001
 Lab Sample ID : 80050906

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 715.000 gram
 Sample Date/Time : 3-23-98 10:25:00 AM
 Acquire Start Date/Time : 3-26-98 12:21:25 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	-----	3.32E+00
TH-234	Not Detected	-----	5.54E-01
RA-226	1.36E+00	7.33E-01	5.92E-01
PB-214	4.98E-01	1.03E-01	4.52E-02
BI-214	4.12E-01	9.23E-02	4.79E-02
PB-210	Not Detected	-----	3.50E+01
TH-232	9.12E-01	4.46E-01	1.35E-01
RA-228	1.02E+00	2.10E-01	1.32E-01
AC-228	8.54E-01	1.89E-01	8.38E-02
TH-228	1.06E+00	3.35E-01	4.95E-01
RA-224	1.00E+00	2.89E-01	7.76E-02
PB-212	8.70E-01	1.45E-01	4.00E-02
BI-212	9.99E-01	3.56E-01	2.65E-01
TL-208	8.69E-01	1.71E-01	7.21E-02
U-235	Not Detected	-----	2.45E-01
TH-231	Not Detected	-----	2.25E+00
PA-231	Not Detected	-----	3.93E+00
TH-227	Not Detected	-----	3.63E-01
RA-223	Not Detected	-----	2.31E-01
RN-219	Not Detected	-----	3.74E-01
PB-211	Not Detected	-----	8.23E-01
TL-207	Not Detected	-----	1.32E+01
AM-241	Not Detected	-----	4.86E-01
PU-239	Not Detected	-----	4.52E+02
NP-237	3.93E-01	2.07E-01	2.74E-01
PA-233	Not Detected	-----	5.57E-02
TH-229	Not Detected	-----	2.55E-01

not detected
J 3/26/98

[Summary Report] - Sample ID: : 80050906

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.00E-02
AG-110m	Not Detected	-----	3.20E-02
AM-243	Not Detected	-----	1.07E-01
BA-133	Not Detected	-----	5.93E-02
BE-7	Not Detected	-----	2.41E-01
CD-109	Not Detected	-----	9.33E-01
CD-115	Not Detected	-----	1.51E-01
CE-139	Not Detected	-----	2.93E-02
CE-141	Not Detected	-----	5.59E-02
CE-144	Not Detected	-----	2.44E-01
CO-56	Not Detected	-----	3.68E-02
CO-57	Not Detected	-----	3.08E-02
CO-58	Not Detected	-----	3.12E-02
CO-60	Not Detected	-----	3.47E-02
CR-51	Not Detected	-----	2.41E-01
CS-134	Not Detected	-----	4.34E-02
CS-137	Not Detected	-----	3.37E-02
EU-152	Not Detected	-----	9.24E-02
EU-154	Not Detected	-----	1.85E-01
EU-155	Not Detected	-----	1.51E-01
FE-59	Not Detected	-----	7.23E-02
GD-153	Not Detected	-----	1.08E-01
HG-203	Not Detected	-----	3.32E-02
I-131	Not Detected	-----	3.54E-02
IR-192	Not Detected	-----	2.66E-02
K-40	1.59E+01	2.38E+00	2.59E-01
KR-85	Not Detected	-----	8.64E+00
MN-52	Not Detected	-----	4.00E-02
MN-54	Not Detected	-----	3.53E-02
MO-99	Not Detected	-----	4.82E-01
NA-22	Not Detected	-----	3.85E-02
NA-24	Not Detected	-----	5.78E-01
NB-95	Not Detected	-----	2.76E-01
ND-147	Not Detected	-----	2.33E-01
NI-57	Not Detected	-----	1.52E-01
NP-239	Not Detected	-----	1.34E-01
RU-103	Not Detected	-----	2.97E-02
RU-106	Not Detected	-----	2.91E-01
SB-122	Not Detected	-----	7.25E-02
SB-124	Not Detected	-----	3.06E-02
SB-125	Not Detected	-----	8.00E-02
SN-113	Not Detected	-----	3.76E-02
TA-182	Not Detected	-----	1.38E-01
TA-183	Not Detected	-----	5.93E-01
TC-99m	Not Detected	-----	4.04E+01
TL-201	Not Detected	-----	3.40E-01
XE-133	Not Detected	-----	3.26E-01
Y-88	Not Detected	-----	2.77E-02
ZN-65	Not Detected	-----	9.44E-02
ZR-95	Not Detected	-----	5.89E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-26-98 1:17:18 PM *

 * Analyzed by: *J* 3/26/98 Reviewed by: *J* 3/26/98 *

 Customer : C.AAS/D.BISWELL (6134/SMO)
 Customer Sample ID : 036731-001
 Lab Sample ID : 80050907

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 777.000 gram
 Sample Date/Time : 3-23-98 10:30:00 AM
 Acquire Start Date/Time : 3-26-98 2:06:23 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	-----	3.16E+00
TH-234	8.72E-01	4.76E-01	4.94E-01
RA-226	1.02E+00	6.55E-01	5.87E-01
PB-214	4.21E-01	9.82E-02	4.25E-02
BI-214	3.98E-01	9.91E-02	4.88E-02
PB-210	Not Detected	-----	3.47E+01
TH-232	6.38E-01	3.12E-01	1.45E-01
RA-228	7.52E-01	2.14E-01	1.51E-01
AC-228	7.11E-01	4.66E-01	8.09E-02
TH-228	6.89E-01	2.37E-01	4.62E-01
RA-224	7.24E-01	2.40E-01	7.59E-02
PB-212	7.12E-01	3.32E-01	4.01E-02
BI-212	6.89E-01	3.91E-01	3.59E-01
TL-208	6.76E-01	2.23E-01	6.98E-02
U-235	2.99E-01	2.03E-01	2.37E-01
TH-231	Not Detected	-----	2.18E+00
PA-231	Not Detected	-----	3.70E+00
TH-227	Not Detected	-----	3.26E-01
RA-223	Not Detected	-----	2.21E-01
RN-219	Not Detected	-----	3.57E-01
PB-211	Not Detected	-----	8.17E-01
TL-207	Not Detected	-----	1.32E+01
AM-241	Not Detected	-----	4.43E-01
PU-239	Not Detected	-----	4.26E+02
NP-237	Not Detected	-----	2.47E-01
PA-233	Not Detected	-----	5.40E-02
TH-229	Not Detected	-----	2.40E-01

not detected J 3/26/98

[Summary Report] - Sample ID: : 80050907

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.70E-02
AG-110m	Not Detected	-----	5.12E-02
AM-243	Not Detected	-----	8.24E-02
BA-133	Not Detected	-----	5.64E-02
BE-7	Not Detected	-----	2.64E-01
CD-109	1.20E+00	5.96E-01	8.39E-01
CD-115	Not Detected	-----	1.44E-01
CE-139	Not Detected	-----	2.80E-02
CE-141	Not Detected	-----	5.37E-02
CE-144	Not Detected	-----	2.39E-01
CO-56	Not Detected	-----	3.34E-02
CO-57	Not Detected	-----	2.94E-02
CO-58	Not Detected	-----	3.06E-02
CO-60	Not Detected	-----	3.69E-02
CR-51	Not Detected	-----	2.38E-01
CS-134	Not Detected	-----	4.13E-02
CS-137	2.72E-01	5.30E-02	2.23E-02
EU-152	Not Detected	-----	8.82E-02
EU-154	Not Detected	-----	1.71E-01
EU-155	Not Detected	-----	1.45E-01
FE-59	Not Detected	-----	7.12E-02
GD-153	Not Detected	-----	1.01E-01
HG-203	Not Detected	-----	3.15E-02
I-131	Not Detected	-----	3.50E-02
IR-192	Not Detected	-----	2.59E-02
K-40	2.08E+01	3.01E+00	2.39E-01
KR-85	Not Detected	-----	8.11E+00
MN-52	Not Detected	-----	3.84E-02
MN-54	Not Detected	-----	3.35E-02
MO-99	Not Detected	-----	4.31E-01
NA-22	Not Detected	-----	4.25E-02
NA-24	Not Detected	-----	6.06E-01
NB-95	Not Detected	-----	2.51E-01
ND-147	Not Detected	-----	2.34E-01
NI-57	Not Detected	-----	1.46E-01
NP-239	Not Detected	-----	1.31E-01
RU-103	Not Detected	-----	2.91E-02
RU-106	Not Detected	-----	2.82E-01
SB-122	Not Detected	-----	7.38E-02
SB-124	Not Detected	-----	3.00E-02
SB-125	Not Detected	-----	7.67E-02
SN-113	Not Detected	-----	3.66E-02
TA-182	Not Detected	-----	1.37E-01
TA-183	Not Detected	-----	5.51E-01
TC-99m	Not Detected	-----	4.67E+01
TL-201	Not Detected	-----	3.25E-01
XE-133	Not Detected	-----	3.15E-01
Y-88	Not Detected	-----	2.57E-02
ZN-65	Not Detected	-----	9.26E-02
ZR-95	Not Detected	-----	5.51E-02

Not detected *J 3/26/51*

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-26-98 1:54:37 PM *

 *
 * Analyzed by: *K 7/6/98* Reviewed by: *AM 7/6/98* *

Customer : C.AAS/D.BISWELL (6134/SMD)
 Customer Sample ID : 036732-001
 Lab Sample ID : 80050908

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 754.000 gram
 Sample Date/Time : 3-23-98 10:30:00 AM
 Acquire Start Date/Time : 3-25-98 5:26:42 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	Not Detected	-----	1.50E+00
TH-234	1.19E+00	4.16E-01	5.10E-01
RA-226	1.11E+00	4.53E-01	5.66E-01
PB-214	4.62E-01	1.14E-01	4.89E-02
BI-214	4.13E-01	1.02E-01	5.53E-02
PB-210	Not Detected	-----	7.96E+00
TH-232	8.10E-01	4.19E-01	1.45E-01
RA-228	8.13E-01	3.07E-01	1.96E-01
AC-228	8.26E-01	2.30E-01	1.01E-01
TH-228	7.35E-01	2.78E-01	4.66E-01
RA-224	6.94E-01	2.98E-01	7.44E-02
PB-212	7.33E-01	1.25E-01	4.19E-02
BI-212	7.48E-01	3.47E-01	3.42E-01
TL-208	6.04E-01	1.57E-01	7.98E-02
U-235	Not Detected	-----	2.10E-01
TH-231	Not Detected	-----	2.21E+00
PA-231	Not Detected	-----	3.54E+00
TH-227	Not Detected	-----	3.70E-01
RA-223	Not Detected	-----	1.55E-01
RN-219	Not Detected	-----	4.24E-01
PB-211	Not Detected	-----	9.80E-01
TL-207	Not Detected	-----	1.59E+01
AM-241	Not Detected	-----	1.88E-01
PU-239	Not Detected	-----	3.49E+02
NP-237	4.72E-01	1.95E-01	2.31E-01
PA-233	Not Detected	-----	5.94E-02
TH-229	Not Detected	-----	1.98E-01

NOT DETECTED *K 7/6/98*

[Summary Report] - Sample ID: : 80050908

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.52E-02
AG-110m	Not Detected	-----	5.13E-02
AM-243	Not Detected	-----	5.55E-02
BA-133	Not Detected	-----	5.18E-02
BE-7	Not Detected	-----	3.00E-01
CD-109	Not Detected	-----	9.50E-01
CD-115	Not Detected	-----	1.39E-01
CE-139	Not Detected	-----	2.58E-02
CE-141	Not Detected	-----	4.76E-02
CE-144	Not Detected	-----	1.95E-01
CO-56	Not Detected	-----	4.09E-02
CO-57	Not Detected	-----	2.40E-02
CO-58	Not Detected	-----	3.75E-02
CO-60	Not Detected	-----	4.22E-02
CR-51	Not Detected	-----	2.50E-01
CS-134	Not Detected	-----	4.07E-02
CS-137	2.11E-01	7.38E-02	2.83E-02
EU-152	Not Detected	-----	7.20E-02
EU-154	Not Detected	-----	2.09E-01
EU-155	Not Detected	-----	1.15E-01
FE-59	Not Detected	-----	8.78E-02
GD-153	Not Detected	-----	8.05E-02
HG-203	Not Detected	-----	3.17E-02
I-131	Not Detected	-----	3.78E-02
IR-192	Not Detected	-----	2.81E-02
K-40	2.15E+01	3.28E+00	2.76E-01
KR-85	Not Detected	-----	9.05E+00
MN-52	Not Detected	-----	4.79E-02
MN-54	Not Detected	-----	3.79E-02
MO-99	Not Detected	-----	5.03E-01
NA-22	Not Detected	-----	5.20E-02
NA-24	Not Detected	-----	5.10E-01
NB-95	Not Detected	-----	2.42E-01
ND-147	Not Detected	-----	2.62E-01
NI-57	Not Detected	-----	1.65E-01
NP-239	Not Detected	-----	1.04E-01
RU-103	Not Detected	-----	3.36E-02
RU-106	Not Detected	-----	3.29E-01
SB-122	Not Detected	-----	8.23E-02
SB-124	Not Detected	-----	3.42E-02
SB-125	Not Detected	-----	9.16E-02
SN-113	Not Detected	-----	4.04E-02
TA-182	Not Detected	-----	1.75E-01
TA-183	Not Detected	-----	2.19E-01
TC-99m	Not Detected	-----	1.50E+01
TL-201	Not Detected	-----	1.85E-01
XE-133	Not Detected	-----	2.02E-01
Y-88	Not Detected	-----	2.69E-02
ZN-65	Not Detected	-----	1.19E-01
ZR-95	Not Detected	-----	6.82E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-25-98 8:54:45 PM *

 *
 * Analyzed by: *J 3/27/98* Reviewed by: *K 3/26/98* *

Customer : C.AAS/D.BISWELL (6134/SMO)
 Customer Sample ID : 036733-001
 Lab Sample ID : 80050909

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 895.000 gram
 Sample Date/Time : 3-23-98 10:35:00 AM
 Acquire Start Date/Time : 3-25-98 7:11:56 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	Not Detected	-----	1.33E+00
TH-234	Not Detected	-----	5.38E-01
RA-226	1.05E+00	4.38E-01	5.39E-01
PB-214	4.41E-01	1.06E-01	4.75E-02
BI-214	3.98E-01	1.68E-01	4.74E-02
PB-210	Not Detected	-----	7.20E+00
TH-232	5.87E-01	2.96E-01	1.40E-01
RA-228	6.68E-01	2.51E-01	1.61E-01
AC-228	6.73E-01	5.16E-01	9.45E-02
TH-228	5.66E-01	3.31E-01	4.26E-01
RA-224	7.29E-01	2.84E-01	8.55E-02
PB-212	6.76E-01	1.15E-01	3.53E-02
BI-212	9.25E-01	6.97E-01	3.71E-01
TL-208	5.94E-01	1.26E-01	6.98E-02
U-235	Not Detected	-----	1.88E-01
TH-231	Not Detected	-----	2.07E+00
PA-231	Not Detected	-----	3.19E+00
TH-227	Not Detected	-----	3.24E-01
RA-223	Not Detected	-----	1.46E-01
RN-219	Not Detected	-----	3.86E-01
PB-211	Not Detected	-----	8.75E-01
TL-207	Not Detected	-----	1.40E+01
AM-241	Not Detected	-----	1.73E-01
PU-239	Not Detected	-----	3.23E+02
NP-237	3.05E-01	1.84E-01	1.72E-01
PA-233	Not Detected	-----	5.31E-02
TH-229	Not Detected	-----	1.83E-01

NOT DETECTED *K 3/26/98*

[Summary Report] - Sample ID: : 80050909

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.04E-02
AG-110m	Not Detected	-----	5.87E-02
AM-243	Not Detected	-----	5.63E-02
BA-133	Not Detected	-----	4.73E-02
BE-7	Not Detected	-----	2.59E-01
CD-109	Not Detected	-----	8.67E-01
CD-115	Not Detected	-----	1.26E-01
CE-139	Not Detected	-----	2.39E-02
CE-141	Not Detected	-----	4.30E-02
CE-144	Not Detected	-----	1.77E-01
CO-56	Not Detected	-----	3.46E-02
CO-57	Not Detected	-----	2.26E-02
CO-58	Not Detected	-----	3.09E-02
CO-60	Not Detected	-----	3.59E-02
CR-51	Not Detected	-----	2.32E-01
CS-134	Not Detected	-----	3.58E-02
CS-137	4.13E-01	7.37E-02	2.52E-02
EU-152	Not Detected	-----	6.86E-02
EU-154	Not Detected	-----	1.90E-01
EU-155	Not Detected	-----	1.05E-01
FE-59	Not Detected	-----	7.70E-02
GD-153	Not Detected	-----	7.39E-02
HG-203	Not Detected	-----	3.03E-02
I-131	Not Detected	-----	3.37E-02
IR-192	Not Detected	-----	2.57E-02
K-40	1.95E+01	3.00E+00	2.56E-01
KR-85	Not Detected	-----	8.25E+00
MN-52	Not Detected	-----	4.05E-02
MN-54	Not Detected	-----	3.50E-02
MO-99	Not Detected	-----	4.30E-01
NA-22	Not Detected	-----	4.54E-02
NA-24	Not Detected	-----	4.94E-01
NB-95	Not Detected	-----	2.17E-01
ND-147	Not Detected	-----	2.34E-01
NI-57	Not Detected	-----	1.42E-01
NP-239	Not Detected	-----	9.29E-02
RU-103	Not Detected	-----	3.05E-02
RU-106	Not Detected	-----	2.80E-01
SB-122	Not Detected	-----	7.44E-02
SB-124	Not Detected	-----	2.98E-02
SB-125	Not Detected	-----	8.63E-02
SN-113	Not Detected	-----	3.67E-02
TA-182	Not Detected	-----	1.52E-01
TA-183	Not Detected	-----	2.04E-01
TC-99m	Not Detected	-----	1.66E+01
TL-201	Not Detected	-----	1.67E-01
XE-133	Not Detected	-----	1.84E-01
Y-88	Not Detected	-----	2.34E-02
ZN-65	Not Detected	-----	1.06E-01
ZR-95	Not Detected	-----	5.88E-02

```

*****
*                               Sandia National Laboratories                               *
*   Radiation Protection Sample Diagnostics Program [881 Laboratory]                     *
*                               3-25-98 10:44:19 PM                                     *
*****
* Analyzed by: [Signature] 3/27/98      Reviewed by: [Signature] 3/26/98      *
*****
Customer      : C.AAS/D.BISWELL (6134/SMO)
Customer Sample ID : 036734-001
Lab Sample ID  : 80050910

```

```

Sample Description : MARINELLI SOLID SAMPLE
Sample Quantity   : 734.000 gram
Sample Date/Time  : 3-23-98 10:55:00 AM
Acquire Start Date/Time : 3-25-98 9:01:38 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	-----	1.53E+00
TH-234	1.04E+00	3.62E-01	4.71E-01
RA-226	9.37E-01	4.71E-01	5.70E-01
PB-214	4.84E-01	9.60E-02	5.17E-02
BI-214	3.97E-01	3.57E-01	5.78E-02
PB-210	Not Detected	-----	7.97E+00
TH-232	6.46E-01	3.67E-01	1.75E-01
RA-228	5.66E-01	2.78E-01	1.91E-01
AC-228	5.88E-01	1.60E-01	1.00E-01
TH-228	7.78E-01	3.96E-01	4.99E-01
RA-224	7.67E-01	2.80E-01	9.47E-02
PB-212	7.01E-01	1.21E-01	4.19E-02
BI-212	6.02E-01	3.04E-01	3.31E-01
TL-208	6.51E-01	1.78E-01	7.98E-02
U-235	Not Detected	-----	2.12E-01
TH-231	Not Detected	-----	2.19E+00
PA-231	Not Detected	-----	3.51E+00
TH-227	Not Detected	-----	3.61E-01
RA-223	Not Detected	-----	1.55E-01
RN-219	Not Detected	-----	4.07E-01
PB-211	Not Detected	-----	9.03E-01
TL-207	Not Detected	-----	1.64E+01
AM-241	Not Detected	-----	1.92E-01
PU-239	Not Detected	-----	3.49E+02
NP-237	4.05E-01	1.67E-01	2.02E-01
PA-233	Not Detected	-----	6.15E-02
TH-229	Not Detected	-----	1.94E-01

NOT DETECTED 3/26/98

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.59E-02
AG-110m	Not Detected	-----	5.06E-02
AM-243	Not Detected	-----	6.00E-02
BA-133	Not Detected	-----	5.41E-02
BE-7	Not Detected	-----	2.85E-01
CD-109	Not Detected	-----	9.43E-01
CD-115	Not Detected	-----	1.43E-01
CE-139	Not Detected	-----	2.62E-02
CE-141	Not Detected	-----	4.80E-02
CE-144	Not Detected	-----	1.99E-01
CO-56	Not Detected	-----	4.19E-02
CO-57	Not Detected	-----	2.47E-02
CO-58	Not Detected	-----	3.72E-02
CO-60	Not Detected	-----	4.33E-02
CR-51	Not Detected	-----	2.64E-01
CS-134	Not Detected	-----	4.09E-02
CS-137	1.66E-01	5.63E-02	2.78E-02
EU-152	Not Detected	-----	7.33E-02
EU-154	Not Detected	-----	2.13E-01
EU-155	Not Detected	-----	1.10E-01
FE-59	Not Detected	-----	8.71E-02
GD-153	Not Detected	-----	7.98E-02
HG-203	Not Detected	-----	3.36E-02
I-131	Not Detected	-----	3.83E-02
IR-192	Not Detected	-----	2.98E-02
K-40	1.98E+01	3.11E+00	3.06E-01
KR-85	Not Detected	-----	9.36E+00
MN-52	Not Detected	-----	5.00E-02
MN-54	Not Detected	-----	4.00E-02
MO-99	Not Detected	-----	4.97E-01
NA-22	Not Detected	-----	5.32E-02
NA-24	Not Detected	-----	5.37E-01
NB-95	Not Detected	-----	2.41E-01
ND-147	Not Detected	-----	2.53E-01
NI-57	Not Detected	-----	1.49E-01
NP-239	Not Detected	-----	1.00E-01
RU-103	Not Detected	-----	3.35E-02
RU-106	Not Detected	-----	3.29E-01
SB-122	Not Detected	-----	8.32E-02
SB-124	Not Detected	-----	3.48E-02
SB-125	Not Detected	-----	9.20E-02
SN-113	Not Detected	-----	3.99E-02
TA-182	Not Detected	-----	1.75E-01
TA-183	Not Detected	-----	2.28E-01
TC-99m	Not Detected	-----	2.25E+01
TL-201	Not Detected	-----	1.84E-01
XE-133	Not Detected	-----	2.04E-01
Y-88	Not Detected	-----	3.38E-02
ZN-65	Not Detected	-----	1.21E-01
ZR-95	Not Detected	-----	6.58E-02

```

*****
*                               Sandia National Laboratories                               *
*   Radiation Protection Sample Diagnostics Program [881 Laboratory]                     *
*                               3-26-98  3:52:00 PM                                     *
*****
* Analyzed by: [Signature] 3/27/98 Reviewed by: [Signature] 3/27/98
*****
Customer      : C.AAS/D.BISWELL (6134/SMO)
Customer Sample ID : 036735-001
Lab Sample ID  : 80050911

```

```

Sample Description      : MARINELLI SOLID SAMPLE
Sample Quantity        : 763.000 gram
Sample Date/Time       : 3-23-98 11:00:00 AM
Acquire Start Date/Time : 3-25-98 8:58:14 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	-----	1.30E+00
TH-234	9.40E-01	3.09E-01	4.10E-01
RA-226	1.07E+00	4.65E-01	4.82E-01
PB-214	5.28E-01	1.28E-01	4.89E-02
BI-214	4.74E-01	1.99E-01	4.88E-02
PB-210	2.31E+00	2.03E+00	3.09E+00
TH-232	7.17E-01	6.80E-01	1.59E-01
RA-228	7.89E-01	1.11E+00	1.71E-01
AC-228	6.84E-01	2.41E-01	1.01E-01
TH-228	5.58E-01	3.39E-01	5.08E-01
RA-224	7.73E-01	3.00E-01	9.01E-02
PB-212	7.27E-01	1.23E-01	4.06E-02
BI-212	8.87E-01	5.85E-01	3.82E-01
TL-208	7.23E-01	6.06E-01	7.20E-02
U-235	Not Detected	-----	1.95E-01
TH-231	Not Detected	-----	2.20E+00
PA-231	Not Detected	-----	3.61E+00
TH-227	Not Detected	-----	3.43E-01
RA-223	Not Detected	-----	1.42E-01
RN-219	Not Detected	-----	4.12E-01
PB-211	Not Detected	-----	9.38E-01
TL-207	Not Detected	-----	1.52E+01
AM-241	Not Detected	-----	1.54E-01
PU-239	Not Detected	-----	3.38E+02
NP-237	Not Detected	-----	2.61E-01
PA-233	Not Detected	-----	6.33E-02
TH-229	Not Detected	-----	1.78E-01

[Summary Report] - Sample ID: : 80050912

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.22E-02
AG-110m	Not Detected	-----	4.25E-02
AM-243	Not Detected	-----	4.90E-02
BA-133	Not Detected	-----	4.89E-02
BE-7	Not Detected	-----	2.08E-01
CD-109	1.09E+00	3.59E-01	5.38E-01
CD-115	Not Detected	-----	1.09E-01
CE-139	Not Detected	-----	2.19E-02
CE-141	Not Detected	-----	3.77E-02
CE-144	Not Detected	-----	1.64E-01
CO-56	Not Detected	-----	2.50E-02
CO-57	Not Detected	-----	2.22E-02
CO-58	Not Detected	-----	2.72E-02
CO-60	Not Detected	-----	2.95E-02
CR-51	Not Detected	-----	2.07E-01
CS-134	Not Detected	-----	3.70E-02
CS-137	2.34E-01	4.49E-02	1.95E-02
EU-152	Not Detected	-----	6.64E-02
EU-154	Not Detected	-----	1.49E-01
EU-155	Not Detected	-----	1.02E-01
FE-59	Not Detected	-----	5.99E-02
GD-153	Not Detected	-----	7.27E-02
HG-203	Not Detected	-----	2.57E-02
I-131	Not Detected	-----	2.85E-02
IR-192	Not Detected	-----	2.37E-02
K-40	2.09E+01	2.97E+00	1.87E-01
KR-85	Not Detected	-----	6.87E+00
MN-52	Not Detected	-----	3.31E-02
MN-54	Not Detected	-----	2.77E-02
MO-99	Not Detected	-----	3.42E-01
NA-22	Not Detected	-----	3.67E-02
NA-24	Not Detected	-----	3.22E-01
NB-95	Not Detected	-----	2.03E-01
ND-147	Not Detected	-----	1.85E-01
NI-57	Not Detected	-----	1.14E-01
NP-239	Not Detected	-----	9.16E-02
RU-103	Not Detected	-----	2.55E-02
RU-106	Not Detected	-----	2.23E-01
SB-122	Not Detected	-----	5.75E-02
SB-124	Not Detected	-----	2.61E-02
SB-125	Not Detected	-----	6.83E-02
SN-113	Not Detected	-----	3.15E-02
TA-182	Not Detected	-----	1.20E-01
TA-183	Not Detected	-----	2.24E-01
TC-99m	Not Detected	-----	1.21E+01
TL-201	Not Detected	-----	1.63E-01
XE-133	Not Detected	-----	1.92E-01
Y-88	Not Detected	-----	1.87E-02
ZN-65	Not Detected	-----	8.22E-02
ZR-95	Not Detected	-----	4.70E-02

NOT DETECTED K-40 3/20/98

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-25-98 7:45:58 PM *

 *
 * Analyzed by: *[Signature]* 3/27/98 Reviewed by: *[Signature]* 3/26/98 *

Customer : C.AAS/D.BISWELL (6134/SMO)
 Customer Sample ID : 036736-001
 Lab Sample ID : 80050912

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 861.000 gram
 Sample Date/Time : 3-23-98 11:10:00 AM
 Acquire Start Date/Time : 3-25-98 6:03:03 PM
 Detector Name : LAB04
 Elapsed Live/Real Time : 6000 / 6004 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	1.52E+00
TH-234	6.58E-01	2.70E-01	3.70E-01
RA-226	9.51E-01	3.37E-01	3.81E-01
PB-214	4.39E-01	9.64E-02	4.04E-02
BI-214	4.26E-01	8.39E-02	3.69E-02
PB-210	Not Detected	-----	8.07E+00
TH-232	6.61E-01	3.24E-01	1.25E-01
RA-228	6.21E-01	2.22E-01	1.19E-01
AC-228	6.30E-01	1.61E-01	6.27E-02
TH-228	4.11E-01	1.78E-01	3.89E-01
RA-224	6.64E-01	3.94E-01	1.29E-01
PB-212	6.58E-01	1.10E-01	3.11E-02
BI-212	6.98E-01	3.48E-01	2.52E-01
TL-208	5.36E-01	1.13E-01	5.10E-02
U-235	Not Detected	-----	1.67E-01
TH-231	Not Detected	-----	1.78E+00
PA-231	Not Detected	-----	3.06E+00
TH-227	Not Detected	-----	2.85E-01
RA-223	Not Detected	-----	1.43E-01
RN-219	Not Detected	-----	3.05E-01
PB-211	Not Detected	-----	6.84E-01
TL-207	Not Detected	-----	1.10E+01
AM-241	Not Detected	-----	1.92E-01
PU-239	Not Detected	-----	3.03E+02
NP-237	Not Detected	-----	1.58E-01
PA-233	Not Detected	-----	4.89E-02
TH-229	Not Detected	-----	1.75E-01

[Summary Report] - Sample ID: : 80050912

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.22E-02
AG-110m	Not Detected	-----	4.25E-02
AM-243	Not Detected	-----	4.90E-02
BA-133	Not Detected	-----	4.89E-02
BE-7	Not Detected	-----	2.08E-01
CD-109	1.09E+00	3.59E-01	5.38E-01
CD-115	Not Detected	-----	1.09E-01
CE-139	Not Detected	-----	2.19E-02
CE-141	Not Detected	-----	3.77E-02
CE-144	Not Detected	-----	1.64E-01
CO-56	Not Detected	-----	2.50E-02
CO-57	Not Detected	-----	2.22E-02
CO-58	Not Detected	-----	2.72E-02
CO-60	Not Detected	-----	2.95E-02
CR-51	Not Detected	-----	2.07E-01
CS-134	Not Detected	-----	3.70E-02
CS-137	2.34E-01	4.49E-02	1.95E-02
EU-152	Not Detected	-----	6.64E-02
EU-154	Not Detected	-----	1.49E-01
EU-155	Not Detected	-----	1.02E-01
FE-59	Not Detected	-----	5.99E-02
GD-153	Not Detected	-----	7.27E-02
HG-203	Not Detected	-----	2.57E-02
I-131	Not Detected	-----	2.85E-02
IR-192	Not Detected	-----	2.37E-02
K-40	2.09E+01	2.97E+00	1.87E-01
KR-85	Not Detected	-----	6.87E+00
MN-52	Not Detected	-----	3.31E-02
MN-54	Not Detected	-----	2.77E-02
MO-99	Not Detected	-----	3.42E-01
NA-22	Not Detected	-----	3.67E-02
NA-24	Not Detected	-----	3.22E-01
NB-95	Not Detected	-----	2.03E-01
ND-147	Not Detected	-----	1.85E-01
NI-57	Not Detected	-----	1.14E-01
NP-239	Not Detected	-----	9.16E-02
RU-103	Not Detected	-----	2.55E-02
RU-106	Not Detected	-----	2.23E-01
SB-122	Not Detected	-----	5.75E-02
SB-124	Not Detected	-----	2.61E-02
SB-125	Not Detected	-----	6.83E-02
SN-113	Not Detected	-----	3.15E-02
TA-182	Not Detected	-----	1.20E-01
TA-183	Not Detected	-----	2.24E-01
TC-99m	Not Detected	-----	1.21E+01
TL-201	Not Detected	-----	1.63E-01
XE-133	Not Detected	-----	1.92E-01
Y-88	Not Detected	-----	1.87E-02
ZN-65	Not Detected	-----	8.22E-02
ZR-95	Not Detected	-----	4.70E-02

NOT DETECTED K&T 3/26/98

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-26-98 4:23:48 PM *

 *
 * Analyzed by: *[Signature]* 3/27/98 Reviewed by: *[Signature]* 3/26/98 *

Customer : C.AAS/D.BISWELL (6134/SMO)
 Customer Sample ID : 036737-001
 Lab Sample ID : 80050913

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 937.000 gram
 Sample Date/Time : 3-23-98 11:15:00 AM
 Acquire Start Date/Time : 3-25-98 6:10:58 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	8.54E-01	6.90E-01	9.73E-01
TH-234	7.10E-01	3.62E-01	3.46E-01
RA-226	8.50E-01	5.16E-01	4.29E-01
PB-214	4.14E-01	7.98E-02	3.92E-02
BI-214	5.02E-01	7.31E-02	4.90E-02
PB-210	Not Detected	-----	3.83E+00
TH-232	6.85E-01	3.35E-01	1.35E-01
RA-228	6.82E-01	2.28E-01	1.60E-01
AC-228	6.19E-01	2.26E-01	9.69E-02
TH-228	7.28E-01	3.68E-01	4.30E-01
RA-224	7.44E-01	3.25E-01	7.54E-02
PB-212	6.74E-01	1.12E-01	3.64E-02
BI-212	6.18E-01	3.70E-01	3.11E-01
TL-208	6.04E-01	1.40E-01	6.20E-02
U-235	Not Detected	-----	1.77E-01
TH-231	Not Detected	-----	1.94E+00
PA-231	Not Detected	-----	3.18E+00
TH-227	Not Detected	-----	3.00E-01
RA-223	Not Detected	-----	1.27E-01
RN-219	Not Detected	-----	3.50E-01
PB-211	Not Detected	-----	8.21E-01
TL-207	Not Detected	-----	1.36E+01
AM-241	Not Detected	-----	1.34E-01
PU-239	Not Detected	-----	3.07E+02
NP-237	Not Detected	-----	2.27E-01
PA-233	Not Detected	-----	5.39E-02
TH-229	Not Detected	-----	1.64E-01

[Summary Report] - Sample ID: : 80050913

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.86E-02
AG-110m	Not Detected	-----	4.97E-02
AM-243	Not Detected	-----	4.54E-02
BA-133	Not Detected	-----	5.19E-02
BE-7	Not Detected	-----	2.42E-01
CD-109	1.27E+00	4.41E-01	5.47E-01
CD-115	Not Detected	-----	1.21E-01
CE-139	Not Detected	-----	2.35E-02
CE-141	Not Detected	-----	4.04E-02
CE-144	Not Detected	-----	1.79E-01
CO-56	Not Detected	-----	3.18E-02
CO-57	Not Detected	-----	2.12E-02
CO-58	Not Detected	-----	3.23E-02
CO-60	Not Detected	-----	3.95E-02
CR-51	Not Detected	-----	2.35E-01
CS-134	Not Detected	-----	4.20E-02
CS-137	2.21E-01	4.67E-02	2.30E-02
EU-152	Not Detected	-----	6.32E-02
EU-154	Not Detected	-----	1.79E-01
EU-155	Not Detected	-----	9.54E-02
FE-59	Not Detected	-----	7.44E-02
GD-153	Not Detected	-----	6.86E-02
HG-203	Not Detected	-----	2.77E-02
I-131	Not Detected	-----	3.13E-02
IR-192	Not Detected	-----	2.66E-02
K-40	2.15E+01	3.18E+00	2.50E-01
KR-85	Not Detected	-----	7.57E+00
MN-52	Not Detected	-----	4.02E-02
MN-54	Not Detected	-----	3.31E-02
MO-99	Not Detected	-----	4.25E-01
NA-22	Not Detected	-----	4.44E-02
NA-24	Not Detected	-----	4.34E-01
NB-95	Not Detected	-----	1.97E-01
ND-147	Not Detected	-----	2.04E-01
NI-57	Not Detected	-----	1.39E-01
NP-239	Not Detected	-----	8.65E-02
RU-103	Not Detected	-----	2.79E-02
RU-106	Not Detected	-----	2.79E-01
SB-122	Not Detected	-----	7.06E-02
SB-124	Not Detected	-----	3.01E-02
SB-125	Not Detected	-----	7.54E-02
SN-113	Not Detected	-----	3.45E-02
TA-182	Not Detected	-----	1.49E-01
TA-183	Not Detected	-----	1.56E-01
TC-99m	Not Detected	-----	1.30E+01
TL-201	Not Detected	-----	1.25E-01
XE-133	Not Detected	-----	1.47E-01
Y-88	Not Detected	-----	2.72E-02
ZN-65	Not Detected	-----	9.53E-02
ZR-95	Not Detected	-----	5.66E-02

not detected J 3/27/98

```

*****
*                               Sandia National Laboratories                               *
*   Radiation Protection Sample Diagnostics Program [881 Laboratory]                     *
*                               3-25-98  9:31:13 PM                                     *
*****
* Analyzed by: [Signature] 3/27/98      Reviewed by: [Signature] 3/20/96      *
*****
Customer      : C.AAS/D.BISWELL (6134/SMO)
Customer Sample ID : 036759-009
Lab Sample ID  : 80050914

```

```

Sample Description      : MARINELLI LIQUID SAMPLE
Sample Quantity        : 500.000 mL
Sample Date/Time       : 3-23-98  9:35:00 AM
Acquire Start Date/Time : 3-25-98  7:47:07 PM
Detector Name          : LAB04
Elapsed Live/Real Time : 6000 / 6001 seconds

```

Comments:

Nuclide Name	Activity (pCi/mL)	2-sigma Error	MDA (pCi/mL)
U-238	Not Detected	-----	9.21E-01
TH-234	Not Detected	-----	3.19E-01
RA-226	Not Detected	-----	4.35E-01
PB-214	1.02E-01	3.76E-02	3.32E-02
BI-214	Not Detected	-----	7.25E-02
PB-210	Not Detected	-----	4.04E+00
TH-232	Not Detected	-----	1.36E-01
RA-228	Not Detected	-----	1.23E-01
AC-228	Not Detected	-----	7.57E-02
TH-228	Not Detected	-----	4.75E-01
RA-224	Not Detected	-----	1.04E-01
PB-212	Not Detected	-----	3.65E-02
BI-212	Not Detected	-----	2.75E-01
TL-208	Not Detected	-----	6.00E-02
U-235	Not Detected	-----	1.24E-01
TH-231	Not Detected	-----	1.42E+00
PA-231	Not Detected	-----	2.40E+00
TH-227	Not Detected	-----	1.28E-01
RA-223	Not Detected	-----	9.06E-02
RN-219	Not Detected	-----	2.49E-01
PB-211	Not Detected	-----	5.53E-01
TL-207	Not Detected	-----	9.21E+00
AM-241	Not Detected	-----	1.07E-01
PU-239	Not Detected	-----	2.06E+02
NP-237	Not Detected	-----	1.46E-01
PA-233	Not Detected	-----	4.00E-02
TH-229	Not Detected	-----	1.27E-01

[Summary Report] - Sample ID: : 80050914

Nuclide Name	Activity (pCi/mL)	2-sigma Error	MDA (pCi/mL)
AG-108m	Not Detected		2.18E-02
AG-110m	Not Detected		2.01E-02
AM-243	Not Detected		4.53E-02
BA-133	Not Detected		3.56E-02
BE-7	Not Detected		1.62E-01
CD-109	Not Detected		4.84E-01
CD-115	Not Detected		6.94E-02
CE-139	Not Detected		1.68E-02
CE-141	Not Detected		2.77E-02
CE-144	Not Detected		1.24E-01
CO-56	Not Detected		2.42E-02
CO-57	Not Detected		1.58E-02
CO-58	Not Detected		1.98E-02
CO-60	Not Detected		2.25E-02
CR-51	Not Detected		1.67E-01
CS-134	Not Detected		3.14E-02
CS-137	Not Detected		2.13E-02
EU-152	Not Detected		4.76E-02
EU-154	Not Detected		9.99E-02
EU-155	Not Detected		6.76E-02
FE-59	Not Detected		4.23E-02
GD-153	Not Detected		4.94E-02
HG-203	Not Detected		1.94E-02
I-131	Not Detected		2.50E-02
IR-192	Not Detected		1.92E-02
K-40	Not Detected		3.06E-01
KR-85	Not Detected		6.60E+00
MN-52	Not Detected		3.24E-02
MN-54	Not Detected		2.12E-02
MO-99	Not Detected		2.63E-01
NA-22	Not Detected		2.03E-02
NA-24	Not Detected		3.35E-01
NB-95	Not Detected		9.31E-02
ND-147	Not Detected		1.56E-01
NI-57	Not Detected		9.53E-02
NP-239	Not Detected		6.04E-02
RU-103	Not Detected		2.03E-02
RU-106	Not Detected		2.21E-01
SB-122	Not Detected		4.55E-02
SB-124	Not Detected		2.27E-02
SB-125	Not Detected		6.00E-02
SN-113	Not Detected		2.50E-02
TA-182	Not Detected		8.96E-02
TA-183	Not Detected		1.26E-01
TC-99m	Not Detected		1.39E+01
TL-201	Not Detected		1.02E-01
XE-133	Not Detected		1.23E-01
Y-88	Not Detected		2.39E-02
ZN-65	Not Detected		6.13E-02
ZR-95	Not Detected		3.60E-02

```

*****
*                               Sandia National Laboratories                               *
*   Radiation Protection Sample Diagnostics Program [881 Laboratory]   *
*                               3-26-98  6:30:16 AM                               *
*****
*
* Analyzed by: [Signature] 3/27/98      Reviewed by: [Signature]
*****
Customer      : C.AAS/D.BISWELL (6134/SMO)
Customer Sample ID : LAB CONTROL SAMPLE USING CG134
Lab Sample ID  : 80050915

```

```

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 : 3-26-98 6:18:20 AM
Detector Name          : LAB04
Elapsed Live/Real Time : 600 / 606 seconds

```

Comments:

Nuclide Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
-----	-----	-----	-----
U-238	Not Detected	-----	1.66E+04
TH-234	Not Detected	-----	3.28E+03
RA-226	Not Detected	-----	5.26E+03
PB-214	Not Detected	-----	6.37E+02
BI-214	Not Detected	-----	5.67E+02
PB-210	Not Detected	-----	8.34E+04
TH-232	Not Detected	-----	2.07E+03
RA-228	Not Detected	-----	2.46E+03
AC-228	Not Detected	-----	1.46E+03
TH-228	Not Detected	-----	9.05E+04
RA-224	Not Detected	-----	3.22E+03
PB-212	Not Detected	-----	6.56E+03
BI-212	Not Detected	-----	5.86E+04
TL-208	Not Detected	-----	1.26E+04
U-235	Not Detected	-----	1.38E+03
TH-231	Not Detected	-----	1.84E+04
PA-231	Not Detected	-----	3.07E+04
TH-227	Not Detected	-----	2.19E+03
RA-223	Not Detected	-----	1.00E+26
RN-219	Not Detected	-----	5.28E+03
PB-211	Not Detected	-----	1.21E+04
TL-207	Not Detected	-----	2.09E+05
AM-241	8.76E+04	1.46E+04	1.45E+03
PU-239	Not Detected	-----	2.44E+06
NP-237	Not Detected	-----	1.65E+03
PA-233	Not Detected	-----	5.83E+02
TH-229	Not Detected	-----	1.33E+03

[Summary Report] - Sample ID: : 80050915

Nuclide Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
AG-108m	Not Detected	-----	3.04E+02
AG-110m	Not Detected	-----	2.85E+06
AM-243	Not Detected	-----	4.23E+02
BA-133	Not Detected	-----	6.53E+02
BE-7	Not Detected	-----	5.57E+18
CD-109	4.23E+05	2.15E+05	2.19E+05
CD-115	Not Detected	-----	1.00E+26
CE-139	Not Detected	-----	1.57E+08
CE-141	Not Detected	-----	1.00E+26
CE-144	Not Detected	-----	9.78E+05
CO-56	Not Detected	-----	1.17E+13
CO-57	Not Detected	-----	1.67E+05
CO-58	Not Detected	-----	9.08E+13
CO-60	8.11E+04	1.10E+04	3.66E+02
CR-51	Not Detected	-----	1.00E+26
CS-134	Not Detected	-----	3.22E+03
CS-137	7.17E+04	9.54E+03	2.49E+02
EU-152	Not Detected	-----	7.50E+02
EU-154	Not Detected	-----	2.43E+03
EU-155	Not Detected	-----	2.25E+03
FE-59	Not Detected	-----	1.44E+21
GD-153	Not Detected	-----	1.25E+06
HG-203	Not Detected	-----	7.50E+19
I-131	Not Detected	-----	1.00E+26
IR-192	Not Detected	-----	2.85E+13
K-40	Not Detected	-----	1.43E+03
KR-85	Not Detected	-----	1.09E+05
MN-52	Not Detected	-----	1.00E+26
MN-54	Not Detected	-----	1.31E+05
MO-99	Not Detected	-----	1.00E+26
NA-22	Not Detected	-----	1.36E+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
NP-239	Not Detected	-----	6.78E+02
RU-103	Not Detected	-----	1.00E+26
RU-106	Not Detected	-----	4.64E+05
SB-122	Not Detected	-----	1.00E+26
SB-124	Not Detected	-----	8.81E+15
SB-125	Not Detected	-----	6.53E+03
SN-113	Not Detected	-----	4.79E+09
TA-182	Not Detected	-----	1.29E+10
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	-----	6.04E+09
ZN-65	Not Detected	-----	1.77E+06
ZR-95	Not Detected	-----	2.54E+15

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

Report Date : 3-26-98 6:30:53 AM
 QA File : C:\GENIEPC\CAMFILES\LCS4.QAF
 Analyst : FCD
 Sample ID : 80050915
 Sample Quantity : 1.00 Each
 Sample Date : 11-01-90 12:00:00 PM
 Measurement Date : 3-26-98 6:18:20 AM
 Elapsed Live Time : 600 seconds
 Elapsed Real Time : 606 seconds

Parameter	Mean	1S Error	New Value	< LU : SD : UD : BS >
AM-241 Activity	8.747E-02	1.510E-03	8.762E-02	< : : : >
CS-137 Activity	7.085E-02	1.815E-03	7.171E-02	< : : : >
CO-60 Activity	7.939E-02	2.259E-03	8.048E-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 3/27/98

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-26-98 6:44:39 AM *

* Analyzed by: *[Signature]*

3/27/98

Reviewed by: *[Signature]*

3/26/98

Customer : C.AAS/D.BISWELL (6134/SMO)
 Customer Sample ID : LAB CONTROL SAMPLE USING CG134
 Lab Sample ID : 80050916

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 : 3-26-98 6:31:52 AM
 Detector Name : LAB01
 Elapsed Live/Real Time : 600 / 604 seconds

Comments:

Nuclide Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
U-238	Not Detected	-----	8.73E+03
TH-234	Not Detected	-----	3.40E+03
RA-226	Not Detected	-----	5.68E+03
PB-214	Not Detected	-----	7.81E+02
BI-214	Not Detected	-----	7.21E+02
PB-210	Not Detected	-----	7.03E+04
TH-232	Not Detected	-----	2.26E+03
RA-228	Not Detected	-----	3.18E+03
AC-228	Not Detected	-----	1.88E+03
TH-228	Not Detected	-----	1.05E+05
RA-224	Not Detected	-----	4.16E+03
PB-212	Not Detected	-----	7.69E+03
BI-212	Not Detected	-----	7.59E+04
TL-208	Not Detected	-----	1.56E+04
U-235	Not Detected	-----	1.56E+03
TH-231	Not Detected	-----	2.14E+04
PA-231	Not Detected	-----	3.41E+04
TH-227	Not Detected	-----	2.61E+03
RA-223	Not Detected	-----	1.00E+26
RN-219	Not Detected	-----	6.66E+03
PB-211	Not Detected	-----	1.54E+04
TL-207	Not Detected	-----	2.78E+05
AM-241	8.45E+04	1.44E+04	1.46E+03
PU-239	Not Detected	-----	2.56E+06
NP-237	Not Detected	-----	1.72E+03
PA-233	Not Detected	-----	6.56E+02
TH-229	Not Detected	-----	1.36E+03

[Summary Report] - Sample ID: : 80050916

Nuclide Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
AG-108m	Not Detected	-----	3.90E+02
AG-110m	Not Detected	-----	3.22E+06
AM-243	Not Detected	-----	4.36E+02
BA-133	Not Detected	-----	7.83E+02
BE-7	Not Detected	-----	7.12E+18
CD-109	3.02E+05	3.27E+05	2.20E+05
CD-115	Not Detected	-----	1.00E+26
CE-139	Not Detected	-----	1.70E+08
CE-141	Not Detected	-----	1.00E+26
CE-144	Not Detected	-----	1.02E+06
CO-56	Not Detected	-----	1.56E+13
CO-57	Not Detected	-----	1.81E+05
CO-58	Not Detected	-----	1.24E+14
CO-60	7.67E+04	1.07E+04	4.68E+02
CR-51	Not Detected	-----	1.00E+26
CS-134	Not Detected	-----	3.98E+03
CS-137	6.87E+04	9.20E+03	3.40E+02
EU-152	Not Detected	-----	8.15E+02
EU-154	Not Detected	-----	3.12E+03
EU-155	Not Detected	-----	2.34E+03
FE-59	Not Detected	-----	1.92E+21
GD-153	Not Detected	-----	1.30E+06
HG-203	Not Detected	-----	8.74E+19
I-131	Not Detected	-----	1.00E+26
IR-192	Not Detected	-----	3.15E+13
K-40	Not Detected	-----	1.93E+03
KR-85	Not Detected	-----	1.29E+05
MN-52	Not Detected	-----	1.00E+26
MN-54	Not Detected	-----	1.73E+05
MO-99	Not Detected	-----	1.00E+26
NA-22	Not Detected	-----	1.80E+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
NP-239	Not Detected	-----	6.94E+02
RU-103	Not Detected	-----	1.00E+26
RU-106	Not Detected	-----	5.38E+05
SB-122	Not Detected	-----	1.00E+26
SB-124	Not Detected	-----	1.05E+16
SB-125	Not Detected	-----	8.32E+03
SN-113	Not Detected	-----	5.63E+09
TA-182	Not Detected	-----	1.73E+10
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	-----	7.58E+09
ZN-65	Not Detected	-----	2.37E+06
ZR-95	Not Detected	-----	3.41E+15

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

Report Date : 3-26-98 6:45:22 AM
 QA File : C:\GENIEPC\CAMFILES\LCS1.QAF
 Analyst : FCD
 Sample ID : 80050916
 Sample Quantity : 1.00 Each
 Sample Date : 11-01-90 12:00:00 PM
 Measurement Date : 3-26-98 6:31:52 AM
 Elapsed Live Time : 600 seconds
 Elapsed Real Time : 604 seconds

Parameter	Mean	1S Error	New Value	< LU : SD : UD : BS >
AM-241 Activity	8.639E-02	1.932E-03	8.453E-02	< : : : >
CS-137 Activity	6.822E-02	1.017E-03	6.865E-02	< : : : >
CO-60 Activity	7.544E-02	2.710E-03	7.810E-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 3/27/98

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-26-98 6:51:12 AM *

* Analyzed by: *J 3/27/98* Reviewed by: *LK 3/28/98* *

Customer : C.AAS/D.BISWELL (6134/SMO)
 Customer Sample ID : LAB CONTROL SAMPLE USING CG134
 Lab Sample ID : 80050917

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 : 3-26-98 6:39:09 AM
 Detector Name : LAB03
 Elapsed Live/Real Time : 600 / 606 seconds

Comments:

Nuclide Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
U-238	Not Detected	-----	7.03E+03
TH-234	Not Detected	-----	3.01E+03
RA-226	Not Detected	-----	6.05E+03
PB-214	Not Detected	-----	7.73E+02
BI-214	Not Detected	-----	7.58E+02
PB-210	Not Detected	-----	4.51E+04
TH-232	Not Detected	-----	2.49E+03
RA-228	Not Detected	-----	3.32E+03
AC-228	Not Detected	-----	1.86E+03
TH-228	Not Detected	-----	1.07E+05
RA-224	Not Detected	-----	3.02E+03
PB-212	Not Detected	-----	7.48E+03
BI-212	Not Detected	-----	7.44E+04
TL-208	Not Detected	-----	1.66E+04
U-235	Not Detected	-----	1.52E+03
TH-231	Not Detected	-----	2.09E+04
PA-231	Not Detected	-----	3.51E+04
TH-227	Not Detected	-----	2.53E+03
RA-223	Not Detected	-----	1.00E+26
RN-219	Not Detected	-----	6.66E+03
PB-211	Not Detected	-----	1.53E+04
TL-207	Not Detected	-----	2.61E+05
AM-241	8.74E+04	1.44E+04	1.00E+03
PU-239	Not Detected	-----	2.41E+06
NP-237	Not Detected	-----	1.50E+03
PA-233	Not Detected	-----	6.92E+02
TH-229	Not Detected	-----	1.29E+03

[Summary Report] - Sample ID: : 80050917

Nuclide Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
AG-108m	Not Detected	-----	3.91E+02
AG-110m	Not Detected	-----	3.48E+06
AM-243	Not Detected	-----	3.26E+02
BA-133	Not Detected	-----	7.97E+02
BE-7	Not Detected	-----	6.89E+18
CD-109	4.36E+05	3.20E+05	2.18E+05
CD-115	Not Detected	-----	1.00E+26
CE-139	Not Detected	-----	1.78E+08
CE-141	Not Detected	-----	1.00E+26
CE-144	Not Detected	-----	1.06E+06
CO-56	Not Detected	-----	1.52E+13
CO-57	Not Detected	-----	1.72E+05
CO-58	Not Detected	-----	1.17E+14
CO-60	8.18E+04	1.15E+04	5.12E+02
CR-51	Not Detected	-----	1.00E+26
CS-134	Not Detected	-----	4.19E+03
CS-137	7.16E+04	9.59E+03	3.51E+02
EU-152	Not Detected	-----	7.67E+02
EU-154	Not Detected	-----	3.15E+03
EU-155	Not Detected	-----	2.25E+03
FE-59	Not Detected	-----	1.87E+21
GD-153	Not Detected	-----	1.18E+06
HG-203	Not Detected	-----	8.77E+19
I-131	Not Detected	-----	1.00E+26
IR-192	Not Detected	-----	3.41E+13
K-40	Not Detected	-----	1.76E+03
KR-85	Not Detected	-----	1.26E+05
MN-52	Not Detected	-----	1.00E+26
MN-54	Not Detected	-----	1.70E+05
MO-99	Not Detected	-----	1.00E+26
NA-22	Not Detected	-----	1.71E+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
NP-239	Not Detected	-----	6.72E+02
RU-103	Not Detected	-----	1.00E+26
RU-106	Not Detected	-----	5.78E+05
SB-122	Not Detected	-----	1.00E+26
SB-124	Not Detected	-----	1.13E+16
SB-125	Not Detected	-----	8.20E+03
SN-113	Not Detected	-----	5.81E+09
TA-182	Not Detected	-----	1.62E+10
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	-----	8.25E+09
ZN-65	Not Detected	-----	2.27E+06
ZR-95	Not Detected	-----	3.37E+15


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

Report Date : 3-26-98 6:52:11 AM
 QA File : C:\GENIEPC\CAMFILES\LCS3.QAF
 Analyst : FCD
 Sample ID : 80050917
 Sample Quantity : 1.00 Each
 Sample Date : 11-01-90 12:00:00 PM
 Measurement Date : 3-26-98 6:39:09 AM
 Elapsed Live Time : 600 seconds
 Elapsed Real Time : 606 seconds

Parameter	Mean	1S Error	New Value	< LU : SD : UD : BS >
AM-241 Activity	8.718E-02	2.092E-03	8.743E-02	< : : : >
CS-137 Activity	6.844E-02	1.891E-03	7.164E-02	< : : : >
CO-60 Activity	7.855E-02	2.600E-03	8.016E-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: _____

 3/27/98

[Summary Report] - Sample ID: : 80050918

Nuclide Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
AG-108m	Not Detected	-----	3.32E+02
AG-110m	Not Detected	-----	3.02E+06
AM-243	Not Detected	-----	7.20E+02
BA-133	Not Detected	-----	7.22E+02
BE-7	Not Detected	-----	6.56E+18
CD-109	3.47E+05	2.02E+05	2.75E+05
CD-115	Not Detected	-----	1.00E+26
CE-139	Not Detected	-----	1.87E+08
CE-141	Not Detected	-----	1.00E+26
CE-144	Not Detected	-----	1.30E+06
CO-56	Not Detected	-----	1.30E+13
CO-57	Not Detected	-----	2.21E+05
CO-58	Not Detected	-----	1.04E+14
CO-60	8.09E+04	1.09E+04	4.21E+02
CR-51	Not Detected	-----	1.00E+26
CS-134	Not Detected	-----	3.51E+03
CS-137	7.17E+04	9.55E+03	2.61E+02
EU-152	Not Detected	-----	9.91E+02
EU-154	Not Detected	-----	2.66E+03
EU-155	Not Detected	-----	3.17E+03
FE-59	Not Detected	-----	1.55E+21
GD-153	Not Detected	-----	1.74E+06
HG-203	Not Detected	-----	8.61E+19
I-131	Not Detected	-----	1.00E+26
IR-192	Not Detected	-----	3.06E+13
K-40	Not Detected	-----	1.56E+03
KR-85	Not Detected	-----	1.18E+05
MN-52	Not Detected	-----	1.00E+26
MN-54	Not Detected	-----	1.46E+05
MO-99	Not Detected	-----	1.00E+26
NA-22	Not Detected	-----	1.54E+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
NP-239	Not Detected	-----	9.36E+02
RU-103	Not Detected	-----	1.00E+26
RU-106	Not Detected	-----	4.79E+05
SB-122	Not Detected	-----	1.00E+26
SB-124	Not Detected	-----	9.47E+15
SB-125	Not Detected	-----	7.15E+03
SN-113	Not Detected	-----	5.24E+09
TA-182	Not Detected	-----	1.36E+10
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	-----	6.88E+09
ZN-65	Not Detected	-----	1.90E+06
ZR-95	Not Detected	-----	2.74E+15

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-26-98 7:03:17 AM *

 *
 * Analyzed by: *[Signature]* 3/27/98 Reviewed by: *[Signature]* 3/27/98 *

Customer : C.AAS/D.BISWELL (6134/SMO)
 Customer Sample ID : LAB CONTROL SAMPLE USING CG134
 Lab Sample ID : 80050918

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 : 3-26-98 6:51:23 AM
 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	-----	2.13E+04
TH-234	Not Detected	-----	4.59E+03
RA-226	Not Detected	-----	6.29E+03
PB-214	Not Detected	-----	7.26E+02
BI-214	Not Detected	-----	6.53E+02
PB-210	Not Detected	-----	2.67E+05
TH-232	Not Detected	-----	2.26E+03
RA-228	Not Detected	-----	2.66E+03
AC-228	Not Detected	-----	1.54E+03
TH-228	Not Detected	-----	1.03E+05
RA-224	Not Detected	-----	3.67E+03
PB-212	Not Detected	-----	7.65E+03
BI-212	Not Detected	-----	6.35E+04
TL-208	Not Detected	-----	1.39E+04
U-235	Not Detected	-----	1.83E+03
TH-231	Not Detected	-----	2.10E+04
PA-231	Not Detected	-----	3.55E+04
TH-227	Not Detected	-----	2.59E+03
RA-223	Not Detected	-----	1.00E+26
RN-219	Not Detected	-----	5.77E+03
PB-211	Not Detected	-----	1.32E+04
TL-207	Not Detected	-----	2.20E+05
AM-241	7.70E+04	1.39E+04	3.30E+03
PU-239	Not Detected	-----	3.22E+06
NP-237	Not Detected	-----	2.40E+03
PA-233	Not Detected	-----	6.26E+02
TH-229	Not Detected	-----	1.80E+03

[Summary Report] - Sample ID: : 80050918

Nuclide Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
AG-108m	Not Detected	-----	3.32E+02
AG-110m	Not Detected	-----	3.02E+06
AM-243	Not Detected	-----	7.20E+02
BA-133	Not Detected	-----	7.22E+02
BE-7	Not Detected	-----	6.56E+18
CD-109	3.47E+05	2.02E+05	2.75E+05
CD-115	Not Detected	-----	1.00E+26
CE-139	Not Detected	-----	1.87E+08
CE-141	Not Detected	-----	1.00E+26
CE-144	Not Detected	-----	1.30E+06
CO-56	Not Detected	-----	1.30E+13
CO-57	Not Detected	-----	2.21E+05
CO-58	Not Detected	-----	1.04E+14
CO-60	8.09E+04	1.09E+04	4.21E+02
CR-51	Not Detected	-----	1.00E+26
CS-134	Not Detected	-----	3.51E+03
CS-137	7.17E+04	9.55E+03	2.61E+02
EU-152	Not Detected	-----	9.91E+02
EU-154	Not Detected	-----	2.66E+03
EU-155	Not Detected	-----	3.17E+03
FE-59	Not Detected	-----	1.55E+21
GD-153	Not Detected	-----	1.74E+06
HG-203	Not Detected	-----	8.61E+19
I-131	Not Detected	-----	1.00E+26
IR-192	Not Detected	-----	3.06E+13
K-40	Not Detected	-----	1.56E+03
KR-85	Not Detected	-----	1.18E+05
MN-52	Not Detected	-----	1.00E+26
MN-54	Not Detected	-----	1.46E+05
MO-99	Not Detected	-----	1.00E+26
NA-22	Not Detected	-----	1.54E+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
NP-239	Not Detected	-----	9.36E+02
RU-103	Not Detected	-----	1.00E+26
RU-106	Not Detected	-----	4.79E+05
SB-122	Not Detected	-----	1.00E+26
SB-124	Not Detected	-----	9.47E+15
SB-125	Not Detected	-----	7.15E+03
SN-113	Not Detected	-----	5.24E+09
TA-182	Not Detected	-----	1.36E+10
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	-----	6.88E+09
ZN-65	Not Detected	-----	1.90E+06
ZR-95	Not Detected	-----	2.74E+15

ANALYSIS REQUEST AND CHAIN OF CUSTODY

PAGE 1 OF 2

SF 100-COC (5-97)
Supp. 12-16-99 issue

Internal Lab

Batch No. _____

SAR/WR No. _____

AR/COC- 510231

Dept. No./Mail Stop: 6134 / 1148
 Project/Task Manager: AAS / PAULETCH
 Project Name: CCTA-61A
 Record Center Code: EA/1334/61A / DAT
 Logbook Ref No: 0151
 Service Order No.: CFC216

SMO USE
 Date Samples Shipped: 3-13-98
 Carrier/Waybill No.: 7715
 Lab Contact: FERNANDO DOMINGUEZ
 Lab Destination: 7715
 SMO Contact/Phone: 204 5441 844-3110
 Send Report to SMO: WENDY PALENCIA

Contract No.: N/A
 Case No.: 725.220500
 SMO Authorization: [Signature]
 Bill to: Sandia National Laboratories
 Supplier Services
 Department
 P.O. Box 5800 MS 0154

Parameter & Method Requested

Location
 Tech Area: N/A
 Building: _____ Room: _____

Beginning
Depth in Ft.
ER Site No.

Date/Time
Collected

Reference LOV (available at SMO)

Container
Type Volume Preservative Sample Collection Method Sample Type

Sample No. - Fraction
ER Sample ID or Sample Location Detail

036787-001 CCTA-61A-AR-02B-0-D.5-S
 02B-0-D.5-S
 02B-0.5-1.0-S
 029-0-0.5-S
 029-0.5-1.0-S
 030-0-0.5-S
 030-0.5-1.0-S
 031-0-0.5-S
 031-0.5-1.0-S
 032-C

0-0.5
0-0.5
0.5-1
0-0.5
0.5-1
0-0.5
0.5-1
0-0.5
0.5-1
N/A

3-13-98 1140
3-18-98 1140
1146
1150
1158
1200
1205
1210
1215
1045

SOIL
P
500ml
-
GORS
SA
X
X
X
X
X
X
X
X
X
X

SA
DU
SA
X
X
X
X
X
X
X
X

SA
DU
SA
X
X
X
X
X
X
X
X

SA
DU
SA
X
X
X
X
X
X
X
X

SA
DU
SA
X
X
X
X
X
X
X
X

SA
DU
SA
X
X
X
X
X
X
X
X

SA
DU
SA
X
X
X
X
X
X
X
X

SA
DU
SA
X
X
X
X
X
X
X
X

SA
DU
SA
X
X
X
X
X
X
X
X

SA
DU
SA
X
X
X
X
X
X
X
X

SA
DU
SA
X
X
X
X
X
X
X
X

SA
DU
SA
X
X
X
X
X
X
X
X

RMMA ☒ Yes ☐ No Ref. No. _____

Sample Disposal ☒ Return to Client ☐ Disposal by lab

Turnaround Time ☐ Normal ☒ Rush Required Report Date _____

Sample Team Members: Name: JOE PAULETCH Signature: [Signature] Init: [Signature]
 Name: KAREN DELICIA Signature: [Signature] Init: [Signature]
 Company/Organization/Phone: GORS/6134/284-2429
 MDM/6131/284-2590

Special Instructions/QC Requirements

RELEASES COC# 510231 8/2/98
 510195

Abnormal
Conditions
Receipt

LAB USE

1. Relinquished by [Signature] Org. 6131 Date 3/26/98 Time 0940
 1. Received by [Signature] Org. 7578 Date 3/26/98 Time 0940
 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 _____

WHITE - To Accompany Samples, Laboratory Copy

BLUE - To Accompany Samples, Return to SMO

YELLOW - SMO Suspense Copy

PINK - Field Copy

ANALYSIS REQUEST AND CHAIN OF CUSTODY CONTINUATION FORM

SF 2601 COD (12-96)
Superseded (10-94) issue

PAGE 2 OF 2

AR/COC- 510231

Parameter & Method Requested

Project Name: <u>CCTA-61A</u>										Project/Task Manager: <u>AAS / PAVLETCH</u>										Case No.: <u>725-220500</u>																																													
Location										Reference LOV (available at SMO)										<div style="writing-mode: vertical-rl; transform: rotate(180deg);">GAMMA SPEC</div>																																													
Tech Area: <u>N/A</u>										<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th rowspan="2">Sample Matrix</th> <th colspan="2">Container</th> <th rowspan="2">Preservative</th> <th rowspan="2">Sample Collection Method</th> <th rowspan="2">Sample Type</th> </tr> <tr> <th>Type</th> <th>Volume</th> </tr> </table>																				Sample Matrix	Container		Preservative	Sample Collection Method	Sample Type	Type	Volume																												
Sample Matrix	Container		Preservative	Sample Collection Method	Sample Type																																																												
	Type	Volume																																																															
Building: _____ Room: _____																																																																	
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>Sample No. - Fraction</th> <th>ER Sample ID or Sample Location Detail</th> <th>Beginning Depth in Ft.</th> <th>ER Site No.</th> <th>Date/Time Collected</th> </tr> </table>										Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>Sample Matrix</th> <th>Type</th> <th>Volume</th> <th>Preservative</th> <th>Sample Collection Method</th> <th>Sample Type</th> </tr> </table>										Sample Matrix	Type	Volume	Preservative	Sample Collection Method	Sample Type	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>Lab Sample ID</th> </tr> </table>										Lab Sample ID																								
Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected																																																													
Sample Matrix	Type	Volume	Preservative	Sample Collection Method	Sample Type																																																												
Lab Sample ID																																																																	
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>036797-001</td> <td>CCTA-61A-62-033-C</td> <td>N/A</td> <td>61A</td> <td>3-15-98 1110</td> </tr> <tr> <td>036798-001</td> <td>034-C</td> <td>↓</td> <td>↓</td> <td>1110</td> </tr> <tr> <td>036799-009</td> <td>000-EB</td> <td>↓</td> <td>↓</td> <td>1000</td> </tr> </table>										036797-001	CCTA-61A-62-033-C	N/A	61A	3-15-98 1110	036798-001	034-C	↓	↓	1110	036799-009	000-EB	↓	↓	1000	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>Gravels</td> <td>P</td> <td>500ml</td> <td>4°C</td> <td>G</td> <td>SA</td> </tr> <tr> <td>↓</td> <td>↓</td> <td>↓</td> <td>↓</td> <td>↓</td> <td>↓</td> </tr> <tr> <td>DIW</td> <td>↓</td> <td>↓</td> <td>↓</td> <td>↓</td> <td>EB</td> </tr> </table>										Gravels	P	500ml	4°C	G	SA	↓	↓	↓	↓	↓	↓	DIW	↓	↓	↓	↓	EB	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>X</td> </tr> <tr> <td>X</td> </tr> <tr> <td>X</td> </tr> </table>										X	X	X
036797-001	CCTA-61A-62-033-C	N/A	61A	3-15-98 1110																																																													
036798-001	034-C	↓	↓	1110																																																													
036799-009	000-EB	↓	↓	1000																																																													
Gravels	P	500ml	4°C	G	SA																																																												
↓	↓	↓	↓	↓	↓																																																												
DIW	↓	↓	↓	↓	EB																																																												
X																																																																	
X																																																																	
X																																																																	
																				LAB USE																																													

WHITE - To Assembly Samples, Laboratory Copy

BLUE - To Assembly Samples, Return to SMO

YELLOW - SMO Suspense Copy

PINK - Field Copy



Sandia National Laboratories
Radiation Protection Sample Diagnostics

Sample Analysis Request Form
Page 1 of 1

To be completed by Customer

Customer: AAE / PANLETICH
Organization: 6034
Project Location: CCTA - 61A
Phone: 284-2479
Date Results Needed: * RUSH *
Suspect Isotopes: DU, Th
Case Number: 7215.220500

Hazards/Special Instructions: RELEASES
RUSH
COG # 510195
RESULTS NEEDED FOR SAMPLE RELEASE
OFFSITE.
FAX RESULTS TO
MARK MILLER @ 284-2616

Shaded areas are for RPSD use only

Batch Log Number: _____
Logged By: _____
Analysis Type: ☐ Gamma Spec
☐ H-3
☐ Alpha/Beta
☐ Alpha Spec
☐ Total U
☐ Other

Customer Sample ID	Sample Type	Date/Time Collected	Sample Quantity	Requested Analysis	RPSD Sample ID	Screen cpm	Sample Mass	Remarks / Aliquot Amount
036787-001	SOIL	2.15.78 1140	500ml	GAMMA SPEC				
036788-001								
036789-001								
036790-001								
036791-001								
036792-001								
036793-001								
036794-001								
036795-001								
036796-001	Concrete							
036797-001								
036798-001								
036799-009	BIW							

Relinquished by _____	Date _____	Received by _____	Date _____
Relinquished by _____	Date _____	Received by _____	Date _____
Relinquished by _____	Date _____	Received by _____	Date _____
Relinquished by _____	Date _____	Received by _____	Date _____



RUSH RUSH

To be completed by Customer

Customer: AMS / PANLETICH
Organization: 6134
Project Location: CCTA - 61A
Phone: 284-2479
Date Results Needed: * RUSH *
Suspect Isotopes: DU, TH
Case Number: 7215.220500

Hazards/Special Instructions: RELEASES
RUSH
COG # 510195
RESULTS NEEDED FOR SAMPLE RELEASE
OFFSITE.
FAX RESULTS TO
MARK MILLER @ 284-2616

Shaded areas are for RPSD use only

Batch Log Number: 800529
Logged By: [Signature]
Analysis Type: ☒ Gamma Spec
☐ H-3
☐ Alpha/Beta
☐ Alpha Spec
☐ Total U
☐ Other

Customer Sample ID	Sample Type	Date/Time Collected	Sample Quantity	Requested Analysis	RPSD Sample ID	Screen cpm	Sample Mass	Remarks / Aliquot Amount
036787-001	SOIL	3/15/98 1140	500ml	GAMMA SPEC	01	1300	523g	
036788-001					02	1300	498g	
036789-001					03	1300	585g	
036790-001					04	1300	821g	
036791-001					05	1300	887g	
036792-001					06	1300	777g	
036793-001					07	1300	824g	
036794-001					08	1300	680g	
036795-001					09	1300	789g	
036796-001	Concrete				10	1300	611g	
036797-001					11	1300	747g	
036798-001					12	1300	712g	
036799-009	BIW				13	1300	493ml	

Relinquished by [Signature] Date 3/26/98 Received by LCS 14 Date _____
Relinquished by [Signature] Date 3/26/98 Received by [Signature] Date _____
Relinquished by [Signature] Date 4/1/98 Received by [Signature] Date 4/1/98
Relinquished by _____ Date _____ Received by _____ Date _____

ANALYSIS REQUEST AND CHAIN OF CUSTODY

PAGE 1 OF 2

SF 2001-COC (5-97)
Supersede 16-351 issue

Internal Lab

Batch No. 800529

SAR/WR No. _____

AR/COC- 510231

Dept. No./Mail Stop: 6134 / 410		Date Samples Shipped: 3/26/98 SMO USE		Contract No.: N/A		Parameter & Method Requested									
Project/Task Manager: JAS / AVIEVCH		Carrier/Waybill No.: 410		Case No.: 715 71501											
Project Name: CCA-61A		Lab Contact: FERNANDO TRINIDAD		SMO Authorization: [Signature]		LAB USE									
Record Center Code: ER/1534/1.10 / PAT		Lab Destination: 7715		Bill to: Sandia National Laboratories Supplier Services Department P.O. Box 5800 MS 0154											
Logbook Ref No: 0151		SMO Contact/Phone: 704-3411 844-3110													
Service Order No.: 0151		Send Report to SMO: [Signature]													

Location		Tech Area		Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Reference LOV (available at SMO)					Sample Matrix	Type	Volume	Preservative	Sample Collection Method	Sample Type	Lab Sample ID
Building	Room	Sample No. - Fraction	ER Sample ID or Sample Location Detail				Sample Matrix	Type	Volume	Preservative	Sample Collection Method							
		1 2 3 4 5 6 7 8 9 10 11 12	CCA-61A-7K	0.0-0.5	61A	3-15-98	SOIL	P	500ml	-	GOM	SA	X					
			028-0-0.5-5	0.0-0.5		3-15-98												
			028-0-0.5-50	0.0-0.5														
			028-0.5-1.0-5	0.5-1														
			029-0-0.5-5	0.0-0.5														
			029-0.5-1.0-5	0.5-1														
			030-0-0.5-5	0.0-0.5														
			030-0.5-1.0-5	0.5-1														
			031-0-0.5-5	0.0-0.5														
			031-0.5-1.0-5	0.5-1														
			032-C	1/8														

RMMA <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Ref. No. _____		Sample Tracking SMO USE		Special Instructions/QC Requirements RELEASED COC # 510195 8/1/98		Abnormal Conditions on Receipt LAB USE	
Sample Disposal <input checked="" type="checkbox"/> Return to Client <input type="checkbox"/> Disposal by lab		Date Entered (mm/dd/yy) _____					
Turnaround Time <input type="checkbox"/> Normal <input checked="" type="checkbox"/> Rush Required Report Date _____		Entered by: _____					
Sample Team Members		Signature		Init		Company/Organization/Phone	
JAS		[Signature]		JY		GOM 6134 / 284-2479	
[Signature]		[Signature]		KD		MDM 1121 / 351-2571	

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 CopyBLUE - To Accompany Samples,
Return to SMO

YELLOW - SMO Suspense Copy

PINK - Field Copy

SF 2001-COD (12-96)
Supersedes (10-94) issue

AR/COC- 510231

[illegible]

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-31-98 8:53:07 AM *

* Analyzed by: *WJ 3/31/98* Reviewed by: *

Customer : C.AAS/MAC (6134/SMO)
 Customer Sample ID : 036787-001
 Lab Sample ID : 80052901

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 523.000 gram
 Sample Date/Time : 3-25-98 11:40:00 AM
 Acquire Start Date/Time : 3-26-98 6:47:40 PM
 Detector Name : LAB04
 Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	2.19E+00
TH-234	1.29E+00	4.23E-01	5.37E-01
RA-226	1.46E+00	5.12E-01	5.51E-01
PB-214	8.08E-01	2.60E-01	5.56E-02
BI-214	6.58E-01	1.48E-01	5.57E-02
PB-210	Not Detected	-----	1.19E+01
TH-232	8.73E-01	4.35E-01	1.72E-01
RA-228	7.75E-01	2.16E-01	1.62E-01
AC-228	8.35E-01	2.15E-01	8.94E-02
TH-228	6.93E-01	2.99E-01	5.55E-01
RA-224	8.11E-01	3.10E-01	2.09E-01
PB-212	8.14E-01	1.40E-01	4.53E-02
BI-212	8.47E-01	5.34E-01	3.93E-01
TL-208	7.15E-01	1.54E-01	7.90E-02
U-235	1.07E-01	2.06E-01	2.41E-01
TH-231	Not Detected	-----	2.59E+00
PA-231	Not Detected	-----	4.33E+00
TH-227	Not Detected	-----	4.07E-01
RA-223	Not Detected	-----	1.98E-01
RN-219	Not Detected	-----	4.77E-01
PB-211	Not Detected	-----	1.08E+00
TL-207	Not Detected	-----	1.69E+01
AM-241	Not Detected	-----	2.74E-01
PU-239	Not Detected	-----	4.36E+02
NP-237	Not Detected	-----	2.50E-01
PA-233	Not Detected	-----	7.22E-02
TH-229	Not Detected	-----	2.46E-01

Not detected WJ 3/31/98

[Summary Report] - Sample ID: : 80052901

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.71E-02
AG-110m	Not Detected	-----	7.89E-02
AM-243	Not Detected	-----	6.86E-02
BA-133	Not Detected	-----	8.09E-02
BE-7	2.25E-01	2.41E-01	1.97E-01 NOT DETECTED K& 3/31/95
CD-109	2.20E+00	7.28E-01	6.47E-01 Not detected K& 3/31/95
CD-115	Not Detected	-----	1.19E-01
CE-139	Not Detected	-----	3.18E-02
CE-141	Not Detected	-----	5.34E-02
CE-144	Not Detected	-----	2.33E-01
CO-56	Not Detected	-----	3.79E-02
CO-57	Not Detected	-----	3.02E-02
CO-58	Not Detected	-----	3.60E-02
CO-60	Not Detected	-----	4.17E-02
CR-51	Not Detected	-----	2.92E-01
CS-134	Not Detected	-----	5.62E-02
CS-137	5.79E-01	1.12E-01	2.85E-02
EU-152	Not Detected	-----	9.05E-02
EU-154	Not Detected	-----	2.17E-01
EU-155	Not Detected	-----	1.42E-01
FE-59	Not Detected	-----	8.22E-02
GD-153	Not Detected	-----	1.05E-01
HG-203	Not Detected	-----	3.66E-02
I-131	Not Detected	-----	3.93E-02
IR-192	Not Detected	-----	3.43E-02
K-40	2.17E+01	3.24E+00	2.98E-01
KR-85	Not Detected	-----	1.06E+01
MN-52	Not Detected	-----	4.02E-02
MN-54	Not Detected	-----	2.05E-02
MO-99	Not Detected	-----	3.92E-01
NA-22	Not Detected	-----	5.21E-02
NA-24	Not Detected	-----	1.62E-01
NB-95	Not Detected	-----	2.40E-01
ND-147	Not Detected	-----	2.61E-01
NI-57	Not Detected	-----	1.03E-01
NP-239	Not Detected	-----	1.28E-01
RU-103	Not Detected	-----	3.73E-02
RU-106	Not Detected	-----	3.24E-01
SB-122	Not Detected	-----	6.65E-02
SB-124	Not Detected	-----	3.69E-02
SB-125	Not Detected	-----	1.04E-01
SN-113	Not Detected	-----	4.62E-02
TA-182	Not Detected	-----	1.76E-01
TA-183	Not Detected	-----	2.79E-01
TC-99m	Not Detected	-----	1.12E+00
TL-201	Not Detected	-----	1.87E-01
XE-133	Not Detected	-----	2.09E-01
Y-88	Not Detected	-----	2.93E-02
ZN-65	Not Detected	-----	1.20E-01
ZR-95	Not Detected	-----	6.50E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-27-98 9:29:12 AM *

 *
 * Analyzed by: WU 3/31/98 Reviewed by: K 3/31/98 *

Customer : C.AAS/MAC (6134/SMO)
 Customer Sample ID : 036788-001
 Lab Sample ID : 80052902

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 498.000 gram
 Sample Date/Time : 3-25-98 11:40:00 AM
 Acquire Start Date/Time : 3-27-98 7:45:47 AM
 Detector Name : LAB04
 Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	2.18E+00
TH-234	9.62E-01	3.73E-01	5.03E-01
RA-226	Not Detected	-----	6.73E-01
PB-214	6.24E-01	1.24E-01	5.51E-02
BI-214	6.14E-01	1.34E-01	5.23E-02
PB-210	Not Detected	-----	1.22E+01
TH-232	8.09E-01	4.09E-01	1.72E-01
RA-228	6.93E-01	3.16E-01	1.75E-01
AC-228	8.06E-01	1.96E-01	9.99E-02
TH-228	Not Detected	-----	9.15E-01
RA-224	7.70E-01	3.02E-01	2.21E-01
PB-212	8.13E-01	1.48E-01	4.38E-02
BI-212	6.76E-01	4.91E-01	3.50E-01
TL-208	7.65E-01	1.61E-01	7.31E-02
U-235	Not Detected	-----	2.44E-01
TH-231	Not Detected	-----	2.65E+00
PA-231	Not Detected	-----	4.29E+00
TH-227	Not Detected	-----	4.13E-01
RA-223	Not Detected	-----	2.00E-01
RN-219	Not Detected	-----	4.57E-01
PB-211	Not Detected	-----	1.08E+00
TL-207	Not Detected	-----	1.68E+01
AM-241	Not Detected	-----	2.70E-01
PU-239	Not Detected	-----	4.36E+02
NP-237	Not Detected	-----	2.21E-01
PA-233	Not Detected	-----	7.32E-02
TH-229	Not Detected	-----	2.45E-01

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	5.76E-02
AG-110m	Not Detected	-----	5.33E-02
AM-243	Not Detected	-----	6.51E-02
BA-133	Not Detected	-----	6.18E-02
BE-7	Not Detected	-----	3.33E-01
CD-109	1.51E+00	5.45E-01	7.39E-01
CD-115	Not Detected	-----	1.43E-01
CE-139	Not Detected	-----	3.11E-02
CE-141	Not Detected	-----	5.40E-02
CE-144	Not Detected	-----	2.17E-01
CO-56	Not Detected	-----	4.82E-02
CO-57	Not Detected	-----	2.88E-02
CO-58	Not Detected	-----	4.52E-02
CO-60	Not Detected	-----	5.07E-02
CR-51	Not Detected	-----	2.75E-01
CS-134	Not Detected	-----	5.14E-02
CS-137	1.21E-01	7.08E-02	3.30E-02
EU-152	Not Detected	-----	8.57E-02
EU-154	Not Detected	-----	2.68E-01
EU-155	Not Detected	-----	1.31E-01
FE-59	Not Detected	-----	1.10E-01
GD-153	Not Detected	-----	9.26E-02
HG-203	Not Detected	-----	3.83E-02
I-131	Not Detected	-----	4.16E-02
IR-192	Not Detected	-----	3.20E-02
K-40	2.06E+01	3.34E+00	3.26E-01
KR-85	Not Detected	-----	1.09E+01
MN-52	Not Detected	-----	5.19E-02
MN-54	Not Detected	-----	4.82E-02
MO-99	Not Detected	-----	5.18E-01
NA-22	Not Detected	-----	5.62E-02
NA-24	Not Detected	-----	3.51E-01
NB-95	Not Detected	-----	2.62E-01
ND-147	Not Detected	-----	2.90E-01
NI-57	Not Detected	-----	1.60E-01
NP-239	Not Detected	-----	1.16E-01
RU-103	Not Detected	-----	4.06E-02
RU-106	Not Detected	-----	3.87E-01
SB-122	Not Detected	-----	8.65E-02
SB-124	Not Detected	-----	4.08E-02
SB-125	Not Detected	-----	1.06E-01
SN-113	Not Detected	-----	4.52E-02
TA-182	Not Detected	-----	2.07E-01
TA-183	Not Detected	-----	2.34E-01
TC-99m	Not Detected	-----	5.38E+00
TL-201	Not Detected	-----	1.85E-01
XE-133	Not Detected	-----	2.00E-01
Y-88	Not Detected	-----	4.07E-02
ZN-65	Not Detected	-----	1.40E-01
ZR-95	Not Detected	-----	7.34E-02

not detected 3/31/98

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-27-98 10:31:53 AM *

 * Analyzed by: *WJ 3/31/98* Reviewed by: *KA 3/31/98* *

Customer : C.AAS/MAC (6134/SMO)
 Customer Sample ID : 036789-001
 Lab Sample ID : 80052903

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 585.000 gram
 Sample Date/Time : 3-25-98 11:45:00 AM
 Acquire Start Date/Time : 3-27-98 8:46:16 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	-----	1.79E+00
TH-234	1.14E+00	4.14E-01	5.41E-01
RA-226	1.24E+00	5.77E-01	6.86E-01
PB-214	5.83E-01	1.30E-01	5.87E-02
BI-214	5.51E-01	1.49E-01	6.88E-02
PB-210	Not Detected	-----	9.23E+00
TH-232	6.98E-01	3.78E-01	1.78E-01
RA-228	8.19E-01	2.78E-01	2.06E-01
AC-228	7.02E-01	2.20E-01	1.31E-01
TH-228	5.86E-01	4.25E-01	5.75E-01
RA-224	8.19E-01	2.93E-01	1.14E-01
PB-212	7.78E-01	1.40E-01	4.38E-02
BI-212	1.15E+00	9.44E-01	5.22E-01
TL-208	7.42E-01	2.24E-01	1.06E-01
U-235	1.30E-01	2.12E-01	2.35E-01
TH-231	Not Detected	-----	2.63E+00
PA-231	Not Detected	-----	4.09E+00
TH-227	Not Detected	-----	4.25E-01
RA-223	Not Detected	-----	1.78E-01
RN-219	Not Detected	-----	4.97E-01
PB-211	Not Detected	-----	1.12E+00
TL-207	Not Detected	-----	1.90E+01
AM-241	Not Detected	-----	2.12E-01
PU-239	Not Detected	-----	4.05E+02
NP-237	Not Detected	-----	2.18E-01
PA-233	Not Detected	-----	6.82E-02
TH-229	Not Detected	-----	2.26E-01

not detected yes 3/31/98

[Summary Report] - Sample ID: : 80052904

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.36E-02
AG-110m	Not Detected	-----	6.04E-02
AM-243	Not Detected	-----	5.58E-02
BA-133	Not Detected	-----	5.46E-02
BE-7	Not Detected	-----	2.30E-01
CD-109	1.61E+00	4.59E-01	6.55E-01
CD-115	Not Detected	-----	1.04E-01
CE-139	Not Detected	-----	2.36E-02
CE-141	Not Detected	-----	4.09E-02
CE-144	Not Detected	-----	1.78E-01
CO-56	Not Detected	-----	2.77E-02
CO-57	Not Detected	-----	2.32E-02
CO-58	Not Detected	-----	2.64E-02
CO-60	Not Detected	-----	2.88E-02
CR-51	Not Detected	-----	2.23E-01
CS-134	Not Detected	-----	3.98E-02
CS-137	5.49E-01	8.56E-02	2.06E-02
EU-152	Not Detected	-----	6.95E-02
EU-154	Not Detected	-----	1.56E-01
EU-155	Not Detected	-----	1.08E-01
FE-59	Not Detected	-----	6.13E-02
GD-153	Not Detected	-----	7.90E-02
HG-203	Not Detected	-----	2.74E-02
I-131	Not Detected	-----	3.01E-02
IR-192	Not Detected	-----	2.54E-02
K-40	1.90E+01	3.02E+00	2.13E-01
KR-85	Not Detected	-----	7.54E+00
MN-52	Not Detected	-----	3.33E-02
MN-54	Not Detected	-----	2.78E-02
MO-99	Not Detected	-----	3.22E-01
NA-22	Not Detected	-----	3.50E-02
NA-24	Not Detected	-----	2.19E-01
NB-95	Not Detected	-----	2.01E-01
ND-147	Not Detected	-----	2.05E-01
NI-57	Not Detected	-----	9.65E-02
NP-239	Not Detected	-----	9.82E-02
RU-103	Not Detected	-----	2.71E-02
RU-106	Not Detected	-----	2.42E-01
SB-122	Not Detected	-----	5.62E-02
SB-124	Not Detected	-----	2.68E-02
SB-125	Not Detected	-----	7.47E-02
SN-113	Not Detected	-----	3.48E-02
TA-182	Not Detected	-----	1.27E-01
TA-183	Not Detected	-----	2.27E-01
TC-99m	Not Detected	-----	4.48E+00
TL-201	Not Detected	-----	1.60E-01
XE-133	Not Detected	-----	1.82E-01
Y-88	Not Detected	-----	2.33E-02
ZN-65	Not Detected	-----	8.69E-02
ZR-95	Not Detected	-----	4.70E-02

Not detected 2/23/98

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-31-98 9:46:07 AM *

 *
 * Analyzed by: WY 3/31/98 Reviewed by: KS 3/31/98 *

Customer : C.AAS/MAC (6134/SMO)
 Customer Sample ID : 036790-001
 Lab Sample ID : 80052904

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 821.000 gram
 Sample Date/Time : 3-25-98 11:50:00 AM
 Acquire Start Date/Time : 3-27-98 9:30:33 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	Not Detected	-----	1.62E+00
TH-234	1.34E+00	3.95E-01	4.13E-01
RA-226	1.29E+00	5.22E-01	4.67E-01
PB-214	5.07E-01	1.08E-01	4.26E-02
BI-214	5.12E-01	9.55E-02	3.79E-02
PB-210	Not Detected	-----	8.79E+00
TH-232	6.84E-01	3.59E-01	1.25E-01
RA-228	7.13E-01	2.38E-01	1.08E-01
AC-228	7.22E-01	1.84E-01	6.99E-02
TH-228	6.53E-01	2.65E-01	3.65E-01
RA-224	7.14E-01	2.42E-01	1.38E-01
PB-212	7.09E-01	1.25E-01	3.29E-02
BI-212	8.20E-01	2.90E-01	2.59E-01
TL-208	6.66E-01	1.30E-01	5.89E-02
U-235	Not Detected	-----	1.79E-01
TH-231	Not Detected	-----	1.96E+00
PA-231	Not Detected	-----	3.21E+00
TH-227	Not Detected	-----	3.04E-01
RA-223	Not Detected	-----	1.51E-01
RN-219	Not Detected	-----	3.41E-01
PB-211	Not Detected	-----	7.74E-01
TL-207	Not Detected	-----	1.14E+01
AM-241	Not Detected	-----	2.06E-01
PU-239	Not Detected	-----	3.30E+02
NP-237	Not Detected	-----	1.93E-01
PA-233	Not Detected	-----	5.38E-02
TH-229	Not Detected	-----	1.85E-01

[Summary Report] - Sample ID: : 80052905

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.12E-02
AG-110m	Not Detected	-----	4.07E-02
AM-243	Not Detected	-----	5.67E-02
BA-133	Not Detected	-----	4.93E-02
BE-7	Not Detected	-----	2.42E-01
CD-109	Not Detected	-----	8.77E-01
CD-115	Not Detected	-----	1.13E-01
CE-139	Not Detected	-----	2.38E-02
CE-141	Not Detected	-----	4.33E-02
CE-144	Not Detected	-----	1.73E-01
CO-56	Not Detected	-----	3.76E-02
CO-57	Not Detected	-----	2.23E-02
CO-58	Not Detected	-----	3.31E-02
CO-60	Not Detected	-----	3.93E-02
CR-51	Not Detected	-----	2.30E-01
CS-134	Not Detected	-----	3.90E-02
CS-137	1.10E-01	3.05E-02	2.20E-02
EU-152	Not Detected	-----	6.67E-02
EU-154	Not Detected	-----	1.91E-01
EU-155	Not Detected	-----	6.28E-02
FE-59	Not Detected	-----	8.45E-02
GD-153	Not Detected	-----	7.48E-02
HG-203	Not Detected	-----	2.96E-02
I-131	Not Detected	-----	3.23E-02
IR-192	Not Detected	-----	2.60E-02
K-40	1.91E+01	2.91E+00	2.34E-01
KR-85	Not Detected	-----	7.98E+00
MN-52	Not Detected	-----	3.89E-02
MN-54	Not Detected	-----	3.45E-02
MO-99	Not Detected	-----	4.12E-01
NA-22	Not Detected	-----	4.62E-02
NA-24	Not Detected	-----	3.18E-01
NB-95	Not Detected	-----	2.04E-01
ND-147	Not Detected	-----	2.14E-01
NI-57	Not Detected	-----	1.26E-01
NP-239	Not Detected	-----	9.28E-02
RU-103	Not Detected	-----	2.95E-02
RU-106	Not Detected	-----	2.72E-01
SB-122	Not Detected	-----	6.27E-02
SB-124	Not Detected	-----	2.96E-02
SB-125	Not Detected	-----	8.43E-02
SN-113	Not Detected	-----	3.65E-02
TA-182	Not Detected	-----	1.64E-01
TA-183	Not Detected	-----	1.94E-01
TC-99m	Not Detected	-----	5.45E+00
TL-201	Not Detected	-----	1.55E-01
XE-133	Not Detected	-----	1.65E-01
Y-88	Not Detected	-----	2.71E-02
ZN-65	Not Detected	-----	1.10E-01
ZR-95	Not Detected	-----	6.05E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-27-98 12:17:07 PM *

 *
 * Analyzed by: *JS 3/31/98* Reviewed by: *KS 3/31/98* *

 Customer : C.AAS/MAC (6134/SMO)
 Customer Sample ID : 036791-001
 Lab Sample ID : 80052905

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 889.000 gram
 Sample Date/Time : 3-25-98 11:55:00 AM
 Acquire Start Date/Time : 3-27-98 10:34:07 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	Not Detected	-----	1.39E+00
TH-234	9.96E-01	3.52E-01	4.15E-01
RA-226	1.14E+00	5.49E-01	5.68E-01
PB-214	5.63E-01	1.02E-01	4.61E-02
BI-214	4.93E-01	1.01E-01	4.87E-02
PB-210	Not Detected	-----	7.01E+00
TH-232	7.31E-01	3.82E-01	1.47E-01
RA-228	6.91E-01	3.26E-01	1.73E-01
AC-228	6.41E-01	1.59E-01	9.61E-02
TH-228	5.07E-01	4.30E-01	4.46E-01
RA-224	7.85E-01	2.62E-01	8.55E-02
PB-212	7.13E-01	1.26E-01	3.91E-02
BI-212	1.02E+00	4.24E-01	3.30E-01
TL-208	6.99E-01	1.69E-01	7.54E-02
U-235	Not Detected	-----	1.92E-01
TH-231	Not Detected	-----	2.10E+00
PA-231	Not Detected	-----	3.21E+00
TH-227	Not Detected	-----	3.29E-01
RA-223	Not Detected	-----	1.43E-01
RN-219	Not Detected	-----	3.68E-01
PB-211	Not Detected	-----	8.56E-01
TL-207	Not Detected	-----	1.40E+01
AM-241	Not Detected	-----	1.75E-01
PU-239	Not Detected	-----	3.21E+02
NP-237	3.58E-01	1.34E-01	2.68E-01
PA-233	Not Detected	-----	5.33E-02
TH-229	Not Detected	-----	1.82E-01

not detected JS 3/31/98

[Summary Report] - Sample ID: : 80052906

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.70E-02
AG-110m	Not Detected	-----	5.64E-02
AM-243	Not Detected	-----	6.10E-02
BA-133	Not Detected	-----	5.78E-02
BE-7	Not Detected	-----	2.30E-01
CD-109	1.23E+00	4.44E-01	6.52E-01
CD-115	Not Detected	-----	1.11E-01
CE-139	Not Detected	-----	2.50E-02
CE-141	Not Detected	-----	4.35E-02
CE-144	Not Detected	-----	1.85E-01
CO-56	Not Detected	-----	3.01E-02
CO-57	Not Detected	-----	2.36E-02
CO-58	Not Detected	-----	2.79E-02
CO-60	Not Detected	-----	3.22E-02
CR-51	Not Detected	-----	2.25E-01
CS-134	Not Detected	-----	4.09E-02
CS-137	4.32E-01	7.45E-02	2.03E-02
EU-152	Not Detected	-----	7.09E-02
EU-154	Not Detected	-----	1.71E-01
EU-155	Not Detected	-----	1.13E-01
FE-59	Not Detected	-----	6.59E-02
GD-153	Not Detected	-----	8.23E-02
HG-203	Not Detected	-----	2.83E-02
I-131	Not Detected	-----	3.24E-02
IR-192	Not Detected	-----	2.58E-02
K-40	2.02E+01	2.90E+00	2.11E-01
KR-85	Not Detected	-----	7.43E+00
MN-52	Not Detected	-----	3.35E-02
MN-54	Not Detected	-----	3.03E-02
MO-99	Not Detected	-----	3.55E-01
NA-22	Not Detected	-----	3.56E-02
NA-24	Not Detected	-----	2.56E-01
NB-95	Not Detected	-----	2.14E-01
ND-147	Not Detected	-----	2.11E-01
NI-57	Not Detected	-----	1.07E-01
NP-239	Not Detected	-----	1.02E-01
RU-103	Not Detected	-----	2.78E-02
RU-106	Not Detected	-----	2.53E-01
SB-122	Not Detected	-----	5.79E-02
SB-124	Not Detected	-----	2.79E-02
SB-125	Not Detected	-----	7.70E-02
SN-113	Not Detected	-----	3.54E-02
TA-182	Not Detected	-----	1.34E-01
TA-183	Not Detected	-----	2.36E-01
TC-99m	Not Detected	-----	5.83E+00
TL-201	Not Detected	-----	1.69E-01
XE-133	Not Detected	-----	1.96E-01
Y-88	Not Detected	-----	2.20E-02
ZN-65	Not Detected	-----	9.16E-02
ZR-95	Not Detected	-----	4.88E-02

not detected 4/3/198

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-27-98 12:58:44 PM *

 *
 * Analyzed by: *WJ 3/31/98* Reviewed by: *KA 3/31/98* *

Customer : C.AAS/MAC (6134/SMO)
 Customer Sample ID : 036792-001
 Lab Sample ID : 80052906

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 777.000 gram
 Sample Date/Time : 3-25-98 12:00:00 PM
 Acquire Start Date/Time : 3-27-98 11:15:47 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	6.16E-01	8.58E-01	1.07E+00
TH-234	9.58E-01	3.15E-01	4.19E-01
RA-226	1.50E+00	6.33E-01	5.27E-01
PB-214	5.88E-01	1.06E-01	4.08E-02
BI-214	4.79E-01	9.40E-02	4.16E-02
PB-210	Not Detected	-----	8.80E+00
TH-232	7.79E-01	3.79E-01	1.23E-01
RA-228	7.28E-01	1.79E-01	1.25E-01
AC-228	7.59E-01	1.85E-01	7.11E-02
TH-228	6.50E-01	2.40E-01	4.13E-01
RA-224	7.49E-01	2.57E-01	1.43E-01
PB-212	7.55E-01	1.24E-01	3.27E-02
BI-212	1.08E+00	4.64E-01	2.84E-01
TL-208	6.96E-01	1.34E-01	5.79E-02
U-235	Not Detected	-----	1.93E-01
TH-231	Not Detected	-----	2.01E+00
PA-231	Not Detected	-----	3.38E+00
TH-227	Not Detected	-----	3.19E-01
RA-223	Not Detected	-----	1.60E-01
RN-219	Not Detected	-----	3.52E-01
PB-211	Not Detected	-----	8.01E-01
TL-207	Not Detected	-----	1.22E+01
AM-241	Not Detected	-----	2.11E-01
PU-239	Not Detected	-----	3.42E+02
NP-237	Not Detected	-----	1.92E-01
PA-233	Not Detected	-----	5.53E-02
TH-229	Not Detected	-----	1.92E-01

[Summary Report] - Sample ID: : 80052907

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.49E-02
AG-110m	Not Detected	-----	3.97E-02
AM-243	Not Detected	-----	5.46E-02
BA-133	Not Detected	-----	5.10E-02
BE-7	Not Detected	-----	2.61E-01
CD-109	Not Detected	-----	9.41E-01
CD-115	Not Detected	-----	1.24E-01
CE-139	Not Detected	-----	2.55E-02
CE-141	Not Detected	-----	4.60E-02
CE-144	Not Detected	-----	1.87E-01
CO-56	Not Detected	-----	3.81E-02
CO-57	Not Detected	-----	2.39E-02
CO-58	Not Detected	-----	3.49E-02
CO-60	Not Detected	-----	4.13E-02
CR-51	Not Detected	-----	2.40E-01
CS-134	Not Detected	-----	4.12E-02
CS-137	7.12E-02	2.48E-02	2.21E-02
EU-152	Not Detected	-----	7.15E-02
EU-154	Not Detected	-----	2.07E-01
EU-155	Not Detected	-----	5.43E-02
FE-59	Not Detected	-----	8.41E-02
GD-153	Not Detected	-----	7.67E-02
HG-203	Not Detected	-----	3.09E-02
I-131	Not Detected	-----	3.37E-02
IR-192	Not Detected	-----	2.67E-02
K-40	1.92E+01	2.90E+00	2.55E-01
KR-85	Not Detected	-----	8.89E+00
MN-52	Not Detected	-----	4.36E-02
MN-54	Not Detected	-----	1.86E-02
MO-99	Not Detected	-----	4.36E-01
NA-22	Not Detected	-----	4.62E-02
NA-24	Not Detected	-----	3.17E-01
NB-95	Not Detected	-----	2.22E-01
ND-147	Not Detected	-----	2.48E-01
NI-57	Not Detected	-----	1.19E-01
NP-239	Not Detected	-----	9.95E-02
RU-103	Not Detected	-----	3.03E-02
RU-106	Not Detected	-----	2.93E-01
SB-122	Not Detected	-----	7.17E-02
SB-124	Not Detected	-----	3.07E-02
SB-125	Not Detected	-----	8.54E-02
SN-113	Not Detected	-----	3.87E-02
TA-182	Not Detected	-----	1.68E-01
TA-183	Not Detected	-----	2.06E-01
TC-99m	Not Detected	-----	6.81E+00
TL-201	Not Detected	-----	1.65E-01
XE-133	Not Detected	-----	1.79E-01
Y-88	Not Detected	-----	2.93E-02
ZN-65	Not Detected	-----	1.12E-01
ZR-95	Not Detected	-----	6.41E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-27-98 2:01:08 PM *

 *
 * Analyzed by: *XJ 3/31/98* Reviewed by: *XJ 3/31/98* *

Customer : C.AAS/MAC (6134/SMO)
 Customer Sample ID : 036793-001
 Lab Sample ID : 80052907

 Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 824.000 gram
 Sample Date/Time : 3-25-98 12:05:00 PM
 Acquire Start Date/Time : 3-27-98 12:18:11 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	Not Detected	-----	1.49E+00
TH-234	1.03E+00	3.45E-01	4.63E-01
RA-226	1.53E+00	7.39E-01	5.42E-01
PB-214	5.66E-01	3.57E-01	4.87E-02
BI-214	5.06E-01	1.21E-01	5.12E-02
PB-210	Not Detected	-----	7.60E+00
TH-232	7.71E-01	3.78E-01	1.52E-01
RA-228	7.30E-01	4.47E-01	1.99E-01
AC-228	7.64E-01	8.82E-01	9.69E-02
TH-228	7.04E-01	8.95E-01	4.71E-01
RA-224	8.55E-01	3.64E-01	7.92E-02
PB-212	7.60E-01	1.27E-01	3.67E-02
BI-212	8.57E-01	5.90E-01	3.21E-01
TL-208	7.39E-01	2.53E-01	7.87E-02
U-235	1.26E-01	1.87E-01	2.05E-01
TH-231	Not Detected	-----	2.15E+00
PA-231	Not Detected	-----	3.46E+00
TH-227	Not Detected	-----	3.52E-01
RA-223	Not Detected	-----	1.52E-01
RN-219	1.18E-01	4.72E-02	1.49E-01
PB-211	Not Detected	-----	9.50E-01
TL-207	Not Detected	-----	1.50E+01
AM-241	Not Detected	-----	1.84E-01
PU-239	Not Detected	-----	3.52E+02
NP-237	4.47E-01	1.60E-01	1.93E-01
PA-233	Not Detected	-----	5.42E-02
TH-229	Not Detected	-----	1.90E-01

not detected XJ 3/31/98

not detected XJ 3/31/98

not detected XJ 3/31/98

[Summary Report] - Sample ID: : 80052908

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected		4.00E-02
AG-110m	Not Detected		6.57E-02
AM-243	Not Detected		5.85E-02
BA-133	Not Detected		6.56E-02
BE-7	3.36E-01	2.04E-01	1.94E-01
CD-109	Not Detected		7.03E-01
CD-115	Not Detected		1.26E-01
CE-139	Not Detected		2.68E-02
CE-141	Not Detected		4.76E-02
CE-144	Not Detected		2.03E-01
CO-56	Not Detected		3.27E-02
CO-57	Not Detected		2.60E-02
CO-58	Not Detected		3.10E-02
CO-60	Not Detected		3.74E-02
CR-51	Not Detected		2.57E-01
CS-134	Not Detected		4.87E-02
CS-137	5.02E-01	8.16E-02	2.40E-02
EU-152	Not Detected		7.81E-02
EU-154	Not Detected		1.84E-01
EU-155	Not Detected		1.23E-01
FE-59	Not Detected		7.19E-02
GD-153	Not Detected		8.88E-02
HG-203	Not Detected		3.22E-02
I-131	Not Detected		3.46E-02
IR-192	Not Detected		2.91E-02
K-40	2.12E+01	3.11E+00	2.17E-01
KR-85	Not Detected		8.32E+00
MN-52	Not Detected		3.82E-02
MN-54	Not Detected		3.43E-02
MO-99	Not Detected		3.94E-01
NA-22	Not Detected		4.38E-02
NA-24	Not Detected		3.07E-01
NB-95	Not Detected		2.37E-01
ND-147	Not Detected		2.28E-01
NI-57	Not Detected		1.26E-01
NP-239	Not Detected		1.10E-01
RU-103	Not Detected		3.12E-02
RU-106	Not Detected		2.83E-01
SB-122	Not Detected		6.87E-02
SB-124	Not Detected		3.11E-02
SB-125	Not Detected		8.63E-02
SN-113	Not Detected		3.88E-02
TA-182	Not Detected		1.56E-01
TA-183	Not Detected		2.64E-01
TC-99m	Not Detected		7.95E+00
TL-201	Not Detected		1.94E-01
XE-133	Not Detected		2.24E-01
Y-88	Not Detected		2.77E-02
ZN-65	Not Detected		1.07E-01
ZR-95	Not Detected		5.70E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-27-98 3:03:32 PM *

 *
 * Analyzed by: *AM 3/31/98* Reviewed by: *KA 3/31/98* *

Customer : C.AAS/MAC (6134/SMO)
 Customer Sample ID : 036794-001
 Lab Sample ID : 80052908

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 680.000 gram
 Sample Date/Time : 3-25-98 12:10:00 PM
 Acquire Start Date/Time : 3-27-98 1:19:32 PM
 Detector Name : LAB04
 Elapsed Live/Real Time : 6000 / 6004 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	1.85E+00
TH-234	9.13E-01	3.17E-01	4.17E-01
RA-226	1.51E+00	1.10E+00	6.33E-01
PB-214	6.96E-01	1.19E-01	4.40E-02
BI-214	7.11E-01	1.32E-01	3.89E-02
PB-210	Not Detected	-----	1.02E+01
TH-232	7.49E-01	3.71E-01	1.47E-01
RA-228	7.67E-01	2.53E-01	1.40E-01
AC-228	8.02E-01	1.88E-01	8.20E-02
TH-228	5.69E-01	2.13E-01	4.93E-01
RA-224	8.74E-01	2.98E-01	1.60E-01
PB-212	7.83E-01	1.30E-01	3.56E-02
BI-212	8.17E-01	3.62E-01	3.17E-01
TL-208	6.79E-01	1.43E-01	6.40E-02
U-235	Not Detected	-----	2.10E-01
TH-231	Not Detected	-----	2.28E+00
PA-231	Not Detected	-----	3.83E+00
TH-227	Not Detected	-----	3.49E-01
RA-223	Not Detected	-----	1.74E-01
RN-219	Not Detected	-----	3.96E-01
PB-211	Not Detected	-----	9.07E-01
TL-207	Not Detected	-----	1.37E+01
AM-241	Not Detected	-----	2.34E-01
PU-239	Not Detected	-----	3.67E+02
NP-237	4.83E-01	1.88E-01	2.07E-01
PA-233	Not Detected	-----	6.07E-02
TH-229	Not Detected	-----	2.15E-01

not detected AM 3/31/98

[Summary Report] - Sample ID: : 80052909

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.62E-02
AG-110m	Not Detected	-----	3.75E-02
AM-243	Not Detected	-----	4.99E-02
BA-133	Not Detected	-----	5.52E-02
BE-7	Not Detected	-----	2.55E-01
CD-109	Not Detected	-----	9.49E-01
CD-115	Not Detected	-----	1.31E-01
CE-139	Not Detected	-----	2.66E-02
CE-141	Not Detected	-----	4.73E-02
CE-144	Not Detected	-----	1.89E-01
CO-56	Not Detected	-----	4.02E-02
CO-57	Not Detected	-----	2.43E-02
CO-58	Not Detected	-----	3.60E-02
CO-60	Not Detected	-----	4.34E-02
CR-51	Not Detected	-----	2.36E-01
CS-134	Not Detected	-----	4.17E-02
CS-137	2.82E-02	1.84E-02	2.28E-02
EU-152	Not Detected	-----	7.25E-02
EU-154	Not Detected	-----	2.13E-01
EU-155	Not Detected	-----	1.15E-01
FE-59	Not Detected	-----	9.32E-02
GD-153	Not Detected	-----	8.34E-02
HG-203	Not Detected	-----	3.15E-02
I-131	Not Detected	-----	3.57E-02
IR-192	Not Detected	-----	2.79E-02
K-40	2.11E+01	3.22E+00	3.00E-01
KR-85	Not Detected	-----	8.92E+00
MN-52	Not Detected	-----	4.66E-02
MN-54	Not Detected	-----	3.92E-02
MO-99	Not Detected	-----	4.54E-01
NA-22	Not Detected	-----	5.13E-02
NA-24	Not Detected	-----	4.01E-01
NB-95	Not Detected	-----	2.32E-01
ND-147	Not Detected	-----	2.42E-01
NI-57	Not Detected	-----	1.42E-01
NP-239	Not Detected	-----	1.03E-01
RU-103	Not Detected	-----	3.11E-02
RU-106	Not Detected	-----	3.33E-01
SB-122	Not Detected	-----	7.13E-02
SB-124	Not Detected	-----	3.15E-02
SB-125	Not Detected	-----	9.02E-02
SN-113	Not Detected	-----	3.95E-02
TA-182	Not Detected	-----	1.71E-01
TA-183	Not Detected	-----	2.19E-01
TC-99m	Not Detected	-----	8.27E+00
TL-201	Not Detected	-----	1.75E-01
XE-133	Not Detected	-----	1.87E-01
Y-88	Not Detected	-----	3.13E-02
ZN-65	Not Detected	-----	1.18E-01
ZR-95	Not Detected	-----	6.42E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-27-98 3:45:09 PM *

 *
 * Analyzed by: *WJ 3/31/98* Reviewed by: *KA 3/2/98* *

Customer : C.AAS/MAC (6134/SMO)
 Customer Sample ID : 036795-001
 Lab Sample ID : 80052909

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 789.000 gram
 Sample Date/Time : 3-25-98 12:15:00 PM
 Acquire Start Date/Time : 3-27-98 2:02:13 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	Not Detected	-----	1.51E+00
TH-234	1.02E+00	3.65E-01	4.68E-01
RA-226	Not Detected	-----	5.90E-01
PB-214	5.60E-01	1.18E-01	4.90E-02
BI-214	5.15E-01	1.13E-01	5.15E-02
PB-210	Not Detected	-----	7.85E+00
TH-232	7.92E-01	3.96E-01	1.56E-01
RA-228	6.24E-01	2.11E-01	1.94E-01
AC-228	7.29E-01	2.52E-01	1.19E-01
TH-228	8.47E-01	6.19E-01	4.80E-01
RA-224	8.67E-01	4.88E-01	8.99E-02
PB-212	7.63E-01	2.45E-01	3.76E-02
BI-212	6.67E-01	4.34E-01	3.55E-01
TL-208	6.95E-01	6.10E-01	7.45E-02
U-235	2.92E-01	1.89E-01	2.11E-01
TH-231	Not Detected	-----	2.19E+00
PA-231	Not Detected	-----	3.53E+00
TH-227	Not Detected	-----	3.63E-01
RA-223	Not Detected	-----	1.54E-01
RN-219	Not Detected	-----	4.13E-01
PB-211	Not Detected	-----	9.39E-01
TL-207	Not Detected	-----	1.68E+01
AM-241	Not Detected	-----	1.93E-01
PU-239	Not Detected	-----	3.50E+02
NP-237	4.74E-01	2.02E-01	2.06E-01
PA-233	Not Detected	-----	5.94E-02
TH-229	Not Detected	-----	2.06E-01

Not detected WJ 3/31/98

Not detected WJ 3/31/98

[Summary Report] - Sample ID: : 80052910

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.86E-02
AG-110m	Not Detected	-----	3.93E-02
AM-243	Not Detected	-----	6.51E-02
BA-133	Not Detected	-----	7.06E-02
BE-7	1.23E-01	8.29E-02	1.21E-01
CD-109	1.49E+00	4.76E-01	7.47E-01
CD-115	Not Detected	-----	1.27E-01
CE-139	Not Detected	-----	2.72E-02
CE-141	Not Detected	-----	4.50E-02
CE-144	Not Detected	-----	1.98E-01
CO-56	Not Detected	-----	3.05E-02
CO-57	Not Detected	-----	2.58E-02
CO-58	Not Detected	-----	2.98E-02
CO-60	Not Detected	-----	3.52E-02
CR-51	Not Detected	-----	2.57E-01
CS-134	Not Detected	-----	5.10E-02
CS-137	9.05E-02	4.91E-02	2.35E-02
EU-152	Not Detected	-----	7.75E-02
EU-154	Not Detected	-----	1.78E-01
EU-155	Not Detected	-----	1.18E-01
FE-59	Not Detected	-----	6.87E-02
GD-153	Not Detected	-----	8.75E-02
HG-203	Not Detected	-----	3.11E-02
I-131	Not Detected	-----	3.28E-02
IR-192	Not Detected	-----	2.75E-02
K-40	1.37E+01	2.11E+00	2.56E-01
KR-85	Not Detected	-----	8.43E+00
MN-52	Not Detected	-----	4.16E-02
MN-54	Not Detected	-----	3.22E-02
MO-99	Not Detected	-----	3.81E-01
NA-22	Not Detected	-----	3.88E-02
NA-24	Not Detected	-----	3.48E-01
NB-95	Not Detected	-----	2.39E-01
ND-147	Not Detected	-----	2.23E-01
NI-57	Not Detected	-----	1.29E-01
NP-239	Not Detected	-----	1.06E-01
RU-103	Not Detected	-----	2.92E-02
RU-106	Not Detected	-----	2.73E-01
SB-122	Not Detected	-----	6.86E-02
SB-124	Not Detected	-----	3.15E-02
SB-125	Not Detected	-----	8.02E-02
SN-113	Not Detected	-----	3.62E-02
TA-182	Not Detected	-----	1.53E-01
TA-183	Not Detected	-----	2.59E-01
TC-99m	Not Detected	-----	1.10E+01
TL-201	Not Detected	-----	1.94E-01
XE-133	Not Detected	-----	2.34E-01
Y-88	Not Detected	-----	3.02E-02
ZN-65	Not Detected	-----	1.01E-01
ZR-95	Not Detected	-----	5.56E-02

Not detected 3/31/93

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-27-98 4:50:39 PM *

 *
 * Analyzed by: 203/31/98 Reviewed by: K. J. / 98 *

Customer : C.AAS/MAC (6134/SMO)
 Customer Sample ID : 036796-001
 Lab Sample ID : 80052910

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 611.000 gram
 Sample Date/Time : 3-25-98 10:45:00 AM
 Acquire Start Date/Time : 3-27-98 3:07:44 PM
 Detector Name : LAB04
 Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
-----	-----	-----	-----
U-238	Not Detected	-----	1.84E+00
TH-234	1.13E+00	4.07E-01	4.56E-01
RA-226	1.62E+00	7.99E-01	5.83E-01
PB-214	7.59E-01	1.30E-01	4.53E-02
BI-214	7.07E-01	2.51E-01	4.22E-02
PB-210	Not Detected	-----	9.86E+00
TH-232	6.77E-01	3.73E-01	1.53E-01
RA-228	6.31E-01	2.60E-01	1.47E-01
AC-228	6.94E-01	1.80E-01	7.75E-02
TH-228	6.23E-01	2.21E-01	4.59E-01
RA-224	6.86E-01	2.63E-01	1.76E-01
PB-212	7.00E-01	1.21E-01	3.65E-02
BI-212	6.86E-01	3.31E-01	2.80E-01
TL-208	6.55E-01	1.59E-01	6.29E-02
U-235	Not Detected	-----	2.00E-01
TH-231	Not Detected	-----	2.18E+00
PA-231	Not Detected	-----	3.76E+00
TH-227	Not Detected	-----	3.42E-01
RA-223	Not Detected	-----	1.76E-01
RN-219	Not Detected	-----	3.64E-01
PB-211	Not Detected	-----	8.31E-01
TL-207	Not Detected	-----	1.31E+01
AM-241	Not Detected	-----	2.25E-01
PU-239	Not Detected	-----	3.71E+02
NP-237	Not Detected	-----	2.20E-01
PA-233	Not Detected	-----	5.67E-02
TH-229	Not Detected	-----	2.07E-01

[Summary Report] - Sample ID: : 80052911

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.11E-02
AG-110m	Not Detected	-----	3.77E-02
AM-243	Not Detected	-----	5.25E-02
BA-133	Not Detected	-----	5.51E-02
BE-7	Not Detected	-----	2.69E-01
CD-109	Not Detected	-----	8.83E-01
CD-115	Not Detected	-----	1.22E-01
CE-139	Not Detected	-----	2.43E-02
CE-141	Not Detected	-----	4.52E-02
CE-144	Not Detected	-----	1.82E-01
CO-56	Not Detected	-----	3.84E-02
CO-57	Not Detected	-----	2.39E-02
CO-58	Not Detected	-----	3.34E-02
CO-60	Not Detected	-----	4.16E-02
CR-51	Not Detected	-----	2.35E-01
CS-134	Not Detected	-----	4.26E-02
CS-137	6.56E-02	2.89E-02	2.34E-02
EU-152	Not Detected	-----	7.09E-02
EU-154	Not Detected	-----	1.92E-01
EU-155	Not Detected	-----	1.05E-01
FE-59	Not Detected	-----	8.25E-02
GD-153	Not Detected	-----	7.78E-02
HG-203	Not Detected	-----	2.97E-02
I-131	Not Detected	-----	3.42E-02
IR-192	Not Detected	-----	2.72E-02
K-40	1.10E+01	1.84E+00	3.08E-01
KR-85	Not Detected	-----	8.41E+00
MN-52	Not Detected	-----	4.38E-02
MN-54	Not Detected	-----	3.43E-02
MO-99	Not Detected	-----	4.29E-01
NA-22	Not Detected	-----	4.27E-02
NA-24	Not Detected	-----	3.93E-01
NB-95	Not Detected	-----	2.09E-01
ND-147	Not Detected	-----	2.39E-01
NI-57	Not Detected	-----	1.48E-01
NP-239	Not Detected	-----	9.38E-02
RU-103	Not Detected	-----	3.06E-02
RU-106	Not Detected	-----	2.71E-01
SB-122	Not Detected	-----	7.25E-02
SB-124	Not Detected	-----	3.12E-02
SB-125	Not Detected	-----	8.71E-02
SN-113	Not Detected	-----	3.77E-02
TA-182	Not Detected	-----	1.68E-01
TA-183	Not Detected	-----	2.04E-01
TC-99m	Not Detected	-----	1.09E+01
TL-201	Not Detected	-----	1.71E-01
XE-133	Not Detected	-----	1.84E-01
Y-88	Not Detected	-----	3.15E-02
ZN-65	Not Detected	-----	1.11E-01
ZR-95	Not Detected	-----	6.16E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-31-98 10:02:28 AM *

 * Analyzed by: *YJ 3/21/98* Reviewed by: *KR 3/31/98* *

Customer : C.AAS/MAC (6134/SMO)
 Customer Sample ID : 036797-001
 Lab Sample ID : 80052911

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 747.000 gram
 Sample Date/Time : 3-25-98 11:10:00 AM
 Acquire Start Date/Time : 3-27-98 3:46:48 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	-----	1.37E+00
TH-234	1.09E+00	4.17E-01	4.88E-01
RA-226	1.84E+00	5.46E-01	5.65E-01
PB-214	6.61E-01	1.35E-01	4.88E-02
BI-214	6.44E-01	2.67E-01	4.97E-02
PB-210	Not Detected	-----	7.61E+00
TH-232	5.16E-01	2.64E-01	1.36E-01
RA-228	5.66E-01	2.18E-01	1.58E-01
AC-228	4.74E-01	4.40E-01	9.09E-02
TH-228	3.87E-01	2.68E-01	3.66E-01
RA-224	4.92E-01	1.65E-01	9.84E-02
PB-212	4.91E-01	1.33E-01	3.81E-02
BI-212	6.54E-01	4.03E-01	3.62E-01
TL-208	4.44E-01	1.12E-01	6.87E-02
U-235	Not Detected	-----	2.01E-01
TH-231	Not Detected	-----	2.08E+00
PA-231	Not Detected	-----	3.42E+00
TH-227	Not Detected	-----	3.20E-01
RA-223	Not Detected	-----	1.48E-01
RN-219	Not Detected	-----	4.04E-01
PB-211	Not Detected	-----	9.04E-01
TL-207	Not Detected	-----	1.44E+01
AM-241	Not Detected	-----	1.77E-01
PU-239	Not Detected	-----	3.40E+02
NP-237	4.17E-01	1.30E-01	1.85E-01
PA-233	Not Detected	-----	5.56E-02
TH-229	Not Detected	-----	1.85E-01

not detected YJ 3/31/98

[Summary Report] - Sample ID: : 80050911

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.46E-02
AG-110m	Not Detected	-----	5.98E-02
AM-243	Not Detected	-----	5.01E-02
BA-133	Not Detected	-----	6.14E-02
BE-7	Not Detected	-----	2.84E-01
CD-109	1.67E+00	5.36E-01	6.09E-01
CD-115	Not Detected	-----	1.49E-01
CE-139	Not Detected	-----	2.66E-02
CE-141	Not Detected	-----	4.50E-02
CE-144	Not Detected	-----	1.91E-01
CO-56	Not Detected	-----	3.73E-02
CO-57	Not Detected	-----	2.29E-02
CO-58	Not Detected	-----	3.72E-02
CO-60	Not Detected	-----	4.32E-02
CR-51	Not Detected	-----	2.65E-01
CS-134	Not Detected	-----	5.01E-02
CS-137	2.68E-01	6.01E-02	2.61E-02
EU-152	Not Detected	-----	6.84E-02
EU-154	Not Detected	-----	2.07E-01
EU-155	Not Detected	-----	1.03E-01
FE-59	Not Detected	-----	8.71E-02
GD-153	Not Detected	-----	7.49E-02
HG-203	Not Detected	-----	3.16E-02
I-131	Not Detected	-----	3.72E-02
IR-192	Not Detected	-----	2.98E-02
K-40	2.01E+01	3.06E+00	2.53E-01
KR-85	Not Detected	-----	8.96E+00
MN-52	Not Detected	-----	4.87E-02
MN-54	Not Detected	-----	3.95E-02
MO-99	Not Detected	-----	4.62E-01
NA-22	Not Detected	-----	5.06E-02
NA-24	Not Detected	-----	5.21E-01
NB-95	Not Detected	-----	2.33E-01
ND-147	Not Detected	-----	2.35E-01
NI-57	Not Detected	-----	1.58E-01
NP-239	Not Detected	-----	9.45E-02
RU-103	Not Detected	-----	3.12E-02
RU-106	Not Detected	-----	3.21E-01
SB-122	Not Detected	-----	8.46E-02
SB-124	Not Detected	-----	3.56E-02
SB-125	Not Detected	-----	8.98E-02
SN-113	Not Detected	-----	4.06E-02
TA-182	Not Detected	-----	1.69E-01
TA-183	Not Detected	-----	1.80E-01
TC-99m	Not Detected	-----	2.00E+01
TL-201	Not Detected	-----	1.44E-01
XE-133	Not Detected	-----	1.68E-01
Y-88	Not Detected	-----	3.11E-02
ZN-65	Not Detected	-----	1.13E-01
ZR-95	Not Detected	-----	6.24E-02

NOT DETECTED LRT 3/26/98

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-27-98 8:55:44 PM *

 *
 * Analyzed by: *AM 3/31/98* Reviewed by: *KG 3/31/98* *

Customer : C.AAS/MAC (6134/SMO)
 Customer Sample ID : 036798-001
 Lab Sample ID : 80052912

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 712.000 gram
 Sample Date/Time : 3-25-98 11:20:00 AM
 Acquire Start Date/Time : 3-27-98 7:09:47 PM
 Detector Name : LAB04
 Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	1.67E+00
TH-234	9.32E-01	3.98E-01	4.00E-01
RA-226	2.04E+00	6.76E-01	5.08E-01
PB-214	6.89E-01	1.17E-01	4.00E-02
BI-214	6.25E-01	1.15E-01	3.69E-02
PB-210	Not Detected	-----	8.75E+00
TH-232	5.22E-01	2.77E-01	1.20E-01
RA-228	5.22E-01	1.95E-01	1.16E-01
AC-228	5.44E-01	1.51E-01	7.02E-02
TH-228	4.69E-01	1.83E-01	4.23E-01
RA-224	5.52E-01	2.24E-01	1.56E-01
PB-212	5.46E-01	9.46E-02	3.19E-02
BI-212	4.36E-01	2.51E-01	2.83E-01
TL-208	4.77E-01	9.94E-02	4.80E-02
U-235	1.23E-01	1.61E-01	1.88E-01
TH-231	Not Detected	-----	1.95E+00
PA-231	Not Detected	-----	3.35E+00
TH-227	Not Detected	-----	2.92E-01
RA-223	Not Detected	-----	1.64E-01
RN-219	Not Detected	-----	3.35E-01
PB-211	Not Detected	-----	7.66E-01
TL-207	Not Detected	-----	1.22E+01
AM-241	Not Detected	-----	2.09E-01
PU-239	Not Detected	-----	3.24E+02
NP-237	Not Detected	-----	1.66E-01
PA-233	Not Detected	-----	5.23E-02
TH-229	Not Detected	-----	1.87E-01

Not detected AM 3/31/98

[Summary Report] - Sample ID: : 80052912

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.41E-02
AG-110m	Not Detected	-----	3.32E-02
AM-243	Not Detected	-----	5.11E-02
BA-133	Not Detected	-----	6.21E-02
BE-7	2.16E-01	1.37E-01	1.48E-01
CD-109	Not Detected	-----	5.63E-01
CD-115	Not Detected	-----	1.17E-01
CE-139	Not Detected	-----	2.41E-02
CE-141	Not Detected	-----	4.21E-02
CE-144	Not Detected	-----	1.82E-01
CO-56	Not Detected	-----	2.71E-02
CO-57	Not Detected	-----	2.31E-02
CO-58	Not Detected	-----	2.70E-02
CO-60	Not Detected	-----	3.15E-02
CR-51	Not Detected	-----	2.24E-01
CS-134	Not Detected	-----	4.39E-02
CS-137	7.28E-02	2.78E-02	1.96E-02
EU-152	Not Detected	-----	6.89E-02
EU-154	Not Detected	-----	1.57E-01
EU-155	Not Detected	-----	1.09E-01
FE-59	Not Detected	-----	6.05E-02
GD-153	Not Detected	-----	7.91E-02
HG-203	Not Detected	-----	2.66E-02
I-131	Not Detected	-----	3.09E-02
IR-192	Not Detected	-----	2.47E-02
K-40	1.21E+01	1.87E+00	2.29E-01
KR-85	Not Detected	-----	7.36E+00
MN-52	Not Detected	-----	3.45E-02
MN-54	Not Detected	-----	2.80E-02
MO-99	Not Detected	-----	3.73E-01
NA-22	Not Detected	-----	3.46E-02
NA-24	Not Detected	-----	3.84E-01
NB-95	Not Detected	-----	2.09E-01
ND-147	Not Detected	-----	2.01E-01
NI-57	Not Detected	-----	1.39E-01
NP-239	Not Detected	-----	9.71E-02
RU-103	Not Detected	-----	2.67E-02
RU-106	Not Detected	-----	2.47E-01
SB-122	Not Detected	-----	5.84E-02
SB-124	Not Detected	-----	2.71E-02
SB-125	Not Detected	-----	7.20E-02
SN-113	Not Detected	-----	3.23E-02
TA-182	Not Detected	-----	1.35E-01
TA-183	Not Detected	-----	2.44E-01
TC-99m	Not Detected	-----	1.50E+01
TL-201	Not Detected	-----	1.78E-01
XE-133	Not Detected	-----	2.24E-01
Y-88	Not Detected	-----	2.31E-02
ZN-65	Not Detected	-----	9.18E-02
ZR-95	Not Detected	-----	4.76E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-27-98 9:45:17 PM *

 *
 * Analyzed by: *WJ3/3/98* Reviewed by: *K 3/2/98* *

Customer : C.AAS/MAC (6134/SMO) ✓
 Customer Sample ID : 036799-009
 Lab Sample ID : 80052913

 Sample Description : MARINELLI LIQUID SAMPLE
 Sample Quantity : 500.000 mL
 Sample Date/Time : 3-25-98 10:20:00 AM
 Acquire Start Date/Time : 3-27-98 8:03:30 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	-----	8.03E-01
TH-234	Not Detected	-----	3.20E-01
RA-226	Not Detected	-----	4.61E-01
PB-214	Not Detected	-----	5.56E-02
BI-214	Not Detected	-----	5.90E-02
PB-210	Not Detected	-----	3.97E+00
TH-232	Not Detected	-----	1.54E-01
RA-228	Not Detected	-----	1.69E-01
AC-228	Not Detected	-----	9.34E-02
TH-228	Not Detected	-----	5.18E-01
RA-224	Not Detected	-----	1.54E-01
PB-212	2.17E-02	2.56E-02	3.07E-02
BI-212	Not Detected	-----	3.88E-01
TL-208	Not Detected	-----	8.49E-02
U-235	Not Detected	-----	1.32E-01
TH-231	Not Detected	-----	1.58E+00
PA-231	Not Detected	-----	2.49E+00
TH-227	Not Detected	-----	1.61E-01
RA-223	Not Detected	-----	8.26E-02
RN-219	Not Detected	-----	2.96E-01
PB-211	Not Detected	-----	6.41E-01
TL-207	Not Detected	-----	1.06E+01
AM-241	Not Detected	-----	9.19E-02
PU-239	Not Detected	-----	2.16E+02
NP-237	Not Detected	-----	1.38E-01
PA-233	Not Detected	-----	4.51E-02
TH-229	Not Detected	-----	1.16E-01

[Summary Report] - Sample ID: : 80052913

Nuclide Name	Activity (pCi/mL)	2-sigma Error	MDA (pCi/mL)
-----	-----	-----	-----
AG-108m	Not Detected	-----	2.83E-02
AG-110m	Not Detected	-----	2.55E-02
AM-243	Not Detected	-----	4.03E-02
BA-133	Not Detected	-----	3.19E-02
BE-7	Not Detected	-----	2.10E-01
CD-109	Not Detected	-----	4.60E-01
CD-115	Not Detected	-----	7.83E-02
CE-139	Not Detected	-----	1.82E-02
CE-141	Not Detected	-----	3.00E-02
CE-144	Not Detected	-----	1.23E-01
CO-56	Not Detected	-----	3.66E-02
CO-57	Not Detected	-----	1.60E-02
CO-58	Not Detected	-----	2.95E-02
CO-60	Not Detected	-----	2.88E-02
CR-51	Not Detected	-----	1.90E-01
CS-134	Not Detected	-----	2.62E-02
CS-137	Not Detected	-----	2.76E-02
EU-152	Not Detected	-----	4.85E-02
EU-154	Not Detected	-----	1.27E-01
EU-155	Not Detected	-----	6.76E-02
FE-59	Not Detected	-----	5.03E-02
GD-153	Not Detected	-----	4.85E-02
HG-203	Not Detected	-----	2.27E-02
I-131	Not Detected	-----	2.78E-02
IR-192	Not Detected	-----	2.24E-02
K-40	Not Detected	-----	4.13E-01
KR-85	Not Detected	-----	7.84E+00
MN-52	Not Detected	-----	4.56E-02
MN-54	Not Detected	-----	2.74E-02
MO-99	Not Detected	-----	3.47E-01
NA-22	Not Detected	-----	2.87E-02
NA-24	Not Detected	-----	4.18E-01
NB-95	Not Detected	-----	1.15E-01
ND-147	Not Detected	-----	1.65E-01
NI-57	Not Detected	-----	1.36E-01
NP-239	Not Detected	-----	6.20E-02
RU-103	Not Detected	-----	2.83E-02
RU-106	Not Detected	-----	2.35E-01
SB-122	Not Detected	-----	5.18E-02
SB-124	Not Detected	-----	2.53E-02
SB-125	Not Detected	-----	6.74E-02
SN-113	Not Detected	-----	2.79E-02
TA-182	Not Detected	-----	9.15E-02
TA-183	Not Detected	-----	1.09E-01
TC-99m	Not Detected	-----	1.44E+01
TL-201	Not Detected	-----	9.82E-02
XE-133	Not Detected	-----	1.08E-01
Y-88	Not Detected	-----	3.57E-02
ZN-65	Not Detected	-----	6.29E-02
ZR-95	Not Detected	-----	4.35E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-30-98 8:01:40 AM *

 *
 * Analyzed by: *SW 3/31/98* Reviewed by: *SA 3/24/98* *

Customer : C.AAS/MAC (6134/SMO)
 Customer Sample ID : LAB CONTROL SAMPLE USING CG134
 Lab Sample ID : 80052914

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 : 3-30-98 7:49:47 AM
 Detector Name : LAB01
 Elapsed Live/Real Time : 600 / 604 seconds

Comments:

Nuclide Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
U-238	Not Detected	-----	8.75E+03
TH-234	Not Detected	-----	3.36E+03
RA-226	Not Detected	-----	5.85E+03
PB-214	Not Detected	-----	7.78E+02
BI-214	Not Detected	-----	6.96E+02
PB-210	Not Detected	-----	7.06E+04
TH-232	Not Detected	-----	2.29E+03
RA-228	Not Detected	-----	3.18E+03
AC-228	Not Detected	-----	1.94E+03
TH-228	Not Detected	-----	1.05E+05
RA-224	Not Detected	-----	1.22E+03
PB-212	Not Detected	-----	7.66E+03
BI-212	Not Detected	-----	8.14E+04
TL-208	Not Detected	-----	1.52E+04
U-235	Not Detected	-----	1.56E+03
TH-231	Not Detected	-----	2.10E+04
PA-231	Not Detected	-----	3.35E+04
TH-227	Not Detected	-----	2.60E+03
RA-223	Not Detected	-----	1.00E+26
RN-219	Not Detected	-----	6.63E+03
PB-211	Not Detected	-----	1.49E+04
TL-207	Not Detected	-----	2.62E+05
AM-241	8.37E+04	1.41E+04	1.49E+03
PU-239	Not Detected	-----	2.51E+06
NP-237	Not Detected	-----	1.73E+03
PA-233	Not Detected	-----	6.51E+02
TH-229	Not Detected	-----	1.39E+03

[Summary Report] - Sample ID: : 80052914

Nuclide Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
AG-108m	Not Detected	-----	4.14E+02
AG-110m	Not Detected	-----	3.30E+06
AM-243	Not Detected	-----	4.34E+02
BA-133	Not Detected	-----	7.61E+02
BE-7	Not Detected	-----	7.24E+18
CD-109	3.74E+05	2.94E+05	2.53E+05
CD-115	Not Detected	-----	1.00E+26
CE-139	Not Detected	-----	1.72E+08
CE-141	Not Detected	-----	1.00E+26
CE-144	Not Detected	-----	1.05E+06
CO-56	Not Detected	-----	1.64E+13
CO-57	Not Detected	-----	1.82E+05
CO-58	Not Detected	-----	1.24E+14
CO-60	7.92E+04	1.12E+04	5.06E+02
CR-51	Not Detected	-----	1.00E+26
CS-134	Not Detected	-----	4.14E+03
CS-137	6.88E+04	9.22E+03	3.09E+02
EU-152	Not Detected	-----	8.06E+02
EU-154	Not Detected	-----	3.34E+03
EU-155	Not Detected	-----	2.33E+03
FE-59	Not Detected	-----	2.00E+21
GD-153	Not Detected	-----	1.32E+06
HG-203	Not Detected	-----	9.31E+19
I-131	Not Detected	-----	1.00E+26
IR-192	Not Detected	-----	3.27E+13
K-40	Not Detected	-----	1.83E+03
KR-85	Not Detected	-----	1.33E+05
MN-52	Not Detected	-----	1.00E+26
MN-54	Not Detected	-----	1.71E+05
MO-99	Not Detected	-----	1.00E+26
NA-22	Not Detected	-----	1.80E+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
NP-239	Not Detected	-----	7.02E+02
RU-103	Not Detected	-----	1.00E+26
RU-106	Not Detected	-----	5.31E+05
SB-122	Not Detected	-----	1.00E+26
SB-124	Not Detected	-----	1.16E+16
SB-125	Not Detected	-----	8.47E+03
SN-113	Not Detected	-----	5.80E+09
TA-182	Not Detected	-----	1.80E+10
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	-----	8.53E+09
ZN-65	Not Detected	-----	2.33E+06
ZR-95	Not Detected	-----	3.68E+15

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

Report Date : 3-30-98 8:02:18 AM
 QA File : C:\GENIEPC\CAMFILES\LCS1.QAF
 Analyst : GLS
 Sample ID : 80052914
 Sample Quantity : 1.00 Each
 Sample Date : 11-01-90 12:00:00 PM
 Measurement Date : 3-30-98 7:49:47 AM
 Elapsed Live Time : 600 seconds
 Elapsed Real Time : 604 seconds

Parameter	Mean	1S Error	New Value	< LU : SD : UD : BS >
AM-241 Activity	8.634E-02	1.938E-03	8.369E-02	< : : : >
CS-137 Activity	6.823E-02	1.008E-03	6.877E-02	< : : : >
CO-60 Activity	7.549E-02	2.699E-03	7.851E-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: WJ 3/31/98

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 3-30-98 8:15:40 AM *

 *
 * Analyzed by: XW 3/31/98 Reviewed by: XW 3/31/98 *

Customer : C.AAS/MAC (6134/SMO)
 Customer Sample ID : LAB CONTROL SAMPLE USING CG134
 Lab Sample ID : 80052915

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 : 3-30-98 8:03:46 AM
 Detector Name : LAB04
 Elapsed Live/Real Time : 600 / 606 seconds

Comments:

Nuclide Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
U-238	Not Detected	-----	1.53E+04
TH-234	Not Detected	-----	3.33E+03
RA-226	Not Detected	-----	5.24E+03
PB-214	Not Detected	-----	6.41E+02
BI-214	Not Detected	-----	5.86E+02
PB-210	Not Detected	-----	8.38E+04
TH-232	Not Detected	-----	2.08E+03
RA-228	Not Detected	-----	2.49E+03
AC-228	Not Detected	-----	1.48E+03
TH-228	Not Detected	-----	9.24E+04
RA-224	Not Detected	-----	3.23E+03
PB-212	Not Detected	-----	6.60E+03
BI-212	Not Detected	-----	6.03E+04
TL-208	Not Detected	-----	1.27E+04
U-235	Not Detected	-----	1.38E+03
TH-231	Not Detected	-----	1.83E+04
PA-231	Not Detected	-----	3.08E+04
TH-227	Not Detected	-----	2.23E+03
RA-223	Not Detected	-----	1.00E+26
RN-219	Not Detected	-----	5.34E+03
PB-211	Not Detected	-----	1.20E+04
TL-207	Not Detected	-----	2.07E+05
AM-241	8.82E+04	1.48E+04	1.37E+03
PU-239	Not Detected	-----	2.38E+06
NP-237	Not Detected	-----	1.66E+03
PA-233	Not Detected	-----	5.85E+02
TH-229	Not Detected	-----	1.34E+03

[Summary Report] - Sample ID: : 80052915

Nuclide Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
AG-108m	Not Detected	-----	3.04E+02
AG-110m	Not Detected	-----	2.88E+06
AM-243	Not Detected	-----	4.23E+02
BA-133	Not Detected	-----	6.57E+02
BE-7	Not Detected	-----	5.92E+18
CD-109	2.91E+05	1.39E+05	1.83E+05
CD-115	Not Detected	-----	1.00E+26
CE-139	Not Detected	-----	1.58E+08
CE-141	Not Detected	-----	1.00E+26
CE-144	Not Detected	-----	9.67E+05
CO-56	Not Detected	-----	1.23E+13
CO-57	Not Detected	-----	1.75E+05
CO-58	Not Detected	-----	9.58E+13
CO-60	8.04E+04	1.09E+04	3.65E+02
CR-51	Not Detected	-----	1.00E+26
CS-134	Not Detected	-----	3.32E+03
CS-137	7.23E+04	9.60E+03	2.40E+02
EU-152	Not Detected	-----	7.76E+02
EU-154	Not Detected	-----	2.46E+03
EU-155	Not Detected	-----	2.26E+03
FE-59	Not Detected	-----	1.49E+21
GD-153	Not Detected	-----	1.25E+06
HG-203	Not Detected	-----	8.06E+19
I-131	Not Detected	-----	1.00E+26
IR-192	Not Detected	-----	2.90E+13
K-40	Not Detected	-----	1.59E+03
KR-85	Not Detected	-----	1.08E+05
MN-52	Not Detected	-----	1.00E+26
MN-54	Not Detected	-----	1.33E+05
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
NP-239	Not Detected	-----	6.81E+02
RU-103	Not Detected	-----	1.00E+26
RU-106	Not Detected	-----	4.46E+05
SB-122	Not Detected	-----	1.00E+26
SB-124	Not Detected	-----	9.21E+15
SB-125	Not Detected	-----	6.65E+03
SN-113	Not Detected	-----	4.89E+09
TA-182	Not Detected	-----	1.30E+10
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	-----	6.93E+09
ZN-65	Not Detected	-----	1.78E+06
ZR-95	Not Detected	-----	2.78E+15

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

Report Date : 3-30-98 8:16:19 AM
 QA File : C:\GENIEPC\CAMFILES\LCS4.QAF
 Analyst : GLS
 Sample ID : 80052915
 Sample Quantity : 1.00 Each
 Sample Date : 11-01-90 12:00:00 PM
 Measurement Date : 3-30-98 8:03:46 AM
 Elapsed Live Time : 600 seconds
 Elapsed Real Time : 606 seconds

Parameter	Mean	1S Error	New Value	< LU : SD : UD : BS >
AM-241 Activity	8.747E-02	1.503E-03	8.825E-02	< : : : >
CS-137 Activity	7.086E-02	1.812E-03	7.229E-02	< : : : >
CO-60 Activity	7.940E-02	2.248E-03	8.066E-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: W 3/31/98

PAGE 1 OF 1

Internal Lab

SF 2001-CDC (5.97)

Batch No.

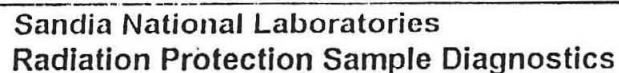
SAR/WR No.

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

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

YELLOW- SMO Suspense Copy

PINK- Field Copy



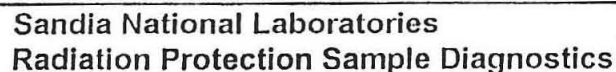
To be completed by Customer

Shaded areas are for RPSD use only

Customer :	<u>AAS / PAVLETCH</u>	Hazards/Special Instructions:	<u>RELEASES</u> <u>CDC # 510196</u>	Batch Log Number:	
Organization:	<u>6134</u>			Logged By:	
Project Location:	<u>CCTA-61A</u>	<u>RUSH</u> RESULTS NEEDED FOR OFFSITE SAMPLE RELEASE	Analysis Type: <input type="checkbox"/> Gamma Spec <input type="checkbox"/> H-3 <input type="checkbox"/> Alpha/Beta <input type="checkbox"/> Alpha Spec <input type="checkbox"/> Total U <input type="checkbox"/> Other		
Phone:	<u>204-2479</u>				
Date Results Needed:	<u>RUSH</u>	Fax results to Mark Miller @ 204-2616			
Suspect Isotopes:	<u>DU, TH</u>				
Case Number:	<u>745.220500</u>				

[illegible]

Relinquished by _____	Date _____	Received by _____	Date _____
Relinquished by _____	Date _____	Received by _____	Date _____
Relinquished by _____	Date _____	Received by _____	Date _____
Relinquished by _____	Date _____	Received by _____	Date _____



RUSH!

Sample Analysis Request Form

Page / of /

To be completed by Customer

Shaded areas are for RPSD use only

Customer :	AAS / PAULETCH
Organization:	6134
Project Location:	CCTA-61A
Phone:	284-2479
Date Results Needed:	RUSH
Suspect Isotopes:	DU, Th
Case Number:	7215.220500

Hazards/Special Instructions:

RELEASES

CDC # 510196

Rusit

RESULTS NEEDED FOR OFFSITE SAMPLE RELEASE

FAX RESULTS TO MARK MILLER @ 284-2616

Batch Log Number:

800580

Logged By:

700

Analysis Type:

☒ Gamma Spec

PH-3

☐ Alpha/Beta

- Alpha Spec

☐ Total U

☐ Other[illegible]

Relinquished by [Signature]
Relinquished by _____
Relinquished by _____
Relinquished by _____

Date 4/2/98
Date 11/6/98
Date _____
Date _____

Received by
Received by
Received by
Received by

Date 4/2/98
Date _____
Date _____
Date _____

RUSH!

PAGE 1 OF 1

Batch No. 800580

SAR/WR No.

AR/COC- 510435

SF 2001-COC (5-97)
Superseded (6-95) issue.

V	- To Accompany Samples, Laboratory Copy	BLUE-	To Accompany Samples, Return to SMO	YEL	SMO Suspense Copy	PINK- Field Copy
---	---	-------	-------------------------------------	-----	-------------------	------------------

```

*****
*                               Sandia National Laboratories                               *
*   Radiation Protection Sample Diagnostics Program [881 Laboratory]                   *
*                               4-03-98  8:07:57 AM                                   *
*****
* Analyzed by: [Signature] 4/3/98 Reviewed by: [Signature] 4/3/98
*****
Customer      : C.AAS/D.BISWELL (6134/SMO)
Customer Sample ID : 036800-101
Lab Sample ID  : 80058001

```

```

Sample Description      : MARINELLI SOLID SAMPLE
Sample Quantity        : 817.000 gram
Sample Date/Time       : 4-01-98 10:40:00 AM
Acquire Start Date/Time : 4-02-98 11:33:59 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	-----	2.95E+00
TH-234	1.17E+00	7.28E-01	6.16E-01
RA-226	1.05E+00	4.66E-01	4.28E-01
PB-214	4.40E-01	9.06E-02	4.24E-02
BI-214	4.02E-01	8.62E-02	4.12E-02
PB-210	Not Detected	-----	3.02E+01
TH-232	6.62E-01	3.53E-01	1.29E-01
RA-228	6.87E-01	3.10E-01	1.47E-01
AC-228	6.88E-01	1.53E-01	7.97E-02
TH-228	4.70E-01	1.91E-01	4.49E-01
RA-224	7.03E-01	2.63E-01	6.13E-02
PB-212	6.12E-01	1.16E-01	3.60E-02
BI-212	6.51E-01	3.25E-01	2.78E-01
TL-208	5.92E-01	1.32E-01	5.83E-02
U-235	Not Detected	-----	2.15E-01
TH-231	Not Detected	-----	2.02E+00
PA-231	Not Detected	-----	3.45E+00
TH-227	Not Detected	-----	2.97E-01
RA-223	Not Detected	-----	1.91E-01
RN-219	Not Detected	-----	3.26E-01
PB-211	Not Detected	-----	7.47E-01
TL-207	Not Detected	-----	1.21E+01
AM-241	Not Detected	-----	4.31E-01
PU-239	Not Detected	-----	3.93E+02
NP-237	Not Detected	-----	3.10E-01
PA-233	Not Detected	-----	5.16E-02
TH-229	Not Detected	-----	2.28E-01

[Summary Report] - Sample ID: : 80058001

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.58E-02
AG-110m	Not Detected	-----	2.71E-02
AM-243	Not Detected	-----	8.07E-02
BA-133	Not Detected	-----	5.29E-02
BE-7	Not Detected	-----	2.15E-01
CD-109	1.82E+00	1.11E+00	1.05E+00
CD-115	Not Detected	-----	9.13E-02
CE-139	Not Detected	-----	2.64E-02
CE-141	Not Detected	-----	4.72E-02
CE-144	Not Detected	-----	2.16E-01
CO-56	Not Detected	-----	3.21E-02
CO-57	Not Detected	-----	2.66E-02
CO-58	Not Detected	-----	2.99E-02
CO-60	Not Detected	-----	3.35E-02
CR-51	Not Detected	-----	2.08E-01
CS-134	Not Detected	-----	3.85E-02
CS-137	Not Detected	-----	2.91E-02
EU-152	Not Detected	-----	8.01E-02
EU-154	Not Detected	-----	1.65E-01
EU-155	Not Detected	-----	1.30E-01
FE-59	Not Detected	-----	6.69E-02
GD-153	Not Detected	-----	9.38E-02
HG-203	Not Detected	-----	2.85E-02
I-131	Not Detected	-----	2.83E-02
IR-192	Not Detected	-----	2.45E-02
K-40	1.77E+01	2.55E+00	2.40E-01
KR-85	Not Detected	-----	7.40E+00
MN-52	Not Detected	-----	2.98E-02
MN-54	Not Detected	-----	2.99E-02
MO-99	Not Detected	-----	3.02E-01
NA-22	Not Detected	-----	3.78E-02
NA-24	Not Detected	-----	1.58E-01
NB-95	Not Detected	-----	1.85E-01
ND-147	Not Detected	-----	1.93E-01
NI-57	Not Detected	-----	7.92E-02
NP-239	Not Detected	-----	1.18E-01
RU-103	Not Detected	-----	2.43E-02
RU-106	Not Detected	-----	2.64E-01
SB-122	Not Detected	-----	5.14E-02
SB-124	Not Detected	-----	2.66E-02
SB-125	Not Detected	-----	6.78E-02
SN-113	Not Detected	-----	3.28E-02
TA-182	Not Detected	-----	1.28E-01
TA-183	Not Detected	-----	4.57E-01
TC-99m	Not Detected	-----	1.99E+00
TL-201	Not Detected	-----	2.30E-01
XE-133	Not Detected	-----	2.11E-01
Y-88	Not Detected	-----	2.13E-02
ZN-65	Not Detected	-----	8.73E-02
ZR-95	Not Detected	-----	5.25E-02

Not detected 7/3/98

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 4-02-98 6:17:29 PM *

 *
 * Analyzed by: *[Signature]* 4/3/98 Reviewed by: *[Signature]* 4/3/98 *

Customer : C.AAS/D.BISWELL (6134/SMO)
 Customer Sample ID : 036801-101
 Lab Sample ID : 80058002

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 845.000 gram
 Sample Date/Time : 4-01-98 10:50:00 AM
 Acquire Start Date/Time : 4-02-98 4:34:29 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	-----	3.02E+00
TH-234	8.18E-01	3.36E-01	4.85E-01
RA-226	9.37E-01	3.05E-01	4.85E-01
PB-214	4.79E-01	9.14E-02	4.21E-02
BI-214	4.45E-01	2.30E-01	4.42E-02
PB-210	Not Detected	-----	3.17E+01
TH-232	6.30E-01	3.08E-01	1.34E-01
RA-228	7.76E-01	2.63E-01	1.41E-01
AC-228	7.70E-01	2.09E-01	8.50E-02
TH-228	6.65E-01	2.16E-01	4.11E-01
RA-224	7.35E-01	2.33E-01	6.51E-02
PB-212	7.13E-01	6.09E-01	3.72E-02
BI-212	7.78E-01	2.90E-01	2.77E-01
TL-208	6.24E-01	3.86E-01	6.54E-02
U-235	Not Detected	-----	2.18E-01
TH-231	Not Detected	-----	2.10E+00
PA-231	Not Detected	-----	3.57E+00
TH-227	Not Detected	-----	3.14E-01
RA-223	Not Detected	-----	1.95E-01
RN-219	Not Detected	-----	3.46E-01
PB-211	Not Detected	-----	7.74E-01
TL-207	Not Detected	-----	1.30E+01
AM-241	Not Detected	-----	4.40E-01
PU-239	Not Detected	-----	4.01E+02
NP-237	4.29E-01	1.60E-01	2.47E-01
PA-233	Not Detected	-----	5.28E-02
TH-229	Not Detected	-----	2.31E-01

not detected *[Signature]* 4/3/98

[Summary Report] - Sample ID: : 80058002

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
-----	-----	-----	-----
AG-108m	Not Detected	-----	3.74E-02
AG-110m	Not Detected	-----	2.90E-02
AM-243	Not Detected	-----	9.82E-02
BA-133	Not Detected	-----	5.47E-02
BE-7	Not Detected	-----	2.26E-01
CD-109	Not Detected	-----	8.39E-01
CD-115	Not Detected	-----	8.52E-02
CE-139	Not Detected	-----	2.69E-02
CE-141	Not Detected	-----	4.83E-02
CE-144	Not Detected	-----	2.23E-01
CO-56	Not Detected	-----	3.49E-02
CO-57	Not Detected	-----	2.80E-02
CO-58	Not Detected	-----	3.08E-02
CO-60	Not Detected	-----	3.24E-02
CR-51	Not Detected	-----	2.18E-01
CS-134	Not Detected	-----	3.97E-02
CS-137	Not Detected	-----	3.09E-02
EU-152	Not Detected	-----	8.43E-02
EU-154	Not Detected	-----	1.74E-01
EU-155	Not Detected	-----	1.35E-01
FE-59	Not Detected	-----	6.99E-02
GD-153	Not Detected	-----	9.66E-02
HG-203	Not Detected	-----	2.84E-02
I-131	Not Detected	-----	2.88E-02
IR-192	Not Detected	-----	2.51E-02
K-40	2.23E+01	3.18E+00	2.28E-01
KR-85	Not Detected	-----	7.62E+00
MN-52	Not Detected	-----	3.06E-02
MN-54	Not Detected	-----	1.37E-02
MO-99	Not Detected	-----	2.96E-01
NA-22	Not Detected	-----	4.32E-02
NA-24	Not Detected	-----	1.22E-01
NB-95	Not Detected	-----	1.84E-01
ND-147	Not Detected	-----	1.91E-01
NI-57	Not Detected	-----	4.51E-02
NP-239	Not Detected	-----	1.21E-01
RU-103	Not Detected	-----	2.58E-02
RU-106	Not Detected	-----	2.69E-01
SB-122	Not Detected	-----	5.07E-02
SB-124	Not Detected	-----	2.78E-02
SB-125	Not Detected	-----	7.32E-02
SN-113	Not Detected	-----	3.30E-02
TA-182	Not Detected	-----	1.39E-01
TA-183	Not Detected	-----	4.42E-01
TC-99m	Not Detected	-----	8.86E-01
TL-201	Not Detected	-----	2.22E-01
XE-133	Not Detected	-----	1.94E-01
Y-88	Not Detected	-----	2.41E-02
ZN-65	Not Detected	-----	9.25E-02
ZR-95	Not Detected	-----	5.25E-02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 4-02-98 8:02:38 PM *

 *
 * Analyzed by: *[Signature]* 4/3/98 Reviewed by: *KR 4/3/98* *

 Customer : C.AAS/D.BISWELL (6134/SMO)
 Customer Sample ID : 036802-101
 Lab Sample ID : 80058003

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 887.000 gram
 Sample Date/Time : 4-01-98 10:05:00 AM
 Acquire Start Date/Time : 4-02-98 6:19:38 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	3.65E+00	3.99E+00	2.20E+00
TH-234	2.53E+00	6.44E-01	5.17E-01
RA-226	1.64E+00	6.81E-01	4.49E-01
PB-214	4.06E-01	7.85E-01	3.70E-02
BI-214	3.76E-01	8.23E-02	3.92E-02
PB-210	Not Detected	-----	3.01E+01
TH-232	6.09E-01	2.94E-01	1.15E-01
RA-228	7.23E-01	2.24E-01	1.41E-01
AC-228	6.98E-01	1.89E-01	7.84E-02
TH-228	6.44E-01	2.20E-01	4.11E-01
RA-224	6.61E-01	1.96E-01	6.94E-02
PB-212	6.89E-01	1.17E-01	3.50E-02
BI-212	8.23E-01	3.95E-01	2.72E-01
TL-208	5.81E-01	2.13E-01	5.88E-02
U-235	1.26E-01	1.83E-01	2.14E-01
TH-231	Not Detected	-----	1.94E+00
PA-231	Not Detected	-----	3.28E+00
TH-227	Not Detected	-----	2.93E-01
RA-223	Not Detected	-----	1.89E-01
RN-219	Not Detected	-----	3.16E-01
PB-211	Not Detected	-----	7.25E-01
TL-207	Not Detected	-----	1.17E+01
AM-241	Not Detected	-----	4.19E-01
PU-239	Not Detected	-----	3.87E+02
NP-237	Not Detected	-----	2.53E-01
PA-233	Not Detected	-----	4.89E-02
TH-229	Not Detected	-----	2.31E-01

NOT DETECTED KR 4/2/98

[Summary Report] - Sample ID: : 80058003

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.48E-02
AG-110m	Not Detected	-----	2.63E-02
AM-243	Not Detected	-----	7.57E-02
BA-133	Not Detected	-----	5.03E-02
BE-7	Not Detected	-----	2.17E-01
CD-109	1.02E+00	3.92E-01	8.59E-01
CD-115	Not Detected	-----	8.34E-02
CE-139	Not Detected	-----	2.53E-02
CE-141	Not Detected	-----	4.70E-02
CE-144	Not Detected	-----	2.12E-01
CO-56	Not Detected	-----	3.05E-02
CO-57	Not Detected	-----	2.59E-02
CO-58	Not Detected	-----	2.72E-02
CO-60	Not Detected	-----	3.16E-02
CR-51	Not Detected	-----	2.06E-01
CS-134	Not Detected	-----	3.66E-02
CS-137	Not Detected	-----	2.81E-02
EU-152	Not Detected	-----	7.78E-02
EU-154	Not Detected	-----	1.60E-01
EU-155	Not Detected	-----	1.29E-01
FE-59	Not Detected	-----	6.60E-02
GD-153	Not Detected	-----	9.67E-02
HG-203	Not Detected	-----	2.73E-02
I-131	Not Detected	-----	2.81E-02
IR-192	Not Detected	-----	2.36E-02
K-40	2.01E+01	2.90E+00	2.28E-01
KR-85	Not Detected	-----	7.14E+00
MN-52	Not Detected	-----	3.10E-02
MN-54	Not Detected	-----	1.40E-02
MO-99	Not Detected	-----	3.02E-01
NA-22	Not Detected	-----	3.82E-02
NA-24	Not Detected	-----	1.32E-01
NB-95	Not Detected	-----	1.75E-01
ND-147	Not Detected	-----	1.84E-01
NI-57	Not Detected	-----	4.62E-02
NP-239	Not Detected	-----	1.16E-01
RU-103	Not Detected	-----	2.56E-02
RU-106	Not Detected	-----	2.57E-01
SB-122	Not Detected	-----	4.81E-02
SB-124	Not Detected	-----	2.61E-02
SB-125	Not Detected	-----	6.65E-02
SN-113	Not Detected	-----	3.21E-02
TA-182	Not Detected	-----	1.26E-01
TA-183	Not Detected	-----	4.39E-01
TC-99m	Not Detected	-----	1.14E+00
TL-201	Not Detected	-----	2.20E-01
XE-133	Not Detected	-----	2.00E-01
Y-88	Not Detected	-----	2.21E-02
ZN-65	Not Detected	-----	8.72E-02
ZR-95	Not Detected	-----	4.93E-02

Not detected 4/3/95

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 4-02-98 9:47:47 PM *

 * Analyzed by: *J 4/3/98* Reviewed by: *K 4/3/98* *

 Customer : C.AAS/D.BISWELL (6134/SMO)
 Customer Sample ID : 036803-101
 Lab Sample ID : 80058004

Sample Description : MARINELLI SOLID SAMPLE
 Sample Quantity : 843.000 gram
 Sample Date/Time : 4-01-98 10:15:00 AM
 Acquire Start Date/Time : 4-02-98 8:04:51 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	-----	3.02E+00
TH-234	1.26E+00	4.51E-01	5.40E-01
RA-226	Not Detected	-----	4.84E-01
PB-214	5.21E-01	1.08E-01	4.24E-02
BI-214	4.73E-01	2.57E-01	4.00E-02
PB-210	Not Detected	-----	3.19E+01
TH-232	7.19E-01	5.03E-01	1.23E-01
RA-228	7.13E-01	4.49E-01	1.40E-01
AC-228	7.68E-01	1.70E-01	7.90E-02
TH-228	6.14E-01	2.17E-01	4.44E-01
RA-224	8.27E-01	2.37E-01	6.11E-02
PB-212	7.28E-01	1.20E-01	3.70E-02
BI-212	7.73E-01	4.40E-01	2.87E-01
TL-208	6.44E-01	6.06E-01	6.15E-02
U-235	Not Detected	-----	2.26E-01
TH-231	Not Detected	-----	2.09E+00
PA-231	Not Detected	-----	3.46E+00
TH-227	Not Detected	-----	3.18E-01
RA-223	Not Detected	-----	1.94E-01
RN-219	Not Detected	-----	3.40E-01
PB-211	Not Detected	-----	7.68E-01
TL-207	Not Detected	-----	1.29E+01
AM-241	Not Detected	-----	4.30E-01
PU-239	Not Detected	-----	4.15E+02
NP-237	Not Detected	-----	2.46E-01
PA-233	Not Detected	-----	5.28E-02
TH-229	Not Detected	-----	2.36E-01

[Summary Report] - Sample ID: : 80058004

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.66E-02
AG-110m	Not Detected	-----	2.85E-02
AM-243	Not Detected	-----	8.50E-02
BA-133	Not Detected	-----	5.55E-02
BE-7	Not Detected	-----	2.26E-01
CD-109	Not Detected	-----	8.34E-01
CD-115	Not Detected	-----	9.32E-02
CE-139	Not Detected	-----	2.71E-02
CE-141	Not Detected	-----	5.00E-02
CE-144	Not Detected	-----	2.26E-01
CO-56	Not Detected	-----	3.23E-02
CO-57	Not Detected	-----	2.86E-02
CO-58	Not Detected	-----	3.01E-02
CO-60	Not Detected	-----	3.31E-02
CR-51	Not Detected	-----	2.14E-01
CS-134	Not Detected	-----	3.98E-02
CS-137	Not Detected	-----	2.98E-02
EU-152	Not Detected	-----	8.59E-02
EU-154	Not Detected	-----	1.69E-01
EU-155	6.28E+00	9.66E-01	9.29E-02
FE-59	Not Detected	-----	6.89E-02
GD-153	Not Detected	-----	9.86E-02
HG-203	Not Detected	-----	2.89E-02
I-131	Not Detected	-----	2.89E-02
IR-192	Not Detected	-----	2.51E-02
K-40	2.09E+01	3.01E+00	2.35E-01
KR-85	Not Detected	-----	7.53E+00
MN-52	Not Detected	-----	3.24E-02
MN-54	Not Detected	-----	3.29E-02
MO-99	Not Detected	-----	3.21E-01
NA-22	Not Detected	-----	3.94E-02
NA-24	Not Detected	-----	1.38E-01
NB-95	5.86E-02	3.18E-02	7.18E-02
ND-147	Not Detected	-----	1.97E-01
NI-57	Not Detected	-----	4.49E-02
NP-239	Not Detected	-----	1.24E-01
RU-103	Not Detected	-----	2.62E-02
RU-106	Not Detected	-----	2.55E-01
SB-122	Not Detected	-----	4.99E-02
SB-124	Not Detected	-----	2.65E-02
SB-125	Not Detected	-----	7.07E-02
SN-113	Not Detected	-----	3.36E-02
TA-182	Not Detected	-----	1.32E-01
TA-183	Not Detected	-----	4.44E-01
TC-99m	Not Detected	-----	1.44E+00
TL-201	Not Detected	-----	2.32E-01
XE-133	Not Detected	-----	2.05E-01
Y-88	Not Detected	-----	2.22E-02
ZN-65	Not Detected	-----	9.09E-02
ZR-95	Not Detected	-----	5.21E-02

not detected 7/3/88

not detected 7/3/88

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 4-03-98 8:27:08 AM *

 *
 * Analyzed by: *[Signature]* 4/3/98 Reviewed by: *[Signature]* 4/3/98 *

Customer : C.AAS/D.BISWELL (6134/SMO)
 Customer Sample ID : 036804-109
 Lab Sample ID : 80058005

Sample Description : MARINELLI LIQUID SAMPLE
 Sample Quantity : 500.000 mL
 Sample Date/Time : 4-01-98 9:45:00 AM
 Acquire Start Date/Time : 4-02-98 9:49:58 PM
 Detector Name : LAB02
 Elapsed Live/Real Time : 6000 / 6001 seconds

Comments:

Nuclide Name	Activity (pCi/mL)	2-sigma Error	MDA (pCi/mL)
U-238	Not Detected	-----	1.77E+00
TH-234	Not Detected	-----	4.15E-01
RA-226	Not Detected	-----	4.84E-01
PB-214	Not Detected	-----	4.70E-02
BI-214	Not Detected	-----	5.52E-02
PB-210	Not Detected	-----	1.54E+01
TH-232	Not Detected	-----	1.49E-01
RA-228	Not Detected	-----	1.46E-01
AC-228	Not Detected	-----	8.50E-02
TH-228	Not Detected	-----	4.77E-01
RA-224	Not Detected	-----	1.11E-01
PB-212	Not Detected	-----	3.71E-02
BI-212	Not Detected	-----	3.02E-01
TL-208	Not Detected	-----	7.10E-02
U-235	Not Detected	-----	1.57E-01
TH-231	Not Detected	-----	1.58E+00
PA-231	Not Detected	-----	2.79E+00
TH-227	Not Detected	-----	1.38E-01
RA-223	Not Detected	-----	1.09E-01
RN-219	Not Detected	-----	2.70E-01
PB-211	Not Detected	-----	6.32E-01
TL-207	Not Detected	-----	9.87E+00
AM-241	Not Detected	-----	2.56E-01
PU-239	Not Detected	-----	2.76E+02
NP-237	Not Detected	-----	1.84E-01
PA-233	Not Detected	-----	4.19E-02
TH-229	Not Detected	-----	1.45E-01

[Summary Report] - Sample ID: : 80058005

Nuclide Name	Activity (pCi/mL)	2-sigma Error	MDA (pCi/mL)
AG-108m	Not Detected	-----	2.44E-02
AG-110m	Not Detected	-----	2.27E-02
AM-243	Not Detected	-----	5.92E-02
BA-133	Not Detected	-----	3.01E-02
BE-7	Not Detected	-----	1.86E-01
CD-109	Not Detected	-----	5.99E-01
CD-115	Not Detected	-----	5.95E-02
CE-139	Not Detected	-----	1.88E-02
CE-141	Not Detected	-----	3.50E-02
CE-144	Not Detected	-----	1.55E-01
CO-56	Not Detected	-----	3.31E-02
CO-57	Not Detected	-----	1.90E-02
CO-58	Not Detected	-----	2.21E-02
CO-60	Not Detected	-----	2.83E-02
CR-51	Not Detected	-----	1.75E-01
CS-134	Not Detected	-----	2.54E-02
CS-137	Not Detected	-----	2.33E-02
EU-152	Not Detected	-----	5.72E-02
EU-154	Not Detected	-----	1.11E-01
EU-155	Not Detected	-----	9.11E-02
FE-59	Not Detected	-----	4.20E-02
GD-153	Not Detected	-----	6.01E-02
HG-203	Not Detected	-----	2.13E-02
I-131	Not Detected	-----	2.30E-02
IR-192	Not Detected	-----	1.97E-02
K-40	Not Detected	-----	3.35E-01
KR-85	Not Detected	-----	7.30E+00
MN-52	Not Detected	-----	2.92E-02
MN-54	Not Detected	-----	2.27E-02
MO-99	Not Detected	-----	2.43E-01
NA-22	Not Detected	-----	2.46E-02
NA-24	Not Detected	-----	1.39E-01
NB-95	Not Detected	-----	8.52E-02
ND-147	Not Detected	-----	1.59E-01
NI-57	Not Detected	-----	6.29E-02
NP-239	Not Detected	-----	8.01E-02
RU-103	Not Detected	-----	2.21E-02
RU-106	Not Detected	-----	2.29E-01
SB-122	Not Detected	-----	4.17E-02
SB-124	Not Detected	-----	2.51E-02
SB-125	Not Detected	-----	6.08E-02
SN-113	Not Detected	-----	2.75E-02
TA-182	Not Detected	-----	7.15E-02
TA-183	Not Detected	-----	2.71E-01
TC-99m	Not Detected	-----	1.40E+00
TL-201	Not Detected	-----	1.33E-01
XE-133	Not Detected	-----	1.16E-01
Y-88	Not Detected	-----	2.68E-02
ZN-65	Not Detected	-----	4.89E-02
ZR-95	Not Detected	-----	3.69E-02

```

*****
*                               Sandia National Laboratories                               *
*   Radiation Protection Sample Diagnostics Program [881 Laboratory]                     *
*                               4-03-98  7:33:12 AM                                     *
*****
*
* Analyzed by: [Signature] 4/3/98      Reviewed by: [Signature] 4/3/98
*****
Customer      : C.AAS/D.BISWELL (6134/SMO)
Customer Sample ID : LAB CONTROL SAMPLE USING CG134
Lab Sample ID  : 80058006

```

```

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 : 4-03-98  7:21:08 AM
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	-----	2.10E+04
TH-234	Not Detected	-----	4.72E+03
RA-226	Not Detected	-----	6.19E+03
PB-214	Not Detected	-----	7.11E+02
BI-214	Not Detected	-----	6.30E+02
PB-210	Not Detected	-----	2.65E+05
TH-232	Not Detected	-----	2.30E+03
RA-228	Not Detected	-----	2.64E+03
AC-228	Not Detected	-----	1.55E+03
TH-228	Not Detected	-----	1.04E+05
RA-224	Not Detected	-----	3.04E+03
PB-212	Not Detected	-----	7.31E+03
BI-212	Not Detected	-----	6.64E+04
TL-208	Not Detected	-----	1.40E+04
U-235	Not Detected	-----	1.82E+03
TH-231	Not Detected	-----	2.11E+04
PA-231	Not Detected	-----	3.66E+04
TH-227	Not Detected	-----	2.49E+03
RA-223	Not Detected	-----	1.00E+26
RN-219	Not Detected	-----	5.71E+03
PB-211	Not Detected	-----	1.29E+04
TL-207	Not Detected	-----	2.19E+05
AM-241	8.37E+04	1.50E+04	3.27E+03
PU-239	Not Detected	-----	3.25E+06
NP-237	Not Detected	-----	2.34E+03
PA-233	Not Detected	-----	6.30E+02
TH-229	Not Detected	-----	1.78E+03

[Summary Report] - Sample ID: : 80058006

Nuclide Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
AG-108m	Not Detected	-----	3.40E+02
AG-110m	Not Detected	-----	3.07E+06
AM-243	Not Detected	-----	7.22E+02
BA-133	Not Detected	-----	7.35E+02
BE-7	Not Detected	-----	7.22E+18
CD-109	2.30E+05	2.26E+05	3.25E+05
CD-115	Not Detected	-----	1.00E+26
CE-139	Not Detected	-----	2.00E+08
CE-141	Not Detected	-----	1.00E+26
CE-144	Not Detected	-----	1.32E+06
CO-56	Not Detected	-----	1.40E+13
CO-57	Not Detected	-----	2.25E+05
CO-58	Not Detected	-----	1.13E+14
CO-60	8.03E+04	1.09E+04	4.14E+02
CR-51	Not Detected	-----	1.00E+26
CS-134	Not Detected	-----	3.59E+03
CS-137	7.14E+04	9.51E+03	2.79E+02
EU-152	Not Detected	-----	9.90E+02
EU-154	Not Detected	-----	2.72E+03
EU-155	Not Detected	-----	3.13E+03
FE-59	Not Detected	-----	1.77E+21
GD-153	Not Detected	-----	1.71E+06
HG-203	Not Detected	-----	9.62E+19
I-131	Not Detected	-----	1.00E+26
IR-192	Not Detected	-----	3.28E+13
K-40	Not Detected	-----	1.68E+03
KR-85	Not Detected	-----	1.18E+05
MN-52	Not Detected	-----	1.00E+26
MN-54	Not Detected	-----	1.48E+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
NP-239	Not Detected	-----	9.35E+02
RU-103	Not Detected	-----	1.00E+26
RU-106	Not Detected	-----	5.10E+05
SB-122	Not Detected	-----	1.00E+26
SB-124	Not Detected	-----	1.06E+16
SB-125	Not Detected	-----	7.36E+03
SN-113	Not Detected	-----	5.49E+09
TA-182	Not Detected	-----	1.46E+10
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	-----	7.32E+09
ZN-65	Not Detected	-----	2.00E+06
ZR-95	Not Detected	-----	2.96E+15


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

Report Date : 4-03-98 7:33:53 AM
 QA File : C:\GENIEPC\CAMFILES\LCS2.QAF
 Analyst : KIC
 Sample ID : 80058006
 Sample Quantity : 1.00 Each
 Sample Date : 11-01-90 12:00:00 PM
 Measurement Date : 4-03-98 7:21:08 AM
 Elapsed Live Time : 600 seconds
 Elapsed Real Time : 605 seconds

Parameter	Mean	1S Error	New Value	< LU : SD : UD : BS >
AM-241 Activity	8.358E-02	4.282E-03	8.375E-02	< : : : >
CS-137 Activity	7.010E-02	1.926E-03	7.141E-02	< : : : >
CO-60 Activity	7.791E-02	2.162E-03	8.145E-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: _____

 4/3/98

ANNEX 8-C
Data Validation Results

INFORMATION ONLY**DOCUMENTATION COMPLETENESS CHECKLIST
(DATA VERIFICATION/VALIDATION LEVEL 1 - DV1)***David H-9-9*Project Leader AAS / PAVLETIProject Name CENT. COYOTE TEST AREA 61ACase No. 8834-2061A2AR/COC No. 06127Analytical Lab GELSDG No. 9702008*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	Tritium Screen data provided (Rad labs)	✓		RELEASED BY COC 06129		

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)	✓				
2.6	Narrative provided	✓				
2.7	TAT met	✓				
2.8	Hold times met	✓				
2.9	All requested result data provided	✓				

Based on the review, this data package is complete

☒ Yes☐ No

If no, provide: correction request tracking # _____ and date correction request was submitted: _____

Reviewed by: *[Signature]*Date: 5/8/97

Closed by: _____

Date: _____

DATA QUALITY INDICATOR CHECKLIST
(DATA VERIFICATION/VALIDATION LEVEL 2—DV2)

Project Name Cent. Coyote Test Area G1A Page 1 of 5

Case Number 8834.2061A0

Sample Numbers 032523, 032524, 032525-032536

AR/COC No. 06127 Analytical laboratory GEL SDG No. 9702008

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 checked="" type="checkbox"/>	<input type="checkbox"/>	Sample 032536, LCS 97339 indicate that several compounds were out of QC windows (see Note.)
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: [Signature]

Date: 5/8/97

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?	N/A		None requested
5) 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?	N/A		None requested
7) Blank data			
a) Method or reagent blank data reported and met for all samples?	✓		Samples 032523-002 & 032529-002 TCLP blank indicated Ba concentration above the PQL. (See Note)
b) Sampling blank (e.g., field, trip, and equipment) data reported and met?	✓		See General Note - B.
8) Narrative included, correct, and complete?	✓		See Note 5a.

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.

5a) The narrative indicates that this was due to the fact that a major portion of the LCS was spilled during filtration at the lab. Additionally, LCS 97818, associated with VOC analyses, was slightly out of the QC window. The QC window

Reviewed by: [Signature]

Date: 5/8/97

DATA QUALITY INDICATOR CHECKLIST
(DATA VERIFICATION/VALIDATION LEVEL 2—DV2)

Page 3 of 5

2.0 COMMENTS CONTINUATION SHEET

for % recovery is 72.2 - 123; the actual % recovery was 125. This is not addressed in the associated narrative.

7a) According to the narrative, Ba contamination is inherent in the TELP filtration procedure and B^a the Ba concentration detected in the blank is relatively negligible with respect to a typical TELP regulatory limit of 10 ppm.

GENERAL NOTES:

A) Sample 032528-002 was received at the lab broken. It was transferred to a 2x125 amber glass. No further anomalies were noted associated with the fact that the sample container was broken upon arrival at the lab.

B) Sample 032536 EB/QC Sample 9702008-72 - Cr-144 was rejected due to interference and QC 417243 Cr-51 & Ru-106 were rejected due to interferences in Rad analyses.

C) Samples 032523-002 & 032531-015 (lab sample 9702008) (QC 415967) Th-231, Ac-228, Pb-212, Ra-228, & Th-232 were rejected due to low abundances.

Reviewed by: [Signature]

Date: 5/8/97

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

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:



Date:

5/8/97

Site: CCTA-61A

AR/COC: 510093

Data Classification: ORGANICS

Sample Fraction No.	Analysis	DV Qualifiers	Comments
<i>CCTA-61A-GR-000-EB</i>	<i>EPA8330</i>	<i>R, A, P</i>	
<i>Data is not acceptable</i>			
<i>QC measures appear to be 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: *7/24/98*

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 CCTA-61A

CASE NO. 7215.2205

ANALYTICAL LABORATORY CORE

SAMPLE IDS _____

LABORATORY REPORT # 980820

CCTA-61A-GR-XXX (036725-003

KAC 7/24/98
TASK LEADER ARCO# 510093

to 036737-003), 036759-107

NO. OF SAMPLES 14: 13 soil, 1 aqueous

DATA ASSESSMENT SUMMARY

	ICP	AA	MERCURY	CYANIDE
1. HOLDING TIMES	✓	✓	✓	NA
2. CALIBRATIONS	✓	✓	✓	
3. BLANKS	✓	✓	✓	
4. ICS	✓			
5. LCS	✓	✓		
6. DUPLICATE ANALYSIS	✓	J	✓	
7. MATRIX SPIKE	J ✓ <u>KAC 7/24/98</u>	✓	✓	
8. MSA	NA	NA		
9. SERIAL DILUTION	NA			
10. SAMPLE VERIFICATION	✓	✓	✓	
11. OTHER QC	✓	✓	✓	
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

KAC 7/24/98
ACTION ITEMS: ① All samples were prepared and analyzed with accepted procedures and specified methods. All compounds were successfully analyzed. One major problem was

KAC 7/24/98
AREAS OF CONCERN: encountered during package review. Hg was not properly qualified ("J" coded) for two samples (036726-103 & 036730-103). Correction request submitted to lab. but KAC 7/24/98

REVIEWED BY: _____

DATE REVIEWED: _____

INORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3—DV3)

Page 2 of 16

NAC 7/24/98

ACTION ITEMS: Hg data assessment was not impacted by improper missing
qualifiers. NAC 7/24/98

② A few minor problems were encountered that minimally
affect data quality were found in the analyses. The following
section discusses specific problems and affect on the data.

③ Metal Analysis: Calibration met acceptance criteria.
No target analytes were detected in ICB, CCB₂, ^{NAC 7/24/98} or MB₂, or EB
above RL. ICS met acceptance criteria. The LCS/LCSD
met acceptance criteria ^{NAC 7/24/98} except for 70 REC of Ag in the
LCS and its associated RPD. The LCS/LCSD was reanalyzed
and results were within acceptance criteria, no data is qualified

NAC 7/24/98

AREAS OF CONCERN: The Field duplicate pair met acceptance criteria
except for AS which was outside control limit. Sample results
will be "J" coded and the variability is suspected to result
from sample inhomogeneity. The MS/MSD met acceptance
criteria except for Ba & Ag. Ba exhibited low recovery
in MS/MSD and Ag had low PREC in MSD and RPD outside
control limits. Sample results will be "J" coded for
associated sample. No MS/MSD was run on the Batch (33587)
that contained the majority of site samples.

② Data is acceptable

③ QC measures are adequate

OVERALL DATA QUALITY ASSESSMENT

Reviewed By:

Kevin A Lambert

Date:

7/24/98

INORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3—DV3)

Page 3 of 16

1.0 HOLDING TIMES

List holding time criteria used to evaluate samples, indicating which samples exceed the holding time. Holding time begins with validated time of sample collection.

Parameter	Holding Time Criteria	Sample ID	Days Holding Time was Exceeded	Action

SEE CUR
FORM

Were the correct preservatives used? Yes ☐ No ☐

List below samples that were incorrectly preserved.

Sample No.	Type of Samples	Deficiency	Action

Reviewed By: Kerrin A. Lambert Date: 7/24/98

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: _____
Mercury: _____
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: 7/24/98

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: _____

Date	Analyte	Coefficient	Action	Samples Affected
		<i>Met</i>		
		<i>Criteria</i>		

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
				<i>Met</i>		
				<i>Criteria</i>		

Reviewed By: _____

Kevin A. Lambert

Date: _____

7/24/98

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 ☐

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
No Target Analytes were detected above RL					

Is concentration in the method blank below the detection limit? Yes ☐ No ☒

Affected samples: Pb, Cr, & Hg were observed at estimated values ("J" coded). No data is qualified since analytes were below RL.

Reviewed By: Kevin A Lambert Date: 7/24/98

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

No target analytes were detected above RL.

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: 7/24/98

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: 7/24/98

INORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3—DV3)

Page 9 of 16

List below any LCS recoveries not within limits.

Batch
35274
LCS-1

Preparation Date	Analyte	%R	Action	Samples Affected
<i>4/26/98</i> <i>2213</i>	<i>Ag</i>	<i>36</i>	<i>80-120</i>	<i>LCS met acceptance criteria. No data to qualify. Also LCS/LCSD reanalyzed and met acceptance criteria. No data to qualify.</i>

6.0 LABORATORY DUPLICATE ANALYSIS

Were laboratory duplicates analyzed at required frequency? Yes ☐ No ☒

Samples affected: *LCSD was not analyzed for Batch 33739 (ICAP) for EB. LCS met acceptance criteria. Precision can not be assessed*

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: *7/24/98*

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:

Batch
35274

Sample ID	Matrix	Preparation Date	Analyte	PQL	RPD	Action	Samples Affected
LCSD-1	soil	4/26/98 2217	Ag		93.9 ±20	LCSD/LCSD was re-analyzed and met acceptance criteria No data qualified	KM 7/24/98

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, quality 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: 7/24/98

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
CCTA-61A-GR-004-0-0.5-DU Soil		3/23/98	AS	5.87 ± 0.5	2.05	Sample results will be "J" coded due to sample inhomogeneity
			Pb	9.22 ± 0.2	KAL 7/24/98	

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 ☐ KAL 7/24/98

No MS/MSD was run on ARCO group for Batch 33587. MS/MSD was run on Batch 335 35274 which contain only one sample from ARCO group KAL 7/24/98

Reviewed By: Kevin A. Lambert Date: 7/24/98

That sample was the chosen MS/MSD sample

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	Positive	Samples Affected
35274 CCTA-61A-GR-006-05X05	MS Soil	7/24/98	BA	65.5	80-120		
↓	MSD ↓	↓ 2242	↓	71.4	↓		
↓	MSD Soil ↓	↓	AS	70.1	↓		
↓	↓	↓	↓	35.4	120		

Sample results will be "N" coded. Non-detects will "LJ" 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: 7/24/98

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

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 ☐ *Not Applicable*

Are MSA calculations outside the linear range of the calibration curve? Yes ☐ No ☐ *Not Applicable*

Reviewed By: Kevin A. Lambert Date: 7/24/98

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

Not Applicable

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

Check for calculation errors and negative interferences.

Reviewed By: _____

Kevin A. Lambert

Date: _____

7/24/98

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 KAL 7/24/98*

Reviewed By: Kevin A. Lambert Date: 7/24/98

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 ☒

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:

OK Looks good

Approved By: _____

Date: _____

*Task/Project Leader is responsible for approval of data set.

Reviewed By: *Kevin A Lambert*

Date: *7/24/98*

Site: CCTA-61A

AR/COC: 510191

Data Classification: Organics

Sample Fraction No.	Analysis	DV Qualifiers	Comments
000-EB	EPA8330	R, A, P	
Data is acceptable except Eg. Blanks			
results are unusable.			
QC measures appear to be 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: Kevin A Lambert Date: 7/24/98

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 CCTA-61A
ANALYTICAL LABORATORY 980861
LABORATORY REPORT # CORE
CASE NO. 7215-2205
ARLOC # 510191

↑ SAMPLE IDS 16:15 soil, 1 aqueous
NO. OF SAMPLES ↓
(CCTA-61A-GR-XXX) 036760-103
to 036774-103, 000-EB

DATA ASSESSMENT SUMMARY

Describe problems/qualifications below (Action Items and Areas of Concern)

	VOC	SVOC	PEST/PCB	HE OTHER	KAL 7/24/98
1. HOLDING TIMES/PRESERVATION	NA	NA	NA	N	
2. GC/MS INST. PERFORM.				NA	
3. CALIBRATIONS: WINDOWS				✓	
4. BLANKS				✓	
5. SURROGATES				✓	
6. MATRIX SPIKE/DUP				NA	
7. LABORATORY CONTROL SAMPLES				N	
8. INTERNAL STANDARDS				NA	
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

NA - Not Applicable

Qualifiers: J - Estimate

UJ - Undetected, estimated

KAL 7/24/98

ACTION ITEMS:

All samples were prepared and analyzed with accepted procedures and specified methods. All compounds were successfully and analyzed. A Major problem was encountered with the E.g. Blank during data package review. The E.g. Blank was received after the extraction hold time. No compounds were detected above

KAL 7/24/98

AREAS OF CONCERN:

encountered with the E.g. Blank during data package review. The E.g. Blank was received after the extraction hold time. No compounds were detected above

Reviewed By: Kevin A. Lambert

Date: 7/24/98

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 2 of 18

PROJECT/TASK LEADER: _____

KAL 7/24/98

ACTION ITEMS: the RL. The LCS/LCSD for the Eg Blank had low % REC and RPDs outside control limits for more than half the compounds. Reanalysis of LCS/LCSD confirmed results. Eg. Blank results will be "R" coded for NDs and detected results are "J" coded.

② HE Analysis: Calibration met acceptance criteria. No target analytes were detected above RL in the MBs. Surrogate % REC met acceptance criteria. No MS/MSD was run on ARCOG group. The MS/MSD reproducibility is not addressed for batch from

KAL 7/24/98

AREAS OF CONCERN: another ARCOG group. The LCS/LCSD for soil samples had low % REC and RPDs outside control limits for more than half the compounds. Reanalysis of the LCS/LCSD produced results within or slightly above acceptance criteria. Therefore no data is qualified. No target analytes were detected above RL in site samples except for HMX in one sample (036760-103). The RPD KAL 7/24/98 The Field duplicate pair was assessed and no data is qualified based on RPD calculations.

③ Data is acceptable except for the Eg Blank results which missed extraction hold time and LCS/LCSD did not

KAL 7/24/98

OVERALL DATA QUALITY ASSESSMENT: meet acceptance criteria.

④ QC measures appear to be adequate

Reviewed By: Kevin A. Lambert

Date: 7/24/98

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	Date Sampled VTSR ^{KAL} 7/24/98	Date Analyzed	Action
000-EB(036786-108)	3/24/98	Ext.-4/2/98 Anal.-4/10/98 =>	Sample received after ext. holding time. Sample results will be "UJ" coded. No analytes were detected above the RL. Sample results will be qualified based on holding time violation and other QC data. See Lospics section.

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
Data: _____

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:

Kevin A. Lambert

Date:

7/24/98

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

Not Applicable

List below compounds that were not within the retention time windows.

Date/Time	Compound	RT	RT Window	Action	Affected Samples

Reviewed By: Karin A Lambert 7/24/98
Date: _____

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: _____

Reviewed By: Kevin A. Lambert
Date: 7/24/98

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	RFSD	Action	Samples Affected

Check for transcription and calculation errors. If errors are found, briefly summarize necessary corrections below:

Reviewed By: Karin A. Lambert
Date: 7/24/98

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)
<i>No target analytes were detected above PL</i>						

PQL = Practical Quantitation Limit from EPA Method.

Reviewed By: Kevin J. Lambert
Date: 7/20/98

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 ☒
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*

Reviewed By: Kevin A. Lambert
Date: 7/24/98

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 ☐ *Not Applicable*

Are method blank surrogate recoveries outside of limits upon reanalysis? Yes ☐ No ☐ *Not Applicable*

Are transcription/calculation errors present? Yes ☐ No ☒

If yes, note necessary corrections. *All sample results met acceptance*

criteria. Note that surrogate %REC for MB analyzed
4/10/98 & LCSD on 4/9/98 were ^{KAL 7/24/98} slightly below acceptance
criteria. MB was reanalyzed and reproducible results
were obtained. The LCSD was reanalyzed and met
acceptance criteria. No data is qualified

Reviewed By: *Kevin A. Lambert*
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 QAPjP for each matrix type?

Yes ☐ No ☒

No MS/MSD was run on ARCO group. The MS/MSD acceptability is not addressed for the batch from another ARCO group

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

No MS/MSD was run on ARCO group

Reviewed By: Kevin A. Lambert
Date: 7/24/98

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.

Batch 33440

Date	Compound	%Rec	Control Limits	Action	Samples Affected
4/10/98	<i>All compds except HAX had low recovery (SEE QC Rpt) and RPDs were outside control limits. Reanalysis produced similar results. All positive results will be "J" coded and ND will be "R" coded.</i>				

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.

Batch 33452

Date	Compound	%Rec	Control Limits	Action	Samples Affected
4/9/98	<i>All compds had low recovery (SEE QC Rpt) and RPDs were outside control limits. Reanalysis of LCS/LCSD produced results that were within or slightly above acceptance criteria. No data is qualified.</i>				

Control Limit Reference: _____

Batch 24098 4/20/98 The RPD for nitrobenzene & O-Nitrotoluene were ^{slightly} outside acceptance criteria. These analytes were not detected in site samples. No data is qualified

Reviewed By: Kevin A. Lambert
Date: 7/24/98

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

Not Applicable
7/24/98

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:

Kevin A. Lambert

Date:

7/24/98

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 15 of 18

Other: Not Applicable

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, resubmission 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:
Date:

Kevin A. Lambert
7/20/00

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 16 of 13

Samples affected: Not Applicable

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

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: 7/24/94

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 17 of 13

13.1 Chromatogram Quality

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 ☐ *Not Applicable*

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: Kevin A. Lambert
Date: 7/24/98

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 Not Applicable

Reviewed By: Kevin A Lambert

Date: 7/24/98

Approved By:*

Date

*Data package must be approved by Project/Task Leader.

Site: CCTA-61AAR/COC: 510191Data Classification: Radiometrics

Sample Fraction No.	Analysis	DV Qualifiers	Comments
<i>CCTA-61A-GR-007-0-0.5-S</i>	<i>12587-47-2</i> <i>(Beta particle)</i>	<i>J</i>	<i>Field precision measurement (DER) for field duplicate pair did not meet acceptance criteria</i>
<i>-007-0-0.5-DU</i>			
<i>-007-0.5-1.0-S</i>			
<i>-008-0-0.5-S</i>			
<i>-008-0.5-1.0-S</i>			
<i>-009-0-0.5-S</i>			
<i>-009-0.5-1.0-S</i>			
<i>-010-0-0.5-S</i>			
<i>-010-0.5-1.0-S</i>			
<i>-011-0-0.5-S</i>			
<i>-011-0.5-1.0-S</i>			
<i>-012-0-0.5-S</i>			
<i>-012-0.5-1.0-S</i>			
<i>-013-0-0.5-S</i>			
<i>-013-0.5-1.0-S</i>			
<i>Data is acceptable</i>			
<i>QC measures appear to be 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: 7/24/98

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

ANALYTICAL RADIOCHEMISTRY DATA VALIDATION CHECKLIST

Project Name <u>CCTA-61A</u>				Site Name <u>CASE # 7215.2205</u>
Laboratory Name/Job No./Batch No. <u>CORE 980861</u>				Chain of Custody No. <u>510191</u>
Analysis Method <u>EPA 900.0</u>		Parameter List: <u>Gross Alpha/Beta</u>		
REVIEW ITEM	YES	NO	NA	COMMENTS
A. HOLDING TIMES				
1. Preparation and analysis holding times met?				<i>SEE CVP FORM</i>
2. Short-half life parameters analyzed for and checked?				
B. CALIBRATION VERIFICATION				
1. Detectors numbered and documented?	✓			<i>Met criteria</i>
2. Frequency: Daily <u>✓</u> , weekly <u> </u> , or monthly <u> </u> ?	✓			
3. Acceptance criteria: Met?	✓			
C. LABORATORY CONTROL SAMPLES				
1. Standard: Independent, certified reference material?	✓			<i>Met acceptance criteria</i>
2. Frequency: Each batch?	✓			
3. % Recovery 80-120% or <u> </u> ?	✓			
METHOD BLANK				
1. Frequency: Each batch?	✓			<i>No target analytes were detected above acceptance criteria</i>
2. Matrix: Matrix specific?	✓			
3. Preparation: Entire procedure?	✓			
4. Blanks show contamination?		✓		
E. MATRIX SPIKE				
1. Frequency: Each batch?		✓		<i>on aqueous sample Only Gross Beta. No MS/MSD run on ARCO group for Gross Alpha/Beta soil. Gross Beta MS/MSD met acceptance criteria for aqueous sample. MS/MSD Gross Alpha on for aqueous sample from another batch met acceptance criteria.</i>
2. Matrix: Matrix specific?	✓			
3. Preparation: Entire procedure?	✓			
4. % Recovery: 75-125% or <u> </u> ?	✓			
F. ANALYTICAL YIELDS/OTHER				
1. Tracer: Correct type, recovery met?			✓	
2. Ingrowth and/or decay: Correct factors applied?			✓	
3. Solids density: Planchette loading <5 mg/cm ² ?	✓			
G. DUPLICATE				
1. Type: Lab or field?	✓			<i>Met DER criteria for soil & aqueous samples. The Field Duplicate DER for Gross Beta was > 1. Sample results will be "Scrubbed". DER - Duplicate Error Ratio</i>
2. Frequency: Each batch?	✓			
3. Matrix: Matrix specific?	✓			

ANALYTICAL RADIOCHEMISTRY DATA VALIDATION CHECKLIST (CONTINUED)

Project Name				Site Name
Laboratory Name/Job No./Batch No.				Chain of Custody No.
Analysis Method			Parameter List:	
REVIEW ITEM	YES	NO	NA	COMMENTS
4. Preparation: Entire procedure?	✓			
H. ANALYTE DETECTION				
1. Detection limit sample/batch specific?	✓			
2. Errors evaluated?	✓			
3. False positives/negatives suspected?		✓		

Reviewed by: Kevin A. Lambert 7/24/98

- ① All samples were prepared and analyzed with accepted procedures and specified methods. All parameters were successfully analyzed. No major problems were encountered during data package review. A few minor problems were observed but they have a minimal effect on data quality.
- ② Rad Analysis: Calibration met criteria. The LCS met acceptance criteria. No target analytes were detected above RL in MBs. No MS/MSD was run on ARCO group for soils samples. The MS/MSD acceptability is not addressed for the batch from another ARCO group. An MS/MSD for Gross Beta on aqueous sample was run on ARCO group and met acceptance criteria. The MS/MSD for Gross Alpha on aqueous sample was run on another ARCO group and met acceptance criteria. No data is qualified. Duplicate Error Ratio (DER) for lab duplicate met acceptance criteria for Gross Alpha/Beta. The field duplicate pair DER was > 1 (1.64) for Gross Beta. Sample results will be "J" coded. The DER for Gross Alpha in field duplicate pair met acceptance criteria. No target analytes were detected above acceptance criteria in EB.
- ③ Data is acceptable
- ④ QC measures are adequate

Site: 61A

AR/COC: 510192

Data Classification: Organics

Sample Fraction No.	Analysis	DV Qualifiers	Comments
No data were qualified			
Data is acceptable			
QC measures appear to be adequate except MS/MSD acceptability is not addressed.			

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: 7/14/98

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 CCTA-61A

ANALYTICAL LABORATORY CORE

LABORATORY REPORT # 980862

CASE NO. 7215.2205

ARCOC# 510192

SAMPLE IDS 11501

NO. OF SAMPLES CCTA-61A-GR-XXX-

DATA ASSESSMENT SUMMARY

Describe problems/qualifications below (Action Items and Areas of Concern)

	VOC	SVOC	PEST/PCB	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				NA
7. LABORATORY CONTROL SAMPLES				X
8. INTERNAL STANDARDS				NA
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

NA - Not Applicable

HE 7/14/98

ACTION ITEMS:

① All samples were prepared and analyzed with accepted procedures and specified methods. All compounds were successfully analyzed. No major

HE 7/14/98

AREAS OF CONCERN:

problems were encountered during data package review. A few minor problems were observed that minimally affect data quality and

Reviewed By:

Kevin A. Lambert

Date:

7/14/98

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 2 of 18

PROJECT/TASK LEADER: _____

~~KHL~~ 7/14/98
ACTION ITEMS:

~~KHL~~ 7/14/98

are ~~to~~ presented below.

② No MS/MSD was run on the ARCO group. The MS/MSD acceptability is not addressed in the batch from another ARCO group.

③ The LCS/LCSD met acceptance criteria except the %REC exceeded the upper control limit and ~~KHL~~ 7/14/98 for some compounds and RPDs did not meet acceptance criteria for

~~KHL~~ 7/14/98

AREAS OF CONCERN: some compounds. SEE CHECKLIST FOR COMPOUNDS.
No detectable concentrations were observed in the site samples. No data were qualified.

④ All other QC measures were within specified criteria except NO FB or EB were submitted on ARCO.

⑤ Data is acceptable.

⑥ QC measures are adequate except MS/MSD acceptability is not addressed.

OVERALL DATA QUALITY ASSESSMENT _____

Reviewed By:

Kevin A. Lambert

Date:

7/14/98

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 7/14/98
Date:

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:

Kevin A. Lambert

Date:

7/14/98

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 5 of 18

3.0 GC INSTRUMENT PERFORMANCE.

3.1 DDT Retention Time

Not Applicable

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.

Not Applicable

Date/Time	Compound	RT	RT Window	Action	Affected Samples

Reviewed By:

Kevin A. Lambert 7/14/94

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) DEC 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	DEC %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: 7/14/98

Date:

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	RPD	Action	Samples Affected

Check for transcription and calculation errors. If errors are found, briefly summarize necessary corrections below:

Reviewed By: Karin A. Lambert
Date: 7/14/98

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. ()	FQL ()	Action Level	Samples Affected (Action)

PQL = Practical Quantitation Limit from EPA Method.

Reviewed By:

Karin A. Lambert

Date:

7/14/98

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 ☒
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-845 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-845 criteria or criteria listed above.

Date	Sample ID/Matrix	Surrogate Compound	%Rec	Action

Reviewed By: Kevin A. Lambert
Date: 7/14/98
AL2-S4 WP:SNL:SOP3044C.R1

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 7/14/98

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 ☒

No MS/MSD was run on ARCO group. The MS/MSD acceptability is not addressed for the batch from another ARCO group

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

Not run on ARCO group

Reviewed By: Kevin A. Lambert
Date: 7/14/98

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.

Batch	Date	Compound	%Rec/RPD Control Limits		Action	Samples Affected
4096 LCSD	4/28/98	Nitrobenzene	1641	21.7 ± 20	No detectable concentration in site samples. No data were qualified	
↓	↓	o-nitrotoluene	↓	25.3		
4112 LCS	4/21/98	2,6-Dinitrotoluene	1945	139.3		
↓	↓	HMX	↓	157.2		

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.

Batch	Date	Compound	%Rec/RPD Control Limits		Action	Samples Affected
07 LCS	4/21/98	4-Amino-2,6-dinitrotoluene	1945	140.1	No detectable concentration in site samples. No data were qualified	
↓	↓	2-Amino-4,6-dinitrotoluene	↓	142.3		
07 LCSD	4/21/98	HMX	2020	143.7		
↓	↓	4-Amino-2,6-dinitrotoluene	↓	133.0		

Control Limit Reference: _____

2-Amino-4,6-dinitrotoluene 131.8 70-130

Reviewed By: Kevin A. Lambert
Date: 7/14/98

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

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:

Kevin A. Lambert

Date:

7/14/98



Comments

Control Limit

%REC/RPD

Compound

Date

Id

Batch

No detectable compounds
in site samples
No data were available

70-130
70-130
70-130
70-130
70-130

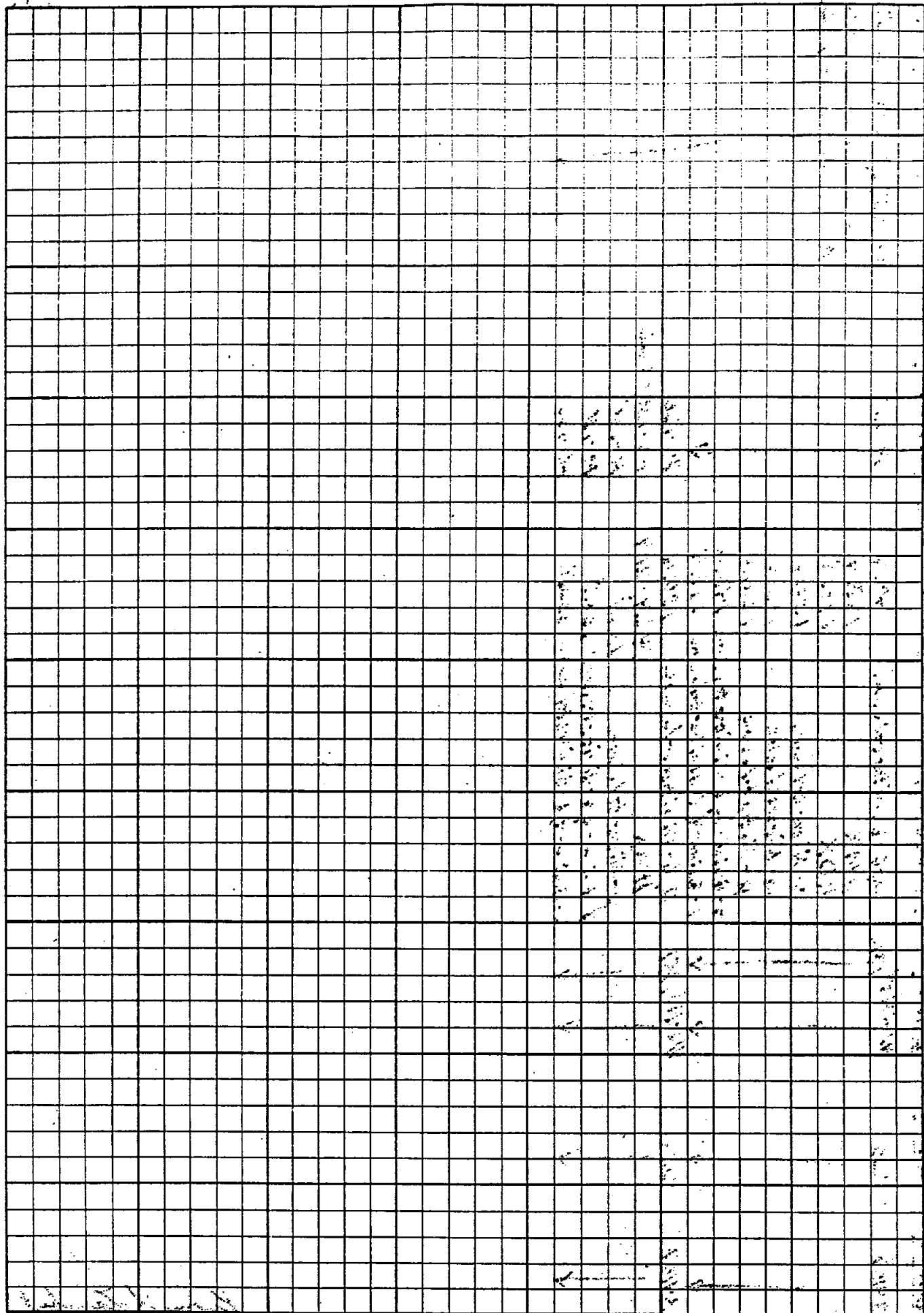
2,6-Dinitrotoluene 140.4
HMX 147.4
RDX 130.8
O-Nitrotoluene 131.1
M-Nitrotoluene 133.6
P-Nitrotoluene 132.4
4-Amino-2,6-dinitrotoluene 143.2
2-Amino-4,6-dinitrotoluene 144.4
2,6-Dinitrotoluene 130.4
HMX 142.4/21.4
P-Nitrotoluene 131.5
4-Amino-2,6-dinitrotoluene 134.5
2-Amino-4,6-dinitrotoluene 132.8

4/28/98, 7/16
4/28/98, 7/51

LCS
LCS

34107
34107

Kevin A. Lambert
7/14/98



ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 15 of 18

Other: Not Applicable

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: 7/14/98

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 16 of 13

Samples affected: Not Applicable

Check chromatograms for false negatives, especially for the multiple peak components (toxaphene and PCEs). 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

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: Karin A. Lambert
Date: 7/14/98

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: *Kevin A. Lambert*

Date: *7/14/98*

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 ☐ *Not Applicable*

Comments _____

Reviewed By: *Kevin A. Lambert*

Date: *7/14/98*

Approved By: _____

Date _____

*Data package must be approved by Project/Task Leader.

ANALYTICAL RADIOCHEMISTRY DATA VALIDATION CHECKLIST

Project Name <i>Site CCTA 161A</i>				VRL 6/23/98	
Laboratory Name/Job No./Batch No. <i>CORE / 980812</i>				Site Name- Case # <i>7215.2205</i>	
Analysis Method <i>EPA 900.0</i>				Chain of Custody No. <i>510198</i>	
Parameter List: <i>Gross Alpha/Beta</i>					
REVIEW ITEM	YES	NO	NA	COMMENTS	
A. HOLDING TIMES					
1. Preparation and analysis holding times met?				<i>SEE CVR FORM</i>	
2. Short-half life parameters analyzed for and checked?					
B. CALIBRATION VERIFICATION					
1. Detectors numbered and documented?	✓			<i>Calibration met acceptance criteria</i>	
2. Frequency: Daily <input checked="" type="checkbox"/> , weekly <input checked="" type="checkbox"/> , or monthly <input type="checkbox"/> ?	✓				
3. Acceptance criteria: Met?	✓				
C. LABORATORY CONTROL SAMPLES					
1. Standard: Independent, certified reference material?				<i>Met acceptance criteria</i>	
2. Frequency: Each batch?	✓				
3. % Recovery <i>80-120%</i> or <input type="checkbox"/> ?	✓				
D. METHOD BLANK					
1. Frequency: Each batch?	✓			<i>Blank within specified limits</i>	
2. Matrix: Matrix specific?	✓				
3. Preparation: Entire procedure?	✓				
4. Blanks show contamination?		✓			
E. MATRIX SPIKE					
1. Frequency: Each batch?			✓	<i>No MS/MSD was run on ARCOE group</i>	
2. Matrix: Matrix specific?			✓		
3. Preparation: Entire procedure?			✓		
4. % Recovery: 75-125% or <input type="checkbox"/> ?			✓		
F. ANALYTICAL YIELDS/OTHER					
1. Tracer: Correct type, recovery met?	✓				
2. Ingrowth and/or decay: Correct factors applied?	✓				
3. Solids density: Planchette loading <5 mg/cm ² ?	✓				
G. DUPLICATE					
1. Type: Lab or <i>field?</i>	✓			<i>Met DER except Gross Alpha-Beta in 3rd Field Duplicate Pair. Associated sample results will be "J" coded</i>	
2. Frequency: Each batch?	✓				
3. Matrix: Matrix specific?	✓				

ANALYTICAL RADIOCHEMISTRY DATA VALIDATION CHECKLIST (CONTINUED)

Project Name				Site Name
Laboratory Name/Job No./Batch No.				Chain of Custody No.
Analysis Method			Parameter List:	
REVIEW ITEM	YES	NO	NA	COMMENTS
4. Preparation: Entire procedure?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
H. ANALYTE DETECTION	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Looks good
1. Detection limit sample/batch specific?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2. Errors evaluated?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3. False positives/negatives suspected?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

Reviewed by: Kevin A. Lambert 6/23/98

- ① All samples were prepared and analyzed with specified methods accepted procedures. All compounds were successfully analyzed. No major problems were encountered except that an MS/MSD was not run on ARCO group. The sample designated was not spiked and was analyzed as field duplicate to a original field sample. Therefore, 3 field duplicate pairs were analyzed.
- ② Minor problems were identified that minimally affected data quality and are presented below.
- ③ RAD ANALYSIS: Calibration met acceptance criteria. No target analytes were detected above RL in MBS. LCS/LCSD met acceptance criteria. The DERs (≤ 1.0) for the field duplicate pairs met criteria except Gross Beta (1.4) in the 3rd Duplicate Pair. Associated sample results will be "J" coded (036752-002 to 036758-002).
- ④ Data is acceptable
- ⑤ QC measure appear to be adequate except MS/MSD acceptability is not addressed.

SAMPLE FINDINGS SUMMARY

Site: 6/A

AR'COC: 510198

Data Classification: *Radiometrics*

Sample Fraction No.	Analysis	DV Qualifiers	Comments
R-025-0-0.5-S	12587-47-2	J	Field precision measurements did not meet acceptance criterion for the field duplicate pair
-025-0.5-1.0-S	(Beta particle)		
-026-0-0.5-S			
-026-0.5-1.0-S			
-027-0-0.5-S			
-027-0.5-1.0-S			
-027-0.5-1.0-DU			
Data is acceptable			
QC measures appear to be adequate except MS/MSD acceptability is not addressed			

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, PCBRI5C

Reviewed by: Kenn A Lambert Date: 6/23/98

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 CCTA-61A CASE NO. 7215.2205
ANALYTICAL LABORATORY CORE SAMPLE IDS _____
LABORATORY REPORT # 980812 036738-002 to 036758-002
KAL 6/19/98
TASK LEADER ARCOC # 510198 _____
NO. OF SAMPLES 21 soil _____

DATA ASSESSMENT SUMMARY

	ICP	AA	MERCURY	CYANIDE
1. HOLDING TIMES	✓	✓	✓	NA
2. CALIBRATIONS	✓	✓	✓	↓
3. BLANKS	✓	✓	✓	↓
4. ICS	✓	✓	✓	↓
5. LCS	✓	✓	✓	↓
6. DUPLICATE ANALYSIS	J	J	✓	↓
7. MATRIX SPIKE	✓	✓	✓	↓
8. MSA	✓	✓	NA	↓
9. SERIAL DILUTION	NA	<i>KAL 6/23/98</i>	✓	↓
10. SAMPLE VERIFICATION	✓	✓	✓	↓
11. OTHER QC	✓	✓	✓	↓
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

KAL 6/23/98

ACTION ITEMS: ① All samples were prepared and analyzed with specified methods and accepted procedures. All compounds were successfully analyzed.

KAL 6/23/98

AREAS OF CONCERN: No major problems were noted during review of the data package. A few minor problems were identified which minimally affect data quality and are identified in next section

REVIEWED BY: Kevin A. Lambert

DATE REVIEWED: 6/23/98

INORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3—DV3)

Page 2 of 16

KAL 6/23/98

ACTION ITEMS: ③ RCRA Metals + Be Analysis: Calibration met acceptance criteria. ICB and CCB met acceptance criteria. No target analytes were detected above the RL in the MBs. The case narrative and QC Results Report show Lead results > MDL but less than RL; however the values are not "J" coded similar to other analytes under the same circumstances. See KAL 6/23/98 The MB should be "J" coded in the QC Results Report and "B" coded should be removed from lead sample results. Seek Revised Laboratory Test Results and QC Results Report. No FB or Eq Blank were submitted on ARCO. ICP check sample met

KAL 6/23/98

AREAS OF CONCERN: acceptance criteria. LCS/LCSD met acceptance criteria. The RPD/±CRDL met acceptance criteria for field duplicate pairs except for Barium, Chromium, Lead and Selenium in one field duplicate pair. The associated samples will be "J" coded (positive results) or "UJ" coded (non-detect) for these four analytes. The MS/MSD met acceptance criteria except Barium, Selenium, and Lead in one MS/MSD and Selenium and Lead in the other MS/MSD for 90 REC. Since the MSD met acceptance criteria for Barium and Lead, no data is qualified. These analytes have already been qualified based on field duplicate results. All other QC measures met acceptance criteria.

KAL
6/23/98

OVERALL DATA QUALITY ASSESSMENT ④ Data is acceptable

⑤ QC measures are adequate

⑥ Obtained KAL 6/23/98 revised Laboratory Test Results and QC Results Report with corrected lead result qualifiers i.e. "J" coded MB and remove "B" coded from sample results

Reviewed By: Kevin A. Lambert Date: 6/23/98

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: _____
Mercury: _____
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: 6/23/98

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: _____

Date	Analyte	Coefficient	Action	Samples Affected
		<i>Met</i>		
		<i>Criteria</i>		

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
		<i>Met</i>				
		<i>Criteria</i>				

Reviewed By: Kevin A. Lambert Date: 6/23/98

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 HML 6/19/98*

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
4/12/98	Lead	0.005950	0.2	Sample results are 10x higher, No data is qualified. MB results are >MDL but < RL, therefore values are estimated and should be "J" coded similar to other analytes. Seek corrective Action from Lab. Change "B" to "J" in QC report and remove "B" from lead results in field samples	
2118					
2124		0.004800	0.2		

Is concentration in the method blank below the detection limit? Yes ☐ No ☒

Affected samples: Several "J" coded analytes. No data is qualified. Sample results are 10x greater than blank concentration.

Reviewed By: Kevin A. Lambert Date: 6/19/98

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 QAPjP? Yes ☐ No ☒

List below analytes detected in the field blanks. NOTE: For soil samples, calculate blank values using digestion weights and volumes.

Not submitted on ARCO

Collection Date	Blank ID	Analyte	Conc.	Required Detection Limits	Action Level	Samples Affected

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: 6/23/98

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: *6/23/98*

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

Within Specified Limits

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: 6/19/98

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: Karin A Lambert

Date: 6/23/98

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
TA-WA-GR-024-0-0.5-5/D4	soil	3-23-98	49%	±35	Barium	Associated Samples will
			5.62±2	3.31	Chromium	be "J" coded. Samples
			41%	±35	Lead	036745-003 to 036751-103
			0.101	0.0009±1	Selenium	

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: 6/23/98

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
CTA-61A-GR-023-0-0.5-S	soil	4/11/98	Barium	78.9	80-120	MSD met criteria. No data is qualified
		4/12/98	Selenium	-42.9		Associated samples will be "J" coded
		4/12/98		-46.6		
TA-61A-GR-026-0.5-10-S	soil	4/13/98	Lead	140.9	80-120	MSD met criteria. No data qualified
		4/21/98	Selenium	72.3		Associated samples will be "J" coded
		4/21/98		69.7		
TA-61A-GR-023-0-0.5-S	soil	4/22/98	Lead	74.7	80-120	
		4/22/98		139.2		

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: 6/23/98

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

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 ☐ *Not Applicable*

Reviewed By: *Kevin A. Lambert* Date: *6/23/98*

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

Not Applicable

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

Check for calculation errors and negative interferences.

Reviewed By: Kevin A. Lambert Date: 6/23/98

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 ☐

Reviewed By: Kevin A. Lambert Date: 6/23/98

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 ☒

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:

OK Look good

Approved By: _____

Date: _____

*Task/Project Leader is responsible for approval of data set.

Reviewed By: *Kevin A Lambert* Date: *6/23/98*

ARCO 5/10/98

Inorganics

Sample Number	7440-39-3 (Ba)	7440-47-3 (Cr)	7439-92-1 (Pb)	7782-49-2 (Se)
CCTA-61A-GR-019-0-0.5-S			J,A2	J,A2
CCTA-61A-GR-019-0-0.5-DU			J,A2	J,A2
CCTA-61A-GR-019-0.5-1.0-S			J,A2	J,A2
CCTA-61A-GR-020-0-0.5-S			J,A2	J,A2
CCTA-61A-GR-020-0.5-1.0-S			J,A2	J,A2
CCTA-61A-GR-021-0-0.5-S			J,A2	J,A2
CCTA-61A-GR-021-0.5-1.0-S			J,A2	J,A2
CCTA-61A-GR-022-0-0.5-S	J	J	J	J
CCTA-61A-GR-022-0.5-1.0-S	J	J	J	J
CCTA-61A-GR-023-0-0.5-S	J	J	J	J
CCTA-61A-GR-023-0.5-1.0-S	J	J	J	J
CCTA-61A-GR-024-0-0.5-S	J	J	J	J
CCTA-61A-GR-024-0-0.5-DU	J	J	J	J
CCTA-61A-GR-024-0.5-1.0-S	J	J	J	J
CCTA-61A-GR-025-0-0.5-S			J,A2	
CCTA-61A-GR-025-0.5-1.0-S			J,A2	
CCTA-61A-GR-026-0-0.5-S			J,A2	
CCTA-61A-GR-026-0.5-1.0-S			J,A2	
CCTA-61A-GR-027-0-0.5-S			J,A2	
CCTA-61A-GR-027-0.5-1.0-S			J,A2	
CCTA-61A-GR-027-0.5-1.0-DU			J,A2	

Kenneth A. Zander
6/23/98

SAMPLE FINDINGS SUMMARY

Site: 61A - CCTA

AR/COC: 510198

Data Classification: Inorganics

Sample Fraction No.	Analysis	DV Qualifiers	Comments
	SEE ATTACHED TABLE		
	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: Kevin A. Lambert Date: 6/23/98

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

Site: 61A

AR/COC: 1980812 510198

Data Classification: Organics

Sample Fraction No.	Analysis	DV Qualifiers	Comments
CLTA-61A-GR-021-0-0.5-5	2691-41-0 (HMX)	J, A	See other other side for explanation of qualifiers
Data is acceptable			
QC measures are adequate except MS/MSD acceptability is not addressed.			

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: 6/19/98

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

KAL 6/18/98

SITE OR PROJECT 65A 61A
ANALYTICAL LABORATORY CORE
LABORATORY REPORT # 980812
CASE NO. 7215.2205

SAMPLE IDS 21 soil
NO. OF SAMPLES 036738-103 to
036759-103

ARLOC # 510198

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				NA
7. LABORATORY CONTROL SAMPLES				J
8. INTERNAL STANDARDS				NA
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

NA - Not Applicable

KAL 6/19/98

ACTION ITEMS: ① All samples were prepared and analyzed with specified methods and accepted procedures. All compounds were successfully analyzed.

KAL 6/19/98

AREAS OF CONCERN: ② No major problems were encountered during review of data package except that No MS/MSD was run as requested on ARLOC. The Lab did not address the

Reviewed By:

Kevin A. Lambert

Date:

6/19/98

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 2 of 18

PROJECT/TASK LEADER: _____

KAL 6/19/98

ACTION ITEMS: MS/MSD acceptability for the batch from other ARCOL group.

③ HE ANALYSIS: Calibration met acceptance criteria
No target analytes were detected in the MBS. No MS/MSD
was run on ARCOL group. Several analytes
were above acceptance criteria for 70 REC in the LCS/LCSD.
The LCS/LCSD was reanalyzed and comparable results were
obtained. No target analytes were detected in associated
field sample except HMX in one sample (CCTA-61A-GR-021-0-05-5).
HMX will be "J" coded in this sample and no other data is qualified

KAL 6/19/98

AREAS OF CONCERN: Surrogate recoveries met acceptance
criteria. No target analytes were detected in the field
duplicate pairs, therefore RPDs were not calculated.
No Eq Blank was submitted on ARCOL group

④ Data is acceptable

⑤ QC measures are adequate except that MS/MSD
acceptability is not addressed

OVERALL DATA QUALITY ASSESSMENT _____

Reviewed By: Kevin A. Lambert

Date: 6/19/98

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: *V. 10/10*

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:

Kevin A. Lambert

Date:

6/11/94

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 5 of 18

3.0 GC INSTRUMENT PERFORMANCE.

3.1 DDT Retention Time

Not Applicable

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

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: _____

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	RF, %RSD	Action	Samples Affected

*Met
Criteria*

Check for transcription/calculation errors. If errors are present, summarize necessary corrections below:

Reviewed By: *Kevin A. Lambert*

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	RFSD	Action	Samples Affected

Check for transcription and calculation errors. If errors are found, briefly summarize necessary corrections below:

Reviewed By:

Kevin A. Lambert
Date: 7/1/94

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: *Karin A. Lambert*

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 ☒

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

Reviewed By:

Date:

Kevin A. Lambert
6/18/98

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 ☐ *Not Applicable*

Are method blank surrogate recoveries outside of limits upon reanalysis? Yes ☐ No ☐ *Not Applicable*

Are transcription/calculation errors present? Yes ☐ No ☒

If yes, note necessary corrections. _____

Reviewed By:

Kevin A. Lusk

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 ☒ *No MS/MSD was run on ARCO group. It was requested on ARCO; however the case narrative states that due to login error the requested MS/MSD was not logged in.*

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

No MS/MSD

Core states in case narrative other samples in SDG were spiked in duplicate. No MS/MSD from other samples is reported. MS/MSD acceptability is not addressed
SEEK CORRECTIVE ACTION

Reviewed By:

Date:

Kevin A. Lambert
6/18/98

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.

Batch
33465

Date	Compound	%Rec	Control Limits	Action	Samples Affected
4/11/98	1706 Nitrobenzene	134.4	70-130	No target compounds detected in associated samples except for HMX in one sample. HMX result will be "J" coded. No other data is qualified.	
	HMX	140			
	o-Nitrotoluene	134.6			
	m-Nitrotoluene	139			

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.

%REC & RPD
4/11/98

Batch
D 33465

Date	Compound	RPD %Rec	Control Limits	Action	Samples Affected
4/11/98	1744 2,6-Dinitrotoluene	132.7 52.5	70-130 ± 20	No target compounds detected in associated samples except for HMX in one sample. HMX will be "J" coded. No other data is qualified.	
	Nitrobenzene	133.3			
	o-Nitrotoluene	133.4			
	m-Nitrotoluene	135.7			

Control Limit Reference: _____

Reviewed By: Kevin A. Lambert

Date: _____

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

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:

Kevin A. Lambert

Date:



22-141 200 SHEETS
22-142 100 SHEETS
22-144 200 SHEETS

Batch	Date	Compound	% REC	Control Limits	Comments
33465	4/11/98	1706 p-Nitrotoluene	136	70-130	No target compounds detected in associated samples except for HMX in one sample. HMX will be "J" coded. No other data is qualified
		4-Amino-2,6-dinitrotoluene	144.5		
		2-Amino-4,6-dinitrotoluene	141.8		
33465	4/14/98	2227 2,6-Dinitrotoluene	137.9	70-130	
		Nitrobenzene	134.1		
		HMX	144.2		
		o-Nitrotoluene	134.4		
		m-Nitrotoluene	137		
		p-Nitrotoluene	137		
		4-Amino-2,6-dinitrotoluene	142.9		
		2-Amino-4,6-dinitrotoluene	139.8		
33465	4/11/98	1744 p-Nitrotoluene	134.2	70-130	
		4-Amino-2,6-dinitrotoluene	143.4		
		2-Amino-4,6-dinitrotoluene	140.2		
33465	4/14/98	2306 2,6-Dinitrotoluene	134.1	70-130	
		Nitrobenzene	132.4		
		HMX	134.8		

Turn Over

13a
Kun: A. J. J. J. J.
6/19/98

Batch	Date	Compound	%REC/RPD	Limit	Comments
33465	4/14/98	0-Nitrotoluene	133.1	70-130	same as other side
		m-Nitrotoluene	134.6		
		p-Nitrotoluene	132.7		
		4-Amino-2,6-dinitrotoluene	143.1		
		2-Amino-4,6-dinitrotoluene	139.3		

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:

Kenneth A. Lusk, Jr.

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 16 of 13

Samples affected: Not Applicable

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 in field duplicate pairs

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: 6/19/98

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 17 of 18

13.1 Chromatogram Quality

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
6/19/98

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 ☐

Not Applicable

Comments

[The following section is crossed out with a diagonal line]

Reviewed By: *Kevin A Lambert*

Date: *6/19/98*

Approved By: _____

Date _____

*Data package must be approved by Project/Task Leader.

ANALYTICAL RADIOCHEMISTRY DATA VALIDATION CHECKLIST

Project Name <u>CCTA-61A</u>				Site Name <u>61A</u>
Laboratory Name/Job No./Batch No. <u>CORE / 980896</u>				Chain of Custody No. <u>510196</u>
Analysis Method <u>Gross Alpha/Beta</u>		EPA <u>900.0</u>		Parameter List: <u>4/13</u>
REVIEW ITEM	YES	NO	NA	COMMENTS
A. HOLDING TIMES				
1. Preparation and analysis holding times met?	✓			
2. Short-half life parameters analyzed for and checked?			✓	
B. CALIBRATION VERIFICATION				
1. Detectors numbered and documented?	✓			
2. Frequency: Daily <u>✓</u> , weekly <u> </u> , or monthly <u> </u> ?	✓			
3. Acceptance criteria: Met?	✓			
C. LABORATORY CONTROL SAMPLES				
1. Standard: Independent, certified reference material?	✓			
2. Frequency: Each batch?	✓			
3. % Recovery 80-120% or <u> </u> ?	✓			
METHOD BLANK				
1. Frequency: Each batch?	✓			
2. Matrix: Matrix specific?	✓			
3. Preparation: Entire procedure?	✓			
4. Blanks show contamination?	<u>OK</u>			<u>< MDL, < Lc</u>
E. MATRIX SPIKE				
1. Frequency: Each batch?			✓	<u>Not requested</u>
2. Matrix: Matrix specific?			✓	
3. Preparation: Entire procedure?			✓	
4. % Recovery: 75-125% or <u> </u> ?			✓	
F. ANALYTICAL YIELDS/OTHER				
1. Tracer: Correct type, recovery met?			✓	
2. Ingrowth and/or decay: Correct factors applied?			✓	
3. Solids density: Planchette loading <5 mg/cm ² ?			✓	
G. DUPLICATE				
1. Type <u>Lab</u> or field?	✓			<u>Not SNL sample</u>
2. Frequency: Each batch?	✓			
3. Matrix: Matrix specific?	✓			

ANALYTICAL RADIOCHEMISTRY DATA VALIDATION
CHECKLIST (CONTINUED)

Project Name <u>CCTA-61A</u>				Site Name <u>61A</u>	
Laboratory Name/Job No./Batch No. <u>CORE / 980896</u>				Chain of Custody No. <u>510196</u>	
Analysis Method <u>EPA 900.0 L/B</u>				Parameter List:	
REVIEW ITEM	YES	NO	NA	COMMENTS	
4. Preparation: Entire procedure?	✓				
H. ANALYTE DETECTION					
1. Detection limit sample/batch specific?	✓				
2. Errors evaluated?	✓				
3. False positives/negatives suspected?		✓			

Reviewed by: H. Senley 7/25/98

Equipment blank #036804-106 was reported
as ND for alpha. Value should have been
reported as -0.02 pCi/L.

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 1 of 18

SITE OR PROJECT CCTA-61
ANALYTICAL LABORATORY CORE
LABORATORY REPORT # 980896
CASE NO. 7215.2208

SAMPLE IDS _____
NO. OF SAMPLES 5
036800-103, 801-103, 802-103,
803-103, 804-103 (EB)

DATA ASSESSMENT SUMMARY

Describe problems/qualifications below (Action Items and Areas of Concern)

	VOC	SVOC	PEST/PCB	EXPLOSIVES OTHER
1. HOLDING TIMES/PRESERVATION				✓
2. GC/MS INST. PERFORM.				NA
3. CALIBRATIONS/WINDOWS				✓
4. BLANKS				✓
5. SURROGATES				* J
6. MATRIX SPIKE/DUP				NA
7. LABORATORY CONTROL SAMPLES				J
8. INTERNAL STANDARDS				NA
9. COMPOUND IDENTIFICATION				✓
10. SYSTEM PERFORMANCE				✓
11. OVERALL ASSESSMENT				J

✓ (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: Explosives data qualified as estimated (J).

(over)

AREAS OF CONCERN: _____

Reviewed By: H. Sealey

Date: 7/25/98

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 2 of 18

PROJECT/TASK LEADER: C. Aas

ACTION ITEMS:

All results should be considered as estimated (J, UJ).

Incorrect surrogate solution used in initial extractions,
so no surrogate recoveries could be calculated.

Re-extraction w/ the correct surrogate was performed
eleven ~~twenty~~ days out of holding time for soils. Re-extraction
results were, per the narrative, comparable to initial

AREAS OF CONCERN: results, however data was not provided.

LCS recoveries for tetra, HMX, and 4-A-2,6-DNT were
were outside acceptance range - initial & re-extraction.

Requesting re-extraction prep log to verify days
out of holding time. HS 5/25/98

Per re-extraction log of batch 980881 (COC 510195), the samples were
re-extracted 4/29/98, 11 days out of hold time. HS 7/14/98

OVERALL DATA QUALITY ASSESSMENT

Data qualified as estimated (J, UJ).

Reviewed By: H. Sealey

Date: 7-25-98

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: 2 days H₂O, 14 day soil

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: H. Seelay

Date: 7/25/99

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 4 of 18

2.0 GC/MS TUNING CRITERIA

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: H. Sealey

Date: 7/25/98

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 5 of 18

3.0 GC INSTRUMENT PERFORMANCE.

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: H. Seeley
Date: 7/25/98
AL/2-94/WP/SNL:SOP3044C.R1

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 6 of 18

3.3 DDT and Endrin Degradation

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: H. Seeley
Date: 7/25/98
AL/2-94/WP/SNL:SOP3044C.R1

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 ☐ **NA**

List below compounds which did not meet initial calibration criteria outlined by the EPA method.

Instrument ID	Date	Compound	RF/%RSD	Action	Samples Affected

Check for transcription/calculation errors. If errors are present, summarize necessary corrections below:

N/A

Reviewed By: H. Seeley
Date: 2/25/98
AL/2-94/WP/SNL:SOP3044C.R1

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/%D	Action	Samples Affected

Check for transcription and calculation errors. If errors are found, briefly summarize necessary corrections below:

N/A

Reviewed By: H. Serley

Date: 2/25/98

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 ☐ *NA*

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)
4/24	036804-108	HMX	0.1 J ug/L	0.5	1.0 ug/L	None

PQL = Practical Quantitation Limit from EPA Method.

Reviewed By: H. Sealey
Date: 7/25/98
AL/2-94/WP/SNL:SOP3044C.R1

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 ☐

If yes, list below.

N/A

7.0 SURROGATE RECOVERY

Were surrogate recoveries evaluated for each of the samples analyzed by ^{HPLC} ~~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

3,4-DNT

70-130

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
4/23	AM	3,4-DNT	0%	3
4/30, 5/1		↓	✓	

Reviewed By: H. Seckley

Date: 7/25/98

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 ☐

*Soils - re-extracted 1 day out of hold
H₂O - not re-extracted*

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: *H. Sedley*
Date: *7/25/98*

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 ☐

Not requested

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
		<i>N/A</i>		

Reviewed By: *H. Sedley*

Date: *7/25/98*

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
4/30/98	Tetryl	49.6 / 38.6	70-130	J	All J
4/31/98	HMX	130.4 / 128.4		None - results NO	None
4/30/98	Tetryl	46.6		J	All
4/30/98	4-A-2,6-DNT	144.0		J	All

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.

Date	Compound	%Rec	Control Limits	Action	Samples Affected
4/30/98	Tetryl	28.9	±20%	J	All
4/30/98	Tetryl	65.6		J	All

Control Limit Reference: _____

Reviewed By: H. Sealey
Date: 7-25-98

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 14 of 18

10.0 INTERNAL STANDARDS EVALUATION

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

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: H. Sealey
Date: 7-25-98

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 ☒ N/A

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

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 ☒ N/A

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: H. Sealey
Date: 7-25-98

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 16 of 18

Samples affected: _____

N/A

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: _____

N/A

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

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: H. Sealey
Date: 2-25-98

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 17 of 18

13.1 Chromatogram Quality

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 ☐ *PM Decision*

If no, make necessary corrections and note below.

14.0 TENTATIVELY IDENTIFIED COMPOUNDS

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: H. Sealey

Date: 7-25-98

INORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3—DV3)

Page 1 of 16

SITE OR PROJECT CCTA-61A
ANALYTICAL LABORATORY CORE
LABORATORY REPORT # 980896
TASK LEADER Aas
NO. OF SAMPLES 5

CASE NO. 7215, 2205
SAMPLE IDS 036800-103 through 036804-107

DATA ASSESSMENT SUMMARY

	ICP	AA	MERCURY	CYANIDE
1. HOLDING TIMES	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
2. CALIBRATIONS	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
3. BLANKS	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
4. ICS	<input checked="" type="checkbox"/>			
5. LCS	<input checked="" type="checkbox"/>			
6. DUPLICATE ANALYSIS	<u>NA</u>	<u>NA</u>	<u>NA</u>	
7. MATRIX SPIKE	<u>NA</u>	<u>NA</u>	<u>NA</u>	
8. MSA		<u>NA</u>		
9. SERIAL DILUTION	<u>NA</u>			
10. SAMPLE VERIFICATION	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
11. OTHER QC	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
12. OVERALL ASSESSMENT	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	

✓ (check mark) — Acceptable

Other — Qualified:

J - Estimate

UJ - Undetected, estimated

R - Unusable (analyte may or may not be present)

ACTION ITEMS:

AREAS OF CONCERN:

Data is acceptable without further qualifications.

(over)

REVIEWED BY:

H. Serley

DATE REVIEWED:

7/25/98

INORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3—DV3)

Page 2 of 16

ACTION ITEMS:

- 1) Transcription error noted in Mercury calibration. The calibration curve printout indicates an absorbance of 0.013 for the 5.0 ppb standard. Actual run data indicates 0.068. Appears that the correct value was used in calculations and the data is not impacted.
- 2) Lead was noted in the method blank for both solids and water samples. All solid results were greater than action limit. The water sample result was non-detect. Data not impacted.

AREAS OF CONCERN:

- 3) Lead and selenium reported for the equipment blank. All soil results for lead were much greater than the action limit. All soil results for selenium were non-detect. Data not impacted.

OVERALL DATA QUALITY ASSESSMENT

Data acceptable w/o further qualification.

Reviewed By:

H. Sealey

Date:

7/25/98

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: 90-110 ICP
Mercury: 80-120
Cyanide: NA
Other: 75-125 GFAA

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:

N/A

Reviewed By: H. Seely

Date: 7/25/98

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: Hg calibration, 4/14/98 Transcription error: 5 ppb std signal (0.0674) transcribed to data summary as 0.0013. Correct values used in calculations.

Date	Analyte	Coefficient	Action	Samples Affected
<i>NONE</i>				

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
<i>N/A</i>						

Reviewed By: H. Sealey Date: 7/25/98

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 ☐

At the frequency indicated in the EPA method or QAPP? 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.

[illegible]

Is concentration in the method blank below the detection limit? Yes ☒ No ☐

Affected samples: _____

N/A

Reviewed By: H. Sealey Date: 7/25/98

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
4-1-98	036804-107	Pb	0.003 J	0.005		None
		Se	0.001 J	0.005		1

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: N/A

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: H. Sealey Date: 7/25/98

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: _____

N/A

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: _____

N/A

Reviewed By: _____

H. Sealey

Date: _____

7/25/98

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: _____
N/A

Was laboratory duplicate analysis performed on field or equipment blanks? Yes ☐ No ☒

Samples affected: _____
N/A

Is any value for sample duplicate pair <PQL and the other value >10xPQL? Yes ☐ No ☒

Samples affected: _____
N/A

Reviewed By: H. Serley Date: 7/25/98

INORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level:3—DV3)

Page 11 of 16

Samples affected: _____

N/A

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

None

Check for transcription/calculation errors. Briefly summarize errors and associated actions when data quality might have been affected.

N/A

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 ☐

NA - not requested

Reviewed By: *H. Sealey*

Date: *7/25/98*

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: N/A

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: N/A

List below the % recoveries for analytes that did not meet the criteria:

Sample ID	Matrix	Preparation Date	Analyte	%R	Action	Samples Affected

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: H. Seeley Date: 2/25/98

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

Were duplicate injections present for each sample, including required QC analyses (not required if MSA is done)? Yes ☒ No ☐

Samples affected: _____
N/A

Were postdigestion spikes analyzed for samples, including QC samples? Yes ☒ No ☐

Were postdigestion spikes analyzed at the required concentration? Yes ☒ No ☐

Samples affected: _____
N/A

Was a dilution analyzed for samples with postdigestion spike recovery <40%? Yes ☐ No ☐

Samples affected: _____
N/A

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 ☐ N/A

Reviewed By: H. Serley

Date: 7/25/98

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: _____
N/A

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 ☐

N/A

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

Check for calculation errors and negative interferences.

Reviewed By: H. Seelay Date: 7/25/98

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 ☐

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: _____

N/A

Are ICP Interelement Correction Factors established and verified annually? Yes ☒ No ☐

Are ICP Linear Ranges established and verified quarterly? Yes ☒ No ☐

If no for any of the above, review problems and resolutions in narrative report. _____

N/A

11.2 Reporting Requirements

Were sample results reported down to the PQL? Yes ☒ No ☐

If no, indicate necessary corrections. _____

N/A

Were sample results that were analyzed by ICP for Se, Ti, As, or Pb at least 5xIDL? Yes ☐ No ☐ N/A

Were sample weights, volumes, and dilutions taken into account when reporting sample results and detection limits? Yes ☒ No ☐

Reviewed By: H. Seckley Date: 7/25/98

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.

N/A

Were any sample results higher than the linear range of calibration curve and not subsequently reanalyzed at the appropriate dilution? Yes ☐ No ☒

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: H. Serley

Date: 7/25/98

SAMPLE FINDINGS SUMMARY

Site: CCTA-61A

AR/COC: 510196

Data Classification: _____

Sample/ Fraction No.	Analysis	DV Qualifiers	Comments
036800-103	HE	J/UJ	All - Holding Time
036801-103	HE	J/UJ	All - Holding Time
036802-103	HE	J/UJ	All - Holding Time
036803-103	HE	J/UJ	All - Holding Time
036804-108	HE	J/UJ	All - Holding Time

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: H. Seely

Date: 7/28/98

ANALYTICAL RADIOCHEMISTRY DATA VALIDATION CHECKLIST

Project Name <u>CCTA-61A</u>				Site Name <u>61A</u>
Laboratory Name/Job No./Batch No. <u>Core/980881/984561</u>				Chain of Custody No. <u>510195</u>
Analysis Method <u>Gross Alpha/Beta EPA 900.0</u>				Parameter List: <u>α/β</u>
REVIEW ITEM	YES	NO	NA	COMMENTS
A. HOLDING TIMES				
1. Preparation and analysis holding times met?	✓			
2. Short-half life parameters analyzed for and checked?			✓	
B. CALIBRATION VERIFICATION				
1. Detectors numbered and documented?	✓			
2. Frequency: Daily <u>✓</u> , weekly <u> </u> , or monthly <u> </u> ?	✓			
3. Acceptance criteria: Met?	✓			
C. LABORATORY CONTROL SAMPLES				
1. Standard: Independent, certified reference material?	✓			
2. Frequency: Each batch?	✓			
3. % Recovery 80-120% or <u> </u> ?	✓			
METHOD BLANK				
1. Frequency: Each batch?	✓			
2. Matrix: Matrix specific?	✓			
3. Preparation: Entire procedure?	✓			
4. Blanks show contamination?	✓			
E. MATRIX SPIKE				
1. Frequency: Each batch?			✓	
2. Matrix: Matrix specific?			✓	
3. Preparation: Entire procedure?			✓	
4. % Recovery: 75-125% or <u> </u> ?			✓	
F. ANALYTICAL YIELDS/OTHER				
1. Tracer: Correct type, recovery met?			✓	
2. Ingrowth and/or decay: Correct factors applied?			✓	
3. Solids density: Planchette loading <5 mg/cm ² ?			✓	
G. DUPLICATE				
1. Type: Lab or field?	✓			
2. Frequency: Each batch?	✓			
3. Matrix: Matrix specific?	✓			

ANALYTICAL RADIOCHEMISTRY DATA VALIDATION CHECKLIST (CONTINUED)

Project Name <u>CCTA-61A</u>				Site Name <u>61A</u>
Laboratory Name/Job No./Batch No. <u>COCE/980881/984561</u>				Chain of Custody No. <u>510195</u>
Analysis Method <u>9000</u>				Parameter List: <u>Alpha-Beta</u>
REVIEW ITEM	YES	NO	NA	COMMENTS
4. Preparation: Entire procedure?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
H. ANALYTE DETECTION	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
1. Detection limit sample/batch specific?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2. Errors evaluated?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3. False positives/negatives suspected?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Reviewed by: H. Sudek 7/28/98

Result for 036799-106 (EB) reported as NO for gross Beta.
Result was -0.15 pCi/L.
No qualifications.

INORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3—DV3)

Page 1 of 16

SITE OR PROJECT CCTA-61A
ANALYTICAL LABORATORY CORE
LABORATORY REPORT # 980881
TASK LEADER Aas
NO. OF SAMPLES 13 w/ fractions => 31

CASE NO. 7215, 2205
SAMPLE IDS 036787-102 thru 036799-110
COC 510195

DATA ASSESSMENT SUMMARY

	ICP	AA	MERCURY	CYANIDE
1. HOLDING TIMES	<u>/</u>	<u>/</u>	<u>/</u>	<u>/</u>
2. CALIBRATIONS	<u>/</u>	<u>/</u>	<u>/</u>	<u>/</u>
3. BLANKS	<u>/</u>	<u>/</u>	<u>/</u>	<u>/</u>
4. ICS	<u>/</u>	<u>/</u>	<u>/</u>	<u>/</u>
5. LCS	<u>/</u>	<u>/</u>	<u>/</u>	<u>/</u>
6. DUPLICATE ANALYSIS	<u>/</u>	<u>/</u>	<u>/</u>	<u>/</u>
7. MATRIX SPIKE	<u>J</u>	<u>/</u>	<u>/</u>	<u>/</u>
8. MSA	<u>/</u>	<u>NA</u>	<u>/</u>	<u>/</u>
9. SERIAL DILUTION	<u>/</u>	<u>/</u>	<u>/</u>	<u>/</u>
10. SAMPLE VERIFICATION	<u>/</u>	<u>/</u>	<u>/</u>	<u>/</u>
11. OTHER QC	<u>/</u>	<u>/</u>	<u>/</u>	<u>/</u>
12. OVERALL ASSESSMENT	<u>/</u>	<u>/</u>	<u>/</u>	<u>/</u>

✓ (check mark) — Acceptable

Other — Qualified:

J - Estimate

UJ - Undetected, estimated

R - Unusable (analyte may or may not be present)

ACTION ITEMS: _____

AREAS OF CONCERN: Specific qualifications on page 2.

REVIEWED BY: H. Seaton

DATE REVIEWED: 7/28/98

INORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3—DV3)

Page 2 of 16

ACTION ITEMS:

- 1) Pb and Zn were detected slightly above detection limit in TAC method blank. Sample results were $>10\times$ the blank concentration and the B qualifier should be removed. 036796-103, 036797-103, 036798-103
- 2) Equipment blank reported low concentrations of Al, Ca, Fe, Pb, K, Na, and Zn. Concentrations do not impact sample results.
- 3) Field duplicate 036788-103 for 036787-103: High RPD between Pb results. Estimate both J.

AREAS OF CONCERN:

- 4) Matrix Spikes - 036796-103 used as MS/MJO. Qualifications are applied only to that sample. As, Se, Ba, Fe, Mn, and Sb concentrations should be estimated J. due to low recoveries or high RPDs.

OVERALL DATA QUALITY ASSESSMENT

Reviewed By:

H. Sealey

Date:

7/28/98

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: 90-110 ICP
Mercury: 80-120
Cyanide: NA
Other: 75-125 GFAA

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:

NA

Reviewed By: H. Seabey

Date: 7/28/98

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: _____

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

Reviewed By: L. Saylor Date: 7/25/98

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 ☐
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 Analysis	Analyte	Conc.	Required Detection Limits	Action Level	Samples Affected
4-28-98	Pb	0.26	0.2	2.6 mg/kg	036796-103
5-10-98	Zn	1.01	1.0	10.1 mg/kg	036797-103
					036798-103

Is concentration in the method blank below the detection limit? Yes ☐ No ☒

Affected samples: 036796-103: Pb 43.98 to 43.9, Zn 2848 to 284,
036797-103: Pb 9.158 to 9.85, Zn 45.58 to 45.5; 036798-103: Pb 9.848 to 9.84,
Zn 41.88 to 41.8. All results > 10x blank level.

Reviewed By: H. Seely

Date: 7/28/98

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.

**See sample results. All values low, sample data not affected.*

Collection Date	Blank ID	Analyte	Conc.	Required Detection Limits	Action Level	Samples Affected
3-25-98	036799	Al, Ca, Fe, Pb, K, Na, Zn	*	*	*	None

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: H. Sedley Date: 7/20/98

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: N/A

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: H. Sealey Date: 7/28/98

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: H. Sealey Date: 7/28/98

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 ☐ ~~N/A - N~~

If yes, quality 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: H. Sealey

Date: 7/25/98

INORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3—DV3)

Page 11 of 16

Samples affected: _____
N/A

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
036788-103	S	3-25-98	45	See below		

Check for transcription/calculation errors. Briefly summarize errors and associated actions when data quality might have been affected.

036787-103 and dup 036788-103:

Cd: 0.69 mg/kg and NO

Pb: 0.29 mg/kg and 19.7 mg/kg High RPD - estimate J

Se: NO and 0.18 J

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: H. Sealey Date: 7/28/98

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	Analysis Preparation Date	Analyte	%R	Action	Samples Affected
036796-103	Soil	4-25-98	As	74.8 14.8	J	036796-10J
		5-1-98	Se	62.1 66	None (skt J)	
		5-10-98	Ba	225.5 101.8	J	
		5-10-98	Fe	432 RAP	J	
		5-10-98	Mn	757.7 81.9	J	
		6-2-98	Sb	44.5 22.6	J	

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: H. Sealey Date: 7/28/98

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

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 ☐ *N/A*

Samples affected: _____
N/A

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 ☐ *N/A*

Reviewed By: *H. Sealey* Date: *7/28/98*

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: _____

N/A

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: _____

N/A

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

N/A

Check for calculation errors and negative interferences.

Reviewed By: W. Seelye Date: 7/28/98

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 ☐

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: _____
_____ N/A _____

Are ICP Interelement Correction Factors established and verified annually? Yes ☒ No ☐

Are ICP Linear Ranges established and verified quarterly? Yes ☒ No ☐

If no for any of the above, review problems and resolutions in narrative report. _____
_____ N/A _____

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 ☐ GFAA

Were sample weights, volumes, and dilutions taken into account when reporting sample results and detection limits? Yes ☒ No ☐

Reviewed By: H. Serley Date: 7/28/98

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.

N/A

Were any sample results higher than the linear range of calibration curve and not subsequently reanalyzed at the appropriate dilution? Yes ☐ No ☒

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: H. Sealey

Date: 7/29/98

SAMPLE FINDINGS SUMMARYSite: CCTA-61AAR/COC: 510195

Data Classification:

Sample/ Fraction No.	Analysis	DV Qualifiers	Comments
036792-103	HE	J/UJ	All - HT ¹⁵ Holding Times, LCS
036793-103	HE	J/UJ	All - HT, LCS
036794-103	HE	J/UJ	All - HT, LCS
036795-103	HE	J/UJ	All - HT, LCS
036796-103	HE	J/UJ	All - HT, LCS
036797-103	HE	J/UJ	All - HT, LCS
036798-103	HE	J/UJ	All - HT, LCS
036799-108	HE	J/UJ	All - HT, LCS
036796-104	SVOC	J/UJ	All - HT
036797-104	SVOC	J/UJ	All - HT
036798-104	SVOC	J/UJ	All HT

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: A. Sealey Date: 7/29/98

SAMPLE FINDINGS SUMMARY

Pg 2 of 3

Site: CCTA-61A

AR/COC: 510195

Data Classification:

Sample/ Fraction No.	Analysis	DV Qualifiers	Comments
036799-110	SVOC	J/UJ	All-HT
036796-103	Lead, Zinc	None	Remove 'B'
036797-103	Lead, Zinc	None	Remove 'B'
036798-103	Lead, Zinc	None	Remove 'B'
036787-103	Lead	J	FDRPO
036788-103	Lead	J	FDRPO
036796-103	Arsenic	J	MS/MSO
036796-103	Selenium	J	MS/MSO
036796-103	Barium	J	MS/MSO
036796-103	Iron	J	MS/MSO
036796-103	Manganese	J	MS/MSO

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: H. Sealey

Date: 7/29/98

SAMPLE FINDINGS SUMMARYSite: CCTA-61AAR/COC: 510195

Data Classification:

Sample/ Fraction No.	Analysis	DV Qualifiers	Comments
036796-103	Antimony	J	MS/MSD

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: H. Seely Date: 7/29/98

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 1 of 18

SITE OR PROJECT CCTA-61A
ANALYTICAL LABORATORY CORE
LABORATORY REPORT # 980881
CASE NO. 7215,2205

SAMPLE IDS _____
NO. OF SAMPLES 31
036787 thru 036799 w/ fractions

DATA ASSESSMENT SUMMARY

Describe problems/qualifications below (Action Items and Areas of Concern)

	VOC	SVOC	PEST/PCB	HE OTHER
1. HOLDING TIMES/PRESERVATION	_____	_____	_____	_____
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: _____

AREAS OF CONCERN: Explosives Data qualified as estimated J.
SVOC data qualified as estimated J.

Reviewed By: H. Seely

Date: 7-27-98

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 2 of 18

PROJECT/TASK LEADER: Aas

ACTION ITEMS: 1) Holding times - water samples were received by laboratory out of holding time. Soils for TCP analysis were extracted 5 days out of hold time. Re-extractions of soils were done 20 days out of hold time. Results for all HE samples and for SVOC samples are qualified as estimated J.

2) Method blank - HE detections below PQL. Sample results were either ND or $>10\times$ blank value.

AREAS OF CONCERN: 3) Equipment blank - 2-ethylhexylphthalate reported below PQL. All soil results were non-detect and no qualification was applied.

4) Surrogate - wrong spiking solution was added by lab, requiring re-extraction well beyond holding times. Results were comparable to the initial analyses, however all results are qualified as estimated for HE. One surrogate showed low recovery for SVOC, however all other surrogate recoveries were acceptable and no further qualification was made.

5) MS/MSD - SVOC: low recovery for 245-TCP and 246-TCP. Samples also extracted out of holding time. Quality estimated.

OVERALL DATA QUALITY ASSESSMENT

6) LCS - HE: High recoveries for 2,6-DNT, 4-MX, 4-A-26-DNT, 2-A-46-DNT, RDX, o- and p-nitrotoluene. Low recoveries for tetraol. Qualified all results as estimated.
SVOC: low recoveries for phenol and 4-nitrophenol. Qualify those two compounds as estimated J.

Reviewed By: H. Seely
Date: 7-29-98

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: HE - 7 days H₂O, 14 days soil

List below samples that were over holding time criteria.

Sample ID	VTSR	Date Analyzed	Action
036799-108 HE	4-2-98	Extracted 4-8-98	J 7
All Soils - HE	4-2-98	Re-extracted 4-29-98	J 20
036799-110 SVOC	4-2-98	Extr 4/7/98	J 6
036796-104, 797-104,	↓	Extr 4/13/98	J 5
798-104 (SAR-RP)	↓	↓	J 5

NOTE: VTSR = Validated time of sample receipt.

Rec'd outside hold time.

Were the correct preservatives used? Yes ☒ No ☐

List below samples that were incorrectly preserved.

Sample No.	Type of Sample	Deficiency	Action

Reviewed By: H. Seelye
Date: 7-27-98

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 4 of 18

2.0 GC/MS TUNING CRITERIA

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)
	N/A	

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: _____

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 5 of 18

3.0 GC INSTRUMENT PERFORMANCE.

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:

N/A

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: _____
Date: _____

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 6 of 18

3.3 DDT and Endrin Degradation

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: _____

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 ☐ *N/A*

List below compounds which did not meet initial calibration criteria outlined by the EPA method.

Instrument ID	Date	Compound	RF/%RSD	Action	Samples Affected

Check for transcription/calculation errors. If errors are present, summarize necessary corrections below:

Reviewed By: _____

Date: _____

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/%D	Action	Samples Affected

Check for transcription and calculation errors. If errors are found, briefly summarize necessary corrections below:

Reviewed By: _____

Date: _____

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. (μg/L)	PQL (μg/L)	Action Level	Samples Affected (Action)
4/23/98	Method-4643	2,4,6-DNT	0.012 J	0.14	N/A	None
		4-A-2,6-DNT	0.012 J	0.16		
		p-Nitrotoluene	0.0038 J	0.19		
		TNT	0.0077 J	0.11		
		HMX	.0034 J	0.09 J		
4/24/98	036799-110	2-ethylhexyl phthalate	2.0 J	10	20	None

PQL = Practical Quantitation Limit from EPA Method.

HE-H₂O sample 799-108: Hmx > 10x blank value. All other sample results ND.

All SVOC so.7 results were ND.

Reviewed By: _____

Date: _____

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 ☒

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

SWOC: 246-TBP

HE: 3,4-DNT

70-130%

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
4/23	All	3,4-DNT	0%	J
4/30, 5/1	Re-extracted	3,4-DNT	ok	-
4/20, 4/22	036797-104	2,4,6-TBP	15% 13%	None - only surrogate cut

Reviewed By: _____

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 ☐ *HE* } Soils re-extracted 26 days outside HT. ~~SW~~
Water - not re-extracted

Are method blank surrogate recoveries outside of limits upon reanalysis? Yes ☐ No ☒
SVOC - 246-TBP out

Are transcription/calculation errors present? Yes ☐ No ☒

If yes, note necessary corrections. _____

Reviewed By: _____

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 QAPjP for each matrix type?

Yes ☒ No ☐

Extracted 4/15/98 - 8 days out of KT

List below % recoveries and RPDs of compounds which did not meet criteria. Indicate on chart criteria used to evaluate recoveries and RPDs.

MS/MSD

Date	Sample ID/Matrix	Compound	%Rec RPD	Action
4/23	036796-104 MS	24,5-TCP	<i>41.7 / 39.1</i>	J sample for 245-TCP
4/23	036796-104 MSD	24,6-TCP	<i>57 / 54.5</i>	J sample for 246-TCP

Reviewed By: _____
Date: _____

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 QAPP?

Yes ☒ No ☐ 4/21, 4/27, 4/28, 4/30 - Following compounds had high recoveries up to 160%:
* 2,6-DNT, HMX, 4-A-2,6-DNT, 2-A-4,6-DNT, RDX, o,p-nitrotoluene.

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
4/30/98	Tetryl	46.6%	70-130	UJ	All
4/23/98	Tetryl	49.6 38.6	70-170	UJ	All
*	Trisect		>130%	J	All
4/24/98	Penol	32.9 37	53-131 70-170	J	All

Control Limit Reference: 4-nitrophenol 31.3
70-170% 36.3 61-151 J Ad

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.

Date	Compound	%Rec ^{PD}	Control Limits	Action	Samples Affected
4/28/98	HMX	21.4%	±20%	J	All
4/23/98	Tetryl	29.9%	±20%	J	All
4/30/98	Tetryl	65.6%	±20%	J	All
4/23/98	Pyridine	101.8%	±20%	None J	All but for pyridine

Control Limit Reference: ±20%

Reviewed By: _____

Date: _____

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 14 of 18

10.0 INTERNAL STANDARDS EVALUATION

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

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

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.

NA

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: _____

Date: _____

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

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: _____
Date: _____

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 17 of 18

13.1 Chromatogram Quality

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 ☐ N/A

If no, make necessary corrections and note below.

14.0 TENTATIVELY IDENTIFIED COMPOUNDS

Are Tentatively Identified Compounds (TIC) properly identified with scan number or retention time, estimated concentration, and J qualifier? Yes ☐ No ☐ N/A

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: _____

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: _____

Date: _____

Approved By:*

Date _____

***Data package must be approved by Project/Task Leader.**

ANALYTICAL RADIOCHEMISTRY DATA VALIDATION CHECKLIST

Project Name <u>CCTA - 61A</u>				Site Name <u>CASE # 7215.2205</u>	
Laboratory Name/Job No./Batch No. <u>CORE / 980820</u>				Chain of Custody No. <u>510093</u>	
Analysis Method <u>EPA 900.0, CA-GLR-R405, CA-GLR</u>				Parameter List: <u>GROSS A/B, ISO-U, ISO-TH</u>	
REVIEW ITEM <u>CA-GLR-5.09</u>				YES	NO
				NA	COMMENTS
A. HOLDING TIMES					
1. Preparation and analysis holding times met?					SEE CUP FORM
2. Short-half life parameters analyzed for and checked?					
B. CALIBRATION VERIFICATION					
1. Detectors numbered and documented?				✓	
2. Frequency: Daily <input checked="" type="checkbox"/> weekly <input type="checkbox"/> or monthly <input type="checkbox"/> ?				✓	
3. Acceptance criteria: Met?				✓	
C. LABORATORY CONTROL SAMPLES					
1. Standard: Independent, certified reference material?				✓	Gross A/B LCS/LCSD met criteria ISO-TH met criteria ISO-U met criteria
2. Frequency: Each batch?				✓	
3. % Recovery 80-120% or ____?				✓	
METHOD BLANK					
1. Frequency: Each batch?				✓	Met criteria except ISO-TH method blank on reanalysis is elevated due to irregular peak for Th229 traces. All other QC acceptable. No data were qualified.
2. Matrix: Matrix specific?				✓	
3. Preparation: Entire procedure?				✓	
4. Blanks show contamination?				✓	
E. MATRIX SPIKE					
1. Frequency: Each batch?				✓	Gross A/B met criteria ISO-TH did not meet criteria. Samples reanalyzed and met criteria. ISO-U did not meet criteria. Samples reanalyzed and met criteria. No data were qualified.
2. Matrix: Matrix specific?				✓	
3. Preparation: Entire procedure?				✓	
4. % Recovery: 75-125% or ____?				✓	
F. ANALYTICAL YIELDS/OTHER					
1. Tracer: Correct type, recovery met?				✓	ISO-TH did not meet tracer recovery. Samples were reanalyzed and met criteria. No data were qualified.
2. Ingrowth and/or decay: Correct factors applied?				✓	
3. Solids density: Planchette loading <5 mg/cm ² ?				✓	
G. DUPLICATE					
1. Type: Lab or field?				✓	Gross A/B met DER criteria ISO-TH met DER criteria ISO-U met DER criteria
2. Frequency: Each batch?				✓	
3. Matrix: Matrix specific?				✓	

ANALYTICAL RADIOCHEMISTRY DATA VALIDATION CHECKLIST (CONTINUED)

Project Name				Site Name	
Laboratory Name/Job No./Batch No.				Chain of Custody No.	
Analysis Method			Parameter List:		
REVIEW ITEM	YES	NO	NA	COMMENTS	
4. Preparation: Entire procedure?	✓				
H. ANALYTE DETECTION					
1. Detection limit sample/batch specific?	✓				
2. Errors evaluated?	✓				
3. False positives/negatives suspected?		✓			

Reviewed by: Kevin A. Lambert 7/28/98

① All samples were prepared and analyzed with accepted procedures and specified methods. All compounds were successfully analyzed. A few minor problems were encountered during data package review with ISO-U and ISO-Th. A minor problem was observed with Gross Alpha/Beta. These problems did not result in any data qualification since steps were taken by lab that minimized their impact.

② ISO-U & ISO-Th: Calibration met criteria. LCS/LCSD met criteria and duplicate pair met DER criteria. MS/MSD did not meet criteria, however samples were reanalyzed and met acceptance criteria. No data were qualified. Low tracer recoveries in ISO-Th water batch resulted in reanalysis. All QC met criteria except LC criteria due to elevated backgrounds for Th230 + Th228. Th 232 was acceptable. The ISO-Th method blank upon reanalysis was elevated due to irregular peak of Th229. All other QC met criteria. Sample inhomogeneity is suspected to cause these low recoveries, etc.. Since reanalysis indicated acceptable QC no data is qualified.

③ Gross Alpha/Beta: Calibration met criteria. LCS/LCSD met criteria. Duplicate pair DER met criteria. M.B. were within acceptable limits. No MS/MSD was run on ARCO group soil sample. Since LCS/LCSD met criteria and Duplicate pair met DER criteria, no data were qualified.

④ Data is acceptable

⑤ QC measures appear to be adequate.
Note: Awaiting corrections from lab that may impact review

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 CCTA-61A
ANALYTICAL LABORATORY CORE
LABORATORY REPORT # 980820
CASE NO. 7215.2205

SAMPLE IDS 1 aqueous
NO. OF SAMPLES 1
~~CCTA-61A-GR-XXX~~ KAL 7/24/98
CCTA-61A-GR-000-EB

ARLCO# 510093

DATA ASSESSMENT SUMMARY

Describe problems/qualifications below (Action Items and Areas of Concern)

	VOC	SVOC	PEST/PCB	HE OTHER
1. HOLDING	NA	NA	NA	✓
TIMES/PRESERVATION				
2. GC/MS INST. PERFORM.				NA
3. CALIBRATIONS WINDOWS				✓
4. BLANKS				✓
5. SURROGATES				N
6. MATRIX SPIKE/DUP				NA
7. LABORATORY CONTROL SAMPLES				N
8. INTERNAL STANDARDS				NA
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

KAL 7/24/98

ACTION ITEMS

All sample were prepared and analyzed with accepted procedures and specified methods. All compounds were successfully analyzed. Major

KAL 7/24/98

AREAS OF CONCERN:

problems were encountered during review. The LCS/LCSD were outside acceptance criteria and upon reanalysis similar results were obtained.

Reviewed By:

Kevin A. Lambert

Date:

7/24/98

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 2 of 18

PROJECT/TASK LEADER: _____

7/24/98

ACTION ITEMS: Low %REC in LCS and RPD were outside control limits for all compounds. No target compounds were detected in the sample. Sample results will be "R" coded. Also surrogate %REC in the MB and LCS were low and reanalysis showed similar results. Sample results are unusable.

② HE ANALYSIS: Calibration met acceptance criteria. No target analytes were detected in MBs. No MS/MSD was run on ARCO group. No site samples were identified.

KAC 7/24/98

AREAS OF CONCERN: for HE analysis, only one Eq. Blank was on ARCO for HE analysis. Therefore no field duplicate pair was on ARCO.

③ Data is not acceptable due to low %REC of LCS and RPDs outside control limits

④ QC measures appear to be adequate

OVERALL DATA QUALITY ASSESSMENT _____

Reviewed By: Karin A. Lambert

Date: 7/24/98

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 7/24/98

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: Kevin A. Lambert

Date: 7/24/98

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 5 of 18

3.0 GC INSTRUMENT PERFORMANCE.

3.1 DDT Retention Time

Not Applicable

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

Not Applicable

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 7/24/98
Date:

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 6 of 18

3.3 DDT and Endrin Degradation

No + 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:

7/24/98

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	RFID	Action	Samples Affected

Check for transcription and calculation errors. If errors are found, briefly summarize necessary corrections below:

Reviewed By: Kevin A. Lambert
Date: 7/24/98

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)
<i>No target analytes were detected</i>						
<i>KPC 7/24/98</i>						

PQL = Practical Quantitation Limit from EPA Method.

Reviewed By: *Kevin A. Lambert*
Date: *7/24/98*

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 ☒

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
	EB met 70 REC for Surrogates (see SURROGATE Report); however MB and LCS did not meet acceptance criteria and upon reanalysis KAL The MB & LCS were reanalyzed and did not meet acceptance criteria Sample results will be "R" coded			

Reviewed By: Kevin A. Lambert
Date: 7/24/98

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 ☐

MB + LCS were outside control limits

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 7/24/98

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 ☒

*No MS/MSD was run on ARCOG Group
ARCOG group includes only EB, not site samples*

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

*No MS/MSD was submitted
was run on ARCOG group
KM 7/24/98*

Reviewed By:

Kevin A. Lambert

Date:

7/24/98

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 QAPP?

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.

Batch
33946

Date	Compound	%Rec	Control Limits	Action	Samples Affected
4/10/98	1306	All compds had low % REC in LCS and RPDs were outside control limits (SEE QC Report). LCSD met % REC criteria. LCS/LCSD was reanalyzed and similar results were obtained. Sample results will be "R" coded			

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.

Date	Compound	%Rec	Control Limits	Action	Samples Affected
See above					

Control Limit Reference: _____

Reviewed By: Kevin A Lambert
Date: 7/24/98

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: Kevin A. Lambert
Date: 7/24/98
AL2-54 WP SNL SOP3044C.R1

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 15 of 18

Other: Not Applicable

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: 7/24/98

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 16 of 18

Samples affected: Not Applicable

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 ☒

*No site samples
Only Eg. Blank*

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

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: 7/24/98

ORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3 DV-3)

Page 17 of 13

13.1 Chromatogram Quality

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 quantization limits (detection limits) adjusted to reflect sample dilutions and for soils, sample moisture? Yes ☐ No ☐ *Not Applicable*

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: *Kenn A. Lambert*

Date: *7/24/98*

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 Not Applicable

Reviewed By:

Kevin A Lambert

Date:

7/24/98

Approved By:

Date

*Data package must be approved by Project/Task Leader.

Site: CC TA - 61A

AR'COC: 5/0/91

Data Classification: Inorganic

CCTA-61A-GR-007-0.5-1.0-S

↓

-008-0-0.5-S
-008-0.5-1.0-S
-009-0.5-1.0-S
-010-0-0.5-S
-010-0.5-1.0-S
-011-0-0.5-S
-011-0.5-1.0-S
-012-0-0.5-S
-012-0.5-1.0-S
-013-0.5-1.0-S

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.

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.

Reviewed by: Kevin A. Lambert Date: 7/23/98

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 CCTA-61A

CASE NO. 7215.2205

ANALYTICAL LABORATORY CORE

SAMPLE IDS _____

LABORATORY REPORT # 980861

CCTA-61A-GR-XXX (036760-003

TASK LEADER ARCOC# 510191

To 036774-103) & 000-EB

NO. OF SAMPLES 16: 15 soil + 1 aqueous

DATA ASSESSMENT SUMMARY

	ICP	AA	MERCURY	CYANIDE
1. HOLDING TIMES	✓	✓	✓	NA
2. CALIBRATIONS	✓	✓	✓	
3. BLANKS	✓	✓	✓	
4. ICS	✓			
5. LCS	✓	✓		
6. DUPLICATE ANALYSIS	✓	✓	✓	
7. MATRIX SPIKE	✓	J	✓	
8. MSA		NA		
9. SERIAL DILUTION	NA			
10. SAMPLE VERIFICATION	✓	✓	✓	
11. OTHER QC	✓	✓	✓	
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: All samples were prepared and analyzed with accepted procedures and specified methods. All parameters were successfully analyzed. No major

AREAS OF CONCERN: problems were encountered during data package review. A few minor problems were encountered that minimally affect data quality and are discussed in the following section.

REVIEWED BY: Kevin A. Lambert

DATE REVIEWED: 7/23/98

INORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3—DV3)

Page 2 of 16

KAC 7/23/98

ACTION ITEMS:

(2) Metals Analysis: Calibration met acceptance criteria. No target analytes were detected in blanks except Pb in the method blank. Sample results are $> 5 \times$ the blank concentration; no data is qualified. No target analytes were detected above RL in the Veg. Blank. LCS/LCSD met acceptance criteria. Field Duplicate pair met acceptance criteria. MS/MSD met acceptance criteria except for As 70 REC in the MS and Pb and Se 70 REC in the MS/MSD. The MSD 70 REC for As met acceptance criteria; therefore As results are not qualified. Se results are "J" coded by the laboratory; therefore

KAC
7/23/98

AREAS OF CONCERN:

no data is qualified. Pb results will be qualified "J" due to the poor recovery (accuracy) exhibited in MS/MSD.

(3) Data is acceptable

(4) QC measures appear to be adequate

OVERALL DATA QUALITY ASSESSMENT

Reviewed By:

Kevin A Lambert

Date:

7/23/98

INORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3—DV3)

Page 3 of 16

1.0 HOLDING TIMES

List holding time criteria used to evaluate samples, indicating which samples exceed the holding time. Holding time begins with validated time of sample collection.

Parameter	Holding Time Criteria	Sample ID	Days Holding Time was Exceeded	Action
EPA 8330	EXT = 7 days ANAL = 40 days	000-ES	Exceeded ext. holding time by 10 days	

KAL
7/23/98

SEE CVR
FORM

Were the correct preservatives used? Yes ☒ No ☐

List below samples that were incorrectly preserved.

Sample No.	Type of Samples	Deficiency	Action

Reviewed By: Kevin A. Lambert Date: 7/23/98

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: _____
Mercury: _____
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
			<i>Met</i>		
			<i>Criteria</i>		

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: 7/23/98

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: _____

Date	Analyte	Coefficient	Action	Samples Affected
		<i>Met</i>		
		<i>Criteria</i>		

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
				<i>Met</i>		
				<i>Criteria</i>		

Reviewed By: Kevin A Lambert Date: 7/23/98

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 ☐
 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. mg/kg	Required Detection Limits	Action Level	Samples Affected
7/23/98 1042	Pb	0.2560	0.2	Sample results are 75x the blank concentration. No data is qualified.	

Is concentration in the method blank below the detection limit? Yes ☐ No ☒

Affected samples: Several analytes (Hg, Se, Cd, Cr, & Ag) were observed at estimated values ("J" code). No data were qualified since blank concentration were not detected above RL.

Reviewed By: Karin A. Lambert Date: 7/23/98

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	mg/l Conc.	Required Detection Limits	Action Level	Samples Affected
3/24/98	000-EB	Pb	0.00189	0.002	Sample results are 5x blank concentration. "B" code should be removed from FB results and replaced w/ "N" code. No data is qualified.	

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: 7/23/98

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: 7/23/98

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

*Met
Limits*

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: 7/23/98

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: 7/23/98

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

Met criteria

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: 7/23/98

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
CCTA-61A-GR-010-05-1.0-3	MS Soil	4/23/98	AS	59.8	80-120 MSD met criteria	33775
		4/23/98	Pb	34.8	No data is qualified	33875
	MSD			39.0	Sample results will be "J" coded.	
	MS	5/1/98	Se	61.0	Sample results are "J" coded	34028
	MSD			65.8	No data is 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: 7/23/98

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

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 ☐ *Not Applicable*

Are MSA calculations outside the linear range of the calibration curve? Yes ☐ No ☐ *Not Applicable*

Reviewed By: Kevin A. Lambert Date: 7/23/98

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

Not Applicable

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

Check for calculation errors and negative interferences.

Reviewed By: Kern A Lambert Date: 7/23/98

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 ☐

Reviewed By: Kerin A. Lambert Date: 7/23/98

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 ☒

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:

OK Looks good

Approved By: _____

Date: _____

*Task/Project Leader is responsible for approval of data set.

Reviewed By: Kevin A Lambert Date: 7/23/98

ARCO # 510093

Inorganic

[illegible]

Kevin A. Landolt
- 1-11-11 -

Site: CCTA-61A

AR COC: 510093

Data Classification: Inorganics

Sample Fraction No.	Analysis	DV Qualifiers	Comments
	See Attached Table		
	Data is acceptable		
	QC appears to be 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: Kevin A Lambert Date: 7/24/98

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

ANALYTICAL RADIOCHEMISTRY DATA VALIDATION CHECKLIST

 KAL 7/14/98
 7215.22

Project Name			CCTA-61A			Site Name			CASE# 7215.2205		
Laboratory Name/Job No./Batch No.			980862 / CORE			Chain of Custody No.			510192		
Analysis Method			EPA 900.0			Parameter List:			GROSS Alpha/Beta		
REVIEW ITEM			YES	NO	NA	COMMENTS					
A. HOLDING TIMES						SEE CVR FORM					
1. Preparation and analysis holding times met?											
2. Short-half life parameters analyzed for and checked?											
B. CALIBRATION VERIFICATION						Calibration looks good					
1. Detectors numbered and documented?			✓								
2. Frequency: Daily <input checked="" type="checkbox"/> , weekly <input type="checkbox"/> , or monthly <input type="checkbox"/> ?			✓								
3. Acceptance criteria: Met?			✓								
C. LABORATORY CONTROL SAMPLES						Met Acceptance Criteria					
1. Standard: Independent, certified reference material?			✓								
2. Frequency: Each batch?			✓								
3. % Recovery 80-120% or ____?			✓								
METHOD BLANK						Target analytes are below RL					
1. Frequency: Each batch?			✓								
2. Matrix: Matrix specific?			✓								
3. Preparation: Entire procedure?			✓								
4. Blanks show contamination?				✓							
E. MATRIX SPIKE						No MS/MSD was run on ARCO group					
1. Frequency: Each batch?					✓	Acceptability for batch is not addressed from another ARCO group					
2. Matrix: Matrix specific?					✓						
3. Preparation: Entire procedure?					✓						
4. % Recovery: 75-125% or ____?					✓						
F. ANALYTICAL YIELDS/OTHER											
1. Tracer: Correct type, recovery met?					✓						
2. Ingrowth and/or decay: Correct factors applied?					✓						
3. Solids density: Planchette loading <5 mg/cm ² ?					✓						
G. DUPLICATE						Duplicate sample run on ARCO group					
1. Type: Lab or field?			✓			(036784-103). The Duplicate Error Ratio (DER) met acceptance criteria					
2. Frequency: Each batch?			✓								
3. Matrix: Matrix specific?			✓								

ANALYTICAL RADIOCHEMISTRY DATA VALIDATION CHECKLIST (CONTINUED)

Project Name				Site Name
Laboratory Name/Job No./Batch No.				Chain of Custody No.
Analysis Method				Parameter List:
REVIEW ITEM	YES	NO	NA	COMMENTS
4. Preparation: Entire procedure?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
H. ANALYTE DETECTION				
1. Detection limit sample/batch specific?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2. Errors evaluated?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3. False positives/negatives suspected?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

Reviewed by: Kevin A. Lambert 7/14/98

- ① All samples were prepared and analyzed with accepted procedures and with specified methods. All compounds were successfully analyzed. No Major problems were encountered during data package review.
- ② No MS/MSD was run on ARCOG group. The acceptability was not addressed for the batch from another ARCOG group.
- ③ Calibration met criterion. LCS %REC met acceptance criterion. No target analytes were detected above RL. Duplicate pair analysis met DER acceptance criterion. No FB or EB was submitted on ARCOG. No data were qualified.
- ④ Data is acceptable.
- ⑤ QC measures are adequate.

Site: 61A

AR/COC: 510192

Data Classification: Radiometrics

Sample Fraction No.	Analysis	DV Qualifiers	Comments
No data were 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: Kevin A Lambert Date: 7/14/98

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 CCTA-61A
ANALYTICAL LABORATORY CORE
LABORATORY REPORT # 980862
KHL 7/14/98
TASK LEADER ARCOC# 510192
NO. OF SAMPLES 11 soil

CASE NO. 7215.2205
SAMPLE IDS 036775-103 to
036795-103

DATA ASSESSMENT SUMMARY

	ICP	AA	MERCURY	CYANIDE
1. HOLDING TIMES	✓	✓	✓	NA
2. CALIBRATIONS	✓	✓	✓	
3. BLANKS	✓	✓	✓	
4. ICS	✓			
5. LCS	✓	✓		
6. DUPLICATE ANALYSIS	J	J	✓	
7. MATRIX SPIKE	J	J	✓	
8. MSA		NA		
9. SERIAL DILUTION	NA			
10. SAMPLE VERIFICATION	✓	✓	✓	
11. OTHER QC	✓	✓	✓	
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

KHL 7/14/98
ACTION ITEMS: ① All samples were prepared and analyzed with accepted procedures and with specified methods. All compounds were successfully analyzed. One

KHL 7/14/98
AREAS OF CONCERN: major problem was observed during data package review; Mercury sample results for seven samples were missing "J" code (036775-103, 036776-103,

REVIEWED BY: Kevin A Lambert

DATE REVIEWED: 7/14/98

INORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3—DV3)

Page 2 of 16

KHL 7/14/98

ACTION ITEMS: 036777-103, 036781-103, 036783-103, 036784-103, and 036785-103.

The sample results in these samples are below the PQL but above the MDL and require a "J" code. SEEK CORRECTIVE ACTION. A few minor problems were identified which minimally affect data quality, were ~~not~~ ^{KHL 7/14/98} and are presented below.

(2) Metals Analysis: Calibration met acceptance criteria. No target analytes were detected in the blanks except mercury, cadmium and selenium were observed at estimated values ("J" coded). No data is qualified since sample results were either non-detects, estimated values or >5X the concentration in the method blank. No FB or EB were submitted with this ARCO group. The LCS/LCSD

KHL 7/14/98

AREAS OF CONCERN: met acceptance criteria. The MS/MSD met acceptance criteria except lead. Lead to REC was below the lower control limit in the MS/MSD. Also, lead in the field duplicate pair is not within specified control limits. The field duplicate pair met acceptance criteria for all other parameters. Lead sample results will be "J" coded due to the poor recovery in the MS/MSD and poor precision in the field duplicate pair.

(3) Data is acceptable

(4) QC measures are adequate

OVERALL DATA QUALITY ASSESSMENT _____

Reviewed By: _____

Kevin A. Lambert

Date: _____

7/14/98

INORGANIC DATA ASSESSMENT SUMMARY FORM
(Data Verification/Validation Level 3—DV3)

Page 3 of 16

1.0 HOLDING TIMES

List holding time criteria used to evaluate samples, indicating which samples exceed the holding time. Holding time begins with validated time of sample collection.

Parameter	Holding Time Criteria	Sample ID	Days Holding Time was Exceeded	Action

SEE CVR FORM

Were the correct preservatives used? Yes ☐ No ☐

List below samples that were incorrectly preserved.

Sample No.	Type of Samples	Deficiency	Action

Reviewed By: Kevin A Lambert Date: 7/10/98

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: _____
Mercury: _____
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
			Met		
			Criteria		

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: 7/10/98

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: _____

Date	Analyte	Coefficient	Action	Samples Affected

Met Criteria

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

Met Criteria

Reviewed By: Kevin A. Lambert Date: 7/14/98

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 ☐
 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
No target analytes were detected above RL					

Is concentration in the method blank below the detection limit? Yes ☒ No ☒ see below

Affected samples: Mercury, Cadmium, & Selenium are observed at estimated values ("J" code).

Note: Mercury sample results are missing "J" code on samples 036775-10-036776-103, 036777-103, 036781-103, 036783-103, 036784-103, 036785-103

Reviewed By: Kevin A. Lambert Date: 7/10/98

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

Not submitted on ARCO

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: 7/14/98

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: 7/10/98

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

Met specified limits

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: Karin A. Lambert Date: 7/10/98

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: 7/10/98

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
CCTA-61A-GR-018-05-10-5/MS SOIL		4/30/98/1447	Pb	38.9	80-120	Sample results will be copied and agree with the field duplicate pair findings for Pb.
" " " " " "	/MSD SOIL	↓ 1449	↓	68.0	↓	

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.

Note: Case narrative incorrectly states "selenium analyses reported in batch #33839." Case narrative should read "lead analyses reported in batch #33839".

Reviewed By: Kristin Lambert Date: 7/10/98

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

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 ☐ *Not Applicable*

Samples affected: _____

MSA Analysis (Method of Standard Additions)—MSA is required when serial dilutions are not with $\pm 10\%$. Was MSA required for any sample but not performed? Yes ☐ No ☐ *Not Applicable*

Are MSA calculations outside the linear range of the calibration curve? Yes ☐ No ☐ *Not Applicable*

Reviewed By: Kevin A. Lambert Date: 7/10/98

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:

Not Applicable

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

Check for calculation errors and negative interferences.

Reviewed By: Kevin A Lambert Date: 7/14/98

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 ☐

Reviewed By: Kevin A. Lambert Date: 7/14/98

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 ☒

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:

OK Look good

Approved By: _____

Date: _____

*Task/Project Leader is responsible for approval of data set.

Reviewed By: *Kevin A. Lambert* Date: *7/14/98*

ANNEX 8-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	8
III.1	Introduction	8
III.2	Nature of Contamination.....	8
III.3	Rate of Contaminant Migration	8
III.4	Extent of Contamination	9
IV.	Comparison of COCs to Background Screening Levels	10
V.	Fate and Transport.....	10
VI.	Human Health Risk Screening Assessment	14
VI.1	Introduction	14
VI.2	Step 1. Site Data	15
VI.3	Step 2. Pathway Identification	15
VI.4	Step 3. COC Screening Procedures.....	16
VI.4.1	Background Screening Procedure.....	16
VI.4.2	Subpart S Screening Procedure	17
VI.5	Step 4. Identification of Toxicological Parameters	17
VI.6	Step 5. Exposure Assessment and Risk Characterization	19
VI.6.1	Exposure Assessment.....	20
VI.6.2	Risk Characterization	20
VI.7	Step 6. Comparison of Risk Values to Numerical Guidelines.....	22
VI.8	Step 7. Uncertainty Discussion.....	23
VI.9	Summary.....	24
VII.	Ecological Risk Screening Assessment.....	25
VII.1	Introduction	25
VII.2	Scoping Assessment.....	25
VII.2.1	Data Assessment	26
VII.2.2	Bioaccumulation	26
VII.2.3	Fate and Transport Potential	27
VII.2.4	Scoping Risk Management Decision	27
VII.3	Screening Assessment.....	27
VII.3.1	Problem Formulation	28
VII.3.2	Exposure Estimation.....	29
VII.3.3	Ecological Effects Evaluation.....	30
VII.3.4	Risk Characterization	35
VII.3.5	Uncertainty Assessment.....	35
VII.3.6	Risk Interpretation	40
VII.3.7	Screening Assessment Scientific/Management Decision Point.....	40
VIII.	References.....	40

LIST OF TABLES

Table		Page
1	Summary of Sampling Performed to Meet Data Quality Objectives	4
2	Summary of Data Quality Requirements	6
3	Nonradiological COCs for Human Health and Ecological Risk Assessment at SWMU 61A with Comparison to the Associated SNL/NM Background Screening Value, BCF, and Log K_{ow}	11
4	Radiological COCs for Human Health and Ecological Risk Assessment at SWMU 61A with Comparison to the Associated SNL/NM Background Screening Value, BCF, and Log K_{ow}	12
5	Summary of Fate and Transport at SWMU 61A	14
6	Toxicological Parameter Values for SWMU 61A Nonradiological COCs	18
7	Radiological Toxicological Parameter Values for SWMU 61A COCs Obtained from RESRAD Risk Coefficients	19
8	Risk Assessment Values for SWMU 61A Nonradiological COCs	21
9	Risk Assessment Values for SWMU 61A Nonradiological Background Constituents	22
10	Exposure Factors for Ecological Receptors at SWMU 61A	31
11	Transfer Factors Used in Exposure Models for Constituents of Potential Ecological Concern at SWMU 61A	32
12	Media Concentrations for Constituents of Potential Ecological Concern at SWMU 61A	33
13	Toxicity Benchmarks for Ecological Receptors at SWMU 61A	34
14	Hazard Quotients for Ecological Receptors at SWMU 61A	36
15	Internal and External Dose Rates for Deer Mice Exposed to Radionuclides at SWMU 61A	36
16	Internal and External Dose Rates for Burrowing Owls Exposed to Radionuclides at SWMU 61A	37
17	HQs for Ecological Receptors Exposed to Background Concentrations for SWMU 61A	39

SWMU 61A: RISK SCREENING ASSESSMENT REPORT**I. Site Description and History**

Solid Waste Management Unit (SWMU) 61A, Schoolhouse Mesa Test Site: Blast Area, covers approximately 34 acres (SNL/NM April 1994) on federally owned land controlled by the U.S. Air Force. This inactive site, which surrounds SWMU 9, is located on Schoolhouse Mesa, northeast of Demolition Range Road and south of Coyote Springs Road. The mean elevation of the site is 5,884 feet above mean sea level (SNL/NM April 1994).

SWMU 61A contains a previously cleared area, one long low debris mound (Debris Mound 1) located southwest of the cleared area, a second, former debris mound (Debris Mound 2), northwest of the cleared area, and three concrete blocks. Both mounds were dismantled during confirmatory sampling (Section 8.4.4.2.3). A small hill lies adjacent to the southern edge of the cleared area. One large metal fragment, identified as a bomb fragment, and numerous metal pieces of aircraft fuselage are scattered on the ground between SWMU 9 and the hill. On top of the hill is a rock mound with a wooden post set in it. Debris Mound 1, 1 to 2 feet high, was located at the base of the hill. Plastic fragments, an old battery, and metal scrap are evident in the debris mound (Sandhaus February 1994). Aerial photographs prior to 1967 indicate that Debris Mound 1 was located along the south edge of the cleared, graded area at SWMU 61A (USGS 1967).

Three concrete blocks are located northwest of the hill. Each block is irregularly shaped, has a blast pit in the center, and is fractured throughout. Approximately one pound of high explosive (HE) compound fragments were found near the concrete blocks (Sandhaus February 1994). Plastic and metal fragments were scattered across SWMU 61A.

Site 61A lies upon the Arroyo del Coyote alluvial fan that is composed of Pleistocene-age fine-to coarse-grained, poorly to moderately sorted sediments ranging in size from clay to boulders (SNL/NM March 1995, IT May 1994). These deposits contain relatively impermeable carbonate-rich soil horizons and impermeable carbonate-cemented horizons that inhibit vertical groundwater flow (SNL/NM March 1995). Based upon the well record for the Schoolhouse Mesa Well, located approximately 0.5 miles west of SWMU 61A, the alluvial fan deposits are less than 100 feet in thickness and unconformably overlie the Madera Formation (SNL/NM March 1995). The Madera Formation consists of predominantly clastic limestone that contains fossiliferous, cherty limestone units with some interbedded shale, siltstone, sandstone, and pebble conglomerate (Myers and McKay 1970). SWMU 61A is bounded on the west by Coyote Fault that forms the eastern margin of the Hubbell structural bench, and exhibits down-to-the-west displacement. The fault is expressed geomorphically as linear range-front facets, and, as evidenced by the coincidence of the Coyote Springs with the Coyote Fault (0.5 miles north of SWMU 61A), probably influences groundwater pathways from the Manzanita Mountains to the alluvium (SNL/NM March 1995). The Schoolhouse Well is completed in the Madera Formation and the depth to groundwater is approximately 95 feet below ground surface (bgs) (SNL/NM March 1997). The groundwater recharge is likely precipitation in the Manzanita Mountains infiltrating through fractured bedrock (SNL/NM March 1995).

SWMU 61A is bounded on the south by an unnamed ephemeral arroyo that is tributary to Arroyo del Coyote. The unnamed arroyo drains a small watershed with headwaters in the western face of the Manzanita Mountains. The confluence of the unnamed arroyo with Arroyo del Coyote is approximately 2,000 feet west of the site. A smaller unnamed arroyo traverses the northern portion of the site and captures the majority of the SWMU 61A surface within its small watershed. This smaller unnamed arroyo drains into the larger southern boundary arroyo prior to the Arroyo del Coyote confluence. Arroyo del Coyote ultimately drains into the Tijeras Arroyo, several miles northeast of the site.

For a detailed discussion regarding the local setting at SWMU 61A, refer to the "RCRA [Resource Conservation and Recovery Act] Facility Investigation [RFI] Work Plan for OU [Operable Unit] 1334, Central Coyote Test Area" (SNL/NM October 1994).

SWMU 61A is located in the former Area Z explosives testing area of the Coyote Test Field. Prior to its use by Sandia National Laboratories/New Mexico (SNL/NM), the area that comprises the Coyote Test Field was the setting for early homesteads, agriculture, ranching, and recreational purposes. Several of the old structures located in the Coyote Test Field were later used for SNL/NM operations. By 1950, the need for large-scale testing (blast-model studies) became apparent and economically feasible. The Division of Military Applications authorized use of an area southeast of Manzano Base as a test site. The primary use for this test area was to study blast pressure and blast damage. Testing included shock-wave diffraction, blast-loading, and height-of-burst measurements. Many of the tests conducted in the Coyote Test Field disproved theories proposed in earlier scientific papers. By 1956, the results of the experiments provided values of blast parameters for a wide range of yields and burst conditions (SNL/NM Date [unk]).

In the mid-1950s, the Atomic Energy Commission (AEC) requested that the Sandia Corporation (currently SNL/NM) participate in fallout predictions on future full-scale testing operations. In 1956, additional land was requested for these studies and work was begun. In 1957, in an agreement with the AEC, the Armed Forces Special Weapons Project finally granted the use of Areas X, Y, and Z (SNL/NM Date [unk]). By 1966, Area W was added to the Coyote Test Field. These four areas, all of which were used for HE tests, covered approximately 32,400 ac. Area W was used for miscellaneous HE tests; Area X, for 15,000-pound (lb) HE tests; Area Y, for fallout, seismic, and miscellaneous explosives tests; and Area Z, for 250-lb HE tests (SNL/NM September 1966).

Two aerial photographs (USGS 1961, 1967) indicate that SWMU 61A was in operation after 1961 but before 1967. The dual roads, concrete blocks, and cleared area were first visible in the 1967 aerial photograph (IT April 1994). The site underwent gradual revegetation between 1967 and 1991 (USGS 1991). No test documents describing site-specific testing have been identified by SNL/NM regarding SWMU 61A. This area has been used by U.S. military forces for war games.

II. Comparison of Results to Data-Quality Objectives

The confirmatory sampling conducted at SWMU 61A was designed to collect adequate samples to:

- Characterize background for soil (metals and radionuclides)
- Characterize debris mounds 1 and 2 and underlying soil for contaminants of concern (COC)
- Characterize soil in the cleared area for COCs
- Characterize soil in the positive gamma area for COCs
- Characterize potential COCs on concrete blocks
- Characterize the nature and extent of COCs in the arroyo channel sediment
- Provide sufficient quality of analytical data to support risk screening assessments.

Table 1 summarizes the sample location design for SWMU 61A. The primary source of COCs at SWMU 65E was general explosive tests conducted on weapons and HE-containing devices at the site. Following detonations, atmospheric fallout of test material shrapnel potentially released COCs to surface and near-surface soils at SWMU 61A. Based upon the surficial nature of the contaminant release mechanism at the site, no COCs are anticipated in the subsurface. However, previous grading activities conducted at the clear area of SWMU 61A may have disturbed near-surface soils. In addition, a pit with buried radioactive debris was discovered at SWMU 61A and remediated during a radiological Voluntary Corrective Measure (VCM) conducted at OU 1334.

The number and location of the samples collected was based upon historical information and the findings of previous investigations and remedial activities conducted at the site. Historical information was used to determine the potentially impacted areas from previous test activities. Since the cleared area was obviously disturbed from historical activities, the area was gridded into approximately 126 20- by 20-foot cells and twelve random sample locations selected. The positive gamma areas were identified during the Phase I surface radiation survey performed at the site and five judgmental sample locations selected. Arroyo channel sediment sample locations were based upon the potentially impacted areas of the site, which are believed to be in the western portion of SWMU 61A. VCM activities were used to define sample locations for the pit. The two debris mounds were present and sample locations were selected to investigate the contents and any potential releases to the underlying soils.

Table 2 summarizes the analytical methods and data-quality requirements necessary to (1) adequately characterize hazardous waste or hazardous constituents associated with the materials used in tests conducted at Schoolhouse Mesa Test Site: Blast Area and (2) support risk screening assessments.

A total of 42 locations were sampled at SWMU 61A and analyzed by SNL/NM on-site laboratories and off-site laboratories. All samples collected were analyzed by gamma spectroscopy at the SNL/NM on-site Radiation Protection Sample Diagnostics (RSPD) laboratory, with two debris mound samples being split for verification gamma spectroscopy analysis off site. Analysis of debris mound samples were conducted at the SNL/NM on-site ER Chemistry Laboratory and an off-site laboratory (General Engineering Laboratories). All remaining sample analyses were performed at an off-site laboratory (Core Laboratories, Inc.).

Table 1
Summary of Sampling Performed to Meet Data Quality Objectives

SWMU 61A Sampling Components	Potential COC Source	Number of Sampling Locations	Sample Density	Sampling Location Rationale
Site-specific Background	Not Applicable	6	Surface and near- surface samples collected at each judgmental soil and arroyo sediment location	Sample locations selected in eastern portion of site where test activities believed to have had no impact
Cleared Area	Test material shrapnel deposited onto surface and near-surface soil from atmospheric fallout following detonations	12	Surface and near- surface samples collected at twelve random sample locations selected from 126 20- by 20- foot cells comprising grid over cleared area	Random sample locations based upon assumed homogeneity of contamination in soil disturbed by previous grading activities and biased towards area where HE fragments were found
Positive gamma area	Test material shrapnel deposited onto surface and near-surface soil from atmospheric fallout following detonations	5	Surface and near- surface samples collected at five judgmental sample locations within positive gamma area	Judgmental sample locations based upon highest measured gamma activity during Phase I surface radiation survey
Arroyo Channel Sediments	Test material shrapnel deposited onto surface and near-surface soil from atmospheric fallout following detonations	4	Surface and near- surface samples collected at four locations in arroyo channel at approximate 150- foot intervals	Sample locations based upon arroyo channel segment in western portion, which is believed to have been impacted by activities conducted at the site. Sample locations begin immediately north of concrete blocks and approach western boundary of site

Table 1 (Concluded)
Summary of Sampling Performed to Meet Data Quality Objectives

SWMU 61A Sampling Components	Potential COC Source	Number of Sampling Locations	Sample Density	Sampling Location Rationale
Concrete Block Area	Residual test material	7	Surface and near- surface soil samples collected at four locations surrounding concrete blocks; one concrete chip sample from each of the three concrete blocks	Soil sample locations based upon potentially impacted area immediately surrounding concrete blocks; Concrete chip samples collected from blast area on each block
Previously Remediated Pit	Residual test material	2	Subsurface soil samples collected at two depth intervals within each of two boreholes advanced approximately 14 feet bgs into pit	Subsurface sample locations based upon confirmation of previous remediation activities, and ensure no other non- radiological COCs are present
Debris Mounds	Debris Mound Contents Uncertain	6	Debris and underlying soil samples collected at three locations in each debris mound	Debris mound sample locations based upon identification of mound contents; underlying soil samples based upon identification of potential releases from mounds

COC = Contaminants of concern.

SWMU = Solid waste management unit.

Table 2
Summary of Data Quality Requirements

Analytical Requirement	Data Quality Level	ER Chemistry Laboratory Department 6684 SNL/NM	Radiation Protection Sample Diagnostics Laboratory Department 7713 SNL/NM	Core Laboratories, Inc. Aurora, Colorado	General Engineering Laboratories Charleston, South Carolina
RCRA metals plus beryllium EPA Method 6010/7000 or 6020	Level 3	11 samples 2 (internal duplicates)	Not applicable	66 samples 7 (internal duplicates)	2 samples (off-site splits)
TAL metals EPA Method 6010/7000	Level 3	Not applicable	Not applicable	3 samples	Not Applicable
TCLP metals plus beryllium EPA Method 1311/601007 000	Level 3	6 samples 1 (internal duplicate)	Not applicable	3 samples	2 samples (off-site splits)
High Explosives (HE) compounds EPA Method 8330 (or equivalent)	Level 3	12 samples 2 (internal duplicates)	Not applicable	54 samples (6 internal duplicates)	2 samples (off-site splits)
VOCs EPA Method 8260	Level 3	12 samples 2 (internal duplicates)	Not applicable	Not applicable	2 samples (off-site splits)
TCLP VOCs EPA Method 1311/8260	Level 3	Not applicable	Not applicable	Not applicable	6 samples 1 (internal duplicate)
SVOCs EPA Method 8270	Level 3	12 samples 2 (internal duplicates)	Not applicable	3 samples	3 samples (off-site splits)

Table 2 (Concluded)
Summary of Data Quality Requirements

Analytical Requirement	Data Quality Level	ER Chemistry Laboratory Department 6684 SNL/NM	Radiation Protection Sample Diagnostics Laboratory Department 7713 SNL/NM	Core Laboratories, Inc. Aurora, Colorado	General Engineering Laboratories Charleston, South Carolina
TCLP SVOCs EPA Method 1311/8270	Level 3	Not applicable	Not applicable	3 samples	6 samples 1 (internal duplicate)
Gross Alpha/Beta EPA Method 900.0	Level 3	Not applicable	Not applicable	66 samples 7 (internal duplicates)	6 samples 1 (internal duplicate)
Isotopic Uranium (CA-GLR-R405) and Thorium (CA-GLR-0R4)	Level 3	Not applicable	Not applicable	12 samples 1 (internal duplicate)	6 samples 1 (internal duplicate)
Tritium EPA Method 906.0	Level 3	Not applicable	Not applicable	Not applicable	6 samples 1 (internal duplicate)
Gamma Spectroscopy EPA Method 901.1	Level 2	Not applicable	78 samples 9 (internal duplicates)	Not applicable	2 samples (off-site splits)

EPA = U.S. Environmental Protection Agency
ER = Environmental restoration.
SNL/NM = Sandia National Laboratories/New Mexico.
SVOC = Semivolatile organic compounds.
TCLP = Toxicity characteristic leaching procedure.

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). On-site results (other than gamma spectroscopy) were 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 1994). 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 61A. The data quality objectives (DQO) for SWMU 61A 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 61A was based upon an initial conceptual model validated with confirmatory sampling at the site. The initial conceptual model was developed from historical background information including site inspections, personal interviews, historical photographs, and radiological surveys. The DQOs contained in the Work Plan for OU 1334 (SNL/NM October 1994), identified the sample locations, sample density, sample depth, and analytical requirements. The sample data collected were subsequently used to develop the final conceptual model for SWMU 61A which is presented in Section 8.5 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 61A 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 to characterize nonradiological inorganic constituents potentially released at the site and define site-specific background concentrations. Target analyte list metals and toxicity characteristic leaching procedure (TCLP) RCRA metals plus beryllium analyses were performed to characterize concrete and debris (TCLP only) at the site. HE analyses were performed to characterize any potentially un-reacted explosive materials that may have been released during the explosive tests. VOC, TCLP volatile organic compounds (VOC), semivolatile organic compounds (SVOC), and TCLP SVOC analyses were performed to characterize concrete (SVOC and TCLP SVOC only) and debris mound contents at the site. Gamma spectroscopy analyses were performed to characterize any depleted uranium potentially released at the site. Gross alpha and gross beta analyses were performed to characterize alpha and beta activities at the site and define site-specific background activities. Isotopic uranium and thorium analysis were performed to characterize debris mound contents and define site-specific background activities. Tritium analyses were conducted solely to characterize debris mound contents. These analytes and methods are appropriate to characterize the COCs and potential degradation products associated with historical activities conducted at the Schoolhouse Mesa Test Site: Blast Area.

III.3 Rate of Contaminant Migration

The Schoolhouse Mesa Test Site: Blast Area is inactive, and therefore all primary sources of COCs (explosive tests) have been eliminated. As a result, only secondary sources of COCs remain at SWMU 61A in the form of adsorbed metals, radionuclides, HE compounds, VOCs, and SVOCs in the surface and near-surface soils. The rate of COC migration from surficial soil is therefore 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, and radiological monitoring programs; biological surveys; and other governmental atmospheric monitoring at the Kirtland

Air Force Base (i.e., National Oceanographic and Atmospheric Administration [NOAA]) are adequate to characterize the rate of COCs migration at SWMU 61A.

III.4 Extent of Contamination

Surface and near-surface soil samples were collected from the areas at SWMU 61A visually impacted by historical activities conducted at the site (cleared area, concrete block area, and the debris mounds). In addition, surface and near-surface samples were collected from the locations of high measured gamma activities during the Phase I surface radiation survey conducted at OU 1334. Subsurface samples were collected from a pit remediated during the radiological VCM conducted at OU 1334. Arroyo sediment samples were collected from the northern arroyo channel. These sample locations are deemed appropriate to determine the lateral extent of COC migration.

The density of locations was dependent on the specific area to be sampled and the associated physical features. Based upon the surficial nature of the COC release mechanism (atmospheric fallout from detonations during explosive tests) and lack of physical disturbance to the majority of the site from historical activities, contamination is most likely present in the surface or near-surface soils. However, random surface and near-surface soil samples were collected from the cleared area where previous grading activities were likely to have uniformly distributed any contamination in the soil. Judgmental surface and near-surface soil samples were collected at the five highest gamma activities measured. Surface and near-surface arroyo sediment samples were collected at 150-foot intervals. Surface and near-surface soil samples were collected at four locations surrounding the concrete blocks. Subsurface soil samples were collected at two depth intervals (approximately 6.5 to 11 feet and 9.5 to 14 feet) within the pit. Soil samples were also collected at three locations beneath each debris mound. The density of sample locations at each potentially contaminated area at SWMU 61A was deemed sufficient to establish the presence of residual COCs in surface and near-surface soils from fallout of test material shrapnel.

Because of the relatively low solubility of most metals and radionuclides, limited precipitation, high evapotranspiration, and the impermeable vadose zone soils beneath the site, the vertical rate of contamination migration is expected to be extremely low. Therefore, samples were collected from the ground surface to a depth of approximately 12 inches bgs (except at the pit). Similarly, samples were collected from the natural soil immediately beneath the debris mounds. With the exception of the pit at SWMU 61A, there is no historical information that any subsurface disturbance, testing, or disposal ever occurred at the site, which could mix surface soils beneath the 12-inch depth. Therefore, the 12-inch maximum sample depth is representative of the media potentially impacted and sufficient to determine the vertical extent of COCs migration. Furthermore, samples collected from the pit are also considered representative of the subsurface soil potentially impacted and sufficient to determine the vertical extent of COC migration at that location.

In summary, the design of the confirmatory sampling was appropriate and adequate to determine the nature, rate, and extent of contamination.

IV. Comparison of COCs to Background Screening Levels

Site history and characterization activities are used to identify potential COCs. The identification of COCs and the sampling to determine the concentration levels of those COCs across the site are described in the SWMU 61A NFA proposal. Generally, COCs evaluated in this risk assessment include all detected organics and radiologicals and all inorganic COCs that were analyzed for. 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. Nondetect organics not included in this assessment were determined to have sufficiently low detection limits to ensure protection of human health and the environment. 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 SNL/NM maximum background concentration (Dinwiddie September 1997) was selected to provide the background screen in Tables 3 and 4. If applicable, human health nonradiological COCs were also compared to proposed RCRA Subpart S action levels (IT July 1994).

Nonradiological inorganics that are essential nutrients such as iron, magnesium, calcium, potassium, and sodium are not included in this risk assessment (EPA 1989). Both radiological and nonradiological COCs are evaluated. The nonradiological COCs evaluated include HE, volatile and semivolatile organic compounds and inorganics.

Table 3 lists nonradiological COCs for the human health and ecological risk assessment at SWMU 61A. Table 4 lists radiological COCs for human health and ecological risk assessment. All tables show the associated approved SNL/NM maximum background concentration values (Dinwiddie September 1997). Sections VI.4, VII.2, and VII.3 provide a discussion of Tables 3 and 4.

V. Fate and Transport

The primary release of COCs at SWMU 61A 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 61A. Moderate winds can transport soil particles with adsorbed COCs (or COCs in particulate form) as suspended dust, capable of dry or wet deposition away from the site. Strong winds may move larger (sand-sized) particles by saltation. However, because this site retains much of its natural vegetative cover and vegetation has recovered in the cleared areas, the potential for significant wind erosion at this site is small, and no above-background particulate radioactive COCs have been observed (SNL/NM June 1997).

Water at SWMU 61A 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. Because of the sloping terrain's proximity to the base of the Manzanita Mountains parts of the site may be subject to significant runoff during intense rainfall events and during extended rainfall periods when soils are near saturation from previous rainfall. However, infiltration at the site is enhanced by the coarse nature of the soil (the soil in the area of the site is primarily Tesajo-Millett stony sandy loam [USDA June 1977]). The vegetative cover of the site will also slow runoff, increasing both infiltration and loss by evapotranspiration. Surface

Table 3
Nonradiological COCs for Human Health and Ecological Risk Assessment at
SWMU 61A 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} (for organic COCs)	Bioaccumulator? ^b (BCF>40, Log K _{ow} >4)
Arsenic	20.8	5.6	No	44 ^c	NA	Yes
Barium	160	130	No	170 ^d	NA	Yes
Beryllium	0.981	0.65	No	19 ^e	NA	No
Cadmium	6.5	<1	No	64 ^c	NA	Yes
Chromium, total	19.8	12.8	No	16 ^c	NA	No
Lead	3950	11.8	No	49 ^c	NA	Yes
Mercury	0.0867	<0.1	Unknown	5500 ^c	NA	Yes
Selenium	2.8	<1	No	800 ^f	NA	Yes
Silver	1.06	<1	No	0.5 ^c	NA	No
Toluene	0.0025 J	NA	NA	10.7 ^c	2.69 ^c	No
bis (2-Ethylhexyl) phthalate	0.44 J	NA	NA	851 ^h	7.6 ^j	Yes
2,4-Dinitrotoluene	0.034 J	NA	NA	204 J	198 J	Yes
Pentachlorophenol	0.23	NA	NA	776 ^e	5.09 ^j	Yes
RDX	1.4	NA	NA	9 ^k	0.87 ^j	No
HMX	2.96	NA	NA		0.26 ⁱ	No

^aFrom Dinwiddie (September 1997) CTF Super Group.

^bNMED (March 1998).

^cBCF and/or Log K_{ow} from Yanicak (March 1997).

^dBCF from Neumann (1976).

^eBCF and/or Log K_{ow} from Howard (1991).

^fBCF from Callahan et al. (1979).

^gParameter nondetect, concentration assumed to be one-half of detection limit.

^hBCF and/or Log K_{ow} from Howard (1989).

ⁱBCF and/or Log K_{ow} from Maxwell and Opresko (1996).

^jBCF and/or Log K_{ow} from Micromedex, Inc (1998).

^kBCF and/or Log K_{ow} from Talmage et al. (1996).

BCF = Bioconcentration factor.

COC = Constituent of concern.

HMX = Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine.

J = Estimated concentration.

K_{ow} = Octanol-water partition coefficient.

Log = Logarithm (base 10).

mg/kg = Milligram(s) per kilogram.

NA = Not applicable (organic COCs do not have accepted background concentrations).

NMED = New Mexico Environment Department.

RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine.

SNL/NM = Sandia National Laboratories/New Mexico.

SWMU = Solid waste management unit.

Table 4

Radiological COCs for Human Health and Ecological Risk Assessment at SWMU 61A 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 (maximum aquatic)	Is this a Bioaccumulator? ^c (BCF>40, log K_{ow} >4)
Cs-137	0.76	0.079	No	3000 ^b	Yes ^b
Th-232	1.33	1.01	No	3000 ^d	Yes ^b
U-235	0.898	0.18	No	900 ^d	Yes ^d
U-238	32	1.4	No	900 ^d	Yes ^d

^aFrom Dinwiddie (September 1997), CTF Super Group.

^bBCF from Yanicak (March 1997).

^cNMED (March 1998).

^dBaker 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.

runoff in the area of SWMU 61A is generally to the west with ephemeral arroyos traversing the site to the north, and bounding the south side of the site. All surface runoff from SWMU 61A ultimately discharges into the Arroyo del Coyote. Runoff may carry soil particles with adsorbed COCs. The distance of transport will depend upon the size of the particle and the velocity of the water. This, in turn, will vary over the site because of differences in slope, soil, and vegetative cover.

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 the site at about 60 inches (USDA June 1977) indicates 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 95 feet bgs, the potential for COCs to reach groundwater through the unsaturated zone above the water table is very small. As water from the surface evaporates, the direction of COC movement may be reversed with capillary rise of the soil water. Vegetation increases the rate of water loss from the subsurface soil through transpiration.

Plant roots can take up COCs that are in the soil solution. This may be a passive process, but active uptake or exclusion of some constituents in the soil solution (i.e., that requiring energy expenditure on the part of the plant) 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 directly from the air or by contact with dust particles. Organic constituents in plant tissues may be metabolized or released through volatilization. Those that remain 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 be returned to the soil (at the site or transported from the site in the herbivore) in feces, or may be absorbed and held in tissues, metabolized, or excreted. The herbivore may be eaten by a primary carnivore or scavenger, and the constituents 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.

Degradation of COCs at SWMU 61A may result from biotic or abiotic processes. COCs at SWMU 61A 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. Other transformations of inorganics may include changes in valence (oxidation/reduction reactions) or incorporation into organic forms (e.g., the conversion of selenite or selenate from soil to seleno-amino acids in plants). Degradation processes for organic COCs may include photolysis, hydrolysis, and biotransformation. Photolysis requires light and, therefore, takes place in the air, at the ground surface, or in surface water. Hydrolysis includes chemical transformations in water and may occur in the soil solution. Biotransformation (i.e., transformation caused by plants, animals, and microorganisms) may occur; however, biological activity may be limited by the aridity of the environment at this site.

Table 5 summarizes the fate and transport processes that may occur at SWMU 61A. COCs at this site include both inorganics (metals and radionuclides) and organics in surface soil.

Table 5
Summary of Fate and Transport at SWMU 61A

Transport and Fate Mechanism	Existence at Site	Significance
Wind	Yes	Low to moderate
Surface runoff	Yes	Low to moderate
Migration to groundwater	No	None
Food chain uptake	Yes	Low to moderate
Transformation/degradation	Yes	Moderate to high (organics) Low (inorganics and radionuclides)

SWMU = Solid waste management unit.

Because the vegetative cover is relatively undisturbed, the potential for transport of COCs by wind or surface-water runoff is moderate to low. Significant leaching into the subsurface soil is unlikely for most inorganics and leaching to the groundwater at this site is highly unlikely. For inorganic COCs, the potential for degradation is low and the potential for uptake into the food chain is considered moderate to low because of the terrestrial nature of the habitat and the arid climate. Degradation and/or biotransformation of HE, however, may be significant.

2,4,6-trinitrotoluene and tetryl are degraded in the environment by photolysis and hydrolysis and are readily metabolized by animals and plants if absorbed (Talmage and Opresko 1995, Talmage et al. 1996a). 1,3-dinitrobenzene is readily metabolized by plants, animals, and microorganisms (Talmage and Opresko 1996). Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX) and hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX) may persist in soil and may leach into the subsurface soil with percolation (Maxwell and Opresko 1996; Talmage et al. 1996b). RDX may be taken up by plant roots and sequestered in aboveground tissues (Talmage et al. 1996b). However, both HMX and RDX are readily metabolized and excreted by animals, making the potential for food chain uptake of these COCs low. The potential for uptake into the food chain of most other COCs at SWMU 61A is considered low to moderate because of the terrestrial nature of the habitat and the arid climate; however, pentachlorophenol and bis(2-ethylhexyl)phthalate may bioaccumulate. Decay of radiological COCs is also insignificant because of their long half lives.

VI. Human Health Risk Screening Assessment

VI.1 Introduction

Human health risk screening 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 were not eliminated during the screening steps.
Step 5.	Potential toxicity effects (specified as a Hazard Index [HI]) and excess 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 U.S. Department of Energy (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 61A. Section II presents a comparison of results to DQOs. Section III describes the determination of the nature, rate, and extent of contamination.

VI.3 Step 2. Pathway Identification

SWMU 61A 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 direct gamma exposure for the radiological COCs. The inhalation pathway for both nonradiological and radiological COCs is included because of the potential to inhale dust and volatiles (volatile inhalation for nonradiologicals only). Soil ingestion is included for the radiological COCs as well. No water pathways to the groundwater are considered. Depth to groundwater at SWMU 61A is approximately 95 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 two screening procedures. The first screening procedure is a comparison of the maximum COC concentration to the background screening level. The second screening procedure compares maximum COC concentrations to SNL/NM proposed Subpart S action levels. This second procedure is applied only 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 nonradiological COCs are compared to the approved SNL/NM maximum screening level for this area. The approved SNL/NM maximum background concentration is selected to provide the background screen in Table 3 and used to calculate risk attributable to background in Table 9. Only the COCs that are above their respective approved SNL/NM maximum background screening levels or do not have a quantifiable background screening level are considered in further risk assessment analyses.

For radiological COCs that exceed the approved SNL/NM background screening levels, background values are subtracted from the individual maximum radionuclide concentrations. Those that do not exceed these background levels are not carried no 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 do not have a background value and are detected above the analytical minimum detectable activity are 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 Background Screening Procedure Results

Tables 3 and 4 present a comparison of SWMU 61A maximum COC concentrations to the approved SNL/NM maximum background values (Dinwiddie September 1997) for the human health risk assessment. For the nonradiological COCs eight COCs exceeded their respective background screening levels. One nonradiological COC has no quantifiable background concentration, so it is not known whether that COC exceeded background. Six of the COCs are organic compounds and do not have background screening levels.

The maximum concentration value for lead is 3,950 milligrams per kilogram (mg/kg). The average lead concentration is 85 mg/kg. The EPA intentionally provides no human health toxicological data on lead, and therefore, no risk parameter values can be calculated. However, EPA Region 6 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 average 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, four constituents had maximum measured activities greater than their respective background (U-235, U-238, Th-232, and Cs-137).

VI.4.2 Subpart S Screening Procedure

VI.4.2.1 Methodology

The maximum concentrations of nonradiological COCs not eliminated during the background screening process were compared with action levels (EPA July 1994) calculated using methods and equations promulgated in the proposed RCRA Subpart S (EPA July 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 and near-surface, this assumption is considered valid. If there were ten or fewer COCs and each had a maximum concentration less than 1/10 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 is not performed.

VI.4.2.2 Results

Because the SWMU 61A sample set has more than ten COCs that continue past the first screening level (including COCs that do not have background screening values), the proposed Subpart S screening process was not performed. All nonradiological COCs that are not eliminated during the background screening process for SWMU 61A have a calculated hazard quotient (HQ) and excess cancer risk value.

Radiological COCs have no 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 6 (nonradiological) and 7 (radiological) show the COCs retained in the risk assessment and the values for the available toxicological information. The toxicological values used for nonradiological COCs in Table 6 are from the Integrated Risk Information System (IRIS) (EPA 1998), Health Effects Assessment Summary Tables (HEAST) (EPA 1997a), and EPA Region 9

Table 6
Toxicological Parameter Values for SWMU 61A 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	--	--	--	--
Beryllium	2E-3 ^c	L to M	5.7E-6 ^c	M	--	8.4E+0 ^c	B1
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
Selenium	5E-3 ^c	H	--	--	--	--	D
Silver	5E-3 ^c	L	--	--	--	--	D
Toluene	2E-1 ^c	M	1.1E-1 ^c	M	--	--	D
Bis (2-Ethylhexyl) phthalate	2E-2 ^d	--	2.2E-2 ^d	--	1.4E-2 ^d	1.4E-2 ^d	--
2,4-Dinitrotoluene	2E-3 ^c	H	2E-3 ^d	--	6.8E-1 ^c	6.8E-1 ^d	B2
Pentachloro-phenol	3E-2 ^c	M	3E-2 ^d	--	1.2E-1 ^c	1.2E-1 ^d	B2
RDX	3E-3 ^c	H	3E-3 ^d	--	1.1E-1 ^c	1.1E-1 ^d	C
HMX	5E-2 ^c	L	5E-2 ^d	--	--	--	D

^aConfidence associated with IRIS (EPA 1998) database values. Confidence - L = low, M = medium, H = high.

^bEPA weight-of-evidence classification system for carcinogenicity (EPA 1989) taken from IRIS (EPA 1998):

A = Human carcinogen.

B1 = Probable human carcinogen. Indicates that limited human data are available.

B2 = Probable human carcinogen. Indicates sufficient evidence in animals and inadequate or no evidence in humans.

C = Possible human carcinogen.

D = Not classifiable as to human carcinogenicity.

^cToxicological parameter values from IRIS electronic database (EPA 1998).

^dToxicological parameter values from EPA Region 9 electronic database (EPA 1996c).

^eToxicological parameter values from EPA Region 3 electronic database (EPA 1997c).

^fToxicological parameter values from HEAST database (EPA 1997a).

^gSlope factors are for PCBs, total.

COC = Constituent of concern.

EPA = U.S. Environmental Protection Agency.

HEAST = Health Effects Assessment Summary Tables.

HMX = Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine.

IRIS = Integrated Risk Information System.

mg/kg-day = Milligram(s) per kilogram day.

(mg/kg-day)⁻¹ = Per milligram per kilogram day.

RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine.

RfD_{inh} = Inhalation chronic reference dose.

RfD_o = Oral chronic reference dose.

SF_{inh} = Inhalation slope factor.

SF_o = Oral slope factor.

SWMU = Solid waste management unit.

-- = Information not available.

Table 7
Radiological Toxicological Parameter Values for SWMU 61A 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
Cs-137	3.2E-11	1.90E-11	2.10E-6	A
Th-232	3.30E-11	1.90E-08	2.00E-11	A
U-238	6.20E-11	1.20E-08	6.60E-08	A
U-235	4.70E-11	1.30E-08	2.70E-07	A

^aFrom Yu et al. (1993a).

^bEPA weight-of-evidence classification system for carcinogenicity (EPA 1989): A - human carcinogen.

1/pCi = One per picocurie.

g/pCi-yr = Gram(s) per picocurie-year.

COC = Constituent of concern.

EPA = U.S. Environmental Protection Agency.

SF_{ev} = External volume exposure slope factor.

SF_{inh} = Inhalation slope factor.

SF_o = Oral (ingestion) slope factor

SWMU = Solid waste management unit.

(EPA 1996c) and EPA Region 3 (EPA 1997c) electronic databases. Dose conversion factors (DCF) used in determining the excess TEDE values for radiological COCs for the individual pathways were the default values provided in the RESRAD computer code (Yu et al. 1993a) as developed in the following documents:

- DCFs for ingestion and inhalation 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).
- 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).
- 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 in ANL/EAIS-8, *Data Collection Handbook to Support Modeling the Impacts of Radioactive Material in Soil* (Yu et al. 1993b).

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 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 calculating intake values and subsequent HI and excess cancer risk values for the individual exposure pathways. The appendix shows parameters for both industrial and residential land-use scenarios. The equations for nonradiological COCs are based upon the RAGS (EPA 1989). Parameters are based upon information from the RAGS (EPA 1989) and other EPA guidance documents and reflect the reasonable maximum exposure (RME) approach advocated by the RAGS (EPA 1989). For radiological COCs, the coded equations provided in RESRAD computer code are used to estimate the incremental TEDE and cancer risk for individual exposure pathways. Further discussion of this process is provided in the *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, 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 potential risk to human health under the more restrictive land-use scenario.

VI.6.2 Risk Characterization

Table 8 shows an HI of 0.08 for the SWMU 61A nonradiological COCs and an excess cancer risk of $1\text{E-}5$ for the designated industrial land-use scenario. The numbers presented included exposure from soil ingestion and dust and volatile inhalation for nonradiological COCs. Table 9 shows an HI of 0.02 and an excess cancer risk of $3\text{E-}6$ assuming the maximum background concentrations of the SWMU 61A associated background constituents for the designated industrial land-use scenario.

For the radioactive 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 equally splits his time indoors and outdoors on the site. After analyzing these two scenarios, the most conservative is the 50/50 time split. This resulted in an incremental TEDE of 2.1 millirem per year (mrem/yr). 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 61A for the industrial land use is well below this guideline. The estimated excess cancer risk is $2.4\text{E-}5$.

For the residential land-use scenario nonradioactive COCs, the HI is 8, and the excess cancer risk is $2\text{E-}4$ (Table 8). The numbers in the table included exposure from soil ingestion, dust and volatile inhalation, and plant uptake. Although the EPA (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 9 shows that for the SWMU 61A associated background constituents, the HI is 0.3 and the excess cancer risk is $6\text{E-}5$.

Table 8
Risk Assessment Values for SWMU 61A Nonradiological COCs^a

COC Name	Maximum Concentration (mg/kg)	Industrial Land-Use Scenario ^a		Residential Land-Use Scenario ^a	
		HI	Cancer Risk	HI	Cancer Risk
Arsenic	20.8	0.07	1E-5	1.19	2E-4
Barium	160	0.00	--	0.02	--
Beryllium	0.981	0.00	4E-10	0.00	7E-10
Cadmium	6.5	0.01	2E-9	5.31	4E-9
Chromium, total ^b	19.8	0.00	4E-8	0.02	7E-8
Mercury	0.0867	0.00	--	0.15	--
Selenium	2.8	0.00	--	0.99	--
Silver	1.06	0.00	--	0.04	--
Toluene	0.0025 J	0.00	--	0.00	--
Bis (2-Ethylhexyl) phthalate	0.44 J	0.00	2E-9	0.00	1E-8
Pentachlorophenol	0.23	0.00	1E-8	0.00	2E-7
RDX	1.4	0.00	5E-8	0.00	2E-7
HMX	2.96	0.00	--	0.00	--
2,4-Dinitrotoluene	0.034 J	0.00	1E-8	0.02	4E-8
Total		0.08	1E-5	8	2E-4

^aEPA (1989).

^bChromium, total assumed to be chromium VI (most conservative).

COC = Constituent of concern.

EPA = U.S. Environmental Protection Agency.

HI = Hazard index.

HMX = Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine.

J = Estimated concentration.

mg/kg = Milligram(s) per kilogram.

RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine.

SWMU = Solid waste management unit.

-- = Information not available.

Table 9
Risk Assessment Values for SWMU 61A 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	5.6	0.02	3E-6	0.32	6E-5
Barium	130	0.00	--	0.02	--
Beryllium	0.65	0.00	3E-10	0.00	5E-10
Cadmium	<1	--	--	--	--
Chromium, total ^c	12.8	0.00	--	0.00	--
Mercury	<0.1	--	--	--	--
Selenium	<1	--	--	--	--
Silver	<1	--	--	--	--
Total		0.02	3E-6	0.3	6E-5

^aFrom Dinwiddie (September 1997), CTF Super Group.

^bEPA (1989).

^cChromium, total assumed to be chromium III

COC = Constituent of concern.

HI = Hazard index.

mg/kg = Milligram(s) per kilogram.

SWMU = Solid waste management unit.

-- = Information not available.

For the radiological COCs, the incremental TEDE for the residential land-use scenario is 4.9 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 61A for the residential land-use scenario is well below this guideline. Consequently, SWMU 61A is eligible for unrestricted radiological release as the residential land-use scenario resulted in an incremental TEDE of less than 75 mrem/yr to the on-site receptor. The estimated excess cancer risk is 6.8E-5. The excess cancer risk from the nonradiological COCs and the radiological COCs is not additive, as noted in the RAGS (EPA 1989).

VI.7 Step 6. Comparison of Risk Values to Numerical Guidelines.

The human health risk assessment analysis evaluated 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 HI calculated is 0.08 (less than the numerical guideline of 1 suggested in the RAGS [EPA 1989]). Excess cancer risk is estimated at 1E-5. Guidance from the New Mexico Environment Department (NMED) indicates that excess lifetime risk of developing cancer by an individual must be less than 1E-6 for

Class A and B carcinogens and less than $1\text{E-}5$ for Class C carcinogens (NMED March 1998). The excess cancer risk is driven by arsenic, which is a Class A carcinogen, thus the excess cancer risk for this site is above the suggested acceptable risk value of $1\text{E-}6$. This 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 0.02 and the excess cancer risk is $3\text{E-}6$. Incremental risk is determined by 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 0.06, and incremental cancer risk is $7\text{E-}6$ for the industrial land-use scenario. These incremental risk calculations indicate risk above the suggested acceptable excess cancer risk value of $1\text{E-}6$ from nonradiological COCs considering a industrial land-use scenario.

For radiological COCs of the industrial land-use scenario, incremental TEDE is 2.1 mrem/yr, which is significantly less than the EPA's numerical guideline of 15 mrem/yr. Incremental estimated excess cancer risk is $2.4\text{E-}5$.

The calculated HI for the residential land-use scenario nonradiological COCs is 8, which is above the numerical guidance. Excess cancer risk is estimated at $2\text{E-}4$. Excess cancer risk is driven by arsenic which is a Class A carcinogen. Thus, the excess cancer risk for this site is above the suggested acceptable risk value ($1\text{E-}6$). The HI for associated background for the residential land-use scenario is 0.3 and the excess cancer risk is $6\text{E-}5$. The incremental HI is 7.4, and the incremental cancer risk is $1.4\text{E-}4$ for the residential land-use scenario. These incremental risk calculations indicate potentially significant 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 4.9 mrem/yr, which is significantly less than the numerical guideline of 75 mrem/yr suggested in the SNL/NM RESRAD Input Parameter Assumptions and Justification (SNL/NM February 1998). The estimated excess cancer risk is $6.8\text{E-}5$.

VI.8 Step 7. Uncertainty Discussion

The determination of the nature, rate, and extent of contamination at SWMU 61A was based upon an initial conceptual model validated with confirmatory sampling conducted at the site. The confirmatory sampling was implemented in accordance with the RFI Work Plan for OU 1334 (SNL/NM October 1994), as reviewed by NMED and EPA. The DQOs contained in the RFI Work Plan are appropriate for use in risk screening assessments. The data collected, based upon sample location, density, and depth, are representative of the site. The analytical requirements and results satisfy the DQOs. Data quality was validated in accordance with SNL/NM procedures (SNL/NM July 1994 and SNL/NM July 1996). Therefore, there is no uncertainty associated with the data quality used to perform the risk screening assessment at SWMU 61A.

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. This means that the parameter values in the calculations are conservative and that calculated intakes are probably overestimates. Maximum measured values of COC concentrations are used to provide conservative results.

Table 8 shows the uncertainties (confidence) in nonradiological toxicological parameter values. There is a mixture of estimated values and values from IRIS (EPA 1998), HEAST (EPA 1997a), and EPA Region 9 (EPA 1996c) and EPA Region 3 (1997b) databases. Where values are not provided, information is not available from the HEAST (EPA 1997a), IRIS (EPA 1998), or the EPA regions (EPA 1996c, 1997c). Because of the conservative nature of the RME approach, uncertainties in toxicological values are not expected to change the conclusion from the risk assessment analysis.

The human health HI for the nonradiological COCs is below the acceptable NMED value for the industrial land-use scenario. The human health risk excess cancer risk value for the nonradiological COCs is above the NMED numerical guidance. The excess cancer risk is driven by arsenic. If the mean for arsenic (2.88 mg/kg) is used in the risk calculations instead of the maximum concentration (20.8 mg/kg), the incremental cancer risk is $1\text{E-}7$. Because the site has been adequately characterized, the mean is more representative of actual average arsenic concentrations upon which risk should be calculated. Therefore, under the more realistic approach, SWMU 61A does not pose significant risk to human health under the industrial land-use scenario.

For radiological COCs, the conclusion of the risk assessment is that potential effects on human health for both 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 not significant with respect to the conclusion reached.

VI.9 Summary

SWMU 61A has identified COCs consisting of some inorganic, organic, and radiological compounds. Because of the location of the site, the designated industrial land-use scenario, and the nature of contamination, potential exposure pathways identified for this site included soil ingestion and dust and volatile inhalation for chemical constituents and soil ingestion, dust inhalation, 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 risk assessment, calculations for nonradiological COCs show that for the industrial land-use scenario the HI of 0.08 is significantly less than the accepted numerical guidance from the EPA. The excess cancer risk of $1\text{E-}5$ is above the acceptable risk value provided by the NMED for an industrial land use scenario (NMED March 1998). The incremental HI is 0.06, and the incremental

cancer risk is $7E-6$ for the industrial land-use scenario. The excess cancer risk is driven by arsenic. If the mean for arsenic (2.88 mg/kg) is used in the risk calculations instead of the maximum concentration (20.8 mg/kg), the incremental cancer risk is $1E-7$. Because the site has been adequately characterized, the mean is more representative of actual average arsenic concentrations upon which risk should be calculated. Therefore, under the more realistic approach, SWMU 61A does not pose significant risk to human health under the industrial land-use scenario.

Incremental TEDE and corresponding estimated cancer risk from radiological COCs are much less than EPA guidance values; the estimated TEDE is 2.1 mrem/yr for the industrial land-use scenario. This value is much less than the numerical guidance of 15 mrem/yr in EPA guidance (EPA 1997b). The corresponding incremental estimated cancer risk value is $2.4E-5$ for the industrial land-use scenario. Furthermore, the incremental TEDE for the residential land-use scenario that results from a complete loss of institutional control is only 4.9 mrem/yr with an associated risk of $6.8E-5$. The guideline for this scenario is 75 mrem/yr (SNL/NM February 1998). Therefore, SWMU 61A is eligible for unrestricted radiological release.

Uncertainties associated with the calculations are considered small relative to the conservativeness of 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 (COPEC) in soils at SWMU 61A. A component of the NMED Risk-Based Decision Tree is to conduct an ecological screening assessment that corresponds with that presented in 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 this report. 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. Although this assessment incorporates conservatism in the estimation of ecological risks, ecological relevance and professional judgment are also used as recommended by the EPA (1998) to ensure that predicted exposures of selected ecological receptors reflect those reasonably 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 3 and 4), inorganic constituents in soil (within all depths) that exceeded background concentrations were as follows:

- Arsenic
- Barium
- Beryllium
- Cadmium
- Chromium
- Lead
- Mercury
- Selenium
- Silver
- Cs-137
- Th-232
- U-235
- U-238.

Several organic analytes were detected in soil which include the following:

- Bis(2-ethylhexyl)phthalate
- 2,4-Dinitrotoluene
- Pentachlorophenol
- RDX
- HMX
- Toluene.

VII.2.2 Bioaccumulation

Among the COPECs listed in Section VII.2.1, the following were considered to have bioaccumulation potential in aquatic environments (Section IV, Tables 3 and 4):

- Arsenic
- Barium
- Cadmium
- Lead
- Mercury
- Selenium
- Cs-137
- Th-232

- U-235
- U-238
- Bis(2-ethylhexyl)phthalate
- Pentachlorophenol
- 2,4 Dinitrotoluene.

It should be noted, however, that as directed by the NMED (NMED March 1998), bioaccumulation for inorganics is assessed exclusively based upon maximum reported bioconcentration factors (BCFs) 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 COPECs to move from the source of contamination to other media or biota is discussed in Section V. As noted in Table 5 (Section V), wind, surface-water runoff, and food chain uptake are expected to be of low to moderate significance as transport mechanisms for COPECs at this site, although pentachlorophenol and bis(2-ethylhexyl) phthalate may bioaccumulate, and therefore, be transported in the food chain. For organic COPECs, the potential for biotransformation and degradation is considered of moderate to high significance at the site. For inorganics and radionuclides, degradation is of low significance. 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 HQs 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 Program" (IT July 1998) and are not duplicated here.

VII.3.1.1 Ecological Pathways and Setting

SWMU 61A is located near the base of the Manzanita Mountains. The site, which comprises approximately 33.9 acres, contains a low, conical hill near its center, and natural arroyo channels are found traversing the northern portion of the site and along its southern and western sides. SWMU 9 is located within SWMU 61A along part of this southern arroyo. Most of the natural vegetation (an open, juniper-savannah grassland) is relatively undisturbed on this site. A central test area had been cleared of vegetation, but sufficient time has elapsed to allow vegetation to become reestablished in this area naturally. A biological and sensitive species survey of this site was conducted on June 16, 1994 (IT February 1995). Populations and individuals of grama grass cactus (*Pediocactus papyracanthus*), Wright's pincushion cactus (*Mammillaria wrightii*), and visnagita cactus (*Neolloydia intertexta*) were observed during this survey. Although all three were listed as endangered by the State of New Mexico at the time of the survey, none are currently listed as threatened or endangered by state or federal agencies.

Complete ecological pathways may exist at this site through the exposure of plants and wildlife to COPECs in surface and subsurface soil. 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 perennial 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). Groundwater is not expected to be affected by COCs at this site.

VII.3.1.2 COPECs

The Schoolhouse Mesa Test Site: Blast Area (SWMU 61A) was used between 1961 and 1967. Records detailing the nature of the tests have not been located, although concrete blocks, metal debris, and HE at the site are evidence of explosive tests. Surface gamma radiation surveys of SWMUs 61A and 9 found 84 point-source anomalies and 12 area-source anomalies. Uranium metal fragments and yellow uranium oxide were found in association with these anomalies, respectively. Based upon this history and a general lack of documented test records, the COPECs at SWMU 61A may include metals, HE, radionuclides, VOCs, and SVOCs.

In order to provide conservatism in this ecological risk assessment, the assessment is based upon the maximum analyte concentrations of the COPECs as measured in soil samples within the first 5 feet of soil. Both radiological and nonradiological COPECs are evaluated. The nonradiological COCs consist of inorganic analytes (i.e., metals). Organic analytes were also detected in these soil samples. Inorganic analytes and radionuclides were screened against background concentrations, and those that exceeded the approved SNL/NM background screening levels (Dinwiddie September 1997) for the area are considered to be COPECs. All organic analytes detected are considered to be COPECs for the site. Maximum COPEC concentrations are reported in Tables 3 and 4. Nonradiological inorganics that are essential nutrients such as iron, magnesium, calcium, potassium, and sodium were not included in this risk assessment as set forth by the EPA (1989).

VII.3.1.3 Ecological Receptors

As described in detail in the "Predictive Ecological Risk Assessment Methodology" (IT July 1998), a nonspecific perennial plant was selected as the receptor to represent plant species at the site. 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. The 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. The burrowing owl 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 for terrestrial plants. 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 perennial 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 as 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 10 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 Cs-137, Th-232, U-235, and U-238. 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 11 presents the transfer factors used in modeling the concentrations of COPECs through the food chain. Table 12 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.

VII.3.3 Ecological Effects Evaluation

Benchmark toxicity values for the plant and wildlife receptors are presented in Table 13. 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.

Table 10
Exposure Factors for Ecological Receptors at SWMU 61A

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).

COC = Constituent of concern.

EPA = U.S. Environmental Protection Agency.

kg = Kilogram(s).

kg/day = Kilogram(s) per day.

SWMU = Solid waste management unit.

Table 11
Transfer Factors Used in Exposure Models for
Constituents of Potential Ecological Concern at SWMU 61A

Constituent of Potential Ecological Concern	Soil-to-Plant Transfer Factor	Soil-to-Invertebrate Transfer Factor	Food-to-Muscle Transfer Factor
Inorganic			
Arsenic	4.0E-2 ^a	1.0E+0 ^b	2.0E-3 ^a
Barium	1.5E-1 ^a	1.0E+0 ^b	2.0E-4 ^c
Beryllium	1.0E-2 ^a	1.0E+0 ^b	1.0E-3 ^a
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
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			
Bis(2-ethylhexyl)phthalate	2.3E-3 ^f	3.1E+1 ^g	6.4E-1 ^f
Pentachlorophenol	4.4E-2 ^f	2.4E+1 ^g	3.3E-3 ^f
Toluene	1.0E+0 ^f	1.8E+1 ^g	1.3E-5 ^f
2,4-Dinitrotoluene	2.8E+0 ^f	1.7E+1 ^g	2.0E-6 ^f
HMX	2.7E+1 ^f	1.4E+1 ^g	1.4E+1 ^f
RDX	1.2E+1 ^f	1.5E+1 ^g	1.5E-7 ^f

^aFrom Baes et al. (1984).

^bDefault value.

^cFrom NCRP (January 1989).

^dFrom Stafford et al. (1991).

^eFrom Ma (1982).

^fBased upon equations from Travis and Arms (1988).

^gBased upon equations from Connell and Markwell (1990).

HMX = Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine.

RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine.

SWMU = Solid waste management unit.

Table 12
Media Concentrations^a for Constituents of
Potential Ecological Concern at SWMU 61A

Constituent of Potential Ecological Concern	Soil (maximum)	Plant Foliage ^b	Soil Invertebrate ^b	Deer Mouse Tissues ^c
Inorganic				
Arsenic	2.1E+1	8.3E-1	2.1E+1	7.0E-2
Barium	1.6E+2	2.4E+1	1.6E+2	6.0E-2
Beryllium	9.8E-1	9.8E-3	9.8E-1	1.6E-3
Cadmium	6.5E+0	3.6E+0	3.9E+0	6.7E-3
Chromium (total)	2.0E+1	7.9E-1	2.6E+0	2.0E-1
Lead	4.0E+3	3.6E+2	1.6E+2	8.4E-1
Mercury	8.7E-2	8.7E-2	8.7E-2	6.9E-2
Selenium	2.8E+0	1.4E+0	2.8E+0	6.7E-1
Silver	1.1E+1	1.1E+0	2.7E-1	1.1E-2
Organic				
Bis(2-ethylhexyl)phthalate	4.4E-1	6.9E-4	1.4E+1	2.8E+1
Pentachlorophenol	2.3E-1	1.0E-2	5.4E+0	2.8E-2
Toluene	2.5E-3	2.5E-3	4.5E-2	9.5E-7
2,4-Dinitrotoluene	3.4E-2	9.4E-2	5.6E-1	2.1E-6
HMX	3.0E+0	8.1E+1	4.0E+1	6.5E-6
RDX	1.4E+0	1.7E+1	2.0E+1	8.5E-6

^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 (EPA 1993).

HMX = Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine.

RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine.

SWMU = Solid waste management unit.

Table 13
Toxicity Benchmarks for Ecological Receptors at SWMU 61A

		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							
Arsenic	10	Mouse	0.126	0.13	Mallard	5.14	5.14
Barium	500	Rat ^h	5.1	10.5	Chicks	20.8	20.8
Beryllium	10	Rat	0.66	1.29	---	---	---
Cadmium	3	Rat ^j	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	0.45
Mercury (organic)	0.3	Rat	0.032	0.063	Mallard	0.0064	0.0064
Selenium	1	Rat	0.20	0.39	Screech owl	0.44	0.44
Organic							
Bis(2-ethylhexyl)phthalate	---	Mouse	18.3	19.4	---	---	---
Pentachlorophenol	---	Rat	0.24	0.47	---	---	---
Toluene	200	Mouse	26.0	27.5	---	---	---
2,4-Dinitrotoluene	---	Rat	3.8 ^m	7.4	---	---	---
HMX	---	Mouse ^k	3.0 ^k	2.97	---	---	---
RDX	---	Mouse ^l	7.0 ^l	7.8	---	---	---

^aIn milligrams per kilogram soil.

^bFrom Efroymson et al. (1997).

^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.

ⁱ--- designates insufficient toxicity data.

^jBody weight: 0.303 kilogram.

^kBased upon toxicity information from Maxwell and Opresko (1996).

^lBased upon toxicity information from Talmage et al. (1996).

^mBased upon toxicity information from Etnier (1987).

HMX = Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine.

NOAEL = No-observed-adverse-effect level.

RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine.

SWMU = Solid waste management unit.

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/day should also offer sufficient protection to other components within the terrestrial habitat of SWMU 61A.

VII.3.4 Risk Characterization

Maximum concentrations in soil and estimated dietary exposures were compared to plant and wildlife benchmark values, respectively. Results of these comparisons are presented in Table 14. HQs are used to quantify the comparison with benchmarks for plants and wildlife exposure.

Analytes with HQs exceeding unity for plants were arsenic, cadmium, chromium (total), lead, and selenium. Arsenic, lead, and HMX were all found to exceed HQs of 1.0 for all three modeled diets of the deer mouse. Barium was also predicted to be potentially hazardous to the omnivorous and insectivorous mouse. Selenium and pentachlorophenol also resulted in HQs greater than 1.0 for the insectivorous deer mouse. Lead, mercury in the organic form, and bis(2-ethylhexyl)phthalate resulted in HQs greater than 1.0 for the burrowing owl. HQs for the burrowing owl could not be determined for beryllium, silver, HMX, RDX, pentachlorophenol, or toluene. As directed by the NMED, HIs were calculated for each of the receptors (the HI is the sum of chemical-specific HQs for all pathways for a given receptor). All receptors had HIs greater than unity, with a maximum HI of 110 for plants.

Tables 15 and 16 summarize the internal and external dose rate model results for the four radionuclides. The total radiation dose rate to the deer mouse was predicted to be $7.1\text{E-}4$ rad/day. With approximately equal contribution from internal and external dose rates. Total dose rate to the burrowing owl was predicted to be $5.1\text{E-}4$ rad/day with external dose rate being the primary contributor to the total dose rate. 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 61A. These uncertainties result from assumptions used in calculating risk that may overestimate or underestimate 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 assessment include the use of maximum measured analyte concentrations in soil to evaluate risk, the use of wildlife toxicity benchmarks based upon NOAEL values, 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 SWMU-specific ecological risk assessments, is discussed in greater detail in the uncertainty section of the ecological risk assessment methodology document for the SNL/NM ER Program (IT July 1998).

Table 14
Hazard Quotients for Ecological Receptors at SWMU 61A

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 ^a
Inorganic					
Arsenic	2.1E+0	1.5E+0	1.3E+1	2.5E+1	1.1E-2
Barium	3.2E-1	4.0E-1	1.4E+0	2.4E+0	1.8E-2
Beryllium	9.8E-2	3.6E-3	6.2E-2	1.2E-1	---
Cadmium	2.2E+0	3.1E-1	3.2E-1	3.3E-1	1.1E-2
Chromium (total)	2.0E+1	3.5E-5	6.0E-5	8.6E-5	6.6E-2
Lead	7.9E+1	4.3E+0	3.3E+0	2.4E+0	2.3E+0
Mercury (inorganic)	2.9E-1	1.0E-3	1.0E-3	1.0E-3	1.8E-2
Mercury (organic)	2.9E-1	2.2E-1	2.2E-1	2.2E-1	1.2E+0
Selenium	2.8E+0	5.8E-1	8.6E-1	1.1E+0	1.9E-1
Silver	5.3E-1	4.8E-3	3.1E-3	1.3E-3	---
Organic					
Bis(2-ethylhexyl)phthalate	---	7.6E-5	5.6E-2	1.1E-1	2.9E+0
Pentachlorophenol	---	4.9E-3	9.0E-1	1.8E+0	---
Toluene	1.3E-5	1.4E-5	1.4E-4	2.6E-4	---
2,4-Dinitrotoluene	---	2.0E-3	6.9E-3	1.2E-2	---
HMX	---	4.3E+0	3.2E+0	2.1E+0	---
RDX	1.4E-2	3.4E-1	3.8E-1	4.1E-1	---
HI ^c	1.1E+2	1.2E+1	2.4E+1	3.6E+1	6.7E+0

^a **Bold** text indicates HQ or HI exceeds unity.

^b --- designates insufficient toxicity data available for risk estimation purposes.

^c The HI is the sum of individual hazard quotients using the value for organic mercury as a conservative estimate of the HI.

HI = Hazard index.

HMX = Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine.

HQ = Hazard quotient.

RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine.

SWMU = Solid waste management unit.

Table 15
Internal and External Dose Rates for
Deer Mice Exposed to Radionuclides at SWMU 61A

Radionuclide	Maximum Concentration (pCi/g)	Internal Dose (rad/day)	External Dose (rad/day)	Total Dose (rad/day)
Cs-137	7.6E-1	2.4E-5	3.5E-5	5.9E-5
Th-232	1.3E+0	5.2E-7	2.5E-4	2.5E-4
U-235 ^a	9.0E-1	9.8E-6	1.5E-5	2.5E-5
U-238	3.2E+1	3.2E-4	6.4E-5	3.8E-4
Total		3.5E-4	3.6E-4	7.1E-4

^aThe U-235 value was calculated using the U-238 concentration and assuming that the U-238 to U-235 ratio was equal to that detected during waste characterization of depleted uranium-contaminated soils generated during the radiological voluntary corrective measures project, where U-235=U-238/73 (Miller June 1998).

pCi/g = Picocurie(s) per gram.

SWMU = Solid waste management unit.

Table 16
Internal and External Dose Rates for
Burrowing Owls Exposed to Radionuclides at SWMU 61A

Radionuclide	Maximum Concentration (pCi/g)	Internal Dose (rad/day)	External Dose (rad/day)	Total Dose (rad/day)
Cs-137	7.6E-1	1.6E-5	3.5E-5	5.1E-5
Th-232	1.3E+0	7.6E-7	2.5E-4	2.5E-4
U-235 ^a	9.0E-1	3.9E-6	1.5E-5	1.9E-5
U-238	3.2E+1	1.3E-4	6.4E-5	1.9E-4
Total		1.5E-4	3.6E-4	5.1E-4

^aThe U-235 value was calculated using the U-238 concentration and assuming that the U-238 to U-235 ratio was equal to that detected during waste characterization of depleted uranium-contaminated soils generated during the radiological voluntary corrective measures project, where U-235=U-238/73 (Miller June 1998).

pCi/g = Picocurie(s) per gram.

SWMU = Solid waste management unit.

Uncertainties associated with the estimation of risk to ecological receptors following exposure to U-235, U-238, Th-232, and Cs-137 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 concentrations in soil to evaluate risk. This results in a conservative exposure scenario that does not necessarily reflect actual site conditions. This is also true with regard to the use of detection limits in the estimation of risk.

Analytical data were examined more closely to assess variability within the data. Arsenic concentrations at the site ranged from 1.13 to 20.8 mg/kg with an average concentration of 2.9 mg/kg which is less than the background screening value. Cadmium concentrations ranged from not detected to 6.5 mg/kg. The average concentration of cadmium for the site was 0.74 mg/kg (Section 8.5.1), which is within the range of background concentrations. Likewise, the range of chromium concentrations were from 3.31 to 19.8 mg/kg, with an average concentration (8.2 mg/kg) less than the background screening value. Lead concentrations ranged from 0.169 to 3950 mg/kg. The average concentration of lead (85.2 mg/kg), however, exceeds the background value. This is primarily attributed to localized hot spots. If the one sample that contained 3,950 mg/kg is removed from the data set, the recalculated average concentration of lead at this site (24.9 mg/kg) does not result in HQs in excess of 1.0 for any of the receptors. Mercury concentrations at the site ranged from not detected to 0.087 mg/kg, with an average concentration of 0.032 mg/kg. The background value for mercury was set at less than 0.1 mg/kg. Use of the average concentration in the prediction of risk would not produce HQs of greater than 1.0 for organic mercury for any receptor. Selenium concentrations ranged from not detected to 2.80 mg/kg and was detected in 65 percent of the soil samples. The average concentration (0.16 mg/kg) for the site is within the range of background concentrations and would result in HQs less than 1.0 if used in the prediction of risk. HMX was found to have an HQ greater than 1.0 for the deer mouse (all diets). It was detected in 14 out of 76 samples collected. If the average concentration is used in the estimation of risk, an HQ of less than 1.0 is generated. Pentachlorophenol had an HQ greater than 1.0 for the insectivorous deer mouse. It was detected in only one of the eight samples. The average concentration of pentachlorophenol (using the full detection limits for the nondetects) would have an HQ less than unity for this receptor. Bis(2-ethylhexyl)phthalate was predicted to be hazardous to the burrowing owl. It was only detected in 3 of the 17 soil samples collected and analyzed from the site. Use of the average on-site bis(2-ethylhexyl)phthalate concentration of 0.26 mg/kg (Section 8.5.1) results in an HQ slightly greater than 1.0. Because full detection limits were used in the calculation of the average, this compound is not expected to occur at ecologically hazardous concentrations at the site. Overall, the analytical data indicate that other than one hot spot for lead, average concentrations of the COPECs for this site should result in no risk to the ecological receptors.

In the estimation of ecological risk, background concentrations are included as a component of maximum on-site concentrations. Table 17 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 arsenic, chromium (total) and selenium.

Table 17
HQs for Ecological Receptors Exposed to Background Concentrations for SWMU 61A

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 ^a
Inorganic					
Arsenic	5.6E+0	3.9E-1	3.5E+0	6.7E+0	2.8E-3
Barium	2.6E-1	3.3E-1	1.1E+0	2.0E+0	1.4E-2
Beryllium	6.5E-2	2.4E-3	4.1E-2	8.0E-2	--- ^b
Cadmium	1.5E-1	2.1E-2	2.2E-2	2.3E-2	7.3E-4
Chromium (total)	1.3E+1	2.3E-5	3.9E-5	5.6E-5	4.3E-2
Lead	2.3E-1	1.3E-2	9.7E-3	6.9E-3	6.7E-2
Mercury (inorganic)	1.7E-1	5.7E-4	5.7E-4	5.7E-4	1.1E-2
Mercury (organic)	1.7E-1	1.3E-1	1.3E-1	1.3E-1	7.1E-1
Selenium	5.0E+0	1.0E-1	1.5E-1	2.0E-1	3.3E-2
Silver	2.5E-1	2.3E-3	1.4E-4	6.0E-4	---
HI ^c	2.5E+1	9.9E-1	5.0E+0	9.1E+0	8.8E-1

^a**Bold** text indicates HQ or HI exceeds unity.

^b--- designates insufficient toxicity data available for risk estimation purposes.

^cThe HI is the sum of individual HQs using the value for organic mercury as a conservative estimate of the HI.

HI = Hazard index.

HQ = Hazard quotients.

SWMU = Solid waste management unit.

HQs greater than unity were also obtained for the omnivorous and insectivorous deer mouse exposed to arsenic and barium. No HQs greater than 1.0 were reported for the burrowing owl from background exposure. Less than 50 percent of the maximum on-site arsenic and selenium soil concentrations were associated with background. Greater than 50 percent of the maximum on-site barium and total chromium concentration were, however, associated with background. Because of the uncertainties associated with exposure and toxicity, it is unlikely that barium and chromium, with maximum exposure concentrations largely attributable to background, present significant ecological risk.

Based upon this uncertainty analysis, ecological risks at SWMU 61A are expected to be 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, and the quality of analytical data.

VII.3.6 Risk Interpretation

Ecological risks associated with SWMU 61A were estimated through a screening assessment that incorporated site-specific information when available. Overall ecological risks to plants are expected to be low because of the fact that predicted risks associated with arsenic, cadmium, chromium, lead, and selenium are based upon calculations using maximum detected values. This is also true for deer mice exposed to arsenic, barium, and selenium, and for owls exposed to lead and mercury, where average site concentrations are either within the range of background concentrations or would not result in HQs greater than 1.0. Bis(2-ethylhexyl)phthalate was also predicted to be hazardous to the owl. Use of the average on-site concentration of this common laboratory contaminate does not result in a prediction of risk. The same is true for mice exposed to HMX and pentachlorophenol. Lead was predicted to be hazardous to each of the receptors. The maximum exposure concentration of 3,950 mg/kg appears to be an anomaly or hot spot. When removed from the data set and risk recalculated, the average lead concentration at the site does not result in HQs of greater than unity. Based upon this final analysis, ecological risks associated with SWMU 61A are expected to be low.

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 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 low. The scientific/management decision is to recommend this site for NFA.

VIII. References

Baes, III, C.F., R.D. Sharp, A.L. Sjoreen, 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.

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.

Efroymsen, R.A., M.E. Will, G.W. Suter II, and A.C. Wooten, 1997. "Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Terrestrial Plants: 1997 Revision." ES/ER/TM-85/R3, Oak Ridge National Laboratory, Oak Ridge, Tennessee.

EPA, see U.S. Environmental Protection Agency.

Gaither, K., Date [Unk]. "Environmental Restoration Sites on Forest Service Withdrawn Land," Sandia National Laboratories, Albuquerque, New Mexico.

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.

Howard, P.H., 1989. *Handbook of Environmental Fate and Exposure Data for Organic Chemicals: Volume 1 Large Production and Priority Pollutants*, Lewis Publishers, Inc., Chelsea Michigan.

Howard, P.H., 1991. *Handbook of Environmental Fate and Exposure Data for Organic Chemicals: Volume III Pesticides*, Lewis Publishers, Inc., Chelsea Michigan.

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), April 1994. "Image Interpretation of the Central Coyote Test Area Operable Unit 1334," IT Corporation, Albuquerque, New Mexico.

IT Corporation (IT), May 1994. "Hydrogeology of the Central Coyote Test Area OU 1334," IT Corporation, Albuquerque, New Mexico.

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, M.S. and D.M. Opresko, 1996, "Ecological Criteria Document for Octahydro-1,3,5,7-trinitro-1,3,5,7-tetrazocine (HMX), CAS No. 2691-41-0," Oak Ridge National Laboratory, Oak Ridge, Tennessee.

Miller, M. (Sandia National Laboratories). Memorandum to D. Jercinovic (IT Corporation), "Radiological Data Tables and DU Ratios Sandia National Laboratories," Memo (unpublished), Albuquerque, New Mexico. June 2, 1998.

Myers, D.A., and E.J. McKay, 1970. "Geologic Map of the Mount Washington Quadrangle, Bernalillo and Valencia Counties, New Mexico, Scale 1:24,000," Map No. GQ-886, U.S. Department of the Interior, United States Geological Survey, Washington, D.C.

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.

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.

NCRP, see National Council on Radiation Protection and Measurements.

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, 1996. "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.

Sandhaus, D. Memorandum to C. Lojek, Sandia National Laboratories, Albuquerque, New Mexico. February 14, 1994.

Sandia National Laboratories/New Mexico (SNL/NM), Date [unk]. "Coyote Canyon Test Site," unpublished notes, Sandia National Laboratories/New Mexico, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), September 1966. Building and Facilities Data, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), April 1994. "Mean Elevation and Acreage Computation Report, Canyons Test Area—ADS 1334," Environmental Restoration Department, GIS Group, Sandia National Laboratories, Albuquerque, New Mexico.

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), October 1994. "RCRA Facility Work Plan for Operable Unit 1334 Coyote Test Field," Sandia National Laboratories/New Mexico, Environmental Restoration Project, 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), July 1996. "Laboratory Data Review Guidelines," Procedure No: RPSD-02-11, Issue No: 02, Radiation Protection Technical Services, 7713, Radiation Protection Diagnostics Project, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), March 1997. "Sampling and Analysis Plan for SWMU 10, Burial Mounds, Operable Unit 1333," Sandia National Laboratories/New Mexico, Environmental Restoration Project, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), June 1997. "NESHAP Annual Report for CY 1996, Sandia National Laboratories, New Mexico," Sandia National Laboratories, 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.

Talmage, S.S., and D.M. Opresko, 1995. "Ecological Criteria Document for 2,4,6-Trinitrotoluene, Cas No. 118-96-7," Oak Ridge National Laboratory, Oak Ridge, Tennessee.

Talmage, S.S., and D.M. Opresko, 1996. "Ecological Criteria Document for 1,3-Dinitrobenzene, Cas No. 99-65-0," Oak Ridge National Laboratory, Oak Ridge, Tennessee.

Talmage, S.S., D.M. Opresko, and F.M. Cretella, 1996, "Ecological Criteria Document for Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX), CAS No. 121-82-4," Oak Ridge National Laboratory, Oak Ridge, Tennessee.

Talmage, S.S., D.M. Opresko, and C. J. Welsh (Talmage et al.), 1996a. "Ecological Criteria Document for N-Methyl-N,2,4,6-Tetranitroaniline (Tetryl), Cas No. 479-45-8," Oak Ridge National Laboratory, Oak Ridge, Tennessee.

Talmage, S.S., D.M. Opresko, and F.M. Cretella (Talmage et al.), 1996b. "Ecological Criteria Document for Hexahydro-1,3,5-Trinitro-1,3,5-Triazine (RDX), Cas No. 121-82-4," Oak Ridge National Laboratory, Oak Ridge, Tennessee.

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, New Mexico, 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 Technology*, Vol. 22, No. 3, pp. 271-274.

USDA, see U.S. Department of Agriculture.

U.S. Department of Agriculture (USDA), June 1997. "Soil Survey of Bernalillo County and Parts of Sandoval and Valencia Counties, New Mexico," Soil Conservation Service, U.S. Department of Agriculture, Washington, D.C.

U.S. Department of Agriculture (USDA) Soil Conservation Service, United States Department of the Interior Bureau of Indian Affairs and Bureau of Land Management, and New Mexico Agriculture Experiment Station, June 1977. "Soil Survey of Bernalillo County and Parts of Sandoval and Valencia Counties, New Mexico," United States 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), 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), July 14, 1994. Memorandum from Elliott 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

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. Personal communication from M. Martinez (Region 6, U.S. Environmental Protection Agency) to E. Klavetter (Sandia National Laboratories/New Mexico), Proposed Subpart S action levels.

U.S. Environmental Protection Agency (EPA), 1996c. "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), 1998, Integrated Risk Information System (IRIS) electronic database, maintained by the U.S. Environmental Protection Agency.

U.S. Fish and Wildlife Service (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. Fish and Wildlife Service.

U.S. Geological Survey (USGS), 1961. Aerial Photograph, EJA-2-135, Albuquerque, New Mexico.

U.S. Geological Survey (USGS), 1967. Aerial Photograph, VGUB(Mt)-2-85, Albuquerque, New Mexico.

U.S. Geological Survey (USGS), 1991. Aerial Photograph, NAPP-3534-182, Albuquerque, New Mexico.

Whicker, F.W., and V. Schultz, 1982. *Radioecology: Nuclear Energy and the Environment*, Volume II, CRC Press, Boca Raton, Florida.

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., C. Loureiro, J.-J. Cheng, L.G. Jones, Y.Y. Wang, Y.P. Chia, and E. Faillace, 1993a. "Data Collection Handbook to Support Modeling the Impacts of Radioactive Material in Soil," ANL/EAIS-8, Argonne National Laboratory, Argonne, Illinois.

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, 1993b. "Manual for Implementing Residual Radioactive Material Guidelines Using RESRAD," Version 5.0. Environmental Assessment Division, 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:

- 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, the exposure routes that will be considered are shown in Table 1. 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 quotients/hazard index [HI], excess cancer risk, or radiation total effective dose equivalent [dose]) is similar for all exposure pathways and is given by:

$$\text{Risk (or Dose)} = \text{Intake} \times \text{Toxicity Effect (either carcinogenic, noncarcinogenic, or radiological)}$$

$$= C \times (CR \times EFD/BW/AT) \times \text{Toxicity Effect} \quad (1)$$

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 day/yr.

^aRAGS, Vol 1, Part B (EPA 1991).

^bExposure Factors Handbook (EPA 1989b)

^cEPA Region VI 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, 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, Office of Solid Waste and Emergency Response, Washington, D.C.